

**PROGRAMMATIC
BIOLOGICAL AND CONFERENCE OPINION**

The Continued Implementation of the Land and Resource Management Plans
for the Eleven National Forests and National Grasslands
of the Southwestern Region

Regional Office, Region 2
U.S. Fish and Wildlife Service

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Executive Summary

The accompanying document transmits the biological and conference opinion of the U.S. Fish and Wildlife Service (FWS) in response to the U.S. Forest Service's request for consultation in accordance with the Endangered Species Act of 1973, as amended. This opinion addresses the Forest Service's continued implementation of the Land and Resource Management Plans (LRMPs) for 11 National Forests and National Grasslands of the Southwest Region (proposed action), and their effects to 36 federally-listed species. In addition to these 36 species, the FWS concurred with the Forest Service's "may affect, not likely to adversely affect" determinations for 15 species occurring within the 11 National Forests and National Grasslands of the Southwest Region (action area). Thus, this opinion examines the effects of the proposed action on 36 species (identified in the Introduction section in this document) and the effects to seven species with designated or proposed critical habitat.

In order to clearly examine the effects of the proposed action on the species, our consultation approach consisted of five main activities: 1) deconstructing the proposed action, 2) diagnosing the species' status, 3) establishing the species' condition within the action area, 4) analyzing the effects, and finally, 5) reconstructing the information compiled from the previous activities to arrive at our conclusions. This approach provided the information necessary to determine whether or not a jeopardy determination could be concluded. For those species with designated or proposed critical habitat, our effects' analysis approach identified how the primary constituent elements (PCEs) or biological features essential to the conservation of the species were likely to be affected; thus, how the proposed action affected the function and conservation value of the associated critical habitat unit(s).

During this process, we found four species that raised concern due to their tenuous current status and environmental baseline. These species included spikedace, Little Colorado River spinedace, Chiricahua leopard frog, and the Sacramento prickly poppy. After a thorough review of their current status and environmental baseline, the FWS and Forest Service cooperatively developed a series of biologically meaningful conservation measures for each of the species. These measures specifically addressed issues related to the long-term conservation of the species on National Forest System lands in the Southwest Region. The conservation measures were included to become part of the proposed action; thus, were analyzed as part of the proposed action. Therefore, we were able to conclude that the proposed action would not jeopardize the continued existence of these four species.

Using the approach described above, along with careful consideration of the species' status, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects; we found that the proposed action would not jeopardize the continued existence of the 36 species identified within the action area. Similarly, we determined that the proposed action was not likely to destroy or adversely modify critical habitat for the seven species with designated or proposed critical habitat.

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INTRODUCTION

This biological and conference opinion responds to the U.S. Forest Service's (U.S. Forest Service) request for consultation with the U.S. Fish and Wildlife Service (FWS) in accordance with the requirements of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). We, the FWS, prepared this opinion which addresses the Forest Service's continued implementation of the Land and Resource Management Plans (LRMPs) for 11 National Forests (NF) and National Grasslands of the Southwestern Region, and their effects to 36 federally-listed species (see below). On April 5, 2004, the Forest Service requested reinitiation of past biological opinions on the 11 National Forest's LRMPs (see consultation history below). At the request of the Forest Service, and pursuant to a 2000 Memorandum of Understanding, species proposed for listing, proposed critical habitat, and candidate species are included in this opinion making this document both a biological and conference opinion.

This opinion is considered a plan-level or programmatic consultation. Further, this programmatic biological and conference opinion uses a "tiered" approach. The tiered approach is a two-stage consultation process: the first stage is the accompanying biological and conference opinion, which evaluates the landscape-level effects of continued implementation of the Forest Service's LRMPs that guide how site-specific projects are designed and managed. The second stage consists of the future consultations on site-specific projects proposed by the Forest Service. Forest Service activities that may affect listed species will tier to this programmatic biological opinion. Thus, site-specific projects within the Southwestern Region of the Forest Service that may affect listed species on National Forest System lands will need to have a separate consultation. The benefits of a programmatic approach include: 1) streamlined site-specific consultation processes; 2) minimization of the potential "piece-meal" effects that can occur when evaluating individual projects out of the context of the complete agency program; 3) more cost effective integration of ecosystem/recovery planning activities with action agency activities; 4) added predictability for all parties; and 5) the opportunity to improve and more efficiently integrate the action agency's 7(a)(1) responsibilities at the program level.

This programmatic consultation examines the effects on 36 species and 7 designated or proposed critical habitat from the direction and guidance provided within the 11 National Forest LRMPs. The following species are included within this biological and conference opinion for which the Forest Service and FWS agreed would be adversely affected by the proposed action.

Mammals

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) Endangered
Mexican long-nosed bat (*Leptonycteris nivalis*) Endangered
Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) Endangered with critical habitat

Birds

Bald Eagle (*Haliaeetus leucocephalus*) Threatened
Cactus Ferruginous Pygmy-Owl (*Glaucidium brasilianum cactorum*) Endangered
Mexican Spotted Owl (*Strix occidentalis lucida*) Threatened with critical habitat

Southwestern Willow Flycatcher (*Empidonax traillii extimus*) Endangered with proposed critical habitat

Yellow-billed Cuckoo (*Coccyzus americanus*) Candidate

Reptiles/Amphibians

Chiricahua leopard frog (*Rana chiricahuensis*) Threatened

New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*) Threatened

Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) Endangered

Fish

Apache trout (*Oncorhynchus apache*) Threatened

Chihuahua chub (*Gila nigrescens*) Threatened

Desert pupfish (*Cyprinodon macularius macularius*)

Gila chub (*Gila intermedia*) Proposed endangered with proposed critical habitat

Gila topminnow (*Poeciliopsis occidentalis*) Endangered

Gila trout (*Oncorhynchus gilae*) Endangered

Little colorado spinedace (*Lepidomeda vittata*) Threatened with critical habitat

Loach minnow (*Tiaroga cobitis*) Threatened

Sonora chub (*Gila ditaenia*) Threatened with critical habitat

Spikedace (*Meda fulgida*) Threatened

Yaqui catfish (*Ictalurus pricei*) Threatened

Yaqui chub (*Gila purpurea*) Endangered

Invertebrates

Gila springsnail (*Pyrgulopsis gilae*) Candidate

New Mexico springsnail (*Pyrgulopsis thermalis*) Candidate

Three Forks springsnail (*Pyrgulopsis trivialis*) Candidate

Plants

Arizona agave (*Agave arizonica*) Endangered

Arizona cliff-rose (*Purshia subintegra*) Endangered

Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) Endangered

Fickeisen plains cactus (*Pediocactus peeblesianus fickeiseniae*) Candidate

Holy ghost ipomopsis (*Ipomopsis sancti-spiritus*) Endangered

Huachuca water-umbel (*Lilaeopsis schaffneriana* var. *recurva*) Endangered with critical habitat

Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) Endangered

Sacramento prickly poppy (*Argemone pleiacantha* ssp. *pinnatisecta*) Endangered

Sacramento Mountains thistle (*Cirsium vinaceum*) Threatened

Zuni fleabane (*Erigeron rhizomatus*) Threatened

In addition to the above species, the FWS concurred with the Forest Service's determinations of "may affect, not likely to adversely affect" for 15 species that occur on the 11 National Forests. The FWS's reasoning for concurrences with the Forest Service's determinations of "may affect, not likely to adversely affect" are discussed in Appendix A. These species included the following:

Alamosa springsnail (*Psuedotryonia alamosae*) Endangered
Arkansas River shiner (*Notropis girardi*) Threatened
Canelo Hills ladies'-tresses (*Spiranthes delitescens*) Endangered
Huachuca springsnail (*Pyrgulopsis thompsoni*) Candidate
Jaguar (*Panthera onca*) Endangered
Kuenzler hedgehog cactus (*Echinocereus fendleri* var. *kuenzleri*) Endangered
Least tern (interior pop.) (*Sterna antillarum*) Endangered
Northern aplomado falcon (*Falco femoralis septentrionalis*) Endangered
Razorback sucker (*Xyrauchen texanus*) Endangered with critical habitat
Rio Grande silvery minnow (*Hybognathus amarus*) Endangered with critical habitat
San Francisco Peaks groundsel (*Senecio franciscanus*) Threatened with critical habitat
Stephan's riffle beetle (*Heterelmis stephani*) Candidate
Todsens pennyroyal (*Hedeoma todsenii*) Endangered with critical habitat
Yuma clapper rail (*Rallus longirostris yumanensis*) Endangered
Zuni bluehead sucker (*Catostomus discobolus yarrowi*) Candidate

During the course of this consultation, the legal status of two species addressed in the Forest Service's 2004 biological assessment changed. On August 18, 2004, the black-tailed prairie dog (*Cynomys ludovicianus*) was taken off the Candidate Species List, and on December 15, 2004, the proposed listing of the Sacramento Mountains checkerspot butterfly (*Euphydryas anicia cloudcrofti*) was withdrawn. Therefore, these two species are not addressed within this consultation. In addition, the Forest Service made a determination of "not likely to jeopardize" for the following species designated as experimental, non-essential: Colorado pikeminnow (*Ptychocheilus lucius*), California condor (*Gymnogyps californianus*), and Mexican gray wolf (*Canis lupus*). The Forest Service requested concurrence for these species; our justification for concurrence is in appendix B.

This biological and conference opinion is based on information provided in the Forest Service's April 8, 2004 biological assessment, subsequent information provided by the Forest Service to the FWS throughout the consultation, the 11 National Forest LRMPs, and 1996 Regional Amendment. In order to obtain current information concerning the above species, we reviewed final listing rules, candidate assessment forms, recovery plans, published literature, unpublished reports and data, species and critical habitat location maps, and other sources of information. In addition, we consulted species experts (i.e., research scientists conducting field surveys, monitoring, or research studies on any of the above species) from state conservation agencies, Forest Service research stations, and FWS biologists. A complete administrative record of this consultation is on file at the FWS Regional Office, Albuquerque, New Mexico.

CONSULTATION HISTORY

The history of this consultation is complex. A chronology of past consultations associated with the proposed action, agreed-upon time extensions, and important meetings associated with this biological and conference opinion is provided below.

- From 1985 to 1988, each of the 11 National Forests in the Southwestern Region developed and approved LRMPs pursuant to the National Forest Management Act (NFMA). The FWS issued a non-jeopardy/no adverse critical habitat modification opinion on each of the Forest Service LRMPs for all federally listed species.
- On April 15, 1993, the Mexican Spotted Owl was listed as threatened. On September 6, 1995, the Forest Service requested initiation of formal consultation on the 11 National Forest Plans for effects on the Mexican Spotted Owl.
- On May 14, 1996, the FWS issued a biological opinion on the 11 LRMPs, which concluded jeopardy to the Mexican Spotted Owl and adverse modification for its designated critical habitat (U.S. Fish and Wildlife Service 1996a). The FWS's Reasonable and Prudent Alternative to the existing LRMPs advised the Forest Service to implement the 1995 Mexican Spotted Owl Recovery Plan. This opinion was challenged in District court because it did not include incidental take for the owl. On November 25, 1996, the FWS issued another final jeopardy biological opinion that included incidental take for the owl pursuant to a September 17, 1996 Court Order. Also on November 25, 1996, the FWS issued a biological opinion on the Forest Service's June 1996 Regional Amendment to the LRMPs for the Mexican Spotted Owl. The 1996 Regional Amendment directs the implementation of the Mexican Spotted Owl Recovery Plan, as well as guidelines for the Northern Goshawk and old-growth management. The FWS concluded non-jeopardy for the Mexican Spotted Owl and no adverse modification of its designated critical habitat (U.S. Fish and Wildlife Service 1996b).
- On May 15, 1996, the Forest Service requested formal consultation on the effects to federally-listed species on National Forests as a result of the continued implementation of the 11 National Forest LRMPs.
- On December 19, 1997, the FWS issued a biological and conference opinion on the Forest Service's 1996 Regional Amendment to the LRMPs for all federally listed species other than the Mexican Spotted Owl (U.S. Fish and Wildlife Service 1997). This biological opinion concluded non-jeopardy for all federally listed or proposed species, and no adverse modification for designated or proposed critical habitats. This opinion contained conservation measures for seven listed species including the Southwestern Willow Flycatcher, Cactus Ferruginous Pygmy-owl, Sonora chub, Little Colorado River spinedace, loach minnow, spikedace, and Pima pineapple cactus. The conservation measures were a product of a collaborative effort by FWS and Forest Service and became known as the "seven species direction." The

- conservation measures implemented by the Forest Service are discussed in the effects of the action sections for these species.
- On December 24, 2002, Forest Guardians (et al.) sent the Forest Service a 60-day Notice of Intent to sue for failing to reinitiate formal consultation on the 11 National Forest LRMPs for all federally listed species.
 - On January 13, 2003, the FWS finalized a biological opinion on the proposed rate of implementation of the grazing standards and guidelines in the 1996 Regional Amendment and its effect on the Mexican Spotted Owl. This opinion concluded no jeopardy for the owl.
 - In February of 2003, the Forest Service and FWS began discussions on the relevance of the 1996 and 1997 LRMP and 1996 Regional Amendment consultations. In early April 2003, the agencies agreed that for the Forest Service would reinitiate consultation with the FWS on the Forest Service's 11 LRMPs and the 1996 Regional Amendment. The Forest Service and FWS held weekly meetings to discuss the development of the biological assessment for this consultation, with the first meeting held on April 21, 2003.
 - On June 2, 2003, the Forest Service and FWS signed a consultation agreement that outlined timelines, responsibilities, and dispute resolution for the 11 National Forest LRMP consultation. The FWS continued attending weekly Forest Service meetings.
 - On February 17, 2003, and again on July 27, 2003, the FWS and Forest Service met with John Horning of Forest Guardians to discuss the consultation.
 - In November 2003, the Forest Service provided the FWS with a draft biological assessment for this consultation.
 - On April 5, 2004, the Forest Service requested reinitiation of formal consultation under section 7 of the ESA on the 1996 Mexican Spotted Owl opinion and the 1997 opinion for all other federally listed species on the 11 National Forests. The Forest Service provided the FWS with the final Biological Assessment for the Continued Implementation of the Land and Resource Management Plans for the Eleven National Forests and National Grasslands of the Southwestern Region (U.S. Forest Service 2004).
 - On May 26, 2004, the FWS responded to the Forest Service, acknowledging formal consultation had been initiated.
 - On September 14, 2004, the FWS requested a 90-day extension 11 LRMP consultation, stating that the draft biological opinion would be available for the Forest Service to review on November 15, 2003. The extension was requested based on the large number of species under consultation and the complexity of the analyses. The

Forest Service responded on November 10, 2004, and extended the timeline further for a draft to be available for Forest Service review on January 15, 2005.

- From October 18-30, 2004, the FWS visited each of the 11 National Forests to discuss the consultation process, share information, and discuss issues specific to each National Forest's LRMP (see Table 1). The FWS split staff in order to attend all meetings.

Table 1. Summary of Forest Service/FWS consultation meetings.

National Forest	Meeting Date	Location
Tonto	October 18, 2004	Tonto NF Supervisor's Office, Phoenix, AZ
Cibola	October 18, 2004	Cibola NF Supervisor's Office, Albuquerque, NM
Santa Fe	October 19, 2004	Cibola NF Supervisor's Office, Albuquerque, NM
Carson	October 20, 2004	Cibola NF Supervisor's Office, Albuquerque, NM
Kaibab	October 20, 2004	Kaibab NF Supervisor's Office, Williams, AZ
Lincoln	October 20, 2004	New Mexico ES Field Office, Albuquerque, NM
Coconino	October 21, 2004	Lake Mary Ranger District Office, Flagstaff, AZ
Prescott	October 22, 2004	Lake Mary Ranger District Office, Flagstaff, AZ
Apache-Sitgreaves	October 25-26, 2004	Apache-Sitgreaves Supervisor's Office, Alpine, AZ
Gila	October 27, 2004	Gila NF Supervisor's Office, Silver City, NM
Coronado	October 28, 2004	Coronado NF Supervisor's Office, Tucson, AZ

- From November of 2004 through January 2005, the FWS continued to meet with species experts, consult appropriate FWS Field Office with regards to the analyses, meet with the Forest Service, and brief the appropriate individuals on the progress of the biological opinion.
- On January 11, 2005, the FWS met with the Regional Forester and Forest Service Directorate to discuss FWS' analyses for four species; spikedace, Little Colorado River spinedace, Chiricahua leopard frog, and Sacramento prickly poppy.
- On February 2, 2005, the Forest Service provided the FWS with supplemental information to their April 8, 2004 biological assessment. The supplemental information included four documents as follows: (1) conservation measures for the spikedace, Little Colorado River spinedace, Chiricahua leopard frog, and Sacramento prickly poppy, (2) replacement of pages 54-66 of the biological assessment regarding the Rangeland Management Program, (3) clarification of grazing management level definitions, and (4) proposed amendment for noxious or invasive plant management

for the Coconino, Kaibab, and Prescott, and Coconino NFs, November 2004 Forest Plan Amendment #20. Post biological assessment submissions were also provided to the FWS informally throughout the consultation and are part of the administrative record.

- On April 5 and 6, 2005, the FWS met with representatives from 10 of the 11 National Forests to discuss a preliminary draft version of the biological opinion. Specifically, the meeting's objectives were to discuss the preliminary draft reasonable and prudent measures and implementing terms and conditions.
- On April 22, 2005, the FWS provided the Forest Service with a draft programmatic biological opinion.

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the programmatic direction of 11 National Forest LRMPs in Arizona and New Mexico, and National Grasslands in Texas and Oklahoma as elaborated by Standards and Guidelines (S&Gs) within these LRMPs and their associated amendment. Also included is the Forest Service's 1996 Regional Amendment that amended all 11 LRMPs to include management of the Mexican Spotted Owl, Northern Goshawk, old-growth, and grazing (U.S. Forest Service 1995). The LRMPs, along with the 1996 Regional Amendment, describe long-range management strategies for the National Forests in the Southwestern Region. They provide a programmatic framework for on-going and future management actions on National Forest System lands. The LRMPs do not, however, make site-specific decisions about exactly how, when, and where activities will be carried out. However, all site-specific activities must conform to the programmatic framework set up in the LRMPs (U.S. Forest Service 2004). In addition, they must meet site-specific requirements under the National Environmental Policy Act (NEPA) and ESA, as appropriate. This consultation on the programmatic direction of the Forest Service's 11 LRMPs does not eliminate the requirement for site-specific biological analyses and the possible need for site-specific informal or formal consultation pursuant to section 7 of the ESA.

An LRMP provides guidance and direction in the context of a broad management framework. These LRMPs define the direction for managing the National Forests for a period of 10-15 years. Direction is provided in the form of the S&Gs. During the development of the biological assessment, the Forest Service could not distinguish the difference between a "standard" and "guideline". The FWS recognizes that much discretion exists on the part of the forest managers at the project level in the implementation of LRMPs through the S&Gs. This discretion adds to the complexity of this consultation.

The S&Gs are written to apply Forest-wide or to a specific management area. Each National Forest has designated "management areas" based on such criteria as vegetation type, principal land use, and special management designations such as wilderness areas. Each National Forest's LRMP contains some S&Gs that apply Forest-wide and some that apply only to specific management areas. During the development of a project, each management program reviews Forest-wide and management area-specific S&Gs that either give direction to, or place constraints on, management activities (e.g., logging, grazing, recreation, mining, etc.). The S&Gs that provide direction state what will be accomplished to achieve specific resource goals. In many cases, the S&Gs were developed to target management of a specific species (e.g., the 1996 Forest-wide amendment to include S&Gs for the threatened Mexican Spotted Owl, and for the S&Gs in the Cibola LRMP that specifically manage for the Zuni blue-head sucker, a candidate species).

The LRMPs direct how current and future activities will be carried out in the following management programs: (1) Engineering, (2) Fire Management, (3) Forestry and Forest Health, (4) Lands and Minerals, (5) Rangeland Management, (6) Recreation, Heritage and Wilderness, (7) Watershed Management, and (8) Wildlife, Fish, and Rare Plants. Each of the Forest Service's eight resource programs are discussed in depth within the April 8, 2004, biological assessment. These programs are discussed individually because S&Gs are associated with each

of these eight programs. We provide a summary of these programs as well as the overall trend of each program pursuant to the Forest Service's biological assessment (U.S. Forest Service 2004).

Engineering Program

The Engineering Program administers and manages a variety of roads, facilities, and structures. Activities include road and bridge decommissioning, construction, maintenance, and improvements. The Engineering Program also manages buildings, water systems, and is responsible for environmental cleanup activities.

The biological assessment summarized road densities (total length of road in a defined area divided by the defined area in the square of that length, i.e., km/km² or mi/mi²) by each Forest. Research has shown that road densities above certain levels in a watershed can be one indicator of an improperly functioning watershed. Other factors such as watershed gradient, vegetation cover and type, road gradient, road surface type, and spacing of drainage relief may also affect watershed condition. The Forest Service has correlated road density to properly functioning condition. If a given watershed has more than 2.5 mi/mi² (1.55 km/km²) of road, the watershed may be considered to be impaired and not properly functioning. The Kaibab and Santa Fe NFs exceed this standard density, while the Carson and Cibola NFs also have high road density and low maintenance (U.S. Forest Service 2004).

Road decommissioning is defined as activities that result in the stabilization and restoration of unneeded roads to a more natural state. Activities used to decommission a road may include, but are not limited to, reestablishing former drainage patterns, stabilizing slopes, restoring vegetation, blocking the entrance to the road, installing water bars, removing culverts, and other methods designed to meet the specific conditions associated with the unneeded road. Over the last 10 years about 4,828 km (3,000 miles) of roads have been decommissioned on National Forest System lands (U.S. Forest Service 2004).

New construction is defined as an activity that results in the addition of National Forest classified or temporary road miles. However, temporary roads are decommissioned at the end of the specific project so they are not tracked in the Forest Service Transportation Atlas. Roughly 37 miles (60 km) of new roads have been added to the road system over the past decade, or approximately 3.7 miles (6 km) annually (U.S. Forest Service 2004).

Road maintenance is defined as the on-going upkeep of roads necessary to retain or restore the road to the approved road management objective. A road area includes surface and shoulders, ditches, fill, cut slopes, parking and turnout areas, structures, and such traffic-control devices as are necessary for its stability, resource protection, and safe and efficient utilization.

Across the region, approximately 27 percent of the classified National Forest road system is maintained on an annual basis. There are approximately 6334 miles (10,193 km) of passenger vehicle roads on National Forest System lands. Road improvement is defined as an activity that results in an increase of an existing road's traffic service level, expands its capacity, or changes its original design function. Road improvements in the past were often part of timber sales, with the greatest amount over the past two decades occurring in 1993 in the Southwestern Region. Since 1994, the Forest Service of the Southwestern Region has averaged nearly 65 miles (104

km) of road improvements annually. Most of these improvements have occurred on major recreation access roads. The Gila NF has had the most road improvements since 1994 with an average of 9.2 miles (14.8 km) per year.

Culverts are common construction features across roads. The Forest Service stated that there is not enough data in the system to provide a full, detailed analysis of these features. Few culverts are needed to maintain stream integrity (i.e., fish passage) in the southwest because of the limited number of perennial streams. Most existing culverts are designed for maintaining road-bed integrity up to 50-year rain events. Regional emphasis is to improve riparian, wetlands, and watersheds by slowing run-off on the National Forests by re-installing culverts to correct historic flow lines and redesigning some areas to emphasize riparian and wetland restoration.

The biological assessment states that the number of road miles on National Forests in the Southwestern Region has decreased over the past 10 years through road decommissioning (U.S. Forest Service 2004:28). However, according to the Forest Service, the trend is slowing due to required road analysis process (U.S. Forest Service 2004:28). In addition, the number of miles of “user-created” roads (i.e., unauthorized roads created by the general public) is unknown. Therefore, because of the complexity of this issue and the lack of data on user-created roads, overall trend for road density is difficult to determine. The Forest Service has stated that, in the long-term, implementing a Roads Analysis Process will assist in identifying unneeded roads. Through this analysis, newly created user roads will be treated as resource damage and not as unclassified roads. Further, with regards to road maintenance and culverts, the Southwestern Region of the Forest Service will continue to emphasize the improvement of riparian areas, wetlands, and watersheds by slowing runoff from roads.

Trends in environmental clean-up will likely continue at current levels. Three sites are scheduled for remediation in the next year under the Forest Service’s Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority that include; (1) Shumway/Rattler Duncan Mine sites, (2) Globe Ranger District Removal project, and (3) Gold Queen Millsite Tailings (U.S. Forest Service 2004:29).

Fire Management Program

The Fire Management Program combines elements of fire prevention, prescribed fire, wildland fire, and fire suppression. However, wildland fire including fire suppression and wildland fire use are covered under emergency procedures and are thus, not included in the proposed action. This program is significant based on historic fire data that shows wildfires in the southwest have become increasingly larger and more intense (U.S. Forest Service 2004:30). The major reason for more intense wildfires is that tree density and accumulation of dead, woody debris has increased on National Forest System lands. However, the primary reason for the current intensity of fires is drought. Human caused fires often contribute to the larger and more intense fires because they tend to occur during drier periods of the year (U.S. Forest Service 2004:31). The 2000 National Fire Plan emphasizes community protection and ecosystem maintenance and restoration. In response to the National Fire Plan, the Southwestern Region of the Forest Service developed a goal to reduce hazardous fuels on approximately 200,000 acres annually. In order to achieve hazardous fuels reduction goals, treatments will be balanced between Wildland-Urban Interface (WUI) areas and non-WUI areas. Wildland Urban Interface areas are where

communities have been identified as being at risk to significant loss in the event of a catastrophic wildfire.

Managing wildland fire for a wide range of objectives across diverse land uses and vegetative complexes subject to a mixture of fire regimes is one of the highest risk and complex programs facing natural resource managers. Wildland fire management, while having a history of more than a century of experience and practice, is continually evolving and expanding. Fire management originated at the start of the 20th century as a one dimensional program of fire suppression and control with exclusion as the single objective. During the time since its origin, program emphasis has expanded from fire control to include fire use for beneficial purposes. The wildland fire program now represents a comprehensive management program based on a single dimension of wildland fire management for multiple objectives. The program is implemented to concurrently meet objectives of the protection of life, property, and sensitive natural and cultural resources through wildfire suppression, and the use and application of fire to manipulate vegetation and habitats, reduce hazardous fuel accumulations, and to restore and maintain all fire adapted ecosystems through wildland fire use and prescribed fire application.

The Federal Wildland Fire Management Policy now being implemented (U.S. Department of Agriculture and U.S. Department of the Interior 2003) provides equity across the multiple attributes of wildland fire management. This policy is the latest stage in the evolution of wildland fire management. It affords management direction and procedures to achieve a balance between suppression and fire use. It incorporates, as a foundation, the best available science and technology and, for the first time, advocates management to accomplish multiple objectives concurrently. The current policy reflects the changing state of fire management and classifies all fires as either wildland fires or structural fires.

All fires in wildland areas, including those ignited by managers for beneficial purposes within predetermined prescriptive elements, have the same classification. Prescribed fires represent a planned strategy in response to planned events. Prescribed fires are managed under prescribed fire burn plans that fully describe suitable conditions of burning and detailed project implementation. Prescribed fire is a useful technique for accomplishing a variety of resource management objectives ranging from sensitive cultural and natural resource protection to hazardous fuel reduction, wildlife habitat improvement and maintenance, and ecosystem restoration. Multiple resource objectives may be accomplished concurrently.

Wildland fires represent planned strategies in response to unplanned events. All wildland fires receive a management response appropriate to conditions of the fire, fuels, weather, and topography to accomplish specific objectives for the area where the fire is burning. These management actions are termed the “appropriate management response” and will necessarily vary among individual fires. This type of management permits a dynamic range of tactical options. Wildland fire use is a management strategy involving naturally-ignited wildland fires that do not receive a suppression response; instead these fires are managed to realize the beneficial effects of fire presence. Appropriate fires are managed within predefined geographic areas under a set of defined conditions to accomplish specific resource management objectives associated with the restoration of fire as a natural process through a detailed, progressively prepared strategic assessment and management plan called a Wildland Fire Implementation Plan. These plans represent a comprehensive assessment of fire risk, hazard, probability of impacts,

and long-term management actions to ensure the fire meets desired objectives. Wildfires represent unwanted wildland fires that receive a response to suppress the fire at minimum cost, considering firefighter and public safety, values to be protected, and consistent with resource objectives. Suppression responses vary markedly in scale and duration, depending on the particular fire and conditions.

The Interagency Strategy for the Implementation of the Federal Wildland Fire Policy (2003) documents 17 policy statements about fire management. These include: safety, fire management and ecosystem sustainability, response to wildland fire, use of wildland fire, rehabilitation and restoration, protection priorities, wildland urban interface, planning, science, preparedness, suppression, prevention, standardization, interagency cooperation, communication and education, agency administrator and employee responsibilities, and evaluation. Operational clarification statements from the Federal Fire Policy (U.S. Department Agriculture and U.S. Department of Interior 2003) directly relevant to fire management include:

“Only one management objective will be applied to a wildland fire. Wildland fires will either be managed for resource benefits or suppressed. A wildland fire cannot be managed for both objectives concurrently. If two wildland fires converge, they will be managed as a single wildland fire.”

“Human caused wildland fires will be suppressed in every instance and will not be managed for resource benefits.”

“Once a wildland fire has been managed for suppression objectives, it may never be managed for resource benefit objectives.”

“The appropriate management response (AMR) is any specific action suitable to meet Fire Management Unit (FMU) objectives. Typically, the AMR ranges across a spectrum of tactical options (from monitoring to intensive management actions). The AMR is developed by using FMU strategies and objectives identified in the Fire Management Plan.”

“The Wildland Fire Situation Analysis (WFSA) process is used to determine and document the suppression strategy from the full range of responses available for suppression operations. Suppression strategies are designed to meet the policy objectives of suppression.”

“Wildland fire use is the result of a natural event. The Land/Resource Management Plan, or the Fire Management Plan, will identify areas where the strategy of wildland fire use is suitable. The Wildland Fire Implementation Plan (WFIP) is the tool that examines the available response strategies to determine if a fire is being considered for wildland fire use.”

“When a prescribed fire or a fire designated for wildland fire use is no longer achieving the intended resource management objectives and contingency or mitigation actions have

failed, the fire will be declared a wildfire. Once a wildfire, it cannot be returned to a prescribed fire or wildland fire use status.”

Forestry and Forest Health Program

The Forestry and Forest Health Program includes timber harvest, forest product extraction, and forest health. Timber harvest includes clear-cutting, shelterwood harvesting, selection cutting, pre-commercial thinning, and fuel reduction thinning. Clear cutting in the Southwestern Region of the Forest Service has historically been limited to aspen regeneration or in forested stands severely infected with mistletoe. Shelterwood cutting includes shelterwood seed cuts and removal cuts. Selection cutting includes mainly commercial thinning treatments, as well as individual tree selection, group selection cutting, and in more recent years, sanitation/salvage cutting.

The forest products component of the Forestry and Forest Health Program supplies forest products to the public and accomplishes vegetation management objectives on Forests throughout the Southwestern region. Forest products include fire wood, Christmas trees, greenery, poles, posts, medicinal plants, and native species for transplanting. The Forest Health component of this program provides technical and financial assistance on insect and disease issues to the National Forests as well as other federal agencies. The Forestry and Forest Health Program’s objectives include controlling the spread of bark beetle and mistletoe. Pesticide spraying for bark beetle control occurred from 1987 to 2002. Treatments for mistletoe include tree felling, tree pruning, and killing (i.e., basal burning) large trees infected with mistletoe to create snags.

A substantial decline in the volume cut and acres treated has occurred from 1990 to present (U.S. Forest Service 2004:41). However, thinning with the goal of restoring ecosystem function will likely increase across this region of the Forest Service by thousands of acres each year due to fuels dollars and treatments developed to protect values at risk in the WUI areas (U.S. Forest Service 2004:41). Future projects will likely be tied to increased insect activity (U.S. Forest Service 2004:41).

Lands and Minerals Program

The Lands and Minerals Program is responsible for land ownership including purchases, withdrawals, land exchanges, mining, oil, gas, and geothermal leases. In addition, this program issues non-recreational special use authorizations that include utility rights-of-way and easements, and water-use authorizations. The Lands and Minerals Program issues a variety of special use permits including utility rights-of-way for electric, oil, and gas; transportation rights-of-way and easements; and water diversion and retention authorizations. Land acquisition involves the acquisition of lands, waters, and related interests within the National Forests. Acquisition of lands occurs for public outdoor recreation, conservation of wildlife (including listed species), acquisition of wetlands and riparian areas, protection of significant cultural resources, to obtain continuity of land ownership, and the protection of rare ecological areas that promote biological diversity. Land ownership adjustments include purchases and land exchanges. Since 1988, approximately 75,915 acres have been added to the National Forest System lands in the Southwest Region, bringing the total land ownership to roughly 20,805,000 acres. Other than minor ownership adjustments, the acquisition of the Valles Caldera adjacent to

the Santa Fe NF in northern New Mexico has been the largest since 1985. The Valles Caldera was acquired through congressional legislation in 2000, and is managed by a board of trustees as a National Preserve under the National Forest system.

The Lands and Minerals Program is also responsible for the management and administration of the surface and certain sub-surface minerals found within the southwest. Program responsibilities include the inspection and monitoring of mineral operations, environmental review of proposed operations, providing professional expertise in sustainable forest management, watershed health, public safety, and management of significant geological resources. The primary program components are leasable minerals such as oil and gas; locatable minerals including gold, silver, copper, and other industrial minerals; saleable minerals such as sand, gravel, and building stone; and reserved and outstanding mineral rights involving private minerals underlying National Forest System lands. On the ground activities include exploration drill holes, small scale prospecting, and active mining from surface quarries, pits, and mill sites. In addition to surface mining, any anticipated surface disturbance associated with underground mining operations.

Locatable minerals include gold, copper, silver, zinc, and others. Approved Lands and Minerals Program activities include any anticipated surface disturbance associated with underground mining operations (excluding oil, gas, geothermal, and water) and all surface mining activity. These activities can involve the exploration of drill holes, small scale prospecting, and active mining from surface quarries, pits and mill sites. Common variety materials include sand, gravel, landscape, rock, and other materials. Activities include surface collecting, borrow pits, community use pits, and quarries.

A withdrawal is a management tool for removing an area of National Forest System lands from sale, location, or entry under the general mining laws for the purposes of limiting activities to maintain other public values or reserving the area for a particular public purpose or program. Purposes for withdrawals may include quality of scientific, scenic, historical, ecological, environmental, air, water, resource, archaeological values, or other special purposes. Withdrawals are approved by the U.S. Bureau of Land Management (BLM). Following a Forest Service review of areas withdrawn prior to 1976, approximately 85,600 acres will be revoked and available for mineral entry within the next two to three years (U.S. Forest Service 2004).

Oil, gas, and geothermal leases are contractual agreements between the government and the lessee to allow oil, gas, or geothermal exploration or development under certain terms and stipulations. A lease does not always mean that exploration or development will occur since many leases are bought for speculative reasons (U.S. Forest Service 2004). A total of 358 applications for permits to drill have been processed since 1988; 323 or 90 percent were received by the Carson NF.

With the exception of the acquisition of the Valles Caldera (located in northern New Mexico) in 2000, the area of landownership base in the Southwest Region has remained relatively stable (U.S. Forest Service 2004:54). With regards to oil, gas, or geothermal leases having increased or decreased, the biological assessment states that there is no clear trend (U.S. Forest Service 2004:54).

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on the 11 National Forests. The Forest Service has a long history of grazing use, and domestic livestock grazing activities are important uses of the National Forest throughout the Southwestern Region. Grazing on National Forests is an integral part of the tradition, culture, and social fabric of many communities within the southwest (U.S. Forest Service 2004:54). The Secretary of Agriculture's regulation at §36 CFR 221.1(a) directs the Chief of the Forest Service to develop, administer, and protect range resources, and to permit and regulate the grazing use of all kinds and classes of livestock on all National Forest System lands. Key components of rangeland management in the Southwestern Region include the following: (1) there are 1,518 grazing allotments within the region, (2) approximately 17,700,000 acres are contained within active allotments, (3) structural and non-structural range improvements are used to properly manage livestock grazing and assist in meeting desired resource conditions, and (4) inventory and control of invasive plants is a key component of improving rangeland health.

The Forest Service provided the FWS with further definition of forage utilization, how it is measured, and appropriate conclusions that can be drawn from those measurements. In addition, the Forest Service provided clarification on the proper use of utilization as a management tool, to assist in meeting resource objectives on an allotment basis. This information was provided to the FWS in the February 2, 2005, supplement to the biological assessment.

The only explicit standard established for grazing in the 1996 LRMP Amendment is, "Forage use by grazing ungulates will be maintained at or above the condition which assures recovery and continued existence of threatened and endangered species." The 1996 LRMP Amendment expressly calls for utilization to be monitored through the establishment of key areas. The Forest Service sets utilization levels based on a wide variety of ecological indicators including, but not limited to the following: plant composition, plant vigor, livestock type, elevation, and a variety of other site specific factors. These site specific factors are addressed in the appropriate NEPA analyses and allotment management plans. In a January 2003 programmatic biological opinion, FWS found that the current rate of implementing the standard and guidelines prescribed by the 1996 LMRP is not likely to jeopardize the continued existence of the Mexican spotted owl.

Individual Forests use the utilization standards and guidelines to make decisions as to whether livestock need to be moved to another pasture or to another part of a pasture, a pasture needs to be removed from grazing, or the number of livestock on an allotment needs to be reduced. Accordingly, an exceedance of a forage utilization standard or guideline does not provide a basis for concluding that an allotment is not in compliance with the LMRP Amendment.

Further, the Forest Service considers utilization standards as one tool for ensuring that forage is maintained at or above the conditions which provide for recovery and continued existence of threatened and endangered species. Other commonly used management tools include: the application of grazing systems, which limit the frequency and duration of grazing periods and the exposure of plants to grazing ungulates; limiting the numbers of livestock authorized in a given grazing season; total exclusion of grazing from sensitive or critical areas and/or extended periods of deferment from grazing; herding livestock into lesser use areas; and distributing livestock by controlling access to water. With respect to protective measures needed for federally listed

threatened and endangered species, all of these tools are considered in consultations with FWS for livestock grazing allotments.

Finally, allotments have differing management objectives based on the resources within the boundaries of the allotment, the condition of the vegetation, watershed condition, class of livestock, and numerous other factors. For these reasons, the FWS concludes that analysis of compliance and enforcement data with respect to these measures is appropriately addressed at the site-specific allotment level rather than at the programmatic LRMP level. If in considering the totality of circumstances surrounding exceedances of the S&Gs and the prior site-specific consultation, FWS determines that the exceedance causes or is contributing to an effect not considered in the prior consultation, FWS will request the individual Forest to reinitiate consultation of that allotment.

Because definitions for grazing management levels differ for each LRMP, we summarize each National Forest's definition of grazing management levels below. These definitions were taken directly out of each Forest's LRMP.

The Forest Service uses the letters A, B, C, D, and others (see below), as a means of articulating "levels" of livestock grazing management within S&Gs. Generally, Level A management excludes livestock grazing to protect other resource values or to eliminate conflicts with other uses. As the level of grazing management increases from Level B to Level D, investment in structural range improvements such as fences and water developments increases. In theory, a higher level of grazing management allows more complex grazing strategies to provide for the physiological needs of plants through improved rest of pastures and increased ability to benefit or minimize effects on other resource values, including listed species and their habitats. Low grazing management in Level B precludes the ability to adequately adjust the intensity, timing, and duration of livestock except by reducing numbers. Effects to resources, particularly those in riparian areas, may not be avoided in Level B management because of the absence of structural improvements which could restrict access to these areas. This said, it is important to note that since 1998 hundreds of miles of riparian areas across management levels B through D throughout the Forest Service Southwestern Region have been excluded from grazing to protect listed species and their habitats. Level D management provides maximum flexibility to exclude, adjust, or reduce livestock use in areas considered sensitive due to the presence of listed species. It is the Forest Service's position that more intensive management strategies assure rest for pastures, better distribution of livestock, and mitigation measures for other resource needs will not result in increased risk to listed species. Also, increased levels of grazing management may result in overstocking of allotments, but does not equate to greater numbers of livestock in most cases.

Apache-Sitgreaves

Level A: No grazing.

Level B (low investment): Management objective is control livestock numbers within present grazing capacity. Improvements and/or management systems are inadequate to fully utilize the range resource. Use is generally continuous.

Level C (extensive): Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including fencing and water developments, are

designed to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor.

Level D (intensive): Management seeks to optimize production and utilization of forage allocated to livestock within the constraints of multiple use. Cost effective methods for achieving improved forage supplies, and uniform livestock distribution and forage use. Cultural practices may be combined with fencing and water developments to implement complex grazing systems.

Level E (maximum livestock production): Management seeks to maximize livestock production while maintaining basic soil and water values. Cost effective management systems and techniques are used to achieve this goal, may involve conversion of forest. It includes administrative pastures or other specifically seeded areas under intensive management.

Carson National Forest

Level A: Currently unstocked.

Level B: Allotments that are currently stocked, are estimated to be not more than 20 percent overstocked, and have minimal levels of management currently being applied. These allotments need additional intensity of management applied.

Level C: Currently stocked allotments are estimated to be no more than 20 percent overstocked, if any, and have management systems being applied on the ground which should lead to resource improvement. Some stocking adjusts may still be needed upon evaluation of systems and follow-up production and utilization studies.

Level D: Currently stocked allotments, are not overstocked more than 20 percent, if any, and have intensive management systems being applied on the ground to correct resource problems. Stocking level may still need verification by production and utilization studies.

Level E: Livestock use permitted by grazing permit, permitted use does not exceed forage production, full development and management for livestock production using cost effective techniques to maximize AUM output without regard for other multiple use constraints, i.e., full range of vegetative type conversion.

Level X: Currently stocked allotments which are either more than 20 percent overstocked, have significant resource deterioration continuing, and will require major adjustments in stocking or greatly improved and intensified management systems or both stocking adjustment and improved management.

Cibola National Forest

Level A: Currently unstocked.

Level B: Allotments that are currently stocked, are estimated to be not more than 20 percent overstocked, and have minimal levels of management currently being applied. These allotments need additional intensity of management applied.

Level C: Currently stocked allotments are estimated to be no more than 20 percent overstocked if any, and have management systems being applied on the ground which should lead to resource improvement. Some stocking adjustments may still be needed upon evaluation of systems and follow-up production and utilization studies.

Level D: Currently stocked allotments are not overstocked more than 20 percent, if any, and have intensive management systems being applied on the ground to correct resource problems. Stocking level may still need verification by production and utilization studies.

Level E: Livestock use permitted by grazing permit, permitted use does not exceed forage production, full development and management for livestock production using cost effective techniques to maximize AUM output without regard for other multiple use constraints, i.e., full range of vegetative type conversion.

Level X: Currently stocked allotments which are either more than 20 percent overstocked, have significant resource deterioration continuing, and will require major adjustments in stocking or greatly improved and intensified management systems or both stocking adjustment and improved management.

Coconino National Forest

Level A: Livestock grazing is eliminated or restricted to situations where it will meet other resource objectives, such a fuel hazard reduction in recreation areas. Areas managed under Level A are not counted in determining forage capacities.

Level B: Livestock grazing is very limited. Management is generally accomplished by moving livestock from one place to another. Capacity and actual use are kept in balance by removing or adding livestock. There is very little structural improvement work done, such as fences or water development, and no forage improvement work such as seeding.

Level C: Livestock grazing is controlled through structural improvements and by physically moving livestock. Long-term capacities are balanced with use by adjusting numbers of livestock. Any forage improvement is generally the result of meeting other resource objectives, such as wildlife habitat improvement.

Level D: Areas under level D are managed intensively for livestock grazing within an over-all multiple use concept. Any structural or nonstructural (forage) improvement technique may be used as long as it fits with the natural environment. Reasonable and approved management techniques are applied to sustain capacity and use at high levels.

Level E: Level E is applied to areas to achieve the maximum livestock production that the land can support. Any management technique may be applied as long as basic watershed values are protected. Some management activities, such as irrigating or large scale planting of non-native grass species, may change the natural character of the land. It could include high intensity – short duration grazing systems, but this is not a necessary prerequisite for level E management.

Coronado National Forest

Level A: No livestock grazing.

Level B: Some livestock grazing. Will obtain relatively uniform distribution at the 25 percent use level over 60 percent of the full capacity range. Limited improvements, boundary fences, low-cost water developments. Only those improvements needed to meet prescription objectives. No non-structural improvements.

Level C: Extensive Livestock management. Will obtain relatively uniform distribution at the 30-35 percent use level over 90 percent of the full capacity range. Additional interior fencing, permanent waters. Limited, if any, non-structural improvements.

Level D: Intensive livestock management. Will obtain relatively uniform distribution at 35-55 percent use level over 100 percent of the full capacity range. Apply intensive management systems. Higher density, water developments, and interior fencing. Lots of non-structural (i.e., seeding, ripping, aerial seeding).

Gila National Forest

Level A: Livestock grazing is eliminated or restricted to situations where it will meet other resource objectives, such as fuel hazard reduction in recreation areas. Areas managed under Level A are not counted in determining forage capacities.

Level B: Livestock grazing is very limited. Management is generally accomplished by moving livestock from one place to another. Capacity and actual use are kept in balance by removing or adding livestock. There is very little structural improvement work done, such as fences or water development, and no forage improvement work such as seeding.

Level C: Livestock grazing is controlled through structural improvements and by physically moving livestock. Long-term capacities are balanced with use by adjusting numbers of livestock. Any forage improvement is generally the result of meeting other resource objectives, such as wildlife habitat improvement.

Level D: Areas under level D are managed intensively for livestock grazing within an over-all multiple use concept. Any structural or nonstructural (forage) improvement technique may be used as long as it fits with the natural environment. Reasonable and approved management techniques are applied to sustain capacity and use at high levels.

Level E: Level E is applied to areas to achieve the maximum livestock production that the land can support. Any management technique may be applied as long as basic watershed values are protected. Some management activities, such as irrigating or large scale planting of non-native grass species, may change the natural character of the land.

Kaibab National Forest

R-1: Livestock grazing is entirely eliminated or restricted to situations where it will meet other resource objectives, such as fuel hazard reduction in recreation areas. Areas managed under R-1 are not counted as full capacity range in the determination of livestock forage capacities.

R-2: Investment for administration and range improvements for management of livestock is at a low level. Improved forage results from other resource investments such as thinning timber stands, and watershed and wildlife habitat improvement. Livestock control is accomplished primarily by moving livestock along with a minimal number of structural range improvements.

R-3: Investment for administration and range improvements for management of livestock is at a moderate level. Forage improvement is generally the result of other resource investments such as thinning timber stands, and watershed and wildlife habitat improvement. Livestock are controlled through the use of structural improvements and physical movement of the livestock.

R-4: Areas under R-4 management are managed intensively for livestock grazing within an overall multiple-use concept. Any structural or non-structural (forage) improvement technique may be used as long as it fits with the natural environment. All reasonable and approved management techniques are applied to sustain capacity and use a high levels.

R-5: Management is applied to areas to achieve the maximum livestock production that the land can support. Any management technique can be applied as long as basic watershed values are protected. Some management activities, such as irrigating or large scale planting of non-native grass species, may change the natural character of the land.

R-U: Unsatisfactory level of grazing management in which the range is overstocked and the general trend in range condition is downward.

Lincoln National Forest

Level A: Excludes livestock grazing to protect other values or eliminate conflicts with other uses.

Level B (Low): Management which is normally continuous grazing throughout the permitted grazing season. Most often associated with minimal improvement development, thus not providing for rest or deferment of pastures or timing of grazing use.

Level C & D (Moderate): Management that provides, as a minimum, for deferment of pastures and improvement in livestock distribution. Moderate management may also provide for full rest of one or more pastures on an allotment, but requires additional improvement not normally associated with low level management strategy.

Level D (High): Management associated with extensive improvement development, which assures yearlong rest of pastures and good distribution of livestock. Provides fully for plant and livestock needs. May entail extensive non-structural improvement for maximization and utilization of forage production.

Prescott National Forest

Level A: Management excludes livestock grazing to protect resource values or eliminate conflicts with other users. Only exterior boundary fences are maintained and/or replaced. No nonstructural investments are made.

Level B: Management controls livestock numbers so that livestock use is within present grazing capacity. Structural and nonstructural investments are for maintenance or replacement of existing projects and facilities only.

Level C: Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including existing structural developments, are designed and applied to obtain relatively uniform livestock distribution and use of forage.

Level D: Management seeks to increase production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing for multiple use of the range. New structural and nonstructural developments are created to help affect increases in production and utilization.

Level E: Management seeks to realize maximum livestock production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing for multiple use of the range. Substantial increases in new structural and nonstructural developments are made to help achieve these objectives.

Level "4": Management seeks to increase production of forage consistent with enhancing the environment and providing for multiple use of the range. New nonstructural developments are created to help increase production; Level C structural developments are applied to obtain relatively uniform livestock distribution and use of forage. Level D Operations and Management and nonstructural investments coupled with a Level C structural investment.

Level X: Areas or allotments where corrective management has not yet been applied. The above categories are generally unsatisfactory at this level. Once management action is implemented, the acres in this level are changed to one of the above depending on the prescription intent.

Santa Fe National Forest

Level A: Livestock grazing is eliminated or restricted to situations where it will meet other resource objectives, such a fuel hazard reduction in recreation areas. Areas managed under Level A are not counted in determining forage capacities.

Level B: Livestock grazing is very limited. Management is generally accomplished by moving livestock from one place to another. Capacity and actual use are kept in balance by removing or adding livestock. There is very little structural improvement work done, such as fences or water development, and no forage improvement work such as seeding.

Level C: Livestock grazing is controlled through structural improvements and by physically moving livestock. Long-term capacities are balanced with use by adjusting numbers of livestock. Any forage improvement is generally the result of meeting other resource objectives, such as wildlife habitat improvement.

Level D: Areas under level D are managed intensively for livestock grazing within an over-all multiple use concept. Any structural or nonstructural (forage) improvement technique may be used as long as it fits with the natural environment. Reasonable and approved management techniques are applied to sustain capacity and use at high levels.

Level E: Level E is applied to areas to achieve the maximum livestock production that the land can support. Any management technique may be applied as long as basic watershed values are protected. Some management activities, such as irrigating or large scale planting of non-native grass species, may change the natural character of the land.

Tonto National Forest

Level A: Management excludes livestock grazing to protect other values or eliminate conflicts with other users.

Level B: Management controls livestock numbers so that livestock use is within present grazing capacity. Improvements are minimal and constructed only to the extent needed to protect and maintain the range resource in presence of grazing.

Level C: Management seeks full utilization of forage allocated to livestock. Cost effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage, and to maintain plant vigor.

Level D: Management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing for multiple use of the range. From all existing range and livestock management technology, practices may be selected and used to develop cost effective methods for achieving improved forage supplies and uniform livestock distribution and forage use. Cultural practices such as brush control, type conversion, fertilization, site preparation and seeding of improved forage species may be used to improve quality and quantity of forage. Cultural practices may be combined with fencing and water developments to implement complex grazing systems and management methods.

In general, more intensive levels of livestock management outlined in S&Gs that allow for level C and D grazing are based on increased control of livestock through structural improvements (i.e. fencing and water developments), grazing strategies such as “rest-rotation”, “deferred”, or “high intensity-short-duration,” and approved allotment management plans. The timing, intensity and duration of grazing are prescribed to obtain the maximum ecological result based on plant phenology, composition and desired future conditions (DFCs). The DFCs include a wide variety of objectives such as wildlife and fish, threatened and endangered species, cultural and aesthetic values. This often includes fencing of important riparian areas and avoidance of other important threatened and endangered species habitats. Several S&Gs allow for stocking at 120 percent of capacity to allow for management flexibility during highly productive years.

The Rangeland Management Program in the Southwestern Region is extremely variable due to widely fluctuating levels of precipitation and resultant forage production. Specifically, the biological assessment states that the southwest has been experiencing precipitation amounts below normal for the past several years. Consequently, significant adjustments in stocking levels and season of use have occurred throughout the National Forests in the Southwestern Region to protect rangeland resources since 1996 (U.S. Forest Service 2004:55). Additional Rangeland Management Program activities include annual monitoring of individual allotments, development of structural and non-structural improvements to facilitate better livestock management and to improve wildlife habitat and watershed conditions, control of invasive weeds, and implementation of the 1996 Regional Amendment through site-specific allotment NEPA. Management of rangelands takes into consideration the needs of wildlife habitat including federally listed species, sensitive species, management indicator species, and other species, with respect to the season of use (U.S. Forest Service 2004).

In general, there are three seasons of grazing use in the Southwestern Region; yearlong, summer, and winter grazing. Summer grazing season extends from April through September, winter grazing extends from October through March of the following year. All National Forests have at least one permit in each category. National Forests that use predominantly summer grazing include the Apache-Sitgreaves, Carson, Coconino, Kaibab, and Santa Fe. National Forests that use predominantly yearlong grazing include the Coronado, Gila, Lincoln, Prescott, Tonto, and Cibola. Yearlong, summer, or winter grazing does not correlate to any specific level of management, but does serve as seasonal descriptors of when livestock are permitted on the allotment. Grazing of domestic livestock is not allowed on allotments classified as closed. Closing an allotment is accomplished through an analysis of social, economic, and resource considerations in conjunction with the LRMP planning process. Table 2 summarizes the number of active, vacant (i.e., allotments currently not being grazed for various reasons), and closed allotments by National Forest in the Southwestern Region as of July 2003.

Table 2. Allotment status by National Forest and by allotment type (U.S. Forest Service 2004:55).

Forest	Active	Vacant	Closed	Total
Apache-Sitgreaves	130	4	1	135
Carson	71	4	1	76
Cibola	497	16	2	515
Coconino	34	1	10	45
Coronado	189	5	3	197
Gila	125	13	1	139
Kaibab	39	1	0	40
Lincoln	103	3	14	120
Prescott	62	1	3	66
Santa Fe	75	1	5	81
Tonto	92	11	1	104
Total	1417	60	41	1518

While permits are issued on a 10-year cycle, grazing is authorized on an annual basis through an authorized use request, approval, and subsequent paid bill for collection of grazing fees. Authorized grazing occurs primarily on active allotments. In unique situations, permittees are allowed to use vacant allotments where resource conditions on their allotment would benefit from certain management practices, such as rest and prescribed burning. Additionally, vacant allotments may provide a forage reserve in times of natural phenomena such as a fire or drought (U.S. Forest Service 2004:55).

The biological assessment provides information on the numbers of permitted use occurrences, by season of use, by National Forest (U.S. Forest Service 2004:56). However, the data provided are not a reflection of the number of allotments by season of use because the Forest Service does not track this information by allotment. The Forest Service tracks season of use by individual permit. It is important to note that multiple use dates may occur within one permit on any given permit. For example, a permit may allow a specified number of cow/calf pairs from May 1 through September 30 (i.e., summer season). This same permit may also allow a specified number of yearlings from November 1 through February 28 (i.e., winter season). According to the biological assessment (U.S. Forest Service 2004:57), all Forests have allotments that are grazed in all seasons of the year.

In 1996, the Forest Service Southwestern Region amended all 11 LRMPs with new S&Gs managing for the Mexican Spotted Owl and Northern Goshawk, as well as for old growth and grazing. Regarding Forest Amendment for grazing, the 1996 Forest Amendment requires Forest managers to make site-specific determinations regarding forage utilizations for each allotment through NEPA and allotment management planning (AMP) process. The region is conducting NEPA analyses gradually over time for all allotments. The Forest Service is conducting NEPA review on approximately 58 allotments per year on average, with a target completion date of 2010. Roughly half of these analyses have already been completed, however 730 grazing allotments need NEPA compliance (U.S. Forest Service 2004:60-61). Grazing authorizations (i.e., permits) resulting from these NEPA analyses and decisions provide appropriate guidance for forage utilization in compliance with the 1996 Forest Amendment. In January 2003, the Forest Service completed formal consultation with the FWS concerning effects to the Mexican Spotted Owl from the rate of implementation of grazing S&Gs pursuant to the 1996 Forest Amendment. This current consultation will supercede the January 17, 2003, biological opinion and all previous opinions on the 11 National Forest LRMPs (U.S. Forest Service 2004).

Rangeland improvement projects consist of structural and non-structural improvements to facilitate better livestock distribution and range management, to improve wildlife habitat and watershed conditions and, in certain circumstances, to limit or exclude livestock use from areas of concentrated public use or sensitive habitat for federally listed species. Examples of structural improvements include, but are not limited to, fences, stock tanks, and holding corrals. Examples of non-structural improvements include, but are not limited to, removal of woody species from rangelands, prescribed burning, and seeding. The regional trend for rangeland improvement projects has decreased since the mid-1980s. However, with the increased emphasis on healthy forests and watershed, new improvement projects may increase in the near future (U.S. Forest Service 2004:62).

Included in the Rangeland Management Program is invasive plant management. Invasive plants are an increasing threat to rangelands throughout the West. The National Forests have experienced similar problems with weed infestations increasing at a rate of about 20 percent annually. Invasive plants impact ecosystem health, degrade range conditions, and can impair the habitats of listed species. The Forest Service has treated many areas to control invasive plants (i.e., 330 acres in 1996, and 8,944 acres in 2002). The management and control of invasive plants has been identified as a national priority for the Forest Service, thus, the Forest Service is in need of additional resources to contain, control, or eradicate non-native plants that are crowding out native plants and disrupting the native ecosystem (U.S. Forest Service 2004:64). Regarding the trend of invasive species, the acres of invasive plant infestation have increased by approximately 20 percent each year over the past six years (U.S. Forest Service 2004:66). The number of acres treated has increased at an average of approximately 40 percent per year. Thus, the control of invasive plants has been identified as a priority by the Forest Service at both the national and regional level. For these priorities to be achieved, additional resources are needed to manage these non-indigenous invaders that are affecting native plants and disrupting ecosystem health and function (U.S. Forest Service 2004:66).

Authorized use levels have fluctuated (with a slight downward trend) with changing resource conditions and with livestock market variables since 1985 (U.S. Forest Service 2004:57). These reduced levels of authorized use are due to a number of factors including permittee convenience, resource protection due to declining rangeland conditions, forage production, site-specific NEPA decisions, and livestock exclusions from riparian areas and other sensitive habitat for federally listed species (U.S. Forest Service 2004:57). Further, since 1996, drought has had a profound influence on authorized levels of grazing with the most significant impacts occurring in central Arizona (U.S. Forest Service 2004:57).

Recreation, Heritage, and Wilderness Program

The Recreation, Heritage, and Wilderness Program (Recreation Program) provides a wide range of recreation opportunities, settings, and services. The Recreation Program oversees the management of one National Recreation Area, one Scenic and Historic Trail, 11 Scenic Byways, eight major visitor center facilities, 60,000 Heritage Resource sites, 52 Wilderness areas, and five Wild and Scenic Rivers. Program components include administration and management of developed recreation sites, dispersed recreation settings, partnerships and tourism, interpretive services, recreation special use permits, congressionally designated areas, visual quality management, trail management, and scenic byways.

Recreational activities (both developed and dispersed) are an important public function of National Forest System lands and, recreational demands on National Forests continue to increase with National Forests experiencing more than 23 million recreation visitors each year (U.S. Forest Service 2004). Developed recreation includes both day use and overnight sites, ranging from designated fishing areas to picnic grounds to boat docks to family campgrounds to wilderness trailheads. The total capacity of a developed site, as a whole number, is defined by multiplying the total number of developed site units by five (which is the accepted number of people per unit). It should be noted that day use areas, such as a picnic ground, can reach capacity several times a day with different crowds while campgrounds can only reach capacity in

a 24-hour period. In addition, there are developed winter and summer recreational sites that have been included for the total capacity of the Forest.

Dispersed recreation differs from developed recreation (which is measured by a maximum capacity); dispersed recreation capacity has been unaccounted for in general. Dispersed recreation activities are those acceptable activities that take place outside designated recreation sites. Nearly 50 percent of recreational visits in the Southwest Region are dispersed (U.S. Forest Service 2004). Dispersed recreation management is often inconsistent across the region. Thus, dispersed recreation has varying environmental impacts such as recreational vehicle camping along stream banks, hiking on fragile soils, mudding in wet meadows, and off-highway vehicle (OHV) use.

Off-highway vehicle use includes Sports Utility Vehicles, all-terrain vehicles, and other types of motorized vehicles. According to the Forest Service, management of OHV has been inconsistent in the region. Approximately 70 percent of the non-wilderness National Forest System lands are currently open to OHV use. In general, OHV use has increased on National Forest System lands in the Southwestern Region. According to the biological assessment, unmanaged use of OHVs has caused resource damage in popular and remote dispersed areas across the region (U.S. Forest Service 2004:11). To address the growing need for management of OHVs, the National Forests in Arizona are currently developing an Environmental Impact Statement (EIS), which will establish a consistent plan for OHV use on the National Forests. Unmanaged OHV use is also a national issue. On July 15, 2004, the Forest Service published a proposed rule on "Travel Management; Designated Routes and Areas for Motor Vehicle Use" (USDA Forest Service 2004). This rule would require all National Forests to designate a system of roads, trails, and areas open to motor vehicles. Following such designation, cross-country motor vehicle use off of the designated system would be prohibited. It is expected that this rule will be finalized in 2005. Once the rule is final, the National Forests within the Southwestern Region will begin implementing the rule. It is expected that full implementation will take several years.

Trails are a significant part of the Recreation Program, with approximately 8,000 miles of trail existing in the region. However, according to the biological assessment, only a small amount of miles of trails have been added to the region since the inception of the LRMPs (U.S. Forest Service 2004:71). Trails are defined as a linear route managed for human-powered, stock, or OHV forms of transportation. Four National Forests (Apache-Sitgreaves, Gila, Santa Fe, and Tonto) account for 55 percent of the region's trail system. Maintenance of trails typically includes clearing the trail-way and/or maintaining trail structures or special features. Trail maintenance, or the lack of it, can have both positive and negative impacts to environmental conditions. Since 1988, over 2,500 miles of trail have been reconstructed. Reconstruction is defined as re-establishment of the trail-way, structure construction, drainage construction, and/or special feature construction. Reconstruction also includes new construction which in many cases consists of re-alignment of a section of trail. High use areas often receive maintenance on an annual basis and may be reconstructed or improved several times in one decade. In addition, annual maintenance varies by Forest; for example, the Prescott NF is able to maintain its trail system every two years while the Apache-Sitgreaves NF is currently on a 16-year schedule.

The Recreation Program has approximately 2,570 recreation special use permit holders who provide public services and facilities on the National Forests. These services and facilities include ski areas, marinas, resorts, and organizational camps. Within this amount, there are approximately 970 permit holders who provide outfitter guide services such as big game hunting, river rafting, horseback riding, mountain bike riding, jeep tours, wildlife viewing, caving, and other commercial services. Outfitters and guides must be authorized on an annual or through a priority special use permit to conduct commercial activities on the Forests. An outfitter can be, but is not limited to, a hunter, guide, fishing guide, backpacking guide, and/or horse packer. In 2002, over 1,050 outfitter guide permits were authorized across the Southwest Region. According to the Forest Service (U.S. Forest Service 2004:73), information on outfitter guide permits was inconsistently collected; thus, no analysis of trend could be conducted. Recreation term permit refers to a facility constructed and/or managed for long-term use. Special Use Permits are authorized for up to 30-year period and require that the permittee manage and maintain the facility. Facilities include boat docks, organizational camps, resorts, tramways, restaurants, marinas, recreation residences, target ranges, and ski areas. Since the inception of the LRMPs, there has been little change in the number of term permits, in part due to the longevity of term permits and the established legacy of facilities. Since 1988, recreation term permits have decreased by 5 percent across the region. One important recreation term permit is ski areas. There are 10 ski areas on seven National Forests in the Southwestern Region. These 10 ski areas cover approximately 4,050 acres, which is 0.02 percent of the land mass of National Forests in the region. Since 1988, ski areas have expanded roughly 0.2 acres per ski area per year.

The Heritage portion of the program manages approximately 60,000 known heritage sites. According to the biological assessment, protection of significant heritage resources is a priority. Activities range from working on heritage projects with Native American Tribes to archeological digs and recording of endangered rock art (U.S. Forest Service 2004:73).

Within the Southwestern Region, congressionally designated areas (i.e., tracts of land set aside for specific management and protection by an act of Congress) include Wilderness, Wild and Scenic River, and National Recreation Areas. Since inception of the LRMPs, no Wilderness has been designated. However, four Wild and Scenic Rivers have been designated. These designations are in addition to the Wild and Scenic designation on the Verde River in 1984. The only National Recreation Area in the Southwestern Region is the Jemez National Recreation Area, which was designated in 1993. These congressionally designated areas have specific management plans that are amended to LRMPs as they are completed.

According to the biological assessment, with regards to trends, the number of recreationalists is expected to increase on an annual basis (U.S. Forest Service 2004). This is do primarily to increasing population centers in Arizona and New Mexico as well as a national increase in popularity of National Forests for recreational use. For example, nationally, use of OHVs has doubled since the 1980s (Northwestern Great Basin Resource Advisory Council Meeting Notes 2003), and an estimated “tens of millions” of OHVs are in use today (Bosworth 2004).

Watershed Management Program

The Watershed Management Program is tasked with implementing practices designated to maintain or improve watershed condition. The methods used to meet the overall objectives of the program include the following: assessing watershed condition, prioritizing watersheds for protection or improvement, coordinating with other federal, state, and tribal agencies, securing water rights under state or federal law to meet National Forest management, improving and maintaining water quality through the use of Best Management Practices (BMPs), improving and protecting riparian areas, protecting floodplains, setting and protecting air quality related values, planning and implementing emergency stabilization and rehabilitation (formerly known as Burn Area Emergency Restoration), and assisting in setting resource management action that will attain LRMP goals for meeting identified water conditions.

Watershed improvement treatments include actions to improve soil condition, water quality or quantity, and riparian condition. Structural and non-structural measures are used to accomplish watershed improvements and include seeding, disking, installation of check dams, cutting of pinyon-juniper and scattering, fencing to exclude livestock from riparian areas, prescribed burning, road obliteration, wetland enhancement, and other soil and water improvement activities.

Protection and restoration of quality of water is the responsibility of the Forest Service on lands it administers. However, the Forest Service is an active partner with the states of Arizona and New Mexico in implementing water quality programs. In Arizona, the rivers and streams are divided into 10 major watersheds. The majority of rivers and streams have reaches that are identified as impaired (U.S. Forest Service 2004:77). Similarly, the NMDGF identifies streams as being impaired or streams within impaired segments. In both states, impaired streams and rivers are monitored (i.e., by Total Maximum Daily Load) for the listed pollutant (i.e., turbidity, certain heavy metals, etc.). The Forest Service uses BMPs to meet water quality standards under the Clean Water Act (CWA). Water bodies that do not meet water quality standards are listed as impaired under the CWA. Primarily, water quality concerns on National Forest System lands include sediment and nutrients from grazing, road construction and maintenance, timber harvest, mining, and recreation impacts (New Mexico Environmental Department 1999).

The Watershed Management Program also manages instream flow water rights. Five National Forests (Coconino, Apache-Sitgreaves, Prescott, Tonto, and Coronado) in Arizona are working toward acquiring state certificates for water rights on 64 or more streams. New Mexico has one stream with adjudicated flow for a Wild and Scenic River reserve claim. The Forest Service is in the process of negotiating reserve flow claims for two streams. One additional stream will be claimed and one stream is claimed for instream flows under the Wilderness Act. While Arizona allows claims under state law without a diversion, New Mexico requires that a diversion be constructed in order to apply for a water right. Further, in New Mexico, direct diversion for livestock and wildlife is allowed without filing a claim, as are fisheries and recreational uses of naturally flowing waters (U.S. Forest Service 2004).

In 2000, the Forest Service identified priority watersheds for soil, water, range, and forest improvements and protection. Priority was given to watersheds with “values at risk” and where

accomplishments could be demonstrated. Those watersheds that have a downward trend and/or extensive unsatisfactory soil and water conditions were identified.

Wildlife, Fish, and Rare Plants Program

The Southwestern Region of the Forest Service contains some of the most diverse fauna and flora in the nation, including a high number of federally threatened and endangered, and Forest Service sensitive species with unique habitats. The Southwestern Region of the Forest Service has the responsibility for managing 45 federally listed species, 2 proposed species to date, 3 experimental populations, and 10 candidate species. In addition, several species have designated critical habitats or proposed critical habitats. Several of the National Forests in the Southwestern Region support local endemic species and often contain the entire range of a particular species on one Forest. For example, the Coronado NF contains the entire range of the threatened Sonora chub. Below is a summary of the Wildlife Program including the use of indicator species and how the Forest Service tracks and reports accomplishments within this program.

The Wildlife, Fish, and Rare Plants Program (Wildlife Program) involves a variety of activities conducted by the Forest Service and its partners including inventory and monitoring; habitat assessments; habitat improvements through land treatments and structures; species reintroduction; development of conservation strategies; research; and education. The Wildlife Program manages habitats for all existing native and desired non-native wildlife and fish in order to maintain viable populations pursuant to NFMA (FSM 2620.1). Management indicator species (MIS) have been chosen for each Forest during the LRMP development to represent overall condition for wildlife, fish, and rare plants (36 CFR 219.19). These MIS can be a species or a group of species with similar habitat relationships or habitats of high concern. Conservation strategies are also to be developed for sensitive species designated by the Regional Forester that are not listed under the ESA.

The biological assessment states that habitat planning and evaluation are integral to meeting the goals for ensuring the continued existence of wildlife on National Forest System lands in the Southwestern Region (U.S. Forest Service 2004:86). Acres of habitat treated and structures installed have been used as the measurement in reporting success of the habitat capability of the targeted species (U.S. Forest Service 2004:86). Habitat treatments include browse coppicing, forage enhancement, forage seeding, fertilization, prescribed burning, browse planning, wetland enhancement, and meadow enhancement and aspen regeneration. Wildlife structures include bird houses/nest boxes, cavity creations, water guzzlers, gates, nesting islands, debris piles for small mammals, water and trick tanks (not related primarily to range improvements), salt and minerals blocks, interpretive signs, wildlife fences, and pond development.

Wildlife Program accomplishments have been reported in annual Management Attainment Reports. Beginning in 1994, targets within these reports were changed in an attempt to improve Forest Service accountability, tracking, and budget planning. Thus, comprehending Forest Service accomplishments within the Wildlife Program in the past several years is extremely problematic. A simple count of structures installed displays considerable variability between the National Forests and National Grasslands in the Southwestern Region. Because structures vary greatly in what they are comprised of, it is difficult to draw significant conclusions from the number of structures reported. For instance, the Tonto NF installed thousands of fish structures

in reservoir habitat from 1990-1992 which benefited primarily non-native warm water sport fish. Another Forest may have installed an “in stream” barrier to fish migration at a considerable expense that benefited Apache trout or Gila trout; however, there is no way to determine what type of structures was actually accounted for or what species was targeted in many cases. However, because of the distribution of fish on each Forest, some conclusions can be generally drawn on some Forests as to which group of fishes may have benefited from the structures.

To summarize, and as stated above, the proposed action is the continued implementation of the programmatic direction of 11 National Forest LRMPs and the Forest Service’s 1996 Regional Amendment. Within each of the eight programs mentioned above are S&Gs within these LRMPs that provide a programmatic framework for future management actions on National Forest System lands. The proposed action also includes on-going actions which may not have an associated project. For example, an S&G that allows for dispersed camping is an action that is continuous. In addition, and as part of the proposed action, the Forest Service developed conservation measures for four listed species (see below).

Conservation Measures

In response to concerns regarding the current status of four species, and after thorough review of their environment baseline, the Forest Service and FWS cooperatively developed a set of conservation measures for each of these species. These conservation measures were provided to the FWS on February 2, 2005, in the form of a supplement to the April 8, 2004, biological assessment. The four species included in the supplement are the spikedace, Little Colorado spinedace, Chiricahua leopard frog, and Sacramento prickly poppy. The conservation measures specifically address issues related to the long-term conservation of the species on National Forest System lands in the Southwestern Region. These conservation measures were included to become part of the proposed action and were analyzed as part of the proposed action by the FWS.

Spikedace

The Forest Service has agreed to implement the following conservation measures for the spikedace:

Conservation Measure #1: Design projects in occupied spikedace habitat on National Forest System lands which address the appropriate components of the spikedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spikedace.

Conservation Measure #2: Cooperate with state game and fish agencies, other federal agencies, Forest Service research stations, FWS, and others (universities, etc.) to assess and prioritize habitat of stream and river segments for potential spikedace reintroduction. Cooperatively document the results in an annual report to the FWS.

- a. Determine necessary habitat and watershed improvements in occupied watersheds and watersheds identified as high priority reintroduction sites and implement projects needed to contribute to recovery.

Conservation Measure #3: Participate in ongoing efforts initiated in 2003 involving state agencies, other federal agencies, universities, Forest Service research facilities, and FWS to document the current state of knowledge regarding the spikedace. Cooperatively develop a conservation assessment and strategy for the spikedace. Target the completion of this effort within 1.5 years.

- a. Identify existing populations in imminent need of protection and develop and implement, to the extent possible by the Forest Service, a strategy for protecting the population and reducing threats to the population.

Conservation Measure #4: With state agencies and other researchers (i.e. academic and Forest Service), who are currently monitoring spikedace populations, participate in the development of a consistent monitoring methodology for spikedace, their associated habitat, and co-occurring aquatic species. Cooperatively document the results in an annual report to the FWS.

Conservation Measure #5: To the extent feasible within the mission and capabilities of the Forest Service, assist the FWS, AGFD, and the NMDGF with any spikedace reintroduction effort.

Conservation Measure #6: Within the mission and capabilities of the Forest Service, assist the FWS, other federal agencies, state agencies, universities, and others in the development of a captive spikedace propagation program designed to augment wild populations.

Conservation Measure #7: The long-term benefits directly attributable to wildland fire use for resource benefits is the reduction of catastrophic fire. This is very significant to long-term land management goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems. That said, the Forest Service agrees to the following:

- a. **Pre-ignition Planning:** Maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

- b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.

- During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.
- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

Little Colorado River Spinedace

The Forest Service has agreed to implement the following conservation measures for the Little Colorado River spinedace:

Conservation Measure #1: Design projects in occupied Little Colorado spinedace habitat on National Forest System lands which address the appropriate components of the Little Colorado spinedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Little Colorado spinedace.

Conservation Measure #2: Over the next two years, the Forest Service, in Cooperation with other state agencies and federal agencies, universities, Forest Service research facilities, and FWS will assess and prioritize habitat stream and river segments on National Forest System lands for potential Little Colorado spinedace reintroduction. Cooperatively document the results in an annual report to FWS.

Conservation Measure #3: To the extent feasible within the mission and capabilities of the Forest Service assist the FWS, and AGFD with any Little Colorado spinedace reintroduction efforts.

Conservation Measure #4: With state agencies and other researchers (i.e. academic and Forest Service), who are currently monitoring Little Colorado spinedace populations, participate in the development of a consistent monitoring methodology for spinedace, their associated habitat, and co-occurring aquatic species. Cooperatively document the results in an annual report to the FWS.

Conservation Measure #5: The long-term benefits directly attributable to wildland fire use for resource benefits, is the reduction of catastrophic fire. This is very significant to long-term land management goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems. That said, the Forest Service agrees to the following:

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in GIS layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

- b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.

During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.

- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

Chiricahua Leopard Frog

The Forest Service has agreed to implement the following conservation measures for the Chiricahua leopard frog:

Conservation Measure #1: Design projects in occupied Chiricahua leopard frog habitat on National Forest System lands which address the appropriate components of the Chiricahua leopard frog recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Chiricahua leopard frog.

Conservation Measure #2: Over the next five years, cooperate with state game and fish agencies, other federal agencies, Forest Service research stations, FWS, and others (universities etc.) to assess and prioritize habitat for potential Chiricahua leopard frog reintroduction. Cooperatively document the result in an annual report to the FWS and to the extent feasible within the mission and capabilities of the Forest Service assist the with any Chiricahua leopard frog reintroduction efforts.

Conservation Measure #3: Implement, as appropriate, recommendations to minimize the effects of stock pond management and maintenance identified in the final recovery plan for the Chiricahua leopard frog.

Conservation Measure #4: Continue to implement the standardized interagency monitoring protocol for Chiricahua leopard frogs.

Conservation Measure #5: The long-term benefits directly attributable to wildland fire use for resource benefits, is the reduction of catastrophic fire. This is very significant in goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and

intensity outside historic ranges of variability which are highly detrimental to aquatic systems. That said, the Forest Service agrees to the following:

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in GIS layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

- b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.

During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.

- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

Sacramento Prickly Poppy

The Forest Service has agreed to implement the following conservation measures on the Lincoln NF for the Sacramento prickly poppy:

Conservation Measure #1: Annually protect newly emerging seedlings from trampling on National Forest System lands.

Conservation Measure #2: Within the mission and capability of the Forest Service, participate with state and federal agencies, Forest Service research and others (i.e., universities, etc.) to identify genetic factors essential to future reintroduction efforts and improve our collective understanding of the poppy's ecology in relation to habitat improvement and species recovery.

Conservation Measure #3: On National Forest System lands limit Off-Highway Vehicle use to established routes.

Conservation Measure #4: To the extent feasible within the mission and capabilities of the Forest Service, assist in the propagation and reintroduction of Sacramento prickly poppy.

Description of the Action Area

The action area for this consultation is defined as all lands that the Southwestern Region of the Forest Service manages, plus adjacent lands that the proposed action may directly or indirectly affect. This includes the 11 National Forests in Arizona and New Mexico and the four National Grasslands in New Mexico, Texas, and Oklahoma, comprising approximately 19 million acres (see Figure 1). Six National Forests occur in Arizona: Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott, and Tonto. The five National Forests in New Mexico are the Carson, Cibola, Gila, Lincoln, and Santa Fe. Portions of the Apache-Sitgreaves and Coronado occur in New Mexico. The Cibola manages three National Grasslands that include Black Kettle, located in Oklahoma; Kiowa/Rita Blanca and McClellan National Grasslands, located in New Mexico, Texas, and Oklahoma.

The action area contains a diversity of vegetative land-cover types, ranging from the Southern Rocky Mountains in northern New Mexico, to the southern Great Plains in Texas and Oklahoma, to the Chihuahuah and Sonora Deserts in southern New Mexico and Arizona. The Forest Service's 2004 biological assessment provides a detailed discussion of these land-cover types (see U.S Forest Service 2004:15-19).

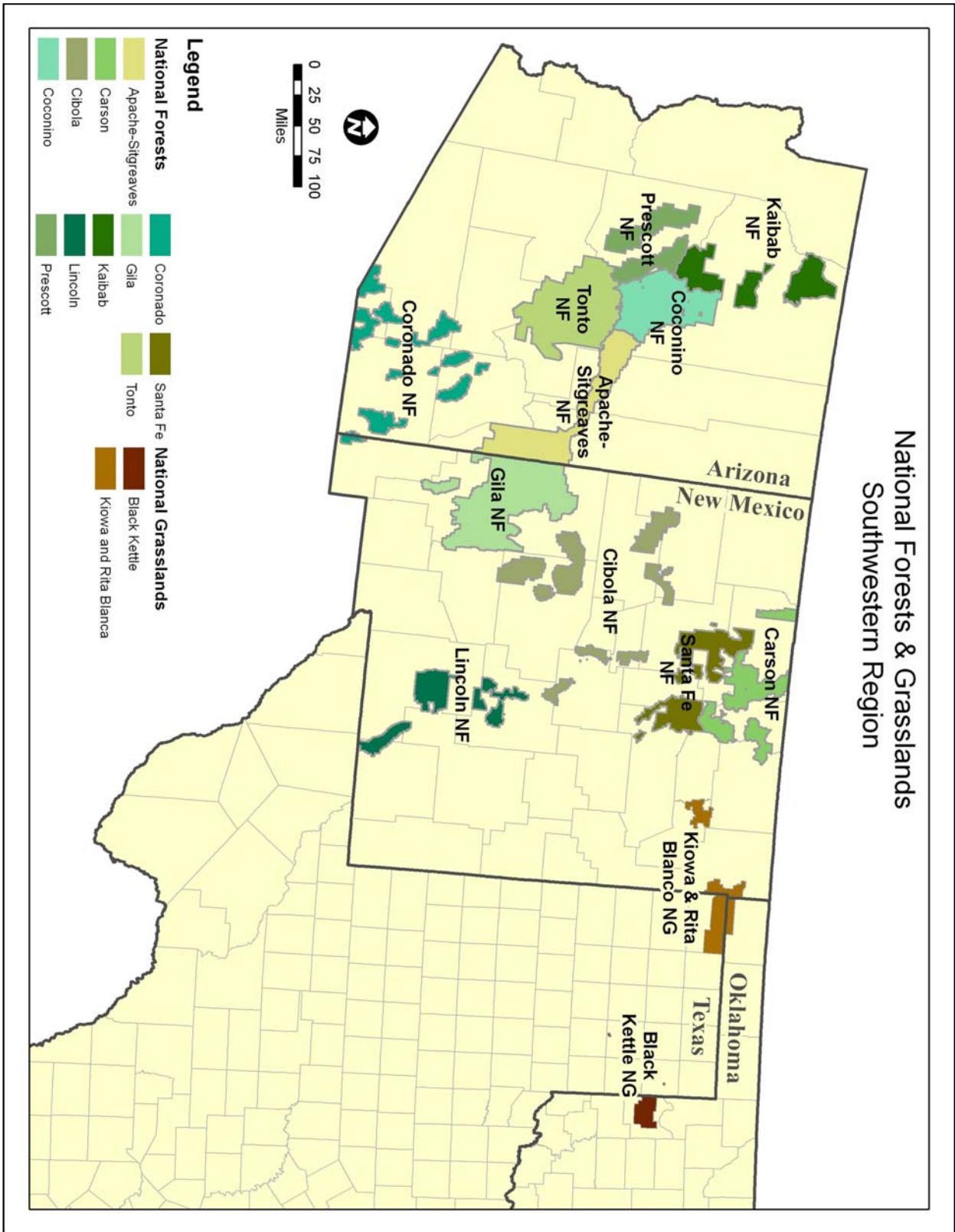


Figure 1. National Forests and Grasslands Southwestern Region

CONSULTATION APPROACH

The purpose of this section is to articulate the FWS's approach to this programmatic consultation in order to clearly present the chain-of-logic supporting our determinations. Due to the relatively large number of species considered under this consultation, the extensive number of Forest Service S&Gs analyzed, as well as the complexity of each of the eight Forest programs, the FWS has taken an analytical approach to conducting this consultation. The approach described below included deconstructing of the proposed action, diagnosing the species' status, establishing the species' condition within the action area, analyzing the effects, and finally, putting it back together to make our conclusions.

The methodology and analysis process is discussed below. Each heading represents a step in the process of this consultation, and also reflects the sections of the biological and conference opinion. The approach used is consistent with the 1998 Consultation Handbook and the implementing regulations at 50 CFR § 402.

Deconstructing the Proposed Action

The FWS began this consultation by first "deconstructing" the proposed action. Deconstructing the proposed action into its component parts is the process by which each individual aspect of the action is identified, along with its potential effects. The FWS deconstructed the proposed action into the Forest Service's eight programs, and further examined these programs through the associated S&Gs (see below). The action area was also identified during the deconstructing process, as well as during the analyses of potential effects, both indirect and direct, to each species. The proposed action was extremely complex, consisting of numerous smaller actions within each of the eight programs. For example, the Engineering Program includes the management of classified and unclassified roads (i.e., user-created roads), culverts, bridges, and other structures, as well as environmental clean-up. Each of these activities has the potential to affect listed species in different ways. Fish and Wildlife Service biologists took time to discuss and thoroughly understand each program being consulted on, which required numerous in-depth meetings with the Forest Service. Thus, deconstructing the action into their constituent elements made it easier to identify various aspects of the actions that have implications on listed species, assess the effects of the complexity of the actions on the species, and retrieve information on their effects.

Diagnosis of the Species' Status

This section presents the biological or ecological information relevant to formulating this biological opinion. Appropriate information on the species' description, habitat, life history, population dynamics, and threats (current and those stated as reasons for listing) to provide background for analyses in later sections and to ensure that an accurate effects and risk analysis (i.e., jeopardy/adverse modification analysis) could be completed. Further, we identified recovery and/or conservation measures implemented by the Forest Service or ones that are in progress. Designated and proposed critical habitat is also discussed as appropriate.

For development of the Status of the Species sections, the FWS used information in species recovery plans, listing documents, publications, unpublished reports and data, and the biological assessment in order to articulate the status of each species within this opinion. In addition, we

engaged in numerous discussions (i.e., meetings and conference calls) with species experts both within and outside the FWS in order to have an overall understanding of each species' biology and current status.

Establishment of the Species' Condition within the Action Area

The species condition or status within the action area is discussed in the Environmental Baseline section. This section includes the effects of past and present human and natural factors leading to the current status of the species and its habitat (including designated or proposed critical habitat) within the action area. Two subsections of the Environmental Baseline include the status of the species within the action area, and the factors affecting the species environment within the action area. The Environmental Baseline section is used as a reference point for evaluating the effects of the action; thus a prelude into the Effects of the Action section.

Analysis of Effects

After collecting a comprehensive list of each National Forest's S&Gs that directly or indirectly affected listed, proposed, or candidate species and critical habitats, Forest Service biologists recorded all S&Gs by National Forest by species on excel spreadsheets (see Appendix H of the biological assessment). Forest Service biologists ranked each S&G as having a positive, negative, or neutral effect for each species and any proposed or designated critical habitats. However, the biological assessment only provided a list of the S&Gs that were ranked and not the actual ranking. These data were eventually provided to the FWS during the development of this biological opinion and are contained in the administrative record. The Forest Service's biological assessment describes their approach to this consultation in detail (see Forest Service 2004: 97-98). In addition, the Forest Service provided the FWS with maps of the locations of federally-listed, candidate, and proposed species and critical habitats within the action area.

Assumptions

In order to make determinations of effects to listed species, proposed, or candidate species, and proposed or designated critical habitats, the Forest Service made two primary assumptions about the implementation of the 11 LRMPs. These assumptions are as follows:

1. The National Forests will implement site-specific management actions to move toward land management goals and desired future conditions for various resources, with the caveat that available funding and other LRMP direction will control the actual extent and intensity of these site-specific management actions;
2. The S&Gs in the LRMPs will be followed when selecting, planning, and executing site-specific management actions. In addition, should a site-specific action not follow the S&Gs, the action must be modified or the LRMP must be amended before the action can be allowed.

The FWS concurred with the two assumptions stated above. However, based on the large amount of uncertainty surrounding how the S&Gs are implemented and exactly which ones are used during project development, it was necessary for the FWS to make additional assumptions regarding this consultation. Our assumptions are as follows:

3. Site-specific projects will conform to the S&Gs, as well as the programmatic framework established in the LRMPs.
4. Land managers use and/or implement the S&Gs at every level of planning (i.e., forest-wide, management areas, and project level).
5. Due to their broad scope, the S&Gs may be interpreted and applied differently depending upon the forest planner and interdisciplinary teams.
6. Implementation of the S&Gs will have varying degrees of effects on the species analyzed.

Exposure/Response Analysis

The FWS’s analysis of each National Forest’s S&Gs was based on the premise that the implementation of the S&Gs will have an effect on the species. Thus, our assessment of all S&Gs was based on an “exposure” and “response” analysis. The exposure analysis was used to identify what the species would conceptually be exposed to relative to the S&Gs. A similar analysis was completed for proposed or designated critical habitat for listed species (see below). Once the potential for exposure is established, a response analysis can be conducted. The response analysis was used to determine how listed species are likely to respond after being exposed to a given Forest Service action implemented through the S&Gs. In the majority of cases, we could establish a relationship between any change in habitat and the species’ response to that habitat change; thus, establishing a range of responses. We articulated these responses in terms of a ranking system for animal and plant species. (See Figures 2, 3, and 4).

Figure 2. Schematic used to rank Forest Service S&Gs that were considered beneficial to the species.

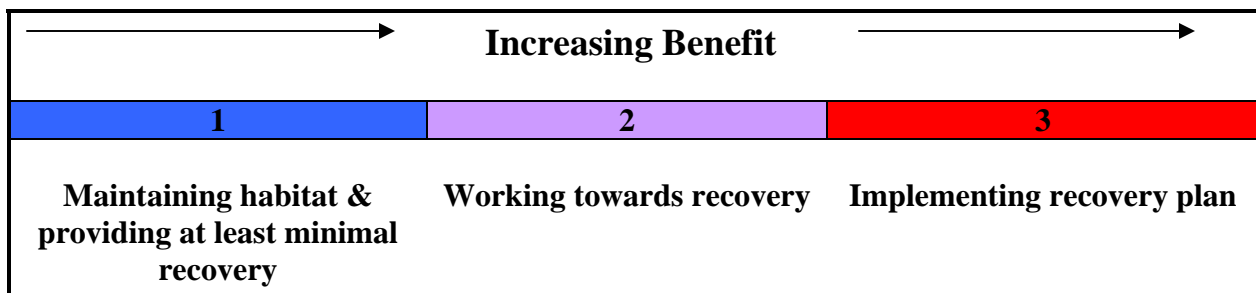


Figure 3. Schematic used rank Forest Service S&Gs that were considered having negative effects to animal species.

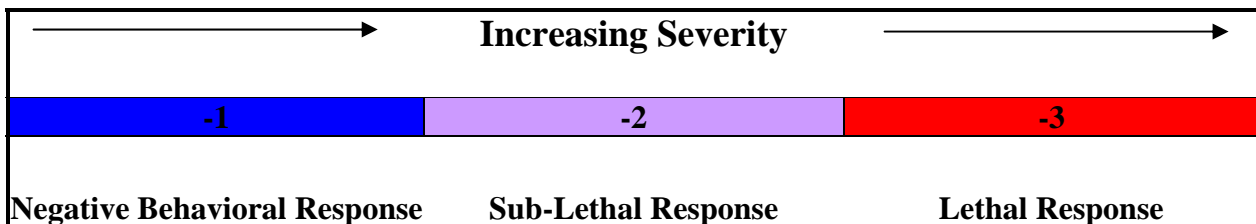
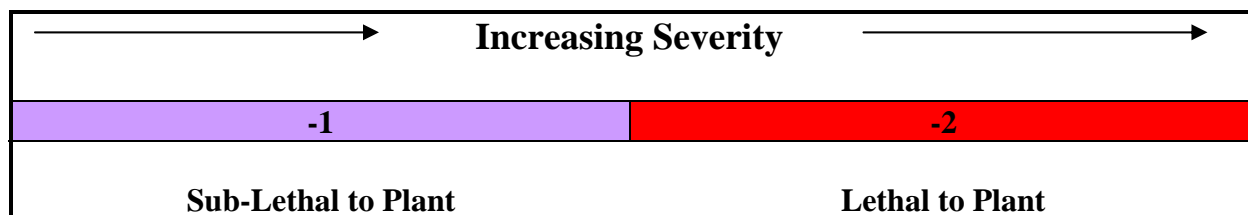


Figure 4. Schematic used to rank Forest Service S&Gs that were considered having negative effects to plant species.



Using the exposure/response schematic detailed in Figures 2-4, the FWS designed a ranking system for the effects of the S&Gs to each species. The Forest Service’s excel spreadsheets (see Appendix H in biological assessment) were used as data sheets, for which the FWS assigned each S&G a numerical code developed specifically for this consultation. The numerical codes and their meanings are shown in Table 3 below. Biologists from the FWS, with assistance from Forest Service biologists, discussed, debated, and concluded on a ranking for each species. This method, known as the Delphi Model, is often used by scientists. The Delphi technique elicits information and judgments from participants to facilitate problem-solving and decision making. The Delphi Model was chosen to capitalize on the merits of group problem-solving and minimize the liabilities of group problem-solving (Dunham 1998).

The numerical codes shown in Table 3 were summarized for each species. These rankings provided a starting point for analyzing the effects of the action. We also referred back to the LRMP for a given Forest for further information (see below).

Table 3. Standards and Guidelines ranking system used by FWS biologists for purposes of this consultation.

Ranking	Explanation of Ranking
-3	S&G is causing lethal response
-2	S&G is causing sublethal response
-1	S&G is causing negative behavioral response
0	S&G is ill-defined and/or open to interpretation
1	S&G is maintaining habitat & providing at least minimal recovery
2	S&G is moving towards recovery
3	S&G is implementing species recovery plan
Y	S&G has no application to the species
Z	S&G implementation is non-discretionary
X	S&G is a heading

Beneficial Effects: For those S&Gs with positive effects to species, the FWS assigned a ranking of 1, 2, or 3. A ranking of a 1 concluded that implementation of that particular S&G would provide for maintaining a species habitat at current levels and/or provide for minimal recovery actions (i.e., does not impede recovery of the species). For example, an S&G that states to “maintain or improve occupied habitat of listed threatened and endangered species” would be

given a ranking of 1. During the response analysis process, the FWS found many S&Gs were designed with the intention of having a long-term positive impact on natural resources. However, the potential for short-term negative effects from the implementation of a positive S&G exists. For example, an S&G that would implement a fuels reduction project with an over-all benefit to a species such as the Mexican Spotted Owl, could include short-term disturbance from the prescribed burning activities. In order to take into account potential short-term effects of an S&G otherwise intended to have positive effects, the FWS noted these in our data sheets as over-all positive for the species, but with short-term negative impacts. These S&Gs are discussed in the Effects of the Action section for each species, with take assigned as needed for any short-term harm or harassment.

Standards and Guidelines were given a ranking of 2 if the S&G referenced approved recovery plans for listed species. For example, an S&G that states a certain action will follow guidelines within species recovery plans, was given a ranking of 2. Those S&Gs that directly state a species will be recovered or delisted in accordance with species recovery plans, were given a ranking of 3. Figure 2 illustrates the range of positive responses for both animals and plants.

Negative Effects: For those S&Gs with negative effects to species, we assigned a ranking of -1, -2, or -3. These ranking reflected negative behavioral responses -1, sublethal -2, or lethal -3. A negative behavioral response was concluded if the S&G would cause a species to flush, avoid an area, or other disruptions in normal behavioral patterns. The individuals exposed to this type of activity could sustain the exposure over an extended amount of time without mortality being the end result. For example, an S&G that implements dispersed recreation in riparian areas where Southwestern Willow Flycatchers may be present that could cause nest abandonment would be given this ranking. Negative behavioral responses were then discussed in our incidental take statements under the definition of harassment. Pursuant to 50 CFR 17.3, harass in the definition of take is defined as intentional or negligent actions which creates the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering.

An S&G was given a ranking of -2 if it caused some type of sublethal response when implemented. Sublethal is defined in this biological opinion as causing a response that is not immediately lethal, but could become lethal if sustained for an extended period of time. This would also result in harm to the species if the exposure is allowed to persist to the point of death. For example, an S&G that emphasized pesticide use in certain areas could reduce a species prey base; thus, it was given a ranking of -2. Those S&Gs, when implemented, that were capable of causing death were (i.e., lethal) were given a ranking of -3. For example, an S&G allowing the use of cyanide leaching ponds for minerals development could cause mortality of bats and possibly some birds; thus, given a ranking of -3. Figure 3 illustrates the range of negative responses that could occur to animals through implementation of the S&Gs, and Figure 4 illustrates the range of negative responses that could occur to plants. The negative ranking system used for animals and plants differs slightly (see Figure 4 above). Lethal and sublethal were then discussed in our incidental take statements under the definition of harm. Harm in the definition of take in the ESA means an act which actually kills or injures wildlife. Such an act may include habitat modification or degradation that results in death or injury to listed species by

significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3).

Although we ranked some S&Gs as having a negative response for a given species, take was not always anticipated. For example, we analyzed the desert pupfish on the Coronado NF, although the species does not occur on that Forest. These analyses were completed at the request of the Forest Service in the chance that the species becomes present on the Forest in the future. Lastly, it should be noted that we evaluated incidental take by program as a whole based on the analysis of the S&Gs (see below).

Other Rankings: Standards and Guidelines were given a ranking of 0 for situations in which a species' exposure, and thus its response, to a given Forest Service action (i.e., an S&G) was unable to be determined. An exposure/response determination could not be made after much discussion because such S&Gs were ill-defined in the context of this analysis. Without a clear understanding of how particular S&Gs may affect listed species, the FWS cannot be reasonably certain that the implementation of these S&Gs is likely to result in take of a species. Furthermore, a ranking of 0 is not meant to imply neutrality or some other balance of positive or negative effects. The assignment of 0 was chosen for our purposes, but any other number or letter could have been used. Although the effects from implementation of 0-ranked S&Gs is unknown, these S&Gs were maintained in the analysis for each species because the FWS believes the indemnification of ill-defined S&Gs relative to potential effects on listed species may be constructive in future Forest Service planning efforts. Each conclusion, as well as its associated incidental take determinations, is not based on individual S&Gs, but rather the analysis of each National Forest LRMP as a whole, defined in the eight programs and their associated S&Gs (see below).

Other rankings were given to S&Gs not considered in the exposure/response analysis. Such S&Gs include those that are merely headings (i.e., merely provided a title for subsequent S&Gs); thus, were coded as "X". Standards and Guidelines for which the Forest Service analyzed, but the FWS biologists did not believe were applicable to the species were coded as "Y". Further, some S&Gs included non-discretionary language, thus coded as "Z". For example, one S&G stated that "consultation will be initiated for situations where federally listed or proposed listed species may be affected." Coding S&Gs in this way provided for an administrative record of the S&Gs analyzed by the Forest Service and the FWS's subsequent analysis.

Reconstructing the Proposed Action

Once the deconstruction of each LRMP (= the proposed action) was complete and each relevant S&G had been assessed, we then reconstructed the LRMP. This involved rolling up all the individual S&Gs within each of the eight program areas under a given LRMP. We were then able to evaluate the dispersion characteristics of the collective S&G exposure-response assessments for each of the program areas. Evaluation of the collective S&G exposure-response assessments provided strong insight as to the potential effects of program implementation to each species.

As stated above, a major assumption stated by the Forest Service (U.S. Forest Service 2004) is that the S&Gs in the LRMPs will be followed when selecting, planning, and executing site-

specific management actions. Many S&Gs are used by the Forest Service during project development. The evaluation of the numeric effects analysis did not involve balancing or averaging the ranking, thus, the full suite of S&Gs are available for the Forest Service to use in their decision-making framework. In addition, at no time did the FWS establish *a priori* a level or percentage of negative S&Gs among Forests for a particular species that would equate to a conclusion of jeopardy to the species.

While deconstructing and subsequent reconstructing of each program within each LRMP provided a quantitative assessment of potential effects from ongoing and future program implementation, the final collective S&G exposure-response assessments were not sufficient in and of themselves to fully derive the jeopardy analysis. Having quantified potential effects of program implementation, it was also essential to compare this information with an accurate assessment of the status of each species. An assessment of each species' status involved a thorough investigation of the numbers of individuals and their distribution across the landscape, including within the boundaries of the National Forests. We reviewed existing literature, monitoring reports, and personally interviewed species experts from within the FWS, other federal agencies, the states, and academia to determine an accurate accounting of status for each of the 36 species in the consultation.

Critical Habitat Analysis

Recent litigation has focused on the regulatory standard for determining whether proposed federal agency actions are likely to result in the "destruction or adverse modification" of designated critical habitat under Section 7(a)(2) of the ESA. On August 6, 2004, the Ninth Circuit Court of Appeals rendered a decision in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279, finding that the FWS's regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. § 402.02 is contrary to law. Therefore, this biological opinion does not rely on the regulatory definition of "destruction or adverse modification" of critical habitat at 50 C.F.R. § 402.02. Rather, the FWS has relied upon the statutory provisions of the ESA to define "conserve" and "critical habitat" for interpreting the meaning of "destruction or adverse modification" with regards to the analysis of critical habitat. Destruction or adverse modification determinations will be made using the analytical framework described above.

For listed species with proposed or designated critical habitat, the FWS analyzed the direct and indirect effects of the proposed action, and those actions interrelated and interdependent of the proposed action on proposed or designated critical habitat. The critical habitat analysis identified how the primary constituent elements (PCEs) or biological features essential to the conservation of the species are likely to be affected, and in turn, how that will impact the function and conservation value of the associated critical habitat unit(s).

The following contains the jeopardy analysis for each of the 36 listed species arranged in the following order: mammals, birds, amphibians, reptiles, fish, invertebrates, and plants. The status of the species, environmental baseline, effects of the action (which includes cumulative effects), conclusion, and incidental take statements are provided for each species henceforth. In the effects of the action section, we evaluated all eight of the Forest Service programs within the appropriate LRMPs for each species. The discussions within the effects of the action section

address the pertinent S&Gs that had effects (both adverse and beneficial) to species as well as which S&Gs would cause take of listed species. Finally, standard language for the disposition of dead, injured, or sick federally listed species as well as a reinitiation statement and literature cited section is contained at the end of this biological opinion.

LESSER LONG-NOSED BAT

STATUS OF THE SPECIES

Description

The lesser long-nosed bat (*Leptonycteris curasoae yerbabuena*) is one of four members of the tropical bat family Phyllostomidae found in the United States. It was formally separated from the greater long-nosed bat (*L. nivalis*) by Hoffmeister in 1957. Despite confusing nomenclature, *L. sanborni* is sometimes called *L. yerbabuena*. However, there is general agreement that *L. nivalis* and *L. sanborni* are distinct species separated by cranial and dental characteristics.

The lesser long-nosed bat is a medium-sized bat with grayish to reddish-brown fur. Juveniles have gray fur. Its elongated rostrum bears a small, triangular noseleaf, its ears are relatively small and simple in structure, and it has a minute tail (U.S. Fish and Wildlife Service 1997:2).

Legal Status: On September 30, 1988, the lesser long-nosed bat was listed as an endangered species under the ESA (U.S. Fish and Wildlife Service 1988). Critical habitat has not been designated for the species. A recovery plan for the lesser long-nosed bat was signed March 4, 1997. According to the Recovery Plan for this species, considerable controversy has developed between members of the scientific community familiar with the lesser long-nosed bat since the listing in 1988 (U.S. Fish and Wildlife Service 1997:1). The debate among scientists regarded the actual population size and the listing status for this species.

Distribution and Abundance

The lesser long-nosed bat is found throughout its historical range from southern Arizona and extreme southwestern New Mexico through western Mexico and south to El Salvador. It is found in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains and southeast to the Chiricahua Mountains. In New Mexico, it occurs in the Animas and Peloncillo Mountains. The species is not present in Arizona or New Mexico in the winter (Hinman and Snow 2003). Occasionally, individuals have been reported outside of this range; for example, there are records of individuals from the Phoenix area and the Bill Williams River during July and August.

Arizona and New Mexico are at the extreme northern edge of the lesser long-nosed bat's range. Wilkison and Fleming (1995) indicated that there were 16 known large roost sites in Arizona and Mexico. According to surveys conducted in 1992 and 1993, the number of bats estimated to occupy these sites was greater than 200,000. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same surveys (Wilkison and Fleming 1995), the maternity roosts are occupied by over 150,000 lesser long-nosed bats (U.S. Fish and Wildlife Service 1995). All known maternity roosts and post-maternity roosts are located within southern Arizona.

Habitat

Within the United States, habitat types for the lesser long-nosed bat include mostly arid regions, such as desert grasslands and shrub land. Farther south, the lesser long-nosed bat occurs at high elevations on wooded mountains. Two sets of resources, suitable day roosts and suitable

concentrations of food plants, are critical for the lesser long-nosed bat. Caves and mines are used as day roosts, with documentation showing that the species will fly long distances from roost sites to forage (Dalton et al. 1994, U.S. Fish and Wildlife Service 1997). Factors that identify potential roost sites as being “suitable” have not yet been identified, but maternity roosts tend to be very warm and poorly ventilated (U.S. Fish and Wildlife Service 1997:5). Such roosts reduce the energetic requirements of adult females while they are raising their young (Arends et al. 1995).

Like many other bats, individuals of this species use night roosts for digesting their meals. These roosts include the bats’ day roosts as well as other caves, mines, rock crevices, trees and shrubs, and occasionally abandoned buildings (Cockrum and Petryszyn 1991, Hoyt et al. 1994). The extent to which night roosts represent essential habitat in this species is currently unknown.

Food and Foraging Habitat: Food requirements of the lesser long-nosed bat are very specific. The lesser long-nosed bat is a nectar-, pollen-, and fruit-eating bat, primarily feeding upon Palmer’s agave (*Agave palmeri*), Parry’s agave (*A. parryi*), desert agave (*A. deserti*), and amole (*A. schotti*). Cacti fed upon include saguaro (*Carnegiea giganteus*) and organ pipe cactus (*Stenocereus thurberi*). Because of its very specific food requirements, the lesser long-nosed bat is considered a major pollinator and seed disperser of columnar cacti (e.g., saguaros) and paniculate agave. A panicle is a compound inflorescence in which the central stem (main stem) bears flowering branches which are themselves branched again. Agaves that produce flowers in this arrangement are called paniculate agaves.

Adequate numbers of flowers and/or fruits are required within foraging range of day roosts and along migration routes to support large numbers of this bat. Location of good feeding sites therefore plays an important role in determining availability of potential roosting sites, and roost/food requirements must be considered jointly when discussing the habitat requirements of this bat. A suitable day roost is probably the most important habitat requirement, but potentially suitable roosts must be within reasonable foraging distances of sufficient amounts of required foods before they will be used by this bat.

Studies have shown the lesser long-nosed bat flying long distances of at least 30 miles at times from roost to foraging sites (Dalton et al. 1994, Horner et al. 1990, 1998). Lesser long-nosed bats are efficient fliers, capable of flight speeds up to 14 mph (23 km) per hour (Sahley et al. 1993), and often foraging in flocks. Horner et al. (1998) stated that the foraging behavior of *L. curasoae* is characterized by relatively long commuting flights, consistent short-term use of a foraging area of about 1 km², occasional long forays to night roosts or other areas, and visits to many flowers scattered over many plants. Bats spend the early part of the evening visiting plants without feeding, apparently to gather information on the location of open flowers, and then do most of their feeding between 24:00 and 02:00 after flowers have accumulated substantial amounts of nectar (Horner et al. 1998).

Nectar and pollen from flowers and fruits provide nearly all the energy and nutrients obtained by these bats, particularly by pregnant and lactating females roosting in the Sonoran desert in the spring and early summer. *L. curasoae* is found in warm, poorly ventilated caves where large numbers of individuals congregate tightly to keep warm to avoid spending energy on the

maintenance of body temperature (Arends et al. 1995). Pollen is likely to be critical in providing essential amino acids to bats (Howell 1974), however, the carbohydrates within the nectar within flowering food plants provides the bats with its energetic needs. In addition, bats depend on cacti and agave flowers for their reproductive success (Petit and Pors 1996). Bats commonly reproduced during periods of high food availability (Heithaus 1982, Racey 1982); reproductive periods of *L. curasoae* coincided with flowering peaks (Moreno-Valdez et al. 2004).

Concentrations of food resources appear to be patchily distributed on the landscape and the nectar of each plant species utilized is only seasonally available. Cacti flowers and fruit are available during the spring and early summer; blooming agaves are available through the summer, primarily from July through early October, though Parry's agave blooms earlier. Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in high elevation desert-scrub areas, desert grasslands and shrublands, and into the mountains. Interestingly, the bats are generally considered to time their movement and feeding to the progression of flowering associated with these cacti and agaves. Many species of columnar cacti and agaves appear to provide a "nectar corridor" for lesser long-nosed bats as they migrate in spring from Central America and Mexico to as far north as southern Arizona, through fall when they return south (Gentry 1982, Flemming et al. 1993, Slauson et al. 1999).

Life History

The species does not hibernate in the winter, therefore it resides in both New Mexico and Arizona until mid-September to late October before departing for Mexico and Central America (Cockrum and Petryszyn 1991; Hoyt et al. 1994; Sidner 1999). The species returns to the United States between April and early May. Once situated, pregnant females accumulate at roost sites, give birth, and raise their young. Current information suggests that most females bear only a single young per year and that timing of mating and parturition varies geographically (U.S. Fish and Wildlife Service 1997). Young are born usually in May, and can fly by the end of June. By late July most females and their young have moved to higher elevations (up to about 1,678 m or 5,500 ft) where they feed on agave flowers (Hinman and Snow 2003).

Population Dynamics

There continues to be much dispute and controversy among scientists regarding the actual population size (and its listing status) for the species. However, population data from Flemming (1997) showed that there were 16 known large roost sites in Arizona and Mexico. Surveys conducted in 1992 and 1993 estimated the number of bats that occupied these sites to be greater than 200,000. In Arizona and Mexico, twelve major maternity roost sites are known, with over 150,000 lesser long-nosed bats occupying these sites (U.S. Fish and Wildlife Service 1997).

Reasons for Listing

The primary reasons for listing the lesser long-nosed bat as an endangered species are as follows:

1. Long-term decline in population numbers;
2. Reports documenting its absence from previously occupied sites; and
3. Decline in the pollination of specific agaves.

Threats: Disturbance to major roost sites and destruction of food plants are the primary threats to this species. Whatever its day-roost location (see above), lesser long-nosed bats appear to be sensitive to human disturbance. According to the Recovery Plan for this species, a single brief visit is sufficient to cause a high proportion of lesser long-nosed bats to temporarily abandon their roost and move to another. Excess harvest of agaves in Mexico, collection of cacti in the U.S., and the other development may further contribute to the decline of this species.

Conservation Measures

In large part, conservation of the lesser long-nosed bat in Arizona is relatively straight-forward because most major maternity roosts and many of the transitory roosts known are on federally owned lands, specifically, National Forest System lands. According to the Recovery Plan, while food plants are protected under law by the state of Arizona, protection of food plants is not sufficient enough to safeguard viable populations over time. Thus, food plants need to be protected.

Annual surveys of known roost sites are conducted in Arizona and parts of Sonora by academia, federal and state agencies, and private entities (Hinman and Snow 2003). Additionally, several caves and mine adits in southeastern Arizona have been gated with “bat friendly” gates, with signage placed nearby. These caves and/or mines are monitored by Forest Service biologists and others. The Coronado NF funded a biologist to conduct an interagency exit count in 2001, and continues to participate in this effort annually (U.S. Forest Service 2004).

Several studies have been initiated within Arizona regarding agave ecology, (fire relationships on Fort Huachuca military reservation), foraging ecology in Sonora, and the effects of low-flying supersonic aircraft on the Barry M. Goldwater Air Force range. Further, according to Hinman and Snow (2003), the *Leptonycteris curasoae* recovery cooperative was formed in 2002 in order to encourage implementation of the 1997 recovery plan, with participants from the AGFD, Bat Conservation International, and the Arizona Sonora Desert Museum.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Lesser long-nosed bat roosts have been documented on the Coronado NF in both Arizona and New Mexico. While some potential habitat occurs on and adjacent to the Tonto NF (bats day roosting in the McDowell Mountains), the Coronado NF is the only National Forest on which its presence has been confirmed. Foraging occurs on the Coronado NF and may also occur on the Apache-Sitgreaves NF and the Gila NF (U.S. Forest Service 2004). There are no known maternity colonies on National Forest System lands in the Southwestern Region (U.S. Fish and

Wildlife Service 2002). Approximately 50 percent of the transitory roosts are known to occur on the Coronado NF (U.S. Forest Service 2004:113).

Lesser long-nosed bats have been recorded in southeastern Arizona as early as May, but these are mostly males and first-year females from scattered small roosts (T. Snow, AGFD, 2005, unpubl. data). Beginning in the mid-July, lesser long-nosed bats move to their transitory roosts. Arizona Game and Fish Department conducts simultaneous counts in August each year. Counts of lesser long-nosed bats from 2001-2004 show a relatively stable numbers, roughly 70,000 bats for the past four years (see Table 4). Because bats are known to forage long distances from their roosts, bats within any of these sites are most likely foraging on the Coronado NF.

Table 4. Simultaneous roost census (August) of *Leptonycteris curasoae* (T.Snow, AGFD, 2004, unpubl. data).

Site Name	2001	2002	2003	2004
	August 25	August 24	August 23	August 21
State of Texas (Coronado NM)	21,100	21,669	9,700	10,768+
Pyeatt Cave (Fort Huachuca)	2,000	7,461	4,024	6,232
Patagonia Bat Cave	41,500	12,842	25,000	20,000+
Mustang Mountains		12,283 +500	9,000	no change August 14
Buckalew Cave (Chiricahua Mtns.)	6,049	5752	not counted	not counted
Hilltop Mines (Chiricahua Mtns.)		90	100+	200
Kasper Tunnel Mine (Chiricahua Mtns.)	61	0	0	0
Lone Star Mine (Whetstone Mtns.)	470	1,000 (+300)	100+	38+ August 20
Rincon Gold Mine (Rincon Mtns.)	20	2,150 (+1,000)	0	12
Colossal Cave	0	0	0	0
Copper Mountain (Organ Pipe NM)	3,000 - 8,000 (estimated)	9,988	17,300	~15,000
Pinacate (Mexico)			1,699	7,486 (July 30 ~100,000)
Pine Canyon (New Mexico)				No estimate yet September 4
Total	74,200	74,945	66,923+	~ 68,724

Factors Affecting the Species within the Action Area

The Coronado NF encompasses all of the major mountain ranges in the southeastern portion of Arizona and a small portion of the New Mexico boot heel area. Within the Coronado, the sky island mountain ranges are divided into twelve Ecosystem Management Areas (EMAs). There

are four primary roost sites in the Chiricahua EMA; two of these sites have greater than 1,000 bats and one has greater than 3,000 bats. Within the Dragoon EMA, there is one primary roost site, although surveys have not been conducted throughout the entire EMA. In 2000, male lesser long-nosed bats were detected in the Galiuro EMA, but no roost has been found and no intensive survey work has been done. There are also at least two large roosts in the Santa Rita EMA, including one in Sawmill Canyon and one in a mine adit within one mile of the formerly occupied Cave of the Bells. Within the Pajarito Mountains, one roost has been found within the Tumacacori EMA. Foraging bats have been documented within the Pinaleno EMA and the Peloncillo EMA, but intensive surveys have not been conducted and there are no known roosts. Furthermore, although there are no recent records in the Santa Catalina EMA, there are roosts on neighboring Saguaro National Park and BLM lands, and bats could be foraging within the EMA (U.S. Forest Service 2004).

Agaves flower only once and then die. Livestock and wild herbivores feed on young agave stalks, which preclude the plant from flowering. Agave stalks are rich in carbohydrates, and as they begin to bolt, are particularly palatable to domestic livestock and wild herbivores (Howell 1996). Bolting means rapid expansion of internodes, increased height, and formation of flowers in otherwise rosette plants in response to cold or hormone application. The desirability of these stalks in early spring is likely influenced by availability of quality forage in the area. Agaves are most numerous where they occur as large clones in steep, rocky habitats largely unsuitable for livestock grazing. In lower gradient areas frequented by livestock, plants are found in smaller clones or as individual plants. The individual plants are low density, scattered throughout the landscape, and extremely susceptible to livestock herbivory. Widmer and McClaran (2001) studied the effect of livestock grazing on *A. palmeri*. Their results stated: 1) overall herbivory on agave stalks was 56 percent; 2) 1/3 of emerging inflorescence were grazed at 70 percent of the sites; and 3) herbivory on agave stalks was 29 percent greater on sites grazed by livestock during the agave bolting season. These plants likely provide connectivity for bats within and between mountain ranges. They also may provide an important mechanism that enables bats to effectively utilize and access high-density agave patches many miles from day roosts. Their presence may determine the amount of habitat available for bats and may be a key limiting factor in the recovery of populations (U.S. Fish and Wildlife Service 1997).

Based on research conducted by Ober et al. (2000) on the foraging ecology of lesser long-nosed bats on Fort Huachuca, the high energy demands of the bat coupled with the small amount of nectar per flower forces bats to visit many flowers per night. The daily expenditure of energy for lesser long-nosed bats may be 1.5-2 times as high as previously reported and thus the amount of food needed to support the bat population in southeastern Arizona may be greater than previously thought. Therefore, maintaining sufficient numbers of agaves as a food source appears to be very important. Ober et al. (2000) also found evidence that bats select areas with both high resource abundance and evidence of high resource abundance in previous years, suggesting that site fidelity may play a role in the bats' foraging behavior. A reduction in or fragmentation of *A. palmeri* populations could have serious effects on bat populations by increasing energy demands with resulting reductions in reproductive success and adult recruitment. It could also force them to roost in substandard areas or compete with one another for food at remaining plants. These negative effects would be even more noticeable during years

of low flower production. The density of flowering agaves on their study areas on Ft. Huachuca varied from 3.5 (1988) to 0.8 (1999) plants/acre within the bats' home range (Ober et al. 2000).

Saguaros are dependent on nurse plants to provide cover during their sensitive seedling stage. Livestock grazing may affect the density and distribution of nurse plants, increasing the mortality of saguaro seedlings. Benson (1982) noted that grazing destroyed seedbeds of saguaros. Neiring et al. (1963) found that enhanced reproduction of saguaros on slopes was correlated with reduced localized levels of grazing.

EFFECTS OF THE ACTION

The lesser long-nosed bat is only known to occur on the Coronado NF. At the request of the Forest Service, effects to lesser long-nosed bat on the Apache-Sitgreaves, Gila, and Tonto NFs were also analyzed because the species may forage on these Forests. However, we concentrated our effects analysis on the Coronado NF where the bat is known to occur.

Table 5. Summary of S&Gs considered for the lesser long-nosed bat.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4, 5, 7, 8,12, 14, 17-21, 26, 28, 31-33, 35, 37, 38, 42, 43, 49, 50, 52, 53, 55, 56, 58-60, 62, 63, 101-108, 166, 167, 171, 172, 179, 180
Coronado	612-629, 631-633, 635-638, 648-655, 666-670, 672-674, 682, 693-696, 697, 702, 704-713, 715, 724, 757, 761-764, 768-771, 774, 778, 779, 780, 781, 785, 793, 794, 796-800, 803-825, 828, 829, 830, 831-839
Gila	854, 856, 857, 861, 862, 864, 866-872, 873, 875, 876, 878, 880, 881, 957e, 957f, 957g, 957h, 957i, 957j, 957k, 957L, 957m
Tonto	1341, 1342, 1344, 1345, 1354, 1358, 1359, 1362, 1363, 1367, 1369, 1370, 1375, 1380-1382, 1384, 1385, 1387, 1420, 1423
1996 Regional Amendment	1510, 1511, 1512, 1513, 1514, 1515

Apache-Sitgreaves National Forest

Lesser long-nosed bats are not currently found on this Forest. However, there may be potential foraging habitat and thus, we analyzed the effects of the proposed action on this species at the request of the Forest Service. Our analysis of the Apache-Sitgreaves NF only found one S&G that, if implemented, could have a negative behavioral response (see Table 6 below). Only two Forest Service programs are discussed below; the Engineering and Wildlife programs were the only programs that we found to affect the lesser long-nosed bat.

Table 6. Effects of the S&Gs analyzed for the lesser long-nosed bat – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	1	2.2
0	S&G is ill-defined and/or open to interpretation	8	17.4
1	S&G is maintaining habitat & providing at least minimal recovery	25	54.3
2	S&G is moving towards recovery	3	6.5
3	S&G is implementing species recovery plan	1	2.2
Y	S&G has no application to the species	4	8.7
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	4	8.7
Total		46	100 %

Engineering Program

Standard and Guideline 63 states that total road density should average 3.5 mi/mi² or less. Open road densities should average 2.0 mi/mi² or less. We ranked this S&G as possibly causing negative behavioral responses to this bat. Roads can facilitate recreation in or near bat roosts, potentially causing disturbance and even abandonment. As stated above, lesser long-nosed bats appear to be sensitive to human disturbance and even brief visits by humans is sufficient to cause temporary abandon of roosts.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 4 allows the Forest to improve habitat for listed, threatened, endangered, or sensitive species of plant and animals and other species as they become threatened or endangered. Obviously implementation of this S&G will provide protection for the lesser long-nosed bat.

Overall, the S&Gs in the Apache-Sitgreaves NF’s LRMP are positive for the long-term conservation and recovery of the lesser long-nosed bat. Positive aspects of the National Forest S&Gs include an emphasis on threatened and endangered species via habitat management, area closure, land acquisition and recovery activities; guidance for OHV and road closures; regulated surface uses in mineral operations, and restricting private land access to a single road. Aspects of concern within the Apache-Sitgreaves NF’s LRMP are S&Gs that allow for relatively high total and open road densities. However, we do not anticipate that take of this bat will occur on this Forest because bats have not been found to occur on the Apache-Sitgreaves NF.

Coronado National Forest

The Coronado NF is the only Forest that contains known occurrences of this bat species. Over 61 percent of the S&Gs were positive for the species (i.e., maintaining habitat and/or providing at least minimal recovery). However, we found one S&G that would cause a lethal response to

bats if implemented and four that would cause sublethal responses if implemented (see Table 7 below).

Table 7. Effects of the S&Gs analyzed for the lesser long-nosed bat – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.9
-2	S&G is causing sublethal response	4	3.4
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	22	18.8
1	S&G is maintaining habitat & providing minimal recovery	61	52.1
2	S&G is moving towards recovery	14	12.0
3	S&G is implementing species recovery plan	12	10.3
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.7
X	S&G is a heading	1	0.9
Total		117	100 %

Fire Management Program

Standard and Guideline 695 allows the Forest Service to conduct fire suppression activities in a way to protect watershed and visual resource values. While this S&G, if implemented, would be positive for this species because it prevents loss of habitat if a wildfire were to burn in bat habitat.

More importantly, S&G 713 states that prescribed fire will be used to reduce fuel hazards, enhance wildlife values, and enhance visual resources. While prescribed fire is beneficial in many respects, fire could negatively affect the bats food plants. Thus, we ranked this S&G as being overall beneficial, but with some short-term adverse affects. Effects to the bat will depend on the overall success of the prescribed burn, intensity, and timing (see below). Slauson et al. (1999) studied how prescribed burning might impact nectar and pollen production and the reproductive success of Palmar agave, but more importantly, how fire may impact the use of agaves by bats in the Peloncillo Mountains. No significant differences were found in visitation of bats between burned and unburned plots. The mosaic burn pattern that resulted from the fire did not produce large contiguous areas without flowering agaves that were beyond the foraging distances of bats. The authors concluded that based on their results, burning did not impact overall bat food plants. However, they also state that additional study is also needed to understand bat foraging behavior more clearly and the long- and short-term effects of various burning frequencies and intensities on agaves. We conclude that take of bats (in the form of harassment) could occur indirectly as a result of short-term effects of reduced food plants from prescribed fire.

Forestry and Forest Health Program

Standard and Guideline 697 states that chemicals such as insecticides and rodenticides may be used (within guidelines approved by other agencies) in recreation areas and administrative sites. Although chemicals are not mentioned as a threat to this species in the listing notice or the Recovery Plan, insecticides and rodenticides could harm bats if they were to come into direct contact with these chemicals. However, we consider there to be a small likelihood that the use of chemicals by the Forest Service would be having an appreciable affect on bat populations. Thus, we do not anticipate that take will occur because of the small likelihood of bats encountering chemicals.

Lands and Minerals Program

Standard and Guideline 701 allows for the use of cyanide leaching as part of mining operations. According to the Forest Service, cyanide is used during mining operations for the purposes of extracting the desired mineral (e.g., gold) and is usually in the form of ponds. Currently, no cyanide leach ponds exist on Coronado National Forest. If this form of mining were developed, bats may be attracted to these ponds and could be directly killed by the cyanide.

Rangeland Management Program

Standard and Guideline 762 allows the Forest to manage suitable rangeland at Level A (no livestock), Level B (some livestock), Level C, and Level D. Acreage is as follows within Management Area 3: 716 acres within Level A grazing, 4,840 acres with Level B grazing, 2,395 with Level C grazing, and 6,821 within Level D grazing. Level D grazing is the highest intensity grazing but with the largest amount of management (i.e., fences). Level B grazing on the Coronado is defined as follows: some livestock grazing; management will obtain relatively uniform distribution at the 25 percent use level over 60 percent of the full capacity range; limited improvements, boundary fences, low-cost water developments; and only those improvements needed to meet prescription objectives (no non-structural improvements). Thus, this could potentially impact the bat's food plants.

As stated in the biological assessment for this consultation, excessive browsing on newly emergent flower stalks of agaves, by both livestock (and wild ungulates), has been suggested as possibly decreasing foraging opportunities and thus contributing to population declines. Impacts from livestock grazing activities may occur from trampling young saguaros or grazing on young saguaros themselves (Abouhalder 1992). Thus, bats could be adversely affected by implementation of this S&G.

Standard and Guideline 805 states to manage suitable rangeland at Level D and if level D is not achievable, manage at Level A (no livestock). This S&G further states that management seeks full utilization of forage allocated to livestock. In addition, cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. As stated above, excessive grazing that occurs in areas with high densities of agaves or saguaros is likely to affect reproduction and survival of this species of bat.

Impacts to forage plants through implementation of the Rangeland Management Program may occur through direct herbivory and possible trampling by livestock, and alteration of the

vegetation community. No long-term investigation has quantitatively documented the effect of grazing on agave mortality stalk herbivory. Individual paniculate agave plants only bloom once in their life (20 years). However, agave stalks are rich in carbohydrates, and as they begin to bolt (i.e., rapid expansion and increased height of stem and formation of flowers) are particularly palatable to domestic livestock and other wild herbivores as well (Howell 1996). Cattle have been known to “walk down” agave flowering stalks (T. Cordery, FWS, 1998, unpubl. data). Effects on bat forage plants due to livestock grazing are expected to be more intense where livestock congregate near water sources and less intense on steep slopes or among rocks where grazing is generally lighter because of topography and agaves are at higher densities. To summarize, effects from livestock activities occur in areas where lesser long-nosed bats forage that could cause sub-lethal responses to bats. However, to what degree livestock grazing alters the distribution and abundance of agaves and other food plants used by lesser long-nosed bat populations needs further study. We conclude that take is reasonably certain to occur as a result of reduction of forage resources caused by impacts of grazing activities on the bats’ food plants.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 655 states that harvest of yucca, cactus, ocotillo, and other plants will be permitted on a site-by-site basis. Loss of food plants through collection, especially in important areas, could negatively affect the bat. Thus, we ranked this S&G being sublethal to the bat because of possible loss of food plants. However, this S&G is regulating the collection through the issuance of a permit on a site by site basis, and the Arizona Native Plant Law regulates cacti removal and prohibits the removal of cacti without a permit even on federal land. Within the Coronado National Forest, public removal of saguaro cactus and agave is prohibited or restricted in Management Areas 4, 7A and 7B (U.S. Forest Service 2004:117). Furthermore, it is unlikely that the removal of even up to a few plants would have a significant effect on the availability or distribution of plant foods for the lesser long-nose bat and it is not likely that collection on the Coronado NF would rise to the level of take.

Standard and Guideline 821 states that nonstructural habitat improvement projects will be based on guidelines in the Forest-wide prescription with the intention to meet the objectives to delist threatened and endangered species following guidelines of approved recovery plans (and Memoranda of Understanding). This S&G, if implemented, would support recovery actions for the lesser long-nosed bat. The Forest had roughly 13 S&Gs that directed the Forest to implement recovery plans and ultimately delist listed species. These S&Gs, if implemented, will be wholly beneficial to the lesser long-nosed bat. For example, proper protection of major roost sites is a recovery action, thus, implementing this action would fulfill a major recovery action.

In summary, the Coronado NF’s LRMP is primarily beneficial to the species. The FWS ranked approximately 75 percent of the S&Gs as positive for the species. However, we did find some of the S&Gs to be lethal or sublethal within the fire, Lands and Minerals, and Rangeland Management programs. Thus, we anticipate that take is reasonably certain to occur as a result of the continued implementation of S&Gs within the Coronado NF’s LRMP.

Gila National Forest

The lesser long-nosed bat is not known to occur on the Gila NF. However, there may be potential foraging habitat and thus, we analyzed the effects of the proposed action on this species

at the request of the Forest Service. The FWS found no negative S&Gs for the bat on the Gila NF (See Table 8 below). In addition, 5 S&Gs stated that the Forest would implement Recovery Plans for listed species. The majority of S&Gs directed the Forest to construct threatened and endangered species habitat improvements as identified through approved management and recovery plans. Although this species of bat has not been observed on this Forest, implementing S&Gs such as this could assist with recovering the species. The FWS does not anticipate that take will occur on this Forest because lesser long-nosed bats have not been found occurring on the Gila NF.

Table 8. Effects of the S&Gs analyzed for the lesser long-nosed bat – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	10.3
1	S&G is maintaining habitat & providing at least minimal recovery	19	65.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	5	17.2
Y	S&G has no application to the species	1	3.4
Z	S&G implementation is non-discretionary	1	3.4
X	S&G is a heading	0	0.0
Total		29	100 %

Tonto National Forest

The lesser long-nosed bat is not known to occur on the Tonto NF. However, there may be potential foraging habitat and thus, we analyzed the effects of the proposed action on this species at the request of the Forest Service. The FWS found three S&Gs that, if implemented, would have a sublethal effect to the lesser long-nosed bat. However, we also found over 60 percent of the S&Gs analyzed for this Forest to be maintaining habitat and/or providing minimal recovery for the bat (see Table 9 below).

Table 9. Effects of the S&Gs analyzed for the Lesser long-nosed bat – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	3	14.3
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	14.3

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	13	61.9
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	4.8
Z	S&G implementation is non-discretionary	1	4.8
X	S&G is a heading	0	0.0
Total		21	100 %

Rangeland Management Program

Standard and Guideline 1380 allows the Forest to manage suitable rangelands at Level B (except Goldfield allotment manage at Level A) and rangeland in less than satisfactory condition will be treated with improved grazing management. Level B grazing uses minimum amount of management tools such as fencing. Standard and Guideline 1420 allows the Forest to manage suitable rangelands at Level C except for the following areas: Three-Bar Wildlife/Watershed Area, Windy Hill Recreation Area, Burnt Corral Campgrounds, Apache Lake Watershed bounded by Apache Lake on the north, the Tonto Basin District Boundary, SR 88 on the south, and the Roosevelt Allotment Boundary fence on the east side of Davis Wash (that portion of Roosevelt Wildlife Area bounded by Roosevelt Lake on the east), Theodore Roosevelt Dam on the south, SR 188 on the west, and Bumblebee Creek on the north. These areas will be managed at Level A. Standard and Guideline 1423 manage suitable rangelands at Level D, except South Thompson Mesa, which will be managed at Level A until the area returns to satisfactory productivity. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements.

These S&Gs allow for certain levels of grazing in areas on the Forest that have potential foraging habitat for the bat. As stated above, impacts to bat food plants from livestock grazing may occur through direct herbivory and possible trampling by livestock. This could affect the bats' reproduction or survival.

In summary, negative effects to the bat could occur from the Rangeland Management program. However, we do not anticipate that take will occur because the bat is not known to occur on the Tonto NF.

1996 Regional Amendment

Our analysis indicated that the 1996 Regional Amendment did not affect the bat appreciably. No negative S&Gs were found and only one S&G was found to maintain habitat and/or provide minimal recovery for the bat. Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species. The FWS ranked this S&G as positive for the bat. Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 10. Effects of the S&Gs analyzed for the lesser long-nosed bat – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Small, privately owned lands are intermixed with federally-administered lands in the lower elevations of the Peloncillo Mountains. Bats could be roosting and/or foraging on adjacent non-Forest Service lands. The same impacts that are mentioned above such as disturbance to major roost sites and destruction of food plants could be occurring on adjacent non-federally owned lands. In addition, whatever its day-roost location (see above), lesser long-nosed bats appear to be sensitive to human disturbance.

There could be adverse impacts to the species from cross-border activities along the U.S./Mexico international border. The following cross-border activities include, but may not be limited to, the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the lesser long-nosed bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s biological opinion that the proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat. Pursuant to 50 CRF 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by

reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS finds that the continued implementation of the National Forest LRMPs is not likely to jeopardize the lesser long-nosed bat for the following reasons:

- Counts of lesser long-nosed bats conducted by AGFD from 2001-2004 in Arizona show relatively stable numbers (see above).
- As stated above, the Forest Service continues to protect caves inhabited by the lesser long-nosed bats. For example, the Forest Service has gated several caves and mine adits (i.e., horizontal entrance to a mine) in southeastern Arizona on Forest Service lands with “bat friendly” gates, with signage placed nearby.
- All maternity roosts are located off of National Forest System lands. Thus, Forest Service activities will not be affecting maternity roosts which are important for reproduction.
- Although short-term adverse effects may occur from prescribed fire, no evidence shows that prescribed fire is a significant threat to the lesser long-nosed bat population. These short-term adverse effects will not reduce appreciably the likelihood of both survival and recovery of the bat. In other words, these short-term adverse effects do not rise to the level of jeopardy because activities such as prescribed burning is not likely to eliminate significant amounts of the bats’ food plants.
- While livestock grazing on the bats’ food plants may be having some impacts, no evidence shows that grazing of food plants appreciably reduces reproduction, numbers, or distribution of the bat.
- Standards and Guidelines within the Coronado NF’s LRMP contain cave protection. Standard and Guidelines 614-620 and 622 provide best management practices for caves which will provide protection for the lesser long-nosed bat.

Based on the above reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the lesser long-nosed bat. The Forest Service has initiated conservation measures for caves, and the Coronado NF LRMP contains S&Gs that will continue to protect the bat. Further, although some S&Gs were found to be potentially harmful to bats, implementation of these negative S&Gs will not cause further population decline of this species, thus, will not lead to jeopardy of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement (50 CFR §402.14(i)(3)).

Amount or Extent of Take Anticipated

Incidental take of the lesser long-nosed bat is reasonably certain to occur as a result of the continued implementation of the Coronado NF LRMP within the Engineering, Fire Management, Lands and Minerals, Rangeland Management, and Wildlife programs. Take is only anticipated on the Coronado NF. Incidental take is expected to be in the forms of both harm and harass. Harm occurs through direct mortality if specific negative S&Gs are implemented (e.g., allowing for cyanide leaching) or indirectly from negatively impacting the bats' food plants (e.g., Level B, C, or D livestock grazing). Harassment occurs if roosting bats are disturbed such that normal behavior patterns including breeding or sheltering are disrupted. The FWS anticipates, however, that incidental take of the lesser long-nosed bat will be difficult to detect because finding a dead or impaired specimen is unlikely. Thus, we used data from simultaneous roost census provided to us by AGFD. These counts are from transitory bat roosts within southern Arizona and New Mexico (see Table 4 above). As stated previously, because lesser long-nosed bats can fly long distances to forage, we considered all of the information for all of the roosts in Table 4. The FWS concludes that the incidental take of lesser long-nosed bats will be considered to be exceeded if these counts drop below 66,923 lesser long-nosed bats (the lowest number in the last four years) for a period of two consecutive years as a result of the proposed action.

Effect of Take

The FWS determined that this level of anticipated take is not likely to result in jeopardy to the lesser long-nosed bat. Because AGFD exit counts appear to show relatively stable numbers (see above) and because bat census counts occur annually, we believe that this level of anticipated take is not likely to result in jeopardy to the lesser long-nosed bat.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the lesser long-nosed bat:

1. Protect lesser long-nosed bats and their roost sites (maternity, post-maternity, daytime, and night roosts) on National Forest System lands.
2. Protect lesser long-nosed bat foraging areas and food plants on National Forest System lands.
3. Monitor lesser long-nosed bats on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering, Lands and Minerals, Rangeland Management, and Wildlife programs to minimize or eliminate adverse effects to the lesser long-nosed bat.
- 1.2 Develop specific management plans for known roosts that provide protection for the lesser long-nosed bat.
- 1.3 Any lesser long-nosed bat roosts (i.e., mines or caves) not already gated shall be gated by the Forest Service unless it is determined that other measures are protective.
- 1.4 Ensure that bats are protected from cyanide leaching ponds and other chemical uses.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Identify areas with important, high density agave and other bat food plants. These areas shall be managed to maintain this habitat component for the lesser long-nosed bat.
- 2.2 Limit collection permits of agave cactus to areas outside known roosts of the lesser long-nosed bat where bats may be foraging.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor lesser long-nosed bats on National Forest System lands. This can be accomplished using AGFD's yearly simultaneous roost census.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on lesser long-nosed bats, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA allows federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to survey potential lesser long-nosed bat roost sites.
2. Provide the FWS with comments, information, data, reports, etc., during the comment period for the 5-year review (pursuant to section 4(c)(2)(A) of the ESA) for the lesser long-nosed bat.
3. Continue to support and cooperate in the investigations of agave relationships to livestock as well as the effects of prescribed fire on paniculate agaves.
4. Support any other needed research that will assist with the conservation and eventual delisting of the species. For example, the Forest Service should support research that further refines the species' range and provides additional information on where and how they forage, roost, and migrate.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

MEXICAN LONG-NOSED BAT

STATUS OF THE SPECIES

Description

The Mexican long-nosed bat (*Leptonycteris nivalis*) (also known as the greater long-nosed bat) is a medium sized bat (3-4 inches) having an elongated muzzle with a small, triangular nose leaf at the tip. The Mexican long-nosed bat can be distinguished by its long snout and tongue, minute tail, and hairs extending beyond the edge of the interfemoral membrane. Coloration ranges from pale brown to gray. This species may be confused with the lesser long-nosed bat (*L. curasoae yerbabuena*) because the two bats' range overlap. However, the Mexican long-nosed bat is slightly larger than the lesser long-nosed bat (Schmidly 1991). In addition, lesser long-nosed bats do not have hairs that extend beyond the interfemoral membrane. Some studies prior to 1988 may have misidentified *L. nivalis* and *L. curasoae*, thus, literature prior to this time should be carefully scrutinized before conclusions about *L. nivalis* are made.

Legal Status: The Mexican long-nosed bat was listed as endangered on September 30, 1988. No critical habitat was designated for this species. On December 30, 1988, the Mexican long-nosed was added to the Texas Parks and Wildlife Department's list of endangered species. Additionally, the NMDGF listed the Mexican long-nosed as endangered on November 30, 1990. Mexico has also listed the Mexican long-nosed as endangered in its Endangered Species Act on May 17, 1991. The Mexican long-nosed has a recovery priority of 5, indicating a high degree of threat to the species with a low potential for recovery.

Distribution and Abundance

Mexican long-nosed bats are known from medium- to high- elevations, 1500 to 9300 feet (500 m to 3,000 m), in northern and central Mexico, southwestern Texas, and southwestern New Mexico (Arita and Humphrey 1988, Hensley and Wilkins 1988, U.S. Fish and Wildlife Service 1994). In Texas, this bat species is known from Big Bend National Park (Borell and Bryant 1942, Easterla 1972) and from Chinati Mountains area (Mollhagen 1973).

No records of this species are known from Arizona; the nearest suspected roost is in the Animas Mountains. Within New Mexico, two specimens taken in Hidalgo County in 1963 and 1967 in southwestern New Mexico were determined to be *L. nivalis* (Wilson 1985, Arita and Humphrey 1988). Their presence was reconfirmed when they were netted over a tank in Hidalgo County in 1992 (Hoyt et al. 1994), 2003, and 2004 (M. Bogan, USGS, 2004, unpubl. data). A sympatric roost for Mexican long-nosed bats and lesser long-nosed bats was found in the Animas Mountains in 2004 (M. Bogan, 2004, unpubl. data). In 2000, a Mexican long-nosed bat was caught on the Gila River in Grant County, New Mexico nearly 100 miles north of the Animas Mountain roost (L. Lewis, FWS, 2000, unpubl. data). The Animas Mountain population is over 400 miles from the Texas locality and over 437 miles from the northern-most record in central Sinaloa, Mexico.

Habitat

Mexican long-nosed bats occupy mid- to high- elevations (1,550 to 9,300 feet) in the Upper Sonoran and Transition Life Zones (U.S. Forest Service 2004). They are one of the most arid-

adapted members of the Glossophaginae subfamily (Koopman 1981). Typical of the desert portion of the bat's range are species of columnar cacti, such as *Pachycereus pringlei* and other plants such as creosotebush (*Larrea tridentate*), elephant tree (*Bursera sp.*), and ocotillo (*Fouquieria splendens*). In the mountainous portion of this species range, vegetation is dominated by typical habitat such as oaks (*Quercus sp.*), juniper (*Juniperus sp.*), yucca (*Yucca sp.*), and agaves (*Agave sp.*) (U.S. Fish and Wildlife Service 1994).

The Mexican long-nosed bat is a colonial species that usually roosts in caves, but can also be found in mines, culverts, and hollow trees (Hensley and Wilkins 1988). Mount Emery cave within Big Bend National Park, the only roost site that has been described in detail, is a shallow fault block cave with a small crumbling entrance in which roosting occurs in an upper level on a high ceiling (Wilson 1985). It is also described as having considerably cooler air inside than outside during the summer and a breeze blowing through at all times (Hensley and Wilkins 1988). There are very few reports of Mexican long-nosed bats occupying human-inhabited structures (U.S. Fish and Wildlife Service 1994).

Life History

Reproductive information is limited to a few records of lactating or pregnant females (U.S. Fish and Wildlife Service 1994:10). Easterla (1973) speculated that young may be born in Mexico before they arrive in Texas.

Because of its long, protrusile nose, the Mexican long-nosed bat feeds on nectar and pollen of agave and cactus flowers. Mexican long-nosed bats may eat some soft fruits and incidentally, some insects associated with fruits or flowers (U.S. Fish and Wildlife Service 1994). The Species-activity peaks during the night. Individuals may travel as much as 50 miles (80 km) per night to forage (U.S. Forest Service 2004).

Population Dynamics

Current Mexican long-nosed bat populations are difficult to quantify because of uncertainty concerning species movements and species rarity. Population estimates in Big Bend National Park in Texas in 1967 showed 10,650 individual Mexican long-nosed bats and later 1,000 individuals in 1983 (Wilson 1985). However, two roosts are known in the U.S., Big Bend National Park in Texas and Animas Mountains in New Mexico (U.S. Forest Service 2004). Data collected between the 1930s and the 1980s from abandoned mines and caves in Nuevo Leon and Morelos, showed considerable decreases in Mexican populations of the bat.

Reasons for Listing

The Mexican long-nosed bat was listed as endangered on September 30, 1988 (U.S. Fish and Wildlife 1988) without designation of critical habitat. The recovery plan was completed in 1994. According to the recovery plan, Mexican long-nosed bat populations appear to have dramatically decreased during the last three decades. Causes for the decline have not been identified with complete certainty, but they may relate to human activities. Modification or destruction of roost sites and foraging habitat are among the major threats identified for the species.

Threats: Mexican long-nosed bat threats include roost disturbance, foraging habitat disruption and destruction, and food availability. Mexican long-nosed bat colonies are sensitive to noise or

movement and take flight when disturbed. Foraging habitat disruption and destruction has also been identified as a threat to Mexican long-nosed bat populations. Foraging habitat can be modified or destroyed by harvesting agave, expansion of agriculture, and other land uses. Large scale habitat alterations may preclude or modify historic migration patterns. Excessive harvest of agaves for the production of alcoholic beverages may also be contributing to the decline of this species (U.S. Fish and Wildlife 1994).

As with other colonial roosting bats, Mexican long-nosed bats may be limited by the number of sites that provide the proper roosting environment especially for parturition. While no known Mexican long-nosed bat roosts have been rendered unusable, caves used as roosts are generally becoming increasingly subject to human destruction and disturbance.

Other threats to Mexican long-nosed bat populations include pesticides, competition for roosts and nectar, natural catastrophes, disease, and predation.

Conservation Measures

To meet the objectives outlined in the 1994 Mexican long-nosed bat Recovery Plan, the Douglas Ranger District of the Coronado NF has completed several recovery activities, which include:

- Protecting, monitoring, and locating roosting sites.
- Protecting Mexican long-nosed bat roosts.
- Developing and Implementing informational/educational programs regarding bats.
- Monitoring known occupied and unoccupied roost sites.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Within the action area, Mexican long-nosed bats are suspected to occur only on the Coronado NF. However, no known Mexican long-nosed bat roosts are known in the Coronado NF (U.S. Forest Service 2004). Thus, FWS speculates that this species of bat may forage on the Coronado NF because the appropriate food-plant species occur on this Forest. However, the species has been confirmed in both Grant and Hildalgo Counties and a single roost documented in the Animas Mountains in Hildalgo County on private land (U.S. Forest Service 2004).

Factors Affecting Species Environment within the Action Area

Effects on Mexican long-nosed bat foraging habitat on the Coronado NF are expected to be minimal due to low road density, guidance for a minimum transportation system, closure of unneeded roads, and prohibition of agave removal. Improper livestock grazing has the potential to affect the species' foraging habitat. Cattle can preclude agave flower development by grazing

the emerging flower stalk, thereby eliminating the nectar and pollen source, and thus, reducing forage availability for the Mexican long-nosed bat (U.S. Forest Service 2004).

Because mineral removal is prohibited in only one Management Area, both mineral removal and common variety mineral extractions could negatively impact the species through cumulative effects of multiple mining operations and abandoned mine closures, which can function as significant bat habitat. Furthermore, these activities can remove, degrade, and fragment potential Mexican long-nosed bat roosting and foraging habitat.

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Should the Mexican long-nosed bat occur on the Coronado NF in the future, the S&Gs within the Forest’s LRMP may have indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Mexican long-nosed bat.

Coronado National Forest

The Coronado NF is the only Forest that contains any potential habitat for this bat species. Again, no occurrences of this species have been documented on the Forest. At the request of the Forest Service, we evaluated the effects of the action on this species (see Table 11 below) if this species is detected on the Forest in the future. The effects of the action are similar to those for the lesser long-nosed bat and thus we provide a limited discussion below.

Table 11. Summary of S&Gs considered for the Mexican long-nosed bat.

National Forest	Standards and Guidelines
Coronado	612-29, 631-33, 635-38, 642, 648-55, 666-69, 673-74, 682, 693-96, 697, 702, 704-13, 715, 757, 761, 763-64, 768-71, 774, 778-80, 781, 782, 785, 793-94, 796-800, 803-07, 809-12, 831-39
1996 Regional Amendment	1510-15

We found several S&Gs that could cause a lethal or sub-lethal response to the Mexican long-nosed bat. However, the majority of the S&Gs within the Coronado NF LRMP were overall positive for the bat. Table 12 below summarizes our analysis for this species.

Table 12. Effects of the S&Gs analyzed for the Mexican long-nosed bat – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.01
-2	S&G is causing sublethal response	3	0.03
-1	S&G is causing negative behavioral response	0	0.0

Ranking	Explanation of Ranking	Total	Percentage
0	S&G is ill-defined and/or open to interpretation	20	20.0
1	S&G is maintaining habitat & providing at least minimal recovery	51	52.0
2	S&G is moving towards recovery	12	12.0
3	S&G is implementing species recovery plan	8	0.08
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	0.02
X	S&G is a heading	1	0.01
Total		98	100 %

Forestry and Forest Health Program

Standard and Guideline 697 states that chemicals may be used within guidelines approved by other agencies for the following purposes of using insecticides and rodenticides in recreation areas and administrative sites. Although chemicals are not mentioned as a threat to this species in the listing notice or the Recovery Plan, insecticides and rodenticides could harm bats if they were to come into direct contact with these chemicals. However, we consider the chances to be small that the use of chemicals by the Forest Service would be having a appreciable affect on bat populations.

Lands and Minerals Program

Standard and Guideline 702 allows for the use of cyanide leaching as part of mining operations. According to the Forest Service, cyanide is used during mining operations for the purposes of extracting the desired mineral (e.g., gold) and is usually in the form of ponds. Currently, no cyanide leach ponds exist on Coronado NF. If this form of mining were developed, bats may be attracted to these ponds and could be directly killed by the cyanide.

Rangeland Management Program

Standard and Guideline 805 within Management Area 7B states to manage suitable rangeland at Level D and if level D is not achievable, manage at Level A (no livestock). This S&G further states that management seeks full utilization of forage allocated to livestock. In addition, cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. As stated above, excessive grazing that occurs in areas with high densities of agaves or saguaros could negatively affect this species of bat.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 655 states that harvest of yucca, cactus, ocotillo, and other plants will be permitted on a site by site basis. Loss of food plants through collection, especially in important areas, could negatively affect the bat. Thus, we ranked this S&G being sublethal to the bat because of possible loss of food plants.

Standard and Guideline 833 states to maintain and improve current habitat for federally listed plant and animal species and work toward delisting. This S&G, if implemented, would support

recovery actions for the Mexican long-nosed bat. The Coronado NF had eight S&Gs that directed the Forest to implement recovery plans and ultimately delist listed species. These S&Gs, if implemented, will be wholly beneficial to the Mexican long-nosed bat.

In summary, the Coronado NF’s LRMP is primarily beneficial to the species. However, we do not anticipate that take is reasonably certain to occur as a result of the continued implementation of S&Gs within the Coronado NF’s LRMP because this species does not occur on the Forest.

1996 Regional Amendment

Our analysis indicated that the 1996 Regional Amendment did not affect the bat appreciably. No negative S&Gs were found and only one S&G was found to maintain habitat and/or provide at least minimal recovery for the bat. Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species. The FWS ranked this S&G as positive for the bat. Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 13. Effects of the S&Gs analyzed for the Mexican long-nosed bat – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Small parcels of privately owned lands are intermixed with federally-administered lands in the lower elevations of the Peloncillo Mountains. Bats could be roosting and/or foraging on lands adjacent to the Forest Service. The same impacts that are mentioned above such as disturbance

to major roost sites and destruction of food plants could be occurring on adjacent non-federally owned lands.

There could be adverse impacts to the species from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: Border Patrol actions, human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the Mexican long-nosed bat, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mexican long-nosed bat. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. The FWS has concluded no jeopardy because the Mexican long-nosed bat has not been detected within the action area. No critical habitat has been designated for the species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

The FWS does not anticipate incidental take of the Mexican long-nosed bats as a result of the proposed action because the species is not currently found on National Forest System lands. Although a few S&Gs within the Coronado NF LRMP have the potential for adverse effects to bats, no resident Mexican long-nosed bats are currently known to occur on Coronado NF. However, if resident Mexican long-nosed bats are found to occur on the Coronado NF in the

future, the effects of the proposed action will be assessed in order to evaluate whether reinitiation of this consultation is needed.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA allows federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to survey for the presence of the Mexican long-nosed bats throughout the Coronado NF.
2. Continue to cooperatively support investigations of the effects of livestock grazing and prescribed fire on paniculate agaves.
3. Support telemetry studies to determine if this species forages on National Forest System lands.
4. Support any other needed research that will assist with the conservation and eventual delisting of the species.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

MOUNT GRAHAM RED SQUIRREL

STATUS OF THE SPECIES

Description

The Mount Graham red squirrel (*Tamiasciurus hudsonicus grahamensis*) (red squirrel) is the southern most subspecies of *Tamiasciurus hudsonicus*, inhabiting high-elevation, mixed conifer and spruce-fir forests of the Pinalenos Mountains in Graham County, Arizona. The red squirrel is a small, grayish brown rodent with a rusty yellowish tinge along its back (Spicer et al. 1985). First described by J. A. Allen (1894), this arboreal rodent has slightly tufted ears during the winter and shows a black lateral pelage line between its upper and lower parts. Isolated from all other red squirrels for greater than 10,000 years, this subspecies was confirmed a separate designation by protein electrophoresis (Sullivan and Yates 1995) and mitochondrial DNA studies (Riddle et al. 1992).

Legal Status: On June 3, 1987, the Mount Graham red squirrel was listed as an endangered species under the ESA, as amended (53 FR 20997). Critical habitat for the species was designated on February 5, 1990 (55 FR 425). Critical habitat for the species encompasses three areas in the Pinalenos commonly known as Hawk Peak/Mount Graham, Heliograph Peak, and Webb Peak, consisting of approximately 2,000 acres (800 hectares). This area is designated as the Mount Graham red squirrel refugium.

A recovery plan for the Mount Graham red squirrel was signed May 3, 1993. The plan recommends increasing and stabilizing existing populations of the Mount Graham red squirrel by protecting existing habitat and restoring degraded habitats in the Pinalenos. The Mount Graham Red Squirrel Recovery Team is currently reviewing the 1993 plan.

Distribution and Abundance

The red squirrel inhabits only specific areas of the Pinaleno Mountains in Graham County in southeastern Arizona, with its entire range situated within the Safford Ranger District of the Coronado NF. As recently as the 1960s, the species ranged as far east as Turkey Flat and as far west as West Peak, but is currently found only as far west as Clara Peak (U.S. Fish and Wildlife Service 1993).

Since 1986 semi-annual midden surveys have been conducted jointly by the AGFD and the Forest Service. Midden surveys in 1986 suggested that 22,436 acres (9,083 hectares) of potential red squirrel habitat existed in the Pinalenos. In 1988, the amount of potential red squirrel habitat was revised to exclude pure ponderosa pine stands (no middens were located in this forest type), and suitable habitat was then estimated to be closer to 11,733 acres (7,750 hectares) (U.S. Fish and Wildlife 1993).

Habitat

The red squirrel inhabits the spruce-fir (*Picea engelmannii*), corkbark fir (*Abies lasiocarpa* var. *arizonaica*), and mixed conifer forest types at high elevations of 8,500 ft (2,590 m). Red squirrels and middens (i.e., cone debris piles used for winter food caching) have also been documented in drainage bottoms where the mixed conifer association reaches lower elevations.

Historically, the species was common above 8,500 ft (2,590 m), but is currently seldom found below 9,200 ft (2,804 m) (Spicer et al. 1985). Old growth mixed conifer stands dominated by Douglas-fir (*Pseudotsuga menziesii*) and white fir (*Abies concolor*) also provide habitat; however, specific needs for the selection of midden placement may limit the red squirrels use of mixed conifer stands (Froehlich 1990).

Overall habitat suitability for the species depends on the ability of the forest to produce reliable and adequate conifer cone crops for food and suitable microclimate conditions for storage of closed cones (U.S. Fish and Wildlife Service 2000).

Critical Habitat: Designated critical habitat for Mount Graham red squirrel includes the areas of Hawk Peak/Mount Graham, Heliograph Peak, and Webb Peak of the Pinaleno Mountains, Graham County, in southeastern Arizona (U.S. Fish and Wildlife Service 1990). These three areas contain the highest concentrations of Mount Graham red squirrel middens. Within the action area, critical habitat consists of three blocks of spruce-fir forests located on the Safford Ranger District of the Coronado NF, specifically located in Management Areas 2, 2A, and some in Management Area 9. Initially, the main primary constituent element was thought to be dense stands of mature spruce-fir forest, but as of 2000, information suggested that mature mixed conifer stands may be of equal importance. (U.S. Forest Service 2004:147). The major primary constituent elements are mature, closed canopy forest with a diversity of tree species, including either Douglas-fir (*Pseudotsuga menziesii*) and/or Engelmann spruce (*Picea engelmanni*), or both. Closed canopy forests are thought to promote increased fungal resources and cooler microclimatic conditions for conifer cone storage (U.S. Fish and Wildlife Service 2000).

Life History

The red squirrel is a solitary, highly territorial mammal, nesting in hollow trees, snags, and logs. Its diet varies seasonally and includes conifer seeds from closed cones, macro-fungi and rusts, pollen and cone buds, cambium of conifer twigs, bones, and berries (U.S. Fish and Wildlife Service 1993:9). However, red squirrels feed predominately on conifer seeds from closed cones. During the fall months, red squirrels cut and store cones deep in piles for winter storage. The piles of stripped and processed cones are referred to as “middens.” Current understanding is that one midden is occupied and defended by one adult red squirrel yearlong (Vahle 1978).

Breeding generally occurs from February through early April, annually, with a typical litter of one to five young produced per year. Two litters per year have been documented, but the frequency of producing a second litter is unknown (U.S. Fish and Wildlife Service 1993:11).

Specific population trends of the Mount Graham red squirrel are unknown. Historically, the red squirrel was common around the turn of the century, but numbers were seen to be declining by the 1920s and sightings were rare by the 1950s (Hoffmeister 1956). Recent midden surveys suggest that squirrel populations vary from approximately 100 to 400 animals (AGFD, unpubl. data).

Midden surveys are conducted semi-annually (spring and fall) to roughly estimate the number of red squirrels on the mountain. One assumption in the midden survey protocol is that one midden is occupied by one adult red squirrel (Vahle 1978). Another assumption is that survey results

taken from a subset of randomly selected middens can be extrapolated across the total middens on the mountain; this does not account for density of midden sites, quality (excellent, good, fair, or poor), or quantity of habitats used by the red squirrel. The AGFD uses a formula to arrive at a discrete number of red squirrels, with a plus or minus number (which is an estimated range of possible red squirrels at that point in time). This does not account for juvenile red squirrels if they remain at the nest /midden site with their mother when surveys are conducted.

Overwintering mortality is another important factor in juvenile red squirrel numbers (T. Snow, AGFD, 2005, unpubl. data).

Since midden surveys began in 1986, the highest number of red squirrels estimated was 562, +/- 12, during the Spring 1999 survey. The lowest number of red squirrels estimated was 116, +/- 29, during the Spring 1989 (June) survey. More recently, the Spring 2003 survey resulted in 224, +/- 11 squirrels; the Fall 2003 survey estimated 274, + or - 13. The Spring 2004 survey estimated 284, +/- 13 squirrels; the Fall 2004 survey estimated 264, +/- 12. Surveys have not yet been conducted for 2005 (AGFD, 2004, unpubl. data). In summary, over the last two years, survey estimates suggest that there are approximately 261 squirrels currently.

Reasons for Listing

Due to the red squirrel's geographic restrictions and inherent vulnerability to extinction, the subspecies was listed as endangered in 1987 under the ESA (U.S. Fish and Wildlife Service 1987), with critical habitat designated on February 5, 1990 (U.S. Fish and Wildlife Service 1990). Reasons for listing included 1) Decline in range and numbers; 2) Habitat loss and destruction through the expansion of logging operations, recreational activities, wildfires, and insects; and, 3) Competition (food sources, midden sites, and cover) with an introduced population of Abert's squirrel (*Sciurus abertii*).

Threats: Although not well documented, early red squirrel population declines may be attributable to the expansion of logging operations in the Pinalenos and the AGFD's introduction of about 70 tassel-eared squirrels (*Sciurus aberti*) in the early 1940s. By 1973, most of the accessible and marketable timber had been cut, altering the age structure and density of much of the squirrel's habitat. Logging operations and road building to accommodate harvests resulted in wind-thrown large trees that damaged additional habitat for the red squirrel. Additional loss of old-growth coniferous forest has been documented from natural and human-ignited fires, a long history of fire suppression (about 100 years), ice storms, insect outbreaks, recreational development, road construction, and establishment of other structures in squirrel habitat on the mountain (T. Gamberg, FWS, 2005, unpubl. data). These habitat losses have reduced the amount of habitat available to the subspecies along with fragmenting forest canopy and moisture conditions, which may have reduced the quality of habitat. Forest fragmentation may have isolated pockets of the squirrel population and prevented successful dispersal and/or movements between areas, thus reducing genetic flow within the population (U.S. Fish and Wildlife 1993). Mannan and Smith (1991) predicted that developments that open the forest canopy, remove large trees, or reduce amounts of dead and down wood, would reduce the number of potential Mount Graham red squirrel middens in the Pinaleno Mountains.

Since 1998, the actions of insects are easily observed within red squirrel habitat. Widespread defoliation of spruce and fir trees by a looper moth (*Nepytia janetae*), followed by mortality of

spruce and fir caused by the spruce aphid (*Elatobium abietinum*). This resulted in significant losses of spruce-fir on the mountain. The spruce beetle (*Dendroctonus rufipennis*) has also infected and killed the defoliated, large-diameter spruce trees. Spruce beetle populations continued to move into nearby un-infested spruce, killing at least 1,400 acres of mature spruce trees and infesting an additional 847 acres during 2002 (U.S. Forest Service 2004a). Insect outbreaks in the Mount Graham area are being monitored by the Rocky Mountain Research Laboratory. In addition, diseased trees have been removed to prevent the spread of tree pathogens (U.S. Forest Service 2004: 141).

Based on stand surveys, residual high-risk spruce-fir type-sites were identified as densely stocked sites with large diameter spruce, in excess of 150 years old and in a state of declining vigor due to competition. The outbreak has intensified within attacked sites and migrated to some high-risk and moderate-risk sites previously not attacked. Where defoliation has occurred, spruce mortality is believed to be greater than 80 percent. Spruce beetle are known as significant natural disturbance agents, perhaps comparable to fire, and the outbreak is over only when the host species is gone (U.S. Forest Service 2004a).

In addition to the continuing insect devastation, catastrophic, stand-altering wildfire is the greatest threat to the red squirrel. Coronado NF fire experts estimate that between 14 to 24 tons of fuelwood per acre exist in areas of red squirrel habitat. Removal of much of the fuel load is hampered by the noncommercial quality of the wood, the lack of bidders for such an operation (which would have to be helicopter-logged), the transportation distance between the timber and the one road on the mountain (Swift Trail), and the lack of budget and personnel available for prescriptive fires or extensive pile and burn operations (U.S. Forest Service 2004:138) which would prevent larger, hotter wildfires from threatening red squirrel habitat. A policy of vigorous fire suppression is in place for the Mount Graham area. Several actions have been taken by the Coronado National Forest to abate fire risk within Mount Graham red squirrel habitat. A thinning project was performed along the Swift Trail as part of the Pinaleno Ecosystem Management Project, and another thinning project was conducted round the Mt. Graham International Observatory. In addition, diseased trees have been removed and burned from some areas of red squirrel habitat to reduce fire risk and prevent the spread of tree pathogens (U.S. Forest Service 2004: 141).

Conservation Measures

The Safford Ranger District of the Coronado NF has completed, and continues to implement the following conservation activities, meeting recovery actions as outlined in the 1993 recovery plan: 1) employing best management practices to conduct projects while protecting and restoring habitat; 2) conducting vegetation monitoring; 3) employing best management practices for recreational activities (a recreation plan is being implemented to protect the red squirrel); 4) coordinating with AGFD for red squirrel population monitoring; and, 5) conducting fire suppression and wildfire risk abatement activities.

Critical habitat designated by the FWS on February 15, 1990, is recognized as the Mount Graham red squirrel refugium (refugium). This area was determined to contain the longest contiguous stand of good to excellent habitat, the densest concentration of concentration of red squirrel middens, and provide the best existing habitat components for the survival of the species

(U.S. Fish and Wildlife Service 1988). The Coronado NF does not conduct any activities that would preclude habitat quality, midden concentrations, or red squirrel survival within the refugium.

Population monitoring continues to be conducted cooperatively between the Forest Service, AGFD, FWS, and the University of Arizona. Surveys have been conducted semi-annually (spring and fall of each year) since 1988; currently fifteen years of population data for the Mount Graham red squirrel have been collected. Future surveys are planned at West Peak to determine if re-colonization has occurred in this area (U.S. Forest Service 2004:141).

The University of Arizona also conducts studies on Mount Graham red squirrel demographics, middens, and competition effects between the red squirrel and the introduced Abert's squirrel. A Population Viability Analysis has been completed for the squirrel (U.S. Forest Service 2004:142).

Established with new members in 2000, the Mount Graham red squirrel Recovery Team continues to revise the 1993 plan. An array of options is being discussed, including the possibility of habitat restoration in the West Peak area, once supporting red squirrel habitat, and a captive breeding program.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Habitat analysis for the Pinalenos (U.S. Fish and Wildlife Service 1993) determined that 11,733 acres of the 22,435 acres that occurs above 8,000 ft in elevation is suitable red squirrel habitat. Since 1986, about 1,300 middens have been recorded in the Pinaleno Mountains. However, many of these middens have become abandoned or unapparent over time, and thus are removed from consideration as potential midden sites. Yet some inactive middens have become re-occupied and added back into the list for survey visits (T. Snow, AGFD, 2004, unpublished data).

In 1996, the Clark Peak wildfire began on April 24, near Riggs Lake, and burned towards the north and east towards Merrill Peak, with a total of 7,405 acres burned as of May 8, 1996. About 2,965 acres burned hot or moderate; with the remainder burned lightly or not at all. The consultation for the Clark Peak Emergency Wildfire (02-21-96-F-0286) determined that due to suppression actions (backfiring operations and bulldozing middens), 15 red squirrels were taken (both individuals and middens) in the form of harm.

On June 26, 2004, the Nuttall Complex wildfire began with a lightning strike on a hillside between Nuttall and Carter Canyons in the Pinaleno Mountains. The Gibson Fire, ignited by a lightning strike on June 22 near Gibson creek in the north-central portion of the Pinaleno Mountains, had shown little activity prior to the Nuttall lightning strike. On July 2, fire activity increased at both sites. The fires burned in warm and dry oak woodland, ponderosa pine forest, mixed conifer forest, and spruce-fir forest. Elevations within the fire perimeter range from about 4,500 ft in Marijilda Canyon to 10,720 ft at the apex of Mt. Graham. The burned area is characterized by slopes less than 40 percent at the lower elevations, and greater than 40 percent at the middle and upper elevations, with the exception of the ridgeline in the vicinity of the Mt. Graham International Observatory, on which the slope is less than 40 percent. The final fire size was 29,710 acres as of July 12, 2004. About 4,706 acres of red squirrel habitat burned in the Nuttall Complex wildfire. Fire severity within red squirrel habitat consisted of 3,317 acres of unburned or low intensity burn, 777 acres of moderate intensity burn, and 612 acres of high intensity burn (U.S. Forest Service 2004b). Of the area burned, about 691 acres were known occupied red squirrel habitat. The AGFD midden database showed 650 middens (including those classified as “disappeared”) in the sample pool for the post-Nuttall Complex survey. There were 400 middens in unburned or low intensity areas, 44 middens in moderate intensity areas, and 91 middens in high intensity areas. While the overall percentage of middens located within the burn area is 42 percent (276 of 650), the percentage of middens located in high intensity burned areas is only 4 percent or 29 middens (Arizona Game and Fish Department 2004).

For the purpose of this environmental baseline, it is noted that on-site assessments have only occurred in areas adjacent to the Swift Trail road and in the areas randomly selected during the Fall 2004 midden survey. These types of preliminary assessments will make it difficult to determine the long-term impacts to squirrel populations; however, a more complete assessment of the direct impacts may come as early as spring of 2005 (Arizona Game and Fish Department 2004).

Factors Affecting the Species within the Action Area

Programs within the Coronado NF LRMP that could affect both the red squirrel and its critical habitat includes the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, and Recreation programs.

Engineering activities, such as road construction and maintenance, affect the red squirrel through habitat degradation and fragmentation. The Coronado NF has approximately 1 mi/mi² (0.61 km/km²) of Forest Service roads (U.S. Forest Service 2004:143). However, non-Forest Service roads, such as easements and special use permits under Lands and Minerals Program, increase the total road density on the Coronado NF. Because Forest Service roads and non-Forest Service roads are present within red squirrel critical habitat, the Engineering Program has the potential to adversely affect the species directly through habitat loss and degradation.

Catastrophic wildfire is a major threat to the red squirrel and its critical habitat due to the species' relatively small, isolated, and restricted distribution in the Pinalenos. Mortality of red squirrels' may occur to a catastrophic wildfire, which can be intense, severe, and fast-moving. Threats to red squirrel critical habitat are due to a catastrophic wildfire's ability to burn large portions of habitat quickly and severely, eliminating canopy closure, midden sites, and food

sources. This threat is being directly addressed through updated and current Forest Service planned fire management activities, where such activities can be both interrelated/interdependent (suppression) or direct (prescribed fire, fire risk abatement, and fuelwood reduction actions) (Arizona Game and Fish Department 2004).

The Forestry and Forest Health program may affect red squirrel critical habitat through direct removal of habitat as well as degradation and fragmentation of existing habitat, including construction of access roads and fuelwood harvest.

The Land and Minerals program may affect the red squirrel by removing, degrading, and fragmenting existing critical habitat. The relevant components of this program affecting the squirrel include the development of facilities and associated infrastructure, the issuing of special use permits for easements, and mineral extraction. Additionally, the Mount Graham International Observatory occurs within designated critical habitat and any expansion would have an effect on red squirrel critical habitat.

Human recreational activities, such as driving, hiking, skiing, camping, hunting, mining, or other activities, may result in disturbance to red squirrels and/or habitat modification and degradation, potentially leading to habitat removal if new recreational facilities are developed (i.e., road systems, trails, parking areas, camp sites, and other developed areas). Visitor use within some areas of red squirrel critical habitat (the refugium) is restricted; however, much of the red squirrel habitat is open to multiple-use recreation (U.S. Fish and Wildlife Service 1993).

Activities that affect red squirrel critical habitat include activities which substantially destroy or reduce forest density. Such activities include timber or fuelwood harvest, recreational developments, road development and maintenance, buildings, antennae arrays, and other habitat-altering actions. While new facilities and infrastructure are discouraged, they are not precluded. Site-specific management plans must be developed for any new facilities, and would be required to comply with the red squirrel recovery plan guidelines to provide adequate consideration for the welfare of the squirrel and its critical habitat.

EFFECTS OF THE ACTION - Species

The Mount Graham red squirrel only occurs on the Coronado NF. Under the direction of the Coronado NF LRMP, adverse effects to the red squirrel and its critical habitat may occur as a result of implementation of the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, and Recreation programs.

Table 14. Summary of S&Gs considered for the Mount Graham red squirrel.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-629, 631-638, 640-643, 648-651, 653, 666-668, 671-674, 682-691, 693, 694, 696, 697, 704, 707-713, 716-750, 752-756, 813-824, 825, 827-829, 830

National Forest	Standards and Guidelines
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1140, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1474, 1476, 1478, 1486-1492, 1495-1498, 1501-1503, 1506, 1508-1517

Coronado National Forest

The red squirrel only occurs on the Coronado NF; thus, only the S&Gs of the Coronado NF LRMP were analyzed. Most of red squirrel habitat is located within management areas on the Coronado NF (2, 2A, 4, 7, 8, 8A, and 9), as defined in the Coronado NF LRMP. In general, most of the S&Gs analyzed have a positive effect in that they prohibited or restricted activities which could adversely affect the red squirrel. This is especially true for the S&Gs within the Wildlife Program. However, the Lands and Minerals Program contains S&Gs that are restrictive rather than prohibitive. Other Coronado NF programs are either positive or neutral with respect to the squirrel. Effects of applicable S&Gs within each LRMP resource program are discussed below.

Table 15. Effects of the S&Gs analyzed for the Mount Graham red squirrel – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.9
-2	S&G is causing sublethal response	1	0.9
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	12	10.6
1	S&G is maintaining habitat & providing at least minimal recovery	81	71.7
2	S&G is moving towards recovery	5	4.4
3	S&G is implementing species recovery plan	7	6.2
Y	S&G has no application to the species	3	2.7
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	1	0.9
Total		113	100 %

Table 15 provides a summary of the effects of S&Gs analyzed for the Mount Graham red squirrel on the Coronado NF. There were 81 applicable S&Gs that, when implemented, maintain habitat or provide at least minimal recovery to the species. Twelve S&Gs either work towards species recovery or implement the Mount Graham red squirrel recovery plan. Additionally, two Coronado NF LRMP S&Gs were found to have sublethal and lethal effects to the squirrel. Most of the beneficial S&Gs are found in the Wildlife program.

Engineering Program

There are only two applicable forest-wide S&Gs (693, 694) within this program. Both S&Gs provide general resource protection from road construction and maintenance, and are beneficial

for overall ecosystem health. There are several applicable Management Area S&Gs. Management Area S&Gs 729, 730, 754, and 818 are more specific to the red squirrel. Standard and Guideline 729 (Management Area 2) would enforce road closures in red squirrel habitat overlapping breeding season. Standard and Guideline 730 (Management Area 2A), 754 (Management Area 2A), and 818 (Management Area 8) provide for road closures in specific areas so as to reduce disturbance to the squirrel. Overall, the S&Gs within this program limit access and reduce road densities in red squirrel habitat.

Fire Management Program

Catastrophic wildfire is an imminent threat to the Mount Graham red squirrel because of its restricted distribution (U.S. Forest Service 2004:144). Coronado NF fire management activities directly address this threat. Fire management activities directly address this threat. Fire activities can be both interrelated/interdependent (suppression activities), or direct actions (e.g., prescribed fire, fire risk abatement). Standards and Guidelines for this program are difficult to assess at the programmatic level, since the application of these standards can have positive long-term effects, but initial negative effects, and are dependant upon site specific prescriptions. However, after close analysis, all applicable S&Gs within this program are noted for their beneficial long-term effects, but are also noted for initial short-term take. Management area S&Gs 713 and 731 provide overall ecosystem health, with respect to fuel reduction. Management Area S&G 755 specifically places emphasis on squirrel habitat for utilizing prescribed fire.

Forest-wide trends on the Coronado NF show prescribed fires to average 2,800 ac (1,133 ha) per year, and remain fairly constant from year to year (U.S. Forest Service 2004:144). Prescribed fires in ponderosa pine and mixed conifer types can have a positive effect on the red squirrel if the fire is not too severe; ladder fuels and fuel loads can be reduced through prescribed fire and thus reduce the risk of catastrophic wildfire (U.S. Fish and Wildlife Service 2000). However, harm could occur to middens (active or inactive) during prescribed fire activities. Harassment through noise disturbance is also likely to occur during prescribed fire activities. Piling and burning debris could also create new, relatively small openings in the canopy covered areas of red squirrel habitat. Midden placement appears to depend upon high levels of canopy closure and foliage volume around the top and side of the midden (U.S. Fish and Wildlife Service 2000). Currently, direct reduction of fuel loads in WUI areas has occurred at about 1,000 acres (404 hectares) per year and has been fairly constant (U.S. Forest Service 2004:144). However, midden placement occurs in stands with high canopy cover, foliage volume, and large amounts of dead or downed wood, therefore prescribed fire and fuel reduction activities, although essential to protect forest resources from catastrophic fires, could prove to have a negative effect to the species.

Forestry and Forest Health Program

Forest-wide and Management Area S&Gs within this program are mixed in their potential effects to the red squirrel. Forest-wide S&G 697 allows for pesticide use in recreation areas and administrative sites. Because this type of activity is authorized under the Coronado NF LRMP, and red squirrels have been documented in and near such sites, it may result in negative effects to the red squirrel. Pesticide operations can be conducted aerially (helicopter or fixed-wing aircraft) or from the ground (backpack hand-sprayers or vehicle-pulled sprayers) for spraying

weeds along roadsides. Aerial and ground-based spray operations are reasonably certain to contact conifer cones, twigs, needles, and fungi, on trees or the forest floor (T. Gamberg, FWS, 2005, unpubl. data). The FWS does not know of existing information or data referring specifically to pesticide levels and their effects to red squirrels; however, a reasonable assumption might be that while pesticides are insect-targeted chemicals, they may result in negative effects to red squirrels that ingest contaminated food items. While it is possible that a red squirrel might be physically sprayed during aerial or ground-based operations, the pesticides used are non-mammal-targeted and are derived to inflict mortality to insect systems, not to mammalian systems. Because of the lack of specific data, we conservatively assume there may be adverse effects to the red squirrel through secondary poisoning. However, pesticide use is not occurring on the Coronado NF at this time (U.S. Forest Service 2004:144).

Another high level threat to the species is habitat destruction through widespread defoliation and subsequent mortality of spruce and fir trees by the four-insect epidemics currently progressing on the mountain. Several Management Area S&Gs discuss ways to control outbreaks of insects by using integrated pest management concepts or lack thereof. Standards and Guidelines 819, 824, and 830 (Management Area 8, 8A, 9) state that insect outbreaks will not be controlled, except when there is clear and imminent danger to timber or other resources. These particular S&Gs are ill-defined because their further application and subsequent effects are indeterminate at the time of our analysis. This same rationale can be used for S&Gs 671 and 725, with respect to timber management. Although 671 and 725 are somewhat ambiguous because they could allow for timber harvest to potentially occur within the range of the squirrel, most (if not all) of the lands within the range of the squirrel are considered unsuitable for timber harvest. Forest-wide trends for the Coronado NF show significant quantities of timber are not harvested; volume sold since 1986 has been less than 1 million board feet per year, and actual harvest has been much less than 1 million board feet. Fuelwood harvest has also been less than 1 million board feet per year since 1986. Additionally, no pesticide use or mistletoe control occurs on the Coronado NF (U.S. Forest Service 2004:144).

However, there are several positive S&Gs within this program (704, 726, 727, 728, 748, and 756), with S&Gs 704 and 756 more specific towards habitat protection for the squirrel.

Lands and Minerals Program

The Lands and Minerals Program contains two components relevant to the squirrel--special uses and minerals. Special use permits affect, both positively and negatively, the development of facilities and their associated infrastructures. Mineral permits affect the actions associated with precious and common variety mineral extraction. These program components can remove, degrade, and fragment existing squirrel habitat (U.S. Forest Service 2004:145). Several applicable forest-wide S&Gs pertain to special use permits within the range of the squirrel. Overall, these forest-wide S&Gs (685, 686, 687, 688) intend to limit electronic site development, expansion of facilities and associated infrastructure, and use of existing facilities, with respect to the Mount Graham International Observatory, a special use permitted development. Standards and Guidelines 683 and 691 permit utility lines to be buried rather than strung from poles and would eliminate right-of-way corridors for utility lines, in turn reducing squirrel habitat loss and fragmentation and thus, maintaining and/or protecting squirrel habitat. Overall, the S&Gs mentioned above seek to improve or maintain squirrel habitat by consolidating existing facilities

to capacity before the construction of additional facilities. However, new facility construction is not prohibited. The Arizona-Idaho Conservation Act (P.L. 100-696) directs the Forest Service to consider applications for up to four additional telescopes at the Mount Graham International Observatory. This expansion, if proposed, would have to comply with the Coronado NF LRMP, because any expansion would have an effect on the species (U.S. Forest Service 2004:145).

The remaining Management Area S&Gs (752, 816, 817, 823) address mineral extraction from specific management areas. Management Area 8 and 8A (both within the range of the squirrel) have been withdrawn from mineral entry (S&Gs 816 and 817). Management Area 2A is *recommended* for withdrawal from mineral entry (823). The remaining management areas have not been withdrawn, including Management Area 2, which contains the largest amount of spruce-fir forest. According to the Land Management Program Trends and Description section (U.S. Forest Service 2004:46), the Coronado NF has averaged over 100 locatable plans of operation per year since 1996, with less than two acres as the average size of each operation. However, most of these activities include mining of semi-precious stones, which have minimal impacts to surfaces and forested environments. Additionally, no oil or gas development occurs on the Coronado NF, but common variety materials use is fairly constant.

Rangeland Management Program

All S&Gs within the Rangeland Management Program apply to specific Management Areas. Management Areas 4 and 7 coincide with the range of the red squirrel, and allow for livestock grazing. More specifically, S&G 792 allows for grazing within management area 7A. Improper livestock grazing has the potential to affect the squirrel through habitat degradation. (U.S. Forest Service 2004:145). Although the habitat type (mixed conifer and spruce-fir forest) utilized by the red squirrel is considered unsuitable for grazing activities, it cannot be assumed that livestock grazing and its related management activities (fences, trailing, water developments, roadways) will not affect the red squirrel, particularly its habitat. However, all other management areas within the range of the squirrel are managed at Grazing Management Level A (no grazing). Management Area S&Gs (710, 747, 815, 822) seek to manage Management Areas 1, 2A, 8, and 8A at level A, or no assigned permitted use for livestock.

Recreation, Heritage, and Wilderness Program

Overall, forest-wide S&Gs within this program (612, 613, 626) provide baseline protection for all forest resources, whereas, Management Area S&Gs within this program specifically address recreation effects to the squirrel. Management Area S&Gs 717 and 718 restrict snow play activities in Management Area 2. Management Area S&G 732 closes trail and trailhead use within red squirrel refugium (Management Area 2A). Management Area S&G 733 is similar in that it restricts hiking within this area. Management Area S&Gs 734 and 735 restrict motorized vehicles within Management Area 2A. Management Area S&G 736 prohibits snow play in management area 2A. Additionally, Management Area S&Gs 737 and 738 limit the amount of human-induced disturbance to the squirrel in Management Area 2A.

Watershed Management Program

In general, watershed activities are targeted at maintaining or improving watershed condition on the Forest. Most applicable S&Gs (672, 673, 674, 711, 749, 782) within this program provide overall watershed maintenance or improvement. No specific activities from the Coronado

LRMP are identified within this program, although general direction is given for site-specific rehabilitation.

Wildlife, Fish, and Rare Plants Program

The Coronado NF Forest Plan, in particular, is very specific to the red squirrel and its habitat. This program directs various activities to maintain or improve fish and wildlife habitat. All applicable forest-wide and Management Area S&Gs were noted for their positive effects to the red squirrel, signifying that this program places an emphasis on endangered species and their requirements. There are several S&Gs (both forest-wide and management area specific) in this program that provide baseline habitat protection. However, there are several S&Gs with positive effects for the red squirrel. Many of these S&Gs (632, 722, 723, 742) work towards the implementation of specific recovery plan objectives. Additionally, there are two S&Gs (744, 745) that specifically implement the Mount Graham red squirrel recovery plan.

In summary, the species effects analysis shows adverse effects to the Mount Graham red squirrel could potentially occur from the Fire Management, Forestry and Forest Health, and Recreation programs.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). The range of the Mount Graham red squirrel coincides with the Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. Thus, the S&Gs associated with the 1996 Regional Amendment are applicable to the red squirrel and its critical habitat. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 16. Effects of the S&Gs analyzed for the Mount Graham red squirrel - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	4.0
1	S&G is maintaining habitat & providing at least minimal recovery	32	64.0
2	S&G is moving towards recovery	1	2.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	11	22.0
Z	S&G implementation is non-discretionary	1	2.0
X	S&G is a heading	3	6.0
Total		50	100 %

Standards and Guidelines from the 1996 Regional Amendment were predominately adopted for the Mexican Spotted Owl and Northern Goshawk; therefore, most of the applicable S&Gs provide only habitat protection for the Mount Graham red squirrel and direction for overall ecosystem health. Standard and Guideline 1516 allows only 20 percent of each forested ecosystem Management Area to be allocated to old growth. Twenty percent of old growth in mixed conifer forests may not be an adequate amount of old growth; therefore, the potential effects from the implementation of this S&G could not be determined at the time of analysis because of data gaps.

EFFECTS OF THE ACTION - Critical Habitat

Table 17 below lists the S&Gs from the Coronado NF LRMP and 1996 Regional Amendment that were analyzed to determine effects on critical habitat for the Mount Graham red squirrel. Many S&Gs considered for Mount Graham red squirrel critical habitat consist of general guidance or program direction. In general, most of the applicable S&Gs have a positive effect in that they prohibit or restrict activities that could adversely modify critical habitat designated for the Mount Graham red squirrel.

Table 17. Summary of S&Gs considered for the Mount Graham red squirrel critical habitat - Coronado NF LRMP

National Forest	Standards and Guidelines
Coronado	613, 627-629, 631-635, 638, 640, 642, 648-65, 667, 693, 671, 683-688, 691, 696, 697, 704, 707, 709-712, 716-724, 725-729, 730, 732-749, 752-754, 782, 792, 794-796, 813, 814, 815-818, 820-823, 825, 827-830
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1140, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1474, 1476, 1478, 1486-1492, 1495-1498, 1501-1503, 1506, 1508-1517

Coronado National Forest

Critical habitat for the red squirrel consists of three blocks of spruce-fir forests on the Safford Ranger District of the Coronado NF, specifically located in Management Areas 2, 2A, and some in Management Area 9. The primary constituent element of critical habitat for the red squirrel is dense spruce-fir forest. Activities which may adversely modify critical habitat are any that destroy or substantially reduce forest density. Such activities include timber harvest and recreational development that proceed without adequate consideration of the welfare of the squirrel (U.S. Fish and Wildlife Service 1990).

Engineering Program

Roads occur within the boundaries of designated Mount Graham red squirrel critical habitat, and therefore maintenance activities occur. Use of many of these roads is restricted to authorized vehicles (especially in management area 2 and 2A). New road construction would be dependent

on need for access from other resource areas, but the S&Gs for this program also require closure of unneeded roads in Management Areas 2 and 2A. The S&Gs limit access and are generally intended to reduce road densities in Mount Graham red squirrel critical habitat; however, a new problem has surfaced.

The Nuttall Complex wildfire created the need for the Forest Service to bulldoze and open Forest Roads 669 and 507; which are located in red squirrel critical habitat (the refugium). The Forest Service was required to close and revegetated these roads to compensate for the acres lost when the Mount Graham International Observatory was built. This would allow natural regeneration of red squirrel habitat and food sources to occur. Ten years of regeneration was lost with the opening of these roads. However, past Forest Service efforts include planting trees in Grant Hill Road and ripping Forest Roads 507 and 669 to allow natural vegetation (U.S. Forest Service 2004: 141). We assume that the Forest Service will begin revegetating these areas as was competed in the past.

Fire Management Program

Catastrophic wildfire is an imminent and high-level threat to the Mount Graham red squirrel critical habitat. Prescribed fires in ponderosa pine and mixed conifer types may have a positive effect on the red squirrel if the fire is not too severe. Ladder fuels and fuel loads can be reduced through prescribed fire and thus reduce the risk of catastrophic wildfire. Direct reduction of fuel loads in WUI areas has occurred at about 1,000 ac (405 ha) per year, and has been fairly constant. Again, these activities can have a positive effect on red squirrel critical habitat for the same reasons as prescribed fire. Overall, applicable S&Gs within this program provide maintenance for Mount Graham red squirrel critical habitat.

Forestry and Forest Health Program

The Forestry and Forest Health Program affect red squirrel critical habitat through direct removal of large (greater than 12 inches diameter) trees and canopy cover, degradation and fragmentation of existing habitat (including construction of access roads), and fuelwood harvest. Although timber harvest could potentially occur within red squirrel critical habitat (S&G 725), most (if not all) of the lands within the designated critical habitat of the red squirrel are considered unsuitable for timber harvest. Standards and Guidelines (704, 727, 728, 748) exist which restrict the type and extent of both commercial harvest and fuelwood harvest, providing some protection for red squirrel critical habitat primary constituent elements.

Lands and Minerals Program

Activities associated with this program, such as special uses and minerals, have the potential to remove, degrade, or fragment existing red squirrel critical habitat. Special uses in the range of the red squirrel have a large number of applicable S&Gs (683, 684, 685, 686, 687, 688, 691), most of which limit electronic site development, expansion of facilities and associated infrastructure, and use of existing facilities. The overall intent is to use and consolidate existing facilities to capacity before considering new facilities. As mentioned in the species Effects Analysis section, new facility construction is not prohibited and any additional expansions would lie within red squirrel critical habitat. If proposed, any expansion would have to comply with the Coronado NF LRMP and would likely have an effect on red squirrel critical habitat. Standard and Guideline 752 recommends management area 2A for withdrawal from mineral entry.

Standard and Guidelines 816, 817, and 823 would not allow mineral withdrawals from management areas 8 and 8A. However, the remaining management areas have not been withdrawn, including Management Area 2, which contains the majority of spruce-fir forest and lies within designated critical habitat.

Rangeland Management Program

All Management Areas that fall within designated red squirrel critical habitat are managed at Grazing Management Level A; no grazing (U.S. Forest Service 2004:150). Therefore, S&Gs within the Rangeland Management Program are not likely to adversely affect red squirrel critical habitat.

Recreation, Heritage, and Wilderness Program

Recreation can cause habitat degradation from human activity, and potentially habitat removal if new facilities are developed. Visitor use within some areas of red squirrel critical habitat is restricted (716, 717, 718) with road closures to unauthorized vehicles in management area 2A (733, 734, 735). Snow play activities are prohibited in management area 2A as well (736). However, other areas are open to recreation uses.

Watershed Management Program

Overall, activities within this program are targeted at maintaining or improving watershed condition; thus, we believe all applicable S&Gs within this program will not negatively affect the primary constituent elements of red squirrel critical habitat.

Wildlife, Fish, and Rare Plants Program

The S&Gs within this program mostly restrict activities within critical habitat of the squirrel, but the majority of S&Gs apply only to the red squirrel and not necessarily to its critical habitat.

1996 Regional Amendment

Standards and Guidelines from the 1996 Regional Amendment were predominately adopted for the Mexican Spotted Owl and Northern Goshawk; therefore, most of the applicable S&Gs provide habitat protection for the Mount Graham red squirrel and direction for overall ecosystem health. More than 50 percent of the S&Gs assessed would promote beneficial effects because they prohibit or restrict activities with potential to adversely modify critical habitat designated for the Mount Graham red squirrel.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Future effects from state, tribal, local or private entities are likely to occur in the action area considered in this biological opinion. Actions will include Arizona Department of Transportation road maintenance and improvements. Arizona Department of Transportation maintains an easement (granted by the U.S. Department of Transportation, Federal Highways Administration), that consists of 100 feet on either side of the centerline on Highway 366 (Swift

Trail). Maintenance projects such as maintenance road grading, drainage ditch and culvert clearing, and hazard tree removal are included in the Arizona Department of Transportation Highway Easement Deed, recorded March 20, 1998.

CONCLUSION

After reviewing the current status of the Mount Graham red squirrel, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Coronado NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Mount Graham red squirrel, and are not likely to destroy or adversely modify designated critical habitat. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS anticipates adverse effects to the Mount Graham red squirrel as a result of the proposed action. However, the FWS does not believe that the implementation of the Coronado NF LRMP will rise to the level of jeopardy for the species, nor will it destroy or adversely modify designated critical habitat for the following reasons:

- Although preliminary burn assessment data collected by the AGFD from the recent Nuttall Complex wildfire suggests a reduced environmental baseline for the Mount Graham red squirrel, the majority of middens within the entire burn range were located in unburned to low intensity burn areas (U.S. Forest Service 2004b). Further, these areas should not be impacted by activities allowed under the Coronado NF LRMP and 1996 Regional Amendment.
- The Coronado NF LRMP contains several beneficial S&Gs that are specific to the Mount Graham red squirrel and its recovery (S&Gs 683, 684, 685, 724, 742, 746).
- Although two S&Gs could allow for timber harvest to potentially occur within the range of the squirrel, most (if not all) of the lands within the range of the squirrel are considered unsuitable for timber harvest.
- The Swift Trail (the only access road open in red squirrel habitat for the observatory) is closed and gated from November 15 through April 15 annually, coinciding with the breeding season of the squirrel, which generally occurs from February through early April.
- Several areas occurring in red squirrel habitat have been planted with trees (e.g. Grant Hill Road), and Forest Roads 507 and 669 were ripped to allow natural vegetation to reestablish, which is beneficial to the species.
- The Coronado NF is actively managing fire impacts in the Mount Graham area through fire abatement measures along the Swift Trail and by conducting thinning

projects around the observatory. Additionally, diseased trees have been removed and burned from some areas of red squirrel habitat to reduce fire risk and prevent the spread of tree pathogens.

- Visitor use within some areas designated as critical habitat and occupied by the squirrel is restricted through road closures and prohibitions on snow play activities.
- The majority of the S&Gs within the Coronado NF LRMP maintain or improve all PCEs for the Mount Graham red squirrel.

Based on the reasons listed above, together with those S&Gs specific to Mount Graham red squirrel recovery, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Mount Graham red squirrel. Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Mount Graham red squirrel will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the Mount Graham red squirrel.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Mount Graham red squirrel is reasonably certain to occur as a result of the continued implementation of the Coronado NF LRMP within the Fire Management, Forestry and Forest Health, and Recreation programs. Incidental take is expected to be in the forms of harm and harass. The FWS anticipates, however, that incidental take of Mount Graham red squirrels will be difficult to detect because finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and midden numbers. Therefore, The FWS defines incidental take in terms of midden occupancy. The FWS concludes that the incidental take of Mount Graham red squirrels will be considered to be exceeded if more than 10 percent of middens outside of the refugia during the life of this opinion are impacted as a result of the proposed action. Impacts will be measured through abandonment and/or physical alteration of middens. The FWS believes 10 percent is a conservative biological estimate of take for those middens located outside of the refugia.

Effect of Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Mount Graham red squirrel. The majority of the S&Gs rated positive for the red squirrel and its habitat; one fully expresses the intent to promote red squirrel recovery. The FWS recognizes the vulnerable position of the species and have carefully evaluated the best scientific information we have at this time for this determination. It is reasonably certain that future modifications in red squirrel habitat will continue to result in increased effects to the species.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Mount Graham red squirrel:

1. Protect Mount Graham red squirrels on the Coronado NF.
2. Protect Mount Graham red squirrel habitat on the Coronado NF.
3. Monitor Mount Graham red squirrel populations on the Coronado NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Maintain adequate levels (i.e., as permitted to reduce the likelihood of catastrophic wildfire) of closed canopy, foliage volume, dead or downed wood around active, inactive, and apparently abandoned midden sites.

- 1.2 Follow the FWS regional guidance criteria for pesticide use in areas occupied by the Mount Graham red squirrel.
- 1.3 Design projects within the Fire Management, Forestry and Forest Health, and Recreation programs to minimize or eliminate adverse effects to the Mount Graham red squirrel.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied red squirrel habitat to incorporate appropriate components of the Mount Graham Red Squirrel Recovery Plan with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the squirrel and its habitat

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and on-going research efforts, monitor Mount Graham red squirrel middens on the Coronado NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Mount Graham red squirrels, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with FWS, AGFD, and ongoing research efforts, monitor habitat dynamics (i.e., midden characteristics) preferred by the Mount Graham red squirrel.

2. Continue monitoring to detect changes in Mount Graham red squirrel midden occupancy that result from project implementation.
3. Continue to actively promote Mount Graham red squirrel population and habitat stability, per the 1993 recovery plan.
4. Continue to enhance and promote a healthy cycle of ecological succession in the Pinaleno range, including the use of prescribed fire, silvicultural, and reforestation methods.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

BALD EAGLE

STATUS OF THE SPECIES

Description

The Bald Eagle (*Haliaeetus leucocephalus*) is the only species of sea eagle native to North America. Literally translated, *Haliaeetus leucocephalus* means white-headed sea eagle (U.S. Fish and Wildlife 1995). A large bird of prey, adult bald eagles average 3 feet (0.9m) tall, weigh 10-12 pounds, and have a 6-7 feet (1.8-2.1m) wingspan. Distinguishing features include a yellow hooked bill and yellow un-feathered legs and feet. Adult species have a dark brownish-black body color, with a white head, neck, and tail. Immature Bald Eagles are mostly dark brown, lacking a white head and tail until they reach four to six years of age (U.S. Fish and Wildlife 1998). Historically, the bald eagle ranged and nested throughout North America, except in extreme northern Alaska and Canada, and central and southern Mexico (U.S. Fish and Wildlife 2004).

The Bald Eagle was first described in 1766 as *Falco leucocephalus* by Linnaeus. This South Carolina specimen was later renamed in 1897 as the Southern Bald Eagle, subspecies *Haliaeetus leucocephalus leucocephalus* (U.S. Fish and Wildlife 1999). At the time of the endangered listing in 1978, the subspecies was no longer recognized by ornithologists. The species is recognized as *Haliaeetus leucocephalus*.

Legal Status: On February 14, 1978, the Bald Eagle was listed as an endangered species in 43 states, and threatened in five others, under the ESA of 1973, as amended. Bald Eagles were not listed in Alaska, and are not found in Hawaii. A recovery plan was developed in 1982 for Bald Eagles in the southwest recovery region. No critical habitat has been designated for the species.

On July 12, 1995, the FWS reclassified the Bald Eagle from endangered to threatened in the lower 48 states, under the ESA of 1973, as amended. The Bald Eagle remained classified as threatened in Michigan, Minnesota, Wisconsin, Oregon, and Washington where it was originally listed as threatened. New information has indicated that Bald Eagles in the southwestern U.S. are part of the same Bald Eagle population found in the remaining lower 48 states, and not a distinct, reproductively isolated population as was previously believed (U.S. Fish and Wildlife 1995). On July 6, 1999, the FWS proposed to remove the Bald Eagle from the List of Endangered and Threatened Wildlife in the lower 48 states of the U.S., including the southwest recovery region. The final ruling on the listing status of the Bald Eagle is currently pending.

On October 6, 2004, the Center for Biological Diversity petitioned the FWS to: (1) recognize the biologically, behaviorally and ecologically isolated southwestern desert nesting Bald Eagle population as a Distinct Population Segment (DPS), (2) to list this population as endangered, and (3) to designate critical habitat for this population. The petitioners state that southwestern desert nesting bald eagles are in imminent threat of extinction and should be designated as a DPS. The FWS has not issued a petition finding to date.

The Bald Eagle remains federally protected under the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, the Lacey Act, and the Convention on International Trade of

Endangered Species. The Bald and Golden Eagle Protection Act prohibits the take, possession, sale, purchase, barter, or offer to sell, purchase or barter, transport, export or import, of any Bald Eagle, alive or dead, including any part, nest, or egg, unless allowed by permit (U.S. Fish and Wildlife 1999).

The Bald Eagle is listed as a Species of Special Concern by the state of Arizona. Such a listing provides policy guidance to state and federal agencies and the public on management priorities. It does not provide specific legal or regulatory protection for listed species. However, as with all native wildlife in Arizona, the general provisions of Arizona Revised Statutes, Title 17 protects Bald Eagles and all threatened and endangered species.

Distribution and Abundance

Historically, Bald Eagles ranged throughout the contiguous U.S., Canada, and northern Mexico. Currently, the range of the Bald Eagle extends throughout much of North America, nesting on both coasts from Florida to Baja California, Mexico in the south, and from Labrador to the western Aleutian Islands, Alaska in the north (U.S. Fish and Wildlife 1999). Bald Eagles are now repopulating areas throughout much of the species' historic range that were unoccupied only a few years ago (U.S. Fish and Wildlife Service 1999).

The Bald Eagle population of the southwest recovery region, referred to as the southwestern Bald Eagle, reaches throughout Oklahoma and Texas west of the 100th meridian, all of New Mexico and Arizona, and the area of California bordering the Lower Colorado River (U.S. Fish and Wildlife 1982). The vast majority of these breeding southwestern Bald Eagles are found within the state of Arizona. The occurrence of breeding Bald Eagles in the state of New Mexico is very limited (U.S. Forest Service 2004). In 2001, the NMGFD reported the occurrence of four Bald Eagle nest sites in New Mexico, all on private lands.

The proposed rule to remove the Bald Eagle in the lower 48 states from the List of Endangered and Threatened Wildlife indicates that current data shows the Bald Eagle has recovered in the lower 48 states (U.S. Fish and Wildlife Service 1999). The Bald Eagle population in the lower 48 states has increased from approximately 487 active nests in 1963 to an estimated minimum 7,066 breeding pairs currently (U.S. Fish and Wildlife Service 1999). According to the U.S. Fish and Wildlife Service (1999), the recovery of the Bald Eagle is due in part to habitat protection and management actions, and the reduction in levels of persistent organochlorine pesticides occurring in the environment.

Habitat

Bald Eagles inhabit a variety of aquatic ecosystems, including estuaries, lakes, reservoirs, major river systems, and some seacoast habitats. In general, suitable habitat for bald eagles includes areas with large trees for perches and nest sites, and those areas which provide an adequate food base of fish, waterfowl, and/or carrion (U.S. Fish and Wildlife 2004b).

Southwestern Bald Eagle breeding areas are located in close proximity to a variety of aquatic habitats including reservoirs, regulated river systems, and free-flowing rivers and creeks. The term "breeding area" is used to define eagle nesting sites and the area they forage. Bald Eagle nests are usually in isolated, tall trees, with a commanding view of the area and in close

proximity to water. Nests are placed mostly on cliff edges, rock pinnacles, and in cottonwood trees. However, artificial structures, junipers, pinyon pines, sycamores, willows, ponderosa pines, and snags of these trees also have housed eagle nests.

In Arizona, the majority of nests are located between 1,080 feet (329m) and 5,640 feet (1,719m), and correspond with the Upper and Lower Sonoran Life Zones, including the riparian habitats and transition areas of both zones (Arizona Game and Fish Department 2002). Representative vegetation of these life zones includes Arizona sycamore (*Platanus wrightii*), blue paloverde (*Cercidium floridum*), cholla (*Opuntia* spp.), Fremont cottonwood (*Populus fremontii*), Gooding willow (*Salix gooddingii*), mesquite (*Prosopis* spp.), saguaro (*Carnegiea gigantean*), and tamarisk or salt cedar (*Tamarix pentandra*; an exotic species). Piñon (*Pinus* spp.) and juniper (*Juniperus* spp.) are found in the transition areas between the two zones (U.S. Forest Service 2004).

Historic evidence to document Bald Eagles nesting in New Mexico is lacking, although unverified reports suggest one or two pairs may have nested in southwestern New Mexico prior to 1928. In the mid-1980s, a pair established a territory in Colfax County in an area where Bald Eagles concentrated in winter, and in 1987 an active nest was discovered nearby which produced two fledglings that year. In 1988, an active nest was discovered in Sierra County, also in an area of wintering eagle concentration; the nest fledged one young that year. Through 1999, those two nests together fledged a minimum of 31 young, with that in Colfax County being one of the more productive nests in North America. Additional nesting activity was recorded elsewhere after the mid-1980s, always in areas of wintering concentrations, including in San Juan, Rio Arriba, Quay, and Sierra counties, but in each instance eagles built nests only to abandon the effort prior to egg laying; such “practice” nests are not uncommon among inexperienced adults. In 1998, two additional nests were discovered in Colfax County, and each fledged young in both 1998 and 1999 (five young total) (S.O. Williams 2000).

Bald Eagles migrating from the north are found in a variety of habitats throughout the southwest recovery region. Wintering bald eagles often congregate at specific sites that are generally close to open water and offer good perch trees and night roosts (U.S. Fish and Wildlife 1995). Bald Eagles wintering in New Mexico are often found in upland habitats.

Life History

Bald Eagles are long-lived bird species. Southwestern Bald Eagles are known to exceed 12 years of age (U.S. Fish and Wildlife 1999). Bald Eagles primarily eat fish, but they will also eat amphibians, reptiles, birds, small mammals, carrion (dead animals), and carcasses of large mammals (cows, elk, deer, etc.). Their food habits can change daily or seasonally, but when a choice is available, bald eagles invariably select fish over other prey (Stalmaster 1987).

Food strongly influences Bald Eagle productivity (Newton 1979, Hansen 1987). A female’s health in the months preceding egg laying can affect egg production, and the prey availability during the breeding cycle affects the survivorship of nestlings and post-fledging juveniles. Thus, any factor affecting the adults’ ability to acquire food can influence productivity and adult survivorship (Newton 1979).

The most common fish eaten in the southwest are Sonora and desert suckers; channel and flathead catfish; common carp; largemouth, smallmouth, yellow, and white bass; and black crappie. Less common are roundtail chub, green sunfish, bluegill, tilapia, and rainbow trout (U.S. Fish and Wildlife 1982). Prey availability has decreased on the upper Salt River. The introduction of predatory flathead catfish in the late 1970s nearly extirpated native fish populations. Flathead catfish, while available as bald eagle prey when smaller, grow to large sizes (up to 50 lbs.) making them unavailable. In turn, flathead catfish populations have increased while other fish species have decreased. Consequently, productivity in the four bald eagle Breeding Areas on the upper Salt River has decreased from 1.12 in the 1980s to 0.29 in the 1990s.

Eagles will scavenge, steal, or actively hunt to acquire food. Carrion constitutes a higher proportion of the diet for juveniles and sub-adults than it does for adult eagles. Eagles are primarily a perch and wait hunter in order to detect carrion or passively detect available live prey (Stalmaster 1987).

Bald Eagles in Arizona demonstrate unique behavioral characteristics in contrast to Bald Eagles in the remaining lower 48 states (U.S. Forest Service 2004). Populations of eagles in Arizona tend to breed earlier in the year in comparison to northern populations. Specifically, Bald Eagles within the southwest nest during the winter months, in November or December, and frequently construct and use nests placed on cliff edges and pinnacles, as opposed to trees. Nests may be used year after year, and are often five feet wide and three feet deep, weighing as much as 2,000 pounds (U.S. Fish and Wildlife Service 1999).

Bald Eagle pairs begin courtship, nest building, and other nest selection behaviors approximately one month before egg laying (U.S. Fish and Wildlife 1999). The nesting season lasts approximately six months. Bald Eagles in Arizona will lay eggs between December and March; yet most eggs are laid in January and February (U.S. Forest Service 2004). Nestlings hatch after a 35 day incubation period, and fledging takes place at 11 to 12 weeks of age. Adult Bald Eagles extend parental care four to eleven weeks after fledging (U.S. Fish and Wildlife 1999).

About 45 days after leaving the nest, young bald eagles migrate to Canada; northern California, Idaho, Montana, North and South Dakota, Oregon, Washington, and Wyoming. Two and three year old Bald Eagles also migrate annually to these destinations. It is unknown where non-breeding four year old and adult Bald Eagles travel to in late spring and summer. One to three year-old sub-adults return to Arizona in September and October. Resident adult bald eagles often stay in their breeding areas year-round, although local short-term migrations are common.

Population Dynamics

The first major decline in Bald Eagle populations began in the mid to late 1800s (U.S. Fish and Wildlife 1999). Nationwide Bald Eagle surveys conducted in 1973 and 1974 revealed the declining trend of bald eagle population numbers throughout the lower 48 states. More recently however, the nesting populations of Bald Eagles have been increasing throughout the U.S. Surveys conducted between 1963 and 1998 show that active nest sites in the lower 48 states have grown from 417 to over 5,748 occupied breeding areas (U.S. Fish and Wildlife 1995, 1999). The largest populations of Bald Eagles are found in Alaska and Canada, and significant populations

are also found in the Pacific Northwest, the Great Lakes states, and along the Southeast Coast (U.S. Fish and Wildlife Service 1998).

The size of Bald Eagle breeding areas depends upon the resources available and the proximity of other breeding areas. Territory size, nest location, and resources are affected by availability of nest sites (cliffs, pinnacles, trees), the water system (regulated/unregulated river and/or impounded lake), and/or diversity and abundance of food. Immigration and emigration is rare for the southwest population of bald eagles. However, young Bald Eagles sometimes migrate for several months and hundreds of miles to their wintering grounds. It is currently unclear if non-breeding four year old and adult Bald Eagles follow the same pattern, or remain in Arizona searching for openings or establishing new territories (U.S. Fish and Wildlife Service 1999). The distribution and abundance of wintering eagles is dependant upon food and the availability of appropriate roosting and foraging habitat (U.S. Forest Service 2004).

Reasons for Listing

The Bald Eagle was originally listed as endangered due to the species' reproductive failure caused by pesticide use (mainly DDT), and unrestricted killing by humans. The widespread use of dichloro-diphenyl-trichloroethane (DDT) and other persistent organochlorine compounds in the 1940s for mosquito control and as a general insecticide caused considerable declines in Bald Eagle populations (U.S. Fish and Wildlife Service 2004b). The pesticide DDT breaks down into dichlorophenyl-dichloroethylene and accumulates in the fatty tissues of adult females, leading to impaired calcium release necessary for egg shell formation. Thinner egg shells led to reproductive failure, which is considered the primary cause of declines in the Bald Eagle population (U.S. Fish and Wildlife Service 2004b). Due to the nationwide banning of DDT use in 1972, Bald Eagles have increased in number and expanded in range. Habitat protection and additional recovery efforts have also contributed to the rise in Bald Eagle population numbers (U.S. Fish and Wildlife Service 1995). The Bald Eagle is currently listed as threatened due to habitat loss, human encroachment on nesting sites, entanglement in fishing lines, reduction in native fish species, illegal shooting, and heavy metal contamination (U.S. Fish and Wildlife Service 1998).

Threats: Populations of Bald Eagles are primarily threatened by the increasing proximity of Bald Eagle breeding areas to major human population centers and recreation areas (Hunt, et al. 1992). Such areas threaten Bald Eagles by variety of factors including extensive loss and modification of riparian breeding and foraging habitat; changes in groundwater levels; changes in water quality; and alteration of aquatic and riparian systems for water distribution systems and maintenance of existing water development features such as dams or diversion structures (Hunt, et al. 1992). Bald Eagles continue to be threatened by recreational activities, especially watercraft, off-road vehicles, and entanglement in monofilament fishing line and fishing tackle; low-level aircraft overflights; malicious and accidental harassment, including shooting; collisions with transmission lines; poisoning; and electrocution (Stalmaster 1987). In addition, high concentrations of heavy metals, particularly mercury, have been detected at levels sufficiently high to cause failure in Bald Eagle eggs, threatening reproduction success. Also, lead poisoning has been identified as an increasing source of mortality for wintering eagles and some breeding eagles. These factors, combined with natural mortality agents such as parasites, predation,

competitors, and heat (affecting nestlings), indicate our attention must remain focused on Bald Eagles for the foreseeable future (U.S. Forest Service 2004).

Conservation Measures

Since the endangered listing of the Bald Eagle in 1967, multiple recovery efforts have led to an increase in Bald Eagles numbers and expanded the range of the species. The lower 48 states were divided into five recovery regions, for which separate recovery teams composed of experts in each geographic area prepared recovery plans for their region (U.S. Fish and Wildlife Service 1999). The Southwestern Bald Eagle Recovery Plan was signed on September 8, 1982 to restore the southwestern bald eagle to its historic status. The Recovery Plan delineates specific research and management objectives designed to insure the continued survival of the small population of southwestern bald eagles (U.S. Fish and Wildlife Service 1982).

Management programs, projects, and committees developed during the past two decades have been critical factors in improving and maintaining the status of the southwestern Bald Eagle. Since 1978, the Arizona Bald Eagle Nestwatch Program (ABENWP) has been dedicated to the study and conservation of Bald Eagles in the Southwest. The program documents disturbance at nest sites, provides on-site protection, and intervenes as necessary to reduce harm or harassment for the benefit of Bald Eagles (Arizona Game and Fish Department 1999). The on-site protection and education provided by nest watchers has improved Bald Eagle nesting success by at least 15 percent (U.S. Fish and Wildlife Service 1999). In 1984, wildlife management agencies within Arizona formed the Southwestern Bald Eagle Management Committee (SWBEMC) to protect the southwestern Bald Eagle. The SWBEMC includes a number of federal, state, tribal, and quasi-governmental agencies and partners. The Committee was formed in an effort to provide oversight and increase communication, essential to the successful recovery of eagles in the southwest (Arizona Game and Fish Department 1999). In addition, the Arizona Bald Eagle Nest Search, and Occupancy and Reproduction Assessment helicopter flights assist the committees and conservation programs in their goal to sustain the abundance and distribution of southwestern Bald Eagles.

From 1979 to 1991, the National Wildlife Federation coordinated an annual, nationwide bald eagle winter count throughout the lower 48 states in order to determine population trends. Throughout Arizona, the AGFD has established 115 standardized routes, which are surveyed annually over a two week period in January. Similar surveys are also conducted in New Mexico each year. These winter count surveys reveal information about Bald Eagle distribution, abundance, age classes, and habitats (U.S. Forest Service 2004). The U.S. Geological Survey, Biological Resources Division at the Snake River Field Station has since coordinated the national winter counts of bald eagles.

Several National Forests in Arizona, including the Apache-Sitgreaves, Coconino, Prescott, and Tonto, contribute to the recovery of southwestern Bald Eagles through the use of breeding areas restrictions. These four National Forests have formal breeding area closures from January – June, and provide enforcement, patrol, interpretation, signing, fencing, and access management necessary to minimize impacts to breeding birds (U.S. Forest Service 2004). In addition, these National Forests support the ABENWP with funding, logistics, and facilities. Seasonal closures have also been implemented within National Grasslands. A seasonal closure has been placed on

a portion of Lake McClellan located in the Texas panhandle. This closure (November through March) coincides with the use of the lake for foraging by wintering eagles (U.S. Forest Service 2004).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Bald Eagles are known to nest on the Apache-Sitgreaves, Coconino, Prescott, and Tonto. Within Arizona, most bald eagles winter near lakes on the Coconino NF, and west along the Mogollon Rim east through the White Mountains of the Apache-Sitgreaves NF. Breeding areas on the regulated lower Verde River are the densest in the states with eight breeding areas downstream of Bartlett Dam above the Salt River confluence. A small resident population of approximately 40 Bald Eagle pairs nest along the Salt, Verde, Gil, Bill Willimas, Agua Fria, San Pedro, and San Francisco rivers and along Tonto and Canyon creeks (U.S. Fish and Wildlife 1998). No nesting has ever been documented on the National Grasslands in the Southwestern Region.

Wintering eagles are also known to occur along the Salt and Verde rivers within the Tonto, Coconino, and Prescott NFs (U.S. Forest Service 2004). Small numbers of bald eagles may be found wintering throughout all National Forest's in New Mexico. In particular, wintering Bald Eagles are known to frequent the Lincoln NF (U.S. Forest Service 2004). Southwestern Bald Eagles rarely winter on the National Grasslands throughout the Southwestern Region. Occasionally, Bald Eagles are seen during the winter foraging near the Kiowa/Rita Blanc National Grasslands and the Black Kettle National Grassland in the Texas Panhandle (U.S. Forest Service 2004).

The occurrence of breeding Bald Eagles in the state of New Mexico is very limited. In 2001, the NMGFD reported that four Bald Eagle nest sites occurred in New Mexico, all on private lands. Two active nests have been monitored since the 1980's. Fledging success has been good at both locations (U.S. Forest Service 2001). In May of 2005, a Bald Eagle nest was discovered at Quemado Lake on the Gila NF (W. Murphy, Forest Service, 2005, unpubl. data).

The number of Bald Eagle breeding pairs in the Southwestern Recovery Area has more than doubled in the last 15 years, the majority of which are found within the state of Arizona (U.S. Fish and Wildlife Service 1999). As of 2002, 47 breeding areas were known in Arizona, approximately 28 (60 percent) of which occurred on Forest Service System lands. Twenty (72 percent) of these breeding areas occur on the Tonto NF, four (14 percent) on the Coconino NF, and two (7 percent) each on the Prescott and Apache-Sitgreaves NFs (U.S. Forest Service 2004). In 2003, 42 of the known 47 breeding areas were occupied. Two new breeding areas were also

discovered in 2003. Furthermore, reports of an adult Bald Eagle standing on nests at Woods Canyon and Chevelon Lake may be the first indication of occupancy along the Mogollon Rim (Canaca et al. 2004). Most wildlife biologists believe the distribution and abundance of breeding Arizona Bald Eagles has improved largely due to intensive management; for some of the threats that led to listing the species (recreational human activity, development, loss of habitat, etc.) have not diminished, but have rather increased (U.S. Forest Service 2004).

From 1970 to 1990, 226 known eaglets fledged in Arizona, for an average of 10.8 young produced per year (Hunt et al. 1992). In 1999, 21 of the 29 breeding eagle pairs in Arizona successfully produced a record 31 juveniles (Driscoll 2001). In 2000, 37 breeding areas were occupied, 27 of which were active nests, and 10 nests failed. Thirteen of the 27 active nests were successful in producing young, and a total of 36+ young hatched. Twenty-two of these young survived to fledge (Driscoll and Koloszar 2001). In 2001, the Bald Eagle breeding season produced the second highest number of young; out of 29 breeding attempts, 19 Bald Eagle pairs successfully produced 28 juveniles (Driscoll 2002). The 2002 breeding season produced a record 37 fledglings in one year (U.S. Fish and Wildlife Service 2002). In 2003, 31 Bald Eagle pairs attempted to breed, 18 of which successfully produced 25 fledglings.

The productivity rate of Bald Eagles has a significant influence upon the species' population levels in Arizona. Productivity rates are lower in Arizona as compared to other parts of the United States (U.S. Forest Service 2004). There were 0.92 average young per occupied breeding area in Arizona before 1984 when there were less than 20 breeding areas, and 0.78 average young per occupied breeding area since 1984, as opposed to 0.96 average young per breeding in Alaska, Florida, and Wisconsin (Arizona Game and Fish Department 1999, Sprunt et al. 1973, McAllister et al. 1986, Kozie and Anderson 1991). Furthermore, the nestling death rate of 25 percent for Arizona is higher than the 15 percent level in range wide studies examined by Stalmaster (1987). However, the productivity rate in raptor populations is frequently density-dependent; as the population of nesting pairs increases, brood size and nest success commonly decrease (Newton 1979).

Wintering bald eagles can be found throughout all 11 National Forests in Arizona and New Mexico, and are a rare winter migrant on the National Grasslands in the Southwestern Region (U.S. Forest Service 2004). Within Arizona, of the 300-400 birds typically detected during statewide winter counts, most occur near lakes on the Coconino NF, west along the Mogollon Rim, and east throughout the White Mountains on the Apache-Sitgreaves NF. However, the Salt and Verde rivers have been known to have 30 and 40 wintering birds, respectively (U.S. Forest Service 2004). From 1997 to 1998, the highest numbers of Bald Eagles counted during winter surveys occurred on the Verde River on the Tonto, Coconino, and Prescott NFs, and San Carlos Reservoir (U.S. Fish and Wildlife Service 2002). In 2002, the largest numbers of wintering eagles were found along the Salt, Verde, and Gila River drainages, and in Coconino County. A small numbers of Bald Eagles may be found wintering throughout all National Forest in New Mexico. One known winter roost area, Monument Spring, is monitored each year (Geo-Marine, Inc. 2001) on the Lincoln NF where known to frequent the Lincoln NF. In 2003, 11 Bald Eagles were located along the Capitan Mountains of the Lincoln NF. The exact location of the roost(s) is unknown at this time (U.S. Forest Service 2004).

Factors Affecting the Species within the Action Area

Although the numbers of southwestern Bald Eagles are considered to be on an upward trend, the Arizona population remains small and under threat from a variety of factors. Direct threats to Bald Eagles include low-level aircraft over-flights; collisions with transmission lines, poisoning, and other human disturbances (U.S. Fish and Wildlife Service 2002). Additional threats to Bald Eagles include habitat disturbances (i.e., degraded aquatic habitat conditions, fluctuating water levels from general climatic conditions and water users) which indirectly affect the species status and reproductive success.

Human disturbances to Bald Eagles may increase as the numbers of eagles increase and human development continues to expand into rural areas (U.S. Fish and Wildlife Service 1999). Fishing line and tackle have been detected in many Bald Eagle nests leading to the death of a few eagles. However, intensive management from nest watcher observations and nest climbs (for banding) helps reduce the threat of this type of litter (fishing line, etc.), that without, would almost certainly pose a greater source of mortality (U.S. Forest Service 2004). Concentrations of heavy metals in Bald Eagle eggs are a concern in Arizona. Mercury is present at levels sufficiently high to cause failure in eggs along the Verde, Salt, and Gila Rivers. It appears that mercury concentrations in addled eggs are increasing over time by as much as two to six times as much as earlier concentrations (U.S. Fish and Wildlife Service 2002).

The continued pumping of groundwater threatens important nesting and foraging riparian habitat. Also, improper grazing, recreation, and OHVs can adversely affect Bald Eagle habitat. Non-native fish species threaten the status and distribution of southwestern Bald Eagles. As a result of predation, exotic flathead and channel catfish and other non-native fish are believed to have simplified the fish community on the upper Salt River, practically eradicating native suckers. As a result, eagle productivity has nearly ceased above Roosevelt Lake for almost the past 10 years (AGFD 2004). This is most likely due to non-native prey not being available to the Bald Eagle. There is considerable risk of this occurring on other free-flowing or regulated rivers and creeks within the eagle's range.

EFFECTS OF THE ACTION

According to the Forest Service, Bald Eagles occur on all 11 National Forests in Arizona and New Mexico. However, Bald Eagles are known to nest on four National Forests within Arizona that include the Apache-Sitgreaves, Coconino, Prescott, and Tonto NF. In May of 2005, a Bald Eagle nest was discovered at Quemado Lake on the Gila NF (W. Murphy, Forest Service, 2005, unpubl. data). Although all of the 11 National Forests contain wintering habitat for the Bald Eagle, we concentrated our effects analysis on the Apache-Sitgreaves, Coconino, Prescott, and Tonto NFs because eagles are known to nest on these Forests.

Table 18. Summary of S&Gs considered for the Bald Eagle.

National Forest	Standards and Guidelines
Apache- Sitgreaves	1,2,4-10, 12, 14, 16-21, 23, 25, 26, 28-33, 37-40, 42-53, 55, 57-65, 83, 90-92, 94-99, 104-113, 115, 116, 121-124, 126-130, 132-140, 149-151, 154-159, 161, 165, 166, 171, 172, 176-180
Carson	181-189, 188, 189, 193-195, 197-201, 203, 204, 206-209, 211-217, 219-227
Cibola	228,229-234, 236, 237, 240-252, 254, 255, 257, 259, 261, 272-275, 277, 278, 283, 285
Coconino	311-325, 327-329, 331, 335-338, 341358, 361-364, 367-391, 393-404, 406-408, 411-417, 424-447, 454-461, 463-466, 469-472, 479, 480, 481, 484-509, 512-520, 525-534, 545, 547-549, 551, 552, 561-570, 572-575, 577-580, 580, 582-584, 587, 588, 590-594, 596-602, 604-606
Coronado	613, 613, 626-629, 631-639, 640, 641, 643, 644, 647-653, 656, 659-662, 666-670, 672-682, 692-696, 697, 698, 702, 704-715, 719-724, 727, 757,-759, 761, 762, 770-773, 774-780, 782, 785-792, 794-805, 807-812, 825-829, 830-839
Gila	841, 842, 844-8855, 857-878, 880, 881, 883, 884, 886-890, 892-894, 895, 896-902, 904-906, 908-928, 930, 932, 933, 935, 936, 938, 940, 941, 945, 946, 948, 950, 952, 953, 955
Kaibab	958-962, 964, 965, 967, 968-974, 976-998, 1000-1024, 1030-1036, 1039, 1040, 1041, 1043-1045
Lincoln	1046-1057, 1058-1070, 1073-1087, 1090-1092, 1094, 1095, 1097, 1100, 1102, 1104, 1107, 1110, 1111, 1114
Prescott	11115-1138, 1140-1163, 1165-1176, 1178-1182
Santa Fe	1183-1194, 1196, 1197, 1199-1202, 1204-11208, 1210-1220, 1222-1234, 1236-1238, 1242, 1245-1275, 1277-1301, 1303-1339
Tonto	1341, 1342, 1344, 1345, 1348-1351, 1353-1357, 1359, 1361-1365, 1367, 1368, 1371, 1372, 1375, 1378, 1380-1382, 1384, 1385, 1388, 1390-1404, 1406, 1408, 1410, 1419-1423
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1443, 1145, 1449, 1453-1456, 1458, 1459, 1461-1466, 1468, 1472-1474, 1476, 1477, 1479, 1486-1493, 1495, 1497-1501, 1503-1506, 1509-1517

Apache-Sitgreaves National Forest

Bald Eagles are known to nest on the Apache-Sitgreaves NF at the following areas: Luna Lake, Crescent Lake, and Chevlene Canyon. Also, Bald Eagles are known to nest on this National Forest. We found two S&Gs on the Apache-Sitgreaves NF that would cause a negative behavioral response. Overall, the S&Gs contained in the Apache-Sitgreaves LRMP were positive for the eagle (see Table 19 below).

Table 19. Effects of the S&Gs analyzed for the Bald Eagle – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	2	1.8
0	S&G is ill-defined and/or open to interpretation	22	19.6
1	S&G is maintaining habitat & providing at least minimal recovery	78	69.6
2	S&G is moving towards recovery	3	2.7
3	S&G is implementing species recovery plan	1	0.9
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	4	3.6
Total		112	100 %

Engineering Program

Standard and Guideline 63 states that total road density should average 3.5 mi/mi² or less and that open road density should average 2.0 mi/mi² or less. This S&G allows for a road density which is above the level determined by the FWS and NOAA Fisheries to affect functioning watershed conditions. Actual road density on the Apache-Sitgreaves is currently 2.2 mi/mi², which is below the level established by FWS and NOAA Fisheries and significantly below the level allowed by S&G 63. This may be an indication of the holistic implementation of plan S&Gs to accomplish the goals of resource management and protection rather than implementing of single S&Gs. Populations of Bald Eagles are primarily threatened by the increasing proximity of eagle breeding areas to major human population centers and recreation areas (Hunt, et al. 1992). Increased road densities in general can add to this threat by increasing the number of people into an area. Thus, eagles may be disturbed (i.e., harassed) by increased human traffic into their nesting areas.

Forestry and Forest Health Program

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average 2.0 mi/mi² or less. Bald Eagles continue to be threatened by recreational activities, off-road vehicles, malicious and accidental harassment, including shooting (Stalmaster 1987). As stated above, high road densities can increase human presence into Bald Eagle nesting areas and thus, eagles could be harassed. As stated above, high road densities had increased human access to areas occupied by bald eagles.

Recreation, Heritage, and Wilderness Program

We found no negative S&Gs within this program. However, recreation on this Forest has caused adverse affects in the past (e.g., Big Lake Campground expansion). Human activity can disturb bald eagles, and the growing popularity of outdoor recreation increases the potential for direct

conflicts between recreationists and eagles. The effects of human activity on the distribution, occupancy, activity, success, and productivity of Bald Eagle nesting sites have been widely studied (Stalmaster and Kaiser 1998, Grubb and King 1991, McGarigal et al. 1991) and significant disturbances to eagles have been documented.

Wildlife, Fish, and Rare Plants Program

Many of the S&Gs were overall positive for federally listed species. For example, S&G 21 allows the Forest to implement threatened and endangered species recovery plans. Implementing this S&G will obviously benefit the Bald Eagle.

In summary, the Apache-Sitgreaves NF’s LRMP was overall positive for the Bald Eagle. However, we found that take is reasonably certain to occur as a result of indirect effects of increased human presence from high road densities in areas where Bald Eagles nest. Take would be in the form of harassment from the Engineering, Forestry and Forest Health, and Recreation programs.

Carson National Forest

Bald Eagles have been observed wintering on the Carson NF. One S&G was found to cause a negative behavioral response. The majority of the S&Gs on the Carson NF were found to be positive for the eagle. No negative S&Gs were found for eagles on the Cibola NF.

Table 20. Effects of the S&Gs for the Bald Eagle – Carson NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	1	2.5
0	S&G is ill-defined and/or open to interpretation	6	15.0
1	S&G is maintaining habitat & providing at least minimal recovery	25	62.5
2	S&G is moving towards recovery	2	5.0
3	S&G is implementing species recovery plan	3	7.5
Y	S&G has no application to the species	1	2.5
Z	S&G implementation is non-discretionary	2	5.0
X	S&G is a heading	0	0.0
Total		40	100%

Engineering Program

We found only one S&G that would have a negative effect on the eagle. Standard and Guideline 216 allows the Forest to construct roads for timber sales utilizing Best Management Practices (guidelines are 2.0 mi/mi² for construction first entry; 2.0 mi/mi² for reconstruction first entry; 4.0 mi/mi² for reconstruction). High road densities could increase human impacting.

All remaining S&Gs within the Carson’s LRMP were overall positive for the Bald Eagle. Most included actions to move towards recovery or implement recovery plans for listed species.

Cibola National Forest

Bald Eagles are have been observed wintering on the Cibola NF. The majority of the S&Gs analyzed directed the Forest to maintain habitat or provide for minimal recovery for wildlife species. Overall, the Cibola LRMP will benefit the Bald Eagle. Therefore, take of Bald Eagles is not anticipated on the Cibola NF.

Table 21. Effects of the S&Gs analyzed for the Bald Eagle – Cibola NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	11.5
1	S&G is maintaining habitat & providing at least minimal recovery	29	80.6
2	S&G is moving towards recovery	1	2.8
3	S&G is implementing species recovery plan	1	2.8
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	2.8
X	S&G is a heading	2	5.6
Total		36	100 %

Coconino National Forest

Bald Eagles are known to nest on the Coconino NF at the following areas: Verde River and Oak Creek. We found no S&Gs that would be lethal or sublethal to the Bald Eagle. However, we found six S&Gs on this Forest that would cause a negative behavioral response. Overall, the S&Gs contained in the Coconino LRMP were positive for the eagle (see Table 22 below).

Table 22. Effects of the S&Gs analyzed for the Bald Eagle – Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	6	2.7
0	S&G is ill-defined and/or open to interpretation	26	11.5
1	S&G is maintaining habitat & providing at least minimal recovery	139	61.5
2	S&G is moving towards recovery	1	0.4
3	S&G is implementing species recovery plan	1	0.4
Y	S&G has no application to the species	6	2.7

Ranking	Explanation of Ranking	Total	Percentage
Z	S&G implementation is non-discretionary	8	3.5
X	S&G is a heading	39	17.3
Total		226	100 %

Forestry and Forest Health Program

Standard and Guideline 346 states that cuts are designed to eliminate or reduce dwarf mistletoe infections to manageable levels. According to the FWS (U.S. Fish and Wildlife Service 1998), the bald eagle is currently listed as threatened due to many factors but also because of habitat loss. Management that eliminates dwarf mistletoe could impact the eagles nest or roosting trees; however, mistletoe pre-commercial thinning has been relatively constant since 1992 and future projects will likely be tied to increased insect activity. Furthermore, the majority of mistletoe and bark beetle control projects will likely be related to high-value sites, such as recreation, administrative, and similar sites (U.S. Forest Service 2004: 41)

Recreation, Heritage, and Wilderness Program

Standard and Guideline 481 allows the Forest to develop campgrounds and other recreational opportunities within Management Area 11 which contains known nesting eagles. In addition, S&G 515 states allows the Forest to increase day-use opportunities emphasizing nature-based activities such as hiking, picnicking, bird watching, photography, fishing and interpretation. Increase opportunities for people to access the water and enjoy the creek. And S&G 575 states for the Forest to provide a system of OHV recreation routes through the area (i.e., Management Area 27) that offers scenic and wildlife viewing, moderately rugged road conditions and dispersed camping. In addition, the Forest is directed to provide route markers, road signs and maps as needed to guide people along the routes. We found these to cause negative behavioral responses by eagles.

Several studies have demonstrated how recreation can influence the behavior of foraging and nesting eagles. Steidl and Anthony (1999) assessed the effects of increased recreation to nesting eagles along the Gulkana River in Alaska. Human activity decreased some eagle activity by 59 percent and the time they left their nest area unattended increased 24 percent. This resulted in birds consuming 29 percent less prey per day. Further, due to recreation use in the areas the eagles may travel longer distances to forage and in turn spend less time at the nest. This could ultimately result in lower productivity for this breeding pair. Currently, the state of Arizona, in cooperation with the Forest Service and others, implements the Arizona Bald Eagle Nestwatch Program; information from this program has lead to a reduction in adverse effects from high use recreational activities in many areas where bald eagles are nesting.

In summary, the Coconino NF’s LRMP was overall positive for the eagle. However, we found that take is reasonably certain to occur as a result of recreation and to a lesser extent, habitat loss. Take would be in the form of harm and harassment. Habitat loss would result in take in the form or harm as habitat loss could significantly affect the ability of the bald eagle to feed, breed, or shelter from the Forestry and Forest Health and Recreation programs.

Coronado National Forest

Bald Eagles have been observed wintering on the Coronado NF. We found two S&Gs concerning chemical-use within the Coronado NF LRMP that would have a lethal and sublethal effect to the eagle. Standard and Guideline 697 states that chemicals such as insecticides and rodenticides may be used in recreation areas and administrative sites. In addition, S&Gs 702 states that cyanide leaching as part of mining operations is allowable. Both of these could impact wintering bald eagles.

Table 23. Effects of the S&Gs analyzed for the Bald Eagle – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.8
-2	S&G is causing sublethal response	1	0.8
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	19	14.4
1	S&G is maintaining habitat & providing at least minimal recovery	78	59.1
2	S&G is moving towards recovery	9	6.8
3	S&G is implementing species recovery plan	10	7.6
Y	S&G has no application to the species	9	6.8
Z	S&G implementation is non-discretionary	2	1.5
X	S&G is a heading	3	2.3
Total		132	100 %

Lands and Minerals Program

Standard and Guideline 701 allows for the use of cyanide leaching as part of mining operations. According to the Forest Service, cyanide is used during mining operations for the purposes of extracting the desired mineral (e.g., gold) and is usually in the form of ponds. Currently, no cyanide leach ponds exist on Coronado NF (W. Murphy, Forest Service 2005, unpubl. data). If this form of mining were developed, eagles may be attracted to these ponds and could be directly killed by the cyanide.

Gila National Forest

In May of 2005, Bald Eagles were found nesting at Quemado Lake on the Gila NF. In addition, Bald Eagles are have been observed wintering on the Gila NF. The majority of the S&Gs analyzed directed the Forest to maintain habitat or provide for minimal recovery for wildlife species, or to implement recovery plans for listed species. Overall, the Gila LRMP will benefit the Bald Eagle.

Table 24. Effects of the S&Gs analyzed for the Bald Eagle –Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	2.1
1	S&G is maintaining habitat & providing at least minimal recovery	67	70.5
2	S&G is moving towards recovery	2	2.1
3	S&G is implementing species recovery plan	22	23.2
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.1
X	S&G is a heading	0	0.0
Total		95	100 %

Kaibab National Forest

Bald Eagles have been observed wintering on the Kaibab NF. The majority of the S&Gs analyzed directed the Forest to maintain habitat or provide for at least minimal recovery for wildlife species. Standard and Guideline 965 allows the Forest to minimize the number of electronic sites and utility corridors consistent with appropriate public services that require the use of Forest Service lands. We found this to be overall beneficial with some short-term effects. However, because no nesting eagles occur, we do not anticipate take of eagles on the Kaibab NF. In addition, we ranked one S&G as possibly causing harm to the eagle (S&G 969) that allows the Forest to; “Provide for extensive management of livestock use of the range resource.”

Table 25. Effects of the S&Gs analyzed for the Bald Eagle – Kaibab NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	1.4
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	4	5.5
1	S&G is maintaining habitat & providing at least minimal recovery	65	89
2	S&G is moving towards recovery	1	1.4
3	S&G is implementing species recovery plan	1	1.4
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	1.4
X	S&G is a heading	0	0.0
Total		73	100 %

Lincoln National Forest

Bald Eagles have been observed wintering on the Lincoln NF. We found two S&Gs that could have a negative behavioral response to the Bald Eagle. However, these S&Gs related to chemical use and road systems. Because eagles do not nest on the Lincoln NF, the FWS does not anticipate that take of Bald Eagles is likely to occur on the Lincoln NF because eagles are not known to nest on this Forest. Overall, the S&Gs contained in the Lincoln LRMP were positive for the eagle (see Table 26 below).

Table 26. Effects of the S&Gs analyzed for the Bald Eagle – Lincoln NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	2	3.6
0	S&G is ill-defined and/or open to interpretation	1	1.8
1	S&G is maintaining habitat & providing at least minimal recovery	47	85.5
2	S&G is moving towards recovery	2	3.6
3	S&G is implementing species recovery plan	1	1.8
Y	S&G has no application to the species	1	1.8
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		55	100 %

Prescott National Forest

Bald Eagles are known to nest on the Prescott NF along the Verde River and Lynx Lake. Also, Bald Eagles are known to nest on this National Forest. We found one S&G that would have adverse affects on the bald eagle. Overall, the S&Gs contained in the Prescott LRMP were positive for the eagle (see Table 27 below).

Table 27. Effects of the S&Gs analyzed for the Bald Eagle – Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	1.5
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.5
1	S&G is maintaining habitat & providing at least minimal recovery	53	83.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.0
Y	S&G has no application to the species	1	1.5

Ranking	Explanation of Ranking	Total	Percentage
Z	S&G implementation is non-discretionary	2	3.0
X	S&G is a heading	2	3.0
Total		64	100 %

Rangeland Management Program

Standard and Guideline 1162 states that when using pesticides, avoid direct application to water. Do not mix or load chemicals near streams or wet areas. While best management practices are built into this S&G, the use of chemicals in the environment could have detrimental effects to wildlife. Thus, Bald Eagles or their prey could be exposed to chemicals which could result in a sub-lethal response.

Santa Fe National Forest

Bald Eagles have been observed wintering on the Santa Fe NF. The majority of the S&Gs analyzed directed the Forest to maintain habitat or provide for minimal recovery for wildlife species, or to implement recovery plans for listed species. Overall, the Santa Fe NF LRMP will benefit the Bald Eagle.

Table 28. Effects of the S&Gs for the Bald Eagle –Santa Fe NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	6	4.3
1	S&G is maintaining habitat & providing at least minimal recovery	109	77.3
2	S&G is moving towards recovery	1	0.7
3	S&G is implementing species recovery plan	3	2.1
Y	S&G has no application to the species	12	8.5
Z	S&G implementation is non-discretionary	3	2.1
X	S&G is a heading	7	5.0
Total		141	100 %

Tonto National Forest

Bald Eagles are known to nest on the Tonto NF along the Verde River, Salt River, and Tonto Creek. Bald Eagles are also known to nest along Bartlett, Saquaro, Apache, Canyon, and Roosevelt lakes. We found two S&Gs that would cause a lethal response to the bald eagle and one that would cause a negative behavioral response. Overall, the S&Gs contained in the Tonto LRMP were positive for the eagle (see Table 29 below).

Table 29. Effects of the S&Gs for the Bald Eagle – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	3.7
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	1	1.9
0	S&G is ill-defined and/or open to interpretation	4	7.4
1	S&G is maintaining habitat & providing at least minimal recovery	44	81.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	2	3.7
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		54	100 %

Rangeland Management Program

Standard and Guideline 1380 in Management Area 3F allows the Forest to manage suitable rangelands at Level B, except Goldfield allotment manage at Level A. Rangeland in less than satisfactory condition will be treated with improved grazing management. Low management levels in Level B may preclude the ability to adequately adjust the intensity, timing, and duration of livestock except by reducing numbers. However, effects to resources, particularly those in riparian areas, may not be avoided in the Level B management because of the absence of structural improvements which could restrict access to these areas. Although this would indirectly affect the eagle, riparian areas could be affected by this type of management. Eagles would most likely avoid these areas thus, implementing Level B grazing could cause a negative behavioral response by eagles.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1372 states that river-running outfitter/guide activities are restricted to no more than two groups entering this Management Area per day. In addition, S&G 1421 states that a group size limitation of not more than 15 people will be enforced. It is possible, although regulated, that these recreational activities could cause negative behavioral effects to the bald eagle. Several studies have demonstrated how recreation can influence the behavior of foraging and nesting eagles. Knight and Knight (1984) found that the total number of boats and people can be an inappropriate measure of recreational intensity because the presence of a single boat might be just as disturbing as the presence of many. McGarigal et al. (1991) discovered that foraging eagles typically avoided an area around a stationary boat. Their study confirmed that boating activities have the potential to significantly affect eagle spatial use patterns and can effectively cause eagles to avoid use of an area. As stated above, recreation can cause birds to consume roughly 30 percent less prey per day (Steidl and Anthony 1999). Thus, we found that this S&G could have a lethal response to eagles because they could starve as a result of increased human presence.

In summary, the Tonto NF’s LRMP was overall positive for the eagle. However, we found that take is reasonably certain to occur as a result of recreation and to a lesser extent, habitat loss from grazing in riparian areas. Take would be in the form of both harm and harassment from the Rangeland Management and Recreation programs.

1996 Regional Amendment

The 1996 Regional Amendment that directed the Forest to implement the Recovery Plan for the Mexican Spotted Owl, follow Northern Goshawk management guidance, and manage old-growth were found to be overall positive for the Bald Eagle. Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 30. Effects of the S&Gs analyzed for the Bald Eagle – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.9
1	S&G is maintaining habitat & providing minimal recovery	37	60.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	13	21.3
Z	S&G implementation is non-discretionary	2	3.3
X	S&G is a heading	6	9.8
Total		61	100 %

Cumulative Effects

Cumulative effects include all future non-federal actions that are reasonably certain to occur within the action area considered in this programmatic biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Impacts from waterfowl hunting through the introduction of lead into the environment as the result of state hunting regulations has the potential to impact the species through direct mortality or impairing reproduction success. Furthermore, recreation activities on private lands where bald eagles nest, winter or forage may also impact the species. Further, improper disposal of fishing lines in high-use fishing areas on National Forest System lands could be considered reasonably certain to occur within the action area affecting the Bald Eagle.

CONCLUSION

After reviewing the current status of the Bald Eagle, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s biological

opinion that the proposed action is not likely to jeopardize the continued existence of the Bald Eagle. Pursuant to 50 CRF 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

In summary, the FWS finds that the continued implementation of the Forest Service’s LRMPs is not likely to jeopardize the bald eagle for the following reasons:

- The status of the Bald Eagle, both within its entire range and within the action area, has substantially improved over the last 15 years. In addition, the species has been proposed for federal delisting.
- The Forest Service actively participates in and provides funding for recovery activities, including the Arizona Bald Eagle Nestwatch Program and the Southwestern Bald Eagle Management Committee.
- Several National Forests have put into place Bald Eagle breeding area restrictions and/or closures. Additionally, law enforcement, patrol, interpretation, signing, fencing, and access management actions to minimize impacts to breeding Bald Eagles are also occurring on National Forest System lands.
- Although some S&Gs were found that cause take of Bald Eagles, all LRMPs contained S&Gs that would conserve the species. For example, S&G 429 on the Coconino NF states that, “Access is prohibited in the vicinity of nesting bald eagles between December 1 and June 15 (Closure Order 16-52, October 23, 1984). Should eagles occupy a nest territory earlier or later, the closure period will be adjusted.” All National Forests with Bald Eagle nesting occurrences had many S&Gs that were overall positive for the eagle.

Our primary reason for concluding known jeopardy for the Bald Eagle is based on that the status of the species throughout its range has substantially improved over the past 15 years. In addition, the Forest Service has put into place many conservation actions that will continue to benefit the Bald Eagle. Based on these reasons, we conclude that the continued implementation of the 11 National Forest’s LRMP is not likely to jeopardize the Bald Eagle.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to

listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Bald Eagle is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Coconino, and Prescott NFs LRMPs. Take is reasonably certain to occur on the Apache-Sitgreaves NF from the Engineering, Forestry and Forest Health, and Recreation programs. Take is reasonably certain to occur on the Cocinino NF from the Forestry and Forest Health Program and the Recreation Program. Take is reasonably certain to occur on the Tonto NF from the Rangeland Management Program and Recreation Program. Take is reasonably certain to occur on the Coronado NF from the Lands and Minerals Program from cyanide leaching ponds. Incidental take is expected to be in the forms of harassment and harm of foraging and nesting bald eagles. Because known nest sites are monitored each year (see Table 31 below), we can anticipate when take will be considered exceeded. The FWS concludes that the incidental take of Bald Eagles will be considered to be exceeded if, for a period of two consecutive years, occupancy of Bald Eagle breeding areas on the Apache-Sitgreaves, Coconino, Prescott, and Tonto NFs falls below 21 breeding areas or the fledgling rate for those breeding areas drops below 11 as a result of the proposed action. These numbers are based on monitoring data from the previous five years.

Table 31. Bald Eagle Breeding Areas on National Forest System lands. Data from AGFD annual reports.

	1999	2000	2001	2002	2003
Total Breeding Areas	22	22	23	26	28
Occupied Breeding Areas	21	21	21	24	26
Breeding Attempts	18	15	16	20	21
Number of Fledglings	14	11	14	23	13

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Bald Eagle.

Bald and Golden Eagle Protection Act - To the extent that this statement concludes that take of any bald eagle will result from the agency action for which consultation is being made, we will not refer the incidental take of such eagle for prosecution under the Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) as amended, if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Bald Eagle:

1. Protect Bald Eagles on National Forest System lands.
2. Protect Bald Eagle habitat within breeding areas on National Forest System lands.
3. Monitor Bald Eagle nest sites on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the US Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Recreation programs to minimize or eliminate adverse effects to the Bald Eagle.
- 1.2 Where appropriate, continue the use of area closures in areas where Bald Eagles are known to nest. Implement area closures where new Bald Eagle nests are found.
- 1.3 Reduce open road densities to minimize disturbance from human-use where Bald Eagles are known to be nesting.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Bald Eagle habitat to incorporate appropriate components of the Bald Eagle Recovery Plan with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the eagle and its habitat.

- 2.2 Manage lakes, wetlands, and riparian areas adjacent to and upstream of Bald Eagle breeding areas to eliminate direct effects and minimize indirect effects to Bald Eagles.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 Continue to coordinate with AGFD Nest Watch Program to monitor Bald Eagle nest sites on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the impacts of the various programs that result in take of Bald Eagles, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the Bald Eagle.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA allows federal agencies to utilize their authorities to further the purposes of the ACT by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Develop Forest-wide or District-wide Bald Eagle management plans.
2. Fund studies that investigate habitat use among Bald Eagles at high elevation lakes.
3. If the Bald Eagle is delisted, work with the AGFD to implement recommendations within the Conservation Assessment and Strategy for the Bald Eagle in Arizona for the continued success of eagles on the Forests.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

CACTUS FERRUGINOUS PYGMY-OWL

STATUS OF THE SPECIES

Description

The Cactus Ferruginous Pygmy-owl (*Glaucidium brasilianum cactorum*) (pygmy-owl) is a small bird (avg. 6.75 inches in length) of reddish brown color and a cream-colored belly streaked with reddish brown. The crown is lightly streaked with black/dark brown spots outlined in white on the nape of the neck. Its tail is relatively long for an owl, and exhibits reddish brown coloration with darker brown bars. The pygmy-owl is one of four subspecies of ferruginous pygmy-owl.

The pygmy-owl occurs from lowland central Arizona, south through western Mexico, to the states of Colima and Michoacan, and from southern Texas south through the Mexican states of Tamaulipas and Nuevo Leon. The FWS has listed only the Arizona population of the pygmy-owl as endangered (U.S. Fish and Wildlife Service 1997).

Legal Status: The Arizona population of the pygmy-owl was listed as an endangered distinct population segment on March 10, 1997 (U.S. Fish and Wildlife Service 1997) without critical habitat. In response to a court order, approximately 731,712 acres of critical habitat were designated on July 12, 1999 (U.S. Fish and Wildlife Service 1999) in areas within Pima, Cochise, Pinal, and Maricopa counties in Arizona. On January 9, 2001, a coalition of plaintiffs filed a lawsuit with the District Court of Arizona challenging the validity of the listing of the Arizona population of the pygmy-owl as an endangered species and the designation of its critical habitat. On September 21, 2001, the Court upheld the listing of the pygmy-owl in Arizona but at FWS request, and without otherwise ruling on the critical habitat issues, remanded the designation of critical habitat for preparation of a new analysis of the economic and other effects of the designation (National Association of Home Builders et al. v. Norton, Civ.-00-0903-PHX-SRB). The Court also vacated the critical habitat designation during the remand. The FWS published a proposed rule in the Federal Register to re-designate critical habitat on November 27, 2002 (U.S. Fish and Wildlife 2002). The proposal includes approximately 1,208,000 acres in portions of Pima and Pinal counties, Arizona off National Forest System lands.

The plaintiffs appealed the District Court's ruling on the listing of the pygmy-owl as a distinct population segment. On August 19, 2003, the Ninth Circuit Court of Appeals rendered an opinion regarding this appeal, which held that, although FWS did not arbitrarily find the Arizona pygmy-owl population to be discrete, FWS arbitrarily found the discrete population to be significant. The judgment of the District Court was reversed and the case was remanded to the district court for further proceedings consistent with the Ninth Circuit's opinion (No. 02-15212, CV 00-0903-SRB). Prior to being remanded to the district court, Defenders of Wildlife, intervenors on the original 2001 lawsuit, filed a petition with the Ninth Circuit for rehearing, or, in the alternative, rehearing *en banc*. This petition was denied, and the matter returned to the District Court. The District Court ruled on June 28, 2004, remanding the Listing Rule to FWS for further proceedings consistent with that order and the opinion of the Court of Appeals for the Ninth Circuit. The Listing Rule was left in place pending the outcome of FWS reconsideration. FWS provided a status update to the Court on January 31 saying that we are still in the process of

reconsideration, with a draft determination being reviewed in Washington. We have indicated that we will finalize our determination as soon as possible.

The pygmy-owl is listed on the AGFD's "Wildlife of Special Concern in Arizona," which serves as the agency's policy guide for wildlife management of special status species. The list provides a mechanism through which the state can allocate resources for the protection, study and management of specially designated species.

Additionally, the Migratory Bird Treaty Act acts as a federal regulatory mechanism for the pygmy-owl. However, there are no stipulations in the Migratory Bird Treaty Act regarding prevention of habitat destruction unless direct mortality or destruction of active nests results.

Distribution and Abundance

Historically, pygmy-owls occupied areas of south-central Arizona from New River, south to the US/Mexican border, west to Agua Caliente near Gila Bend and Cabeza Prieta Tanks, and east to Tucson (Bent 1938, Monson and Phillips 1981, Johnson et al. 2003). This includes the Arizona counties of Gila, Pima, Pinal, Maricopa, Graham, Santa Cruz, Cochise, Greenlee, and Yuma (U.S. Fish and Wildlife Service 2002). No pygmy-owls have been recorded in New Mexico (Hubbard 1978) or from the lower Colorado River valley (Rosenberg et al. 1991).

Documentation of total pygmy-owl numbers and current distribution in Arizona is incomplete. Survey and monitoring work in Arizona resulted in documenting 41 adult pygmy-owls in 1999, 34 in 2000, 36 in 2001, 24 in 2002, and, most recently, 21 in 2003 (Arizona Game and Fish Department 2002a) (note: These figures do not include documented pygmy-owl locations on the Tohono O'odham Nation). Most of these pygmy-owls were distributed in four general areas: northwest Tucson, southern Pinal County, Organ Pipe Cactus National Monument, and the Altar Valley. Unsurveyed habitat on the Tohono O'odham Nation may also support meaningful numbers of pygmy-owls. Additionally, recent survey information shows that pygmy-owls are more numerous in northern Sonora, Mexico, near and adjacent to the Arizona border, than previously recorded (Flesch and Steidl 2000).

In 2003, the number of documented adult pygmy-owls nest sites and successful reproduction in Arizona declined (Arizona Game and Fish Department 2003). While data from 2004 has not been summarized, indications are that numbers in these categories were similar or lower than in 2003 (AGFD, 2004, unpubl. data).

Habitat

Historically, pygmy-owls were recorded in association with riparian woodlands in central and southern Arizona (Bendire 1892, Gilman 1909, Johnson et al. 1987, Johnson et al. 2003). Vegetation in these areas can be characterized by cottonwood, willow, ash, mesquite, and hackberry. Currently, pygmy-owls are found primarily in the Arizona Upland Subdivision of the Sonoran desertscrub vegetation community (Brown 1994). Desertscrub communities are characterized by the presence of saguaros and large trees, with a diversity of plant species and vegetation strata. Pygmy-owl habitat elements consist of saguaros and large trees to provide cover and nesting substrates (Phillips et al. 1964, Davis and Russell 1984 and 1990, Monson and Phillips 1981, Johnson and Haight 1985, Johnsgard 1988), presence of cavities for nesting, good

vertical structure, and relatively high plant species diversity. Within Arizona, pygmy-owls have also been found in riparian, xeroriparian, and semidesert grassland vegetation communities.

Critical Habitat: As currently proposed (U.S. Fish and Wildlife Service 2002), critical habitat for the pygmy-owl would include portions of Pima and Pinal counties in Arizona. Proposed critical habitat consists of an interconnected system of habitat linkages for the pygmy-owl, supported by the principals of conservation biology. All proposed Critical Habitat Units support nesting and dispersal habitat likely to be utilized by resident and dispersing pygmy-owls (U.S. Fish and Wildlife Service 2002).

Proposed critical habitat for the pygmy-owl suits the evolutionary, ecological, behavioral, and physiological requirements for the conservation of the species. The proposed Critical Habitat Units were constructed by evaluating topography, vegetation, and current information related to pygmy-owl habitat suitability, occupancy, and dispersal capabilities (U.S. Fish and Wildlife Service 2002). The proposed rule designating critical habitat for the pygmy-owl (U.S. Fish and Wildlife Service 2002) has undergone public comment. However, pending the outcome of the listing litigation, no work is currently being done to finalize the critical habitat proposal.

Life History

The pygmy-owl is primarily diurnal (active during daylight) with crepuscular (active at dawn and dusk) tendencies. Pygmy-owls are most vocal and responsive during the courtship and nesting period (February through June). Male pygmy-owls establish territories using territorial-advertisement calls to repel neighboring males and attract females.

Usually, pygmy-owls nest as yearlings (Abbate et al. 1999, Gryimek 1972), and both sexes breed annually thereafter. Territories normally contain several potential nest-roost cavities from which a breeding female selects a nest.

Pygmy-owls exhibit a high degree of site fidelity once territories (the area defended) and home ranges (the area used throughout the year) have been established (Arizona Game and Fish Department 2003). Therefore, it is important that habitat characteristics within territories and home ranges be maintained over time in order for them to remain suitable. This is important for established pygmy-owl sites, as well as new sites established by dispersing pygmy-owls.

Little is known about the rate or causes of mortality to pygmy-owls. However, they are susceptible to predation from a wide variety of species. Documented and suspected pygmy-owl predators include great horned owls (*Bubo virginianus*), Harris' hawks (*Parabuteo unicinctus*), Cooper's hawks (*Accipiter cooperii*), screech-owls (*Otus kennicottii*), and domestic cats (*Felis domesticus*) (Abbate et al. 2000, Arizona Game and Fish Department 2003). Pygmy-owls may be particularly vulnerable to predation and other threats during and shortly after fledging (Abbate et al. 1999).

The pygmy-owl's diet includes birds, lizards, insects, and small mammals. Hunting occurs from tree perches with dense foliage. Because free-standing water does not seem to be necessary for the species' survival, it is supposed that pygmy-owls may partially meet their biological water requirements through the prey they consume. However, the availability of water may contribute

to improved vegetation structure and diversity, improving cover availability. The presence of water also likely attracts potential prey species improving prey availability.

The patchy, dispersed nature of the pygmy-owl populations in Arizona (Abbate et al. 2000) and Mexico (Flesch 2003) suggests that the overall population may function as a metapopulation. A metapopulation is a set of subpopulations within an area, where movement and exchange of individuals among population segments is possible, but not routine. A metapopulation's persistence depends on the combined dynamics of the productivity of subpopulations, the maintenance of genetic diversity, the availability of suitable habitat for maintenance and expansion of subpopulations, and the "rescue" of subpopulations that have experienced local extinctions by the subsequent recolonization of these areas by dispersal from adjacent population segments (Hanski and Gilpin 1991, 1997). The local groups of pygmy-owls within Arizona may function as subpopulations within the context of metapopulation theory. However, more information is needed regarding the population dynamics of pygmy-owls in Arizona.

The ability and opportunity for pygmy-owls to disperse within population segments, as well as emigrate to adjacent population segments is likely important for the long-term persistence of pygmy-owls in Arizona. Pygmy-owl dispersal patterns are just beginning to be documented. A banded juvenile in Arizona was observed in 1998 approximately 2.4 mi (3.9 km) from its nest site following dispersal. Five young monitored with radio telemetry during 1998 were recorded dispersing from 2.17 mi (3.5 km) to 6.5 mi (10.4 km) for an average of 3.6 mi (5.9 km) (Abbate et al. 1999). In 1999, six juveniles in Arizona dispersed from 2.3 km (1.4 mi) to 12.9 mi (20.7 km) for an average of 6.2 mi (10 km) (Abbate et al. 2000). In Arizona, the maximum documented dispersal distance is 21.8 mi (34.8 km) (Arizona Game and Fish Department 2002b). However, monitoring of a dispersing female pygmy-owl in 2004 has revealed a total distance traveled of over 80 mi (130 km) (Arizona Game and Fish Department 2004).

Reasons for Listing

Following the 1997 listing, it was determined that the following three factors applied to the pygmy-owl - Arizona Distinct Population Segment to the extent that endangered status is appropriate (U.S. Fish and Wildlife Service 1997): (1) the present or threatened destruction, modification, or curtailment of the species habitat or range; (2) the inadequacy of existing regulatory mechanisms and; (3) the natural or manmade factors affecting the pygmy-owl's continued existence.

The pygmy-owl is threatened by present and potential future destruction and modification of its habitat throughout a significant portion of its range in Arizona (Phillips et al. 1964, Johnson et al. 1979, Monson and Phillips 1981, Johnson and Haight 1985, Hunter 1988, Millsap and Johnson 1988). One of the most urgent threats to pygmy-owls in Arizona continues to be the loss and fragmentation of habitat (U.S. Fish and Wildlife Service 1997, Abbate et al. 1999). The complete removal of vegetation and natural features required for many large-scale and high-density housing developments directly and indirectly affects the pygmy-owl (Abbate et al. 1999). Although the pygmy-owl in Arizona is considered nonmigratory, it is protected under the Migratory Bird Treaty Act (16 U.S.C. 703-712). However, there are no stipulations in the Migratory Bird Treaty Act regarding prevention of habitat destruction unless direct mortality or destruction of active nests results. Additionally, the state of Arizona's list of Species of Special

Concern will not adequately protect the pygmy-owl in Arizona from further decline. There are currently no provisions under Arizona statute addressing the destruction or alteration of pygmy-owl habitat. Other reasons for listing include low levels of genetic variation, possible contamination from pesticides, and potential competition from other bird species that use cavities for nesting.

Threats: Potential threats to the pygmy-owl include loss and fragmentation of habitat, recreational birding, predation, and disease. Due to the rarity of this species and its aesthetic qualities, the pygmy-owl is highly sought by recreational birders who gather at several of the remaining known locations of pygmy-owls in the U.S. Oberholster (1974) and Hunter (1988) suggest that recreational birding may disturb pygmy-owls in highly visited areas, affecting their occurrence, behavior, and reproductive success. Additionally, nest depredation was found to be a significant catalyst of mortality in Texas (Proudfoot 1996, Proudfoot and Johnson 2000); however, it has not been documented in Arizona. However, substantial losses to predators, including domestic cats, do occur in Arizona after fledging, during dispersal, and during the winter (Arizona Game and Fish Department 2003). Trichomoniasis is a disease documented in a number of prey species of the pygmy-owl (doves, finches, sparrows, and other seed-eating birds), which could potentially affect the pygmy-owl in Arizona. Recent work has suggested that ectoparasites within nest cavities have the potential to contribute to juvenile mortality (Proudfoot 2004).

Conservation Measures

In September 1998, FWS appointed the Cactus Ferruginous Pygmy-owl Recovery Team. The Team is comprised of a Technical Group of biologists (pygmy-owl experts and raptor ecologists) and an Implementation Group, which includes representatives from affected and interested parties (i.e., federal and state agencies, local governments, the Tohono O’odham Nation, and private groups). The draft plan addresses the conservation and survival of the pygmy-owl – Arizona Distinct Population Segment only; however other pygmy-owl populations (e.g., western Mexico) are likely to play an important role in the recovery of pygmy-owls in Arizona through demographic support and genetic interchange. Plan objectives include to identify information needed to develop the population target (a size or a rate of increase that ensures a high probability of persisting over the long-term and propose actions that will protect existing pygmy-owls and allow for the expansion of the population and maintain management options for the future. A draft recovery plan was released for public comment in January 2003 (U.S. Fish and Wildlife Service 2003). Following consideration of the public comments and resolution of listing litigation, FWS will work to finalize the recovery plan.

Additionally, the draft recovery plan identifies five tasks that are further needed to ensure achievement of recovery objectives: 1) Estimate the number and define the distribution of pygmy-owls in Arizona, and define their general distribution and abundance in Sonora, Mexico; 2) Protect all currently known (since 1993) pygmy-owls in Arizona and those subsequently documented after this plan is finalized and the integrity of their territories, including adequate dispersal habitat. Identify and maintain an interconnected system of habitat extending from the northern portion of the historical range, south to areas of Mexico; 3) Continue to gather information essential to the management of pygmy-owls, including habitat requirements, population demographics, dispersal capabilities, and genetics; 4) Initiate the process of

augmenting pygmy-owl subpopulations at critically low population levels and establishing pygmy-owls in areas that appear suitable, but are presently unoccupied, or into areas that have been modified to enhance some habitat characteristic for pygmy-owls; and, 5) Develop an outreach and public education and encourage its implementation.

The “Seven Species Direction” was designed by the FWS and the Forest Service in 1997, as a means of protecting various listed species and their habitats. Between 1997 and 2002, both the Coronado and Tonto NFs have conducted annual surveys to locate new nesting and breeding locations, conducted surveys in historic locations, reviewed all projects that affect habitat structure or that cause impacts to the pygmy-owl, and retained all nest trees and nest cacti within occupied habitat (U.S. Forest Service 2004:770). In 1999 and 2002, the Coronado NF surveyed (by contract) for the species. These surveys are considered to have included the majority of suitable habitat on the Coronado NF. Additionally, surveys were conducted on the Tonto NF in areas located on the Mesa and Cave Creek Ranger Districts (U.S. Forest Service 2004: 170). While it is true that the Forest Service has completed some relatively extensive and inclusive surveys on both the Coronado and Tonto NFs, the survey efforts did not comply with the pygmy-owl survey protocol (multiple visits over 2 consecutive years) and occurred so many years ago that the data does not assist the FWS in our current evaluation. However, the project clearance surveys that were conducted by both Forests’ were completed in a meaningful time frame (according to protocol and within the past 2 years), but did not provide extensive information on current status and distribution of pygmy-owls within the two Forests.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Only the Coronado and Tonto NFs in southeastern and central Arizona contain habitat for the pygmy-owl (U.S. Forest Service 2004:169). No pygmy-owls have been documented in New Mexico. To estimate the amount of National Forest System lands containing habitat for pygmy-owls, several Geographic Information System mapping mechanisms were conducted and evaluated for riparian, Sonoran desert, and Sonoran desert scrub below 4,000 ft (1,219 m) elevation (U.S. Forest Service 2004:169). Based on the Geographic Information System mapping attempts, a minimum of 42,000 ac (16,996 ha) of pygmy-owl habitat was identified within the National Forest System lands in Arizona (U.S. Forest Service 2001).

Two ranger districts (Santa Catalina and Nogales) contain suitable habitat for the pygmy-owl, based on present vegetative communities and elevation. Dispersing pygmy-owls have been documented on two occasions, most recently in 2004, within the Nogales Ranger District. A pygmy-owl of unknown status was documented within the Santa Catalina Ranger District.

Nesting pygmy-owls have been documented within typical dispersal distance of both the Nogales and Santa Catalina ranger districts.

The Tonto NF contains four ranger districts (Cave Creek, Mesa, Globe, and Tonto Basin) with potential pygmy-owl habitat. Surveys have been conducted in these districts since 1994 and selected areas within potential habitat have been surveyed further to comply with current protocol standards through 2002; although no birds have been found on the Tonto NF.

Within the Tonto NF, the FWS believes Recovery Area Six (along the Salt River and in upland desert scrub) to be potential, protected pygmy-owl breeding habitat, providing connectivity to other suitable areas, and serving as possible sites for reestablishment of pygmy-owl populations (U.S. Forest Service 2004:170).

Factors Affecting the Species within the Action Area

Both the Coronado and Tonto NFs are subject to encroaching urban and sub-urban developments. Damage to vegetation, human disturbance, and general pygmy-owl habitat destruction all result from the increasing numbers in the human population and subsequent land development. Additionally, historic and current pygmy-owl range is located on lands permitting livestock grazing, potentially causing further impacts to pygmy-owl habitat within the action area. Projects and existing infrastructure such as highways, roads and road construction, mining activities, and recreation facilities within the action area also eliminate and alter suitable pygmy-owl habitat (U.S. Forest Service 2004:170).

EFFECTS OF THE ACTION

Table 32 below provides a summary of applicable S&Gs within the Coronado NF LRMP and 1996 Regional Amendment for the pygmy-owl. Over half of the applicable S&Gs maintain and improve habitat, or prove at least minimal recovery to the species. Eleven S&Gs provided direction for the recovery of the pygmy-owl or implementation of the Cactus-Ferruginous Pygmy-owl Recovery Plan. However, six S&Gs have the potential for sublethal or lethal effects to the pygmy-owl. Proposed critical habitat for the Cactus Ferruginous Pygmy-owl does not occur within the action area; thus, no proposed critical habitat for this species will be affected as a result of the proposed action.

Table 32. Summary of S&Gs considered for the Cactus Ferruginous Pygmy-owl.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-639, 648-655, 666-669, 672-674, 682, 693-696, 697, 699, 702, 704-713, 715, 727, 728, 729, 762, 764, 768-771, 773, 774, 778-780, 781, 782, 785, 794, 796-800, 803-805, 807, 809-812, 825, 828, 829, 830
Tonto	1341, 1342, 1344, 1345, 1348, 1354, 1359, 1362, 1363, 1367, 1375, 1420
1996 Regional Amendment	1510, 1511, 1512, 1513, 1514, 1515

Coronado National Forest

The only Ranger Districts within the Coronado NF that are believed to support suitable habitat for the owl, based on vegetative communities present and elevation, are the Santa Catalina and Nogales Ranger Districts. In 1999, a telemetered pygmy-owl was documented on the Jarillas allotment (Tumacacori Ecosystem Management Area) by AGFD personnel. This individual was a juvenile dispersing into an area managed by the Coronado NF within the Nogales Ranger District. In 2004, another dispersing juvenile pygmy-owl dispersed onto lands managed by the Coronado NF Nogales Ranger District in the Sardina Canyon area. This dispersing juvenile spent no more than three days on Forest Service System lands before moving a considerable distance back to the north, off of Forest Service System lands. Though limited, this information suggests that pygmy-owls are reasonably certain to occur on the Coronado NF, thus the S&Gs will be analyzed in order to determine their effects on the pygmy-owl.

Table 33. Effects of the S&Gs analyzed for the Cactus Ferruginous Pygmy-owl – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.2
-2	S&G is causing sublethal response	5	6.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	11	13.3
1	S&G is maintaining habitat & providing at least minimal recovery	49	59.0
2	S&G is moving towards recovery	5	6.0
3	S&G is implementing species recovery plan	6	7.2
Y	S&G has no application to the species	3	3.6
Z	S&G implementation is non-discretionary	2	2.4
X	S&G is a heading	1	1.2
Total		83	100 %

Engineering Program

Facets of this program such as road construction and road use have the potential to cause behavioral effects (displacement or abandonment) to the pygmy-owl. New road construction could result in additional habitat loss and fragmentation. Indirect effects of roads such as the introduction and spread of exotic and invasive plant species, and an increased potential for wildfires are also effects of this program. The Coronado NF contains a total of 3,061 mi (4,926 km) of road, of which they maintain 28 percent annually. On average, the Coronado NF improves 14.1 mi (22.7 km) of road per year and has a road density of 0.99 mi/mi² (0.61 km/km²) of Forest Service roads (U.S. Forest Service 2004:173). However, the majority of applicable S&Gs within this program were noted to at least provide maintenance and/or improvement of pygmy-owl habitat. These S&Gs (693, 694, 712, 797, and 811) are mostly directed at general ecosystem health.

Fire Management Program

Fires can affect pygmy-owls by altering their habitat (Abbate et al. 1999). Direct effects to individual pygmy-owls could occur if fires burn active nest sites in nesting stages from incubation through fledging. With the introduction of exotic plant species, such as fountain grass, (*Pennisetum setaceum*), buffelgrass (*Pennisetum cilare*), Lehman's lovegrass (*Eragrostis lehmanniana*), and red brome (*Bromus rebens*), which accompanies urbanization and agriculture, fire is a management issue that must be heavily considered in areas occupied by pygmy-owls (U.S. Fish and Wildlife Service 2003). Although fires have occurred near active pygmy-owl nest sites (Flesch 1999) and could result in short-term negative impacts, there is not enough information to determine under what conditions the long-term effects of fire are positive or negative with regard to pygmy-owls. However, some information suggests that fires may positively affect pygmy-owl prey base populations, but negatively affect nesting habitat structure by destroying saguaro cactus or mesquite. Fires that improve the overall health of the ecosystem should be beneficial to pygmy-owls, but increases in potential predators and decreased cover following fires may be detrimental. The Coronado NF has the smallest prescribed fire program in the Southwestern Region. Between 1994 and 2002, the Coronado NF has used prescribed fire to burn 34,422 ac (13,930 ha). From 1985 to present, wildfires have burned 370,695 ac (150,015 ha) on the Coronado, the highest in the region. However, fire intensity on the Coronado is mostly low (U.S. Forest Service 2004:173).

Within the Fire Management Program only three Management Area S&Gs were analyzed for the pygmy-owl. Standards and Guidelines 713, 798, and 812 provide for the use of prescribed fire in Management Areas 1, 7A, and 7B, with the intent to enhance ecosystem resources and wildlife, while reducing fuel hazards. Flesch (1999) also emphasizes the careful use of prescribed fires in potentially suitable pygmy-owl areas so as not to degrade or destroy habitat. However, the S&Gs that apply to fire or fuels management activities do not: 1) ensure that known nest sites and associated vegetation are protected during prescribed fires; 2) limit activities during sensitive seasonal time periods such as nesting, fledging, and dispersal; and, 3) protect mesquite and other trees and shrubs along riparian and xeroriparian systems and all saguaros when fire is used as a management tool in suitable pygmy-owl habitat. Increased fire frequency and intensity has the potential to negatively affect the pygmy-owl because many of the dominant plants used by pygmy-owls, such as saguaro, palo verde, and ironwood are not tolerant of fire. However, there is currently not enough information to determine whether fires have positive or negative effects on pygmy-owls. Providing that nest cavities and larger trees can be maintained, prescribed fire may improve overall ecosystem health.

Forestry and Forest Health Program

Overall, applicable S&Gs within this program are mixed in their effects to pygmy-owls, with most S&Gs noted for their behavioral, sublethal, or lethal effects. Forest-wide S&Gs 697, 699, and 702 are noted for their sublethal effects to pygmy-owls. Standard and Guidelines 697 and 699 could negatively affect pygmy-owl prey base (insects and small mammals, targets of pesticides) causing secondary pesticide effects. However, no specific scientific data exists for the effects of pesticides on pygmy-owls. Standard and Guideline 702 could have sublethal effects on pygmy-owls through secondary poisoning by via prey consumed. However, there is a low probability of drinking from cyanide leaching ponds because it is believed that pygmy-owls meet much of their biological water requirements through the prey they consume. Although no

current cyanide leach ponds exist on the Coronado NF, such mining practices are still authorized under the LRMP.

Standard and Guideline 704 states that precedence will be given to threatened and endangered species over vegetation manipulation to control disease and insects. This S&G could possibly mitigate the effects from S&Gs 697 and 699.

Lands and Mineral Program

Mineral operations and utility rights-of-way have the potential to directly and indirectly affect the pygmy-owl by displacing owls, disrupting movements and removing habitat. Access roads and the accompanying vehicle traffic are a necessary component of minerals activities. In most cases, mineral removal also requires the use of heavy equipment on the site. In addition, surface occupancy causes direct habitat loss and the addition of human occupation increases the chances for harassment and displacement. Overall, there were few applicable S&Gs within this program.

Rangeland Management Program

Livestock grazing and management actions may affect pygmy-owls by altering vegetation types in ecosystem communities, trampling vegetation, compacting soils, and reducing vegetation cover, including grasses, that pygmy-owls and their prey species require for their life cycles. However, the effects of livestock grazing on the cactus ferruginous pygmy owl has not been well studied.

The S&Gs for this program, both forest-wide and management area specific, are mixed in their effects to pygmy-owls. Management Area S&G 762 could have possible sublethal effects to pygmy-owls upon implementation. Although this S&G contains specific provisions for resource and riparian area protection, it still intends on utilizing 6,821 acres for Level D range management in Management Area 3. Additional levels of range management include 716 acres of Level A, 4,840 acres of Level B, and 2,395 acres of Level C range management within Management Area 3. This level of grazing could cause direct displacement of pygmy-owls, abandonment, and modification of suitable habitat, as well as sublethal effects to the pygmy-owl. The same reasoning can be used for S&G 805. The remaining S&Gs (710, 771, 780, and 829) applicable to MAs 1, 3A and 3B, 4, and 9, respectively, allow Level A range management or provide baseline habitat maintenance/improvement. Forest-wide trends for the Coronado NF show that over the last 10 years grazing intensity has decreased by 44% (U.S. Forest Service 2004:175).

Overall, no applicable S&Gs within this program were found to provide sufficient protection and/or conservation elements for the pygmy-owl. The S&Gs appear to be non-specific to the pygmy-owl and generally apply to listed species, but do not provide any overarching protections to the pygmy-owl that would prohibit any adverse affects. For example, the S&Gs that apply to grazing activities do not: 1) provide assurances that livestock grazing will maintain understory vegetation; 2) ensure that regeneration will occur for any strata of desert scrub, xeroriparian, and riparian vegetation; or 3) limit forage utilization to 30 percent for all palatable species in desert scrub and xeroriparian areas.

Recreation, Heritage, and Wilderness Program

There were few applicable S&Gs within this program. Overall, most S&Gs (612, 628, 705, 706, 715, 768) provide baseline habitat maintenance or improvement for pygmy-owls.

Watershed Management Program

Overall, both forest-wide and management area S&Gs provide for general ecosystem health. Applicable S&Gs within this program are specific to Management Areas 1, 3, 3A and 3B, 4, 7A, and 7B. The S&Gs in the Watershed Management Program are positive for the long-term conservation and recovery of the pygmy-owl. However, negative aspects of this program, with respect to the pygmy-owl, include allowances for mineral and oil and gas exploration and development, priority on increasing permitted livestock numbers, and road maintenance standards emphasizing road uses.

Wildlife, Fish, and Rare Plants Program

With the exception of one S&G, all the applicable S&Gs within this program were assigned positive numbers, signifying that these S&Gs provide beneficial guidance ranging from habitat maintenance to species recovery. However, forest-wide S&G 655 allows for the removal of yucca and cactus through a special use permit on a site by site basis. Therefore, this S&G was noted for possible sublethal effects to pygmy-owls, which could contain nesting pygmy owls. However, Arizona Native Plant Law regulates cacti removal and prohibits its removal without a permit even on federal land. This Overall, S&Gs within this program are directed at threatened and endangered species, habitat improvements, maintaining vegetative diversity, developing monitoring and inventory plans, and mitigating impacts to threatened and endangered species.

In summary, the species effects analysis shows adverse effects to the pygmy-owl could potentially occur from the Fire Management; Wildlife; Forestry and Forest Health; and Rangeland Management programs.

Tonto National Forest

Current information does not show that pygmy-owls are reasonably certain to occur on the Tonto NF; however, the draft recovery plan (U.S. Fish and Wildlife Service 2002) is proposing Recovery Area 6, of which 15,134 ha (37,398 ac) of 39,031 ha (96,449 ac) are administered by the Tonto NF. Although past surveys failed to detect any pygmy-owls along the Salt River (Johnson and Haight 1998), this area still appears to provide suitable conditions for the pygmy-owl and may be one of the most suitable sites for pygmy-owls in central Arizona (Johnson and Simpson 1971). It is our belief that the documentation or establishment of a subpopulation of pygmy-owls in this area may be necessary to meet recovery criteria. Thus, the continued implementation of the Tonto NF LRMP will be analyzed for its effects on the pygmy-owl.

Table 34. Effects of the S&Gs analyzed for the Cactus Ferruginous Pygmy-owl – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	8.3
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	25.0
1	S&G is maintaining habitat & providing at least minimal recovery	7	58.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	8.3
X	S&G is a heading	0	0.0
Total		12	100 %

Table 34 provides a summary of applicable S&Gs analyzed for the pygmy-owl on the Tonto NF, where only twelve S&Gs were applicable. Positive S&Gs, or those determined to maintain pygmy-owl habitat or provide at least minimal recovery, include standards for identification, mapping, and analyzing habitat for threatened and endangered species (1344), management of threatened and endangered species taking precedence over management of other species (1345), conduct surveys to analyze allotments for threatened and endangered species (1354), and general ecosystem health measures (1362, 1363, 1367).

However, S&G 1348 would allow up to 20 percent utilization of riparian areas for livestock use. Western riparian areas are focal points of maximum conflict among competing uses for livestock grazing, timber harvest, recreation, and water diversion for agriculture and domestic consumption (Thomas et. al 1979, Johnson et. al 1985). Among these factors, the most widespread and pervasive adverse influence continues to be exerted by livestock (Chaney et. al 1990, Fleischner 1994, Ohmart 1994). The most direct effect of livestock on riparian vegetation is removal of the lower vegetation layers (Dobkin et. al 1998). Mid-and lower-story vegetation within riparian communities provide necessary protection from predators and an abundance of prey items for the pygmy-owl.

After reviewing the Tonto NF’s management direction, resource programs, and the appropriate S&Gs for the pygmy-owl, we found that the LRMP provides minimal recovery for the pygmy-owl, mostly through habitat maintenance. Furthermore, no applicable S&Gs within the Tonto NF LRMP provide sufficient protection or conservation elements for the pygmy-owl. The S&Gs are non-specific to the needs of the pygmy-owl and generally apply to listed species, but do not provide any overarching protections to the pygmy-owl that would prohibit adverse affects. For example, the S&Gs that apply to grazing activities do not: 1) provide assurances that livestock grazing will maintain understory vegetation; 2) ensure that regeneration will occur for any strata of desert scrub, xeroriparian, and riparian vegetation; or 3) limit forage utilization to 30 percent for all palatable species in desert scrub and xeroriparian areas.

In summary, the species effects analysis shows adverse effects to the pygmy-owl could potentially occur from the Fire Management; Wildlife; and Rangeland Management programs.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 35. Effects of the S&Gs analyzed for the Cactus Ferruginous Pygmy-owl – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

All of the S&Gs in the 1996 Regional Amendment lie under the Wildlife Program. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat, and provide for minimal recovery of these species. While not a focus of the Amendment, the S&Gs have the potential to affect other threatened and endangered species.

Table 35 provides a summary of applicable S&Gs analyzed for the pygmy-owl on the 1996 Regional Amendment. There were only six applicable S&Gs, none were found to have behavioral, sublethal, or lethal effects to the pygmy-owl. Similarly, most applicable S&Gs have little or no relevance to the pygmy-owl. The only positive S&G within the 1996 Regional Amendment is 1510. In general, the amendment set sideboards on grazing and allotment planning region-wide by further constraining grazing beyond forest-wide S&Gs.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The continued development of non-federal lands in the Tucson and Marana areas is currently extant and increasing in scope, as is urbanization Maricopa and Pinal counties. Urban development continues to be a major threat to pygmy-owl populations in Arizona. Agricultural uses, continued grazing on state and private lands, and woodcutting are also other activities expected to occur on non-federal lands in potential pygmy-owl habitat. State and private lands that are currently suitable habitat for pygmy-owls may also be developed, which further impacts the species. Additionally, recreational activities will continue to increase as the population of the region increases, such activities can also further impact the pygmy-owl and its habitat.

CONCLUSION

After reviewing the current status of the Cactus Ferruginous Pygmy-owl, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Coronado and Tonto NF LRMPs, as well as the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Cactus Ferruginous Pygmy-owl. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Critical habitat for the Cactus Ferruginous Pygmy-owl has been proposed in Pima and Pinal counties, Arizona. However, no critical habitat has been proposed on either the Coronado or Tonto NFs, thus outside the action area. Therefore, no destruction or adverse modification of proposed critical habitat is anticipated.

The FWS finds that the continued implementation of the Coronado NF LRMP is not likely to jeopardize the Cactus Ferruginous Pygmy-owl for the following reasons:

- Occupancy, breeding, and nesting is not known to occur on either of the National Forests analyzed (for these same reasons, no incidental take is anticipated and is not being issued in this opinion).
- Since 1998 only three dispersing birds have been found on the Coronado NF.
- Actions allowed under the Coronado and Tonto LRMPs should not affect pygmy-owls because most applicable S&Gs are positive for pygmy-owls and their habitat.

Based on the reasons listed above, together with the positive management direction of the Coronado and Tonto LRMP, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Cactus Ferruginous Pygmy-owl.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat

modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

The FWS does not anticipate incidental take of the cactus ferruginous pygmy-owl as a result of the proposed action because the species is not currently found on National Forest System lands. Although a few S&Gs within the Coronado NF LRMP have the potential for adverse effects to owls, no resident owls are currently known to occur on Coronado NF lands. The potential for adverse effects to pygmy owls were also identified for the Tonto NF; however, no resident owls are currently known to occur on this Forest. Therefore, take of pygmy-owls is not anticipated. However, if resident pygmy-owls are found to occur on the Coronado or Tonto NFs in the future, this effects of the proposed action will be assessed in order to evaluate whether reinitiation of this consultation is needed

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

Within the Coronado NF LRMP, the majority of negative S&Gs for the pygmy-owl occurred within the Forestry and Forest Health (pesticide use) and Rangeland Management (grazing at level D) programs. All negative S&Gs within the Tonto NF LRMP occurred within the Rangeland Management Program. Therefore, the FWS recommends the following conservation activities:

1. Adopt average grazing utilization rates of 30 percent year-long for areas that contain potential habitat for the pygmy-owl. This utilization standard could be used until further research or literature review finds that a different level is appropriate to maintain or improve pygmy-owl habitat conditions (food, cover, breeding, and space for population growth and normal behavior).
2. Follow the FWS regional guidance criteria for pesticide use in suitable pygmy-owl habitat located on both the Coronado and Tonto NFs.
3. Continue to conduct or fund studies using both monitoring and telemetry, to

determine pygmy-owl habitat use patterns and relationships between owls and the actions authorized under this amendment.

4. Continue assistance in the implementation of recovery tasks identified in the pygmy-owl Recovery Plan when approved by us. Specifically, the Forest Service should participate in ongoing planning and coordination related to the potential use of population augmentation to achieve recovery of the pygmy-owl.
5. Continue to actively participate in regional planning efforts, such as Pima County's Sonoran Desert Conservation Plan and the Town of Marana's Habitat Conservation Plan, and other conservation efforts for the pygmy-owl.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

MEXICAN SPOTTED OWL

STATUS OF THE SPECIES

Description

The Mexican Spotted Owl (*Strix occidentalis lucida*) is mottled in appearance with irregular white and brown spots on its abdomen, back, and head. *Strix occidentalis* translates as “owl of the west” and *lucida* means “light” or “bright.” Unlike most owls, spotted owls have dark eyes. Several thin white bands mark an otherwise brown tail. Adult male and female spotted owls are mostly monochromatic in plumage characteristics, but the sexes can be readily distinguished by voice. Juveniles, subadults, and adults can be distinguished by plumage characteristics (Forsman 1981, Moen et al. 1991). Juvenile spotted owls (hatchling to approximately five months) have a downy appearance. Although the spotted owl is often referred to as a medium-sized owl, it ranks among the largest owls in North America. Of the 19 species of owls that occur in North America, only 4 are larger than the Spotted Owl (Johnsgard 1988). Like many other owls, spotted owls exhibit reversed sexual dimorphism (i.e., females are larger than males).

The Mexican subspecies is geographically isolated from both the California and northern subspecies. Using electrophoresis to examine allozyme variation, Barrowclough and Gutiérrez (1990) found a major allelic difference between the Mexican spotted owl and the two coastal subspecies. This difference suggests that the Mexican spotted owl has been isolated genetically from the other subspecies for considerable time, has followed a separate evolutionary history, and could therefore be considered a separate species (Barrowclough and Gutiérrez 1990:742). Other recent studies (Barrowclough et al. 1999, Haig et al. 2001), as well as a review of all available genetic data, both published and unpublished (Fleischer et al. 2004), also supported designation of the Mexican spotted owl as an Evolutionary Significant Unit.

Legal Status: The Mexican Spotted Owl was listed as a threatened species in 1993 (U.S. Fish and Wildlife Service 1993). The primary reasons for listing were the threat of even-aged timber harvest and threat of catastrophic wildfire. On August 31, 2004, critical habitat for the Mexican spotted owl was designated. The FWS appointed the Mexican Spotted Owl Recovery Team in 1993, which produced the Recovery Plan for the Mexican Spotted Owl (Recovery Plan) in 1995 (U.S. Fish and Wildlife Service 1995).

Distribution and Abundance

The Mexican Spotted Owl occurs throughout the southwestern United States and Mexico in forested mountains and canyonlands (Gutierrez et al. 1995, Ward et al. 1995). It occurs from the four corner states of Utah, Colorado, Arizona, New Mexico, south into small portions of Texas, south through Mexico. While this owl occupies a broad geographic area, it does not occur uniformly throughout its range (U.S. Fish and Wildlife 1995). Instead, Mexican spotted owls occupancy corresponds to isolated mountain systems and canyons within the southwest. Their distribution reflects the availability of forested mountain and canyon habitats (Ganey 1998). The assumption has been made that the current owl distribution mimics its historical extent, with a few exceptions however (U.S. Fish and Wildlife 1995). The owl has not been reported recently along major riparian corridors in Arizona and New Mexico, or in historically documented areas of southern Mexico (U.S. Fish and Wildlife 1995). Riparian communities and previously

occupied localities in the southwestern United States and southern Mexico have undergone significant habitat alteration since the historical sightings (U.S. Fish and Wildlife 1993).

In the U.S., the majority of owls are found on National Forest System lands. However, surveys have found an increasing number of owls on National Park Service lands within the United States. This increase is a product of more surveys being completed within National Parks (e.g., several parks within southern Utah, Grand Canyon in Arizona, Dinosaur National Park in Colorado, and Guadalupe National Park in west Texas).

The U.S. range of the Mexican Spotted Owl has been divided into six recovery units (RU), pursuant to the 1995 Recovery Plan. These include Colorado Plateau, Southern Rocky Mountains - Colorado, Southern Rocky Mountains - New Mexico, Upper Gila Mountains, Basin and Range - West, and Basin and Range - East. The RUs were identified based on physiographic provinces, biotic regimes, perceived threats to owls or their habitat, administrative boundaries, and known patterns of owl distribution (U.S. Fish and Wildlife Service 1995).

Habitat

Mexican spotted owls nest, roost, forage, and disperse in a diverse array of biotic communities. Mixed-conifer forests are commonly used throughout most of the range (Johnson and Johnson 1985, Skaggs and Raitt 1988, Ganey et al. 1988, Ganey and Balda 1989, Seamans and Gutiérrez, in press). In general, these forests are dominated by Douglas-fir and/or white fir, with codominant species including southwestern white pine, limber pine, and ponderosa pine (Brown et al. 1980). The understory often contains the above coniferous species as well as broadleaved species such as Gambel oak, maples, boxelder, and New Mexico locust. In southern Arizona and Mexico, Madrean pine-oak forests are also used commonly (Ganey and Balda 1989a, Duncan and Taiz 1992, Ganey et al. 1992, Tarango et al. 1994). These forests are typically dominated by an overstory of Chihuahua and Apache pines in conjunction with species such as Douglas-fir, ponderosa pine, and Arizona cypress. Evergreen oaks are typically prominent in the understory (Brown et al. 1980).

Habitat-use patterns vary throughout the range and with respect to owl activity (see below). In the northern portion of the range, including southern Utah, southern Colorado, and far northern Arizona and New Mexico, owls occur primarily in steep-walled, rocky canyons (Kertell 1977, Reynolds 1990, Rinkevich 1991, Rinkevich and Gutierrez 1996, Willey 1993). Along the Mogollon Rim in Arizona and New Mexico, habitat use is less restricted, and spotted owls occur in mixed-conifer forests, ponderosa pine-Gambel oak forests, rocky canyons, and associated riparian forests (Ganey and Balda 1989, Ganey et al. 1992, Fletcher and Hollis 1994, Seamans and Gutiérrez 1995). South of the Mogollon Rim and into Mexico a still wider variety of habitat types are used, including mixed-conifer, Madrean pine-oak, and Arizona cypress forests, encinal oak woodlands, and associated riparian forests (Ganey and Balda 1989, Duncan and Taiz 1992, Ganey et al. 1992, Tarango et al. 1994). Much of this regional variation in habitat use likely results from differences in regional patterns of habitat and prey availability.

Nest and Roost Habitat: In areas within areas Arizona and New Mexico, forests used for roosting and nesting often contain mature or old-growth stands with complex structure (U.S. Fish and Wildlife Service 1995:26). The complex structure is often difficult to describe; typically uneven-

aged, multistoried, and having high canopy closure (U.S. Fish and Wildlife Service 1995:27). Several hypotheses have been proposed to explain why spotted owls nest in closed-canopy forests (Gutierrez 1995). Barrows (1981) suggested that spotted owls are relatively intolerant of high temperatures and roost and nest in shady forests because they provide favorable microclimate conditions. In these areas, nest trees are typically large in size, whereas owls roost in both large and small trees (Ganey 1988, Rinkevich 1991, Willey 1993, Seamans and Gutierrez 19xx, U.S. Fish and Wildlife 1995:27). Tree species used for nesting vary somewhat among areas and habitat types, but available evidence suggests that Douglas-fir is the most common species of nest tree (SWCA 1992, U.S. Fish and Wildlife Service 1995:27). In southern Utah, owls occur primarily in narrow, steep-walled canyons or hanging canyons with little or no sun exposure (Kertell 1977, Rinkevich and Gutierrez 1996).

In northern New Mexico, the volcanic-tuff canyons of Bandelier National Monument provide many pot-holes, ledges, and small caves for owls to use as day time roosts and nesting (Johnson and Johnson 1985). In addition, Mexican spotted owls occur within the complex canyon networks of Guadalupe National Park in southeastern New Mexico. Brown (1982) describes the diverse assembles of vegetation within these canyons as encinal due to the mixed woodland, specifically, the broadleaf, evergreen codominant presence of Texas Madrone (*Arbutus xalapensis*). In southern Arizona, Ganey and Balda (1989) stated that most owls within the isolated mountains known as the Sky Islands occurred in deep canyons, steep canyons containing cliffs and stands of evergreen oaks such as Mexican pinyon (*P. cembroides*), and broadleaved riparian trees. Owls within these canyons used extensive rocky cliffs with potholes and caves both roosting and nesting when available (Ganey and Balda 1989, Duncan and Taiz 1992, Ganey et al. 1992). These areas of the Sky Islands may be one of the most complex in terms of describing where owls occur due to the complex topographic features and the numerous encinal oak species.

Foraging Habitat: More is known about owl nesting and roosting habitat than owl foraging habitat. Ganey and Balda (1994) found owls foraging more than expected in unlogged forest in Arizona than selectively logged forests. Further, Ward (2001) found that woodrats (an important prey item for Mexican Spotted Owls) occurred more frequently in unlogged forested areas.

Home Range, Migration, and Dispersal: Spotted owls are described as territorial in the sense that mated pairs defend a breeding territory, at least during the nesting season. Fidelity to these territories is apparently high in Mexican spotted owls, with most owls remaining on the same territory year after year (Ganey 1988, Gutiérrez et al. 1995).

Resident owls expanded their home range during the non-breeding season in all areas where seasonal range estimates were available, although the magnitude of this seasonal expansion varied among areas. Clearly, owl home ranges were larger than Protected Activity Centers (PACs) as defined in U.S. Fish and Wildlife Service (1995:84-89). PAC size was based on the size of owl activity centers, however, not home ranges. In general, non-breeding-season activity centers contained most of the breeding-season activity center. The mean proportion of the non-breeding-season activity center contained in the breeding-season activity center was lower, but still indicated considerable spatial overlap. Thus, protection of nesting areas provides protection to areas and habitats used throughout the year, not only during the breeding season.

Migrating owls typically left study areas in November or December, and returned from January to April. Distance moved ranged from 5 to 50 km for owls whose wintering areas were located. Wintering areas of two owls from the San Francisco Peaks could not be located despite an aerial search covering thousands of square kilometers. This suggests that some owls may move long distances. Also presently unknown is how and why migrating owls select particular wintering areas. For example, the two migrating owls from the Bar-M Canyon study area moved 50 km to winter in pinyon-juniper woodlands. These owls were members of a mated pair, but did not migrate together or even in the same year. They occupied adjacent but non-overlapping winter ranges. Much of the area between these wintering areas and their breeding area consisted of pinyon-juniper woodland that was, at least superficially, similar to the wintering areas occupied.

At present, there is little information on the specific habitat features that migrating spotted owls use in wintering areas. Further, owls use these areas at a time of year when they are unlikely to vocalize (Ganey 1990), making it difficult to locate such areas through calling surveys. This leaves us with no objective means to identify and protect such areas. The types of lowland areas in which wintering owls have been observed cover vast areas, and we have no evidence that suitable wintering areas are limiting. Thus, we see little evidence that specific protective measures for wintering areas or habitats used by migrating spotted owls would be useful or appropriate at this time.

Radio-marked juveniles dispersed in September and October in all study areas, with most dispersing in September. They are capable of moving long distances, but many successful dispersers occupy territories near their natal territory. Distance from the natal site to the last observed location for radio-marked juveniles ranged from <1 to >92 km. They move through a wide variety of habitats during the dispersal period, many of which differ greatly from typical breeding habitat and have no formal protective measures under U.S. Fish and Wildlife Service (1995).

Critical Habitat: On August 31, 2004, the FWS re-designated critical habitat for the Mexican spotted owl. Critical habitat had been designed prior to this final designation twice; once in 1995, and again in 2001. However, both designations were challenged by the court and the FWS was ordered by the courts to re-propose and thus, re-designate critical habitat for the owl a third time.

The primary constituent elements (PCEs) identified below provide a qualitative description of those physical and biological features necessary to ensure the conservation of the owl. The range of quantitative estimates (e.g., basal area, canopy closure, etc.) is not provided because these vary greatly over the range of the owl. The FWS stated that the Recovery Plan and forthcoming revision to the Recovery Plan should be consulted for more detailed information on effects to owl habitat. The PCEs included in the August 31, 2004, designation include the following:

A. PCEs related to forest structure:

1. a range of tree species, including mixed conifer, pine-oak, and riparian forest types, composed of different tree sizes reflecting different ages of trees, 30 percent to 45 percent of which are large trees with a trunk diameter of 12 inches (0.3 meters) or more when measured at 4.5 feet (1.4 meters) from the ground;

2. a shade canopy created by the tree branches covering 40 percent or more of the ground; and
 3. large dead trees (snags) with a trunk diameter of at least 12 inches (0.3 meters) when measured at 4.5 feet (1.4 meters) from the ground.
- B. PCEs related to maintenance of adequate prey species:
1. high volumes of fallen trees and other woody debris;
 2. a wide range of tree and plant species, including hardwoods; and
 3. adequate levels of residual plant cover to maintain fruits, seeds, and allow plant regeneration.
- C. PCEs related to canyon habitat include one or more of the following:
1. presence of water (often providing cooler and often higher humidity than the surrounding areas);
 2. clumps or stringers of mixed-conifer, pine-oak, pinyon-juniper, and/or riparian vegetation;
 3. canyon wall containing crevices, ledges, or caves; and
 4. high percent of ground litter and woody debris.

Individual critical habitat units on the 11 National Forests are discussed below in the Environmental Baseline section.

Life History

Feeding Habits: Forsman (1976) described spotted owls as “perch and pounce” predators. They typically locate prey from an elevated perch by sight or sound, then pounce on the prey and capture it with their talons. Spotted owls also have been observed capturing flying prey such as birds and insects (Verner et al. 1992). They hunt primarily at night (Forsman et al. 1984, Ganey 1988), although infrequent diurnal foraging has been documented (Forsman et al. 1984, Laymon 1991, Sovern et al. 1994, Delaney et al. 1999).

Mexican spotted owls consume a variety of prey throughout their range but commonly eat small- and medium-sized rodents such as woodrats, mice (peromyscid), and voles (microtine). Spotted owls also consume bats, birds, reptiles, and arthropods. The diet varies by geographic location (Ward and Block 1995; Figure. II.A.4). For example, spotted owls dwelling in canyons of the Colorado Plateau take more woodrats, and fewer birds, than do spotted owls from other areas (Ward and Block 1995, Figure. II.A.4). In contrast, spotted owls occupying mountain ranges with forest-meadow interfaces, as found within the Basin and Range - East, Southern Rocky Mountains - Colorado, and Upper Gila Mountains RUs, take more voles (Ward and Block 1995, Figure. II.A.4). Regional differences in the owl's diet likely reflect geographic variation in population densities and habitats of both the prey and the owl. Forsman et al. (2001) also documented considerable spatial variation in a regional analysis of diets of northern spotted owls.

Reproductive Biology: Knowledge of the annual reproductive cycle of the Mexican spotted owl is important both in an ecological context, and for placing seasonal restrictions on management or on other activities that may occur within areas occupied by spotted owls.

Mexican spotted owls nest on cliff ledges, stick nests built by other birds, debris platforms in trees (i.e., “witches brooms” from mistletoe infected trees), and in tree cavities (Johnson and Johnson 1985, Ganey 1988, SWCA 1992, Fletcher and Hollis 1994, Rinkevich 1991, Gutiérrez et al. 1995, Seamans and Gutiérrez 1995, Johnson 1997, Willey 1998). Spotted owls have one of the lowest clutch sizes among North American owls (Johnsgard 1988, Gutiérrez et al. 1995). Females normally lay one to three eggs, two being most common, and four being observed rarely (LaHaye 1997, Gutiérrez et al. 2003). Re-nesting following nest failure is unusual, but has been observed in Mexican spotted owls (Kroel 1991, Gutiérrez et al. 1995). Mexican spotted owls breed sporadically and do not nest every year (Ganey 1988, Gutiérrez et al. 1995). In good years, most of the population will nest, whereas in other years only a small proportion of pairs will nest successfully (Fletcher and Hollis 1994, Gutiérrez et al. 1995, 2003).

Mexican spotted owls have a distinct annual breeding period (i.e., approximately March through August). The eggs usually hatch in early May (Ganey 1988). Females brood their young almost constantly for the first couple of weeks after the eggs hatch but then begin to spend time hunting at night, leaving the owlets unattended for up to several hours (Delaney et al. 1999). Nestling owls generally fledge four to five weeks after hatching in early- to mid-June (Ganey 1988). Owlets usually leave the nest before they can fly, jumping from the nest to surrounding tree branches or the ground (Forsman et al. 1984, Ganey 1988). Dispersal occurs usually from mid September to early October (Arsenault et al. 1997, Ganey et al. 1998, Willey and van Riper 2000).

Population Dynamics

Based on estimates of vital rates and a Leslie stage-projection matrix model, Seamans et al. (1999) reported declining populations for two study areas in Arizona and New Mexico (the exact years covered by these estimates was not stated explicitly). These estimates of declining trends were supported by estimates of annual abundance based on observed numbers of owls from 1992 – 1997 (Seamans et al. 1999: fig.4). Gutiérrez et al. (2003) updated information on estimated trends in owl numbers for these study areas from 1993 – 2000. In Arizona, they indicated a stable population over this period. In contrast, the New Mexico population appeared to be declining by approximately 6 percent per year during this period. Analytical methods used differed between states, however (see Gutiérrez et al. 2003 for details), and differed from the methods used by Seamans et al. (1999). These differences in methodology complicate interpretation of the difference in observed trends between states and/or time periods.

In summary, data on trends in populations or occupancy rates are sparse, and methods and sample sizes differ among studies, making comparisons difficult. In general, however, results suggest that most populations studied either have declined slightly in the recent past or are still declining.

Environmental Variation: Environmental conditions greatly affect reproduction and/or survival of nestlings through fledging and to adulthood. Further, environmental variability is pronounced in the range of the Mexican spotted, across both space and time (Gutiérrez et al. 2003). Consequently, understanding how spotted owls respond to environmental variation is critical to recovering the owl.

Temporal and spatial variation in vital rates of two Mexican spotted owl populations (Gutiérrez et al. 2003) was roughly 2 – 5 times greater than in the population studied by Franklin et al. (2000). Seamans et al. (2002) modeled the influence of climatic factors on temporal variation in vital rates, and Gutiérrez et al. (2003) expanded this effort to include models of spatial variation. Temporal variability in fecundity was far greater than temporal variability in survival for these populations. Both vital rates appeared to be influenced by precipitation, but the nature of the relationship varied between study areas. In Arizona, a moisture index (the Palmer Z index) explained much of the temporal variation in both owl survival and fecundity. In New Mexico, the best approximating model included rainfall from the previous monsoon season (Jul – Sep), but explained little of the temporal process variation in fecundity and none of the variation in survival. Survival varied more spatially than temporally in these populations (Gutiérrez et al. 2003). Habitat covariates examined explained little of the spatial variation in owl vital rates for either study area.

Ward (2001) also attempted to model reproductive output of owls in southern New Mexico with a suite of covariates including climatic factors, habitat factors, and available prey biomass over a 6-yr period. He found that (1) models including factors describing climate or prey availability were better predictors of owl reproductive output than models that included only habitat variables; (2) models that included factors related to both weather and prey availability were better predictors than models that included only weather or prey availability; and (3) models that included availability of prey aggregated among species were better predictors than models that included availability of single prey species. Relative to the third point, annual reproductive output of owls was positively correlated with three indices of prey availability: (1) available biomass of mice and voles; (2) available biomass of mice, voles, and woodrats; and (3) available biomass of mice, voles, and woodrats in mesic forest habitat (Ward 2001). In general, models developed explained relatively little of the observed variation in owl reproductive output, however.

Thus, despite concerted efforts to understand the influence of environmental variation on owl vital rates, considerable uncertainty remains. In general, temporal variation in owl vital rates appears to be influenced by climatic factors, especially precipitation. Because estimated vital rates appear responsive to precipitation several months prior to the estimation period, Gutiérrez et al. (2003) suggested that precipitation influences vital rates through an indirect mechanism. They further proposed that this mechanism might involve precipitation influencing primary productivity, prey population dynamics, and ultimately owl vital rates. Biomass of available prey appeared to influence owl reproductive output in southern New Mexico, although much of the variation in reproductive output could not be explained by simple models (Ward 2001, see also Rosenberg et al. 2003).

Spotted owl life history strategy allows owls to reproduce when conditions are favorable and survive unfavorable periods with little or no reproduction, and has been described as a “bet-hedging” strategy (Boyce 1988, Franklin et al. 2000). Because reproduction in this owl is inherently variable, we may expect to see large variability in owl populations over time. Much of this temporal variability likely relates to large-scale climatic patterns, which also are inherently variable in the range of the Mexican spotted owl.

Reasons for Listing

The Mexican Spotted Owl was listed as a threatened species in 1993 (U.S. Fish and Wildlife 1993). The primary reasons for listing were the threat of even-aged timber harvest and threat of catastrophic wildfire.

Threats: The primary threats to the species are even-aged timber harvest and threat of stand-replacing, catastrophic wildfire. Catastrophic wildfire is a threat when large, landscape fires stand-replace owl habitat. Grazing, recreation, and other land uses have also been mentioned as possible factors influencing the Mexican Spotted Owl populations. Inappropriate grazing practices is primarily manifested through two indirect effects, (1) adverse alteration of food and cover resources needed by the owl's prey species and (2) adverse alteration or elimination of vegetation (e.g., riparian and oak communities) that may ultimately develop into owls roosting or nesting cover. Recreational activities may affect Mexican spotted owls directly through disturbances caused by human activity (e.g., hiking, shooting, Off Highway Vehicle use) at nesting, roosting, or foraging sites or indirectly through alteration of habitats such as damage to vegetation, soil compaction, or soil disturbance from compaction by hikers or vehicles.

The Healthy Forests Restoration Act (HFRA) was passed in December of 2003 and provides statutory processes for hazardous fuel reduction projects on certain types of at-risk Forest Service and BLM lands. These areas have been identified as wildland urban-interface or WUI. The Healthy Forest Restoration Act and the 2001 National Fire Plan provides additional impetus and tools for fuels reduction needed to protect and enhance owl habitat, and ultimately recover the subspecies. However, some proposed treatments within the WUI areas are consistent with the spirit and intent of recovery plan guidelines; other treatments are more intensive and might negatively impact owls and their habitat. Collectively, effects of the treatments on owl recovery are unknown, but could constitute a potential threat to owl recovery, given the number of owl PACs and amount of owl habitat involved.

Conservation Measures

The Southwestern Region of the Forest Service has adopted the 1995 Recovery Plan for the Mexican spotted owl pursuant to the 1996 Regional Amendment. In addition, the Forests have conducted fairly intensive spotted owl inventories since 1988. From these surveys, the Forest Service has designated the recommended 600 acre protected activity centers (PACs) around most all of the spotted owls on National Forest System lands. Some Forests, however, have not designated PACs within wilderness areas. In addition, the Forest Service has funded a research project on the Lincoln NF investigating the use of fuels reduction treatments on owl prey base, reproduction and demographic parameters.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation. This section is organized by

recovery unit.

The Southwestern Region of the Forest Service includes five of the six RUs located in the United States. This Region of the Forest Service does not manage any National Forest System lands in the Southern Rocky Mountains - Colorado RU. The FWS discusses the environmental baseline (i.e., the analysis of the effects of past and ongoing human and natural factors leading to the current status for the species) by RU below. National Forests are discussed by RU. Within each RU, owl PACs and designated critical habitat units are discussed by National Forest. The status of the species and the factors affecting the species environment within the action area are combined and discussed below.

The Southwestern Region of the Forest Service has incorporated the recommendation of the Recovery Plan and established 600 acre PACs at all Mexican Spotted Owl sites known from 1989 to present. The designated 600 acre PAC has been the accepted unit for analyses by both the Forest Service when designing projects and by the FWS when anticipating the amount and extent of take. As stated above, PAC size was based on the size of owl activity centers, however, not home ranges (U.S. Fish and Wildlife Service 1995). Thus, pursuant to the Recovery Plan, PAC are to be designated around a nest site or roost groove (U.S. Fish and Wildlife Service 1996:86). The Recovery Team recommended that PACs remain delineated for the life of the Recovery Plan. It is assumed that PACs include at least one adult owl if not a breeding pair.

While we use the PAC designation as the center of our analysis, restricted habitat as defined in the Recovery Plan is also important. Restricted habitat is defined as Mexican Spotted Owl habitat outside of PACs and other protected areas. Within restricted habitat are components that the Recovery Team felt necessary for land managers to retain and/or to manage for on the landscape. These habitat components discussed within the Recovery Plan (see U.S. Fish and Wildlife Service 1995:90-95:Table III.B.1). Both protected and restricted habitat were used as the basis for defining critical habitat (U.S. Fish and Wildlife Service 2004:53231).

The primary administrator of lands supporting the Mexican Spotted Owl in the U.S. is the Forest Service. According to the Recovery Plan, 91 percent of Mexican Spotted Owls known to exist in the U.S. between 1990 and 1993 occurred on lands administered by the Forest Service (U.S. Fish and Wildlife Service 1995). Mexican Spotted Owl PACs by RU for National Forest System lands in the Southwestern Region (Arizona and New Mexico) are shown in Table 36 below. Table 2 shows the number and percentage of PACs by National Forest. In addition, we compiled the number of PACs taken (i.e., owl PACs associated with an incidental take statement) from a previous biological opinion issued to the Forest Service (see Table 3).

Table 36. Protected activity centers by recovery unit for National Forest System lands in the Southwestern Region (Arizona and New Mexico).

Recovery Unit	Number of PACS	Percent of PACs by RU
Colorado Plateau	22	2.5
Southern Rocky Mountains - NM	50	5.0
Upper Gila Mountains	624	63.0
Basin and Range - West	154	15.5
Basin and Range - East	139	14.0
Total	989	100

Table 37. Number and percentage of Mexican Spotted Owl PACs per Forest within the Southwestern Region as reported by the Forest Service in 2003.

National Forest	Number of PACs	Percent
Apache-Sitgreaves	138	14.0
Carson	2	0.2
Cibola	53	5.4
Coconino	184	18.6
Coronado	107	10.8
Gila	225	22.7
Kaibab	6	0.6
Lincoln	139	14.0
Prescott	15	1.5
Santa Fe	48	4.9
Tonto	72	7.3
Total	989	100

Table 38. Number of PACs in which the FWS gave take pursuant to an incidental take statement in previous biological opinions issued to the Forest Service from 1993 to present. The activity for which the take was associated with is also shown.

Recovery Unit	Roads /Trails	Fuels	Salvage	Wildfire	Grazing	WUI ¹	Total
Colorado Plateau	0	0	0	0	0	1	1
Southern Rocky Mtns-NM	2	0	0	0	0	3	5
Upper Gila Mountains	47	2	4	35	12	31	131
Basin and Range-West	14	7	0	8	4	28	61
Basin and Range-East	4	14	0	3	2	22	45
TOTAL	67	23	4	46	18	85	243

¹Wildland Urban Interface

Colorado Plateau Recovery Unit

The Colorado Plateau RU is the largest of the six recovery units, extending from southwestern Utah, through northern Arizona into northwestern New Mexico, and a small portion of the southwestern corner of Colorado. In northern Arizona and New Mexico, owls have been reported in both canyon and montane habitats. Records of Mexican Spotted Owls exist for the Grand Canyon and Kaibab Plateau in Arizona; the Chuska Mountains, Black Mesa, and Fort Defiance Plateau on the Navajo Reservation; and, the Zuni Mountains and Mount Taylor in New Mexico. The Mount Taylor area has been identified as being an important “stepping stone”. Keitt et al. (1995) investigated landscape analysis and metapopulation structure for the Mexican Spotted Owl and found that the Mount Taylor area could function as an important link in landscape connectedness for this species. This analysis was based on habitat, not on owl densities (Keitt et al. 1995:10).

Currently, the Forest Service has designated 22 Mexican Spotted Owl PACs on the Mount Taylor Ranger District of the Cibola NF. This equates to only 2.2 percent of the total PACs that the Forest Service manages. Only one PAC has been reported as having incidental take associated with a WUI project.

Critical habitat units on National Forest System lands within this RU (within the action area) include CP-1 and CP-2 on the Cibola NF, and CP-10 on the Kaibab NF. Habitat within CP-1 is naturally fragmented into disjunct canyon systems or isolated mountain ranges. Areas with steep slopes (greater than 40 percent slope), canyons, rocky outcroppings with dense, mixed-coniferous forests are included in this unit. CP-2 (Zuni Mountains) contains mixed-conifer and canyons habitat that contain attributes of owl habitat. This unit is located approximately 30 mi southeast of Gallup, in West-central New Mexico. It contains primarily Forest Service (Mount Taylor Ranger District, Cibola NF) lands and some private land. Habitat is naturally fragmented into disjunct canyon systems or isolated mountain ranges. Areas with steep slopes (greater than 40 percent slope), canyons, rocky outcroppings with dense, mixed-coniferous forests are

included in this unit. This unit contains mixed-conifer and canyons habitat that contain attributes of owl habitat.

The Kaibab NF was included in CP-10 because of its proximity to the significant population of owls in the Grand Canyon and its juxtaposition to southern Utah. This unit is located in north-central Arizona, and is predominantly within the boundaries of Grand Canyon National Park. In addition, an area along Kanab Creek managed by the Bureau of Land Management, Arizona Strip Office, Marble Canyon National Monument, and a portion of the North Kaibab Ranger District, Kaibab National Forest are included within this unit. The majority of this unit contains steep-walled canyon habitat, but the unit also contains forested habitat within the North Kaibab Ranger District. Willey (2004, unpublished data) detected radioed spotted owls using the Kaibab Plateau for nighttime foraging off of Forest Service lands.

Southern Rocky Mountains - New Mexico Recovery Unit

The Southern Rocky Mountains-New Mexico RU encompasses a large portion of northern New Mexico, but encompasses a fairly small portion of the known owl PACs throughout its range. Designated owl PACs occur on the Santa Fe NF within the Jemez and Sangre de Cristo Mountains on the Carson NF. The number of PACs within this RU is small in comparison with other RUs with approximately 5 percent (see Table 36 above). Further, only 5 PACs have associated incidental take from previous biological opinions. Currently, there are a total of 26 wildland urban interface treatment (WUI) areas within this RU. Pursuant to the FWS's 2001 biological opinion on WUI projects, seven PACs are proposed for fuels reduction treatments. Approximately 25 percent of the acreage proposed for treatment will not follow the Recovery Plan recommendations for fuels reduction treatments in Mexican Spotted Owl habitat, but instead, will be more intensive (U.S. Fish and Wildlife Service 2001).

This RU had several large wildfires within the past decade. The Dome fire in 1995, Cerro Grande and Viveash fires in 2000 resulted in stand-replacement events within 11 owl PACs on the Santa Fe NF. The threat of catastrophic wildfire obviously continues to pose a treat to owls and their habitat within this RU.

Critical habitat units on the Santa NF include SRM-NM-1 and SRM-NM-4 within the Jemez Mountains. Unit SRM-NM-1 is located in the Jemez Mountains, in north-central New Mexico. It contains primarily the Jemez Ranger District of the Santa Fe NF. This unit contains mixed-conifer on steep slopes and canyons incised into volcanic rock. Unit SRM-NM-4 is located in the Jemez Mountains, south of Los Alamos, in north-central New Mexico. It contains primarily the Jemez Ranger District. Areas with steep slopes (greater than 40 percent slope), canyons incised into volcanic rock, rocky outcroppings with dense, mixed-coniferous forests are included in this unit.

Units SRM-NM-5a and SRM-NM-5b of the Sangre de Cristo Mountains are located in the Sangre de Cristo Mountains, in north-central New Mexico. These units contain the Espanola and Pecos and Las Vegas Ranger Districts of the Santa Fe NF. Areas contain attributes of owl habitat with steep slopes (greater than 40 percent slope), canyons, rocky outcroppings with dense, mixed-coniferous forests.

Unit SRM-NM-11 is located approximately 40 mi East and 12 mi South of Bloomfield, in northwestern New Mexico. It contains primarily contains the Jicarilla Division of the Carson National Forest. Areas with steep slopes (greater than 40 percent slope), canyons, rocky outcroppings with dense, mixed-coniferous forests are included in this unit. This unit contains mixed-conifer on steep slopes and canyons incised into volcanic rock. Unit SRM-NM-12 is located approximately 40 mi East and 6 mi North of Bloomfield, New Mexico, in northwestern New Mexico. It contains primarily contains the Jicarilla Ranger District of the Carson NF. Areas with steep slopes (greater than 40 percent slope), canyons, rocky outcroppings with dense, mixed-coniferous forests are included in this unit. This unit contains mixed-conifer on steep slopes and canyons incised into volcanic rock.

Upper Gila Mountains Recovery Unit

The Upper Gila Mountains RU is a relatively narrow band bounded on the north by the Colorado Plateau RU and to the south by the Basin and Range-West RU. Mexican spotted owls are widely distributed and use a variety of habitats within this RU. Land ownership within this RU is a mosaic of public and private lands, with the Mexican Spotted Owl primarily occupying National Forest System lands. National Forests within this RU include the Gila, Coconino, Apache-Sitgreaves, and portions of the Kaibab and Prescott National Forests.

This RU contains the largest known concentration of Mexican Spotted Owls with approximately 63 percent of known PACs in Southwestern Region of the Forest Service. This equates to 624 owl PACs. The Gila National Forest contains the majority of the owl PACs with 225, and the Apache-Sitgreaves having the second largest number of PACs with 138 (see Table 36 above). Because of its central location and its large and relatively continuous Mexican Spotted Owl population, the Recovery Team identified RU as one of three RU that are critically important to the overall stability and persistence of the MSO in the U.S. Specifically, this RU may be considered a source population, providing immigrants to smaller, isolated populations in other RUs. The Kaibab NF has designated six owl PACs on Williams Ranger District.

As throughout the southwest, fire intensity and size has been increasing within this geographic area. Several high-intensity fires have had a large influence on Mexican Spotted Owl habitat in this RU in the last decade (see Table 39). Although data within Table 39 is not a comprehensive analysis of fires in the Upper Gila Mountains RU or the effects to owls, this information illustrates the influence that stand-replacing fire has on current and future Mexican Spotted Owl habitat in this RU. This list of fires alone estimates that approximately 11 percent of the PAC habitat within the RU suffered high to moderate intensity, stand-replacing fire in the last seven years.

There are 73 wildland urban interface project areas with Mexican Spotted Owl habitat in the Upper Gila Mountain RU. Of these project areas, we estimated that 7,000 acres in 31 PACs will have some level of fairly intensive fuels reduction treatment. The proposed action may also potentially affect up to 31,374 acres of protected habitat and 90,000 acres of restricted habitat.

Table 39. Names of influential fires within the Upper Gila Mountains Recovery Unit, approximate acres burned, number of PACs affected, and PAC acres burned.

Fire Name	Year	Total Acres Burned	# PACs Burned	# PAC Acres Burned
Rhett-Prescribed Natural Fire	1995	20,938	7	3,698
Pot	1996	5,834	4	1,225
Hochderffer	1996	16,580	1	190
BS Canyon	1998	7,000	13	4,046
Pumpkin	2000	13,158	4	1,486
Rodeo-Chediski	2002	462,384	55	~ 33,000
Total		525,894	84	~ 43,645

Critical habitat units within this RU includes the following units: UGM-2 and UGM-3 on the Cibola NF; UGM-5a, UGM-5b, UGM-6 on the Gila NF. Unit UGM-7 is on portions of the the Apache-Sitgreaves and Gila NFs. Units UGM-10, UGM-11, UGM-12, UGM-13, UGM-14 occur on the Coconino NF and UGM-15 and UGM-17 occur on the occur on the Kaibab NF.

Unit UGM-2 is located in the Magdalena Mountains, 6 mi south of Magdalena, New Mexico. It contains primarily National Forest System lands (Magdalena Ranger District, Cibola NF). This unit contains ponderosa pine, mixed-conifer, spruce fir, stringers of deciduous riparian forests. Unit UGM-3 is located in the San Mateo Mountains, 36 mi Southwest of Magdalena, New Mexico. This unit contains ponderosa pine, mixed-conifer, spruce fir, stringers of deciduous riparian forests.

Unit UGM-5 is unit is located in the Gila Mountains, North of Silver City, New Mexico. It contains primarily Forest Service lands (Mimbres, Truth or Consequences, Reserve and Silver City Ranger Districts, Gila NF). This unit contains ponderosa pine, mixed-conifer, spruce fir, stringers of deciduous riparian forests. Unit UGM-6 is unit is located in the Gila Mountains, North of Silver City, New Mexico. It contains primarily National Forest System lands (Reserve Ranger District, Gila NF) lands. This unit contains ponderosa pine, mixed-conifer, spruce fir, stringers of deciduous riparian forests.

Unit UGM-7 is unit is located in the Mogollon Rim in Arizona and New Mexico and contains portions of the Apache-Sitgreaves and Gila NFs. This unit contains ponderosa pine, mixed-conifer, spruce fir, stringers of deciduous riparian forests

Unit UGM-10 is located north, northwest, east, and southeast of Payson, Arizona. The western boundary of this unit runs parallel to the Yavapai County – Coconino County line, south to the Mogollon Rim. The southwest boundary runs along the Mogollon Rim. To the north, the unit encompasses the Coconino County portion of West Clear Creek and runs east along Jacks Canyon on the Coconino NF. The unit includes portions of West Chevelon, Chevelon, and

Wildcat Canyons on the Apache-Sitgreaves NF and extends from Heber, Arizona, through the Apache-Sitgreaves National Forest, south along the Tonto National Forest boundary to Gentry Mountain.

Unit UGM-11 is located south of Mountaineer, Arizona and runs south-southeast, encompassing Howard, Mormon, and Hutch Mountains. To the west, the unit parallels Interstate 17, skirting Stoneman Lake. The southern boundary runs from east of Apache Maid Mountain to Happy Jack, Arizona, south to Willow Valley Dam. The unit does not include Mormon Lake and the area due south to Double Cabin Park.

Unit UGM-12 is unit includes all of Walnut Canyon National Monument, south to Lower Lake Mary. This unit contains portions of the Coconino, Kaibab, and Prescott NF. This unit is located approximately between Williams, Arizona and Flagstaff, Arizona to the north, and runs south to the Mogollon Rim. The eastern portion of the unit begins at the U.S. Naval Observatory Flagstaff Station and runs south following Oak Creek to Indian Gardens. The western portion of the unit encompasses the area south of Williams, Arizona, south to the Mogollon Rim. This area includes Bill Williams Mountain, Sycamore Canyon Wilderness, and Volunteer Canyon. Unit UGM-14 is located due north of Flagstaff, Arizona and encompasses the San Francisco Peaks of the Coconino NF

Unit UGM-15 is on the Kaibab NF and is located northwest of Flagstaff, Arizona. The unit is located west of U.S. Highway 180 and encompasses the area from Kendrick Peak northwest to Wild Horse Canyon. Unit UGM-17 (Kaibab NF) is located north of Parks, Arizona and includes Sitgreaves Mountain, RS Hill, and Government Hill.

Basin and Range - East Recovery Unit

A majority of the Basin and Range-East RU is within New Mexico. The Lincoln and Cibola NFs administer habitat within this RU. The 139 PACs listed in the above table are all located on the Lincoln NF. The largest concentration of Mexican Spotted Owls in the RU occurs in the Sacramento Mountains on the Lincoln NF. Owls also occur in the Guadalupe Mountains of the Lincoln National Park.

Mexican spotted owls occurring in the Sacramento Mountains have been exposed to various disturbances for more than a century. Natural disturbances include forest fires, and human disturbances include timber and fuelwood harvest, livestock grazing, development, and recreation. Coniferous forests, especially mixed-conifer, were extensively logged during an era of railroad logging from 1890 to 1945 (Glover 1984). Consequently, much of the habitat currently used by owls in the Sacramento Mountains is “second growth” forest with a high density of relatively small sized trees, poles, and saplings.

Past timber harvest practices have left a few remnant mature stands and residual pockets of “old-growth” trees in the Sacramento Mountains (Kaufman et al. 1998, Moline 1992, Regan 1997). Many of these stands are small (less than ten acres) and exist as groves amid the younger coniferous forest. The Recovery Plan states that these remnant patches are critical to the MSO, particularly for nesting and roosting (U.S. Fish and Wildlife 1995).

Within the last couple of years, at least three fires have impacted owl habitat on the Lincoln NF. The Cree fire (2000) burned through one PAC that is no longer considered viable as a result of the fire. The Scott Able fire (2000) burned through eight PACs, but destroyed habitat in three PACs such that one is no longer viable and two others needed to be reconstructed with additional habitat. Finally, the Penasco fire (2002) burned through six PACs, but only one PAC lost a significant amount of habitat.

The FWS consulted on eleven wildland urban interface fuels reduction projects containing owl habitat in the Basin and Range - East RU as a part of the WUI programmatic opinion (U.S. Fish and Wildlife 2001a). Approximately 71 of the 133 viable PACs on the Lincoln NF occur within the 0.5 mile wildland urban interface buffer. However, in order to maximize the likelihood that these PACs will be able to support reproductive pairs, the Lincoln NF proposed to thin mixed conifer stands according to the Recovery Plan guidelines. The proposed action is expected to affect approximately 11,238 acres of protected habitat, with 7,600 acres receiving intensive fuels reduction treatments not in compliance with the Recovery Plan guidelines. In addition, approximately 41,000 acres of restricted habitat within 0.5 mile of private land was proposed to be treated.

An Environmental Assessment was written in 2002 that amended the Lincoln's LRMP to implement the Penasco II project. The primary purpose of this project is to reduce fuel loadings (both natural and activity-created), reduce overly dense forested stands resulting from years of suppression, and institute a monitoring program.

Critical habitat units within the Basin and Range – East RU include BR-E-1a, BR-E-1b, BR-E-3, and BR-E-4 on the Lincoln NF. In addition units BR-E-5 and BR-E-7 have been designated on the Cibola NF. Unit BR-E-1 is located in the Sacramento Mountains (Sacramento Ranger District of the Lincoln NF). Montane habitat includes ponderosa pine, mixed-conifer, and spruce fir forests and is patchy distributed throughout the higher mountain ranges. Unit BR-E-2 is also located in the Sacramento Mountains, 3 mi west of Alto, New Mexico. Montane habitat includes ponderosa pine, mixed-conifer, and spruce fir forests and is patchy distributed throughout the higher mountain ranges. Unit BR-E-4 is located in the Carrizo Mountains, 7 mi East of Carrizozo, New Mexico. It contains the Smokey Bear Ranger District of Lincoln NF. Montane habitat includes ponderosa pine, mixed-conifer, and spruce fir forests and is patchy distributed. State and private lands are excluded.

Basin and Range - West Recovery Unit

The majority of this RU encompasses southern Arizona with a small portion covering the southwestern “bootheel” of New Mexico. The RU is characterized by numerous mountain ranges often referred to as the Sky Islands of southern Arizona. The Forest Service has designated 154 PACs on the Coronado, Tonto, Prescott, and Apache-Sitgreaves NFs.

As in the Upper Gila Mountain RU, this area has experienced multiple wildfires that have influenced owl habitat. The Clark Peak, Gibson Canyon, Miller, Noon, Rattlesnake, Shovel, Bullock, and Oversight fires burned at varying intensities throughout owl PACs on the Coronado NF. The Four Peaks/Lone Fire was a catastrophic, high-intensity wildfire on the Tonto NF that burned through two owl PACs. In 2003, there were two fires that burned at high-intensity across

significant acreage that included owl habitat. The Aspen Fire on the Coronado NF burned approximately 85,000 acres and partially burned nine MSO PACs and the Helen's 2 Fire burned approximately 3,500 acres and impacted three owl PACs within Saguaro National Monument. The 2004 Nuttall Complex Fire in the Pinaleno Mountains burned approximately 29,725 acres and impacted 20 owl PACs. However, a majority of the acreage in Mexican Spotted Owl habitat burned at moderate fire severity and the long-term effects to Mexican Spotted Owl habitat are not known.

The Coronado, Tonto, and Prescott NFs are used heavily for recreation, mainly due to their proximity to the large urban areas of Tucson and Phoenix. Riparian areas may provide important dispersal habitat between mountain ranges in this RU, so grazing in these areas is of concern due to potential negative impacts.

There are a total of 38 wildland urban interface projects in this RU. Nineteen of the proposed projects contain owl PACs; 28 PACS within this project area will receive fuels reduction treatments. The Prescott NF is expecting to treat seven of the 15 known PACs on the Forest. The WUI programmatic biological opinion states that only four of the PACs are expected to receive intensive treatments. Approximately 8,927 acres of protected habitat and 55,000 acres of restricted habitat occur within the proposed project area. The FWS expects that no more than 2,000 acres of protected habitat will be intensively treated, with the remainder of protected habitat treated per the recommendations in the Recovery Plan. The restricted habitat is all located within 0.5 mile of private land and will most likely receive fairly intensive treatments.

Critical habitat units within this RU include BR-W-2 and BR-W-3 on the Prescott NF; BR-W-4, BR-W-5, and BR-W-6 on the Tonto NF; and BR-W-7, BR-W-8, BR-W-9, BR-W-10, BR-W-11, BR-W-12, BR-W-13, BR-W-14, BR-W-15, BR-W-16, BR-W-18 on the Coronado NF.

Unit BRW-2 is located south of Prescott, Arizona on the Prescott NF. The northwestern arm of the unit encompasses the area south of Iron Springs and runs south to near Mount Francis. The area located due south of Prescott, Arizona encompasses Maverick and Lookout Mountains. Unit BRW-3 is located in the Bradshaw Mountains on the Prescott NF. The unit runs north to the south slope of Tuscumbia Mountain and runs southeast to the north slope of Lane Mountain.

Unit BRW-4 is located within the Mazatzal Wilderness on the Tonto NF, Arizona. The unit begins in the north at North Peak and runs south encompassing the Mazatzal Mountains south to Buckhorn Mountain. Unit BRW-5 is located on the Tonto NF and runs southeast from Pine Mountain, towards Greenback Peak, south to Round Mountain. The area includes the northern half of the Salome Wilderness and the Sierra Ancha Wilderness.

Unit BR-W-6 is located south of Miami and Globe, Arizona. It is south of U.S. Highway 60 and west of State Highway 77. It is centered on the Pinal Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Globe Ranger District of the Tonto National Forest. It also contains a small portion of BLM lands. State and private lands are excluded.

Unit BR-W-7 is located south of the San Carlos Indian Reservation and north of Klondyke, Arizona. It is centered on the Santa Teresa Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Safford Ranger District of the Coronado NF.

Unit BR-W-8 is located southwest Safford, Arizona. It is centered on the Pinaleno Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Safford Ranger District of the Coronado NF. Unit BR-W-9 is located south of Klondyke, Arizona. It is centered on the Galiuro Mountains and contains much of the owl habitat within that mountain range. It is on the Safford Ranger District of the Coronado NF. Unit BR-W-10 is located northwest of Willcox, Arizona. It is centered on the Winchester Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Safford Ranger District of the Coronado NF. Unit BR-W-11 is located north and east of Tucson, Arizona. It is centered on the Santa Catalina and Rincon Mountains and contains much of the owl habitat within those mountain ranges. It is primarily on the Santa Catalina Ranger District of the Coronado NF. Unit BR-W-12 is located west of Sonoita, Arizona. It is centered on the Santa Rita Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Nogales Ranger District of the Coronado NF. Unit BR-W-13 is located west of Nogales, Arizona. It is centered on the Atascosa and Pajarito Mountains and contains much of the owl habitat within those mountain ranges. It is primarily on the Nogales Ranger District of the Coronado NF. Unit BR-W-14 is located south of Patagonia, Arizona. It is centered on the Patagonia Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Sierra Vista Ranger District of the Coronado NF. Unit BR-W-15 is located west and south of Sierra Vista, Arizona. It is centered on the Huachuca Mountains and contains much of the owl habitat within that mountain range. It is on the Sierra Vista Ranger District. It also contains a relatively large portion of the Fort Huachuca Military Reservation, and the Coronado National Monument. Unit BR-W-16 is located southwest of Benson, Arizona. It is centered on the Whetstone Mountains and contains much of the owl habitat within that mountain range. It is primarily on the Sierra Vista Ranger District. Unit BR-W-18 is located northeast of Douglas, Arizona. It is centered on the Chiricahua Mountains and contains much of the owl habitat within that mountain range. It is on the Douglas Ranger District of the Coronado NF.

EFFECTS OF THE ACTION

Mexican Spotted Owls are known to occur on all 11 National Forest. The 1996 Regional Amendment provide specific S&Gs for the owl for all 11 National Forests. Critical habitat for the owl was designated on August 31, 2004 (U.S. Fish and Wildlife Service 2004). Where important, we point out the effects to critical habitat (i.e., PCEs A-B) according to the August 31, 2004 final rule.

Table 40. Summary of S&Gs considered for the Mexican Spotted Owl.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 4-8, 10-11, 14, 16-21, 26, 28, 30-33, 37-40, 42-66, 69, 72, 74, 77-79, 81-82, 84, 86-87, 89-99, 102, 104-113, 115-116, 121-124, 130, 132-145, 147, 155, 157, 159-160, 162,

National Forest	Standards and Guidelines
Apache-Sitgreaves	166, 171-172, 175, 177-180
Carson	181, 183-186, 188, 190, 193-195, 197-199, 202, 204-205, 207, 209-217, 219-227
Cibola	228-230, 233, 237-252, 255, 257, 259, 261-271, 280-285, 287-290, 292-293, 295-296, 298-302, 305-308, 310
Coconino	312-325, 327-328, 330, 332-334, 336, 338-341, 343-348, 350, 355-358, 361-364, 366, 368-369, 375-378, 382-386, 388-390, 393-402, 404, 406-408, 410-414, 417, 419-422, 424, 428, 430-432, 436-438, 441-443, 446-453, 455-463, 467-468, 470-471, 475, 489-491, 493-497, 499-504, 507, 512-515, 517-523, 528-537, 540-545, 547-549, 552, 561-569, 572-575, 577-581, 585-586, 589, 592, 595, 598, 603, 607-610
Coronado	612-613, 626-629, 631-634, 636-642, 644-651, 653, 657-662, 664-665, 667-669, 671-674, 682, 692-697, 704, 707, 709-714, 719-721, 724-728, 762, 764, 769-771, 773-774, 779-780, 786, 791-792, 794, 796-800, 803-805, 807, 809-825, 829-830, 833, 836-839
Gila NF	841-842, 844-855, 857-862, 864-876, 878, 880-881, 883-884, 887, 889-890, 892-893, 895-897, 899-901, 903-906, 909-910, 913-915, 917-927, 930, 932-933, 935-936, 938, 940-941, 943, 945-946, 948, 950, 952-953, 955, 957
Kaibab NF	958-965, 967-973, 976-982, 984-988, 991, 993, 995-996, 999, 1001-1004, 1006-1014, 1016-1034, 1036, 1039-1045
Lincoln	1046-1048, 1051, 1053, 1055-1065, 1067-1069, 1071-1074, 1076, 1079-1080, 1082-1092, 1094-1095, 1100, 1111, 1114
Santa Fe	1183-1197, 1199-1200, 1202-1208, 1210-1215, 1217-1227, 1229-1234, 1236-1238, 1242, 1245-1265, 1268-1270, 1272-1276, 1278-1281, 1284-1300, 1304-1309, 1311-1317, 1319-1328, 1330-1339
Prescott	1119, 1122, 1124-1125, 1127-1138, 1141-1143, 1145-1148, 1150-1161, 1164-1168, 1170, 1173-1175, 1177-1178, 1180-1181

National Forest	Standards and Guidelines
Tonto	1341-1342, 1344-1350, 1353, 1355-1357, 1359, 1361-1368, 1371, 1375-1376, 1388-1403, 1405-1406, 1410-1415, 1418, 1420, 1424
1996 Regional Amendment	1425-1477, 1479, 1481-1490, 1508-1510, 1512-1517

Apache-Sitgreaves National Forest

The Apache-Sitgreaves LRMP had no lethal S&Gs according to our rankings system (see Table 41 below). However, one S&G was found to have sublethal effects and five were found to cause some type of behavioral response. However, the majority of the S&Gs were ranked positive (i.e., as maintaining habitat for the owl or providing minimal recovery). Further, several were ranked as moving towards recovery or implementing recovery plans for listed species.

Table 41. Effects of the S&Gs analyzed for the Mexican Spotted Owl – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	0.8
-1	S&G is causing negative behavioral response	5	3.8
0	S&G is ill-defined and/or open to interpretation	25	19.2
1	S&G is maintaining habitat & providing at least minimal recovery	84	64.6
2	S&G is moving towards recovery	3	2.3
3	S&G is implementing species recovery plan	1	0.8
Y	S&G has no application to the species	3	2.3
Z	S&G implementation is non-discretionary	2	1.5
X	S&G is a heading	6	4.6
Total		130	100 %

Engineering Program

Facets of this program such as road construction and road use have the potential to cause behavioral effects. High road densities can increase human presence into areas. As stated above, increase human presence into an area can cause behavioral responses such as owls flushing or leaving their roost. Standard and Guideline 63 states that road densities on the Forest should average 3.5 mi/mi² or less. This is above the agreed upon agency standard for road densities as discussed above (see Proposed Action above). An increased amount of disturbance to breeding owls could occur from high amounts human traffic with increased road densities. However, this program also permits the Forest to seasonally or permanently close existing roads in certain circumstances. Seasonally or permanently closing roads within areas where owls are known to occur would reduce the amount of disturbance, particularly during the breeding season (i.e., March – August).

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, some short-term behavioral response such as flushing or nest/roost abandonment could occur. With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

This program had the majority of negative S&Gs ranked for the owl. Standard and Guideline 89 states that, "All reforestation projects will include rodent control where needed." This S&G could negatively affect the owl by reducing its prey in certain areas.

Standard and Guideline 93 advises the Forest to reduce susceptibility of Englemann spruce stands to Englemann bark beetle and to salvage windthrown trees as soon as possible. Because some PACs within the Apache-Sigreaves NF contain Englemann spruce, removal of downed trees could remove important habitat components within owl habitat. However, as stated above, the 1996 Regional Amendment offers protection to the owl by recommending that important owl habitat components be retained in owl PACs and within restricted owl habitat. Standard and Guideline 96 allows the Forest to reduce the amount of wood volume lost to stem decays and to remove infected, unsound and defective trees at the first opportunity which would result in the removal of important owl habitat characteristics. In addition, PCE A could be negatively affected.

Standard and Guideline 97 states that road densities (from timber sale preparation and administration) should be planned to economically balance road costs and skidding costs. The S&G additionally states that permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber, and to open road densities after timber sale activities cease should average 2.0 mi/mi² or less. Pursuant to the Recovery Plan (U.S. Fish and Wildlife Service 1995:74), both motorized and non-motorized vehicles may degrade spotted owl habitat, particularly meadow and shrub habitat vital to the owl's prey. In addition, noise produced by vehicles and human presence may disturb nesting spotted owls.

Lands and Minerals Program

The following S&G (52) could have a potential sublethal effect on the owls: "Limit use of herbicides, insecticides, rodenticides, or other chemical agents as part of management activities to times and places where possible transport to or by surface or groundwater has a low probability of occurrence. Limit the use of certain facilities in floodplains to non-flood seasons or daylight hours only." The use of rodenticides and other chemical agents used in and around occupied Mexican Spotted Owl habitat could have negative effects on the owls prey or possibly on an individual owl. This could also affect PCE B.

This program had several S&Gs that were ranked as positive for the owl. For instance, direction to protect threatened and endangered species by controlling surface uses during mineral

operations. In addition, guidance is given to protect riparian areas. These may have indirect benefits to the owl.

Watershed Management Program

The only S&G that was found to pertain to the owl related to enhancing watershed conditions by closing and/or obliterating roads that are causing resource damage. Implementation of this S&G would indirectly benefit owl habitat by restoring damaged watersheds. However, there could be some short-term disturbance to owls from activities involving road obliteration.

Wildlife, Fish, and Rare Plants Program

The majority of S&Gs within this program were ranked providing beneficial affects to the owl when implemented. For example, several gave direction to manage threatened and endangered species to achieve declassifying (i.e., delisting). Others stated that habitat management for federally listed species will take precedence over unlisted species. Standard and Guideline 30 specifically mentions consulting with a wildlife biologist during project planning within habitats with known spotted owls. Implementing tasks within the owl’s recovery plan and working towards delisting the owl is obviously beneficial for the species. In addition, all PCE would benefit.

In summary, the overall assessment of the Apache-Sitgreaves NF’s LRMP was overall positive for the owl. However, take is reasonably certain to occur in the form of harm and harassment from the Forestry and Forest Health,, Lands and Minerals, and watershed programs. Based on our analyses of the S&Gs, we found that the programs within the Apache-Sitgreaves NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Carson National Forest

The FWS found no S&Gs within the Carson NF’s LRMP that would cause a lethal, sublethal, or behavioral effect to Mexican Spotted Owls (see Table 42 below). The majority of the S&Gs were ranked positive (i.e., as maintaining habitat for the owl or providing at least minimal recovery). Further, several were ranked as moving towards recovery or implementing recovery plans for listed species. However, few owls occur on the Carson NF with all known owl PACs occurring on the Jicarilla Ranger District in the extreme northern portion of New Mexico.

Table 42. Effects of the S&Gs analyzed for the Mexican Spotted Owl - Carson NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	6	14.3
1	S&G is maintaining habitat & providing at least minimal recovery	28	66.7
2	S&G is moving towards recovery	2	4.8
3	S&G is implementing species recovery plan	3	7.1
Y	S&G has no application to the species	1	2.4

Ranking	Explanation of Ranking	Total	Percentage
Z	S&G implementation is non-discretionary	2	4.8
X	S&G is a heading	0	0.0
Total		42	100 %

Engineering Program

The only S&G within this program related to reseeded and restoring areas to provide for effective erosion control. This would have a beneficial effect to the owl through these types of best management practices.

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, some short-term behavioral response such as flushing or nest/roost abandonment could occur. With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

The majority of the S&Gs related to Forest Health were generally positive for the owl. For instance, maintaining natural processes, not harvesting in areas designated as old growth, and preventing fragmentation of biological valuable stands (see S&G 187, 188, & 189). With regards to critical habitat, these S&Gs would benefit PCE A.

Lands and Minerals Program

Standard and Guideline 185 was ranked as positive for the owl which regarded purchasing lands containing threatened and endangered species and critical habitats.

Recreation, Heritage, and Wilderness Program

Recreation S&Gs were ranked as either having maintaining habitat for the owl Standard and Guideline 186 places emphasis on both recreation and wildlife concerns thus, we ranked this as too vague for interpretation. Other S&Gs within Management Areas 17 and 19 were ranked positive because they reference prohibiting off road vehicle travel in certain Research National Areas as well as identifying areas with threatened and endangered species habitats.

Watershed Management Program

The FWS ranked one S&G in the Watershed Management Program as having overall benefits to the species with possible short-term effects. Standard and Guideline 221 guides the Forest Service to locate new roads outside of the riparian type and if new roads are to be built that erosion control measures utilizing Best Management Practices. Depending upon the type of erosion control measures used, potential short-term disturbance could occur. This would be beneficial to all PCEs.

Wildlife, Fish, and Rare Plants Program

The majority of S&G within the Wildlife Program ranked as positive for the owl. Standard and Guideline 202 states that Mexican Spotted Owl areas will be identified according to standardized survey methods and that nesting territories will be protected. In addition, S&Gs 197 and 198 specifically states to accomplish recovery projects included in approved recovery plans and to manage listed species to achieve delisting in a manner consistent with the goals established with the FWS.

In summary, the overall assessment of the Carson NF’s LRMP was positive for the owl. No S&Gs were ranked as having a negative effect to the owl. However, take is reasonably certain to occur in the form of short-term disturbance (i.e, harassment) from erosion control measures in the watershed program. Based on our analyses of the S&Gs, we found that the programs within the Carson NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Cibola National Forest

The Cibola NF had no S&Gs that were ranked as having lethal, sub-ethal, or negative behavioral effects to Mexican Spotted Owls (see Table 43 below). However, we ranked 14 of the S&Gs as being overall positive for the owl but with short-term adverse effects. Further, one S&G was ranked as moving towards recovery and one was ranked as implementing recovery plans for listed species.

Table 43. Effects of the S&Gs analyzed for the Mexican Spotted Owl - Cibola NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	2.9
1	S&G is maintaining habitat & providing at least minimal recovery	61	89.7
2	S&G is moving towards recovery	1	1.5
3	S&G is implementing species recovery plan	1	1.5
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	1.5
X	S&G is a heading	2	2.9
Total		68	100 %

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur. With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on

owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Recreation, Heritage, and Wilderness Program

All S&Gs within this program were ranked as either having maintaining habitat for the owl or providing at least minimal recovery for the owl. Use of buffers, minimal road densities, and protection of listed species were some of the management mentioned in S&Gs within the Cibola NF's LRMP.

Watershed Management Program

Many S&Gs within this program were either positive or were overall positive but had short-term adverse affects. Standard and Guideline 269 states that road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Thus, short-term adverse affects could occur to the owl.

Wildlife, Fish, and Rare Plants Program

The majority of S&G within the Wildlife Program ranked as positive for the owl. Standard and Guideline 228 provides guidance to apply technology and manage habitat to help recover threatened and endangered species. Further, S&G 250 specifically states to accomplish recovery projects included in approved recovery plans and to manage listed species to achieve delisting in a manner consistent with the goals established with the FWS.

In summary, the overall assessment of the Cibola NF's LRMP was overall positive for the owl. However, take is reasonably certain to occur in form of short-term disturbance (i.e., harassment) within the watershed program from road obliteration and associated erosion control measures. Based on our analyses of the S&Gs, we found that the programs within the Cibola NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Coconino National Forest

The FWS found no S&Gs within Coconino NF's LRMP that would cause a lethal response to the owl, however, we ranked seven S&Gs as having sublethal and five as having negative behavioral response to Mexican Spotted Owls. Several S&Gs were ranked as overall positive but having short-term adverse affects to the owl. The majority of the S&Gs were as maintaining habitat for the owl or providing minimal recovery for the owl. Further, only two S&Gs were ranked as moving towards recovery or implementing recovery plans for listed species (see Table 44).

Table 44. Effects of the S&Gs analyzed for the Mexican Spotted Owl - Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	7	2.9
-1	S&G is causing negative behavioral response	5	2.1
0	S&G is ill-defined and/or open to interpretation	36	14.8
1	S&G is maintaining habitat & providing at least minimal recovery	142	58.4

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	1	0.4
3	S&G is implementing species recovery plan	1	0.4
Y	S&G has no application to the species	10	4.1
Z	S&G implementation is non-discretionary	6	2.5
X	S&G is a heading	35	14.4
Total		243	100 %

Engineering Program

The S&Gs ranked in this program that were overall positive to the owl but could have some short-term adverse affects related to locating or relocating roads outside of riparian areas. In addition, S&Gs stated to obliterate unnecessary road in riparian areas. As stated previously, the intent of these S&Gs are good, however, the activity of obliterating roads could have short-term adverse affects, such as harassment, of owls.

Fire Management Program

All S&Gs ranked for the owl in the Fire Management Program were given overall positive rankings but with short-term adverse impacts. For instance, S&Gs 410-412 permit the Forest to allow a fire to burn naturally provided that prescribed conditions are met. Fuels reduction and light burning are recommended in the owl Recovery Plan for the owl to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Several S&Gs within this program were ranked as having a sublethal effect to the owl. For instance, S&G 346 guides the Forest to eliminate or reduce dwarf mistletoe infections to manageable levels. This may eliminate future nest sites since owls use dwarf mistletoe (also known as “witches brooms”). Standard and Guideline 347 states that pesticides will be used for pest outbreaks. Pesticides could have lethal affects to small rodents, thus reducing the owls prey distribution and abundance.

Standard and Guideline 446 states that when stands are managed under even-aged systems, that the shelterwood method is the preferred method in accordance with guidelines. The FWS ranked this S&G as sublethal to the owl because even-aged management removes important habitat features such as nest and roost stands. The FWS realizes however that the 1996 Regional Amendment would most likely supercede this S&G.

Standard and Guideline 450, 451, and 452 address prescriptions for Gambel oak such as rotation age and retaining snags. Management within these S&Gs does not appear to be compatible with maintaining nesting habitat for spotted owls. Mexican Spotted Owls are known to use nest structures in living oak trees either in a broken top or side cavity (Ganey and Dick 1995:25).

The Recovery Plan for the owl recommends to retain existing large oaks and promote the growth of additional large oaks (U.S. Fish and Wildlife Service 1995:94). Thus, we ranked S&Gs 450, 451, and 452 as having sublethal because removal or manipulation of Gambel oak in occupied owl habitat could harm owls.

With regards to critical habitat, S&Gs 346, 446, 450-452 would negatively impact PCE A and PCE B. Management within these S&Gs does not appear to be compatible with maintaining nest/roost habitat for spotted owls.

Lands and Minerals Program

All S&Gs within this program were ranked as being too vague or had conflicting management emphasis to determine responses to the species. For example, S&G 386 states to cooperate with Department of Interior in oil and gas leasing operations, including surface reclamation efforts. This S&G was ill-defined and thus, FWS did not assign an exposure/response ranking. In general, this program allows for certain amounts of oil and gas leasing, however, we did not have enough information to determine how this would affect the owl and its habitat.

Rangeland Management Program

S&G 339 states that full capacity rangeland in unsatisfactory condition that has potential for improvement is treated through appropriate structural and nonstructural range improvements. The FWS ranked this S&G as overall positive, but having short-term negative affects. While range improvements will improve owl habitat and habitat for its prey base (i.e., small mammals), adverse impacts from poor range management could still be occurring that alter the owl's prey availability in areas occupied by owls. This would negatively affect PCE B. In addition to this particular S&G, the Coconino NF's LRMP guides the Forest to emphasize high quality range forage and to manage grazing generally at level D intensity (i.e., highest level of grazing with a maximum amount of management such as fences), see page 23 of the Coconino NF's LRMP.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 423 allows for camping albeit on permit system. This S&G states that camp areas will be located outside of spotted owl PACs where possible. The FWS ranked this S&G as having a negative effect to owls within the areas due to human presence. Although the S&G has minimization measures built in, there could be disturbance from people camping within the vicinity.

Standard and Guideline 515 allows the Forest to increase day-use opportunities that emphasize nature-based activities such as hiking, bird-watching, photography, etc, in the area of Oak Creek Canyon. Owl PACs have been designated in Oak Creek Canyon, thus, while positive for the general public, this S&G could cause some behavioral disturbance to owls occupying this area. There are direct costs associated with responding to disturbance, such as energetic demands of avoidance flight and time lost that would be allocated to other activities (Swarthout and Steidl 2001:316).

Standard and Guideline 574 and 575 guide the Forest to provide for OHV recreation. Noise at certain noise levels has been shown to cause a flush response (Delaney et al. 1997). The FWS

ranked this as -1 because of the possibility of OHV recreation use causing owls to flush or abandon their nest site or roost.

Watershed Management Program

Some S&Gs in the Watershed Management Program may have short-term adverse affects to the owl. For instance, S&G 377 guides the Forest to implement emergency fire rehabilitation measures where necessary to protect soil and water resources from intolerable losses or to prevent unacceptable downstream damage. Implementing this standard is obviously good management and will be overall positive for owl habitat. There could however be some disturbance to owls if rehabilitation occurs in areas occupied by owls especially during the breeding season. The FWS believes this will be minimal and thus, fire rehabilitation should be left to the discretion of forest managers.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 321 states that habitat management for federally listed species will take precedence over unlisted species and to follow approved recovery plans. Standard and Guideline 324 guides the Forest to inventory, evaluate, and prepare recovery schedules for listed species and to monitor the effects of management on threatened and endangered species. These S&Gs will be wholly beneficial to the Mexican Spotted Owl.

In summary, the overall assessment of the Coconino NF’s LRMP is that it has numerous negative S&Gs that we found could be negatively affecting the owl. However, there were over 100 S&Gs that maintain habitat or provide minimal recovery for the owl. In addition, one S&G stated that threatened and endangered should monitored and for the Forest to follow recovery plans. If these are implemented, adverse affects to the owl will be minimized. Regarding critical habitat, we found that the programs within the Cocinino NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Coronado National Forest

The FWS found no S&Gs within Coronado NF’s LRMP that would have a lethal effect to the owl (see Table 45 below). However, 4 were found to have sublethal effects and 1 was ranked as causing a negative behavioral response. There were 82 S&Gs that we ranked as maintaining owl habitat or providing for minimal recovery. The following programs are not mentioned because they did have S&G that affected the owl either negatively or positively: Engineering, Lands and Minerals Program, and Watershed Management Program.

Table 45. Effects of the S&Gs analyzed for the Mexican Spotted Owl - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	4	2.9
-1	S&G is causing negative behavioral response	1	0.7
0	S&G is ill-defined and/or open to interpretation	20	14.6
1	S&G is maintaining habitat & providing minimal recovery	88	64.3
2	S&G is moving towards recovery	8	5.8

Ranking	Explanation of Ranking	Total	Percentage
3	S&G is implementing species recovery plan	11	8.0
Y	S&G has no application to the species	2	1.5
Z	S&G implementation is non-discretionary	2	1.5
X	S&G is a heading	1	0.7
Total		137	100 %

Fire Management Program

Standard and Guideline 713 stated that prescribed fire will be used to reduce fuel hazards, enhance wildlife values, and enhance visual resources. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Standard and Guideline 697 states that chemicals may be used within guidelines approved by other agencies; insecticides and rodenticides will be used in recreation areas and administrative sites. Using chemical agents such as rodenticides in areas occupied by spotted owls could have negative effects by killing their primary prey item (i.e., small mammals).

Standard and Guideline 726 provides the Forest standards on timber removal based on rotation age and basal area. Management direction provided by this S&Gs does not appear to be compatible with maintaining nesting and/or roosting habitat for spotted owls.

Rangeland Management Program

Several S&Gs in the Rangeland Management Program were ranked as possibly causing a sublethal response (e.g., reduced reproduction). For instance, S&G 792 calls for managing suitable rangeland at level D (i.e., highest grazing intensity) and if level D is not achievable then to manage at level A (no livestock). According to the Coronado’s definition, level D grazing includes intensive livestock management and will obtain relatively uniform distribution at 35-55 percent use level over 100 percent of the full capacity range. In addition, S&G 805 also manages for level D and projects that approximately 1,700 acres will be in unsatisfactory condition with 15,000 being in satisfactory condition. As stated above, inappropriate grazing practices is primarily manifested through two indirect effects, (1) adverse alteration of food and cover resources needed by the owl’s prey species and (2) adverse alteration or elimination of vegetation (e.g., riparian and oak communities) that may ultimately develop into owls roosting or nesting cover. The Recovery Plan for the owl recommends to implement management strategies that will restore good conditions to degraded riparian communities as soon as possible.

Recreation, Heritage, and Wilderness Program

No negative S&Gs were identified in the Recreation Program. However, the LRMP for the Coronado NF allows for certain levels of recreation. There may be disturbance from hiker, campers, and bird watchers on the various Ranger Districts on the Coronado NF. Because of its proximity (southern Arizona), this Forest experiences a large number of birdwatchers, with the Mexican Spotted Owl being one of the more popular species sought by birders in the region (U.S. Fish and Wildlife Serviced 1995:101). However, activities such as these that do no cause habitat alteration generally have a low potential to impact the Mexican Spotted Owl.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 724 allows the Forest to maintain and improve occupied habitat for the several species including the Mexican Spotted Owl. In addition, this S&G specifically states to delist threatened and endangered species following guidelines of approved recovery plans. If implemented, these S&Gs will be wholly beneficial to the Mexican Spotted Owl.

In summary, the overall assessment of the Coronado NF’s LRMP is that it is beneficial for the owl. Eight S&Gs moved toward recovery and 11 actually stated specifically to implement recovery plans. The Coronado NF was one of two Forests that had a large number of positive S&Gs for the owl and for threatened and endangered species in general. Based on our analyses of the S&Gs, we found that the programs within the Coronado NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Gila National Forest

The FWS found no S&Gs on this Forest that were negative (i.e., lethal, sublethal, or causing a negative behavioral response). The majority were positive with a few having some short-term adverse affects, mostly associated with fire management. The FWS also looked to the 1986 LRMP and analyzed the overall management direction. The FWS found no adverse effects occurring from the Engineering, Lands and Minerals, or Watershed Management programs.

Table 46. Effects of the S&Gs analyzed for the Mexican Spotted Owl - Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	2.1
1	S&G is maintaining habitat & providing minimal recovery	68	71.6
2	S&G is moving towards recovery	2	2.1
3	S&G is implementing species recovery plan	21	22.1
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.1
X	S&G is a heading	0	0.0
Total		95	100 %

Fire Management Program

Standard and Guideline 844 states that prescribed fire implementation plans will be initiated on vegetative types where the natural role of fire has been identified. The FWS is unaware if such “implementation plans” have been established. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

No S&Gs were provided that addressed timber management. Although the Gila NF’s LRMP contains tables of 10-year timber sale program, the 1996 Regional Amendment supercede this guidance for timber harvest.

Rangeland Management Program

Standard and Guideline 858 states that grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas. The FWS ranked this as having an overall beneficial intent with possible negative effects in the short-term. The Recovery Plan recommends to restore lowland riparian areas and to maintain riparian broad-leaved forest in a healthy condition, especially in canyon-bottom situations. Thus, while the intent of this S&G appears to be beneficial, we believe there could be some negative impacts occurring from grazing in riparian zones. This S&G could influence PCE C by affecting riparian vegetation.

In general, the Gila NF’s LRMP states the following; “Manage and utilize range resources and improve range grazing. Currently, livestock use is in balance with capacity on a significant portion of the Forest. However, there are some areas where livestock use exceeds capacity. Opportunities are available to increase production capability and reduce conflicts with other resources” (Gila LRMP: 4). The FWS interprets this to mean livestock can be managed in such a way as to not conflict with resources (i.e., listed species). In addition, on page 11 of the Gila NF’s LRMP, the plan states to provide cooperation with other agencies and private range landowners to reduce impacts of livestock grazing, and identify and manage areas that contain threatened and endangered species. If implemented correctly, no adverse effects should occur to Mexican Spotted Owls from livestock grazing.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs within the Recreation Program affected the owl. However, the LRMP states that dispersed recreation is expected to increase. The biological assessment states that the dispersed recreation amounts are above the regional average. As stated in the proposed action, dispersed recreation activities are those activities which take place outside of designated recreation sites. According to the biological assessment, nearly 50 percent of recreational visits in the Southwestern Region are dispersed. However, although some disturbance to owls may be occurring, activities such as these that do not cause habitat alteration generally have a low potential to impact the Mexican Spotted Owl.

Wildlife, Fish, and Rare Plants Program

Many S&Gs within this program directed the Forest to manage threatened and endangered species to achieve delisting in compliance with approved recovery plans (S&G 869). In addition, S&G 872 says to accomplish projects included in approved recovery plans and for projects to be coordinated through integrated resource management plans. Other S&Gs throughout the Gila LRMP state similar objectives within specific Management Areas on the Forest. Implementation of the Mexican Spotted Owl Recovery Plan is especially important on the Gila NF because this Forest has the most amount of known owls (i.e., PACs), roughly 22 percent (see Table 37 above). Because Recovery Plans are considered “road-maps” for recovering listed species, accomplishing recovery tasks and goals are important means to achieving delisting.

In summary, the S&Gs provided to us by the Forest Service were positive for the owl. Further, the overall assessment of the Gila NF’s LRMP was that his plan has a considerable amount of positive guidance for listed species. The primary areas where take would occur is within the Rangeland Management and Fire Management programs. However, based on our analyses of the S&Gs, we found that the programs within the Gila NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Kaibab National Forest

The FWS found 5 S&G within the Kaibab NF’s LRMP that could cause sublethal effects to Mexican Spotted Owls. Fifty-seven S&Gs were ranked as maintaining habitat or providing minimal recovery for the owl. Several of these had short-term negative affects however. One S&G moved towards recovery and one stated to implement recovery plans for listed species. No S&Gs were found within the Recreation or Watershed Management programs that affected the owl.

Table 47. Effects of the S&G analyzed for the Mexican Spotted Owl - Kaibab NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	5	6.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	6.0
1	S&G is maintaining habitat & providing minimal recovery	68	81.0
2	S&G is moving towards recovery	1	1.2
3	S&G is implementing species recovery plan	1	1.2
Y	S&G has no application to the species	2	2.4
Z	S&G implementation is non-discretionary	1	1.2
X	S&G is a heading	1	1.2
Total		84	100 %

Engineering Program

Standard and Guideline 972 states to identify and obliterate un-needed system roads. Obliterating unneeded roads in areas that would access owl PACs would benefit the owl by

reducing disturbance from human presence. However, short-term disturbance to owls could occur but is dependent on methods, location, and timing of such activities.

Fire Management Program

Standard and Guideline 973 states that fires from natural ignition may exceed 200 acres in size when burning within an approved area and declared a wildland fire use action. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur. In addition, adverse affects to the owl will depend upon where and when these fires occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Standard and Guideline 1005 (within Ecosystem Management Areas 1, 3, 8, 9, 12, 16) states the following: “Do not cut any tree larger than 40 inches in DBH.” The FWS interpreted this as allowing cutting of 24 to 39 inch dbh trees. While this may not be the case, we ranked this as possibly harming the owl. However, we realize that the S&G in the 1996 Regional Amendment that implement the owl Recovery Plan supercede this S&G. The 1996 Regional Amendment states that only trees less than 9 inch dbh in PACs will be cut. Further, according to the 1996 Regional Amendment, trees 18 inch dbh or larger must be retained outside of owl PACs.

Lands and Minerals Program

Minimizing the amount of land allocated to electronic and utility corridors consistent with appropriate accommodation for public services as stated in S&G 974 will minimize habitat alteration which could benefit the owl depending upon location on the Forest. Utility corridors can impact owl habitat by removing trees. However, these corridors also create openings and edge that could improve prey availability to owls.

Standard and Guideline 1012 and 1013 state to restrict use and occupancy within one mile of threatened and endangered raptor nest sites from March 1 to August 15 and to prohibit use and occupancy within one-quarter mile of raptor nests from March 1 to July 30

Rangeland Management Program

Standard and Guideline 969 states to provide for extensive management of livestock use of the range resource. This guideline goes on to state that long-term grazing use and capacity is kept in balance through the removal or addition of permitted livestock use. Livestock grazing may not affect designated PACs on the Kaibab because of the steep, forested areas where they occur.

Standard and Guideline 1001 states to manage grazing allotments at the range management level determined on a level basis and to bring permitted grazing in line with grazing capacity on all grazing allotments. The FWS ranked this S&G as overall intended to be positive (i.e., maintaining owl habitat), however, this be wholly dependent upon livestock numbers and timing.

Wildlife, Fish, and Rare Plants Program

Within the Wildlife Program, S&G 981 states to take all reasonable precautions during fire suppression to conserve and protect threatened and endangered species habitats consistent with policies regarding jeopardy to human life and property. Fire suppression activities are not included in the proposed action for this consultation. The Forest Service conducts Emergency Consultation for fire suppression activities.

In summary, the overall assessment of the Kaibab NF’s LRMP is that there are protective measures for the owl incorporated within the S&Gs. However, we found several S&Gs that could cause take. Based on our analyses of the S&Gs, we found that the programs within the Kaibab NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Lincoln National Forest

The FWS found several S&Gs that could have a sublethal effect to owls. The majority of S&Gs within the Lincoln NF’s LRMP were generally positive for the Mexican Spotted Owl. The FWS assumes that the Forest will be using Fire as a management tool, however, we were not provided with S&Gs within the biological assessment that pertained to fire use on the Lincoln.

Table 47. Effects of the S&Gs analyzed for the Mexican Spotted Owl – Lincoln NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	2	3.8
-1	S&G is causing negative behavioral response	1	1.9
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing minimal recovery	42	80.8
2	S&G is moving towards recovery	4	7.7
3	S&G is implementing species recovery plan	1	1.9
Y	S&G has no application to the species	1	1.9
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		52	100 %

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Standard and Guideline 1055 states that the Forest will use pesticides only when they are the most economically sound and environmentally acceptable means of preventing or suppressing pest outbreaks which threaten the attainment of objectives. Using chemical agents such as rodenticides in areas occupied by spotted owls could have negative effects by killing their primary prey item (i.e., small mammals). Thus, we ranked this S&G as having a sublethal effect to the owl because it could effect Mexican Spotted Owl prey distribution and abundance. However, S&G 1056 states that when pesticides are used for pest control, project plans will contain appropriate and necessary monitoring procedures and mitigation measures. Thus, if implemented properly, the effect of chemicals could be minimized.

Rangeland Management Program

Standard and Guideline 1086, 1087, and 1088 and others discuss unsatisfactory condition of range that will be treated by implementing improved management and range improvements within various Management Areas on the Forest in which owls occur. Unsatisfactory range conditions could affect the owl's reproduction by impacting its prey distribution and abundance. This would negatively affect PCE B which relates to maintenance of adequate prey species. Although the overall intent of the S&G is positive, the length of time to obtain satisfactory range conditions through existing management could be adversely affecting the owl.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1073 states that all vehicles will be restricted to system roads and trails signed as open, except they are allowed up to 300 feet from roads and trails for dispersed camping. The FWS found this to be positive, in general to the species, but with some short-term disturbance possible. Owls on the Lincoln NF have been known to roost and nest in forested areas not too far from roads (Rinkevich, pers. obs).

Watershed Management Program

Standard and Guideline 1081 states that chemical treatments may be applied on areas that would benefit from selective control of plant species. As stated above, chemical use could have sublethal effects to the owl because it could effect Mexican Spotted Owl prey distribution and abundance.

Wildlife, Fish, and Rare Plants Program

Many S&Gs within this program directed the Forest to manage threatened and endangered species to meet the goals and intent of the ESA (see S&G 1047). In addition, S&G 1063, states to manage threatened and endangered species to attain total recovery levels over time. Implementation of the Mexican Spotted Owl Recovery Plan is especially important on the Lincoln NF is in an important Recovery Unit (Basin and Range – East). In addition, the Lincoln contains a large amount of known owls (i.e., 137 PACs), roughly 15 percent (see Table 37 above). Because Recovery Plans are considered “road-maps” for recovering listed species, accomplishing recovery tasks and goals are important means to achieving delisting.

In summary, the S&Gs provided to us by the Forest Service were positive for the owl for the Lincoln NF. Further, the overall assessment of the Lincoln NF's LRMP was that his plan has a considerable amount of positive guidance for listed species. Incidental take of owls will occur

through the implementation of S&Gs within the following programs: Forestry and Forest Health, Rangeland Management, Recreation, and Watershed Management programs. However, based on our analyses of the S&Gs, we found that the programs within the Lincoln NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Prescott National Forest

The FWS found no S&Gs that would cause a lethal response or sublethal response to the owls. In addition, we ranked no S&Gs that would have a negative behavioral response. The majority however, were generally positive for the Mexican Spotted Owl. Within the S&Gs in which we ranked as positive, were two that we found could have short-term adverse affects. These are summarized below.

Table 49. Effects of the S&Gs analyzed for the Mexican Spotted Owl – Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	5.0
1	S&G is maintaining habitat & providing minimal recovery	51	85
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.3
Y	S&G has no application to the species	1	1.7
Z	S&G implementation is non-discretionary	2	3.3
X	S&G is a heading	1	1.7
Total		60	100 %

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Lands and Minerals Program

Standard and Guideline 1169 states that roads needed for private land access, special uses or mineral activities will be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use. The intent of this S&G is overall positive because it implies that roads will be minimal (i.e., 2-tracks that may restrict use) and that they will be closed and revegetated. Roads increase vehicle

traffic and thus, can cause disturbance to owls. However, if implemented, disturbance will be minimal to the owl.

Rangeland Management Program

Standard and Guideline 1154 allows the Forest to manage to bring all grazing allotments to satisfactory management by the end of the first decade. Satisfactory management occurs on allotments where management actions are proceeding according to a schedule (Allotment Management Plan), which lead to fair or better range condition with upward trend. Acres of satisfactory management are the total full capacity acres for a complete allotment within a management area being operated satisfactorily. Acres of unsatisfactory managed range are the total full capacity acres for complete allotments within a management area being operated unsatisfactorily. The FWS ranked this S&G as potentially having some adverse affects. Unsatisfactory range conditions could affect the owl's reproduction by impacting its prey distribution and abundance. This would negatively affect PCE B which relates to maintenance of adequate prey species. Although the overall intent of the S&G is positive, the length of time to obtain satisfactory range conditions through existing management could be adversely affecting the owl.

Wildlife, Fish, and Rare Plants Program

Many S&Gs within this program directed the Forest to manage threatened and endangered species to meet the goals and intent of the ESA. For instance, S&G 1119, states to maintain and/or improve habitat for threatened or endangered species and work toward the eventual recovery and delisting of species through recovery plan implementation. Because Recovery Plans are considered "road-maps" for recovering listed species, accomplishing recovery tasks and goals are important means to achieving delisting.

In summary, the S&Gs provided to us by the Forest Service were positive for the owl for the Prescott NF. Further, the overall assessment of the Prescott NF's LRMP was that his plan has a considerable amount of positive guidance for listed species. Incidental take of owls will occur through implementation of S&Gs within the following programs: Lands and Minerals and Rangeland Management. However, based on our analyses of the S&Gs, we found that the programs within the Prescott NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Santa Fe National Forest

The FWS found two S&Gs that would cause a sublethal response to the owls. In addition, we ranked no S&Gs that would cause a lethal response or negative behavioral responses. The majority however, was that the S&Gs within the Santa Fe NF's LRMP were generally positive for the Mexican Spotted Owl. Within the S&Gs in which we ranked as positive, were two that we found could have short-term adverse affects. These are summarized below.

Table 50. Effects of the S&Gs analyzed for the Mexican Spotted Owl –Santa Fe NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	2	1.4
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	8	5.7
1	S&G is maintaining habitat & providing minimal recovery	110	78.0
2	S&G is moving towards recovery	1	0.7
3	S&G is implementing species recovery plan	2	1.4
Y	S&G has no application to the species	8	5.7
Z	S&G implementation is non-discretionary	3	2.1
X	S&G is a heading	7	5.0
Total		141	100 %

Fire Management Program

Implementation of a fire program is obviously good management and will be overall positive for owl habitat. Fuels reduction and light burning are all recommended in the Recovery Plan for the owl to reduce the treat of large-scale, stand-replacing fires for long-term survival and recovery of owl habitat. However, some short-term behavioral response such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Standard and Guideline 1224 states that, “Log landing areas will be located outside of designated sensitive land areas to the extent practical. These sensitive areas include: riparian areas, wetlands and natural meadows, archaeological sites, threatened and endangered or sensitive species habitat and along Level 1 roads requiring viewshed corridor plans. When landings must be located in these areas they will be coordinated to the sensitive resource.” This S&G was ranked as having adverse affects to the owl (i.e., sublethal) because of wording within the S&G that states “to the extent practical”. If implemented with the needs of the owl in mind, adverse affects will be minimized.

Standard and Guideline 1317 states that timber harvest activities will be planned to limit the potential of catastrophic fire and promote long-term forest and watershed health. Fuels reduction and light burning are all recommended in the Recovery Plan for the owl to reduce the treat of large-scale, stand-replacing fires for long-term survival and recovery of owl habitat. However, some short-term behavioral response such as flushing or nest/roost abandonment could occur.

Watershed Management Program

Standard and Guideline 1252 states that in the harvest units designated for skyline logging, yarding will be upslope or fully suspended if cross slope yarding is necessary. Skyline corridor widths will be limited to 15 feet (require tail-end suspension during in-haul for all skyline operations). Although during meetings with the Santa Fe in October of 2004 (see Consultation History section above), managers suggested that this type of management does not occur on the Forest. In addition, the 1996 Regional Amendment would supercede this type of treatment. However, because it is still part of the proposed action and thus is still applicable, we ranked it as having sublethal effects to the owl such reproductive failure due to habitat alteration.

Wildlife, Fish, and Rare Plants Program

Many S&Gs within this program directed the Forest to manage threatened and endangered species to meet the goals and intent of the ESA (see 1184). In addition, S&G 1204 allows the Forest to accomplish recovery projects included in approved recovery plans.

In summary, overall assessment of the Santa NF’s LRMP was that his plan has very few negative S&Gs that would affect the owl. Many were ranked as positive for the owl. Based on our analyses of the S&Gs, we found that the programs within the Santa Fe NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

Tonto National Forest

The FWS found two S&Gs that would cause a sublethal response to the owls. In addition, we ranked no S&Gs that would cause a lethal response or negative behavioral responses. The majority however, was that the S&Gs within the Tonto NF’s LRMP were generally positive for the Mexican Spotted Owl. Within the S&Gs in which we ranked as positive, were two that we found could have short-term adverse affects. These are summarized below.

Table 51. Effects of the S&Gs analyzed for the Mexican Spotted Owl –Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	5	9.3
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	15	27.8
1	S&G is maintaining habitat & providing minimal recovery	30	55.6
2	S&G is moving towards recovery	1	1.9
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	2	3.7
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		54	100 %

Fire Management Program

Implementation of a fire program is good management and will be overall positive for owl habitat. Fuels reduction and light burning are recommended in the owl Recovery Plan to reduce the threat of large-scale, stand-replacing fires (U.S. Fish and Wildlife Service 1995). However, short-term behavioral responses such as flushing or nest/roost abandonment could occur.

With regards to critical habitat, fire has the potential to affect all PCEs. Although short term data on owl response to fire is inconclusive, it is suspected that appropriate fuels reduction will benefit areas designated as critical habitat.

Forestry and Forest Health Program

Standard and Guideline 1392 states to integrate dwarf mistletoe surveys into stand examinations and remove infected overstories as soon as regeneration is accomplished. The S&G also states to thin understories to densities which will maximize fiber production, and therefore stand vigor, using yield simulation models as guides, and eradicate infected stands by clear-cutting and regenerate artificially when yield simulation models indicate that they will not reach maturity because of mistletoe. This may eliminate future nest sites since owls use dwarf mistletoe (also known as “witches brooms”) or possibly alter the multi-storied stand structure preferred by the owl.

Rangeland Management Program

Standard and Guideline 1376 allows the Forest to manage suitable rangelands at Level C. Rangeland in less than satisfactory condition will be treated with improved grazing management. As stated above, Level C is defined as extensive livestock management with additional interior fencing and permanent waters. Inappropriate grazing practices is primarily manifested through two indirect effects, (1) adverse alteration of food and cover resources needed by the owl’s prey species and (2) adverse alteration or elimination of vegetation (e.g., riparian and oak communities) that may ultimately develop into owls roosting or nesting cover. This would negatively affect PCE B and C which relate to maintenance of adequate prey species and riparian vegetation. Thus, this S&G could have sublethal effects to the owl.

In summary, the Tonto NF has many S&Gs that were positive for the species. Although there were two that were found to be lethal, our assessment of the Tonto NF was that it was overall positive. Based on our analyses of the S&Gs, we found that the programs within the Tonto NF will not appreciably impact the PCEs to the point that critical habitat for the owl is no longer functional.

1996 Regional Amendment

The Forest Service intends for these region-wide S&Gs to replace, or take priority over, the existing S&Gs specified for each National Forest. This assumption is based on the Forest Service’s statement that, “in any case of project design where there is any apparent conflict between the new standards and guidelines, the new S&Gs will take precedence.” (U.S. Forest Service, letter February 14, 1996). Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect the owl.

Table 52. Effects of the S&Gs analyzed for the Mexican Spotted Owl – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	5.7
1	S&G is maintaining habitat & providing minimal recovery	67	76.2
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	1	1.1
Y	S&G has no application to the species	6	6.8
Z	S&G implementation is non-discretionary	2	2.3
X	S&G is a heading	7	8
Total		88	100 %

Although the 1996 Regional Amendment attempted to include all the essential features of the Recovery Plan for the owl, these Amendment do not encompass everything needed for the recovery of the owl. Interpretations of the plan were incorporated into the 1996 Regional Amendment which varied from the 1996 Regional Amendment. Therefore, it is crucial that resource managers and biologists on the ground refer to the 1995 Recovery Plan in order to correctly interpret the Standards and Guidelines for the owl.

The FWS addressed the effects to the owl from the rate of implementation of grazing S&Gs in a 2003 biological opinion (U.S. Fish and Wildlife Service 2003). At the time, the Forest Service predicted that the rate of implementation was approximately 38 allotments with Mexican Spotted Owl habitat or PACs per year from 2003 through 2010. This was based on the fact tha, at the time, the Forest Service estimated that 509 allotments had owl habitat; of which, 274 contained PACs. Of these, 202 allotments with owl habitat were completed (128 with PACs) leaving 307 (146 with PACs) that remained needing NEPA compliance. As of December 2004, the Forest Service updated this information to 446 allotments having owl habitat; of which, 300 allotments contain PACs. Of the 446 allotments, 222 allotments with owl habitat have gone through NEPA leaving 224 allotments remaining. The Forest Service states that 152 allotments with owl PACs have had NEPA compliance. The Forest Service has stated that they will complete these by 2010 at a rate of 37 allotments per year. However, the proposed action for this current consultation stated that NEPA review will average approximately 58 allotments per year through 2015. Although the rate of implementation appears to have slowed and adverse effects may be occurring from grazing in owl PACs, effects of the rate of implementation of grazing S&Gs are not substantial.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future

federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Although a small number of owls most likely occur on state and privately owned parcels of land, the majority of known owls occurring on non-Forest Service lands inhabit Tribal lands. Tribes are sovereign governments with management authority over wildlife and other Tribal land resources. In this section, we provide some of the specific Management/Conservation Plans for the that were developed by the San Carlos Apache Tribe, Navajo Nation, White Mountain Apache Tribe, Mescalero Apache Tribe, and Jicarilla Apache Nation. The FWS considers all of these plans wholly beneficial to the owl.

San Carlos Apache Tribe: The San Carlos Apache Tribal lands are located between and directly adjacent to the Tonto and Apache Sitgreaves NFs. Their Forestry Department staff developed the Mexican Spotted Owl Conservation Plan for the San Carlos Apache Indian Reservation (Conservation Plan) which has been approved by their Tribal Council. The San Carlos Apache Tribe conducts owl surveys to evaluate and design projects that minimize or avoid impacts to the owl and its habitat. The Tribe also conducts periodic surveys within PACs to determine occupancy. Owls are found across the northern third of the SCA Indian Reservation; however, most suitable nesting and foraging habitat is in remote, inaccessible areas. Although these areas have very little overlap with commercial forest operations, owl habitat has generally been deferred from timber harvests since the listing of the owl. Nevertheless, this continual monitoring of habitat and species occupancy provides current GIS and other information to manage the overall forest resources.

The San Carlos Apache Tribe's primary timber management practice is uneven-aged silviculture systems, using single-tree selection methods. The key factor considered in the Tribe's Conservation Plan is that there is very little overlap between forested lands currently considered practical for commercial harvesting operations and forested lands considered to be owl habitat. Thus, the majority of the high-potential breeding habitat (steep slopes, mixed-conifer) receives little or no timber management. The Tribe's conservation plan for the owl addresses identified threats to owl habitat by maintaining sufficient suitable habitat across the landscape and by using site-specific retention of complex forest structure following timber harvest in those few areas where owl habitat and timber management overlap. Owl nest and roost habitats, primarily in mixed-conifer and steep slope areas, are not managed for timber extraction and will remain as suitable nest/roost habitat. Foraging habitat will be managed almost entirely by uneven-aged timber harvest methods. Timber sales, thinning, and fuelwood projects are conducted within some owl habitat to extract resources, improve or maintain current habitat conditions, and increase forest health (e.g. controlling dwarf mistletoe and bark beetles).

Wildfire is considered to be the greatest threat to owl habitat on the San Carlos Apache Reservation. Steep slopes and canyons occupied by the owl are especially at risk. Fire is managed through the Tribe's Wildland Fire Management Plan Programmatic Environmental Assessment (Fire Management Plan).

White Mountain Apache Tribe: The Fort Apache Indian Reservation is directly adjacent to the Tonto and Apache Sitgreaves NFs. The White Mountain Apache Tribe was one of the first

Tribes to develop a management plan for the owl. The Tribe developed a conservation plan for the Mexican Spotted Owl shortly after its listing. Areas containing spotted owls are placed in one of two land-management categories, termed Designated Management Areas (DMAs). Areas supporting “clusters” of four or more territories are considered Category-1 DMAs. In these areas, spotted owl habitat concerns drive manage prescription; timber harvest is secondary objective. Category-1 DMAs range approximately 6,000-10,000 acres (2,430-4,050 ha) in size and contain 57 percent of known spotted owl sites on the Reservation. Category-2 DMAs include areas supporting 1-3 owl territories. Habitat outside the territories managed only secondarily for spotted owls, with other objectives given priority. No timber harvest is allowed in 75 acre (30 ha) patches around the owl activity centers. A seasonal restriction on potentially disturbing activities is provided in a 500 acre (202 ha) area, and timber prescriptions within this area should be designated to improve habitat integrity. The FWS determined that the White Mountain Apache managemen plan is adequate to ensure persistence of the Mexican Spotted Owl.

Navajo Nation: The Navajo Nation covers a large portion of northeastern corner of Arizona and is directly adjacent to the Kaibab NF. The Navajo Nation developed the Navajo Nation Management Plan for the Mexican Spotted Owl, which was approved by the Navajo Nation Council. The Navajo Nation management plan describes the Navajo Nation’s management scheme that has been in effect since the listing of the owl: the known and potential habitat for the owl on the Navajo Nation; threats to the species; and future management practices. Except for the few exceptions detailed below, the Navajo Mexican Spotted Owl Management Plan follows the recommendations of the Recovery Plan.

The Navajo’s management plan is designed to effectively manage the owl on the Navajo Nation using accepted conservation techniques, especially those recommended in the Recovery Plan. The following practices are used to protect and manage the owl on the Navajo Nation: (1) mandatory pre-action owl protocol surveys; (2) federal agency section 7 consultations for proposed projects; (3) establishment of 600-ac (243-ha) PACs around all recent and historic owl sites; and (4) the Tribal project approval process, including requiring that all non-federal activities avoid taking owls (Navajo Nation 2000). To date, very few projects have altered owl habitat on the Navajo Nation and none have occurred without section 7 consultation.

Mescalero Apache Tribe: The Mescalero Apach Reservation lays between two Ranger Districts of the Licoln NF. The Mexican Spotted Owl Management Plan for the Mescalero Apache Reservation was adopted and approved by the Mescalero Apache Tribal Council in August 2000. The Mescalero management plan for the owl provides for maintenance and/or improvement of essential habitat features and manages for the long-term conservation of the species on their lands. Specific guidelines are provided concerning forest management, livestock grazing, and recreation that are designed to maintain current owl populations while allowing levels of resource outputs that meet Tribal desires and provide for a healthy ecosystem. In addition, a number of tribal forest management practices and methods provide protection to the owl and promote forest biodiversity. These include, but are not limited to, retention of the hardwood component in all areas that are harvested; retention of all snags that are not hazardous to human life; protection of habitat on steep slopes; emphasis on uneven-aged silvicultural techniques; and provisions for special management areas such as riparian and reserve/wilderness areas.

Except for PAC size being smaller, the Mescalero Tribe's management plan generally follows the recommendations within the Recovery Plan. The following are used to protect and manage the owl on the Mescalero Tribal lands: (1) surveys to determine occupancy; (2) federal agency section 7 consultations for proposed projects; (3) establishment of 400-ac (162-ha) PACs around owl sites; (4) three levels of habitat management: protected areas, unoccupied project areas (which we consider restricted areas), and other forest and woodland types; (5) the establishment of 100-ac (40.5-ha) core areas around nest trees or roost groves where no trees are harvested; (6) no trees are harvested within a 250-ac (101-ha) area within PACs during the breeding season (March 1 through August 31); and (7) additional management guidelines are also incorporated, for example, addressing steep slopes, road building, and unevenaged silvicultural methods.

Jicarilla Apache Nation: The Jicarilla Apache Reservation is located in northern New Mexico, adjacent to the Carson and Santa Fe NFs. The Jicarilla Apache Reservation has developed a spotted owl conservation plan, approved by the Jicarilla Tribal Council. No resident owls have been detected to date on the Reservation, however, in the event resident owls are detected, the Tribe has proposed to designate a 1,000 acre (405 ha) management territory. Uneven-aged timber management will be allowed to continue in all but 100 acres (40 ha) of the territory. In the absence of confirmed resident owls, all mixed-conifer states that are 25 acres (10 ha) or greater will be treated as roosting or nesting sites with no timber harvest allowed. A seasonal restriction around any active site is also proposed.

CONCLUSION

After reviewing the current status of the Mexican Spotted Owl, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Mexican Spotted Owl, and is not likely to destroy or adversely modify designated critical habitat. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS finds that the continued implementation of the 11 National Forest's LRMPs is not likely to jeopardize the Mexican Spotted Owl for the following reasons:

- In 1996, the Forest Service amended all 11 National Forests LRMPs to incorporate the Recovery Plan for the Mexican Spotted Owl.
- The majority of the S&Gs within the 11 National Forest LRMPs directed the Forest Service to implement recovery plans for listed species.
- While results of non-randomly chosen studies have shown slight declines in owl populations, spotted owl life history strategy allows owls to reproduce when conditions are favorable and survive unfavorable periods with little or no reproduction (see above). In addition, these declines could be from temporal

variability likely relating to large-scale climatic patterns, which also are inherently variable in the range of the Mexican spotted owl.

- Much of the incidental take within the last 10 years has been take from harassment and not habitat alteration, which has been noted as the greatest threat to the Mexican Spotted Owl.
- Although recent fires (e.g., Dude, Rattlesnake, Rodeo-Chedeski, Bullock, and Aspen) have been uncharacteristically stand-replacing, resulting in loss mixed-conifer forests, some evidence appears to show that owls return to some of these areas after they have burned (see Bond et al. 2002 for example).

Although no long-term monitoring has been initiated pursuant to the owl Recovery Plan, it is the FWS's biological opinion that the proposed action will not jeopardize the continued existence of the Mexican Spotted Owl primarily because the Forest Service amended their LRMPs to include protective measures for the owl. Also, many additional protective measures exist within each National Forest's LRMPs.

Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Mexican Spotted Owl will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the Mexican Spotted Owl.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and

conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Mexican Spotted Owl is reasonably certain to occur as a result of the continued implementation of National Forest’s LRMPs. All take is expected to be in the forms of harm or harass. Harm occurs through direct habitat alterations and harassment occurs when owls are disturbed from their roost or nest sites. Incidental take from harassment will most likely be of limited extent and intensity, and therefore difficult to measure. Thus, anticipated level of take of this species is most appropriately quantified in terms of number or percent of PACs with disturbance and/or habitat alteration.

We anticipate that while the Forests are operating under the existing LRMPs, take is reasonably certain to occur within 5 percent of the total PACs in the form of harm and 5 percent of the total number PACs in the form of harassment (see Table 53 below) for a total of 10 percent as a result of the proposed action.

Table 53. Total number of PACs on National Forest System lands, number of PACs with associated take from previous biological opinions, and anticipated take from this biological opinion.

Recovery Unit	PACs on NFS Lands	PACs with Take From Previous Biological Opinions	Anticipated Take in the Form of Harm (PACs)	Anticipated Take in the Form of Harass (PACs)	Total
Colorado Plateau	22	1	1	1	2
Southern Rocky Mtns-NM	50	5	2	2	4
Upper Gila Mtns	624	131	31	31	62
Basin & Range-West	154	61	8	8	16
Basin & Range-East	139	45	7	7	14
Total	989	243	49	49	98

The incidental take that is anticipated is per recovery unit and is for a decade or the life of the current LRMPs, whichever comes first. Incidental take of owl PACs cannot exceed 75 percent of the decadal total in any one year. The FWS and Forest Service agree to review and evaluate

the actual incidental take anticipated for project-specific actions annually. Adjustments will only be made as the results of research and management experiments become available.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Mexican Spotted Owl. Because we estimate that the majority of the take anticipated above will not result in dead birds, this level of anticipated take will not jeopardize the continued existence of the Mexican Spotted Owl. The incidental take stated above will be reviewed and evaluated annually by the FWS and Forest Service.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Mexican Spotted Owl.

1. Protect Mexican Spotted Owls on National Forest System lands.
2. Protect Mexican Spotted Owl habitat on National Forest System lands.
3. Monitor Mexican Spotted Owl occupancy on National Forest System lands, pursuant to the most current approved Mexican Spotted Owl Recovery Plan.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering, Forestry and Forest Health, Fire Management, Lands and Minerals, Rangeland Management, Watershed Management, and Recreation programs to minimize or eliminate adverse effects to the Mexican Spotted Owl.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Forestry and Forest Health, Fire Management, Lands and Minerals, Rangeland Management, Watershed Management, and Recreation programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied Mexican Spotted Owl habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, the Mexican Spotted Owl Recovery Team, and on-going research efforts,

monitor Mexican Spotted Owl PAC occupancy pursuant to the most recent version of an approved Recovery Plan for this species. This monitoring scheme will assess changes in owl site occupancy rates so that management actions can be adjusted if changes in owl population occur.

- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Mexican Spotted Owls, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the Mexican Spotted Owl.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA allows federal agencies to utilize their authorities to further the purposes of the ACT by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Monitor fuels reduction and fire-risk abatement projects within owl PACs using systematic and standardized research designs to evaluate effects of fuels treatments on owls, their habitat, and important prey species.
2. Survey for Mexican Spotted Owls in areas where stand-replacing fire events have occurred because owls have been known occur to areas that have been “burned over”. This may include, but not limited to, occupancy rates and trend, owl reproduction, and/or fledgling success.
3. Continue to monitor large burns (e.g., Rodeo-Chediski Fire) for owl distribution and abundance.
4. Assess prey habitat dynamics and determine owl-prey relationships throughout the range of the Mexican Spotted Owl.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SOUTHWESTERN WILLOW FLYCATCHER

STATUS OF THE SPECIES

Description

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is one of 11 flycatchers in the genus *Empidonax* (Order Passeriformes, Family Tyrannidae) breeding in North America. Although the *Empidonax* flycatchers are notoriously difficult to distinguish by sight in the wild, each has unique morphological features, vocalizations, habitats, behaviors and/or other traits that allow biologists to distinguish them.

The Southwestern Willow Flycatcher is one of four subspecies of the willow flycatcher currently recognized (Hubbard 1987, Unitt 1987), though Browning (1993) posits a fifth subspecies (*E. t. campestris*) in the central and midwestern U.S. The willow flycatcher subspecies are distinguished primarily by subtle differences in color and morphology, and by habitat use. The southwestern subspecies *E. t. extimus* was described by Phillips (1948), and its taxonomic status has been accepted by most authors (Aldrich 1951, Bailey and Niedrach 1965, Behle and Higgins 1959, Hubbard 1987, Phillips et al. 1964, Oberholser 1974, Monson and Phillips 1981, Unitt 1987, Schlorff 1990, Browning 1993, U.S. Fish and Wildlife Service 1995). Recent research (Paxton 2000) concluded that *E. t. extimus* is genetically distinct from the other willow flycatcher subspecies.

Legal Status: The Southwestern Willow Flycatcher was listed on February 27, 1995, as endangered throughout its range in the U.S. This included Arizona, New Mexico, California, Colorado, Nevada, Texas, and Utah. The primary cause of the flycatcher's decline is loss and modification of habitat (see below). The FWS proposed critical habitat for the flycatcher on October 12, 2004.

Distribution and Abundance

The historical breeding range of the Southwestern Willow Flycatcher included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico (Hubbard 1987, Unitt 1987, Browning 1993). The flycatcher's current range is similar to the historical range, but the quantity of suitable habitat within that range is much reduced from historical levels. The flycatcher occurs from near sea level to over 8500 feet (2600 m), but is primarily found in lower elevation riparian habitats. Throughout its range, the flycatcher's distribution follows that of its riparian habitat; relatively small, isolated, widely dispersed locales in a vast arid region. Marshall (2000) found that 53 percent of Southwestern Willow Flycatchers were in just 10 sites (breeding groups) rangewide, while the other 47 percent were distributed among 99 small sites of ten or fewer territories. In some parts of its northern range, questions of range boundaries between other willow flycatcher subspecies exist, including possible intergradations between subspecies.

The historical range of the flycatcher in Arizona included portions of all major watersheds (Swarth 1914, Phillips 1948, Unitt 1987). Contemporary investigations (post-1990) show the flycatcher persists, probably in much reduced numbers, along the Big Sandy, Bill Williams, Colorado, Gila, Hassayampa, Little Colorado, Salt, San Francisco, San Pedro, Santa Cruz, Santa

Maria, Tonto Creek, and Verde river systems (Sferra et al. 1997, Sogge et al. 1997a, McKernan and Braden 1999, Paradzick et al. 1999, Tibbitts and Johnson 1999, Smith et al. 2002).

The historic breeding range of the flycatcher is considered to have been primarily from the Rio Grande Valley westward, including the Rio Grande, Chama, Zuni, San Francisco, and Gila watersheds (Bailey 1928, Ligon 1961, Hubbard 1987); breeding was unconfirmed in the San Juan and Pecos drainages (Hubbard 1987). Contemporary surveys documented that flycatchers persist in the Rio Grande, Chama, Zuni, San Francisco, and Gila watersheds and that small breeding populations also occur in the San Juan drainage and along Coyote Creek in the Canadian River drainage, but breeding remains unconfirmed in the Pecos watershed (Maynard 1995, Cooper 1996, Cooper 1997, Williams and Leal 1998). The Gila Valley was identified by Hubbard (1987) as a stronghold for the taxon, and recent surveys have confirmed that area contains one of the largest known flycatcher populations (Skaggs 1996, Stoleson and Finch 1999). The subspecific identity (*E. t. extimus*. vs. *E. t. adastus*) of willow flycatchers in northern New Mexico has been problematical (Hubbard 1987, Unitt 1987, Maynard 1995, Travis 1996), but recent genetic research supports affiliation with *E.t. extimus* (Paxton 2000).

When the Southwestern Willow Flycatcher was listed as endangered in 1995, approximately 350 territories were known to exist (Sogge et al. 2001). As of the 2001 breeding season, the minimum known number of Southwestern Willow Flycatchers was 986 territories. Though much suitable habitat remains to be surveyed, the rate of discovery of new nesting pairs has recently leveled off (Sogge et al. 2001). A coarse estimate is that an additional 200 to 300 nesting pairs may remain undiscovered, yielding an estimated total population of 1,200 to 1,300 pairs/territories. Unitt (1987) estimated that the total flycatcher population may be 500 to 1000 pairs; thus, nearly a decade of intense survey efforts have found little more than slightly above the upper end of Unitt's estimate. The surveys of the 1990s have been valuable in developing a rangewide population estimate, but cannot identify a rangewide trend over that period. However, some local trends may be evident, as discussed below.

Habitat

The flycatcher breeds in different types of dense riparian habitats, across a large elevational and geographic area. Although other willow flycatcher subspecies in cooler, less arid regions may breed more commonly in shrubby habitats away from water (McCabe 1991), the Southwestern Willow Flycatcher usually breeds in patchy to dense riparian habitats along streams or other wetlands, near or adjacent to surface water or underlain by saturated soil. Common tree and shrub species comprising nesting habitat include willows (*Salix* spp.), seepwillow (aka mulefat; *Baccharis* spp.), boxelder (*Acer negundo*), stinging nettle (*Urtica* spp.), blackberry (*Rubus* spp.), cottonwood (*Populus* spp.), arrowweed (*Tessaria sericea*), tamarisk (aka saltcedar; *Tamarix ramosissima*), and Russian olive (*Eleagnus angustifolia*) (Grinnell and Miller 1944, Phillips et al. 1964, Hubbard 1987, Whitfield 1990, Brown and Trosset 1989, Brown 1991, Sogge et al. 1993, Muiznieks et al. 1994, Maynard 1995, Cooper 1996, Skaggs 1996, Cooper 1997, McKernan and Braden 1998, Stoleson and Finch 1999, Paradzick et al. 1999). Habitat characteristics such as plant species composition, size and shape of habitat patch, canopy structure, vegetation height, and vegetation density vary across the subspecies' range. However, general unifying characteristics of flycatcher habitat can be identified. Regardless of the plant species composition or height, occupied sites usually consist of dense vegetation in the patch

interior, or an aggregate of dense patches interspersed with openings. In most cases this dense vegetation occurs within the first 10-13 feet (3-4 m) above ground. These dense patches are often interspersed with small openings, open water, or shorter/sparser vegetation, creating a mosaic that is not uniformly dense. In almost all cases, slow-moving or still surface water and/or saturated soil is present at or near breeding sites during wet or non-drought years.

Thickets of trees and shrubs used for nesting range in height from 6 to 98 feet (2 to 30 m). Lower-stature thickets (6-13 feet or 2-4 m) tend to be found at higher elevation sites, with tall stature habitats at middle and lower elevation riparian forests. Nest sites typically have dense foliage from the ground level up to approximately 13 feet (4 m) above ground, although dense foliage may exist only at the shrub level, or as a low dense canopy. Nest sites typically have a dense canopy, but nests may be placed in a tree at the edge of a habitat patch, with sparse canopy overhead. The diversity of nest site plant species may be low (e.g., monocultures of willow or tamarisk) or comparatively high. Native, non-native, and exotic plants are discussed below.

Occupied sites dominated by native plants vary from single-species, single-layer patches to multi-species, multi-layered strata with complex canopy and subcanopy structure. Site characteristics differ substantially with elevation. Low to mid-elevation sites range from single plant species to mixtures of native broadleaf trees and shrubs including willows, cottonwood, boxelder, ash (*Fraxinus* sp.), alder (*Alnus* sp.), blackberry, and nettle. Average canopy height can be as short as 13 ft (4 m) or as high as 98 feet (30 m). High-elevation nest sites dominated by native plants are more similar to each other than low elevation native sites. Most known high elevation (6,230 feet or >1,900 m) breeding sites are comprised completely of native trees and shrubs, and are dominated by a single species of willow, such as coyote willow (*Salix exigua*) or Geyer's willow (*S. geyeriana*). However, Russian olive is a major habitat component at some high elevation breeding sites in New Mexico. Average canopy height is generally only 10-23 feet (3 to 7 m). Patch structure is characterized by a single vegetative layer with no distinct overstory or understory. There is usually dense branch and twig structure in the lower 6.5 ft (2 m), with high live foliage density from the ground to the canopy. Tree and shrub vegetation is often associated with sedges, rushes, nettles and other herbaceous wetland plants. These willow patches are usually found in mountain meadows, and are often associated with stretches of stream or river that include beaver dams and pooled water.

Southwestern Willow Flycatchers also breed in sites comprised of dense mixtures of native trees and shrubs mixed with exotic/introduced species such as tamarisk or Russian olive. The exotics are often primarily in the understory, but may be a component of the overstory. At several sites, tamarisk provides a dense understory below an upper canopy of gallery willows or cottonwoods, forming a habitat that is structurally similar to the cottonwood-willow habitats in which flycatchers historically nested. A particular site may be dominated primarily by natives or exotics, or be a more-or-less equal mixture. The native and exotic components may be dispersed throughout the habitat or concentrated in distinct, separate clumps within a larger matrix. Generally, these habitats are found below 3,940 feet (1,200 m) elevation.

Southwestern Willow Flycatchers also nest in some riparian habitats dominated by exotics, primarily tamarisk and Russian olive. Most such exotic habitats range below 3,940 ft (1,200 m) elevation, and are nearly monotypic, dense stands of tamarisk or Russian olive that form a

nearly continuous, closed canopy with no distinct overstory layer. Canopy height generally averages 16 - 33 feet (5 to 10 m), with canopy density uniformly high. The lower 6.5 feet (2 m) of vegetation is often comprised of dense, often dead, branches. However, live foliage density may be relatively low from 6.5 feet (0 to 2 m) above ground, but increases higher in the canopy. The flycatcher does not nest in all of the exotic species that can dominate riparian systems. For example, flycatchers rarely use giant reed (*Arundo donax*) and are not known to use tree of heaven (*Ailanthus altissima*).

Forty-seven percent of willow flycatcher territories occur in mixed native/exotic habitat (> 10% exotic) and twenty-five percent are at sites where tamarisk is dominant (Sogge et al. 2000). Flycatchers nest in tamarisk at many river sites, and in many cases, use tamarisk even if native willows are present (Sferra et al. 2000). Southwestern Willow Flycatchers nest in tamarisk at sites along the Colorado, Verde, Gila, San Pedro, Salt, Bill Williams, Santa Maria, and Big Sandy rivers in Arizona (McCarthy et al. 1998), Tonto Creek in Arizona (McCarthy et al. 1998), the Rio Grande and Gila rivers in New Mexico (Hubbard 1987, Maynard 1995, Cooper 1995), and the San Dieguito, lower San Luis Rey, and Sweetwater rivers in California, Meadow Valley Wash, and Virgin River in Nevada (McKernan and Braden 1999, U.S. Fish and Wildlife Service 2002). Rangewide, 86 percent of nests were in tamarisk in mixed and exotic habitats. In Arizona, 93 percent of the 758 nests documented from 1993 - 1999 in mixed and exotic habitats were in tamarisk. This distribution is similar on an annual basis in Arizona, where in 1999, 92 percent of the 303 nests in mixed and exotic habitats were in tamarisk (Paradzick et al. 2000). In addition to the tamarisk, three other exotics have been used as nesting substrates. Two nests were documented in giant reed in California, 26 nests were documented in Russian olive and one nest was documented in Siberian elm (*Ulmus pumila*) in New Mexico (Stoleson and Finch, Forest Service, unpubl. data).

Habitat Definitions

The definition of the two commonly used terms - "suitable habitat" and "potentially suitable habitat" are important for managers to understand for the recovery of the flycatcher. These terms encompass all the habitat components thought to influence reproductive success, including foraging habitat, micro-climate, vegetation density and distribution throughout the home range, presence of water, patch size, presence of other Southwestern Willow Flycatchers, or other factors as they become identified.

Suitable habitat is defined as a riparian area with all the components needed to provide conditions suitable for breeding flycatchers. These conditions are generally dense, mesic riparian shrub and tree communities 0.1 ha or greater in size within floodplains large enough to accommodate riparian patches at least 10 m wide (measured perpendicular to the channel). Currently, this definition of suitability is based solely on habitat characteristics, not on measures of flycatcher productivity or survival. Suitable habitat may be occupied or unoccupied; any habitat in which flycatchers are found breeding is, by definition, suitable. Occupied suitable habitat is that in which flycatchers are currently breeding or have established territories. Unoccupied suitable habitat appears to have physical, hydrological, and vegetation characteristics within the range of those found at occupied sites, but does not currently support breeding or territorial flycatchers. Some sites that appear suitable may be unoccupied because they may be missing an important habitat component not yet characterized. Other sites are

currently suitable but unoccupied because the Southwestern Willow Flycatcher population is currently small and spatially fragmented, and flycatchers have not yet colonized every patch where suitable habitat has developed.

Potentially suitable habitat (hereafter “potential habitat”) is defined as a riparian system that does not currently have all the components needed to provide conditions suitable for nesting flycatchers (as described above), but which could - if managed appropriately – develop these components over time. Regenerating potential habitats are those areas that are degraded or in early successional stages, but have the correct hydrological and ecological setting to become, under appropriate management, suitable flycatcher habitat. Restorable potential habitats are those areas that could have the appropriate hydrological and ecological characteristics to develop into suitable habitat if not for one or more major stressors, and which may require active abatement of stressors in order to become suitable. Potential habitat occurs where the flood plain conditions, sediment characteristics, and hydrological setting provide potential for development of dense riparian vegetation. Stressors that may be preventing regenerating and restorable habitats from becoming suitable include, but are not limited to, de-watering from surface diversion or groundwater extraction, channelization, mowing, recreational activities, improper livestock grazing, grazing of native ungulates, exotic vegetation, and fire.

Specifying locations where nesting habitat is or could develop for flycatchers should not be confused with the overall management goal of rehabilitating and/or improving entire watersheds for Southwestern Willow Flycatcher recovery. The health of riparian ecosystems and the development, maintenance, and regeneration of flycatcher nesting habitat depends on appropriate management of uplands, headwaters, and tributaries, as well as the main stem river reaches. All of these landscape components are inter-related. As a result, nesting habitat is only a small portion of the larger landscape that needs to be considered when developing management plans, recovery actions, biological assessments for section 7 consultations with the FWS, or other documents defining management areas or goals for flycatcher recovery.

The Importance of Unoccupied Suitable Habitat and Potentially Suitable Habitat

Because riparian vegetation typically occurs in flood plain areas that are prone to periodic disturbance, suitable habitats will be ephemeral and their distribution dynamic in nature. Suitable habitat patches may become unsuitable through maturation or disturbance (though this may be only temporary, and patches may cycle back into suitability). Therefore, it is not realistic to assume that any given suitable habitat patch (occupied or unoccupied) will remain continually occupied and/or suitable over the long-term. Unoccupied suitable habitat will therefore play a vital role in the recovery of the flycatcher, because it will provide suitable areas for breeding flycatchers to: (a) colonize as the population expands (numerically and geographically), and (b) move to following loss or degradation of existing breeding sites. Indeed, many sites will likely pass through a stage of being suitable but unoccupied before they become occupied. Potential habitats that are not currently suitable will also be essential for flycatcher recovery, because they are the areas from which new suitable habitat develops as existing suitable sites are lost or degraded; in a dynamic riparian system, all suitable habitat starts as potential habitat. Furthermore, potential habitats are the areas where changes in management practices are most likely to create suitable habitat. Not only must suitable habitat always be present for long-term survival of the flycatcher, but additional acreage of suitable habitat must develop to achieve full

recovery. Therefore, habitat management for recovery of the flycatcher must include developing and/or maintaining a matrix of riparian patches - some suitable and some potential - within a watershed so that sufficient suitable habitat will be available at any given time.

Critical Habitat: Critical habitat had been previously designated on July 22, 1997. However, that designation was vacated by the 10th Circuit Court of Appeals, citing a faulty economic analysis. Under court order, critical habitat for this species was re-proposed on October 12, 2004. The specific biological and physical features, otherwise referred to as the PCEs, essential to the conservation of the Southwestern Willow Flycatcher are as follows pursuant to our October 12, 2004, proposed rule:

1. Nesting habitat with trees and shrubs that include, but are not limited to, willow species and boxelder;
2. Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 m to 30 m (6 to 98 ft) with lower-stature thickets of (2-4 m or 6-13 ft tall) found at higher elevation riparian forests and tall-stature thickets at found at middle-and lower-elevation riparian forests;
3. Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 ft) above ground or dense foliage only at the shrub level, or as a low, dense tree canopy;
4. Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e. a tree or shrub canopy with densities ranging from 50 percent to 100 percent);
5. Dense patches of riparian forests that are interspersed with small openings of open water or marsh or shorter/sparser vegetation, that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 ha (0.25 ac) or as large as 70 ha (175 ac); and
6. A variety of insect prey populations, including but not limited to, wasps and bees (Hymenoptera); flies (Diptera); beetles (Coleoptera); butterflies/moths and caterpillars (Lepidoptera); and spittlebugs (Homoptera).

Life History

Southwestern Willow Flycatchers spend only three to four months on their breeding grounds, typical of Neotropical migrants. The remainder of the year is spent on migration and in wintering areas south of the U.S. Southwestern Willow Flycatchers typically arrive on breeding grounds between early May and early June, although a few individuals may establish territories in very late April (Willard 1912, Ligon 1961, Maynard 1995, Skaggs 1996, Sferra et al. 1997). Because arrival dates vary geographically and annually, northbound migrant willow flycatchers (of all subspecies) pass through areas where *E.t. extimus* have already begun nesting. Similarly, southbound migrants (of all subspecies) in late July and August may occur where Southwestern Willow Flycatchers are still breeding (Unitt 1987). Therefore, it is only during a short period of

the breeding season (approximately 15 June through 20 July) that one can assume that a willow flycatcher seen within *E.t. extimus* range is probably of that subspecies.

Southwestern Willow Flycatchers are strongly territorial. Flycatcher territories are often clumped together, rather than spread evenly throughout a habitat patch. This has led some authors to label willow flycatchers as “semi-colonial” (McCabe 1991), although they do not fit the strict definition of a colonial species and regularly breed at sites with only one or a few pairs (Sferra et al. 1997, Sogge et al. 1997a and 1997b, Paradzick et al. 1999). Territory size varies greatly, probably due to differences in population density, habitat quality, and nesting stage. Estimated breeding territory sizes generally range from approximately 0.25-5.7 acres (0.1 ha to 2.3 ha), with most in the range of approximately 0.5-1.2 acres (0.2 - 0.5 ha) (Sogge 1995, Whitfield and Enos 1996, Skaggs 1996, Sogge et al. 1997b).

Evidence gathered during multi-year studies of color-banded populations shows that although most Southwestern Willow Flycatchers return to former breeding areas, flycatchers regularly move among sites within and between years (Netter et al. 1998).

The willow flycatcher is an insectivore. It catches insects while flying, hovers to glean them from foliage, and occasionally captures insects on the ground. Flycatchers forage within and above the canopy, along the patch edge, in openings within the territory, above water, and glean from tall trees as well as herbaceous ground cover (Bent 1960, McCabe 1991).

All North American *Empidonax* flycatchers appear to have generally similar diets during the breeding season, consisting of small to medium-sized insects (Beal 1912). The willow flycatcher is somewhat of a generalist. Wasps and bees (Hymenoptera) are common food items, as are flies (Diptera), beetles (Coleoptera), butterflies/moths and caterpillars (Lepidoptera), and spittlebugs (Homoptera) (Beal 1912, McCabe 1991). Plant foods such as small fruits have been reported (Beal 1912, Roberts 1932, Imhof 1962), but are not a significant food during the breeding season (McCabe 1991). Diet studies of adult Southwestern Willow Flycatchers (Drost et al. 1997, DeLay et al. 1999) found a wide range of prey taken. Major prey items were small (flying ants) to large (dragonflies) flying insects, with Hymenoptera, Diptera and Hemiptera (true bugs) comprising half of the prey items. Willow flycatchers also took non-flying species, particularly Lepidoptera larvae.

Population Dynamics

The total number of southwestern willow flycatchers is small, with an estimated 1100-1200 territories rangewide. These territories are distributed in a large number of very small breeding groups, and only a small number of relatively large breeding groups. These isolated breeding groups are vulnerable to local extirpation from floods, fire, severe weather, disease, and shifts in birth/death rates and sex ratios. Marshall and Stoleson (2000) noted that even moderate variation in stochastic factors that might be sustained by larger populations can reduce a small population below a threshold level from which it cannot recover. The persistence of small populations depends in part on immigration from nearby populations, at least in some years (Stacey and Taper 1992). The small, isolated nature of current southwestern willow flycatcher populations exacerbates the risk of local extirpation by reducing the likelihood of immigration among populations.” The vulnerability of the few relatively large populations makes the above threats

particularly acute. In recent years, several of the few larger populations have been impacted by fire (San Pedro River) and inundation by impounded water (Lake Mead, Lake Isabella). Also, the flycatcher appears to be a quasi-colonial species (McCabe 1991). At its few large breeding sites, many territories are often packed into relatively small areas, with significant levels of polygyny, extra-pair copulation, and pair re-shuffling (Paxton et al. 1997, Netter et al. 1998, Paradzick et al. 1999). These may be significant factors in maintaining genetic interchange. The presence of a threshold “colony size” may be an important catalyst for successful breeding sites to function.

The Recovery Plan for the flycatcher estimated population persistence over time within an existing network of occupied willow flycatcher sites through an incidence function analysis (Hanski 1994, Lamberson et al. 2000). Results of the model predicted that the greatest stability occurred when flycatcher sites have 10 - 25 territories. Once a threshold of about 25 territories/site is reached, the benefit of increasing the number of birds diminishes. Instead, metapopulation persistence (stability) is more likely to increase by adding more sites rather than adding more territories to existing sites. In addition to maximizing the colonization potential of sites within the metapopulations, this risk-spreading strategy reduces the likelihood that catastrophic events (e.g. fire, flood, disease) will negatively impact all sites. The goal of the Recovery Plan is to assure long-term persistence of the species throughout its range, rather than maximize the number of birds or achieve historical pre-European settlement population levels.

Reasons for Listing

The reasons for the decline of the Southwestern Willow Flycatcher and current threats it faces are numerous, complex, and inter-related. The primary cause of the flycatcher’s decline is loss and modification of habitat. Its riparian nesting habitat tends to be uncommon, isolated, and widely dispersed. Historically, these habitats have always been dynamic and unstable in place and time, due to natural disturbance and regeneration events such as floods, fire, and drought. With increasing human populations and the related industrial, agricultural, and urban developments, these habitats have been modified, reduced, and destroyed by various mechanisms.

Threats: Riparian ecosystems have declined from reductions in water flow, interruptions in natural hydrological events and cycles, physical modifications to streams, modification of native plant communities by invasion of exotic species, and direct removal of riparian vegetation. Wintering habitat has also been lost and modified for this and other Neotropical migratory birds (Finch 1991, Sherry and Holmes 1993). The major mechanisms resulting in loss and modification of habitat involve water management and land use practices, and are discussed below.

Most of the major and many of the minor southwestern streams that likely supported Southwestern Willow Flycatcher habitat are now dammed. Operation of dams modifies, reduces, destroys, or increases riparian habitats both downstream and upstream of the dam site. Below dams, natural hydrological cycles are modified. Maximum and minimum flow events both can be altered. Flood flows are reduced in size and frequency below many dams. Base flows can be increased or decreased depending on how the dam is operated. High flows are often reduced or shifted from that of the natural hydrograph below dams managed for downstream water supply. Daily water fluctuations can be very high below dams operated for

hydroelectric power. The more or less annual cycle of base flow punctuated by short-duration floods is lost. In so doing, dams inhibit the natural cycles of flood-induced sediment deposition, floodplain hydration and flushing, and timing of seed dispersal necessary for establishment and maintenance of native riparian habitats. Lack of flooding also allows a buildup of debris, resulting in less substrate available for seed germination, and increasing the frequency of fires.

Surface water diversions and groundwater pumping for agricultural, industrial, and municipal uses are major factors in the deterioration of Southwestern Willow Flycatcher habitats (Briggs 1996).

Southwestern riparian ecosystems have also been modified through physical manipulation of stream courses. Channelization, bank stabilization, levees, and other forms of flow controls are carried out chiefly for flood control. These engineering activities affect riparian systems by separating a stream from its floodplain. These control structures prevent overbank flooding, reduce the extent of alluvial-influenced floodplain, reduce water tables adjacent to streams, increase stream velocity; increase the intensity of extreme floods, and generally reduce the volume and width of wooded riparian habitats (Szaro 1989, Poff et al. 1997).

In some areas riparian vegetation is removed from streams, canals, and irrigation ditches to increase watershed yield, remove impediments to streamflow, and limit water loss through evapotranspiration (U.S. Fish and Wildlife Service 2002). Methods include mowing, cutting, root plowing, and application of herbicides and other chemicals. The results are that riparian habitat is eliminated or maintained at very early successional stages not suitable as breeding habitat for willow flycatchers (Taylor and Littlefield 1986). Clearing or mowing habitat can also result in establishment of exotic plants species, which can further reduce suitability.

Improper livestock grazing has been a significant factor in the modification and loss of riparian habitats in the arid western U.S. (U.S. Forest Service 1979, Rickard and Cushing 1982, Cannon and Knopf 1984, Klebenow and Oakleaf 1984, General Accounting Office 1988, Clary and Webster 1989, Schultz and Leininger 1990, Belsky et al. 1999). If not properly managed, livestock grazing can significantly alter plant community structure, species composition, relative abundance of species, and alter stream channel morphology. The primary mechanism of effect is by livestock feeding in and on riparian habitats. Overutilization of riparian vegetation by livestock also can reduce the overall density of vegetation, which is a primary attribute of Southwestern Willow Flycatcher breeding habitat. Palatable broadleaf plants like willows and cottonwood saplings may also be preferred by livestock, as are grasses and forbs comprising the understory, depending on season and the availability of upland forage. Livestock may also physically contact and destroy nests. This impact is documented for nests of *E.t. brewsteri* in California (Stafford and Valentine 1985, Valentine et al. 1988). Southwestern Willow Flycatcher nests in low-stature habitats could be vulnerable to this impact, e.g., nests in *Salix geyeriana* at higher elevation near Greer, AZ. Livestock also physically degrade nesting habitat by trampling and seeking shade and by creating trails that nest predators and people may use. Furthermore, improper livestock grazing in watershed uplands above riparian systems can cause bank destabilization, increased runoff, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. Because the impact of herbivory can be highly variable both geographically and temporally, proper grazing management strategies must be developed locally.

In the warm, arid Southwest, recreation is often concentrated in riparian areas because of the shade, water, aesthetic values, and opportunities for fishing, boating, swimming, and other activities. As regional human populations grow, the magnitude and cumulative effects of these activities is considerable. Effects include: reduction in vegetation through trampling, clearing, woodcutting and prevention of seedling germination due to soil compaction; bank erosion; increased incidence of fire; promoting invasion by exotic plant species; promoting increases in predators and scavengers due to food scraps and garbage (ravens, jays, grackles, skunks, squirrels, domestic cats, etc.); promoting increases in brood-parasitic cowbirds; and noise disturbance. Recreational development also tends to promote an increased need for foot and vehicle access, roads, pavement, trails, boating, and structures which fragment habitat (i.e., verandas, picnic areas, etc.). Effects of these activities on Southwestern Willow Flycatchers certainly vary with different situations. Reductions in density and diversity of bird communities, including willow flycatchers (*E. t. adastus*), has been associated with recreational activities (Aitchison 1977, Blakesley and Reese 1988, Szaro 1980, Taylor 1986, Riffell et al. 1996).

Fire is an imminent threat to occupied and potential Southwestern Willow Flycatcher breeding habitat. Although fires occurred to some extent in some of these habitats historically, many native riparian plants are neither fire-adapted nor fire-regenerated. Thus, fires in riparian habitats are typically catastrophic, causing immediate and drastic changes in riparian plant density and species composition. Busch (1995) documented that the current frequency and size of fires in riparian habitats on two regulated rivers (Colorado and Bill Williams) is greater than historical levels because reduced floods have allowed buildup of fuels, and because of the expansion and dominance of the highly-flammable tamarisk. Tamarisk and arrowweed (*Tessaria sericea*) recover more rapidly from fire than do cottonwood and willow. In recent years riparian wildfires destroyed occupied Southwestern Willow Flycatcher sites on the Rio Grande in New Mexico, the San Pedro and Gila rivers in Arizona, and in the Escalante Wildlife Area in Colorado.

Conservation Measures

One of the most significant accomplishments for the Southwestern Willow Flycatcher has been the removal of livestock from occupied habitat. Some of the suitable unoccupied and potential habitat have also been excluded from livestock activities. The Forest Service estimates that approximately 500 acres have been fenced. Some recreational impacts have been addressed on the Carson, Coconino, and the Gila NFs. Some Forests also participated in cowbird trapping activities in conjunction with the state fish and game departments.

The Apache-Sitgreaves NF has conducted cowbird trapping at occupied sites. All occupied sites are closed to livestock grazing. In addition, the Apache-Sitgreaves NF has conducted riparian restoration and fencing at Nelson Reservoir along Nutrioso Creek specifically to improve habitat for Southwestern Willow Flycatchers. The Carson NF has excluded livestock from the Rio Grande Rancho flycatcher site since 1990. The Coconino NF has conducted cowbird trapping and has also conducted a cowbird movement study. Riparian exclosures have been constructed along 2.65 miles (4.26 km) of stream and exclude approximately 570 acres (230 ha) from livestock grazing. The Gila NF has excluded livestock grazing from large portion of the San Francisco and Gila Rivers to improve riparian function. The National Forest has also developed

wetlands at the Gila River Bird Area. The Gila River Bird Area is also excluded from livestock grazing except for occasional trailing during rotations. The Gila River Bird Area is also closed to OHV use. The Tonto NF has excluded grazing from approximately 15 miles (24 km) of Tonto Creek. A seasonal employee is hired annually to patrol the area around Roosevelt Lake. The National Forest conducted cowbird trapping at most occupied flycatcher sites from 1995, and cooperates with the Salt River Project to implement mitigations from the Salt River Project Habitat Conservation Plan.

The majority of the National Forests in Arizona conduct flycatcher surveys for project related and non-project related purposes. For example, the Tonto has conducted numerous annual boating trips down the Verde River in order to survey for flycatchers.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The Southwestern Willow Flycatcher is currently found nesting on four National Forests that include: the Apache-Sitgreaves and Tonto in Arizona, and Carson and Gila in New Mexico (see Table 54 below). However, it is likely that Southwestern Willow Flycatchers use major river drainages on many National Forest System lands during spring and fall migration. On the Tonto NF, Southwestern Willow Flycatchers nest at Roosevelt Lake at the confluence of the Upper Salt River, on Tonto Creek, and on the Verde River at, below, and above Horseshoe Lake. On the Apache-Sitgreaves NF, Southwestern Willow Flycatchers nest at two sites near Greer, Arizona (Little Colorado River), and at one site near Alpine, Arizona (San Francisco River headwaters). Southwestern Willow Flycatchers have likely used areas on the Prescott NF, nesting directly adjacent to an isolated piece of Forest Service land in Camp Verde. On the Gila NF, Southwestern Willow Flycatchers nest on National Forest System lands along the Gila River at the Gila Bird Area and Fort West Ditch. On the Carson NF, Southwestern Willow Flycatchers nest at Rio Grande del Rancho. Migrant Southwestern Willow Flycatcher habitat is not well understood, but has been recorded on major southwestern river drainages. Migrant birds have been detected in riparian habitat suitable and unsuitable for nesting and may occur in non-riparian areas. Such migration stopover areas are critically important resources affecting productivity and survival (U.S. Fish and Wildlife Service 2002:Appendix E, page 3).

Table 54. Number of Southwestern Willow Flycatcher territories on five National Forests (M. Sogge, USGS, 2003, unpubl. data).

NF	Tonto	Tonto	Gila	Apache-Sitgreaves	Apache-Sitgreaves	Cibola	Carson
Area	Roosevelt	Verde	Upper Gila	San Francisco	Little Colorado	Middle Rio Grande	Upper Rio Grande
Year							
1993	5	1	0	5	5	0	5
1994	33		0	5	5	1	3
1995	21		0	4	9	0	
1996	39		0	3	11	0	2
1997	39	2	5	2	7	0	
1998	48	0	8	3	7	0	2
1999	76	0	8	3	5	0	3
2000	115	0	5	2	3	0	4
2001	140	0	4	1	2	0	4
3 year avg.	110	0	6	2	3	0	4

The abundance and distribution of nesting Southwestern Willow Flycatchers across three National Forests in New Mexico and Arizona should be viewed as dynamic (U.S. Fish and Wildlife Service 2002). Through coordinated Southwestern Willow Flycatcher surveys we are still attempting to assess its distribution and abundance, and habitat is changing conditions throughout the National Forests where Southwestern Willow Flycatcher currently. Because riparian vegetation typically occurs in flood plain areas that are prone to periodic natural disturbance, suitable habitats will be ephemeral and their distribution dynamic in nature. Therefore, according to the biological assessment (U.S. Forest Service 2004) it is not realistic to assume that any given suitable habitat patch (occupied or unoccupied) will remain continually occupied and/or suitable over the long-term (see Status of Species above). Unoccupied suitable habitat will therefore play a vital role in the recovery of the Southwestern Willow Flycatcher, because it will provide suitable breeding areas for flycatchers to colonize as populations expands (numerically and geographically), and move to following loss or degradation of existing breeding sites. Indeed, many sites will likely pass through a stage of being suitable but unoccupied before they become occupied. Potential habitats that are not currently suitable will also be essential for Southwestern Willow Flycatcher recovery, because they are the areas from which new suitable habitat develops as existing suitable sites are lost or degraded; in a dynamic riparian system, all suitable habitat starts as potential habitat (U.S. Fish and Wildlife Service 2002).

Factors Affecting the Species within the Action Area

All of Arizona’s major rivers and their tributaries where Southwestern Willow Flycatchers were known to have bred have changed, often dramatically (Tellman et al. 1997). Rivers such as the

Colorado, Gila, Santa Cruz, San Pedro, and Verde rivers have suffered extensive dewatering, and loss and fragmentation of riparian habitats. Consequently, many areas where the flycatcher was formerly locally abundant now support few or none. Following are just a few examples. The flycatcher was once abundant near the confluence of the Gila and Colorado rivers, but is now rare (McKernan and Braden 1999 and 2001, Paradzick et al. 1999 and 2000). The Verde Valley once hosted large amounts of dense, mesic riparian habitats in which flycatchers bred (Swarth 1914). Conversion to agriculture and phreatophyte control programs dramatically reduced riparian vegetation, and fewer than 10 flycatcher territories persist on the Verde River (Paradzick et al. 1999). Two riparian areas continue to support substantial numbers of flycatchers. Over 150 flycatcher territories have been found along the lower San Pedro River and nearby portions of the Gila River (BOR, 2003, unpubl. data), where flycatchers have been known since the early 1900s (Willard 1912, Phillips 1948). Riparian habitat at the Tonto Creek and Salt River inflows to Roosevelt Lake hosts approximately 140 territories (Smith et al. 2002); these habitats probably developed only recently and are subject to inundation and possible destruction when reservoir levels are raised. The largest breeding population (21 territories) currently known along the lower Colorado River is found at Topock Marsh (McKernan and Braden 2002).

Roosevelt Lake is considered within the action area. The FWS's biological opinion on the operation of the modified Roosevelt Dam, dated July 23, 1996, directed the Bureau of Reclamation to implement a Reasonable and Prudent Alternative that would allow the use of the newly developed water conservation space within the reservoir. The Reasonable and Prudent Alternative directed Bureau of Reclamation to: 1) acquire occupied willow flycatcher habitat on the lower San Pedro River, now owned and managed by The Nature Conservancy as the San Pedro River Preserve; 2) establish a \$1.25 million Management Fund to conduct management activities that benefit the willow flycatcher through habitat acquisition, fencing, restoration, cowbird trapping, and other projects; 3) create a Southwestern Willow Flycatcher Conservation Coordinator position to assist the FWS in initiating recovery and conservation planning, and to implement activities required by the biological opinion; 4) implement a 10-year program of willow flycatcher research and monitoring at Roosevelt Lake and the lower San Pedro River; 5) implement a cowbird trapping program on the lower San Pedro River; and, 6) fund a variety of research and monitoring programs range-wide (U.S. Fish and Wildlife Service 1996).

In addition to the above, the Salt River Project's incidental take permit, Environmental Impact Statement and Roosevelt Lake Habitat Conservation Plan (HCP) for the continued operation of the reservoir was finalized in 2001. The goals of the Roosevelt HCP are to "minimize and mitigate incidental take (due to continued operation of Roosevelt Lake) of flycatchers, Yuma clapper rails, bald eagles, and cuckoos, to the maximum extent practicable, and to not appreciably reduce the likelihood of survival and recovery...in the wild." If the Roosevelt HCP is approved, the Salt River Project commits to implementing the following measures for the southwestern willow flycatcher in Gila and Maricopa counties, Arizona: (1) creating and managing riparian habitat at Roosevelt Lake; (2) acquiring and managing riparian habitat in several basins in central Arizona to provide a diversity of geographic locations; and, (3) focusing acquisition of riparian land in locations that birds are expected to occupy (i.e., in proximity to existing populations of flycatchers). This commitment will entail protection in perpetuity of a minimum of 1,500 acres of riparian habitat either on-site or near-site of Roosevelt reservoir, as

well as 750 acres of riparian habitat management, water rights acquisition, and/or providing of benefits.

Within New Mexico, along the San Francisco River, habitat degradation likely lead to the loss of breeding flycatchers in the vicinity of Glenwood. The large population along the Gila River reported by and Montgomery et al. (1985), and identified by Hubbard (1987) as a stronghold remains one of the largest known Southwestern Willow Flycatcher population rangewide (Skaggs 1996, Stoleson and Finch 1999, Sogge et al. 2001).

EFFECTS OF THE ACTION

As stated above, National Forests that have occurrences of Southwestern Willow Flycatchers include the Apache-Sitgreaves, Carson, Gila, and Tonto NFs. Proposed critical habitat units for the flycatcher occur on the following Forests: Apache-Sitgreaves, Carson, Cibola, Coconino, Gila, Prescott, Santa Fe, and Tonto NFs. Table 55 displays all the S&Gs analyzed for the flycatcher.

Table 55. Summary of S&Gs considered for the Southwestern Willow Flycatcher.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4-10, 12, 14, 16-21, 26, 28, 31-33, 37-40, 42-53, 55, 58-63, 84, 97-99, 104, 106-13, 115-16, 120-25, 130, 132-40, 144, 149, 150-51, 155-58, 160-163, 165-66, 171-72, 177-80
Carson	181-87, 189, 190-95, 197-99, 203, 206, 208-17, 219-24, 227-28, 229-34, 236-37, 240-47, 249-52, 255, 257, 259, 261, 283-85, 297, 298-303, 310
Gila	841-42, 844-51, 854, 857-76, 878, 880-81, 909-10, 912-17, 921-928, 930, 932-33, 935, 940h-s, 957h,
Tonto	1341-42, 1344-45, 1348-50, 1353-57, 1359, 1361-65, 1367-68, 1371, 1371a-j, 1372-75, 1376, 1381, 1384b, 1385, 1404, 1418c, 1419-22, 1422a, 1423, 1423c-e,
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-41, 1445, 1449, 1453-56, 1458-59, 1461-65, 1468, 1473-74, 1476-77, 1479, 1486-92, 1495, 1501, 1508-15

Apache-Sitgreaves National Forest

The Apache-Sitgreaves NF’s LRMP had no lethal S&Gs according to our rankings system (see Table 55 below). However, one S&G was found to have sublethal effects and four were found to cause negative behavioral responses. However, the majority (67 percent) of the S&Gs were ranked positive (i.e., as maintaining habitat or providing minimal recovery). Further, several were ranked as moving towards recovery or implementing recovery plans for listed species. The FWS did, however, rank 15 S&Gs that could not be interpreted; in other words, depending upon how they are implemented, could either have a negative or positive response by the species.

Table 55. Effects of the S&Gs analyzed for the Southwestern Willow Flycatcher – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	1.0
-1	S&G is causing negative behavioral response	4	4.2
0	S&G is ill-defined and/or open to interpretation	15	15.6
1	S&G is maintaining habitat & providing at least minimal recovery	65	67.7
2	S&G is moving towards recovery	3	3.1
3	S&G is implementing species recovery plan	1	1.0
Y	S&G has no application to the species	1	1.0
Z	S&G implementation is non-discretionary	2	2.1
X	S&G is a heading	4	4.2
Total		96	100 %

Lands and Minerals Program

Standard and Guideline 52 allows the Forest Service to, “Limit use of herbicides, insecticides, rodenticides, or other chemical agents as part of management activities to times and places where possible transport to or by surface or groundwater has a low probability of occurrence. Limit the use of certain facilities in floodplains to non-flood seasons or daylight hours only.” Major prey items were small (flying ants) to large (dragonflies) flying insects, with Hymenoptera, Diptera and Hemiptera (true bugs) comprising half of the prey items. In addition, flycatchers eat non-flying species, particularly Lepidoptera larvae. Use of insecticides could kill flycatcher food sources, thus, we ranked this S&G, if implemented, as causing sublethal effects to the flycatcher. In addition, this would negatively affect PCE 6.

Rangeland Management Program

Within the Rangeland Management Program, no S&Gs were ranked as having a negative effect to flycatchers on the Apache-Sitgreaves NF. However, the Apache-Sitgreave NF’s LRMP allows the Forest to provide a program of range management that emphasizes high quality range and forage improvements. Standard and Guideline 162 states to ensure there is no effect on the unique willow stands caused by grazing. This was ranked as overall positive to the flycatcher. Thus, our overall assessment is that there should be no adverse affects from livestock grazing on the Apache-Sitgreaves NF. Further, all PCEs for flycatcher proposed critical habitat should benefit.

Wildlife, Fish, and Rare Plants Program

The FWS ranked the following S&G (39) as having a negative behavioral response to the species: “Within each diversity unit maintain or achieve at least 40 percent of the potential habitat capability for the management indicator species selected for each vegetation type.” The FWS speculates that if only 40 percent of potential habitat for the flycatcher were maintained that it would not be adequate for the species. Managers should maintain all of the potential habitat for the species. As stated above, potential habitats that are not currently suitable will also be essential for flycatcher recovery, because they are the areas from which new suitable habitat

develops as existing suitable sites are lost or degraded; in a dynamic riparian system, all suitable habitat starts as potential habitat. General unifying characteristics of flycatcher habitat can be identified. Regardless of the plant species composition or height, occupied sites usually consist of dense vegetation in the patch interior, or an aggregate of dense patches interspersed with openings. In most cases this dense vegetation occurs within the first 10-13 feet (3-4 m) above ground. These dense patches are often interspersed with small openings, open water, or shorter/sparser vegetation, creating a mosaic that is not uniformly dense.

Regarding proposed critical habitat, although the intent of this S&G appears positive, however, managing for 40 percent could result in a loss of habitat. Thus, this S&G could affect PCEs 1-5 which all relate to the species' habitat. Specifically, as stated above, PCE 5 states that dense patches of riparian forests are essential for the conservation of the species. Again, we opine that if only 40 percent of potential habitat for the flycatcher were maintained that it would not be adequate for the species.

In summary, 67 percent of the S&Gs analyzed for the flycatcher maintained habitat or provided minimal recovery. However, we found several S&Gs that would cause adverse effects to the flycatcher resulting in take. The FWS anticipates that take (in the form of harm and harass) is reasonably certain to occur on this Forest from the Lands and Minerals and Wildlife programs.

Flycatchers appear to be declining on this Forest (see Environmental Baseline above) for unknown reasons. However, Apache-Sitgreaves NF conducts cowbird trapping at occupied sites, and all occupied sites are closed to livestock grazing. In addition the Forest has conducted riparian restoration and fencing at Nelson Reservoir along Nutrioso Creek specifically to improve habitat for the species.

Carson National Forest

The Carson NF has very few flycatchers. However, substantial recovery value exists in these areas (U.S. Fish and Wildlife Service 2002). Thus, although the Carson may have a small population of flycatchers, these sites may be important for the species persistence.

The Carson NF's LRMP had no lethal or sublethal S&Gs according to our rankings system (see Table 57 below). However, one S&G was found to cause a negative behavioral response if that S&G were implemented. However, approximately 63 percent of the S&Gs were ranked positive (i.e., as maintaining habitat or providing minimal recovery). Further, several were ranked as moving towards recovery or implementing recovery plans for listed species. The FWS did, however, find several S&Gs that were ranked as overall positive, but could have short-term adverse impacts.

Table 57. Effects of the S&Gs analyzed for the Southwestern Willow Flycatcher – Carson NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	1	2.9

Ranking	Explanation of Ranking	Total	Percentage
0	S&G is ill-defined and/or open to interpretation	6	17.1
1	S&G is maintaining habitat & providing at least minimal recovery	22	62.9
2	S&G is moving towards recovery	2	5.7
3	S&G is implementing species recovery plan	2	5.7
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	5.7
X	S&G is a heading	0	0.0
Total		35	100 %

Engineering Program

Standard and Guideline 216 allows the Forest to construct roads for timber sales utilizing Best Management Practices. Further, the S&G states that guidelines are 2.0 mi/mi² for construction first entry; 2.0 mi/mi² for reconstruction first entry; 4.0 mi/mi² for reconstruction second entry. The FWS ranked this as potentially causing a negative behavioral response to flycatchers from disturbance of heavy equipment and other associated activities. However, we do not believe that implementation of this S&G will appreciably alter riparian habitat for the flycatcher, which poses a significant threat to the species (see above).

Watershed Management Program

The following S&G (223) has an overall positive intent, however, it could have short-term adverse impacts: “Align crossings so that the minimum possible area is affected. Do not align roads to pass through the long axis of narrow riparian strips. Schedule construction activities during low water periods. Minimize road-clearing widths.” While the S&G has minimization measures built in (i.e., minimizing stream or riparian areas affected), adverse affects could occur if this S&G was implemented within occupied flycatcher habitat. In addition, this S&G could negatively affect PCEs 1-5.

In addition, the following S&G (221) also could have short-term adverse affects, “Locate new roads outside of the riparian type. If new roads are to be built, then erosion control measures utilizing Best Management Practices will be included.” As stated above, minimization is built into this S&G, however, it still allows for activities to occur that may affect flycatchers. This S&G could negatively affect PCEs 1-5.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 197 states that the Forest will accomplish recovery projects included in approved recovery plans and that projects will be coordinated through integrated resource management practices. This S&G, if implemented, will obviously benefit flycatchers and its proposed critical habitat.

In summary, the S&Gs that we analyzed within the Carson NF’s LRMP as well as the LRMP itself were overall positive for the flycatcher. In addition, the Carson has excluded livestock from the Rio Grande Rancho site since 1990. We found no S&Gs that would negatively impact any of the six PCEs for its proposed critical habitat. The FWS anticipates that take is reasonably

certain to occur in the form of harassment if S&Gs are implemented within the Engineering Program and through short-term impacts as stated above.

Gila National Forest

The Gila NF’s LRMP had three sublethal S&Gs according to our rankings system (see Table 58 below). However, 48 S&Gs (roughly 72 percent) were ranked positive (i.e., as maintaining habitat or providing at least minimal recovery). The FWS did, however, find several S&Gs that were ranked as overall positive, but could have short-term adverse impacts. Further, several were ranked implementing recovery plans for listed species.

Table 58. Effects of the S&Gs analyzed for the Southwestern Willow Flycatcher – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	3	4.5
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	3.0
1	S&G is maintaining habitat & providing minimal recovery	48	71.6
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	12	17.9
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	3.0
X	S&G is a heading	0	0.0
Total		67	100 %

Fire Management Program

Standard and Guideline 845 states the following: “A decision to use prescribed fire in wilderness shall not be based on benefits to wildlife, maintenance of vegetation types, improvements [to] forage production, or enhancement of other resource values. These can be additional benefits which may result from a decision to use prescribed fire but are not objectives for managing fire in wilderness.” Fire is an imminent threat to occupied and potential Southwestern Willow Flycatcher breeding habitat. Although fires occurred to some extent in some of these habitats historically, many native riparian plants are neither fire-adapted nor fire-regenerated. Thus, fires in riparian habitats are typically catastrophic, causing immediate and drastic changes in riparian plant density and species composition. This S&G could prevent catastrophic wildfire from eliminating flycatcher habitat. However, short-term disturbance to flycatcher could occur if prescribed fire is used near occupied flycatcher habitat.

Rangeland Management Program

Standard and Guidelines 940 in Management Area 7A states that grazing allotments generally will be managed to a level of C or above and lands classified as full capacity rangelands equal 93,387 acres of which 27, acres are currently unsatisfactory. Further, approximately 24,847 acres are estimated to be unsatisfactory by the fifth decade. In addition, S&G 940 in Management Area 7F states that grazing allotments generally will be managed to a level of B or

above. Lands classified as full capacity rangelands equal 64,358 acres, of which 50,843 acres are unsatisfactory. About 47,295 acres are estimated to be unsatisfactory by the fifth decade.

Unsatisfactory range conditions have resulted from past improper grazing practices. Improper grazing by domestic livestock has been a significant factor in the modification and loss of riparian habitats in the arid western U.S. as stated above (U.S. Forest Service 1979, Rickard and Cushing 1982, Cannon and Knopf 1984, Klebenow and Oakleaf 1984, General Accounting Office 1988, Clary and Webster 1989, Schultz and Leininger 1990, Belsky et al. 1999). If not properly managed, livestock grazing can significantly alter plant community structure, species composition, relative abundance of species, and alter stream channel morphology which can harm flycatcher habitat. The primary mechanism of effect is by livestock feeding in and on riparian habitats. Overutilization of riparian vegetation by livestock also can reduce the overall density of vegetation, which is a primary attribute of Southwestern Willow Flycatcher breeding habitat. Palatable broadleaf plants like willows and cottonwood saplings may also be preferred by livestock, as are grasses and forbs comprising the understory, depending on season and the availability of upland forage. Livestock may also physically contact and destroy nests.

Standard and Guideline 940 will also negatively impact PCE 1-5. The PCEs describe habitat that is generally typified by high plant density and moist conditions. Grazing in these habitats can result in reduction of plant density and a drying of riparian habitats.

Livestock grazing has been excluded from large areas of the Gila NF. Specifically, livestock grazing has been excluded from a large portion of the San Francisco and Gila Rivers to improve riparian function. The Gila NF has also developed wetlands at the Gila River Bird Management Area. Further, the Gila River Bird Management Area is also excluded from livestock grazing except for occasional trailing during rotations.

Watershed Management Program

Standard and Guideline 909 allows the Forest to identify and implement channel and land treatment structures on 120 acres within the first decade in conjunction with other resource activities. The FWS ranked this S&G as being overall positive with its intent, however, short-term adverse impacts could occur to nesting flycatchers. Channelization, bank stabilization, levees, and other forms of flow controls are carried out chiefly for flood control. These engineering activities affect riparian systems by separating a stream from its floodplain. This is also true for S&G 917 which states to identify and implement channel restoration and stabilization structures on 7,000 acres within the first decade.

Wildlife, Fish, and Rare Plants Program

Standards and Guidelines 930 and 932 state that wildlife planning emphasis is on game species and threatened and endangered species. Management plans for threatened and endangered species will be addressed as recovery plans are completed and approved. Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain threatened and endangered habitats and address recovery needs on a case by case basis. The FWS ranked these as being highly beneficial to the flycatcher because they direct the Forest to implement recovery plans (i.e., the flycatcher recovery plan).

In summary, the S&Gs that we analyzed within the Gila NF’s LRMP were positive for the flycatcher. The FWS found three that would have a sublethal affect to the flycatcher. These occurred within the Rangeland Management Program. The remainder of impacts to the flycatcher were short-term effects from the Fire Management and Watershed Management programs. The FWS anticipates that take is reasonably certain to occur from the Rangeland Management Program.

Tonto National Forest

The Tonto NF has the most amount of flycatchers territories of all the National Forests in the Southwestern Region. The Tonto NF’s LRMP had one lethal and six sublethal S&Gs according to our analysis (see Table 59 below). However, one S&G was found to cause a negative behavioral response. However, 35 S&Gs (i.e., 70 percent) were ranked positive (i.e., as maintaining habitat or providing minimal recovery). The FWS did, however, find several S&Gs that were ranked as overall positive, but could have short-term adverse impacts.

Table 59. Effects of the S&Gs analyzed for the Southwestern Willow Flycatcher – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	2.0
-2	S&G is causing sublethal response	6	12.0
-1	S&G is causing negative behavioral response	2	4.0
0	S&G is ill-defined and/or open to interpretation	5	10.0
1	S&G is maintaining habitat & providing at least minimal recovery	35	70.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	2.0
X	S&G is a heading	0	0.0
Total		50	100 %

Rangeland Management

Standard and Guideline 1371 allows the Forest to manage suitable rangelands at Level B. Further, rangeland in less than satisfactory condition will be treated with improved grazing management. Projected range conditions were provided that stated unsatisfactory range conditions are or would be roughly 6,000 acres. The FWS ranked this S&G as having sublethal effects because, if implemented, grazing at levels with minimal fencing and other structures could impact flycatchers. Improper livestock grazing in watershed uplands above riparian systems can cause bank destabilization, increased runoff, increased sedimentation, increased erosion, and reduced capacity of soils to hold water. Because the impact of herbivory can be highly variable both geographically and temporally, proper grazing management strategies must be developed locally. According to the Forest Service, this area (i.e., Management Area 1C) may be closed to grazing because of concern for the Bald Eagle.

According to S&G 1423, the Forest is directed to manage suitable rangelands at Level D in Management Area 6J, except South Thompson Mesa manage at Level A unit the area returns to satisfactory productivity. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements. Projected changes in range condition acreages: satisfactory range condition - 44,664 acres (current) to 67,599 acres (decade 1); unsatisfactory range condition - 229,350 acres (current) to 206,415 acres. As stated above, improper grazing by domestic livestock has been a significant factor in the modification and loss of riparian habitats in the arid western U.S. If not properly managed, livestock grazing can significantly alter plant community structure, species composition, relative abundance of species, and alter stream channel morphology which can harm flycatcher habitat.

Standard and Guideline 1423 allows the Forest to use approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas will be identified in Allotment Management Plans and will involve areas of limited size and extent where other management practices (i.e. prescribed burning) cannot be effectively or economically utilized to achieve management objectives or economically utilized to achieve management objectives. Projects of this nature will be subject to environmental assessment and public involvement to insure project objectivity and public safety. Limit the use of certain facilities in floodplains to non-flood seasons or daylight hours only.” As stated above, flycatchers are insectivores; major prey items include small (flying ants) to large (dragonflies) flying insects. In addition, flycatchers eat non-flying species, particularly Lepidoptera larvae. Any use of insecticides could kill flycatcher food sources, thus, we ranked this S&G, if implemented, as causing sublethal effects to the flycatcher.

Standard and Guideline 1423 states that maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production. Methods will be appropriate to vegetation and terrain of treatment areas and could include prescribed fire, chemical and/or mechanical means. Chemical treatments can adversely affect flycatcher prey base. Further, while prescribed fire is beneficial, fire is an imminent threat to occupied and potential Southwestern Willow Flycatcher breeding habitat. Although fires occurred to some extent in some of these habitats historically, many native riparian plants are neither fire-adapted nor fire-regenerated. Thus, fires in riparian habitats are typically catastrophic, causing immediate and drastic changes in riparian plant density and species composition. This S&G could prevent catastrophic wildfire from eliminating flycatcher habitat.

Standards and Guidelines 1371 and 1423, if implemented, could adversely affect proposed critical habitat. In other words, all proposed PCEs for the flycatcher could be affected. As stated above, improper livestock grazing can significantly alter plant community structure, species composition, relative abundance of species, and alter stream channel morphology which can harm flycatcher habitat.

The Tonto NF has excluded livestock from certain areas on the Forest. Specifically, the Tonto NF has excluded grazing from approximately 15 miles of Tonto Creek. A seasonal employee is hired annually to patrol the area around Roosevelt Lake.

To summarize the Tonto NF, we found all lethal and sublethal S&Gs within the Tonto NF’s LRMP within the Rangeland Management Program. The FWS found no S&Gs that implemented or worked towards recovery or delisting of listed species as with other LRMPs. As stated above, the Tonto NF has the greatest number of known flycatcher nest sites. The FWS anticipates that take is reasonably certain to occur on the Tonto NF from certain grazing practices. Take will be in the form of harm and possibly harassment.

The Forest conducted cowbird trapping at most occupied sites since 1995, and cooperates with the Salt River Project to implement mitigations from the Salt River Project Habitat Conservation Plan. Further, the Tonto has conducted numerous annual boating trips down the Verde River in order to survey for flycatchers.

1996 Regional Amendment

Where the 1996 Regional Amendment to all National Forest LRMPs overlapped, we found all S&Gs to have positive effects to the flycatcher. However, several of the S&Gs that we ranked as maintaining habitat or providing minimal recovery also have associated short-term adverse effects. For example, 1476 allows the Forests to utilize prescribed fire. If fire abatement is successful, then flycatcher habitat will be protected. However, fire could also be detrimental to flycatcher habitat. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 60. Effects of the S&Gs analyzed for the Southwestern Willow Flycatcher – 1996 Regional Amendment

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sub-lethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	6.5
1	S&G is maintaining habitat & providing at least minimal recovery	25	54.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	10	21.7
Z	S&G implementation is non-discretionary	2	4.3
X	S&G is a heading	6	13.0
Total		46	100 %

In summary, it is likely that the Forest Service land will bear nearly all the burden for recovering the flycatcher, due to land ownership, in the Roosevelt, Verde, San Francisco, and Little Colorado management units. We are uncertain about land ownership in New Mexico, but it is clear that in the Upper Gila, and Upper and Middle Rio Grande management units, the Forest Service will not bear the entire burden for recovery. However, it seems likely that the Forest’s responsibility will be greater in the Upper Gila Management Unit and Upper Rio Grande Management Unit, than the Middle Rio Grande Management Unit.

We found that take is reasonable certain to occur on the Apache-Sitgreaves, Carson, Gila and Tonto NFs from impacts related to the Engineering, Lands and Minerals, Rangeland, and Wildlife programs. Take will be in the form of harm and harass.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Southwestern Willow Flycatchers may occur on private lands within the action area. Flycatchers could be adversely impacted by grazing and water diversions from private lands. Future non-federal actions that are reasonably certain to occur within the action area include the following: (1) in Pima County, Arizona, the Sonoran Desert Conservation Plan's multi-species habitat conservation component includes the southwestern willow flycatcher as a "Priority Vulnerable Species." (2) the Salt River Project is currently developing an HCP for Horshoe-Bartlett reservoirs in Arizona to minimize and mitigate effects to the flycatcher in Arizona, and (3) in the Cliff-Gila Valley in New Mexico, The Nature Conservancy has initiated habitat enhancement on its lands, including reducing levees to allow controlled flooding and subsequent establishment of riparian vegetation for nesting flycatchers. Also in the same area, the U-Bar Ranch continues to provide conservation benefits for flycatchers in the Gila River.

CONCLUSION

After reviewing the current status of the Southwestern Willow Flycatcher, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Southwestern Willow Flycatcher, and is not likely to destroy or adversely modify proposed critical habitat for the species. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS concludes that the proposed action is not likely to jeopardize the Southwestern Willow Flycatcher because the LRMPs provide protective measure for endangered species; livestock grazing has been eliminated from all occupied habitat on National Forests; and some of the suitable unoccupied and potential habitat have also been excluded. Further, the Forest Service continues to survey occupied as well as suitable and potential habitats. In addition, the FWS bases our no jeopardy finding on the following activities that National Forests with breeding flycatchers are currently implementing:

- The Apache-Sitgreaves NF conducts cowbird trapping at occupied sites, and all occupied sites are closed to livestock grazing. In addition the Forest has conducted riparian restoration and fencing at Nelson Reservoir along Nutrioso Creek specifically to improve habitat for the species.

- The Carson NF continues to exclude livestock from the Rio Grande Rancho site and has since 1990.
- The Gila NF continues to exclude livestock grazing from a large portion of the San Francisco and Gila Rivers to improve riparian function and the Forest has also developed wetlands at the Gila River Bird Management Area. The Gila River Bird Management Area continues to exclude from livestock grazing except for occasional trailing during rotations. In addition, the Gila River Bird Management Area is also closed to OHV use.
- The Tonto NF continues to exclude livestock grazing from approximately 15 miles of Tonto Creek and a seasonal employee is hired annually to patrol the area around Roosevelt Lake. The Tonto NF has also conducted cowbird trapping at most occupied sites since 1995, and cooperates with the Salt River Project to implement mitigations from the Salt River Project Habitat Conservation Plan. Furthermore, the Tonto NF conducts numerous annual boating trips down the Verde River in order to survey for flycatchers.

As stated previously, when the Southwestern Willow Flycatcher was listed as endangered in 1995, approximately 350 territories were known to exist (Sogge et al. 2001). As of the 2001 breeding season, the minimum known number of Southwestern Willow Flycatchers was 986 territories. A coarse estimate is that an additional 200 to 300 nesting pairs may remain undiscovered, yielding an estimated total population of 1,200 to 1,300 pairs/territories. A significant portion of flycatcher territories could occur on non-federal lands. The increase in the number of flycatcher territories should not be confused with increasing population trends, but rather is most likely a function of addition and/or improved surveys techniques.

Based on the activities mentioned above, as well as the Forest Service continuing to survey occupied, suitable, and potential habitats for Southwestern Willow Flycatchers, the FWS concludes that the proposed action will not jeopardize the continued existence of the Southwestern Willow Flycatcher. Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Southwestern Willow Flycatcher will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify proposed critical habitat for the Southwestern Willow Flycatcher.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to

listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Southwestern Willow Flycatcher is reasonably certain to occur as a result of the continued implementation of National Forests LRMPs. Incidental take is expected to be in the forms of harm and harass. Harm occurs through direct habitat alterations and harassment occurs when flycatchers are flushed or disturbed from their nesting areas. We found that take of flycatchers is reasonable certain to occur on the Apache-Sitgreaves NF from the Lands and Minerals Program and the Wildlife Program; on the Carson NF from the Engineering Program; and on the Gila and Tonto NFs from the Rangeland Management Program. The FWS cannot, however, anticipate the exact number of territories that will be taken within the time-frame of this opinion.

As stated previously, Southwestern Willow Flycatchers are a territorial species, where males select and defend exclusive breeding territories in which they attempt to attract a mate and breed. Because it can be difficult to determine whether a particular male is paired with a female, the FWS selected “territory” as the unit of measure for recovery goals (rather than “pairs”), recognizing that overall, one territory generally equates to two flycatchers (one male and one female). Flycatcher territories are distributed in a large number of very small breeding groups, and only a small number of relatively large breeding groups. Thus, numbers of “territories” make up a “site.” Results of an incidence function analysis (Hanski 1994, Lamberson et al. 2000) as described in the Southwestern Willow Flycatcher Recovery Plan, stated that flycatcher population stability occurred when sites equaled 10-25 territories (U.S. Fish and Wildlife Service 2001). Once a threshold of about 25 territories/site is reached, the benefit of increasing the number of birds diminishes. Instead, metapopulation persistence (stability) is more likely to increase by adding more sites rather than adding more territories to existing sites. Therefore, pursuant to this information, the FWS concludes that incidental take of Southwestern Willow Flycatchers will be considered to be exceeded with the loss of one “site” on the Gila NF or Tonto NFs as a result of the proposed action, without a “site” being replaced. Because the Gila NF and Tonto NF occur in the same RU (i.e., the Gila RU), a site may be replaced on either of these two

National Forests. If 10-25 territories do not occur at a site, the Forest Service should define a “site” based on habitat patches.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Southwestern Willow Flycatcher. The continued implementation of the 11 LRMPs for the Southwestern Forests accomplished through the implementation of the S&Gs as analyzed within this opinion indicates that many S&Gs are positive for threatened and endangered species.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Southwestern Willow Flycatchers.

1. Protect Southwestern Willow Flycatchers on National Forest System lands.
2. Protect Southwestern Willow Flycatcher habitat on National Forest System lands.
3. Monitor Southwestern Willow Flycatcher sites on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas to eliminate direct effects and minimize indirect effects to the Southwestern Willow Flycatcher in order to maintain flycatcher populations on National Forest System lands over time.
- 1.2 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Wildlife programs to minimize or eliminate adverse effects to the Southwestern Willow Flycatcher.
- 1.3 Follow FWS regional guidance criteria issued by the FWS for pesticide use in occupied Southwestern Willow Flycatcher habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Wildlife programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effect within occupied flycatcher habitat.

2.2 Continue existing exclusions of livestock grazing in flycatcher habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Southwestern Willow Flycatcher sites and associated territories on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Southwestern Willow Flycatchers, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA allows federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Identify and survey potential flycatcher habitat following FWS approved survey protocol on Forest Service System lands.
2. Investigate flow regimes necessary to provide these ecological conditions and strive for the presence of flows, surface water, or saturated soil in/or adjacent to flycatcher nesting sites through Forest Service research stations.
3. Work to achieve double the amount of suitable breeding habitat available within each Management Unit, pursuant to the Recovery Plan, as required to support the target number of flycatchers described under reclassification to threatened status.
4. Promote the growth of potential flycatcher habitat.
5. Develop management plans to reduce threats and promote processes that secure,

restore, and enhance currently suitable and potentially suitable habitat.

6. Continue to exclude activities such as OHVs that can impact flycatcher habitat.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

YELLOW-BILLED CUCKOO

STATUS OF THE SPECIES

The information used to describe the species' status was gathered from the June 10, 2004 Candidate Assessment and Listing Priority Assignment Form for the Yellow-billed Cuckoo, unless otherwise referenced.

Description

The Yellow-billed Cuckoo (*Coccyzus americanus*) is medium sized bird (about 12 in.) with a slender, long-tailed profile and a fairly stout, slightly down-curved bill. Plumage ranges from grayish brown above to white below, with red primary flight feathers. Yellow-billed Cuckoo (cuckoo) tail feathers can be characterized by their slim profile and white spots prefaced at the tip of their black undertail feathers. Habitat for the cuckoo includes dense riparian areas containing large blocks of cottonwood trees. The cuckoo is a neo-tropical, migratory bird that winters in South America.

Legal Status: In February 1998, the FWS was petitioned to list the Yellow-billed Cuckoo under the ESA from 22 groups (Southwest Center for Biological Diversity et al. 1998). FWS published a 90-day finding on the petition on February 17, 2000 (65 FR 8104), concluding the petition had presented substantial information that listing the species may be warranted, but not throughout the entire range of the species. FWS conducted a status review and published a 12-month petition finding on July 25, 2001 (66 FR 38611), finding that listing was warranted, but precluded by other agency priorities. However, the 2004 Candidate Notice of Review found that threats to the Yellow-billed Cuckoo have not changed over the past year, but to better reflect the fact that threats are imminent, the FWS revised the listing priority number from a six to a three, within a range of 1-12, with one being the highest priority number.

The Migratory Bird Treaty Act is the only current federal regulatory mechanism provided for the Yellow-billed Cuckoo. There are no stipulations in the Migratory Bird Treaty Act regarding prevention of habitat destruction unless direct mortality or destruction of active nest results.

Currently, only the western Distinct Population Segment is a candidate for listing. The Distinct Population Segment boundary includes all Yellow-billed Cuckoos west of the Continental Divide and west of the eastern edge of the Rio Grande drainage, excluding the Pecos River drainage, but including the Sangre de Cristo Mountains.

Distribution and Abundance

Quantitative data on the decline of the western Yellow-billed Cuckoo are lacking, but significant range data has been documented for the distinct population segment (U.S. Forest Service 2004:221). In addition to the species absence and rarity in Washington, Oregon, Idaho, Colorado, and Nevada, the three remaining cuckoo-inhabited states (Arizona, New Mexico, and California) demonstrate a decline in both range and abundance of the distinct population segment. However, New Mexico presently supports a relatively abundant population within its river systems. In 2002, Woodward et al. (2003) found 89 Yellow-billed Cuckoos on private, state, and federal lands in the upper Gila and Mimbres river drainages. Additionally, Yellow-

billed Cuckoos can be found in the Rio Grande river valley from the headwaters of Cochiti Dam to the headwaters of Elephant Butte reservoir. The Yellow-billed Cuckoo is considered extirpated as a breeding bird in Washington, Oregon, and British Columbia.

Habitat

Yellow-billed Cuckoos prefer large blocks of dense riparian habitat adjacent to river valley systems. Cuckoos seem to prefer mature cottonwoods as nesting sites. In the southwest, foraging birds can be found in stands of smaller mesquite trees and salt cedar, but will seldom nest there.

Life History

Dense understory foliage seems to be important in nest site selection and cottonwoods serve as foraging habitat. Cuckoos are facultative brood parasites; however most cuckoos construct their own nests. Nesting occurs much later for cuckoos than other co-occurring species and typically peaks in mid-June to August. Average clutch size is from two to three eggs, and the total nesting cycle is brief with only 17 days occurring between egg laying and fledging.

Historically, western Yellow-billed Cuckoos were found in southern British Columbia through the states of Washington, Oregon, California, and east towards the Rocky Mountains. The species was considered locally common and widespread in Arizona and California; common locally in New Mexico, Oregon, Washington, and local and uncommon in scattered drainages in Colorado, western Wyoming, Idaho, Nevada, and Utah (U.S. Fish and Wildlife Service 2001). Presently, the northernmost breeding extent of the Yellow-billed Cuckoo is in the Sacramento River Valley in California (U.S. Forest Service 2004:220). Breeding also occurs in the states of Arizona and New Mexico.

Reasons for Candidate Listing

A 12-month finding for the Yellow-billed Cuckoo was warranted, but precluded on July 25, 2001. To date, the Yellow-billed Cuckoo is listed as a candidate species.

Since 1980, state-wide surveys from New Mexico, Arizona, and California indicate an overall estimated 52 percent decline, with numbers too low to establish trends from Idaho, Montana, Utah, Nevada, and Colorado. The natural or human-induced destruction, modification, or curtailment of cuckoo habitat represents the primary threat to the species.

Threats: Like many riparian dependant species, the decrease in cuckoo distribution and population can be attributed primarily to habitat loss, modification, and fragmentation (Franzreb 1987, Laymon and Halterman 1989, Hughes 1999); decreased water tables (Phillips et al. 1964); and possibly the use of pesticides (Gaines and Laymon 1984, Laymon and Halterman 1986, Rosenberg et al. 1991, Hughes 1999). However, the primary cause for the cuckoos decline is the extensive loss of its riparian forest habitat throughout the west (U.S. Fish and Wildlife Service 2000). Knopf et al. (1988) and Catron et al. (2000) suggest about 90 percent of the riparian habitat in the west has been lost to urban and agricultural development, livestock grazing, and water impoundments.

Conservation Measures

Because the Yellow-billed Cuckoo is a candidate species, no recovery plan has been developed. However, four National Forests (Tonto, Carson, Coconino, and Gila) have implemented recovery efforts in riparian habitat for the Southwestern Willow Flycatcher, which may benefit cuckoos. These efforts include: excluding grazing from 15 miles of Tonto Creek and continuing to cooperate with the Salt River Project to implement mitigations from the Habitat Conservation Plan (Tonto NF), excluding livestock from the Rio Rancho SWWF site since 1990 (Carson NF), constructing riparian closures (along 2.65 miles of stream) to exclude approximately 570 acres from livestock grazing in suitable Yellow-billed Cuckoo habitat (Coronado NF), and excluding livestock grazing from large portions of the San Francisco and Gila Rivers, developing wetlands at the Gila River Bird Management Area, and closing the Gila River Bird Management Area to OHV use (Gila NF) (U.S. Forest Service 2004:224).

Laymon (1980) identifies additional conservation strategies needed for the cuckoo: 1) determine numbers and locations of remnant populations; 2) acquire and improve riparian habitats; 3) eliminate pesticide spraying in areas adjacent to riparian areas; and, 4) investigate feasibility of captive breeding and reintroduction to naturally regenerated or reforested habitat.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

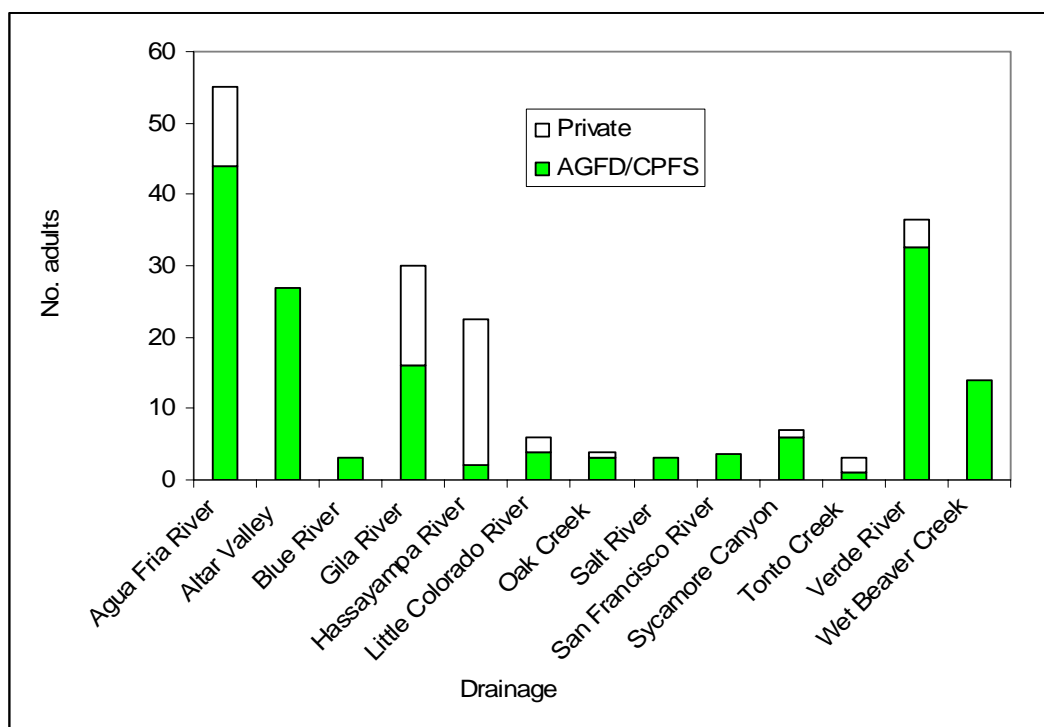
In New Mexico, the Yellow-billed Cuckoo occurs on the Carson, Cibola, and Gila NFs. Only incidental sightings of Yellow-billed Cuckoos were reported on or adjacent to the Cibola and Carson NFs, subsequent in-depth surveys have not been conducted (U.S. Forest Service 2004:222). Additionally, 15 years of surveys conducted by the Cibola NF do not indicate that the species currently occurs on the Forest. However, the Gila NF detected a total of 22 cuckoos in the Gila Bird Area on the Gila River from recent cuckoo surveys. Table 61 below summarizes the total number of birds detected by drainage on the Gila NF. Woodward et al (2003) found 38 cuckoos at nine sites in three major drainages on the Gila NF. On adjacent (non-Forest Service) lands, Woodward et al. found 47 birds at five sites, with 34 of the birds found on the U-Bar Ranch (U.S. Forest Service 2004:227).

Table 61. Number of Sites at which Yellow-billed Cuckoos were detected and total number of birds by drainage on the Gila NF (Woodward et al. 2003).

Drainage	Number of Sites	Number of Cuckoos
San Francisco River	2	5
Gila River	6	32
Little Walnut (Mimbres River)	1	1

In Arizona, the Yellow-billed Cuckoo occurs on the Apache-Sitgreaves, Coconino, Coronado, Prescott, and Tonto NFs. Surveys performed throughout Arizona in 1998 and 1999 by the AGFD and the U.S. Geological Survey Colorado Plateau Field Station allow cuckoo abundance to be extracted from major drainages occurring on National Forest System lands (U.S. Forest Service 2004:228). The surveys performed in 1998 and 1999 were conducted mostly on public lands, but some information was reported from private lands. Figure 4 shows the average number of adult cuckoos over the two year survey period. Yellow-billed Cuckoos were most abundant in the Agua Fria, Verde, Hassayampa, and Altar Valley River systems (Corman and Magill 2000).

Figure 5. Average number of adult Yellow-billed Cuckoos in major drainages that includes portions of National Forest Systems lands in Arizona.



Data Source: Corman and Magill (2000)

Additionally, the Tonto, Carson, Coconino, and Gila NFs have implemented various conservation and restoration efforts in riparian areas in order to improve the baseline riparian conditions. See above discussion in Conservation Measures section.

Factor Affecting the Species within the Action Area

Loss of riparian habitat occurring through river flow management, stream channelization and stabilization, and livestock grazing is the primary threat to the cuckoo. Forest Service activities which directly affect riparian areas are water diversions and withdrawals, recreation, livestock grazing, fuels reduction, and enhancements of habitat and watershed condition. Diversions and water authorizations occurring on National Forest System lands also contribute to the loss of cuckoo populations within the action area. Since livestock grazing occurs on National Forests

System lands, grazing continues to have direct effects on cuckoo habitat and indirect upland effects. Due to the invasion of riparian habitats by exotic plant species, the southwest is experiencing considerable changes to the dynamics of its riparian ecosystems. Therefore, invasive plants will have direct effects on cuckoo habitat. Human-induced destruction of available cuckoo habitat occurring in the action area remains prevalent, with recreational activities directly affecting riparian conditions. All National Forests, with the exception of the Coronado, allow off-highway vehicle use to some extent. Off-highway vehicle use can destroy riparian habitats, and can degrade watershed condition in upland habitats.

EFFECTS OF THE ACTION

The Yellow-billed Cuckoo is known to occur on eight National Forests including Apache-Sitgreaves, Carson, Cibola, Coconino, Coronado, Gila, Prescott, and Tonto; thus, these Forests' S&Gs were analyzed. However, only incidental sightings of Yellow-billed Cuckoos were reported on or adjacent to the Cibola and Carson NFs. Additionally, 15 years of surveys conducted by the Cibola NF do not indicate that the species currently occurs on the Forest.

Table 62. Summary of S&Gs considered for the Yellow-billed Cuckoo.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 4-9, 12, 14, 16-20, 28, 32, 33, 37, 38, 40, 42-53, 55, 58-63, 97-99, 104-113, 115, 116, 120-124, 130, 132-140, 144, 150-152, 154-159, 161, 166, 171, 172, 177-179
Carson	181-187 189, 191, 192-196, 198, 199, 203, 206, 208-215, 217, 219-224, 227
Cibola	228-234, 236, 237, 240-247, 249, 251, 252, 255, 257, 259, 261, 272
Coconino	313-325, 327-329, 331, 336, 337-339, 341 342, 343-345, 348, 350, 353-358, 361-364, 366, 368, 369, 370, 371-375, 376, 377-379, 380, 381-384, 385, 386, 387-391, 393-395, 398-402, 404, 406-408, 411, 413, 415-417, 424-426, 428, 430-432, 479-481, 484-491, 492, 493-497, 499-507, 520, 545-549, 551, 552-567, 570, 572-575
Coronado	612, 613, 626-629, 631-638, 644, 648-653, 659-661, 666-669, 672-682, 692-697, 699, 704, 707-713, 774, 779, 780, 782, 785, 786, 788, 790-792, 794, 796-800, 803-805, 807, 809-812, 825, 826, 828-839,
Gila	841, 842, 844-851, 854, 857-871, 873-876, 878, 880, 884, 886, 888, 921, 922, 924, 925, 927, 928, 930, 933, 935, 935
Prescott	1115-1129, 1131-1138, 1140, 1142-1148, 1150-1163, 1165-1167, 1169-1176, 1178-1182

National Forest	Standards and Guidelines
Tonto	1341-1344, 1345, 1348-1350, 1353-1356, 1357, 1359, 1360-1365, 1367, 1368, 1371, 1375, 1378, 1381, 1385, 1404, 1419, 1420
1996 Regional Amendment	1432, 1434, 1445, 1449, 1473, 1474, 1476, 1477, 1479, 1488-1490, 1509, 1510, 1512-1515

Apache-Sitgreaves National Forest

Table 63 provides a summary of effects of S&Gs analyzed for the Yellow-billed Cuckoo on the Apache-Sitgreaves NF. Over half of the S&Gs analyzed for the cuckoo on the Apache-Sitgreaves NF maintain habitat or provide at least minimal recovery to the species. One S&G works towards recovery of the species. However, five S&Gs are likely to cause either behavioral or sublethal effects.

Table 63. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	2	2.2
-1	S&G is causing negative behavioral response	3	3.3
0	S&G is ill-defined and/or open to interpretation	14	15.6
1	S&G is maintaining habitat & providing at least minimal recovery	63	70.0
2	S&G is moving towards recovery	1	1.1
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	1.1
Z	S&G implementation is non-discretionary	3	3.3
X	S&G is a heading	3	3.3
Total		90	100 %

Engineering Program

The FWS recommends total road densities on National Forests to be less than or equal to 2.5 mi/mi². Standard and Guideline 63 exceeds this recommendation and it is likely to cause direct effects to the cuckoo such as displacement or abandonment of nest sites. Engineering activities, such as road construction and maintenance, may impact the cuckoo through habitat degradation and fragmentation. The effect can be direct (e.g., a road through a riparian area) or indirect (e.g., alteration of stream flows or sediment inputs from upland roads). However, road densities on the Apache-Sitgreaves NFs are considered low, having a system road density of less than 2 mi/mi² (U.S. Forest Service 2004:229). S&G 62 directs the Apache-Sitgreaves NF to seasonally or permanently close existing roads and prohibit or manage off-highway vehicle use in sensitive areas.

Forestry and Forest Health Program

There are three applicable S&Gs within this program. S&G 97 is likely to cause behavioral effects to the cuckoo because only the economic costs associated with timber sale are taken into account. However, S&Gs 42 and 138 may mitigate negative effects associated with S&G 97 because both S&Gs provide direction for riparian habitat maintenance.

Land and Minerals Program

Standard and Guideline 52 limits the use of chemical agents, such as pesticides and herbicides, within the Apache-Sitgreaves NF. However, it does not fully eliminate their use nor does the S&G suggest alternate land management activities to that of pesticide use. Hughes (1999) suggests pesticides may affect behavior or cause death by direct contact. Laymon and Halterman (1987) note that pesticides contaminate preferred prey items, particularly Lepidoptera larva and some food such as frogs, which occur in pesticide-laden runoff adjoining agricultural land. Overall, the majority of applicable S&Gs within the land and minerals program prove to provide some beneficial measures towards maintaining or improving cuckoo habitat. Notable positive S&Gs that work towards maintaining/improving cuckoo habitat are 50, 51, and 58.

Rangeland Management Program

Forest-wide S&G 40 works to improve riparian habitat and adjacent water by placing salt $\frac{1}{4}$ of a mile way from these areas. Standards and Guidelines shown to provide habitat maintenance in specific management areas include: 132, 133, 134, 135, 136, 137, 144, 158, and 165. Within this group, notable positive S&Gs include directing grazing to include both biological and physical systems of riparian areas (133), limit livestock pasture-to-pasture movement in riparian areas (137), and defer from grazing until watershed and riparian areas are satisfactorily restored (165). Overall, the S&Gs associated with range management in the Apache-Sitgreaves NF appear to be beneficial to the cuckoo and riparian habitat.

Recreation, Heritage, and Wilderness Program

S&G 112 permits the implementation of maximum possible recreation use in the riparian area of Management Area 3. Riparian areas in the Southwest Region provide critical resources for migrating and breeding birds (Knopf and Samson 1994, Skagen et al. 1998). Studies conducted to determine the effects of recreation and development on riparian birds show that many species decline or disappear as settlement intensity increases (Blair 1996, Clergeau et al. 1998). Because recreation is an important public function of National Forests', recreational demands continue to increase each year on National Forest System lands. The Apache-Sitgreaves NF alone receives over 2 million visits per year (U.S. Forest Service 2004:67). Furthermore, it is not likely that recreation or settlement will be completely excluded from National Forest System lands, particularly sensitive riparian areas. However, it is possible to mitigate the adverse effects of recreation and development on birds that use riparian habitats by adhering to those S&Gs working to achieve habitat maintenance and at least baseline recovery.

Notable positive S&Gs working towards maintaining cuckoo habitat include, S&G 6, 7, 8, 12, 14, 16, 17, 113, 154, and 159.

Watershed Management Program

Positive S&Gs working towards habitat maintenance and providing at least baseline recovery within this program include S&G 44, 45, 47, 48, 106, 140, 177, 178, and 179.

Wildlife, Fish, and Rare Plants Program

Management Area S&G 123 is likely to have behavioral effects to the Yellow-billed Cuckoo, such as displacement or abandonment of nest sites. S&G 123 states to manage and maintain only 60 percent of near natural shrub and tree crown cover, within the riparian area of Management Area 3. Habitat documentation for Yellow-billed Cuckoos shows that the species prefers large blocks of riparian habitats, particularly woodlands with cottonwoods and willows, with a dense understory (Ehrlich et al. 1988). Sixty percent of shrub and tree crown cover may not be an adequate amount of habitat for the cuckoo and may cause nest abandonment and displacement from nest sites. Similarly, S&G 39 was also identified for its behavioral effects to the Yellow-billed Cuckoo, stating that only 40 percent of the potential habitat capability will be managed for the particular indicator species within each diversity unit. Again, this percentage may not represent the adequate amount of habitat the required by the cuckoo. However, many S&Gs within this program provide recovery and habitat maintenance for the cuckoo. For example, S&G 4 improves habitat for sensitive species and also works towards recovery and declassification of sensitive species. Other notable positive S&Gs in this program that work towards maintaining cuckoo habitat include 1, 2, 5, 20, 32, 33, 37, 38, 115, 116, 121, 122, 130, 151, and 166. Standards and Guidelines within this group that are particularly beneficial to the cuckoo are 5, 29, and 33.

In summary, on the Apache-Sitgreaves NF, our effects analysis shows take of Yellow-billed Cuckoos is reasonably certain to occur from the Engineering, Forestry and Forest Health, Lands and Minerals, Recreation, and Wildlife programs.

Carson National Forest

Table 64 provides a summary of the effects of S&Gs analyzed for the Yellow-billed Cuckoo on the Carson NF. Significant portions of the S&Gs analyzed maintain habitat or provide at least minimal recovery to the species. Two S&Gs work towards recovery of the cuckoo. No applicable S&Gs within the Carson NF LRMP have behavioral, sublethal or lethal effects to the cuckoo. Additionally, this particular LRMP contains very few S&Gs applicable to the cuckoo. There were no forest-wide S&Gs for the Fire Management, Rangeland, and Fish/Wildlife/Rare Plants programs that affect the Yellow-billed Cuckoo. Most of the forest-wide S&Gs are general guidelines with little direction to reduce impacts to riparian areas. However, the Management Area S&Gs provide protection for riparian areas.

Table 64. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Carson NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	6	17.6

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	23	67.6
2	S&G is moving towards recovery	2	5.9
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	2.9
Z	S&G implementation is non-discretionary	2	5.9
X	S&G is a heading	0	0.0
Total		34	100.0 %

Engineering Program

There is only one applicable S&G in this program, which relates to improving drainage and surfacing roads. These activities would only take place on existing roads not already closed to improve riparian areas and reduce stream sedimentation, therefore providing minimal recovery for the cuckoo.

Forestry and Forest Health Program

The two applicable S&Gs (187, 189) for this program relate to ecological diversity and fragmentation prevention, both positive aspects for cuckoo habitat.

Lands and Minerals Program

Standard and Guideline 181 contains flexible language with respect to riparian areas and proposed oil and gas leases, saying these areas will be available for leasing, but with “limited surface occupancy.” Although the Carson NF reports only a few incidental sightings of cuckoos, mineral developments should not occur in sensitive riparian areas. However, S&Gs 184 and 185 might mitigate any effects from S&G 181.

Recreation, Heritage, and Wilderness Program

S&G 186 contains vague language regarding resource utilization practices and recreation forest-wide. With respect to the cuckoo, wildlife concerns should be placed above those of recreation for such practices. However, S&G 224 and 227 provide for habitat protection within Management Area 17.

Watershed Management Program

Applicable S&Gs within this program are mixed in their effects to the cuckoo. Although some S&Gs provide habitat maintenance and/or minimal recovery for the cuckoo, most S&Gs are ill-defined or involve short-term take/harassment of Yellow-billed Cuckoos. S&G 222 contains ill-defined language. S&G 222 seeks to locate roads outside of riparian areas, but doesn’t fully eliminate the possibility and states that BMPs should be utilized when locating new roads within riparian types. S&G 220 is a notable positive S&G in this program because it prohibits new borrow pits and road material storage sites in riparian areas.

Wildlife, Fish, and Rare Plants Program

Many S&Gs within this program seek to maintain/improve cuckoo habitat. Standard and Guidelines 194, 196, and 209 all speak to improving habitat or providing recovery efforts for sensitive species. Additionally, S&Gs 195 and 198 provide measures towards recovery of

threatened, endangered, and sensitive species. Other applicable positive S&Gs within this program include 206, 210, 211, 212, and 214. Standard and Guideline 215 could have possible short-term adverse effects to cuckoos because although it seeks to improve and manage riparian vegetation condition, these management activities, such as selective cutting and burning, will involve short-term take of the cuckoo.

On the Carson NF, our effects analysis shows take of Yellow-billed Cuckoos is reasonably certain to occur from the Watershed and Wildlife programs; however, at this time the species is not known to occur on the Forest.

Cibola National Forest

Table 65 provides a summary of the effects of S&Gs analyzed for the yellow-billed cuckoo on the Cibola NF. Over half of the S&Gs analyzed maintain habitat or provide at least minimal recovery to the species. No S&Gs were determined to have significant beneficial effects to the cuckoo other than providing baseline recovery to the species. Similarly, only one S&G was determined to have behavioral effects to the cuckoo, while no applicable S&Gs within the Cibola NF LRMP were found to have sublethal or lethal effects.

Table 65. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Cibola NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	1	0.0
0	S&G is ill-defined and/or open to interpretation	2	8.0
1	S&G is maintaining habitat & providing at least minimal recovery	19	80.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	4.0
X	S&G is a heading	2	8.0
Total		25	100 %

Lands and Minerals Program

Standards and Guidelines 259 and 261 are the only applicable S&Gs within this program. Both are identified as positive S&Gs for the cuckoo and its habitat.

Recreation, Heritage, and Wilderness Program

All the S&Gs identified within this program provide minimal benefits to the cuckoo. Noteworthy S&Gs within this program include implementing off-highway vehicle restrictions or closures (229), establishing mitigation measures to protect riparian areas (230), and constructing minimal road densities (231).

Watershed Management Program

Applicable S&Gs within this program are mixed in their effects to the cuckoo. Although some S&Gs were found to provide habitat maintenance and/or at least minimal recovery for the cuckoo, most S&Gs within the watershed program are either ill-defined or involve short-term take of Yellow-billed Cuckoos. Standard and Guideline 246 manages and maintains only 60 percent of near natural shrub and tree crown cover. This percentage of shrub and tree crown cover may not be an adequate amount of habitat for the cuckoo and may cause displacement and abandonment of nest sites. S&G 236 allows for road construction/reconstruction and obliteration to facilitate temporary watershed activities, while S&G 237 provides protection from skidding within riparian areas and other stream courses. Both S&Gs involve are recognized for providing overall resource protection, but both S&Gs have the capacity to cause short-term take of Yellow-billed cuckoos. Particularly noteworthy positive S&Gs are 240, 244, and 247.

Wildlife, Fish, and Rare Plants Program

Forest-wide S&Gs on the Cibola NF mainly offer guidance to programs to minimize impacts to other resources, including riparian systems. All of the S&Gs within this program provide direction for cuckoo habitat maintenance or improvement. S&G 228 is notable because it seeks to manage for diverse, well-distributed habitat patterns for fish and wildlife.

On the Cibola NF, our effects analysis shows take of Yellow-billed Cuckoos is reasonably certain to occur could occur from the continued implementation of the Watershed Management Program; however at this time the species is not known to occur on the Forest.

Coconino National Forest

The Coconino NF along with Prescott NF and the Gila NF have the largest numbers of cuckoos, therefore, the S&Gs applicable to the cuckoo in these Forests may be somewhat more significant than S&Gs for the Carson (incidental sightings of the cuckoo reported) and the Cibola (15 years of surveys conducted by the Cibola NF do not indicate that the species currently occurs on the Forest). Table 65 provides a summary of the effects of S&Gs analyzed for the yellow-billed cuckoo on the Coconino NF. Over half of the S&Gs analyzed provide habitat maintenance and/or at least minimal recovery to the species. Two applicable S&Gs work towards recovery of the species, while eight S&Gs have either behavioral or sublethal effects to the cuckoo.

Table 66. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	3	2.3
-1	S&G is causing negative behavioral response	5	3.8
0	S&G is ill-defined and/or open to interpretation	13	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	86	64.7
2	S&G is moving towards recovery	2	1.5
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	6	4.5

Ranking	Explanation of Ranking	Total	Percentage
Z	S&G implementation is non-discretionary	8	6.0
X	S&G is a heading	10	7.5
Total		133	100 %

Engineering Program

Positive forest-wide S&Gs within this program are 400, 402, 404, 407, and 408. S&G 408 is particularly notable because it directs the Coconino NF to locate new roads out of riparian areas and promises to use BMPs if reconstruction is needed in wet meadows. However, short-term harassment of Yellow-billed Cuckoos may occur from the implementation of S&Gs 400, 404, 408. These S&Gs speak to road operation or maintenance which is overall positive for riparian habitat, but have the ability to cause initial disturbance of individual cuckoos.

Fire Management Program

There are only two applicable forest-wide S&Gs within the Fire Management Program on the Coconino NF. No management area S&Gs are applicable to the cuckoo. S&G 413 has no application to the cuckoo because it is outside the scope of this consultation as it relates to fire suppression activities. S&G 411 provides general ecosystem health, but involves fuel treatments, which could have an initial behavioral effect to the cuckoo.

Forestry and Forest Health Program

There are very few applicable S&Gs within this program. Of those that are applicable (345, 350, and 548), all are beneficial for the cuckoo and its riparian habitat.

Lands and Minerals Program

There are several S&Gs within this program both forest-wide and within management areas. Although some of the S&Gs restrict program activities to reduce impacts on riparian systems, many seem to give preference to other resource uses, particularly regarding mineral extraction and easements for roads and utility corridors. Management Area S&G 505 allows for mineral excavation within riparian areas following an environmental analysis and provides for riparian habitat protection during the excavation process. However, such mining activities are likely to disturb cuckoos, causing avoidance or abandonment, particularly during their breeding season. However, S&G 507 (also within the same management area) may mitigate negative effects of S&G 505 and should be highly considered by forest officials. Although S&G 384 prohibits surface occupancy where threatened and endangered species exist, the prohibition does nothing for suitable, unoccupied habitat nor does it address indirect impacts.

Two applicable S&Gs (391, 393) within this program are noted for their short-term adverse effects to cuckoos, because although projects identified within these S&Gs are positive over the long-term for threatened, endangered, and sensitive species and their habitat, the S&Gs are likely to involve initial or short-term take of the Yellow-billed Cuckoo. Positive forest-wide and management area S&Gs include 385, 394, 395, 398, and 507. S&G 394 is a particularly notable positive S&G which speaks to threatened and endangered species habitats.

Rangeland Management Program

Both forest-wide and management area S&Gs within this program are mixed in their impacts. Although some of the forest-wide S&Gs restrict program activities to reduce impacts on riparian systems, there are also many which give preference to other resource uses. Management Area S&G 424 could have sublethal effects to cuckoos by allowing grazing within wilderness areas (i.e., Management Area 1).

Forest-wide S&G 339 and management area S&G 499 are both positive S&Gs in the fact that they recognize unsatisfactory rangeland conditions and work towards improving them; however, these S&Gs may involve short-term harassment and/or take of the cuckoo. Forest-wide S&Gs 343 and 344 place controls on livestock grazing in riparian areas through fencing enclosures. Management area S&G 501 is also very similar to the above mentioned S&Gs. Other positive forest-wide and management area S&Gs within this program include 337, 425, and 485.

Recreation, Heritage, and Wilderness Program

Forest-wide S&Gs in this program are mixed in their impacts. There are very few S&Gs that restrict program activities, such as trail management, off-highway vehicle travel, and general recreation interests. Management Area S&Gs for this program are also mixed. One particular S&G for Management Area 11 (S&G 480) manages for dispersed recreation in Verde Valley along the upper Verde River and the lower Oak Creek. Dispersed recreation management has varying levels and locality of environmental impacts such as recreational vehicle camping along stream banks, hiking on fragile soils, mudding in wet meadows, and off-highway vehicle use (U.S. Forest Service 2004:68). Since the Verde River contains among the highest numbers of cuckoos within Arizona's major drainages (Corman and Magill 2000), this S&G may cause adverse behavioral effects. Also, off-highway vehicle use is of concern to the cuckoo because of potential habitat destruction, degradation of watershed condition in upland habitats, and disturbance of occupied habitats. Another negative S&G is 481, also in Management Area 11. It proposes to evaluate developments for impoundments and new water diversions, developed recreation sites, road building, and livestock grazing. With the implementation of this S&G, there is a strong possibility to potentially destroy, fragment, and remove cuckoo habitat if new facilities are developed. Other S&Gs that could potentially cause behavioral effects to the cuckoo are S&Gs 574 and 575 with in Management Area 27.

However, there are a handful of both forest-wide and Management Area S&Gs that provide habitat maintenance and/or at least minimal recovery for the cuckoo.

Watershed Management Program

Forest-wide S&G 369 allows the for the use of pesticides, and although it provides direction to ensure that surface or groundwater contamination does not occur, the S&G does not offer alternatives to pesticide use. As described above in the effects analysis for the Apache-Sitgreaves NF, pesticides may affect cuckoo behavior or cause death by direct contact (Hughes 1999). Other pesticide studies suggest possible contamination of preferred prey items (Laymon and Halterman 1987). However, most of the applicable S&Gs within this program provide minimal recovery for the cuckoo through habitat protection or provide general ecosystem health measures.

Wildlife, Fish, and Rare Plants Program

In general, most if not all of these S&Gs are positive for the cuckoo and its habitat, particularly in riparian areas. A notable forest-wide S&G is 324, which would implement beneficial activities for sensitive species. Such activities would include preparing recovery schedules and monitoring reproductive success, monitoring effects of management, and evaluating species status. Additionally, all applicable management area S&Gs prove to be beneficial for the cuckoo and its habitat. Examples of beneficial management area S&Gs include retaining and implementing riparian standards (490), livestock exclosures (491), and rehabilitation of riparian areas (494).

On the Coconino NF, our effects analysis shows take of Yellow-billed Cuckoos is reasonably certain to occur from the Engineering, Lands and Minerals, Rangeland Management, Recreation, and Watershed Management programs.

Coronado National Forest

Table 67 provides a summary of the effects of S&Gs analyzed for the Yellow-billed Cuckoo on the Coronado NF. Over half of the S&Gs maintain habitat or provide at least minimal recovery to the species. Six applicable S&Gs have behavioral and sublethal effects. However, fourteen S&Gs work towards recovery. Additionally, no S&Gs for the Coronado NF have lethal effects to the cuckoo.

Table 67. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	4	4.3
-1	S&G is causing negative behavioral response	2	2.2
0	S&G is ill-defined and/or open to interpretation	13	14.0
1	S&G is maintaining habitat & providing at least minimal recovery	54	58.1
2	S&G is moving towards recovery	14	15.1
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	3	3.2
Z	S&G implementation is non-discretionary	2	2.2
X	S&G is a heading	1	1.1
Total		93	100 %

Engineering Program

The applicable S&Gs within this program are not highly relevant to the cuckoo nor did they provide much resource protection. The majority of the time, these S&Gs were too vague, had conflicting meanings or management direction, and/or were not interpretable to assign a ranking pursuant to our exposure/response analysis.

Fire Management Program

Standards and Guidelines 713, 798, and 812 all involve the use of prescribed fire to reduce fuel hazard and maintain or improve wildlife habitat, livestock forage, and watershed condition. While these S&Gs are overall positive to ecosystem management and health, short-term adverse effects in the form of harassment of the Yellow-billed Cuckoo is likely to occur.

Forestry and Forest Health Program

Within this program, forest-wide and management area S&Gs are mixed in their effects to Yellow-billed Cuckoos. Most applicable S&Gs for this program are noted for their behavioral effects to the Yellow-billed Cuckoo, with only one S&G receiving a positive ranking. Forest-wide S&Gs 697 and 699 allow for the use of pesticides within cuckoo habitat. Refer to the effects analysis section of the Apache-Sitgreaves NF LRMP (Lands and Minerals program). Management Area S&G 704 considers threatened, endangered, and sensitive species habitat above vegetation manipulation for insect and disease control.

Lands and Minerals Program

The Lands and Minerals program impacts cuckoo populations through water diversions and authorizations to convey water over National Forest System lands. The Coronado NF along with the Tonto NF has the most acres (102 acres or 12.4 percent of total) in water diversions (U.S. Forest Service 2004:53). The most notable and relevant S&Gs within this program are 837 and 838.

Rangeland Management Program

Overall, the applicable S&Gs within this program are mixed in their effects. Management Area S&Gs 792 and 805 allow for grazing in 7A and 7B, respectively. The decline of the Yellow-billed Cuckoo in the western United States can be attributed to riparian habitat fragmentation or loss. Among the main catalysts leading towards riparian fragmentation and degradation in the western United States is livestock grazing. Livestock grazing in riparian habitats typically results in reduction of plant species diversity and density, particularly palatable broadleaf plants like willows and cottonwood saplings (Carothers 1977, Rickard and Cushing 1982, Cannon and Knopf 1984, Klebenow and Oakleaf 1984, General Accounting Office 1988, Clary and Webster 1989, Schultz and Leininger 1990). Due to the cuckoo's sensitivity to habitat fragmentation and destruction through grazing, these particular S&Gs could have sublethal effects. Possible outcomes of grazing within cuckoo habitat include reduced fecundity and reduced feeding success.

However, management area S&G 710 directs rangeland within Management Area 1 to be managed at Level A (no assigned permitted use for livestock) and management area S&G 780 directs Management Area 4 to develop grazing systems to protect vegetation, soil, and water resources. Additionally, S&G 829 (Management Area 9) provides direction towards range management within riparian areas.

Recreation, Heritage, and Wilderness Program

There are very few applicable S&Gs within this program. Of those applicable, S&Gs 626 and 832 were determined to be ill-defined. However, positive forest-wide and management area S&Gs include 612, 613, 626, and 831.

Watershed Management Program

Overall, both forest-wide and management area S&Gs for this program are positive, with most applicable S&Gs providing overall watershed protection and general ecosystem health. However, forest-wide S&Gs 679 and 680 may need to reevaluate if 60 percent of natural cover is adequate for the cuckoo. Cuckoos prefer large blocks of riparian habitats, particularly woodlands with cottonwoods and willows, with a dense understory (Ehrlich et al. 1988). Therefore, sixty percent of shrub and tree crown cover may not be an adequate amount of habitat for the cuckoo and may cause behavioral effects, particularly abandonment and displacement. The most relevant, positive S&Gs are 675, 676, 678 and 681. S&G 677, although extremely important to properly functioning riparian systems, could involve short-term adverse effects to Yellow-billed Cuckoos.

Wildlife, Fish, and Rare Plants Program

Only one S&G within this program is noted for its short-term adverse effects to cuckoos. Standard and Guideline 667 seeks to provide for structural and non-structural improvements, and specifies that prescribed burning as part of these improvements. Prescribed burning is, in general, a positive aspect of habitat improvement; however, short-term harassment may be associated with this S&G. Overall, most applicable S&Gs within this program are beneficial for cuckoo habitat, or worked towards species recovery.

Particularly noteworthy S&Gs within the Wildlife Program are 629, 632, 635, 644, 649, and 659. Additionally, all management area S&Gs seem to be beneficial to the cuckoo and its habitat. However, most of the management area S&Gs specifically seek to maintain habitat for threatened and endangered species. This could be beneficial to the cuckoo if habitat is maintained for riparian bird species, such as the Southwestern Willow Flycatcher. Overall, management area S&Gs are generally management emphasis. The most notable management area S&G is 788.

On the Coronado NF, our effects analysis shows adverse effects to Yellow-billed Cuckoos may occur from the Engineering, Fire Management, Rangeland Management, Watershed Management, and Wildlife programs.

Gila National Forest

The Coconino NF along with Prescott NF and the Gila NF have the largest numbers of cuckoos, therefore, the S&Gs applicable to the cuckoo in these Forests may be somewhat more significant than S&Gs for the Carson (incidental sightings of the cuckoo reported) and the Cibola (15 years of surveys conducted by the Cibola NF do not indicate that the species currently occurs on the Forest). Table 68 provides a summary of the effects of S&Gs analyzed for the Yellow-billed Cuckoo on the Gila NF. Most of the S&Gs maintain habitat or provide minimal recovery to the species. Additionally, five S&Gs work towards recovery. No S&Gs for the Gila NF were determined to have behavioral, sublethal, or lethal effects to the cuckoo.

Many of the applicable S&Gs within the Gila NF LRMP provide direction for riparian systems, especially those S&Gs in the Watershed Management and Wildlife programs. Also, the Gila NF has excluded livestock grazing from large portions of the San Francisco and Gila Rivers to

improve riparian function. Wetlands have been developed at the Gila River Bird Management Area, with both livestock grazing and off-highway vehicles excluded from this area.

Table 68. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	4.5
1	S&G is maintaining habitat & providing at least minimal recovery	35	79.5
2	S&G is moving towards recovery	5	11.4
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	4.5
X	S&G is a heading	0	0.0
Total		44	100 %

Engineering Program

Standard and Guideline 842 is the only applicable S&G within this program. It avoids road construction in riparian areas; therefore, this S&G provides baseline recovery for the Yellow-billed Cuckoo.

Fire Management Program

There are only two applicable forest-wide S&Gs for this program. Standard and Guideline 845 allows for forest-wide prescribed fires, which is beneficial for ecosystem health overall, but could cause adverse effects to Yellow-billed Cuckoos. This can also be said for S&G 844, which also allows for prescribed burning, but intends to be conscientious of vegetation types and the role of natural fire.

Lands and Minerals Program

Within this program, S&G 854 is especially positive for cuckoo habitat in that it limits land acquisitions within classified wilderness areas and areas containing threatened and endangered species. This is the only applicable S&G within this program for the Gila NF LRMP.

Rangeland Management Program

Standard and Guideline 858 states grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas. The overall intent of this S&G appears to provide for improved riparian conditions; however, short-term adverse effects to the cuckoo may occur during the period of overlap between cuckoo nesting season and livestock grazing in riparian areas. However, as stated above, livestock grazing has been excluded from areas occupied by the Yellow-billed Cuckoo.

Recreation, Heritage, and Wilderness Program

There are only two applicable forest-wide S&Gs and both relate to the improvement of riparian areas with respect to recreation. One S&G prohibits off-highway vehicle use in forest-wide research natural areas; the other seeks to manage riparian areas within recreational areas so as to minimize damage.

Watershed Management Program

There are several applicable forest-wide S&Gs within this program, but only one management area S&G. Of all the applicable S&Gs within this program, the most beneficial S&Gs are 860 and 863.

Wildlife, Fish, and Rare Plants Program

There are several S&Gs within this program that will perform a variety of activities to maintain or improve cuckoo habitat, particularly riparian habitat and include S&Gs 846, 847, 850, and 851. Two other extremely notable S&Gs are 869 and 870. Additionally, S&G 878 provides direction to manage for indigenous species. Two S&Gs (848 and 933) are noted for their potential short-term adverse effects to cuckoos.

On the Gila NF, our effects analysis shows adverse effects to take of Yellow-billed Cuckoos could occur from the Fire Management, Range and Wildlife programs.

Prescott National Forest

Table 69 provides a summary of the effects of S&Gs analyzed for the Yellow-billed Cuckoo on the Prescott NF. Nearly all the S&Gs analyzed for the Prescott provide at least minimal recovery for the cuckoo. This is significant because the Prescott NF was among the three Forests identified as having the largest numbers of cuckoos (Northern Arizona University 1999). Additionally, only one S&Gs on this Forest was determined to have sublethal effects to the cuckoo.

Table 69. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	1.6
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.9
1	S&G is maintaining habitat & providing at least minimal recovery	47	77.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	1.6
Z	S&G implementation is non-discretionary	2	3.3
X	S&G is a heading	7	11.5
Total		61	100 %

Overall, the forest-wide S&Gs for the Prescott NF were positive in that most were specific to the cuckoo and habitat maintenance or improvement and include these S&Gs within the following programs:

- Wildlife, Fish, and Rare Plants - 1115, 1119, 1127, 1133
- Watershed Management - 1123, 1124, 1143, 1144, 1145, 1146
- Recreation, Heritage, and Wilderness - 1126, 1138
- Rangeland Management – 1150, 1151, 1155, 1157, 1158

Forest-wide S&Gs 1162, within the Rangeland Management Program, allows for the use of pesticides within cuckoo habitat. Refer to the effects analysis section of the Apache-Sitgreaves NF LRMP (Lands and Minerals program).

On the Prescott NF, our effects analysis shows adverse effects to the Yellow-billed Cuckoos may occur from the Rangeland Management Program.

Tonto National Forest

Table 70 provides a summary of the effects of S&Gs analyzed for the yellow-billed cuckoo on the Tonto NF. Most of the S&Gs analyzed maintain habitat or provide minimal recovery to the species. Additionally, only two S&Gs for the Tonto NF were determined to have behavioral or sublethal effects to the cuckoo.

Table 70. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo - Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	3.3
-1	S&G is causing negative behavioral response	1	3.3
0	S&G is ill-defined and/or open to interpretation	3	10.0
1	S&G is maintaining habitat & providing at least minimal recovery	24	80.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	3.3
X	S&G is a heading	0	0.0
Total		30	100 %

Rangeland Management Program

S&G 1420 allows for Level C grazing within Management Area 6F, except in specified portions. This S&G is noted for possible sublethal effects; please refer to the effects analysis section in the Rangeland Management Program on the Coronado NF for a discussion of grazing effects on riparian habitat.

Wildlife, Fish, and Rare Plants Program

Nearly all applicable forest-wide S&Gs for the Tonto NF are in the Wildlife Program. These S&Gs provide guidance and place restrictions on program activities to reduce impacts to resources, including riparian areas. These include S&Gs 1341, 1342, 1355, 1356, 1357, and 1360. Of these S&Gs, the most noteworthy is 1360 as it relates directly to the status of candidate species forest-wide. However, S&Gs 1349, 1350, and 1353 involve riparian management activities on cottonwood-willow and other broadleaf species. Although working towards a properly function system, these projects may cause behavioral effects such as disturbance or abandonment. As such, these S&Gs were noted for potential initial adverse effects associated with these overall beneficial projects. Management area S&Gs focus on conservation for other threatened and endangered species, such as the bald eagle, which might also benefit the cuckoo. S&Gs 1371, 1378, and 1419 concentrate on planting large cottonwood poles in different management areas within the Tonto NF.

On the Tonto NF, our effects analysis shows adverse effects to Yellow-billed Cuckoos may occur from the Range and Wildlife programs. short-term take associated with these overall beneficial projects. Management Area S&Gs focus on conservation for other threatened and endangered species, such as the bald eagle, which might also benefit the cuckoo. S&Gs 1371, 1378, and 1419 concentrate on planting large cottonwood poles in different management areas within the Tonto NF.

On the Tonto NF, our effects analysis shows adverse effects of Yellow-billed Cuckoos may occur from the Range and Wildlife programs.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems, functioning watersheds, and riparian and aquatic systems (U.S. Forest Service 2004). Yellow-billed Cuckoo sites occur within the Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are relevant to the Yellow-billed Cuckoo. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 71. Effects of the S&Gs analyzed for the Yellow-billed Cuckoo – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	6.5
1	S&G is maintaining habitat & providing at least minimal recovery	25	54.3
2	S&G is moving towards recovery	0	0.0

Ranking	Explanation of Ranking	Total	Percentage
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	10	21.7
Z	S&G implementation is non-discretionary	2	4.3
X	S&G is a heading	6	13.0
Total		46	100 %

Table 71 provides a summary of the effects of S&Gs within the 1996 Regional Amendment analyzed for the Yellow-billed Cuckoo. S&Gs from the 1996 Regional Amendment were predominately adopted for the Mexican Spotted Owl and Northern Goshawk; therefore, most of the applicable S&Gs provide at least minimal recovery for the cuckoo.

Most S&Gs within the 1996 Regional Amendment maintain cuckoo habitat or provide at least minimal recovery as indicated by Table 71. S&G 1438 would allow the continuation of recreation at a level similar to what was occurring before listing of the Mexican Spotted Owl. High levels of recreation in riparian areas could result in adverse effects to individual Yellow-billed Cuckoos. These responses could range from startling and alarming cuckoos to displacement and abandonment of established habitat. If the level of recreation prior to Mexican Spotted Owl listing was relatively low, then the cuckoos should not be affected. However, this S&G is ill-defined, because depending on its implementation on the ground, it could either be beneficial or detrimental to the cuckoo.

Most of the applicable S&Gs address beneficial indirect effects to the cuckoo by improving watershed condition or reducing upland effects. Standards and Guidelines would improve overall watershed condition include 1477, 1479, 1490, and 1510.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Future activities affecting the Yellow-billed Cuckoo that are reasonably certain to occur within the action area include grazing on state and private lands, agricultural development, water developments, urban developments, and possibly other non-federal activities.

CONCLUSION

After reviewing the current status of the Yellow-billed Cuckoo, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s conference opinion that the LRMPs for the Apache-Sitgreaves, Carson, Cibola, Coconino, Coronado, Gila, Prescott, and Tonto NFs, as well as the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Yellow-billed Cuckoo. Pursuant to 50 CRF 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the

reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

Our non-jeopardy opinion is based on the analysis of the S&Gs within the above mentioned LRMPs. Although our effects analysis showed that negative impacts to the species is likely to occur with the implementation of certain S&Gs, we do not believe that actions authorized under the Apache-Sitgreaves, Carson, Cibola, Coconino, Coronado, Gila, Prescott, and Tonto NF LRMPs, as well as the 1996 Regional Amendment will jeopardize the existence of the Yellow-billed Cuckoo. The FWS reached this conclusion for the following reasons:

- The proposed actions authorized under the above LRMPs and 1996 Regional Amendment are not expected to result in the disruption of the western distinct population segment population dynamics.
- The effects analysis showed few S&Gs with behavioral, sublethal, and lethal effects within the above LRMPs and 1996 Regional Amendment.
- The broad distribution of the Yellow-billed Cuckoo outside the action area allows cuckoo numbers to remain stable.
- River systems in New Mexico located off National Forest System land presently support a relatively abundant Yellow-billed Cuckoo population.
- Four of the eight National Forests under consideration for this species have implemented various conservation and restoration efforts in riparian areas as follows, thus working towards improving the baseline riparian conditions: Tonto NF – excluded grazing from 15 miles of Tonto Creek and continues to cooperate with the Salt River Project to implement mitigations from the Habitat Conservation Plan, Carson NF – excluded livestock from the Rio Rancho SWWF site since 1990, Coconino NF – constructed riparian closures (along 2.65 miles of stream) to exclude approximately 570 acres from livestock grazing in suitable Yellow-billed Cuckoo habitat, and Gila NF – excluded livestock grazing from large portions of the San Francisco and Gila Rivers, developed wetlands at the Gila River Bird Management Area, closed the Gila River Bird Management Area to OHV use.

Therefore, given the wide-ranging distribution of the species, the improvement of baseline riparian conditions, and the management direction provided by the S&Gs listed above, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Yellow-billed Cuckoo.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat

modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

As a candidate species, the prohibitions against taking the Yellow-billed Cuckoo found in section 9 of the ESA (as stated above) do not apply until the species is listed. However, the FWS advises the Forest Service to consider implementing the reasonable and prudent measures defined in this conference opinion to conserve the species and preclude listing. If this conference opinion is adopted as a biological opinion following federal listing and/or critical habitat designation, the measures described below, with their implementing terms and conditions, will be non-discretionary. These measures must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Yellow-billed Cuckoo is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Carson, Coconino, Coronado, Gila, Prescott, and Tonto NFs LRMPs. Incidental take is expected to be in the forms of harm and harass to the species. However, the FWS anticipates incidental take of the Yellow-billed cuckoo will be difficult to detect for the following reasons: the species is wide ranging; finding a dead or impaired specimen is unlikely; and the species occurs in habitat that makes detection difficult. Therefore, based on the best available scientific and commercial data, the FWS is providing a mechanism for when take would be considered exceeded. Currently occupied drainages will be used to indicate when take has been exceeded. The FWS concludes that the incidental take of Yellow-billed Cuckoos will be considered to be exceeded if, after a period of two consecutive years of surveys, one of the currently occupied drainages (See Table 61 and Figure 4) is no longer occupied by Yellow-billed Cuckoos as a result of the proposed action.

Effect of the Take

In the accompanying conference opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Yellow-billed Cuckoo.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Yellow-billed Cuckoo:

1. Protect known populations of Yellow-billed Cuckoo on National Forest System lands.
2. Protect Yellow-billed Cuckoo habitat on National Forest System lands.
3. Monitor Yellow-billed Cuckoo occupancy on National Forest System lands.

TERMS AND CONDITIONS

Following the species listing or designation, in order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Follow FWS regional guidance criteria issued for pesticide use in occupied cuckoo habitat.
- 1.2 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Recreation programs to minimize or eliminate adverse effects to the Yellow-billed Cuckoo.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Recreation programs to minimize negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied Yellow-billed Cuckoo habitat.
- 2.2 Manage riparian areas inhabited by Yellow-billed Cuckoos for dense riparian vegetation with large blocks of cottonwood trees to eliminate direct effects and minimize indirect effects to Yellow-billed Cuckoo.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and on-going research efforts, monitor Yellow-billed Cuckoo occupancy in drainages identified by Woodward et al. 2003 in New Mexico, and Corman and Magill 2000 in Arizona on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Yellow-billed Cuckoos, pursuant to 50

CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Identify and survey potential Yellow-billed Cuckoo habitat following species-specific survey protocol.
2. Monitor the population trends of the Yellow-billed Cuckoo. Monitoring schemes will be developed in cooperation with FWS, state conservation agencies, and/or with any associated on-going research efforts.
3. Work in conjunction with local universities and other relevant federal and state agencies to determine habitat use by cuckoos outside of the riparian areas.
4. Develop a Candidate Conservation Plan for the Yellow-billed Cuckoo to maintain and promote status of the cuckoo on National Forest System lands.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

CHIRICAHUA LEOPARD FROG

STATUS OF THE SPECIES

Description

Leopard frogs (*Rana pipiens* complex), long considered to consist of a few highly variable species, are now recognized as a diverse assemblage of 17 or more species, with many of these species described in the last 20 years (Hillis 1988, Frost 2004). Based on morphology, mating calls, and genetic analysis (electrophoretic comparisons of blood proteins), Platz and Platz (1973) demonstrated that at least three distinct forms of leopard frogs occurred in Arizona, including the southern form, which was subsequently described as the Chiricahua leopard frog (*Rana chiricahuensis*) (Platz and Mecham 1979).

The Chiricahua leopard frog (frog) is distinguished from other members of the *Rana pipiens* complex by a combination of characters, including a distinctive pattern on the rear of the thigh consisting of small, raised, cream-colored spots or tubercles on a dark background; dorsolateral folds that are interrupted and deflected medially; stocky body proportions; relatively rough skin on the back and sides; and, often green coloration on the head and back (Platz and Mecham 1979). The species has a distinctive call consisting of a relatively long snore of 1 to 2 seconds in duration (Platz and Mecham 1979, Davidson 1996). Snout-vent lengths of adults range from 2.1 to 4.2 in (54 to 107 mm) (Degenhardt et al. 1996).

Legal Status: On June 13, 2002, the Chiricahua leopard frog was listed as a threatened species under the ESA, as amended (U.S. Fish and Wildlife Service 2002). Included in the final listing package was a special rule to exempt operation and maintenance of livestock tanks on non-federal lands from section 9 take prohibitions of the ESA.

In Mexico, the Chiricahua leopard frog is considered a threatened species. As a result, their habitat is afforded moderate protection from some activities, while their collection is prohibited (U.S. Fish and Wildlife Service 2002). The species is not protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates international trade.

The Chiricahua leopard frog is included on the AGFD's Draft Species of Concern (Arizona Game and Fish Department 1996). Arizona Game and Fish Commission Order 41 prohibits the collection of the frog in Arizona, except where collection is authorized by a special permit. The species is afforded no protected status in the state of New Mexico beyond its federal listing under the ESA.

This species has a recovery priority number of 2C. This ranking, determined in accordance with the Recovery Priority Criteria (U.S. Fish and Wildlife Service 1983) and ranging from a high of 1C to a low of 18, is based on the high degree of threat, a high potential for recovery, and the Chiricahua leopard frog's taxonomic classification as a species. A public review draft of the Chiricahua leopard frog Recovery Plan is scheduled for release in the fall of 2005.

Designation of critical habitat requires that location data be published in the Federal Register, which may lead to increased collection pressures and likelihood of disease transmission. For these reasons, designation of critical habitat for the frog was considered not prudent (U.S. Fish and Wildlife Service 2002).

Distribution and Abundance

Recent articles in the scientific literature report the extirpation and extinction of amphibians in many parts of the world (Blaustein and Wake 1990, Pechmann et al. 1991, Vial and Saylor 1993, Laurence et al. 1996, Lips 1998, Berger et al. 1998, Houlahan et al. 2000, Stuart et al. 2004). A total of 1,856 species, or 32.5 percent of all amphibians, are globally threatened (on the IUCN Red List), and 43.2 percent are experiencing some form of population decrease (Stuart et al. 2004). In the U.S., the family Ranidae, which includes the Chiricahua leopard frog, is particularly affected (Corn and Fogleman 1984, Hayes and Jennings 1986, Clarkson and Rorabaugh 1989, Bradford 1991, Sredl 1993, Sredl et al. 1997). Currently, the frog is known to be absent from approximately 76 percent and 82 percent of its historic localities in Arizona and New Mexico, respectively (U.S. Fish and Wildlife Service 2000).

In Arizona, the frog still occurs in seven of eight major drainages of historical occurrence (Salt, Verde, Gila, San Pedro, Santa Cruz, Yaqui/Bavispe, and Magdalena river drainages), but appears to be extirpated from the Little Colorado River drainage on the northern edge of the species' range. Within the drainages where the species occurs, it was not found recently in some major tributaries and/or in river mainstems. For instance, the species has not been reported since 1995 from the following drainages or river mainstems where it historically occurred: White River, West Clear Creek, Tonto Creek, Verde River mainstem, San Carlos River, upper San Pedro River mainstem, Santa Cruz River mainstem, Aravaipa Creek, Babocomari River mainstem, and Sonoita Creek mainstem. In southeastern Arizona, no recent records (1995 to the present) exist for the following areas: Pinaleno Mountains, Peloncillo Mountains, and Sulphur Springs Valley. Moreover, the species is now absent from all but one of the southeastern Arizona valley bottom cienega complexes. Large valley bottom cienega complexes may have once supported the largest populations in southeastern Arizona, but non-native predators are now so abundant that the cienegas do not presently support the frog in viable numbers (U.S. Fish and Wildlife Service 2002).

Northern populations of the frog along the Mogollon Rim and in the mountains of west-central New Mexico are disjunct from those in southeastern Arizona, southwestern New Mexico, and Mexico. Recent genetic analyses, including a 50-loci starch gel survey, morphometrics, and analyses of nuclear DNA, supports describing the northern populations as a distinct species (Platz and Grudzien 1999). In another study, frogs from these two regions showed a 2.4 percent average divergence in mitochondrial DNA sequences (Goldberg et al. 2004). Multiple haplotypes within the frog were also identified using mitochondrial DNA analysis (Benedict and Quinn 1999), providing further evidence of genetically distinct population segments. Based on morphological similarities, Hillis and Wilcox (2005) suggest the northern populations may be referable to *Rana fisheri* (Vegas Valley leopard frog), a taxon from the Las Vegas Valley, Nevada, considered by most to be extinct (Bradford 2002). However, *R. fisheri* in the Vegas Valley was disjunct from Mogollon Rim *chiricahuensis* populations by about 230 miles, thus if the two are closely-related or conspecific, it begs some interesting biogeographical questions.

The Ramsey Canyon leopard frog (*Rana subaquavocalis*) is similar in appearance to the Chiricahua leopard frog, and genetic work supports subsuming *R. subaquavocalis* into *chiricahuensis* (Goldberg et al. 2004, Hillis and Wilcox 2005). Not counting the two extant populations of Ramsey Canyon leopard frog, we estimate that about 17 northern (Mogollon Rim) and 39 southern populations are extant in Arizona.

The frog occurs in west-central and southwestern New Mexico in Catron, Grant, Hidalgo, Luna, Socorro, and Sierra Counties. In New Mexico, the frog has been collected or observed at 182 localities over time (Painter 2000). In 1995, Jennings reported that frogs still occurred at only eleven sites in New Mexico. Based on additional work, Painter (2000) listed forty-one localities at which frogs were found from 1994-1999. Thirty-three of these are north of Interstate 10 and eight are in the southwestern corner of the state. Thirty-one of the 41 populations were verified extant during 1998-1999 (Painter 2000). However, during May-August 2000, the frog was found at only eight of 34 sites (U.S. Fish and Wildlife Service 2002). Three populations east of Hurley in Grant County declined or were extirpated during 1999 to 2000, and preliminary data indicate another population on the Mimbres River, also in Grant County, has experienced a significant die-off (U.S. Fish and Wildlife Service 2002). Survey results from the 2004 field season indicate that in New Mexico, there are thirty-one locations where the frog can be considered as likely to occur (R. Williams, FWS, 2004, unpubl. data; R. Jennings, Western New Mexico University, 2005, unpubl. data).

Habitat

The frog is an inhabitant of cienegas (wetlands), pools, livestock tanks, lakes, reservoirs, streams, and rivers at elevations of 3,281 to 8,890 ft (1,000 to 2,710 m) in central and southeastern Arizona; west-central and southwestern New Mexico; and in northern Sonora, the Sierra Madre Occidental of northern and central Chihuahua, and perhaps south to northern Durango in Mexico (Platz and Mecham 1984, Degenhardt et al. 1996, Sredl et al. 1997). The distribution of the species in Mexico is unclear due to limited survey work and the presence of closely related taxa (especially *Rana montezumae*) in the southern part of the range of the frog. In New Mexico, of sites occupied by the frog from 1994 to 1999, 67 percent were creeks or rivers, 17 percent were springs or spring runs, and 12 percent were stock tanks (Painter 2000). In Arizona, slightly more than half of known historical localities are natural lotic systems, a little less than half are stock tanks, and the remainder are lakes and reservoirs (Sredl et al. 1997). Sixty-three percent of known populations in Arizona in 1998 occurred in stock tanks (Sredl and Saylor 1998).

No formal studies of habitat use by frogs have been completed. However, an important general characteristic is the presence of permanent or nearly permanent water that is devoid of non-native predators (e.g., bullfrogs, crayfish, and predatory fish). The role of habitat heterogeneity within the aquatic and terrestrial environment is unknown, but is likely important. Shallow waters with emergent and perimeter vegetation provide tadpole and adult basking habitats, while deeper water, root masses, and undercut banks provide refuge from predators and potential sites for hibernation (Sredl and Jennings, *in press*). Most perennial waters supporting frogs possess fractured rock substrata, emergent or submergent vegetation, deep water, root masses, undercut banks, or some combination of these features that frogs may use as refugia from predators and extreme climatic conditions. Frogs are thought to over-winter at or near breeding sites, although

these microsites have not been studied. Other leopard frogs typically over-winter at the bottom of well-oxygenated ponds or lakes and may bury themselves in the mud (Nussbaum et al. 1983, Cunjak 1986, Harding 1997).

Life History

Breeding sites include stock tanks, streams, cienegas, springs, and ponds. Sites with year-round flow, constant water temperature, a depauperate fish community, and thermal springs appear to be particularly important (Scott and Jennings 1985). Egg masses have been found in all months except November, December, and January; however, reports of oviposition in June are also uncommon (Sredl and Jennings, *in press*). Frost and Platz (1983) found that Chiricahua leopard frogs at elevations below 5,900 ft (1,800 m) tended to oviposit from spring to late summer, while populations above 5,900 ft (1,800 m) bred during the summer months of June, July, and August. Oviposition may take place year-round in thermal springs (Scott and Jennings 1985).

Females deposit egg masses on vegetation within 2 in (5 cm) of the water surface (Jennings and Scott 1991), probably in water temperatures between 54.7-85.1°F (12.6-29.5°C). Zweifel (1968) found that the temperature range for Chiricahua leopard frog embryo development is 53.6-88.7°F (12.0-31.5°C). They lay 300-1500 eggs in an egg mass (Jennings and Scott 1991) on aquatic vegetation including *Potamogeton* spp., *Rorippa* spp., *Echinochloa* spp., and *Leersia* spp. (Sredl and Jennings, *in press*). Hatching time may be as short as 8 days in geothermal influenced springs (Sredl and Jennings, *in press*). Tadpoles are known to over-winter (Frost and Platz 1983) with the larval period lasting as short as three months to as long as nine months (Jennings 1988, 1990).

The juvenile habitat requirements of frogs are not well studied, but spatial and temporal separation of adults and juveniles may enhance survivorship. Seim and Sredl (1994) studied the association of juvenile-adult stages and pool size in the closely related lowland leopard frog (*Rana yavapaiensis*) and found that juveniles were more frequently associated with small pools and marshy areas while adults were associated with large pools. Fernandez (1996) speculated that lack of cover and cannibalism was the reason for low juvenile survival in a captive colony of frogs. Jennings (1988) found that juveniles were more active during the day, while adults were more active at night.

Age and size at reproductive maturity are also poorly known. In southeastern Arizona, juvenile frogs and late-stage tadpoles introduced to an outdoor enclosure in May and June 1994, reproduced in September 1994 (Rosen and Schwalbe 1998). Size at which females reach sexual maturity is not known. Although scoring of annuli (annual growth rings in bones) in Chiricahua leopard frogs is more difficult than in lowland leopard frogs (Collins et al. 1996), preliminary determination of age based on annual growth rings indicates that they can live as long as six years (Durkin 1995). Skeletochronology of the closely related Ramsey Canyon leopard frog indicated that 47 percent of sampled adults were age six or older. The oldest frogs were estimated to be 10 years post-metamorphosis (Platz et al. 1997).

Although frog juveniles and adults are generally inactive between November and February, a detailed study of wintertime activity or habitat use has not been done. Male home range sizes (dry season mean = 161.0 m²; wet season, mean = 375.7 m²) tended to be larger than those of

females (dry season mean = 57.1 m²; wet season mean = 92.2 m²). The largest home range size documented for the frog was that of a male who used approximately 23,390 m² (2,339 m by 10 m) of an intermittent, low elevation canyon (1,775 m) in New Mexico during July and August of 1999. Another male moved 2.1 mi (3.5 km) in one direction during that same time period. The largest home range size documented for a female frog was about 9,500 m² (950 m by 10 m). Male frogs tended to expand home range size to a greater degree than females when dry season (early July) was compared to wet season (late July and August) (Sredl and Jennings, *in press*).

Adult and juvenile frogs avoid terrestrial predators by jumping into the water (Frost and Bagnara 1977). Among members of the *Rana pipiens* complex, Chiricahua leopard frogs possess the unusual ability to profoundly darken their ventral skin under conditions of low albedo (reflectance) and low temperature (Fernandez and Bagnara 1991, 1993). In clear, swiftly-moving streams (low albedo environments) this trait is thought to aid in escape from predators by reducing the amount of attention generated by bright flashes of white ventral skin. Other anti-predator mechanisms have not been identified, but deep water, vegetation, undercut banks, root masses, and other cover sites have been mentioned as important retreats.

Populations of the frog occurring in thermally stable habitats (hot springs) may be reproductively active throughout the year. Jennings (1988, 1990) reported reproductive activity throughout the year in Alamosa Warm Springs in Socorro County, New Mexico, where the water temperature remains above 16° C (61° F). He also found that in a nearby stock tank with varying water temperatures, reproduction occurred only during late April through May and mid-August through late September. In New Mexico, the frog may exhibit seasonal fluctuations in relative abundance. Overall frog abundance increases with the metamorphosis of tadpoles in August and September, and is lowest from December through March (Degenhardt et al. 1996). Throughout the year, frog activity generally increases as the nocturnal water temperature increases (Jennings 1990).

No comprehensive studies of the feeding behavior or diet of frog larvae or adults have been conducted. Larval frogs are primarily herbivorous. Available food items at one site examined within the range of this species include bacteria, diatoms, phytoplankton, filamentous green algae, water milfoil (*Myriophyllum* sp.), duckweed (*Lemna minor*), and detritus (Marti and Fisher 1998). The diet of adult frogs likely contains a wide variety of insects and other arthropods (Degenhardt et al. 1996). Stomach analyses of other members of the leopard frog complex from the western U.S. show a wide variety of prey items including many types of aquatic and terrestrial invertebrates (e.g., snails, spiders, and insects) and vertebrates (e.g., fish, other anurans [including conspecifics], and small birds) (Stebbins 1951).

Population Dynamics

Metapopulation dynamics are an important component of stable, persistent frog populations. A metapopulation is a system of local populations connected by dispersing individuals (or a set of local populations which interact via individuals moving among local populations) (Hanski and Gilpin 1991). A local population is a set of individuals which interact with each other with a high degree of probability (Hanski and Gilpin 1991). Local populations are often disjunct, occupying relatively isolated suitable patches of habitat. Interactions among local populations establish a dynamic which can be characterized by the rates of local population extirpation and

recolonization, and that in turn, create a phenomenon of local population turn over. Metapopulations persist until all local populations are extirpated (Hanski and Gilpin 1991). Metapopulations provide an important survival mechanism for frogs in that they allow for suitable habitats to be repopulated after extirpation or for new sites close to extant populations to be populated anew.

An understanding of the dispersal abilities of frogs is essential for determining the likelihood that unoccupied habitat will be colonized from a nearby population of extant frogs. As a group, leopard frogs are surprisingly good at dispersal. Movement may occur with the active movement of adult frogs or the passive movement of tadpoles along stream courses. The Rio Grande leopard frog (*Rana berlandieri*) in southwestern Arizona has been observed to disperse at least one mile from any known water source during the summer rainy season (Rorabaugh, *in press*). In New Mexico, Jennings (1987) noted collections of Rio Grande leopard frogs from intermittent water sources and suggested these were frogs that had dispersed from permanent water during wet periods.

In 1974, Frost and Bagnara (1977) noted passive and active movement of Chiricahua and Plains (*Rana blairi*) leopard frogs for five miles or more along East Turkey Creek in the Chiricahua Mountains. In August 1996, Rosen and Schwalbe (1998) found up to 25 young adult and sub-adult frogs at a roadside puddle in the San Bernardino Valley of Arizona. They believed that the only possible origin of these frogs was a stock tank located 3.4 miles away. Rosen et al. (1996) found small numbers of frogs at two locations in Arizona that supported large populations of non-native predators. The authors suggested these frogs could not have originated at these locations because successful reproduction would have been precluded by predation. They found that the likely source of these animals were from populations 1.2 to 4.3 miles away. In the Dragoon Mountains of Arizona, frogs breeding at Halfmoon Tank occasionally turn up at Cochise Spring (0.8 miles down canyon via an ephemeral drainage) and in Stronghold Canyon (1.1 miles down canyon via an ephemeral drainage). Because there is no breeding habitat for frogs at Cochise Spring or Stronghold Canyon, it appears that observations of frogs at these sites represent immigrants from Halfmoon Tank. In the Chiricahua Mountains, a population of frogs disappeared from Silver Creek stock tank after the tank dried up, but frogs then began to appear in Cave Creek, which is about 0.6 miles away, again, suggesting immigration.

Movements away from water do not appear to be random. Streams are important dispersal corridors for young northern leopard frogs (Seburn et al. 1997). Displaced northern leopard frogs apparently use olfactory and auditory cues, and possibly celestial orientation, as guides (Dole 1968, 1972). Rainfall or humidity may also be important factors in dispersal because odors carry well in moist air, making it easier for frogs to find other wetland sites (Sinsch 1991).

Reasons for Listing

A number of factors have been identified as possible causes of global amphibian decline, and although the specific role of each factor in the declining status of the frog is unknown or poorly studied, in certain populations, each may be contributing causal factors. Furthermore, many factors are likely working in concert to exacerbate deleterious effects (Keisecker and Blaustein 1995; Vatnick et al. 1999; Middleton et al. 2001; Keisecker et al. 2001; Carey et al. 1999, 2001). Known threats to the frog include predation by non-native organisms, especially bullfrogs, fish,

and crayfish; disease (chytrids); drought; climate change; floods; degradation and destruction of habitat as a result of dams, water diversions, and groundwater pumping; improper livestock management; altered fire regimes due to fire suppression and livestock grazing; disruption of metapopulation dynamics; mining; woodcutting; development and other human activities; increased possibility of extirpation due to low population numbers; and environmental contamination (U.S. Fish and Wildlife Service 2002).

Threats: Numerous studies indicate that declines and extirpations of the frog is at least in part caused by predation and possibly by competition with non-native organisms, including fish in the family Centrarchidae (*Micropterus* spp., *Lepomis* spp.), bullfrogs (*Rana catesbeiana*), tiger salamanders (*Ambystoma tigrinum*), crayfish (*Oronectes* spp.), and several other fish species (Clarkson and Rorabaugh 1989; Sredl and Howland 1994; Fernandez and Bagnara 1995; Fernandez and Rosen 1996; Snyder et al. 1996; Rosen et al. 1994, 1996). For example, in the Chiricahua region of southeastern Arizona, Rosen et al. (1996) found that almost all perennial waters that lacked introduced vertebrate predators contained frogs. In perennial waters with introduced predators (e.g., fishes and bullfrogs), frogs were generally absent (Sredl and Howland 1994).

Disruption of metapopulation dynamics is also an important factor in the regional loss of populations (Sredl and Howland 1994; Sredl et al. 1997). Frog populations are often small, with dynamic habitats (appearing and disappearing), resulting in a relatively low probability of long-term population persistence at any one site. Historically, populations were more numerous and closer together (Sredl and Howland 1994; Sredl et al. 1997). If populations disappeared due to drought, disease, or other causes, extirpated sites could be recolonized by immigration from nearby populations. However, as the numbers of populations decline and become more isolated, it is less likely the areas previously occupied will be recolonized. In addition, most of the larger source populations along rivers and streams and in valley bottom cienegas have disappeared.

Livestock grazing effects on ranid frog populations are not well studied, but probably depend on several factors such as grazing intensity (both numbers and duration), season, habitat type, climate, and rainfall. Possible adverse effects to the frog and its habitat as a result of livestock grazing and management actions include: trampling of egg masses, tadpoles, and frogs; possible incidental ingestion of small larvae or eggs while drinking; deterioration of watersheds; degraded water quality with subsequent toxic effects on frogs; elimination of undercut banks that provide cover for frogs; loss of cover provided by wetland and riparian vegetation; loss of deep backwater pools; spread of disease; and facilitating dispersal of non-native predators (Gunderson 1968; Arizona State University 1979; Hendrickson and Minckley 1984; Chapman 1988; Ohmart 1995; Jancovich et al. 1997; Bartelt 1998; Belsky et al. 1999; U.S. Fish and Wildlife Service 2002).

Livestock grazing may also cause long-term changes to the watershed and its functions. The relationship between livestock grazing in a watershed and effects to river systems is widely recognized and documented (Leopold 1946, Blackburn 1984, Skovlin 1984, Chaney et al. 1990, Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994, Myers and Swanson 1995). Improper livestock grazing practices have been shown to increase soil compaction; decrease infiltration rates; increase runoff; change vegetative species composition; decrease riparian vegetation;

increase erosion; increase stream sedimentation; increase stream water temperature; and change channel form (Meehan and Platts 1978, Kaufman and Kruger 1984, Schulz and Leininger 1990, Platts 1991, Fleischner 1994, Ohmart 1996).

Water-column alterations can be caused by changes in the magnitude and timing of organic and inorganic inputs into the stream; increases in fecal contamination; changes in water temperatures due to removal of vegetation; reduction of stream shore water depth; changes in timing and magnitude of stream flow events from changes in watershed vegetative cover; and an increase in stream temperature (Platts 1990, Fleischner 1994). These alterations in stream conditions can affect the entire food chain, including the frog and its prey base.

Cattle can remove bank-line vegetation that provides escape cover for frogs and a source of insect prey. Litter is reduced by trampling and churning into the soil, thus reducing cover for soil, plants, and wildlife (Schulz and Leininger 1990). Overuse of vegetation by livestock can cause changes to plant root structures, altering plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio et al. 1994). Reduced herbaceous vegetation leads to accelerated soil loss due to increased exposure of soils to downpour events and reduced sediment filtering capabilities of the vegetation (Erman et al. 1977, Osborne and Kovacic 1993). Hoof action can cause loss of cryptobiotic soil crusts, soil compaction, erosion, and gullyng (Klemmedson 1956, Ellison 1960, Gifford and Hawkins 1978, Webb and Stielstra 1979, Harper and Marble 1988, Orodho et al. 1990, Schlesinger et al. 1990, Bahre 1991, McClaran and Anable 1992). Bank configuration, soil type, and soil moisture content influence the extent of damage, with moist soils being more vulnerable (Marlow and Pogacnik 1985, Platts 1990).

The creation of livestock waters in arid environments may provide the means for non-native predators such as bullfrogs and crayfish to move across landscapes that would otherwise serve as barriers to their movement. Maintenance of occupied livestock tanks can also result in death or injury of frogs. Eggs, tadpoles, juveniles, and possibly adult frogs are vulnerable to being trampled by cattle on the perimeter of stock tanks and in pools along streams (Bartelt 1998, Ross et al. 1999, U.S. Fish and Wildlife Service 2002). Juvenile and adult frogs can probably avoid trampling when they are active; however, leopard frogs are known to hibernate on the bottom of ponds (Harding 1997) where they may be subject to trampling during the winter months. Working in Nye County, Nevada, Ross et al. (1999) found a dead adult Columbia spotted frog (*Rana luteiventris*) in the hoof print of a cow along a heavily grazed stream. They observed numerous other dead frogs in awkward postures suggesting traumatic death likely due to trampling. In Idaho, Bartelt (1998) documented near complete loss of a metamorph cohort of boreal toads (*Bufo boreas*) due to trampling by sheep at a livestock tank.

Frogs can also be adversely affected by degraded water quality caused by cattle urine and feces at these livestock waters. At Headquarters Windmill Tank on the Coronado NF in the Chiricahua Mountains of southeastern Arizona, Sredl et al. (1997) documented heavy cattle use at a stock tank that resulted in degraded water quality, including elevated hydrogen sulfide concentrations. A die-off of frogs at the site was attributed to cattle-associated water quality problems, and the species has been extirpated from the site since the die-off occurred (U.S. Fish and Wildlife Service 2002). Larval frogs may be particularly susceptible to nitrogenous

compounds that can be associated with grazing (Schepers and Francis 1982, Boyer and Grue 1995). Toxicity could result from high concentrations of un-ionized ammonia (Schuytema and Nebeker 1999), particularly in combination with primary-production induced elevation in pH.

Although direct impacts to the stream and riparian area can be the most obvious sign of improper livestock grazing, upland watershed condition is also important because changes in soil compaction, percent cover, and vegetation type influence the timing and amount of water delivered to stream channels (Platts 1991). Increased soil compaction, decreased vegetative cover, and a decrease in grasslands lead to faster delivery of water to stream channels, increased peak flows, and lower summer base flow (Platts 1991, Ohmart 1996, Belsky and Blumenthal 1997). As a consequence, streams are more likely to experience flood events during monsoons that negatively affect the riparian and aquatic habitats because the water runs off quickly instead of soaking into the ground. Additionally, streams are more likely to become intermittent or dry in September and October as groundwater recharge is less when water runs off quickly. These flood flow changes interact with the stream channel and exacerbate flood damage to banks, channel bottoms, and riparian vegetation (Platts 1990, 1991; Meehan 1991; Johnson 1992; Ohmart 1996).

The role of infectious diseases has recently been recognized as a key factor in amphibian declines in seemingly pristine areas (Daszak et al. 1999; Carey et al. 1999, 2001). A fungal skin disease, chytrids (*Batrachochytrium* sp.), has been linked to amphibian decline in many parts of the world (Berger et al. 1998, Speare and Berger 2000), including Arizona (Sredl 2000, Sredl and Caldwell 2000) and New Mexico (U.S. Fish and Wildlife Service 2002). Chytrids is partly responsible for observed declines of frogs, toads, and salamanders in Panama, Costa Rica, Brazil, Ecuador, Uruguay, Australia, New Zealand, Spain, Germany, South Africa, Kenya, Mexico, and the U.S. (Berger et al. 1998, Longcore et al. 1999, Speare and Berger 2000). Although the exact cause of death is uncertain, a thickening of the skin on the feet, hind legs, and ventral pelvic region is thought to interfere with water and gas exchange, leading to death of the host (Nichols et al. 2001). Die-offs occur during the cooler months from October to February. High temperatures during the summer may slow reproduction of chytrids to a point at which the organism cannot cause disease (Bradley et al. 2002). Rollins-Smith et al. (2002) also showed that chytrid spores are sensitive to antimicrobial peptides produced in ranid frog skin. The effectiveness of these peptides is temperature dependent and other environmental factors probably affect their production and release (Matutte et al. 2000).

Epizootic disease data from Central America and Australia (high mortality rates, wave-like spread of declines, wide host range) (Berger et al. 1998), and analysis of genetic variability (Morehouse et al. 2003), suggest recent introduction of the disease into native populations and the disease subsequently becoming enzootic in some areas. Virulence of the pathogen or host susceptibility may be affected by environmental factors (Berger et al. 1998), including changes in climate or microclimate, contaminant loads, increased UV-B radiation, or other conditions that cause stress (Pounds and Crump 1994, Daszak 2000, Carey et al. 2001). The rapid spread of chytrids throughout the world is believed to have been facilitated by human activities. The fungus does not have an airborne spore, so it must spread via other means. Amphibians in the international pet trade (Europe and USA), outdoor pond supplies (USA), zoo trade (Europe and USA), laboratory supply houses (USA), and species recently introduced (*Bufo marinus* in

Australia and bullfrogs in the USA) have been found infected with chytrids, suggesting human-induced spread of the disease (Daszak 2000, Mazzoni et al. 2003). Recently, retrospective analysis revealed presence of chytrids in African clawed frogs (*Xenopus laevis*) dating to 1938 (Weldon et al. 2004). Further evidence showed the disease was a stable endemic in southern Africa for at least 23 years before any chytrid-positive amphibian specimen was found outside of that region. African clawed frogs were exported from Africa for use in human pregnancy testing beginning in the 1930s. Weldon et al. (2004) suggest that Africa is the origin of the disease and that international trade in African clawed frogs was the means of disease dissemination.

Once introduced to the Southwest via escaped or released clawed frogs, the disease may have spread across the landscape by human introductions or natural movements of infected American bullfrogs, tiger salamanders, and leopard frogs. Free-ranging healthy bullfrogs with low-level chytrids infections have been found in southern Arizona (Bradley et al. 2002). Tiger salamanders and bullfrogs can carry the disease without exhibiting clinically significant or lethal infections. When these animals move, or are moved by people, among aquatic sites, chytrids may be carried with them (Collins et al. 2003). Other native or non-native frogs may also serve as disease vectors or reservoirs of infection (Bradley et al. 2002). Grazing activities may also result in the spread of infectious disease. Chytrids can survive in wet or muddy environments and could conceivably be spread by livestock carrying mud on their hooves and moving among frog habitats. Personnel working at an infected tank or aquatic site and then traveling to another site, thereby transferring mud or water from the first site, could also spread this disease. Chytrids could be carried inadvertently in mud clinging to wheel wells or tires, or on shovels, nets, boots, and other equipment. Other transfers of chytrids could accidentally occur during intentional introductions of fish or other aquatic organisms; road maintenance; stock tank maintenance; and, by anglers, hunters, or other recreation users. These people may inadvertently introduce chytrids from other locales, or may intentionally introduce non-native predators for angling or other purposes. Finally, chytrids could also be spread by fieldworkers sampling aquatic habitats (Halliday 1998). Because the fungus can exist in water or mud, it could be spread by wet or muddy boots, vehicles, animals moving among aquatic sites (livestock or wild animals), or during scientific sampling of fish, amphibians, or other aquatic organisms. Chytrids cannot survive complete drying; if equipment is allowed to thoroughly dry, the likelihood of disease transmission is greatly reduced. Bleach or other disinfectants will also kill chytrids fungi and can be applied to tools and vehicles (Longcore 2000). Preventive measures have been established by many land management and wildlife agencies to ensure that the disease is not spread by aquatic sampling.

Worldwide, 94 species of amphibians have been reported as infected with chytrid fungus (Speare and Berger 2000). The proximal cause of extinctions of two species of Australian gastric brooding frogs (*Rheobatrachus spp.*) and the golden toad (*Bufo periglenes*) in Costa Rica were likely chytrids. In Arizona, chytrids infections have been reported from four populations of Chiricahua leopard frogs (U.S. Fish and Wildlife Service 2002), as well as populations of several other frogs and toads (Morell 1999, Davidson et al. 2000, Sredl and Caldwell 2000, Hale 2001, Bradley et al. 2002). In New Mexico, chytrids was identified in a declining population near Hurley, and patterns of decline at three other populations are consistent with chytrids infections (U.S. Fish and Wildlife Service 2002). What was described as Postmetamorphic Death

Syndrome by Scott (1993) that resulted in extirpation of frogs from all stock tanks in an area of Grant County, New Mexico, was likely chytrids.

The role of chytrids in the population dynamics of the frog is as yet undefined; however, there is increasing evidence for amphibian population declines correlated with chytrids infections (Carey et al. 2003). The disease has now been documented to have been associated with Tarahumara frog die-offs since 1974 (Hale 2001). The earliest record for chytrids in Arizona (1972) roughly corresponds to the first observed mass die-offs of ranid frogs in Arizona. Hale and May (1983) and Hale and Jarchow (1988) believed toxic airborne emissions from copper smelters killed Tarahumara frogs and Chiricahua leopard frogs in Arizona and Sonora, but in both cases symptoms of moribund frogs has been found to match those of chytrids. It is also known that some frog populations can exist with the disease for extended periods. The frog has coexisted with chytrids in Sycamore Canyon, Arizona, since at least 1972. However, at a minimum, it is an additional stressor, resulting in periodic die-offs that increase the likelihood of extirpation and extinction. It may well prove to be an important contributing factor in observed population declines.

Severe wildfires capable of extirpating or decimating amphibian populations are a relatively recent phenomena resulting from the cumulative effects of historical or ongoing grazing (removes the fine fuels needed to carry fire) and fire suppression (Madany and West 1983, Savage and Swetnam 1990, Swetnam 1990, Touchan et al. 1995, Swetnam and Baisan 1996, Belsky and Blumenthal 1997, Gresswell 1999). The absence of ground fires has allowed a buildup of woody fuels that precipitate infrequent yet intense crown fires (Swetnam and Baisan 1996, Danzer et al. 1997). In ponderosa pine ecosystems, historical wildfires were primarily cool-burning understory fires with return intervals of three to seven years (Swetnam and Dieterich 1985). Cooper (1960) concluded that prior to the 1950s crown fires were extremely rare or nonexistent in the region. Increased canopy cover within forest and woodland types, increased relative abundance of ponderosa pine, and invasion of mesa-top grasslands by alligator junipers are the result of a reduction in the frequency of tree-thinning surface fires (Miller 1999).

Fire and subsequent degradation of watershed condition immediately after fires can result in dramatically increased runoff, sedimentation, debris flow that can scour aquatic habitats in canyon bottoms or bury them, and ash flow that can create toxic conditions. Amphibian communities, including frog populations, can be significantly altered following prescribed fires, and recovery of these areas may take 12 or more years post-fire for southern leopard frog (*Rana sphenocephala*) populations (Schurbon and Fauth 2003). In Romero Canyon, Catalina Mountains, Pima County, Arizona, lowland leopard frogs (*Rana yavapaiensis*) and their habitat were severely reduced or eliminated due to runoff and sedimentation following the Aspen Fire in 2003. Loss of occupied habitat also occurred in Buehman Canyon and probably other localities in the Catalina Mountains due to recent catastrophic fires (Wallace 2003). Additionally, smoke diffusion into water and ash flow can result in high levels of phosphorus and nitrogen (Spencer and Hauer 1991) with potentially toxic effects to frogs.

Probably of greater consequence would be the effect of ash flows on eggs and tadpoles. Adults most likely could escape an ash flow but aquatic life stages would likely perish. Following the 1994 Rattlesnake fire in the Chiricahua Mountains of Arizona, a debris flow filled Rucker Lake,

a historical frog locality. The impacts of ash/sediment flow from the large Fire Use fires on the Gila NF from 2001 to 2003 appear to be a real threat to the frog, likely causing extirpation in both the Middle Fork and West Fork of the Gila River (R. Jennings, Western New Mexico University, 2004, unpubl. data). A documented population of leopard frogs (either Chiricahua or Ramsey Canyon leopard frogs) disappeared from Miller Canyon in the Huachuca Mountains of Arizona, after a 1977 crown fire in the upper canyon and subsequent erosion and scouring of the canyon during storm events (U.S. Fish and Wildlife Service 2002). Leopard frogs were historically known from many localities in the Huachuca Mountains; however, natural pool and pond habitat is largely absent now and the only breeding leopard frog populations occur in man-made tanks and ponds. Crown fires followed by scouring floods are a likely cause of this absence of natural leopard frog habitats (U.S. Fish and Wildlife Service 2002).

Each year, millions of gallons of fire retardants and suppressants are broadly applied aerially and from the ground to wildlands in the western U.S. Contamination of aquatic sites can occur via direct application or runoff from treated uplands. These chemicals are ammonia-based, which in itself can be potentially toxic; however, many formulations also contain yellow prussiate of soda (sodium ferrocyanide), which is added as an anticorrosive agent. Such formulations are toxic to a variety of aquatic and other organisms, including frogs. Toxicity of these formulations is typically found to be low in the laboratory, but toxicity to the southern leopard frog (*Rana sphenoccephala*) and rainbow trout in the field has been found to be photoenhanced by ambient UV radiation (Calfee and Little 2003). A retardant spill into the Fall River of Oregon in 2002 resulted in a significant fish kill there. No information was available regarding potential effects to amphibians (Oregon Department of Fish and Wildlife 2002).

Aquatic habitats are often the ultimate sinks for herbicides, insecticides, fertilizers, sewage, and other contaminants. These chemicals have a variety of direct and indirect effects on amphibians (Sparling 2003). Airborne movement and deposition of acidic compounds, pesticides, and potentially other chemicals over long distances can affect otherwise pristine areas that do not receive direct applications (Blanchard and Stromberg 1987, Davidson et al. 2002), and some pesticides may cause sublethal effects at very low dosages (Hayes et al. 2002). No studies have been conducted on the effects of contaminants on the Chiricahua leopard frog; however, they are likely affected by a number of contaminants; effects are probably similar to other ranid frogs and amphibians (Sparling 2003). In June 1969, leach ponds at the Phelps Dodge mine at Clifton, Arizona breached and spilled a heavy, red residue (probably iron oxide) into Chase Creek, which flowed for four miles to the San Francisco River. Rathbun (1969) estimated a nearly 100 percent kill of "leopard" frogs and tadpoles along the four-mile reach of Chase Creek. Overflow, leakage, and tailings dam failures at the copper mine at Cananea, Sonora, occurred several times during 1977 to 1979 and severely affected many miles of the upper San Pedro River, Sonora and Arizona. A spill in 1979 resulted in water that was brick red in color with a pH as low as 3.1. Aquatic life in the river was killed (U.S. Bureau of Land Management 1998). The last known occurrence of the Chiricahua leopard frog in the upper San Pedro River was 1979 (U.S. Fish and Wildlife Service 2002).

Conservation Measures

Federal listing under the ESA provided considerable protection to the frog and its habitat. Section 9 of the ESA prohibits take of any listed wildlife species, including the frog.

The Forest Service has educated biologists as to proper frog survey techniques including appropriate measures needed to curb the spread of chytrids. The Apache-Sitgreaves NF has closed the area around Three Forks Springs (U.S. Forest Service 2004). This closure helps to protect the frog population in the spring complex. Additionally, the Apache-Sitgreaves NF cooperated with the FWS and the AGFD to re-establish a population of frogs at Sierra Blanca Lake in 2004. The Tonto NF is working to restore frog habitat at Bottle Spring near Young. The Coconino NF, AGFD, and FWS have hauled water and helped salvage frogs from a drying tank, and the Coconino NF is working to conduct habitat restoration in the Buckskin Hills. The Coronado NF built wing dikes in Sycamore Canyon in the Pajarito Mountains to prevent the loss of a frog population. In addition, all of the forests have funded rapid frog surveys.

In the February 2, 2005 supplement to the biological assessment, the Forest Service provided additional conservation measures meant to benefit the frog. They are as follows:

Conservation Measure #1: Design projects in occupied Chiricahua leopard frog habitat on National Forest System lands which address the appropriate components of the Chiricahua leopard frog recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Chiricahua leopard frog.

Conservation Measure #2: Over the next five years, cooperate with state game and fish agencies, other federal agencies, Forest Service research stations, FWS, and others (universities/colleges, etc.) to assess and prioritize habitat for potential Chiricahua leopard frog reintroduction. Cooperatively document the result in an annual report to the FWS and to the extent feasible within the mission and capabilities of the Forest Service assist with any Chiricahua leopard frog reintroduction efforts.

Conservation Measure #3: Implement, as appropriate, recommendations to minimize the effects of stock pond management and maintenance identified in the final recovery plan for the Chiricahua leopard frog.

Conservation Measure #4: Continue to implement the standardized interagency monitoring protocol for Chiricahua leopard frogs.

Conservation Measure #5: The long-term benefits directly attributable to wildland fire use for resource benefits, is the reduction of catastrophic fire. This is very significant in goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems.

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in GIS layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.

During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.

c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

In summary, these Conservation Measures should go a long way towards not only minimization of projects impacts, but also towards recovery of frog populations on Forest Service lands. Conservation Measure #1 attempts to reduce and/or remove adverse project level impacts. It is understood that not all projects will be able to meet this standard, but as a goal statement, this measure can be very powerful and should help alleviate some of the threats to the frog. Conservation Measures #3 and #5 are similar to Conservation Measure #1 in that they minimize impacts, but they are aimed specifically at minimizing impacts of stock tanks and fire use, respectively. Finally, Conservation Measures #2 and #4 address recovery actions that will be required to actually recover the frog. As much of the historical habitat for frogs has been lost and population numbers have been declining, beneficial actions such as these will be required in order to reverse this trend.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species in the Action Area

Within the action area, the Chiricahua leopard frog is known to occur on the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto NFs. There is an additional population site just outside the Cibola NF boundaries, with the potential for indirect, interrelated, and interdependent effects on the frog. For the purposes of this biological opinion, a population site has permanent or nearly permanent water and is capable of supporting breeding. As of January 2004, the frog was believed to be extant on National Forest System lands as follows:

Coronado NF:

Nogales Ranger District: 11 populations extant, most are in stock tanks
Sierra Vista Ranger District: nine populations extant, most are in stock tanks
Douglas Ranger District: one population extant
Safford Ranger District: one populations extant
Santa Catalina Ranger District: no extant populations known, Santa Catalina and Rincon mountains are not within historic range

Coconino NF:

Red Rock Ranger District: two populations extant, both are in stock tanks
Other Ranger Districts: no extant populations known

Apache-Sitgreaves NF:

Clifton Ranger District: four populations extant
Alpine Ranger District: the status on the Blue River is unclear; however, two to four may exist, two are likely extant
Other Ranger Districts: no extant populations known

Tonto NF:

Pleasant Valley Ranger District: four extant populations
Payson Ranger District: possibly one population extant
Other Ranger Districts: no extant populations known

Gila NF:

Quemado Ranger District: two populations extant
Reserve Ranger District: seven populations extant
Glenwood Ranger District: one population extant
Wilderness Ranger District: two populations extant
Black Range Ranger District: two populations extant

Factors Affecting the Species within the Action Area

The action area covers a large portion of the range of the frog, thus all of the threats identified above are applicable in the action area.

EFFECTS OF THE ACTION

The S&Gs listed in the National Forest LRMPs and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the frog and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the frog.

Table 72. Summary of S&Gs considered for the Chiricahua leopard frog.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4-10, 12, 14, 16-20, 26, 28, 29, 31-53, 55, 58-63, 84, 97-99, 104-117, 119-125, 128-130, 132-140, 143, 147, 149, 151, 152, 154-162, 165-167, 169-172, 177-180
Cibola	228, 228a-k, 229-234, 236, 237, 239-247, 249-253, 255, 257, 259, 261, 270a-f, 271, 291a-d 294a-f, 297, 297a, 298, 305a-j, 306-308
Coconino	311-325, 327-329, 331, 336-339, 341-345, 348, 353-359, 361-391, 393-395, 398-402, 404, 406-408, 411, 413-417, 424, 425, 433, 434, 458-462, 464, 466, 469, 470, 472-476, 479, 480, 483-507, 520, 525-534, 538-544
Coronado	612, 613, 626-638, 644, 645, 648-653, 657, 659, 661, 666-669, 672-682, 692-695, 696a, 697-100, 702-713, 715, 727, 757, 759, 761, 762, 764, 765, 770-773, 774, 778-780, 782-785, 786, 788, 790-792, 794-800, 803-805, 807-824, 825, 826, 828, 829, 830-839
Gila	840-842, 844-851, 854, 857-871, 873-876, 878, 880, 881, 883-885, 887-890, 892-894, 895-906, 908, 909, 912, 913, 918, 921, 922, 924, 925, 928, 930, 933, 935, 936, 938-940, 941, 943, 944, 946, 948, 950, 952, 953, 955, 957
Tonto NF	1341, 1342, 1344, 1345, 1348-1350, 1352-1357, 1359, 1361-1368, 1370a-c, 1375, 1376, 1391-1393, 1398-1404, 1410
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1479, 1486-1492, 1495, 1496, 1499-1502, 1504-1515

Apache-Sitgreaves National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Apache-Sitgreaves NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the frog; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in frogs. In summary, less than six percent of the applicable S&Gs are likely to cause negative responses of frogs, while almost 66 percent of the S&Gs have positive effects to the species. The remaining 29 percent of the applicable S&Gs have no effect to the frog or are too vague or ill-defined to analyze.

Table 73. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	2.7
-2	S&G is causing sublethal response	2	1.8
-1	S&G is causing negative behavioral response	1	0.9
0	S&G is ill-defined and/or open to interpretation	26	23.4
1	S&G is maintaining habitat & providing at least minimal recovery	70	63.1
2	S&G is moving towards recovery	3	2.7
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	4	3.6
Total		111	100 %

Engineering Program

Three S&Gs were analyzed for the Engineering Program on the Apache-Sitgreaves NF. Of these, only S&G 63 had a negative effect on the frog. This S&G allows for a road density which is above the level determined by the FWS and NOAA Fisheries to affect functioning watershed condition in the Northwestern United States. At this density it is likely that watershed and water quality degradation will occur due to increased erosion, leading in turn to impairment and/or loss of frog habitats. Although S&G 63 allows for a higher road density, the actual classified road density on the Apache-Sitgreaves is currently 2.2 mi/mi², which is below the level established by FWS and NOAA Fisheries and significantly below the level allowed by S&G 63. However, this density does not include non-system (unclassified) roads which may be contributing to watershed degradation. Additionally, at any road density, improperly placed roads may disrupt metapopulation dynamics due to habitat fragmentation, as these roads may serve as barriers to movement (deMaynadier 2000). These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. In addition, mortality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be subject to road mortality. The effects of S&G 63 should be lessened by S&Gs 61 and 62 which provide for erosion control measures in road plans and allow for road closures in sensitive areas.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in negative effects to the frog. However, there may be negative effects from this program not captured in the applicable S&Gs. In the Apache-Sitgreaves NF LRMP there is not a specific Fire Management Program listed; however, there is a Protection Program listed which deals with fire. The goal for the Protection Program includes the following “Fire is used as a resource management tool where it can effectively accomplish resource management objectives (Apache-Sitgreaves NF

LRMP).” Based on the analysis in the Forest Service’s biological assessment, it can be inferred that prescribed fire would be utilized in this capacity. The use of prescribed fire and other fuels treatment methods provides great benefit to the frog by reducing the risk of catastrophic wildfire, which given the limited number of populations in existence, could have serious impacts to population functions. However, these projects are likely to result in lethal incidental take of individuals associated with humans, tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, as stated above, ash flows and erosion/sedimentation in burn areas have been known to cause local extirpations of frogs in the affected areas.

Forestry and Forest Health Program

Only one S&G in this program has a negative effect on the frog. Like S&G 63 mentioned above, S&G 97 also allows for a road density which was determined to compromise watershed functionality. Although the higher road density is temporary, the effects are likely to be the same as discussed above in the Engineering Program.

Land and Minerals Program

In this program, S&G 52 allows for the use of herbicides, insecticides, rodenticides, and other chemical agents. Although this S&G is somewhat self-limiting in requiring that minimal probability of transfer to surface or groundwater will occur, it is still likely that frogs would be affected. First, adult frogs living in the terrestrial environment could be impacted directly through reduced feeding success as a result of insecticide use. Additionally, this S&G does not eliminate the potential for transmission of chemicals into aquatic environments. These types of chemicals are likely to result in death and deformity of multiple life stages of frogs. Also, at a minimum, any herbicide or insecticide in the waters would likely result in reduced breeding success through lack of cover and reduced feeding success through lack of prey and forage items. Amphibians in general, and ranid frogs, in particular, are quite sensitive to pesticides and other chemical insult. These chemicals have a variety of direct and indirect effects on amphibians (Sparling 2003). Airborne movement and deposition of acidic compounds, pesticides, and potentially other chemicals over long distances can affect otherwise pristine areas that do not receive direct applications (Blanchard and Stromberg 1987, Davidson et al. 2002), and some pesticides may cause sublethal effects at very low dosages (Hayes et al. 2002, Hayes 2004; but see Carr et al. 2003).

Rangeland Management Program

No applicable S&Gs in the Rangeland Management Program are likely to result in direct negative effects to the frog. There are, however, multiple S&Gs which are likely to have short-term impacts to individuals, although they may provide benefit to the frog populations in the long-term. Standards and Guidelines 41 and 170 promote the use of road pit tanks as water sources for livestock. Like other livestock waters and stock tanks, frogs are likely to use these pit tanks as refugia during drought conditions. Additionally, the use of these pit tanks might help prevent the dewatering of natural systems which provide better long-term habitat for the frogs. However, individual frogs are likely to be trampled by livestock using the pit tanks, frogs may be killed when the tanks are maintained and livestock or wildlife movement between tanks might contribute to the spread of chytrids. These tanks may also facilitate movement of non-native predators such as bullfrogs and tiger salamanders across the landscape.

Standard and Guideline 137 allows for some livestock use of the riparian. This S&G is somewhat self-limiting; however, it does not completely remove the impact. In the event livestock are moved through the riparian area without degrading it appreciably, all life stages, but particularly eggs, small tadpoles, and small frogs, would still be trampled during this process.

Standard and Guideline 158 allows for use of habitat improvement structures. These structures are seen as positive in that they improve watershed and overall ecosystem health which benefits the frog populations. However, the actual construction and maintenance of these structures could result in some take of individuals. Frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur at these times.

In addition, there may be negative effects from the Rangeland Management Program not captured in the applicable S&Gs. The goal for this program is to “Provide a program of range management that emphasizes high quality range forage and improvements. Benefits are improved watershed conditions, improved range forage production, improved wildlife habitat, and enhanced visual quality (Apache-Sitgreaves LRMP).” This goal statement provides direction for the Rangeland Management Program which should, in the long-term, provide increased watershed health and improved habitat for the frog. There are likely to be impacts to the populations during the time that these areas are improving. Impacts include degraded watersheds that result in reduced breeding success through avoidance of those degraded areas. There are likely to be impacts to frogs under any grazing regime, in the form of lethal take via trampling, spread of chytrids and non-native predators, and livestock water maintenance.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in the Recreation Program are likely to result in negative effects to the frog. However, there may be negative effects from this program not captured in the applicable S&Gs. The goal for this program is to “Manage the recreation resource to provide opportunities for a wide variety of developed and dispersed experiences. Provide for developed site and dispersed visitor use (Apache-Sitgreaves LRMP)”. This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the frog, they are likely to involve some incidental take of individual frogs in the form of disturbance, avoidance of impacted recreation areas, and even mortality from direct contact with humans and vehicles. Additionally, as these recreational users move through the environment, they might contribute to the spread of chytrids, especially water users if boats and other equipment are not thoroughly dried or sterilized between sites, and some will likely spread non-native predators.

Watershed Management Program

No applicable S&Gs in the Watershed Management Program are likely to result in direct negative effects to the frog. However, S&G 49 is likely to result in take of individuals while contributing positively to the populations. This S&G allows for roads that are causing resource damage to be closed and obliterated. This activity should result in improved watershed conditions reducing the impact on frogs; however, the act of obliterating roads is likely to result in take of individuals. Frogs of multiple life stages could be killed by tools and machinery.

There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

A number of S&Gs may provide substantial benefit to the frog by helping to minimize impacts of this and other programs. Although not specific to fire use impacts, S&G 44 should help to minimize impacts of the Fire Management Program, discussed above, by reducing ash flow and sediment delivery to water courses. Furthermore, S&Gs 171 and 177 should help to minimize effects of disturbance by conserving soil and water resources and using appropriate buffers in order to maintain water quality. Taken together, these S&Gs should minimize the impacts to watersheds of projects in multiple programs across the Forest.

Wildlife, Fish, and Rare Plants Program

The vast majority of the applicable S&Gs in this program are beneficial to the frog, but there are also some S&Gs with negative impacts. Standard and Guideline 114 allows for the maintenance and management of game fish habitat. While the act of specifically managing for game fish habitat should not negatively impact the frog, where these game fish are already present in the watershed, improved habitat will allow them to expand their ranges. This has potential to increase predation and competition pressures on the frogs resulting in reduced feeding and breeding success, lethal take via consumption of tadpoles, eggs, and frogs, and avoidance of affected areas.

Standard and Guideline 39 requires maintenance of only 40 percent of potential habitats. Those areas that are not maintained or are allowed to degrade would result in further avoidance of these areas, limiting dispersal and reproductive potential.

Standard and Guideline 35 allows for the use of wildlife escape ramps in all livestock waters. The impacts here are similar to the impacts from pit tanks discussed in the Rangeland Management Program. These waters can be crucial frog refugia in years of drought; however, there could be lethal take of individuals due to trampling. In addition, wildlife movement between waters could contribute to the spread of chytrids and availability of these waters could facilitate the dispersal of non-native bullfrogs and salamanders.

Standards and Guidelines 155, 156, and 161 are all similar in that they provide for habitat improvement which benefits the frog populations. However, the actual construction and maintenance of these structures is likely to result in take of individuals. Frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

A number of S&Gs in the Wildlife Program provide substantial benefits to the frog. Standard and Guideline 20 benefits the frog by prioritizing threatened and endangered species habitat above those of other species. Standard and Guideline 5 takes this one step further by actually directing the Forest to identify and protect threatened and endangered species habitats. Standards and Guidelines 4 and 19 provide direction to improve habitat for threatened and endangered species and to work towards recovery. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other

Forest uses could occur largely outside critical frog areas, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs in the Apache-Sitgreaves LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of take, thus take of frogs is reasonably certain to occur as a result of implementation of the Apache-Sitgreaves NF LRMP.

Cibola National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Cibola NF LRMP. The applicable S&Gs were analyzed for their effect in the event the frog moves onto the Cibola NF or is present but currently undetected. Generally speaking, the impacts are similar to those seen on the Apache-Sitgreaves NF in that some individuals would be taken at the project level with some program level impacts seen in the Rangeland Management and Watershed Management programs were the frog in fact present on the Cibola. As it stands, no applicable S&Gs are likely to result in downstream effects to the frog in either an indirect, interrelated, or interdependent capacity.

Table 74. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Cibola NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	6	8.5
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.2
1	S&G is maintaining habitat & providing at least minimal recovery	55	77.5
2	S&G is moving towards recovery	1	1.4
3	S&G is implementing species recovery plan	1	1.4
Y	S&G has no application to the species	1	1.4
Z	S&G implementation is non-discretionary	1	1.4
X	S&G is a heading	3	4.2
Total		71	100 %

Coconino National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Coconino NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the frog; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in frogs. In summary, less than three percent of the applicable S&Gs are likely to cause negative responses of frogs, while 67 percent of the S&Gs have positive effects to the species. The remaining 30 percent of the applicable S&Gs have no effect to the frog or are too vague or ill-defined to analyze.

Table 75. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	2.0
-2	S&G is causing sublethal response	1	0.7
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	14	9.5
1	S&G is maintaining habitat & providing at least minimal recovery	97	65.5
2	S&G is moving towards recovery	1	0.7
3	S&G is implementing species recovery plan	1	0.7
Y	S&G has no application to the species	3	2.0
Z	S&G implementation is non-discretionary	8	5.4
X	S&G is a heading	20	13.5
Total		148	100 %

Engineering Program

No applicable S&Gs in the Engineering Program are likely to result in direct negative effects to the frog. A handful of S&Gs do result in some short-term project level take associated with overall positive actions. Standards and Guidelines 400, 404, 460, and 534 allow for roads to be closed and obliterated. This activity should result in improved watershed conditions, reducing the impact of degraded watersheds on frog populations; however, the act of obliterating roads is likely to result in take of individuals. Frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Standard and Guideline 408 has multiple impacts. The first part of this S&G allows for roads in riparian areas to be relocated. Movement of these roads would reduce habitat degradation, but would also have short-term effects associated with obliterating roads, as discussed above. The second part allows for roads to cross the riparian, but directs that they go through perpendicular to the stream course. This impact is somewhat self-minimizing in that it reduces habitat destruction and watershed degradation by having roads run perpendicular rather than parallel to the stream course, but any construction of roads in the riparian could result in some short-term lethal take of individuals associated with tools and machinery. However, no frogs are currently known to occur in stream or riverine habitats on the Coconino NF, so at present, these impacts are unlikely to occur.

Additionally, there may be negative effects from this program not captured in the applicable S&Gs. The Engineering Program includes activities such as construction, maintenance, and operation of roads. Construction and use of roads in general may have negative effects on frogs in that, at any road density, improperly placed roads may disrupt metapopulation dynamics due to habitat fragmentation if these roads serve as barriers to movement (deMaynadier 2000). These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. Although not documented for

Chiricahua leopard frogs, mortality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be subject to road mortality.

Fire Management Program

Standards and Guidelines 411 and 414 allow for the use of fuel treatments which would include prescribed fire and mechanical thinning. These S&Gs provide benefit to the frog by reducing the risk of catastrophic wildfire, which given the limited populations in existence, could have serious impacts to population functions. However, the fuels treatment projects are likely to result in lethal take of individuals associated with humans, tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, ash flows and erosion/sedimentation in burn areas have been known to cause local extirpations of frogs in the affected areas. However, because the known populations of frogs on the Coconino NF are in stock tanks, they are not likely to be affected much by these S&Gs.

Forestry and Forest Health Program

No applicable S&Gs within the Forestry and Forest Health Program are likely to result in direct negative effects to the frog. However, S&G 458 could result in take through short-term project level impacts. This S&G addressed the use of K-V funds, which the FWS is aware is not currently in use; however, there is nothing in the Coconino NF LRMP preventing their use in the future, thus impacts from the use of K-V funds must be addressed. Like many other S&Gs addressed thus far, there is potential for lethal take of individuals during the course of habitat improvement projects. Frogs of multiple life stages could be stepped on by humans or killed by tools and machinery. In the event frogs dispersed to riparian habitats on the Coconino NF, there would likely be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Standard and Guideline 461 is also a somewhat self-limiting S&G. Similar to S&G 408, this S&G allows skid trails to cross the riparian, but requires them to cross in stable areas thus reducing the potential for watershed degradation. In areas where skidding does occur in or near occupied riparian, there is potential for lethal take of individuals associated with tools and machinery.

Land and Minerals Program

No applicable S&Gs in the Lands and Minerals Program are likely to result in direct negative effects to the frog. However, some S&Gs could result in take through short-term project level impacts. Standard and Guideline 391 allows for reclamation of mined areas. This is beneficial in that it provides improved watershed conditions and could recreate lost frog habitat; however, frogs of multiple life stages could be stepped on by humans or killed by tools and machinery in the course of reclamation projects.

Standard and Guideline 393 guides projects to use existing transmission corridors to the greatest extent possible by utilizing overbuilding and underbuilding strategies. This protects other undisturbed areas from habitat destruction, but there could be project level impacts associated

with the overbuilding and underbuilding if dispersing frogs are present in the area. Take is likely to occur in the form of mortality due to use of tools and machinery in the area.

Rangeland Management Program

The S&Gs in this program allow for a variety of effects to the frog. Standard and Guideline 424 allows grazing to occur in wilderness areas. In those areas where grazing overlaps occupied frog habitat, there are likely to be negative impacts that result in reduced feeding and breeding success. In addition, there are likely to be impacts to individual frogs under any grazing regime, in the form of lethal take via trampling, spread of chytrids, livestock water maintenance, and spread of non-native predators via livestock waters. On the other hand, livestock waters in non-Wilderness areas currently provide the only habitat for frogs on the Coconino NF, thus the impacts due to this S&G are likely to be minimal at this time.

Similarly, S&G 500 provides for 20 percent allowable use. For migratory birds, no take would occur if the use were to occur outside the breeding season. This concept does not apply to the frog as multiple life stages may be found throughout the year; thus even if the riparian area is not adversely affected, there could still be incidental trampling of frogs.

Standards and Guidelines 338 and 339 calls for range management to occur in a fashion that allows for rangelands to be improved. This could, in the long-term, provide increased watershed health and improved habitat for the frog. However, there are likely to be impacts to populations during the time that these areas are improving, as described above.

Standards and Guidelines 341 and 499 call for salting to generally occur outside the riparian. This helps reduce the impacts to frogs via trampling, disturbance, and watershed degradation. However, these S&Gs do allow for some salting in the riparian in order to improve the riparian condition. Where this is possible, these activities could still involve trampling of frogs in the short-term while cows are in the riparian.

Standard and Guideline 342 calls for maintenance of range improvement structures, as needed. These actions are generally good for frogs as they help lessen the impact of livestock. However, there are likely short-term impacts to individual frogs killed by humans, tools, and machinery during the project. Additionally, this S&G could include stock tank maintenance which is likely to result in mortality of frogs if they are not properly handled during the project.

Standard and Guideline 483 allows for the maintenance of pinyon-juniper vegetation type. There may be short-term project impacts due to mechanical manipulation, chemical use, and prescribed fire. The impacts from these projects could include simple disturbance, reduced feeding and breeding due to chemical use, avoidance of burned areas resulting in reduced breeding success, and mortality due to fire, tools, and machinery.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 480 allows for dispersed recreation in areas that are likely to be occupied by frogs. Any dispersed recreation such as camping, hiking, fishing, or boating could result in take of individual frogs in the form of disturbance, avoidance of impacted recreation areas, and even mortality from direct contact with humans and vehicles. Additionally, as these recreational

users move through the environment, they might contribute to the spread of chytrids, especially water users if boats and other equipment are not thoroughly dried or sterilized between sites, and some will likely spread non-native predators. Such predators in the form of sport fishes have been illegally introduced by the public to former frog habitats in the Buckskin Hills. Standard and Guideline 318 may minimize the effects of S&G 480 by allowing closures and restrictions in damaged areas or T&E species habitats.

Watershed Management Program

There are a number of S&Gs in this program which are likely to affect the frog. First, S&G 369 allows for the use of chemical agents as long as surface and ground waters do not become contaminated. Frogs in the water should not be affected by this S&G, but as adult frogs are not restricted entirely to the aquatic environment, some may be found on land and are likely to be affected by chemical use that reduces upland cover plant species and prey (insects). However, application of chemicals is not likely to occur during precipitation events or the wet season, when frogs are most likely to be dispersing overland (R. Maes, Forest Service, 2005, unpubl. data), thus the impacts from this S&G should be minimal.

Standard and Guideline 356 provides for general protection of frog habitats, but it does allow for some skidding as long as the ability of the area to function as a filter strip is not compromised. It is likely that some individual frogs foraging or dispersing overland may be killed through the operation of this heavy machinery even while the filter strip is functioning properly to protect the stream course habitat.

Standard and Guideline 359 provides for general maintenance or improvement of riparian conditions which benefit the frog. However, the action of removing debris from the waterway is likely to result in disturbance and lethal take of individual frogs associated with human foot traffic or use of tools and machinery. Additionally, removal of debris from the water (logs, etc.) could adversely affect frogs by removing cover and egg deposition sites.

Standards and Guidelines 361 and 378 allow for roads to be obliterated. These activities should result in improved watershed conditions reducing the impact on frogs and the likelihood of frogs being killed on roads; however, the act of obliterating roads is likely to result in take of individuals. Frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Standard and Guideline 377 addresses rehabilitation projects to occur after fires. This could be an extremely important S&G to deal with sedimentation, erosion, or ash flow contamination that is likely to occur after large fires. There is potential that these activities could result in some lethal take of individuals at the project level if the area to be rehabilitated was not completely scorched or degraded allowing some frogs to persist.

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in Wildlife Program are likely to result in direct negative effects on the frog. However, S&G 475 is likely to result in some short-term impacts. The FWS believes this S&G can be applied to benefit the frog because it helps to keep livestock out of riparian areas,

but it may affect the frog by wholly or partially dewatering the riparian area. This would have the effect of avoidance of the dewatered area resulting in reduced feeding and breeding.

A number of S&Gs in the Wildlife Program potentially provide substantial benefits to the frog. Standards and Guidelines 321 and 328 would help to alleviate some effects from all of the analyzed programs by establishing T&E species habitat as higher priority than that of other species. Standard and Guideline 321 also directs the Coconino NF to follow approved recovery plans, allowing for some recovery actions and potential mitigation of impacts. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical frog areas, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs within the Coconino NF LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of take, thus take of frogs is reasonably certain to occur as a result of implementation of the Coconino NF LRMP.

Coronado National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Coronado NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the frog; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in frogs. In summary, six percent of the applicable S&Gs are likely to cause negative responses of frogs, while 77 percent of the S&Gs have positive effects to the species. The remaining 17 percent of the applicable S&Gs have no effect to the frog or are too vague or ill-defined to analyze.

Table 76. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	8	6.2
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	17	13.2
1	S&G is maintaining habitat & providing at least minimal recovery	80	62.0
2	S&G is moving towards recovery	8	6.2
3	S&G is implementing species recovery plan	11	8.5
Y	S&G has no application to the species	2	1.6
Z	S&G implementation is non-discretionary	2	1.6
X	S&G is a heading	1	0.8
Total		129	100 %

Some S&Gs presented for analysis for the Coronado NF were not assigned a Consultation Resource Program; however, these S&Gs were categorized as Chemical Management under the LRMP Resource Program heading. Standards and Guidelines 699 and 703 allow herbicides and pesticides to be used for forest management. Use of these chemicals in occupied habitat is likely to result in take of frogs if applied on or near water. Adult frogs living in the terrestrial environment could be impacted through reduced feeding success as a result of insecticide use. Additionally, this S&G does not completely eliminate the potential for transmission of chemicals into the waters. These types of chemicals are likely to result in death and deformity of multiple life stages of frogs. Also, at a minimum, any herbicide or insecticide in the waters would likely result in reduced breeding success through lack of cover and reduced feeding success through lack of prey and forage items. Amphibians in general, and ranid frogs, in particular, are quite sensitive to pesticides and other chemical insult. These chemicals have a variety of direct and indirect effects on amphibians (Sparling 2003). Airborne movement and deposition of acidic compounds, pesticides, and potentially other chemicals over long distances can affect otherwise pristine areas that do not receive direct applications (Blanchard and Stromberg 1987, Davidson et al. 2002), and some pesticides may cause sublethal effects at very low dosages (Hayes et al. 2002, Hayes 2004; but see Carr et al. 2003). Similarly, S&G 702 allows for the use of cyanide leaching ponds during mining operations. These ponds would likely result in lethal take of frogs that disperse into these areas.

Engineering Program

No applicable S&Gs in the Engineering Program are likely to result in direct negative effects to the frog. Standards and Guidelines 712, 785, 797, 811, and 818 all call for roads to be closed, drained, and revegetated. This activity should result in improved watershed condition thereby reducing the impact of degraded watersheds on frog populations; however, the act of manipulating roads is likely to result in take of individuals. Frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Additionally, there may be negative effects from this program not captured in the applicable S&Gs. The Engineering Program includes activities such as construction, maintenance, and operation of roads. Construction and use of roads in general may have negative effects on frogs in that, at any road density, improperly placed roads may disrupt metapopulation dynamics due to habitat fragmentation if these roads serve as barriers to movement (deMaynadier 2000). These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. Although not documented for Chiricahua leopard frogs, mortality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be subject to road mortality.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in direct negative effects to the frog. Standards and Guidelines 695, 713, 798, 812, and 829b all allow for the use of prescribed fire. These S&Gs provide great benefit to the frog by reducing the risk of catastrophic wildfire, which given the limited number of populations in existence, could have

serious impacts to population functions. However, these projects are likely to result in lethal incidental take of individuals associated with humans, tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, as stated above, ash flows and erosion/sedimentation in burn areas have been known to cause local extirpations of frogs in the affected areas.

Forestry and Forest Health Program

Standard and Guideline 697 allows for the use of chemical agents in recreation areas. There is reason to believe that frogs would be present in these areas, particularly riparian camping or boating areas, thereby likely being affected by chemical use. Similarly, S&G 698 allows for the use of herbicides in fishing lakes. Any use of chemical agents could affect the frog, as discussed above; however, the frog does not currently occur in any lakes on the Coronado NF that are managed for recreational fishing, thus this S&G should not have an impact on the frog.

Standard and Guideline 773a calls for vigilance for outbreak of disease or insect infestation. The control of disease and insects in the Coronado NF helps to maintain the general environment; however, the use of chemicals to control them could result in incidental take of frogs as discussed above. Standard and Guideline 704 allows for T&E habitat needs to take precedence over disease and insect control and should help to minimize the impacts of S&G 773a on the frog.

Land and Minerals Program

No applicable S&Gs in the Lands and Minerals Program are likely to result in negative effects to the frog. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

In the Rangeland Management Program, S&Gs 762, 792, and 805 all allow for grazing. In those areas where grazing overlaps occupied frog habitat there are likely to be negative impacts that result in reduced feeding and breeding success. In addition, there are likely to be impacts to individual frogs under any grazing regime, in the form of lethal incidental take via trampling, spread of chytrids, and livestock water maintenance. In addition, S&G 771 allows some grazing in order to reduce fuel hazard. The fuels reduction can be important in reducing the effects of catastrophic wildfire; however, some take of individuals is likely to occur due to trampling, and grazing to a level that significantly reduces fire frequency will likely cause watershed degradation and changes in vegetation communities.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in the Recreation Program are likely to result in direct negative effects to the frog. However, there may be negative effects from this program not captured in the applicable S&Gs. The goal for this program is to “Maintain the current spectrum of developed, dispersed, and primitive recreation opportunities and increase those opportunities with the capability of the resources and the framework of this plan as needs and funds develop (Coronado NF LRMP).” This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the frog, they are likely to involve some incidental take of individual frogs in the form of disturbance, avoidance of impacted recreation areas, and even mortality from direct contact

with humans/vehicles. Additionally, as these recreational users move through the environment, they might contribute to the spread of chytrids, especially water users if boats and other equipment are not thoroughly dried or sterilized between sites. Some are also likely to spread non-native predators.

Watershed Management Program

No applicable S&Gs in the Watershed Management Program are likely to result in direct negative effects to the frog. Standards and Guidelines 677, 711, 764, 782, 794, and 807 all provide for watershed improvement projects. These projects should result in improved watershed condition thereby maintaining or improving habitat for the frog. However, frogs of multiple life stages could be killed by tools and machinery. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in the Wildlife Program are likely to have direct negative effects to the frog. Standard and Guideline 652 allows for use of wildlife escape ramps in all livestock waters. These waters can be crucial in the survival of frogs as refugia in years of drought; however, there could be lethal take of individuals due to trampling. In addition, wildlife movement between waters could contribute to the spread of chytrids and availability of these waters could facilitate the dispersal of non-native bullfrogs and salamanders. Similarly, S&Gs 666, 668, 708, 778, and 790 provide for maintenance of wildlife structures. These could include occupied wildlife waters and stock tanks resulting in lethal take of frogs during the maintenance projects.

Standard and Guideline 667 allows for projects to be implemented which would improve habitat for T&E species. Some of these projects could include prescribed burning and forest thinning. These projects are likely to reduce the risk of catastrophic fire, but are likely to result in short-term take of individuals as discussed under the Fire Management Program.

A number of S&Gs in the Wildlife Program potentially provide substantial benefits to the frog. For example, S&G 634 establishes the maintenance of T&E species habitat as a priority over other species habitats forest-wide. Standards and Guidelines 629, 709, 770, 779, 791, 804, 814, 821, and 836 all provide for actions which work towards delisting of T&E species by implementing recovery plans. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical frog areas, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs within the Coronado NF LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of take, thus take of frogs is reasonably certain to occur as a result of implementation of the Coronado NF LRMP.

Gila National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Gila NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the

frog; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in frogs. In summary, less than four percent of the applicable S&Gs are likely to cause negative responses of frogs, while 91 percent of the S&Gs have positive effects to the species. The remaining five percent of the applicable S&Gs have no effect to the frog or are too vague or ill-defined to analyze.

Table 77. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	3.6
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	2.4
1	S&G is maintaining habitat & providing at least minimal recovery	60	72.3
2	S&G is moving towards recovery	2	2.4
3	S&G is implementing species recovery plan	14	16.9
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.4
X	S&G is a heading	0	0.0
Total		83	100 %

Engineering Program

No applicable S&Gs for the Engineering Program are likely to result in negative affects to the frog. In addition, S&G 842 should help prevent negative effects of this and other programs by encouraging new roadways to occur outside of riparian areas.

However, there may be negative effects from this program not captured in the applicable S&Gs. The Engineering Program includes activities such as construction, maintenance, and operation of roads. Construction and use of roads in general may have negative effects on frogs in that, at any road density, improperly placed roads may disrupt metapopulation dynamics due to habitat fragmentation if these roads serve as barriers to movement (deMaynadier 2000). These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. Although not documented for Chiricahua leopard frogs, mortality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be subject to road mortality.

Fire Management Program

Standards and Guidelines 844 and 845 allow for the use of prescribed fire. These S&Gs provide benefits to the frog by reducing the risk of catastrophic wildfire, which given the limited number of populations in existence, could have serious impacts to population functions. However, the fuels treatment projects are likely to result in lethal take of individuals associated with humans,

tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, as stated above, ash flows and erosion/sedimentation in burn areas have been known to cause local extirpations of frogs in the affected areas.

Forestry and Forest Health Program

No applicable S&Gs within the Forestry and Forest Health Program are likely to result in negative affects to the frog. In addition, no negative impacts are anticipated from this program as a whole.

Land and Minerals Program

No applicable S&Gs for the Lands and Minerals Program are likely to result in negative affects to the frog. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

No applicable S&Gs in the Rangeland Management Program are likely to result in direct negative effects to the frog. However, S&G 858 is likely to have short-term impacts to individuals. This S&G allows for the grazing of riparian areas when it can be managed to maintain or improve the riparian. Where this type of grazing regime is possible, this management should allow for improved watershed health and reduced habitat degradation. However, any grazing where frogs occur is likely to result in lethal incidental take of individual frogs via trampling.

In addition, there may be negative effects from this program not captured in the applicable S&Gs. The goal for this program is to “Provide forage to the extent benefits are commensurate with costs without impairing land productivity and within the constraints of social needs. Provide cooperation with other agencies and private range landowners to reduce impacts of livestock grazing (Gila NF LRMP).” This goal statement implies that there are adverse impacts and costs associated with grazing in general. Where livestock are grazed in occupied frog habitats, some negative impacts are expected even if the range management is not allowing for further degradation of the environment. Impacts include reduced feeding and breeding success through avoidance of degraded areas and a reduction in both submergent and emergent vegetation, which has been shown to increase predation on juvenile frogs by adult frogs. In addition, there are likely to be impacts to individual frogs under any grazing regime that allows cattle into occupied aquatic habitats, in the form of lethal incidental take via trampling and spread of chytrids. Finally, livestock water maintenance may also result in incidental take of frogs associated with pond drying and use of tools and machinery.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in the Recreation Program are likely to result in direct negative effects to the frog. However, there may be negative effects from this program not captured in the applicable S&Gs. The goal statement for this program is to “Provide a balanced level of developed and dispersed recreation experiences (Gila NF LRMP).” This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the frog, they are likely to involve some incidental take of individual frogs in the form of as disturbance, avoidance of

impacted recreation areas, and even mortality from direct contact with humans and vehicles. Additionally, as these recreational users move through the environment, they might contribute to the spread of chytrids, especially water users if boats and other equipment are not thoroughly dried or sterilized between sites. Some recreationists will also spread non-native predators.

Watershed Management Program

No applicable S&Gs in the Watershed Management Program are likely to result in direct negative effects to the frog. However, S&Gs 909 and 913 allow for channel and land treatment structures. These activities would help to improve watershed condition and decrease habitat degradation, but are likely to have project level take of individuals including lethal mortality through use of tools and heavy machinery and reduced breeding success through avoidance of project areas.

Wildlife, Fish, and Rare Plants Program

Standards and Guidelines 885, 939, and 944 all provide direction to manage for game fish habitat. While the act of specifically managing for game fish habitat should not negatively impact the frog, where these game fish are already present in the watershed, improved habitat will allow them to expand their ranges. This has the potential to increase predation and competition pressures on the frogs resulting in reduced feeding and breeding success, mortality from consumption of tadpoles and eggs, and avoidance of affected areas.

Standard and Guideline 848 provides for a desired future condition which would result in a dramatic improvement in watershed condition across the Forest. This action could benefit the frog by potentially increasing the availability of habitats suitable for the frog's full reproductive cycle and even dispersing potential. However, until these areas actually become improved they are likely to continue to affect the frog because of reduced watershed condition resulting in avoidance of these areas and reduced breeding success.

A number of S&Gs in the Wildlife Program potentially provide substantial benefits to the frog. In general, many of the applicable S&Gs allow for T&E species concerns to be prioritized over those of other species. Standards and Guidelines 811, 887, 893, 897, 901, 906, 918, 924, 936, 940, 946, 953, 883, 889, 895, and 903 call for habitat maintenance or improvement for T&E species to be prioritized over game and other species. In addition, S&Gs 869, 881, and 892 allow the Forest to implement recovery plans and work towards delisting. These S&Gs should help to minimize the effects of projects and activities in all of the forest programs and even help establish new populations. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical frog areas, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs within the Gila NF LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of take, thus take of frogs is reasonably certain to occur as a result of implementation of the Gila NF LRMP.

Tonto National Forest

The following table summarizes the effects to the frog from the applicable S&Gs within the Tonto NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the frog; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in frogs. In summary, five percent of the applicable S&Gs are likely to cause negative responses of frogs, while 79 percent of the S&Gs have positive effects to the species. The remaining 15 percent of the applicable S&Gs have no effect to the frog or are too vague or ill-defined to analyze.

Table 78. Effects of the S&Gs analyzed for the Chiricahua leopard frog - Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	5.3
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	4	10.5
1	S&G is maintaining habitat & providing at least minimal recovery	30	78.9
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	2.6
Z	S&G implementation is non-discretionary	1	2.6
X	S&G is a heading	0	0.0
Total		38	100 %

Engineering Program

No applicable S&Gs in the Engineering Program are likely to result in negative effects to the frog. However, there may be negative effects from this program not captured in the applicable S&Gs. The Engineering Program includes activities such as construction, maintenance, and operation of roads. Construction and use of roads in general may have negative effects on frogs in that, at any road density, improperly placed roads may disrupt metapopulation dynamics due to habitat fragmentation if these roads serve as barriers to movement (deMaynadier 2000). These effects would likely result in reduced feeding and breeding success due to degraded habitat and increased difficulty in dispersion and reproduction. Although not documented for Chiricahua leopard frogs, mortality of other species of leopard frogs by vehicle traffic on roadways can be considerable (Carr and Fahrig 2001). Chiricahua leopard frogs, although rarely, are sometimes found on roads (J. Rorabaugh, FWS, 2005, unpubl. data) where they could be subject to road mortality.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in direct negative impacts to the frog. However, the use of prescribed fire could provide benefits to the frog by reducing the risk of catastrophic wildfire, which given the limited numbers of populations in existence, could have serious impacts to population functions. At the project level, the fuels

treatment projects are likely to result in lethal incidental take of individuals associated with humans, tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, as stated above, sedimentation/erosion and ash flows in burn areas have been known to cause local extirpations of frogs in the affected areas.

Forestry and Forest Health Program

Standard and Guideline 1400 allows for skidding in areas with slopes of 40 percent or less. This S&G helps to minimize some erosion impacts, but it does not eliminate the potential for skidding and use of heavy machinery in the riparian or other occupied areas, which is likely to result in lethal take of individuals. There is also likely to be some temporary avoidance of the project areas which could result in reduced breeding success if projects occur during these times.

Standard and Guideline 1398 provides some restrictions on timber sale roads by reducing erosion and soil compactions which degrade watersheds and alter streamflows. However, it does not completely remove the impacts. Roads may still be used in occupied areas resulting in lethal take of frogs due to trampling, skidding, and heavy machinery and reduced breeding success to due avoidance of project areas.

Standards and Guidelines 1401 and 1403 should help to reduce the impacts of S&G 1400 by placing restrictions on use of skidding in sensitive soils and during inclement weather. This would help to alleviate the impacts on the watershed, but would not prevent lethal take of frogs from the machinery and skidding itself.

Land and Minerals Program

No applicable S&Gs in the Lands and Mineral Program are likely to result in negative impacts to the frog. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

Of the applicable S&Gs in this program, S&Gs 1376 and 1375 allow for some grazing. Standard and Guideline 1370c calls for continued maintenance of stock tanks. In addition, the goal statement for the Rangeland Management Program is to “Emphasize a program of range administration which will bring the range resource under proper management and improve range forage conditions (Tonto NF LRMP).” Where livestock is grazed in occupied frog habitats, some negative impacts are expected even if the range management is allowing for improvement of the range condition. Impacts include reduced feeding and breeding success through avoidance of degraded areas. In addition, there are likely to be impacts to individual frogs under any grazing regime, in the form of lethal take via trampling, spread of chytrids, and livestock water maintenance, especially stock tanks used by frogs as refugia.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in the Recreation Program are likely to result in negative impacts to the frog. However, there may be negative effects from the Recreation Program not captured in the applicable S&Gs. The goal statement for this program is to “Maintain and enhance visual resource values by emphasizing recreation resource management which will increase opportunities for a variety of developed and dispersed experiences. Provide those developed

sites needed to meet most of the public demand and to support dispersed visitor use (Tonto NF LRMP).” This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the frog, they are likely to involve some incidental take of individual frogs in the form of as disturbance, avoidance of impacted recreation areas, and even mortality if stepped on by humans. Additionally, as these recreational users move through the environment, they might contribute to the spread of chytrids, especially water users if boats and other equipment are not thoroughly dried or sterilized between sites. Some recreationists are also likely to spread non-native predators.

Watershed Management Program

No applicable S&Gs in the Watershed Management Program are likely to result in direct negative effects to the frog. However, S&G 1350 allows for grazing in the riparian in order to rehabilitate the shrub cover. Any grazing in the riparian is likely to result in lethal take of individual frogs and avoidance of the area resulting in decreased breeding success, as discussed under the Rangeland Management Program.

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in the Wildlife Program are likely to result in direct negative effects to the frog. However, S&G 1348 provides for 20 percent allowable use. For migratory birds, no take would occur if the use were to occur outside the breeding season. This concept does not apply to the frog as multiple life stages may be found throughout the year; thus even if the riparian is not adversely affected, there could still be incidental trampling of frogs.

Standards and Guidelines 1364 and 1365 allow for the minimization of impacts of roads in riparian areas. This should help to decrease watershed degradation in these areas. However, the actual construction and use of any roads in the riparian is likely to result in lethal take of individual frogs from use of tools and machinery, and avoidance of the project area resulting in decreased breeding success.

A number of S&Gs in the Wildlife Program provide a great deal of benefit to the frog. Standards and Guidelines 1345, 1391, and 1410 all allow for habitat requirements for T&E species to take precedence over those for other species. These S&Gs should help to minimize the effects of projects and activities in all of the forest programs and even help establish new populations. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical frog areas, and may also result in increased population numbers and sizes.

In summary, the applicable S&Gs within the Tonto NF LRMP allow for a variety of effects to the frog. To a large extent, activities conducted under the positive S&Gs should benefit the frog and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not of eliminate the possibility of take, thus take of frogs is reasonably certain to occur as a result of implementation of the Apache-Sitgreaves NF LRMP.

1996 Regional Amendment

All of the S&Gs analyzed for the 1996 Regional Amendment fall under the Wildlife Program. This Amendment implemented the Mexican Spotted Owl recovery plan, Northern Goshawk guidelines, and some additional grazing guidelines. We found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 79. Effects of the S&Gs analyzed for the Chiricahua leopard frog – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.3
1	S&G is maintaining habitat & providing at least minimal recovery	31	57.4
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	10	18.5
Z	S&G implementation is non-discretionary	2	3.7
X	S&G is a heading	6	11.1
Total		54	100 %

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs analyzed for the Wildlife Program under the 1996 Regional Amendment are likely to result in negative effects to the frog. Standards and Guidelines 1432, 1445, 1455, 1458, 1468, 1476, and 1508 all allow for some use of prescribed fire and fuels reduction. These S&Gs provide benefits to the frog by reducing the risk of catastrophic wildfire, which given the limited numbers of populations in existence, could have serious impacts to population functions. However, the fuels treatment projects are likely to result in lethal take of individuals associated with humans, tools, machinery, and burning. There is also likely to be temporary avoidance of the burned and/or cleared areas resulting in decreased breeding success. Finally, sedimentation/erosion and ash flows in burn areas have been known to cause local extirpations of frogs in the affected areas.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Wildlife herds such as elk are managed by AGFD and NMDGF. Grazing by elk can adversely affect riparian health in similar ways as livestock. Additionally, sport fish stocking and management on Forest Service lands is conducted through these state agencies. The threat of

non-native fishes to frogs has been well documented. Although these programs are managed primarily by the state agencies, many of them are consulted on through the Federal Aid or Fisheries programs.

Additional cumulative impacts to the frog may result from cross-border activities along the U.S./Mexico border. Cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increased fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference with survey, monitoring, and research efforts.

CONCLUSION

After reviewing the current status of the Chiricahua leopard frog, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Chiricahua leopard frog. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The Chiricahua leopard frog is currently found on the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto NFs where its survival is threatened by many factors, in particular the spread of chytrids, presence of non-native predators, and habitat loss and degradation. As discussed above, the FWS anticipates incidental take of the Chiricahua leopard frog is reasonably certain to occur from activities authorized under the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto NF LRMPs as well as the 1996 Regional Amendment. However, the FWS does not believe that such activities will rise to the level of jeopardy for the species for the following reasons:

- These LRMPs include S&Gs that direct the Forests to prioritize threatened and endangered species over other species, which in part, should help to minimize or eliminate the impacts of non-native fishes on frogs. In addition, other S&Gs direct the Forests to work towards recovery, and even to delist threatened and endangered species.
- These LRMPs include S&Gs that direct range and watershed conditions to improve, which should increase the availability and quality of frog habitat on National Forest System lands.
- All of these Forests have adopted a survey protocol that minimizes or eliminates the spread of disease (e.g., chytrids) associated with survey efforts.
- The Conservation Measures provided by the Forest Service to supplement the biological assessment work to further limit the adverse impacts of all projects, particularly the adverse impacts of stock tank maintenance and fire use. Furthermore,

and most importantly, these Conservation Measures should lead to the establishment of additional frog populations on National Forest System lands.

In summary, although the evaluation of the numeric effects analysis does not involve balancing or averaging the rankings, the full suite of S&Gs in the Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto NF LRMPs and 1996 Regional Amendment, in combination with the direction provided by the Conservation Measures, creates a decision-making framework within which these National Forests can continue to implement their respective LRMPs without appreciably reducing the likelihood of the survival or recovery of the Chiricahua leopard frog in the wild.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without species exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the Incidental Take Statement. [50 CFR section 402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Chiricahua leopard frog is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto NFs LRMPs and the 1996 Regional Amendment. This incidental take is expected to be in the forms of harm (i.e., direct mortality) and harassment due to road use and management, prescribed fire, mechanical fuels treatments, chemical use, rangeland management, recreation, and impacts of surface disturbing projects from various programs. The FWS anticipates, however, that

incidental take of Chiricahua leopard frogs will be difficult to detect for the following reasons: small body size, finding all or most of the dead or impaired specimens is unlikely, and losses may be masked by seasonal fluctuations in numbers. Although we cannot estimate the number of individual frogs that will be incidentally taken, the FWS is providing a mechanism to quantify when take would be considered to be exceeded at the population level (i.e., we use populations of frogs to determine when take is exceeded). The FWS concludes that the incidental take of Chiricahua leopard frogs will be considered to be exceeded if, after a period of two consecutive years, there is a decrease in the total number of occupied Chiricahua leopard frog population sites on National Forest System lands as a result of the proposed action. Presence or absence of frog populations will be assessed using the current Fish and Wildlife Service Protocol for Project Evaluation (U.S. Fish and Wildlife Service 2003). The baseline for this determination will be the 2004 survey season data outlined above (49 extant population sites). The two-year period begins in 2005 and extends through the 2006 survey season. Thus for the period 2005-2006, the status of the Chiricahua leopard frog will be reviewed at the end of the 2006 survey period. This review period will be replicated every two years thereafter for the life of the biological opinion (e.g., 2007-2008, 2009-2010).

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Chiricahua leopard frog.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Chiricahua leopard frog:

1. Protect Chiricahua leopard frogs on National Forest System lands.
2. Protect Chiricahua leopard frog habitat on National Forest System lands.
3. Monitor Chiricahua leopard frog populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Where feasible, all equipment associated with authorized and permitted use will be properly sterilized between aquatic sites, by completely drying or treating with a 10% bleach or 1% Quat 128 solution, in order to reduce the spread of chytrids.
- 1.2 Develop contingency plans in cooperation with FWS, other federal and state agencies, and others to preserve, rescue, and secure populations in imminent threat of localized extirpation.

- 1.3 Cooperatively work to eliminate the presence of non-native aquatic species within occupied habitat of the Chiricahua leopard frog on National Forest System lands.
- 1.4 When designing fish habitat improvement projects, give consideration to Chiricahua leopard frogs in order to minimize conflicts with non-native aquatic predators.
- 1.5 Design projects within the Engineering, Forestry and Forest Health, Fire Management, Rangeland Management, and Recreation programs, as well as fire and chemical use to minimize or eliminate adverse effects to the Chiricahua leopard frog.
- 1.6. Where feasible and appropriate, implement any applicable project mitigation protocols outlined in the final Chiricahua leopard frog recovery plan.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Forestry and Forest Health, Fire Management, Rangeland Management, and Recreation programs, as well as fire and chemical use to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied frog habitats.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor populations of Chiricahua leopard frogs on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Chiricahua leopard frogs, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the Chiricahua leopard frog.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Implement an educational program for recreation users, encouraging them to properly sterilize or dry equipment between sites.
2. The road densities and analyses reported in the Forest Service's biological assessment do not include "illegal" roads which affect frogs even though they are not counted. To this end, the Forest Service should close and obliterate roads causing resource damage.
3. Many S&Gs call for watershed, range, and/or habitat improvements. These improvements are not given a timeframe, thus populations may be impacted and incidental take of individuals may occur over time. It is recommended that the Forest Service prioritize improvement projects using some combination of factors which recognize extreme environmental degradation and T&E occupied sites.
4. Consider providing support and/or funding research on methods to eliminate chytrids and non-native predators (e.g., bullfrogs, crayfish) from frog habitats.
5. Consider developing a biological assessment for consultation on Fire Use at a programmatic level.
6. Assist the FWS in implementing the final Chiricahua leopard frog recovery plan.
7. To the greatest extent feasible, design projects such that impacts to Chiricahua leopard frogs will occur outside the times they are most active (i.e., April through September and when water temperatures are at least 14oC at elevations below 5,500 feet and at least 12oC at 5,500 feet and above).
8. The Forest Service is encouraged to continue surveying and monitoring unoccupied or potentially occupied Chiricahua leopard frog habitats.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

NEW MEXICO RIDGE-NOSED RATTLESNAKE

STATUS OF THE SPECIES

Description

The ridge-nosed rattlesnake (*Crotalus willardi*), as a species, is known from southeastern Arizona, southwestern New Mexico, and the Mexican States of Sonora, Chihuahua, Durango, and Zacatecas (Harris and Simmons 1975). Individuals of the species are relatively small, with a maximum length of approximately 2.19 feet (66 cm) (Klauber 1972). The dorsal coloration of ridge-nosed rattlesnakes consists of a light brownish background overlain by pale crossbands with dark edges. The ventral side is white to pale brown (Klauber 1972). One of five subspecies, the New Mexico ridge-nosed rattlesnake (*Crotalus willardi obscurus*) occupies the Animas Mountains of southwestern New Mexico, the Peloncillo Mountains of Arizona and New Mexico, and the Sierra San Luis of Chihuahua, Mexico (Campbell et al. 1989, Painter 1995, Degenhardt et al. 1996, Keegan et al. 1999).

In the 1970s, H.S. Harris and R.S. Simmons assigned the name *C. w. obscurus* to the ridge-nosed rattlesnake populations of the Animas Mountains in southwestern New Mexico, and the Sierra San Luis Mountains of Chihuahua, Mexico (U.S. Fish and Wildlife Service 1985). Formerly, these two disjunct populations were recognized as the subspecies *C. w. silus*. Yet, *C. w. obscurus* has since been accepted as the valid subspecies by the Society for the Study of Amphibians and Reptiles, the FWS, and the NMDGF (U.S. Fish and Wildlife Service 1985). Baker (1990), using morphometric characters and allozymic analysis, confirmed the five recognized subspecies of *C. willardi* as valid.

Legal Status: On August 4, 1978, the FWS listed the New Mexico ridge-nosed rattlesnake (*C. w. obscurus*) as a threatened species under the ESA of 1973, as amended. Along with the listing of threatened, the FWS designated critical habitat for the subspecies. Critical habitat is designated for the New Mexico ridge-nosed rattlesnake in Hildago County, New Mexico at elevations between 6,200 feet and 8,532 feet in the Bear, Indian, and Spring Canyons of the Animas Mountains (U.S. Fish and Wildlife Service 1978).

The species *Crotalus willardi* is listed as Endangered in Mexico's "Especies de Fauna en Peligro de Extincion en Mexico" (Virginia Polytechnic 1996 which cited Reyes, August 1982).

On January 24, 1975, the New Mexico ridge-nosed rattlesnake, then listed as *C. w. silus*, was listed as endangered by the state of New Mexico. This listing requires an issuance of a permit to legally possess or take any specimen of *C. w. silus*, now identified as *C. w. obscurus*. The New Mexico ridge-nosed rattlesnake is also listed as a species of special concern in Arizona; and may not be collected from the wild in Arizona pursuant to Arizona Game and Fish Commission Order 43 (U.S. Forest Service 2004).

A recovery plan for the New Mexico ridge-nosed rattlesnake was signed on March 3, 1985. The FWS's recovery plan for *C. w. obscurus* is directed at the recovery of the New Mexico populations of the subspecies, yet most of the recovery actions are also applicable to the Sierra

San Luis populations. The Peloncillo population was not known at the time, but the actions in the recovery plan are also applicable in this mountain range.

Distribution and Abundance

The subspecies, *C. w. obscurus*, is known to occupy the Animas Mountains, Hidalgo County, New Mexico; the Peloncillo Mountains, Hidalgo County, New Mexico and Cochise County, Arizona; and the Sierra San Luis in Sonora and Chihuahua, Mexico. At the time of listing, the largest population of New Mexico ridge-nosed rattlesnakes was known to occur in the Animas Mountains of New Mexico; the subspecies was not known to occur in the Peloncillo Mountains (U.S. Fish and Wildlife Service 1999). Since the listing, the New Mexico ridge-nosed rattlesnake has been found within the Peloncillo Mountains of the Coronado NF (U.S. Forest Service 2004).

The distribution of the New Mexico ridge-nosed rattlesnake within the Animas Mountains occurs in four canyon bottom areas and adjacent slopes. The four known areas of occurrence include West Fork, Indian Creek, Bear, and Spring Canyons. Additional areas of potentially occupied habitat (i.e., areas of essential habitat) total approximately 6.5 square miles in surrounding areas (U.S. Fish and Wildlife Service 1985). The New Mexico ridge-nosed rattlesnake moves relatively short distances and less frequently than other rattlesnake species (Baker 1991, Holycross 1995).

Habitat

The New Mexico ridge-nosed rattlesnake is a woodland reptile found primarily in areas of Madrean evergreen woodland and Petran montaine conifer forest (Brown 1982). The subspecies occupies steep, rocky canyons with intermittent streams, or talus slopes at elevations ranging from approximately 5,200 – 8,500 feet (1,576 – 2,576 m) (Campbell et al. 1989). Talus slopes are apparently absent from the Peloncillo Mountains, where the subspecies occurs in wooded canyon bottoms and on steep wooded slopes as low as 5,000 feet (1,525 m). Occupied habitat within the Peloncillo Mountains is characteristically more arid, lower in elevation, and less vegetated than typical habitats found in the Animas Mountains of New Mexico (U.S. Forest Service 2004). The annual precipitation in the Animas Mountains is approximately 20 inches, with annual evaporation of approximately 65 inches (U.S. Fish and Wildlife 1985).

In general, the floras of the Animas and San Luis Mountain ranges where New Mexico ridge-nosed rattlesnakes found are similar, with predominantly evergreen forests at high elevations. Dominant vegetation characterizing the habitat of this subspecies includes several species of oak, *Quercus* spp.; Douglas fir, *Pseudotsuga menziesii*; Apache pine, *Pinus engelmannii*; Chihuahua pine, *P. leiophylla* var. *chihuahuana*; Arizona madrone, *Arbutus arizonica*; manzanita, *Arctostaphylos pungens*; and grasses (Degenhardt 1972, Barker 1991, Degenhardt et al. 1996, Holycross 1998). The San Luis Mountains are somewhat more mesic than the Animas Mountains, with the additions of such species as Arizona cypress, *Cupressus arizonica*; bigtooth maple, *Acer grandidentata*; and other riparian plants (Virginia Polytechnic 1996).

Of the potentially occupied habitat, areas in and near canyon bottoms are the most essential for the New Mexico ridge-nosed rattlesnake. The subspecies favors access to rock shelters and perennial bunch grasses for cover. Preferred substrate for concealment includes rocks, leaf litter,

and downed logs. Ridge-nosed rattlesnake species hibernate in protected areas that do not freeze, often in small groups and possibly with other snake species. Winter retreats are often talus areas and other labyrinthian formations (e.g., rock outcrops, cliffs/ledges, etc.) that allow the snakes to move below the frost line (Applegarth 1980). In warmer temperatures, *C. willardi* is often found on or near vegetated areas, which provide shade, a more stable temperature regime, and concealment for the rattlesnake.

Critical Habitat: As noted in the Federal Register (Vol. 43, No. 151) on August 4, 1978, designated critical habitat for the New Mexico ridge-nosed rattlesnake, *Crotalus willardi obscurus*, includes the area in Hidalgo County, New Mexico, at elevations between 6,200 and 8,532 feet in the Bear, Indian, and Spring Canyons of the Animas Mountains. The area of critical habitat consists of private lands. Critical habitat for the subspecies does not include Forest Service lands, nor does it occur within the action area.

Life History

Ridge-nosed rattlesnake species differ from other members of their genus in having upturned internasal and canthal scales that form a ridge around the front of the snout (Stebbins 1966). The New Mexico ridge-nosed rattlesnake is grayish-tan along its ventral side, versus more reddish brown hues in the other subspecies. *C. w. obscurus* is further distinguished from the other subspecies by the lack or obscurity of white facial markings. Specifically, there is no white vertical line on the rostral or mental (as on *C. w. willardi*, *C. w. amabilis*, and *C. w. meridionalis*) and generally no white flash mark on the sides of the head (as *C. w. silus*) (Harris and Simmons 1975, 1976).

The ridge-nosed rattlesnake is known to reach sexual maturity when 80 percent full-grown. Individuals reproduce biennially, with a gestation period of 13 months. Females mate in summer or fall, and ovulation and fertilization occurs early the subsequent spring (Holycross and Goldberg 2001). Ridge-nosed rattlesnakes are ovoviviparous, with the female retaining the fertilized eggs in oviducts until the time of hatching. Once ready to hatch, females give birth to live young (Klauber 1956, 1972). In *C. obscurus*, young snakes are born July through August, with a mean litter size of 5.4, ranging from two to nine (Applegarth 1980, Holycross and Goldberg 2001). No maternal care exists for any of the ridge-nosed species. Dispersal of newborn rattlesnakes occurs within a few days following their birth.

Young ridge-nosed rattlesnakes resemble adults, yet are browner and have yellow-orange lip pigment (Klauber 1972). *C. w. obscurus* neonates, like the other subspecies of *C. willardi*, have polymorphic tail coloration with either black or yellow colored tail-tips (Holycross 2000). Yellow colored tail-tips are associated with caudal prey luring behavior in young pitvipers (Schuett et al. 1984, Greene 1992, Strimple 1992).

Ridge-nosed rattlesnakes are active during periods of moderate temperatures, both diurnal, and seasonally. *C. w. obscurus* is known to be active as early as April and as late as October, with heightened activity between July and September. These months coincide with the rainy season in the Animas Mountains. Higher humidity may ameliorate temperatures and provide more optimal conditions under which these rattlesnakes might be active (U.S. Fish and Wildlife Service 1985). Currently, there are no records of nocturnal activity.

The subspecies may forage more actively using caudal or facial luring to catch prey. Fecal samples from 246 New Mexico ridge-nosed rattlesnakes and a literature record identified 95 identifiable prey. Juvenile snakes feed primarily on spiny lizards (*Sceloporus* sp.) and centipedes (*Scolopendra* spp.), and some juveniles exhibit yellow tails that may be used to lure prey (Holycross 2000). Adults prey mostly on small mammals, spiny lizards, and passerine birds (Holycross et al. in prep.). Based on more limited samples, other workers have come to similar conclusions regarding the diet of *C. w. obscurus* (Applegarth 1980, Barker 1991).

Population Dynamics

Currently, specific population trends of the Mexican ridge-nosed rattlesnake are unknown. Ridge-nosed rattlesnakes have historically been limited in range and uncommon. Within its U.S. range, the largest known population of ridge-nosed rattlesnakes occurs in the Animas Mountains of New Mexico. Smaller populations are known from the Peloncillo Mountains of Arizona and New Mexico (U.S. Forest Service 2004). In 1985, surveys estimated 250-500 adult snakes of the subspecies *C. w. obscurus* occupied the Animas Mountains (U.S. Fish and Wildlife Service 1985). However, eight years of mark and recapture data in West Fork Canyon of the Animas Mountains suggests that this was an underestimate. Encounter rates by experienced herpetologists suggest that the densest populations of ridge-nosed rattlesnakes may occur in portions of the Sierra San Luis of Mexico, with comparatively moderate and low densities in the Animas and Peloncillo Mountains, respectively (U.S. Fish and Wildlife Service 2001).

Reasons for Listing

The New Mexico ridge-nosed rattlesnake is listed as a federally threatened species as a result of its limited range, over-collecting, and habitat loss. After publication of the Animas Mountain locality in 1961 (Bogert and Degenhardt 1961), the area was reportedly heavily collected for New Mexico ridge-nosed rattlesnakes. Harris and Simmons (1976) reported encountering 15 collectors from six states in the Animas Mountains during August of 1974. The FWS (1985) has estimated that as many as 130 New Mexico ridge-nosed rattlesnakes may have been collected in the Animas Mountains between 1961 and 1974. Given that the total area inhabited by *C. w. obscurus* is less than two square miles, collection during this period may have significantly affected the Animas Mountain population (Harris and Simmons 1976, U.S. Fish and Wildlife Service 1985).

The collection of ridge-nosed rattlesnake populations was often associated with habitat disturbance. Rock and log turning, and the use of crowbars or gasoline on rock outcroppings were techniques associated with collecting ridge-nosed rattlesnakes. These activities destroyed or altered occupied and potentially occupied habitat available to the subspecies.

Threats: New Mexico ridge-nosed rattlesnakes occur in three, small disjunct populations. Thus, its viability is sensitive to natural events, habitat destruction or modification, and collection (U.S. Fish and Wildlife Service 1999). Natural threats to the New Mexico ridge-nosed rattlesnake include predation, starvation, and disease. While disease is not known to limit wild populations of *C. w. obscurus*, the highly disjunct range of this subspecies increases its vulnerability to extinction due to disease and habitat loss (U.S. Fish and Wildlife Service 1985).

The largest threat to the New Mexico ridge-nosed rattlesnake is loss of habitat. The Animas Mountains in New Mexico are privately owned, and access to this range of the ridge-nosed rattlesnake is strictly controlled (U.S. Fish and Wildlife Service 1999). However, most of the rattlesnake habitat in the Peloncillo Mountains is managed by the Coronado NF and the Bureau of Land Management; thus open to public use. The Peloncillo Mountains are more accessible than the Animas or San Luis ranges, making illegal collection and other human activities more likely. Activities that may affect the New Mexico ridge-nosed rattlesnake in the Peloncillo Mountains include prescribed fire, wildfire, illegal collection, cattle grazing, commercial beargrass harvesting, and low to moderate levels of recreational activities such as birding, vehicle use, backpacking, camping, and hunting (U.S. Fish and Wildlife Service 1999).

Conservation Measures

The Coronado NF has implemented riparian habitat enhancement activities in pine/oak canyons of the Peloncillo Mountains (U.S. Forest Service 2004). In addition, implementation of the Coronado NF's Peloncillo Programmatic Fire Management Plan reduces the risk of catastrophic fires across the landscape. Such conservation measures aim to improve and protect habitat conditions for the New Mexico ridge-nosed rattlesnake.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The Peloncillo population of New Mexico ridge-nosed rattlesnakes is one of three known populations; the Animas and Sierra San Luis Mountains contain the other two populations. The population of ridge-nosed rattlesnakes on the Peloncillo Mountains is the only population of the subspecies within the action area. This occupied habitat area is managed by the Forest Service and BLM. Specifically, occupied area managed by the Forest Service is found entirely within Management Area 4. Management Area 4 is composed of 1,128,739 ac (456,786 ha) located on the Douglas Ranger District of the Coronado NF in the boot-heel of New Mexico, near the border with the state of Arizona (U.S. Forest Service 2004). Within the Peloncillo Mountains, a total of 27 New Mexico ridge-nosed rattlesnakes have been found in 13 general areas (U.S. Fish and Wildlife 2002). The relatively low number (27 snakes) may be attributed to the difficulty in locating this subspecies in the Peloncillo Mountains.

Holycross and Smith (2001) prepared a report and mapped *C. w. obscurus* habitat in the Peloncillo Mountains. Habitats were mapped as: 1) habitats probably or likely supporting (the FWS equates this to reasonably certain species are present) a deme of *C. w. obscurus* (habitats 3 and 4); 2) habitats very unlikely or unlikely to have *C. w. obscurus* occurring there (habitats 1 and 2); and 3) potential habitats that burned destructively in the Maverick prescribed fire and no longer contain habitat characteristics. A total of 275 habitat patches were identified; 233 were

ranked as habitats 3 and 4, 13 habitats rated as 1 or 2, and 30 patches identified that burned in the Maverick prescribed fire. This provides a map of potential core habitat, based upon a comparison of the known occupied locations and the potential available habitat within the Peloncillo Mountains. This does not attempt to cover all habitats used by *C. w. obscurus*, but only the canyon woodlands that are typically used during the active season.

Designated critical habitat for the New Mexico ridge-nosed rattlesnake includes private lands within the Animas Mountains. Critical habitat for the subspecies does not include Forest Service lands, nor does it occur within the action area.

Factors Affecting the Species within the Action Area

Factors affecting the New Mexico ridge-nosed rattlesnake and its associated habitat within the Peloncillo Mountains include illegal collection, wildfires, prescribed fires, and low to moderate levels of recreational activities. Potential threats to the subspecies include fuel wood harvest, mining, improper grazing management, and development (U.S. Fish and Wildlife Service 1985, 2002).

Collection and commercial exploitation of the New Mexico ridge-nosed rattlesnake has occurred in the past, and may still continue. During the 1960's and 1970's, as the taking of species in Mexico and Arizona became more difficult, the collection of New Mexico ridge-nosed rattlesnakes increased. Increased poaching (collection) has been known to significantly impact ridge-nosed rattlesnake populations (U.S. Forest Service 2004:215).

Catastrophic, stand replacing fire events are a serious threat to *C. w. obscurus* and its woodland habitat. Altered fire regimes in the southwestern U.S. have caused woody fuel loads to build up in woodland habitats, increasing the risk for high intensity stand replacing fires (U.S. Forest Service 2004). Such catastrophic fires can destroy habitat essential to the survival of the species and pose a serious threat to the New Mexico ridge-nosed rattlesnake (U.S. Fish and Wildlife Service 2001). In 1997, the Maverick prescribed fire occurred in two of the 13 areas known to be occupied by New Mexico ridge-nosed rattlesnakes in the Peloncillo Mountain range. In 2003, the Baker II prescribed fire was successfully implemented. The perimeter of the burn encompassed approximately 47,000 acres. Post fire evaluation of the *C. w. obscurus* habitat as identified by Holycross and Smith (2001) showed that about 9 percent of the type 3 and 4 habitats within the burn were affected by high-intensity fire effects (Helbing 2004).

In September of 2004, the Coronado NF completed a biological assessment of the Forest Service's Peloncillo Programmatic Fire Management Plan. Objectives of the fire plan consist of reducing catastrophic fires, developing mosaic habitat patterns, and promoting natural ecological processes (U.S. Forest Service 2004:506). Activities associated with the implementation of this plan may kill or injure ridge-nosed rattlesnakes through the use of heavy equipment and fire effects from back burns and prescribed burns. These activities may also contribute to an increase in snake predation due to loss of ground cover, potentially reduce prey species numbers, and alter suitable habitat as to significantly disrupt normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

On March 18, 2005, the FWS issued a biological opinion on the Forest Service's Peloncillo Programmatic Fire Management Plan (Consultation #02-21-04-F-0474). The FWS concluded that the proposed action of the fire plan was "not likely to jeopardize" the continued existence of the New Mexico ridge-nosed rattlesnake. However, incidental take was anticipated as a result of the fire plan. The 2005 Biological Opinion on the Forest Service's Peloncillo Programmatic Fire Management Plan quantified take by the number of individuals for actions where it is relatively easy to detect individuals. For projects on a scale where detection of individuals is extremely unlikely, the FWS used potential core habitat ranked by Holycross and Smith (2001) as "habitats probably or likely supporting a deme of *C. w. obscurus*" (habitats 3 and 4) as a surrogate for take. The FWS anticipated the following incidental take for the New Mexico ridge-nosed rattlesnake as a result of the fire plan:

1. One New Mexico ridge-nosed rattlesnake will be killed or injured; or
2. Up to 10 percent of delineated core habitat ranked as 3 or 4 (Holycross and Smith 2001), in Fire Management Areas IV and V (Upper Cloverdale Creek Watershed) will be affected by high intensity fire during the life of the fire plan. A high canopy consuming fire is one where 90 percent to 100 percent of the wooded overstory canopy is burned off; or
3. Up to 20 percent of delineated core habitat ranked as 3 or 4 (Holycross and Smith 2001), in the remaining Fire Management Areas will be affected by high intensity fire during the life of the fire plan (U.S. Fish and Wildlife Service 2005).

The Incidental Take Statement for the New Mexico ridge-nosed rattlesnake from the 2005 biological opinion covers all effects of prescribed fire and related activities for a period of 10 years.

Recreational activities and OHV use have the potential to directly and indirectly affect the subspecies. In 2001, the Coronado NF had 2.7 million visitors, and the capacity at developed recreation sites is approximately 15,000 visitors (U.S. Forest Service 2004:510). Although the Coronado NF restricts the use of motorized vehicles to existing trails and roadways, snake mortalities associated with vehicle use have been known to affect the subspecies (U.S. Forest Service 2004:510).

The lands within Management Area 4 are suitable for livestock forage. The effects of livestock grazing on the New Mexico ridge-nose rattlesnake are largely speculative and poorly studied. Potential impacts from livestock grazing to the subspecies may include trampling and habitat degradation. Improper livestock grazing is believed to reduce snake hiding and prey cover, and reduces available habitat (U.S. Fish and Wildlife Service 1985, 1999). Although permitted, the recent drought has limited the grazing of livestock within Management Area 4.

In 2002, the FWS issued a biological opinion on the Forest Service's On-going and Long-term Grazing Activities on the Coronado NF (Consultation # 2-21-98-F-399-R1). The 2002 biological opinion addressed the continued grazing of domestic livestock on 190 allotments, as well as the effects of associated roads and other range projects. The FWS concluded that the

proposed action of the continued grazing was “not likely to jeopardize” the continued existence of the New Mexico ridge-nosed rattlesnake. Yet, incidental take was anticipated as a result of the proposed grazing activities. The 2002 biological opinion authorized the taking of two New Mexico ridge-nosed rattlesnakes as a result of direct impacts, including trampling by cattle or horses associated with grazing, snakes run over by vehicles associated with livestock grazing, snakes killed by permittees or ranch hands, and construction and maintenance of range projects. Take was also authorized for two New Mexico ridge-nosed rattlesnakes as a result of indirect effects of livestock grazing, including reduction of vegetation cover quantity or quality, which increases predation and lowers prey availability, reducing reproductive output and/or increases snake mortality (U.S. Fish and Wildlife Service 2002). The Incidental Take Statement for the 2002 biological opinion covers all effects associated with livestock grazing on the Coronado NF for a period of 10 years.

Timber harvesting has been classified as unsuitable in all acres within Management Area 4. However, the lands within Management Area 4 are suitable for fuel wood harvesting (U.S. Forest Service 2004). The harvesting of fuel wood has the potential to destroy or damage habitat essential to the survival of the New Mexico ridge-nosed rattlesnake.

Mineral operations and utility right-of-ways have the potential to directly and indirectly affect the New Mexico ridge-nosed rattlesnake through habitat destruction and disturbance (U.S. Forest Service 2004). Access roads and the accompanying vehicle traffic are a necessary component of minerals activities. The use of heavy equipment along with surface occupancy causes direct habitat loss. In addition, human occupation increases the chances for harassment and displacement of this subspecies (U.S. Forest Service 2004).

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within the Coronado LRMP are applicable to the New Mexico ridge-nosed rattlesnake and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the subspecies. Designated critical habitat for the New Mexico ridge-nosed rattlesnake does not occur within the action area; thus, no critical habitat for this species will be affected as a result of the proposed action.

Table 80. Summary of S&Gs considered for the New Mexico ridge-nosed rattlesnake.

National Forest	Standards and Guidelines
Coronado	612-13, 626-29, 631-38, 648-53, 666-69, 672-74, 682, 693-94, 696-97, 702, 704, 774, 778-80, 782, 785
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-41, 1445, 1449, 1453-56, 1458-59, 1461-1465, 1468, 1474, 1476, 1486-89, 1491-92, 1495, 1500-01, 1505, 1507-15

Coronado National Forest

Within the action area, the New Mexico ridge-nosed rattlesnake is only known to occur on the Peloncillo Mountains of the Coronado NF. Occupied sites include 13 general areas within Management Area 4 of the Douglas Ranger District, near the Arizona/New Mexico border. As outlined in the Coronado LRMP, the management emphasis for Management Area 4 is for a sustained harvest of livestock forage and fuelwood, while maintaining and improving game animal habitat (U.S. Forest Service 2004).

The S&Gs within the Coronado NF LRMP generally emphasize the restoration and protection of threatened and endangered species' habitat. Approximately 68 percent of the S&Gs within the Coronado NF LRMP have a positive response on the New Mexico ridge-nosed rattlesnake. However, Forest Service management on the Coronado NF may negatively impact New Mexico ridge-nosed rattlesnakes and their habitat through prescribed fire, improper grazing management, fuel wood harvesting, mining, pesticide use, and low to moderate levels of recreational activities. Yet, less than 5 percent of the S&Gs within the Coronado NF LRMP have the potential for sublethal and lethal effects to the rattlesnake.

Table 81. Effects of the S&Gs analyzed for the New Mexico ridge-nosed rattlesnake - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	2.4
-2	S&G is causing sublethal response	1	2.4
-1	S&G is causing negative behavioral response	0	0
0	S&G is ill-defined and/or open to interpretation	6	14.6
1	S&G is maintaining habitat & providing at least minimal recovery	24	58.6
2	S&G is moving towards recovery	2	4.9
3	S&G is implementing species recovery plan	2	4.9
Y	S&G has no application to the species	1	2.4
Z	S&G implementation is non-discretionary	3	7.3
X	S&G is a heading	1	2.4
Total		41	100 %

Engineering Program

The Engineering Program of the Coronado NF LRMP includes the construction, maintenance and operation of roads. Although such activities could potentially result in snake mortality, habitat modification and destruction, no applicable S&Gs within the Engineering Program have a negative effect upon New Mexico ridge-nosed rattlesnakes. General guidelines provided for the Engineering Program focus on road construction, use, maintenance, and closures with regards to natural resource protection. In particular, management direction of S&G 785 involves the closure and re-vegetation of roads and trails that are not needed for further use. Such direction has a positive effect on New Mexico ridge-nosed rattlesnake by reducing road density and minimizing threats to the subspecies.

Additional guidelines within the Coronado LRMP relate to activities conducted under the Engineering Program. The LRMP directs management to ensure public access to various parts of the Forest via state, county, or permanent Forest Service roads (U.S. Forest Service 1986). Such a transportation structure in occupied or potential rattlesnake habitat supports two of the activities that pose substantial threats to the subspecies. Effects on the subspecies include direct road mortality and an increase in illegal collection by increased public access. However, the LRMP also provides direction for minimizing the transportation system to adequately meet management, protection and utilization needs; but in locations that will minimize damage and maximize the values of all resources (U.S. Forest Service 1986). Implementation of this guidance, along with S&G 785 helps minimize the negative effects of the transportation system on the New Mexico ridge-nosed rattlesnake.

Fire Management Program

Fire management on the Coronado NF includes fire prevention, fire suppression, and fire use. Wildfires in the southwest are getting larger and more intense, primarily due to the density of trees and accumulated dead woody debris on National Forest System lands (U.S. Forest Service 2004). Such catastrophic fire has been identified as a natural stochastic threat to the New Mexico ridge-nosed rattlesnake and habitat.

No applicable S&Gs within the Coronado NF LRMP were associated with the Fire Management Program. However, the Coronado LRMP directs the use of prescribed fire to reduce fuel hazard and enhance and improve wildlife habitat, livestock forage, watershed values, and visual resources values (U.S. Forest Service 1986). Fuel treatments may consist of chipping, broadcast burning, piling and burning, or lopping and scattering (U.S. Forest Service 1986).

Prescribed fire activities may directly affect New Mexico ridge-nosed rattlesnakes. The subspecies may be caught and burned by these fires. Snakes may also be killed or injured during the surface disturbing activities associated with fire management actions. The potential exists for an increase in snake predation due to loss of ground cover and longer periods of surface exposure as more time and energy is devoted to foraging (Bureau of Land Management 2004). Additional indirect effects include reduction in prey availability, changes in reproductive patterns, and long-term alteration of suitable habitat. Combined with the disjunct distribution of the subspecies, the loss of individual rattlesnakes and habitat disturbance may also affect the ability of individuals to find suitable mates.

Interdependent effects from fire prevention activities may have a long-term positive impact to the New Mexico ridge-nosed rattlesnake. Fire prevention activities reduce the chances of injury and mortality, as well as destruction of habitat from catastrophic fires. The Coronado NF has developed a Peloncillo Programmatic Fire Management Plan, which includes the use of prescribed fire and management of fire ignitions that may occur on the Peloncillo Mountain Range over a 10 year period. The goal of the fire plan is to maintain a mosaic of woodlands, shrub lands, and grasslands, while reducing woody plant encroachment (U.S. Forest Service 2004). The effects of prescribed fire and associated activities have been identified and addressed in the FWS's 2005 Biological Opinion on the Peloncillo Programmatic Fire Management Plan. The FWS does not foresee any additional impacts to the New Mexico ridge-nosed rattlesnake

from the effects of prescribed fire activities than those outlined in the fire plan biological opinion.

Forestry and Forest Health Program

The Forest Health component of the Forestry and Forest Health Program involves the management of forest insects and disease. Standard & Guideline 696a guides the use of pesticides and fire retardants to safeguard water, people, animals, pets, and property. The use of pesticides to manage insects and disease has the potential to adversely affect New Mexico ridge-nosed rattlesnakes. The use of insecticides may indirectly affect the subspecies by reducing prey availability. Rattlesnakes may also be affected by the use of herbicides applied for land treatments, which contribute to the loss of habitat structure. Thus, the implementation of S&G 696a has the potential to negatively affect on New Mexico ridge-nosed rattlesnakes.

The Coronado LRMP also provides standards and guidelines for the use of chemicals related to mining operations. Specifically, S&G 702 allows for the use of chemicals involved with cyanide leaching activities. Cyanide leaching ponds could have lethal and sublethal effects on New Mexico ridge-nosed rattlesnakes through direct mortality and reduced prey availability. Although cyanide leaching is permitted forest-wide within the Coronado NF, Forest Service personnel have stated that no cyanide leaching ponds exist on the Forest to-date; thus reducing threats to the rattlesnake from cyanide leaching activities (W. Murphy, Forest Service, 2005, unpubl. data).

Land and Minerals Program

The Lands and Minerals Program manages purchases, withdrawals, land exchanges, mining, oil, gas, geothermal leases, and the issuance of non-recreational special use authorizations. The management and administration of minerals includes surface disturbances associated with underground mining operations, such as exploration drill holes, road construction, and active mining. Impacts associated with these activities could include increased traffic mortality, limited protection, and habitat loss and degradation from activities related to mineral extraction permits.

The Forest Service has limited discretion on the authorization and management of land and minerals permits. Furthermore, no S&Gs within the Lands and Minerals Program are applicable to the Management Area 4, where New Mexico ridge-nosed rattlesnakes are known to occur. As a result, no S&Gs within the Land and Minerals Program have been given a negative exposure/response ranking for the rattlesnake.

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on National Forest System lands (U.S. Forest Service 2004). As stated earlier, the management emphasis for Management Area 4 includes a sustained harvest of livestock forage. The S&Gs within the Rangeland Management Program emphasize the improvement of range conditions, including the construction and maintenance of water developments.

The effects of grazing activities within the range of the rattlesnake have been identified and addressed in the FWS's 2002 Biological Opinion on the On-going and Long-term Grazing Activities on the Coronado NF (Consultation # 2-21-98-F-399-R1). The 2002 biological opinion

covers all livestock activities conducted on Coronado NF lands over a 10 year period. The FWS does not foresee any additional impacts to the New Mexico ridge-nosed rattlesnake than those outlined in the grazing biological opinion.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites within the National Forests and National Grasslands of the Southwestern Region. The majority of recreational use on the Coronado NF is day use and dispersed use recreation. Low to moderate levels of recreational activities have the potential to directly affect New Mexico ridge-nosed rattlesnakes through increased poaching (collection) and motor vehicle related mortality.

Although OHV use has increased on all National Forest System lands in the Southwestern Region, the Coronado NF has restricted OHV use to designated roads, unless they are posted otherwise. No off-road OHV use is permitted on the Coronado NF. In addition, the Coronado NF LRMP only permits dispersed recreation activities that do not adversely affect the productivity of the land or resources. Specifically, S&Gs 612 and 613 determine use capacities and develop operational plans for managing use capacity at less than standard or standard. This management direction would limit and minimize the effects of recreation upon the New Mexico ridge-nosed rattlesnake. Implementation of these S&Gs, as well as additional guidance for the Recreation Program, provides for the protection of natural resources from recreational activities. Thus, implementation of S&Gs 612 and 613 minimizes the threats of recreation on New Mexico ridge-nosed rattlesnakes within the Peloncillo Mountain Range.

Wildlife, Fish, and Rare Plants Program

The Wildlife Program involves a variety of activities for managing habitats of all existing native and desired non-native wildlife, fish, and plant species in order to maintain viable populations (U.S. Forest Service 2004). Much of the guidance under the Wildlife Program applicable to the New Mexico ridge-nosed rattlesnake has a positive effect on the subspecies.

Multiple S&Gs direct the development of general activity plans to guide habitat management on the Coronado NF, specifically to improve threatened and endangered species habitat conditions. Forest-wide S&Gs 629 and 633 provide direction for delisting threatened and endangered species in accordance with approved recovery plans. Guidance includes determining essential habitat for threatened and endangered species; recommending appropriate conservation measures to meet the protection and management needs of these species; and prioritizing completion of recovery plans. Thus, standard and guidelines 629 and 633 have a positive effects on the New Mexico ridge-nosed rattlesnake. Specific to Management Area 4, S&G 774 directs the management of wildlife to maintain and improve threatened and endangered species' habitats. Also, Management Area 4 S&G 779 guides structural and nonstructural habitat improvement projects for the benefit of threatened and endangered species in accordance with approved recovery plans. As a result, management guidance for S&Gs 774 and 779 have a positive effect on the New Mexico ridge-nosed rattlesnake.

Forest-wide management guidance for the Wildlife Program provides direction for minimizing adverse effects to the New Mexico ridge-nosed rattlesnake. Multiple S&Gs allow for the identification of threatened and endangered species habitat, and include site-specific restrictions

to protect such habitat. Standard & Guideline 638 lists management practices for minimizing the effects of mineral extraction on threatened and endangered species, which includes the rattlesnake. Standard & Guideline 648 allows for modification of fuelwood harvest practices in areas of threatened and endangered species habitat. In addition, S&Gs 649 and 651 limit road construction and maintenance in accordance to tolerance levels of federally listed threatened and endangered species. Standard & Guideline 653 includes direction on range and watershed rehabilitation projects, which restore and protect rattlesnake habitat. These S&Gs have a positive effect on the New Mexico ridge-nosed rattlesnake and help maintain habitat and provide for minimal recovery of the subspecies.

Standard & Guidelines within the Wildlife may direct management activities to improve threatened and endangered species habitat conditions, yet short-term negative impacts may occur. Forest-wide S&G 652 permits wildlife consideration when developing allotment management plans. These plans aim to maintain both livestock and wildlife utilization. Such management direction helps maintain rattlesnake habitat, providing prey and foraging cover. However, S&G 652 directs the use of structural improvements to maintain livestock utilization of vegetation. Structural improvements may have an adverse effect on individuals depending on the timing and techniques used in construction, but most likely will destroy or modify habitat features essential to the New Mexico ridge-nosed rattlesnake. The management direction of S&G 652 has the potential for short-term effects on the subspecies, while providing for long-term habitat conditions needed for the subspecies' recovery.

Structural and nonstructural improvement guidelines are provided to meet the specific wildlife habitat objectives for each management area. Habitat improvement activities, while working to maintain and improve wildlife habitat, may have a short-term negative effect on threatened and endangered species, including the ridge-nosed rattlesnake. For Management Area 4, guidelines are provided to manage for a sustained harvest of livestock forage and fuelwood, while maintaining and improving game animal habitat. Standard & Guideline 667 directs the use of nonstructural wildlife improvements, which include prescribed burns, seeding of suitable wildlife forage species, thinning, and the transplanting of listed threatened and endangered species and other identified species into suitable habitat. These improvement actions have a positive impact on New Mexico ridge-nosed rattlesnakes by providing adequate habitat characteristics. However, the subspecies experience short-term negative effects during the implementation of habitat improvement projects.

Adverse effects to the New Mexico ridge-nosed rattlesnake resulting from the implementation of the Coronado NF LRMP are likely to occur in response to activities conducted under the Engineering, Forestry and Forest Health, Rangeland Management, and Fire Management programs. Road development, improvements, and maintenance activities within the Engineering Program may directly kill or injure individual snakes, and indirectly harm the subspecies through habitat loss. Also, increased public access allows for an increase in recreational activities, which may displace or harass the rattlesnake. The use of pesticides (i.e., insecticides and herbicides) under the Forestry and Forest Health Program has the potential to indirectly affect New Mexico ridge-nosed rattlesnakes through the reduction of prey availability and loss of habitat structure. Also, the authorization of cyanide leaching ponds on Coronado NF lands has the potential to cause direct mortality to the ridge-nosed rattlesnake and reduce prey availability; however, at this

time there are no such ponds on the Coronado National Forest. The adverse effects to the New Mexico ridge-nosed rattlesnake described above are likely to occur as a result of implementation of the Coronado NF LRMP.

As stated earlier, effects to the New Mexico ridge-nosed rattlesnake associated with activities conducted under the Fire Management and Rangeland Management programs have been addressed in the 2005 Biological Opinion on the Peloncillo Programmatic Fire Management Plan and the 2002 Biological Opinion on the Ongoing and Long-term Grazing Activities on the Coronado NF, respectively. The FWS does not anticipate any additional take of New Mexico ridge-nosed rattlesnakes from the effects of prescribed fire and associated activities beyond that issued in the 2005 Biological Opinion on the Peloncillo Programmatic Fire Management Plan (Consultation # 02-21-04-F-0474). The FWS does not anticipate any additional take of New Mexico ridge-nosed rattlesnakes from the effects of livestock grazing beyond that issued in the 2002 Biological Opinion on the Ongoing and Long-term Grazing Activities on the Coronado NF (Consultation # 2-21-98-F-399-R1).

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Occupied Mexican Spotted Owl habitats, along with restricted and protected areas for the owl do not overlap the range of the New Mexico ridge-nosed rattlesnake. Yet, three Northern Goshawk management areas coincide with the rattlesnake's range. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species. Designated critical habitat for the New Mexico ridge-nosed rattlesnake does not occur within the action area; thus, the proposed action does not affect this area.

Table 82. Effects of the S&Gs analyzed for the New Mexico ridge-nosed rattlesnake - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0
-2	S&G is causing sublethal response	0	0
-1	S&G is causing negative behavioral response	0	0
0	S&G is ill-defined and/or open to interpretation	0	0
1	S&G is maintaining habitat & providing at least minimal recovery	9	20.0
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	30	66.7
Z	S&G implementation is non-discretionary	2	4.4
X	S&G is a heading	4	8.9
Total		45	100 %

All of the S&Gs in the 1996 Regional Amendment lie under the Wildlife Program; yet the content of the S&Gs applies to several program activities. The majority of the S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat, and provide for recovery of these species. While not a focus of the LRMP, S&Gs have the potential to affect other threatened and endangered species. In the case of the New Mexico ridge-nosed rattlesnake, approximately 67 percent of the S&Gs within the 1996 Regional Amendment have no effect, or have no application to the subspecies, mainly due to the lack of owl and rattlesnake habitat overlap. Twenty percent of the S&Gs within the 1996 Regional Amendment have a positive effect on the subspecies.

A few S&Gs pertain to forest and woodland types outside protected and restricted Mexican Spotted Owl areas. Standard & Guideline 1476 promotes habitat management for landscape diversity. This guideline applies an ecosystem approach to managing habitat by incorporating natural variation in stand conditions and retaining snags and large trees, which are used by ridge-nosed rattlesnakes for concealment. By managing for habitat diversity and healthy watersheds, S&G 1476 has a positive effect on the subspecies.

Standards and Guidelines within the 1996 Regional Amendment also pertain to Northern Goshawk habitat. Management direction provided in S&G 1509 focuses on limiting road densities and the use of small skid trails in lieu of roads. This S&G minimizes the effects of road-related activities on the ridge-nosed rattlesnake. Guidance provided in S&G 1508 directs the use of prescribed fires within Goshawk nesting areas. Prescribed fires aim to reduce fuels and minimize the potential for catastrophic fires, which pose a threat to the rattlesnake. Thus, S&G 1508 has a long-term positive effect on the subspecies.

A few standards and guidelines within the 1996 Regional Amendment include Grazing Management Standards. Standard & Guideline 1510 allows for the identification of key ungulate forage monitoring areas, in order to monitor and maintain forage use at levels that assure recovery and continued existence of threatened and endangered species. As a threatened species, management guidance under S&G 1510 has a positive affect on New Mexico ridge-nosed rattlesnakes.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

All known rattlesnake sites within the action area are located on Forest Service lands (i.e., the Coronado National Forest within the Peloncillo Mountains). Small, privately owned lands are intermixed with federally-administered lands in the lower elevations of the Peloncillo Mountains (Bureau of Land Management 2004). Snake injury or mortality, along with habitat fragmentation, degradation, or destruction from grazing and recreation activities on these small, privately owned parcels could affect disjunct populations of New Mexico ridge-nosed rattlesnakes within the action areas (Bureau of Land Management 2004). Cumulative effects to the subspecies may also include the spread of catastrophic wildfires from private to federal lands.

The recent closure of a private section of the access road to Skeleton Canyon has restricted public access to several known occupied sites within the Peloncillo Mountains. This road closure should reduce the amount of incidental recreation effects, the potential for poaching, and human caused fire.

Additional cumulative impacts to the species may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the New Mexico ridged-nosed rattlesnake, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Coronado NF LRMP and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the New Mexico ridge-nosed rattlesnake. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Critical habitat for the New Mexico ridge-nosed rattlesnake has been designated in the Bear, Indian, and Spring Canyons of the Animas Mountains. However, this area does not occur within the action area; thus, no destruction or adverse modification of critical habitat is anticipated.

The population of New Mexico ridge-nosed rattlesnakes on the Peloncillo Mountains is the only population of the subspecies within the action area, which occurs on lands administered by the Coronado NF. Two other populations of the subspecies occurs outside of the action area. The Peloncillo Mountains populations of ridge-nosed rattlesnakes is vulnerable to illegal collection, wildfires, prescribed fires, and low to moderate levels of recreational activities. Although adverse effects to the New Mexico ridge-nosed rattlesnake may occur from the implementation of the Coronado NF LRMP and 1996 Regional Amendment, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the following reasons:

- The action area includes only one of the three mountain ranges in which the subspecies is known to occur.
- Standard and Guidelines within the Coronado NF LRMP minimize impacts of existing forest infrastructure or ongoing activities to maintain and improve current habitat for federally listed species, including the New Mexico ridge-nosed rattlesnake.
- Forest-wide guidelines in the Coronado NF LRMP provide direction for delisting threatened and endangered species in accordance with approved recovery plans.

- The Coronado LRMP provides direction for limiting the transportation system to minimize damage and protect natural resources, thus reducing potential impacts from recreation activities.
- The Coronado NF LRMP requires the determination of recreational use capacities and manages dispersed recreation activities to protect the natural resource base, including habitat of threatened and endangered species.
- The Coronado NF Programmatic Fire Management Plan directs the use of prescribed fire to develop mosaic habitat patterns to enhance and improve wildlife habitat, and reduce fuel hazards contributing to risk of catastrophic fires.

With the implementation of these management standards outlined above, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the New Mexico ridge-nosed rattlesnake.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the Incidental Take Statement. [50 CFR section 402.14(i)(3)]

Amount or Extent of Take Anticipated

As previously stated, the FWS has anticipated take of New Mexico ridge-nosed rattlesnakes from the effects of prescribed fire and related activities in the 2005 Biological Opinion on the Forest

Service's Peloncillo Programmatic Fire Management Plan. Also, the FWS has anticipated take of New Mexico ridge-nosed rattlesnakes from continued grazing of domestic livestock, as well as the effects of associated roads and other range projects in the 2002 Biological Opinion on the Forest Service's On-going and Long-term Grazing Activities on the Coronado NF. The incidental take anticipated in these two programmatic biological opinions is included here by reference (see Environmental Baseline). In addition to this anticipated take, the FWS anticipates incidental take of New Mexico ridge-nosed rattlesnakes is reasonably certain to occur as a result of the continued implementation of the Coronado NF LRMP. The incidental take is expected to be in the forms of direct mortality, harm, and harassment to the subspecies, as a result of the Engineering Program and Forestry and Forest Health Program.

Under the Engineering Program, direct mortality to the subspecies can be attributed to road density and associated vehicular traffic. Such factors may contribute to the killing or injuring of individual New Mexico ridge-nosed rattlesnakes from engineering activities related to construction and maintenance, road closure, and improvement of the existing transportation system. In addition, roads increase human accessibility to forest areas. Incidental take in the form of harass occurs as a result of human occupation of New Mexico ridge-nosed rattlesnake habitat and their associated recreational activities. Therefore, the FWS anticipates direct mortality and take in the form of harassment of the New Mexico ridge-nosed rattlesnake from the implementation of the Engineering Program.

The FWS anticipates harm, harass, and direct mortality to New Mexico ridge-nosed rattlesnakes through the implementation of the Forestry and Forest Health Program. This program allows for the use of pesticides within the Peloncillo Mountains, which may harm rattlesnakes indirectly through the reduction of prey populations and accumulation of toxins. The loss of core habitat through the use of herbicides may harass rattlesnakes by significantly disrupting normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

The FWS anticipates however, that incidental take of the New Mexico ridge-nosed rattlesnake will be difficult to detect for the following reasons: the subspecies has small body size, cryptic coloration, and several actions will take place on such a large scale, which will highly diminish the ability to detect a dead or injured individual. Therefore, incidental take will be quantified by the number of individuals taken or by using a habitat surrogate (core habitat ranked by Holycross and Smith (2001)). The FWS anticipates the following incidental take for the New Mexico ridge-nosed rattlesnake:

1. One New Mexico ridge-nosed rattlesnake will be killed or injured as a result of the proposed action; or
2. Up to 2 percent of delineated core habitat ranked as 3 or 4 (Holycross and Smith 2001), where the rattlesnake are known to occur, will be affected as a result of the proposed action; or
3. Up to 2 percent of delineated core habitats ranked as 3 or 4 (Holycross and Smith 2001), where the rattlesnake is reasonably certain to occur, will be affected as a result of the proposed action.

The illegal collection of the New Mexico ridge-nosed rattlesnake is not intended as part of the Forest Service's proposed action; thus not incidental to, or the purpose of an otherwise lawful activity. Therefore, the illegal collection of rattlesnakes is not considered within this Incidental Take Statement.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the New Mexico ridge-nosed rattlesnake. Designated critical habitat for the subspecies does not occur within the action area; therefore, none will be destroyed or adversely modified.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the New Mexico ridge-nosed rattlesnake:

1. Protect New Mexico ridge-nosed rattlesnakes on the Coronado NF.
2. Protect New Mexico ridge-nosed rattlesnake habitat on the Coronado NF.
3. Monitor New Mexico ridge-nosed rattlesnakes habitat on the Coronado NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering (i.e., road management) and Forestry and Forest Health (i.e., use of chemicals) programs to minimize or eliminate adverse effects to the New Mexico ridge-nosed rattlesnake.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied New Mexico ridge-nosed rattlesnake habitat to incorporate the appropriate components of the New Mexico Ridge-nosed Rattlesnake Recovery Plan, with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the rattlesnake and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor New Mexico ridge-nosed rattlesnakes habitat on the Coronado NF.

- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on New Mexico ridge-nosed rattlesnakes, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the New Mexico ridge-nosed rattlesnake.

The reasonable and prudent measures, with their implementing terms and conditions, outlined in these biological opinions are designed to minimize the impact of incidental take that might otherwise result from the proposed actions. If, during the course of these actions, the level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the Coronado NF implement the following conservation activities:

1. Actively participate in the recovery of the subspecies through the implementation of the recovery plan.
2. Work in coordination with the BLM, Natural Resource Conservation Service, FWS, the Malpai Borderlands Group, and others to develop an Ecosystem Management Plan for the Peloncillo Mountains and surrounding areas.
3. Work in coordination with AGFD, NMDGF, BLM, FWS, and the Malpai Borderlands Group to obtain funds for research designed to clarify the life history and ecology of the New Mexico ridge-nosed rattlesnake in order to quantify the effects of livestock grazing on the subspecies.
4. Adopt conservative utilization rates to maintain or improve range conditions and vegetation communities within occupied habitats on the Peloncillo Mountains.
5. Use traffic counters to monitor and manage levels of vehicular use on Forest Service roads to minimize threats to New Mexico ridge-nosed rattlesnakes.
6. Follow the FWS's regional guidance criteria for the use of pesticides.
7. Post signs to educate visitors of the laws restricting the collection of New Mexico

ridge-nosed rattlesnakes in general information Kiosks and brochures. Signs and other information should not identify location of suitable habitat.

8. Monitor areas where core habitat has been altered or destroyed to determine regeneration times after various disturbances.
9. Provide the FWS's Arizona Ecological Services Office with an annual report of all survey and monitoring activities.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SONORA TIGER SALAMANDER

STATUS OF THE SPECIES

Description

Sonora tiger salamanders (*Ambystoma tigrinum stebbinsi*) are large salamanders with a dark venter and light-colored blotches, bars, or reticulation on a dark background. Metamorphosed terrestrial Sonora tiger salamanders have a color pattern ranging from a reticulate pattern with an irregular network of light coloration, often coupled with light spots, on a dark background color to a pattern of large, well-defined light or yellow spots or transverse bars, some of which encroach on the dark venter (Jones et al. 1988). Metamorphosed Sonora tiger salamanders measure from about 6.6 to 12.4 cm (2.6 to 4.9 inches) snout to vent length (SVL) (Lowe 1954, Jones et al. 1988). Male and female adult Sonora tiger salamanders can be distinguished by the presence of two black folds of tissue (cloacal folds) on the caudal side of a male's vent.

Branchiate adults are gray to olive on the dorsum, head, and tail, and off-white to yellow on the ventral surface. They have three external gills on each side of their head, and measure between 6.5 and 16.5 cm (2.6 to 6.5 inches) SVL. Larvae are aquatic with external plume-like gills and well-developed tail fins (Behler and King 1980). At this stage, they are gray on the dorsum, head, and tail, with little pigment on the ventral surface. They hatch without legs, but grow hind and forelimbs early in development.

Sonora tiger salamanders are one of three subspecies of tiger salamanders found in Arizona; the other two subspecies are Arizona tiger salamanders (*A. t. nebulosum*) and barred tiger salamanders (*A. t. mavortium*). The barred salamander is an introduced species in the San Rafael Valley and elsewhere in southern Arizona. The Sonora tiger salamander was discovered in 1949 at the J.F. Jones Ranch stock tank in Parker Canyon, San Rafael Valley, Arizona (Reed 1951).

The eggs, larvae, and branchiate adults of the three subspecies appear similar, except that larval and branchiate adult Arizona and barred tiger salamanders sometimes develop into a cannibalistic morph that has a wider head, enlarged vomerine teeth, and feeds preferentially on smaller conspecifics. Metamorphosed Arizona tiger salamanders have 11-50 irregularly shaped, yellow to olive spots and blotches, often with indistinct edges (Stebbins 2003), on a dark dorsal ground, with a similar pattern on the head and tail. Metamorphosed barred tiger salamanders have large, distinct, yellowish bars, spots, or transverse bars on a darkly grounded dorsum. Some of the spots or bars encroach on the dark venter. The reticulate pattern that can be seen in Sonora tiger salamanders is not seen in Arizona or barred tiger salamanders, however, many metamorphosed Sonora tiger salamanders do not have the reticulate pattern and are visually indistinguishable from barred tiger salamanders.

The rosy salamander occurs from Durango, Chihuahua, to Sonora, Mexico, including the southern portion of the San Rafael Valley in Mexico (Shannon 1951, Jones et al. 1995). Rosy salamander larvae are pinkish in color with dark patterning on the sides and back (Taylor 1941) and fewer gill rakers (9-15) than tiger salamanders found in Arizona and Mexico (15-24) (Collins 1979). Metamorphosed rosy salamanders are uniformly dark brown on the sides and back and lighter ventrally (Anderson 1961). Allozyme data suggest that interbreeding between tiger

salamanders and rosy salamanders is rare or non-existent, even when their distributions overlap (Shaffer 1983).

Genetic analysis was conducted between the gene loci of Sonora tiger salamanders and the gene loci of rosy salamanders (*Ambystoma rosaceum*), barred tiger salamander, and Arizona tiger salamanders (Jones et al. 1988). Based on this analysis, distinctive reticulate color patterns, low heterozygosity, and apparent geographic isolation, subspecific designation of Sonora tiger salamander was considered warranted by Collins and Jones (1987) and Jones et al. (1988). Further analysis of mitochondrial DNA reaffirmed subspecific designation (Collins et al. 1988).

Legal Status: In 1997, the FWS listed the Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*) as an endangered species under the ESA, as amended (U.S. Fish and Wildlife Service 1997a). A final Recovery Plan for the species was signed on September 24, 2002. The Sonora tiger salamander has a recovery priority number of 3. Recovery priority numbers range from 1 to 18, with 1 having the highest priority. No critical habitat has been designated for the Sonora tiger salamander. The species is not protected by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), which regulates international trade.

Distribution and Abundance

Because so few sites were sampled prior to the 1980's, it is impossible to determine the historical distribution of Sonora tiger salamanders. However, based on collections and observations of salamanders and the distribution of plains grassland and adjacent Madrean evergreen woodlands (Brown 1994) in which the salamander has been found, the range of the subspecies and its occupied and potentially occupied habitat is thought to extend from the crest of the Huachuca Mountains west to the crest of the Patagonia Mountains, including the San Rafael Valley and adjacent foothills from its origins in Sonora north to the Canelo Hills.

It is speculated that historically the Sonora tiger salamander probably inhabited springs, cienegas, and possibly backwater pools of the Santa Cruz River and streams in the San Rafael Valley that were extant long enough to support breeding and metamorphosis (at least two months), but ideally were permanent or nearly permanent, allowing survival of mature branchiates. The grassland community of the San Rafael Valley and adjacent montane slopes, where all extant populations of Sonora tiger salamander occur, may represent a relictual grassland and a refugium for grassland species.

All confirmed historic and extant aquatic populations are found in tanks, ponds, or impounded cienegas within 31 km (19 mi) of Lochiel, Arizona. This region lies between the Patagonia and Huachuca Mountains, is bordered on the north end by the Canelo Hills, and stretches from Santa Cruz County in Arizona south into Sonora, Mexico. Cattle ponds or tanks are the primary habitat for Sonora tiger salamanders, but there are several observations of unidentified salamanders away from cattle ponds.

Surveys for the Sonora tiger salamander have been conducted on public lands throughout the Arizona portion of the San Rafael Valley. Dr. James P. Collins began surveying ponds with tiger salamanders in the San Rafael Valley in 1979. The Sonora tiger salamander has been found at approximately 58 breeding localities, although not all are currently occupied (Collins and Jones

1987, Collins 1996, Abbate 1998, U.S. Fish and Wildlife Service 2002a and files). During intensive surveys in 1997, from one to 150 Sonora tiger salamanders were found at 25 stock tanks (Abbate 1998). Populations and habitats are dynamic, thus the number and location of extant aquatic populations change over time, as exhibited by the differences between survey results in 1985 and 1993-1996 (Collins and Jones 1987, Collins 1996, U.S. Fish and Wildlife Service 1997a). In 1999, the lab of Dr. James Collins, Arizona State University, found Sonora tiger salamanders at 17 localities (Collins 1999). A population of salamanders at Los Fresnos, a natural cienega in the San Rafael Valley, Sonora, may be *A. t. stebbinsi* (Varela-Romero et al. 1992).

A single terrestrial Sonora tiger salamander was found near Oak Spring in Cooper Canyon of the Huachuca Mountains (U.S. Fish and Wildlife Service 1997a). Tiger salamanders have also been reported from a cave, a vertical mining shaft at the northwestern edge of the San Rafael Valley, and one spring-fed well, which have yet to be confirmed (Ziemba et al. 1998).

More data are needed to make definitive statements about the long-term viability of Sonora tiger salamanders in the San Rafael Valley. About half of the 58 Sonora tiger salamander populations have been discovered within the last five years, and only within the last five years were ponds with salamanders sampled consistently, making it difficult to determine long-term trends in the proportion of ponds occupied by salamanders and suitability of those ponds for salamander breeding habitat. Also, more data on the ecology of Sonora tiger salamanders (*e.g.*, life-span, proportion of adults breeding each year, frequency and distance of dispersal events) are required to develop a suitable population viability analysis.

Tiger salamanders have also been found in areas just outside the San Rafael Valley, such as Fort Huachuca, Harshaw Canyon, Copper Canyon, and the Coronado Memorial. Of these localities, genetic testing has only been performed on salamanders from Fort Huachuca, and with the exception of one pond within a kilometer of the San Rafael Valley, salamanders on the Fort Huachuca appear to be barred tiger salamanders (U.S. Fish and Wildlife Service 2002a).

Genetic testing has been performed on salamanders from a number of San Rafael Valley ponds to determine their identity. This testing has showed that some San Rafael Valley ponds contain salamanders with genetic characteristics similar to barred tiger salamanders. Salamanders with these “*mavortium*-like” sequences are more common on the outskirts of the San Rafael Valley and ponds close to Parker Canyon Lake, which, because of prior use of imported waterdogs as fish bait, is where we expect to find introduced barred tiger salamanders (Ziemba et al. 1998).

Recent genetic analysis confirmed that barred salamanders or hybrids between barred salamanders and Sonora tiger salamanders are present at 7 stock tanks in the southeastern portion of the San Rafael Valley (Ziemba et al. 1998). A salamander population in Garden Canyon, Fort Huachuca, near the crest of the Huachuca Mountains, may contain hybrids as well (Storfer et al. 1999).

Habitat

Historically, the Sonora tiger salamander probably inhabited springs, cienegas, and possibly backwater pools of the Santa Cruz River and streams in the San Rafael Valley where permanent

or nearly permanent water allowed survival of mature branchiataes. Erosion and arroyo cutting in the late 19th and early 20th centuries caused the San Rafael Valley to dry and natural standing water habitats to disappear (Hendrickson and Minckley 1984, Hadley and Sheridan 1995). The Sonora tiger salamanders are no longer found in these rare habitats. The state of Arizona (1990) estimated that up to 90 percent of the riparian habitat along Arizona's major desert watercourses has been lost, degraded, or altered. The Sonora tiger salamander apparently has opportunistically taken advantage of available stock tank habitats as natural habitats disappeared (Hendrickson and Minckley 1984) or were invaded by non-native predators with which the salamander cannot coexist (U.S. Fish and Wildlife Service 2002a).

The San Rafael Valley is a broad, open valley that forms the headwaters of the Santa Cruz and San Pedro rivers. The dominant terrestrial plant community in the San Rafael Valley is plains grassland (Brown 1994). Typical grasses include, among others, plains lovegrass (*Eragrostis intermedia*), side-oats grama (*Bouteloua curtipendula*), and curly mesquite (*Hilaria belangeri*). Within the grasslands, stringers or groves of cottonwoods and other wetland plants grow along some drainages and at ponds and springs. Upslope, at the edges of the San Rafael Valley, juniper and several species of oak form patchy woodlands or savannas that gradually give way to pine-oak woodlands at higher elevation (Brown 1994).

The most important habitat requirement for Sonora tiger salamanders is the availability of standing water for breeding from January through June. This gives the salamanders enough time to breed, grow as larvae, and metamorphose before the pond dries. Permanent bodies of water can be good breeding sites, except they often contain introduced fish and bullfrogs (Snyder 1998). As a result, ponds created by ranchers for watering their cattle are now almost the only suitable breeding sites remaining. However, there are still some springs on the San Rafael Cattle Ranch (U.S. Fish and Wildlife Service 2002a), and possibly elsewhere, such as in Scotia Canyon, that may be suitable breeding sites.

Sonora tiger salamanders are tolerant of a wide range of temperatures, with temperatures in ponds varying from less than 5°C (41°F) at the beginning of the year up to 30°C (86°F) during summer. Temperatures in the terrestrial environment range from below freezing to over 35°C (95°F). Mammal burrows or loosened soils outside the pond likely provide refugia for metamorphosed salamanders in the terrestrial environment, enabling them to burrow underground to avoid extreme environmental conditions.

Life History

Sonora tiger salamanders begin their life as jelly-coated eggs laid in water. They hatch and grow as aquatic larvae with gills, and then either mature as gilled aquatic adults called branchiate adults, neotenes, or paedomorphs; or metamorphose into terrestrial Sonora tiger salamanders without gills. Branchiate adults are reproductively mature but have not undergone metamorphosis and spend their entire lives in water. Terrestrial adults are those that have undergone metamorphosis and spend most of their lives out of the water but return to ponds to breed. Populations and habitats are dynamic, thus the number and location of extant aquatic populations changes over time, as exhibited by the differences between survey results in 1985 and 1993 to 1997 (Collins and Jones 1987, Collins 1996, Abbate 1998, Ziemba et al, 1998).

Sonora tiger salamanders begin breeding as early as January, and eggs can be found in ponds as late as early May (U.S. Fish and Wildlife Service 2002a). Breeding after monsoon rains in July and August is rare (U.S. Fish and Wildlife Service 2002a). Sonora tiger salamanders that are ready to breed have swollen, reddish vents. Terrestrial adults return to ponds to breed, and branchiate adults in the pond also breed. Although there is little data on breeding site fidelity for Sonora tiger salamanders, other *Ambystoma* species usually return to breed in the ponds where they were born (Shoop 1965, 1968; Shoop and Doty 1972; Douglas and Monroe 1981; Semlitsch 1981; Madison 1997; Madison and Farrand 1998). Courtship takes place under water, and is difficult to observe in the field.

After fertilization, female tiger salamanders lay 200 to 2000 eggs (U.S. Fish and Wildlife Service 2002a), attaching them to aquatic vegetation, sticks, rocks, or substrate either individually or in clumps of up to 50. Eggs take from 2-4 weeks to hatch; the colder the water, the longer the eggs take to develop. Sources of mortality for tiger salamander eggs include freezing, drying, trampling by livestock, and predation by adult salamanders (Holomuzki 1986) and introduced fish (Snyder 1998). Crayfish may prey upon salamander eggs as well.

Following hatching, Sonora tiger salamander larvae can develop to the minimum size necessary to metamorphose into terrestrial salamanders in as little as two months between late July to early September. However, because many San Rafael Valley sites with salamanders hold water all year, larvae often remain in the water longer before metamorphosing or develop into branchiate adults instead of metamorphosing. In addition, larvae may not undergo metamorphoses and may overwinter in ponds (Collins and Jones 1987). Only an estimated 17 to 40 percent of Sonora tiger salamanders metamorphose annually (Collins and Jones 1987). All larvae that hatch in ephemeral waters metamorphose into the terrestrial form. Larvae must be at least 4.5 cm (1.8 in) SVL in order to make the transformation (U.S. Fish and Wildlife Service 1997a).

Small tiger salamander larvae feed primarily on zooplankton (daphnids, copepods, bosminids, ostracods, etc.), but incorporate larger aquatic macroinvertebrates (chironomids, trichoptera, molluscs, zygoptera, etc.) into their diet as they grow (Collins and Holomuzki 1984). Sources of mortality for tiger salamander larvae include pond drying, disease (Jancovich et al. 1997), and predation by wading birds, introduced fish and bullfrogs (Snyder 1998), aquatic insects (Holomuzki 1986), and adult salamanders (Holomuzki 1986). Crayfish may also prey upon larval salamanders.

Salamander larvae in permanent water often develop into branchiate adults. San Rafael Valley ponds that do not dry may support up to several hundred branchiates (U.S. Fish and Wildlife Service 2002a). Branchiate adults can sometimes metamorphose into the terrestrial form in response to stressful events such as pond drying, but are often unable to complete metamorphosis and may even die during the process (U.S. Fish and Wildlife Service 2002a). The lifespan of branchiate adults in the field is not known, but Arizona tiger salamanders have survived as branchiates for up to 8 years in captivity (U.S. Fish and Wildlife Service 2002a). The reason that branchiates have not been kept longer is that they eventually metamorphose, even after years as branchiates.

Branchiate adult tiger salamanders prey on zooplankton and a variety of macroinvertebrates, and eat salamander eggs and larvae during the breeding season (Holomuzki 1986). Although branchiate adult Sonora tiger salamanders probably eat salamander eggs and larvae, they seldom develop into a cannibalistic morph. Sources of mortality for branchiate adults include pond drying, disease (Jancovich et al. 1997), and predation by wading birds and larger introduced fish species (Snyder 1998).

When larvae are large enough (>4.5 cm (1.77 inches) SVL), they can metamorphose into terrestrial salamanders. The proportion of larvae that metamorphose depends heavily on pond permanence. In ponds that dry, all larvae that are large enough metamorphose. In ponds that do not dry, approximately 17 percent of larvae that are large enough to metamorphose actually do so (Collins et al. 1988). Metamorphs often re-populate ponds following drying or disease outbreaks that kill most branchiate adults and larvae. Metamorphs are also the only life stage that can disperse from pond to pond and establish new populations.

Outside the pond, metamorphosed tiger salamanders consume terrestrial insects and other macroinvertebrates. In the pond, metamorphosed individuals eat aquatic macroinvertebrates and terrestrial insects that fall in the water (Whiteman et al. 1994). Sources of mortality for metamorphosed adults include extreme conditions in the terrestrial environment, disease (Jancovich et al. 1997), and predation by terrestrial predators and introduced fish and bullfrogs (Snyder 1998). The lifespan of metamorphosed Sonora tiger salamanders in the wild is not known, but metamorphosed Arizona tiger salamanders have survived 17 years in captivity (U.S. Fish and Wildlife Service 2002a). Analysis of growth rings in toe bones (skeletochronology) of 150 Arizona tiger salamanders captured in the field revealed no salamanders over 6 years old (U.S. Fish and Wildlife Service 2002a), but it remains to be seen whether the same is true for Sonora tiger salamanders.

Population Dynamics

The dispersal patterns of Sonora tiger salamanders are also unknown. The number of metamorphs in each population is difficult to estimate because most metamorphosed salamanders leave the pond after breeding, and it is unknown what fraction of salamanders in the terrestrial environment return each year to breed. In some years, salamanders will be completely absent from a pond, only to return the following year to breed and produce many offspring. Radio tracking of other *Ambystoma* species has shown that they frequently move up to 250 m (273 feet) from their breeding ponds (Shoop 1965, 1968; Shoop and Doty 1972; Douglas and Monroe 1981; Semlitsch 1981; Madison 1997; Madison and Farrand 1998).

Although most records for Sonora tiger salamanders occur at stock tanks where breeding occurs, terrestrial metamorphs potentially wander considerable distances from these aquatic habitats, and are occasionally encountered in upland habitats. Arizona Game and Fish Department personnel captured a Sonora tiger salamander in a pit fall trap at Oak Spring in Copper Canyon, Huachuca Mountains. The nearest known breeding site is approximately 0.6 mile to the south, suggesting the salamander may have moved at least that far. Capture in a pit fall trap also confirms that the individual was surface active. In other subspecies of *Ambystoma tigrinum*, metamorphs may disperse hundreds of meters from the breeding pond, or may remain nearby (Gehlbach et al. 1969, Petranka 1998). Of hundreds of marked *Ambystoma tigrinum nebulosum* in northern

Arizona, two were found to move from 0.9 to 1.2 miles to new ponds (U.S. Fish and Wildlife Service 1999a). On Fort Huachuca, Sheridan Stone reported finding terrestrial tiger salamanders (probably *A. t. mavortium*) 1.9 to 2.5 miles from the nearest known breeding pond (U.S. Fish and Wildlife Service 1999a). Referring to conservation of the California tiger salamander, *A. californiense*, Petranka (1998) finds that based on studies of movements of other *Ambystoma* species, conservation of a 650-1,650 foot radius of natural vegetation around a breeding pond would protect the habitat of most of the adult terrestrial population. Adults of western subspecies of *A. tigrinum* typically live in or about mammal burrows (Petranka 1998), although metamorphs may construct their own burrows, as well (Gruberg and Stirling 1972, Semlitsch 1983). Some species of salamanders exhibit seasonal migrations of up to several miles each way from breeding sites to upland habitats (Stebbins and Cohen 1995). If such migrations occur in the Sonora tiger salamander, we have no information about migration corridors or non-breeding habitat. Because of the arid nature of the environments in the region where the subspecies occurs, if salamanders move very far from breeding ponds, they may use wet canyon bottoms as movement corridors.

Reasons for Listing

The FWS's Final Rule (U.S. Fish and Wildlife Service 1997a) and Recovery Plan (U.S. Fish and Wildlife Service 2002a) for the Sonora tiger salamander described multiple threats or limiting factors which, when taken together, justified listing. These threats or limiting factors include the following: restricted distribution; limited number of breeding habitats; disappearance of natural standing water habitat; predation by non-native fish, bullfrogs, and crayfish; genetic swamping by introduced, non-native barred salamanders (*A. t. mavortium*); disease; low genetic diversity; collection for bait or translocation by anglers; use of man-made water holding structures (*i.e.* impoundments, stock tanks, ponds); maintenance of impoundments; use of occupied sites as water sources for fire suppression; loss of cover around occupied sites; illegal collecting; catastrophic floods and drought; and stochastic extirpations or extinction characteristic of small populations .

Threats: Salamanders have disappeared from a few ponds since surveys began in the late 1970's, but there is little indication that there is a general decline in the number of populations in the San Rafael Valley. Furthermore, the density of ponds supporting salamander populations in the San Rafael Valley is comparable to that in other regions supporting tiger salamanders. However, the restricted distribution of Sonora tiger salamanders makes them vulnerable to relatively small-scale environmental disturbances and land-use changes.

Prior to the 20th century, the San Rafael Valley contained many more cienegas and vernal pools than it does today. Erosion and arroyo cutting in the late 19th and early 20th centuries caused the San Rafael Valley water table to drop and natural standing water habitats to disappear (Hendrickson and Minckley 1984, Hadley and Sheridan 1995). However, at the same time natural standing water habitats were disappearing, cattle ponds were built. Many of the remaining springs and cienegas were converted into impoundments at this time, so most of the small standing water habitats remaining in the San Rafael Valley are cattle ponds. Currently, Sonora tiger salamanders breed almost exclusively in these cattle ponds. The fact that Sonora tiger salamanders breed in human-constructed cattle ponds instead of natural habitats does not necessarily threaten persistence of the taxon. Sonora tiger salamanders have successfully bred in

cattle ponds for decades, but salamanders are now dependent on humans to maintain the habitat. In particular, cattle ponds require occasional re-excavation because they fill in with silt, and pond dams also require occasional maintenance. Unfortunately, the maintenance required to maintain these ponds also adversely affects the Sonora tiger salamander. Cattle pond habitats are also vulnerable to extreme weather conditions. Long-term drought could dry many of the ponds, and if ponds remained dry for several years, lack of breeding could lead to local extirpation of the salamander population.

Illegal collection of salamanders for bait has been reported from the San Rafael Valley although there are no data on the number of Sonora tiger salamanders that are collected for bait (Collins and Jones 1987, U.S. Fish and Wildlife Service 2002a). If large numbers of salamanders are collected for bait, it could threaten the persistence of Sonora tiger salamander populations. Given the popularity of other salamanders as bait, it is reasonable to assume that illegal collection of salamanders will continue to occur.

There are reports of introduced non-native fish occurring in the San Rafael Valley as early as the 1950's, and various introduced fish species now occur in San Rafael Valley ponds, including mosquito fish (*Gambusia affinis*), green sunfish (*Lepomis cyanellus*), bluegill sunfish (*Lepomis macrochirus*), black bullheads (*Ameiurus melas*), and largemouth bass (*Micropterus salmoides*). Bullfrogs (*Rana catesbeiana*) have also been in the valley since at least the early 1970's. Laboratory and field experiments have shown that metamorphosed bullfrogs and all of the fish species listed above quickly eat salamander larvae, and even adult Sonora tiger salamanders have been found in the stomachs of adult bullfrogs (Snyder 1998). In addition, whenever non-native fish are introduced to a pond, the salamanders almost always disappear within the next few years, and do not reappear unless the fish are killed by pond drying (Snyder 1998). For some reason, adult bullfrogs have not maintained consistently high population densities in many San Rafael Valley ponds, so the potential effect of bullfrogs on Sonora tiger salamanders remains unclear (Snyder 1998). However, given the observation that bullfrogs eat salamanders and the effect of bullfrogs on other native western herpetofauna populations (*e.g.*, Rosen and Schwalbe 1996, Kupferberg 1997, Kiesecker and Blaustein 1997), bullfrogs should be considered a threat to Sonora tiger salamanders. Occasional drying of cattle ponds due to drought or siltation has limited the number of ponds occupied by non-native fish and/or bullfrogs, because both taxa are vulnerable to drying. Crayfish are potential predators on salamanders as well, but have only been found in a few San Rafael Valley ponds, and those did not contain salamanders (U.S. Fish and Wildlife Service 2002a). Crayfish are in many San Rafael Valley streams, however, and if they are introduced to ponds with salamanders, it is likely they will harm Sonora tiger salamanders, much as they have harmed other western herpetofauna populations (*e.g.*, Gamradt and Kats 1996, Fernandez and Rosen 1996).

Tiger salamander populations in the western United States and Canada, including populations of the Sonora tiger salamander, exhibit frequent epizootics (Collins et al. 2001). Sonora tiger salamander populations experience frequent disease-related die-offs (approximately eight percent of populations are affected each year) in which almost all salamanders and larvae in the pond die. *Ambystoma tigrinum* virus (ATV) is the pathogen believed to be primarily responsible for these die-offs (Jancovich et al. 1997). This, and possibly other iridoviruses, is also apparently the proximate cause of die-offs observed in other *Ambystoma* salamander populations in the

United States and Canada (Collins et al. 2000, Docherty et al. 2003). It is also possible that some die-offs might occur as a result of low pH (U.S. Fish and Wildlife Service 2002a). A copper smelter at Cananea, Sonora, less than 25 miles south of the border, may have released sulfur plumes resulting in acid precipitation (Blanchard and Stromberg 1987, Platz 1989), but currently there is no evidence to connect salamander die-offs with the copper smelter, and the smelter has not been operated since 1999. ATV may be spread by bullfrogs, birds, cattle, or other animals that move among tanks (Jancovich et al. 1997); however, the viral life cycle appears to be restricted to tiger salamanders as no other syntopic hosts have been identified (Jancovich et al. 2001). In the laboratory, Sonora tiger salamanders exhibited lower survival and growth rates when exposed to the disease as compared to *Ambystoma tigrinum nebulosum* from the White Mountains of Arizona (Collins et al. 2003). Animals that survive ATV exposure may harbor transmissible infection for more than six months. Dispersing metamorphosed salamanders have been found carrying ATV, and may reinfect the aquatic population when they return to a pond to breed (Collins et al. 2003). The disease could be spread by researchers or anglers if equipment such as waders, nets, or fishing tackle used at a salamander tank are not allowed to dry or are not disinfected before use at another tank. ATV has been identified from waterdogs obtained from a Phoenix bait shop, suggesting another mechanism of transmission (Collins et al. 2003). Storfer (2003) considers ATV an emerging pathogen, with recent spread likely attributable to human activities.

Sonora tiger salamanders also contract chytridiomycosis, a fungal disease associated with global declines of frogs and toads (Berger et al. 1998, Longcore et al. 1999, Speare and Berger 2000, Davidson et al. 2003). However, compared to anurans, infected salamanders exhibit only minimal symptoms (Davidson et al. 2000). In the laboratory, infected Sonora tiger salamanders did not die from the disease and are capable of ridding themselves or much reducing chytrid infections by frequent sloughing of the skin (Davidson et al. 2003). The effect of this disease on salamander populations needs further study.

Sonora tiger salamanders also face the threat of genetic swamping by introduced barred tiger salamanders which are often sold as large larvae or branchiate adults for fishing bait or to anglers trying to establish a population that could be harvested at a later date. Genetic analysis has suggested that barred tiger salamanders have been introduced to some San Rafael Valley ponds, perhaps by anglers using salamanders as bait. Ponds in which introduced barred salamanders are most likely to occur are those that are most accessible, i.e. adjacent to roads on public lands, those that have a history of angling, and those near existing populations of barred salamanders. Salamanders with genetic characteristics similar to barred tiger salamanders have been found in 7 San Rafael Valley ponds in the southeastern portion of the valley (Ziemba et al. 1998). Very low sample sizes (maximum of three individuals tested from these sites) have made it impossible to determine what percentage of salamanders in these ponds had *mavortium*-like sequences and what percentage had *stebbinsi*-like sequences. Although the analysis of allozymes that was used could not determine whether there was any hybridization between the two subspecies, such hybridization is likely when the two subspecies co-occur.

Research on the ecology and viability of Sonora tiger salamander populations should assist in developing a management strategy to protect salamanders and their habitat that will ensure persistence of salamanders in the San Rafael Valley. The genetic status of Sonora tiger

salamanders is still being studied, but it appears that some (approximately 25 percent) San Rafael Valley ponds with tiger salamanders contain at least some salamanders with sequences resembling barred tiger salamanders (Ziemba et al. 1998). The threat of genetic swamping by introduced barred tiger salamanders is one of the most difficult threats to assess because genetic testing is often required to distinguish between Sonora tiger salamanders, barred tiger salamanders, and potential hybrids of the two subspecies.

Allozyme analysis has shown very little genetic variability in Sonora tiger salamanders (Jones et al. 1988, 1995; Ziemba et al. 1998). Low genetic variability is a concern because in populations with low heterozygosity, deleterious alleles are expressed more frequently, disease resistance may be compromised, and there is little capacity for evolutionary change in response to environmental change.

Conservation Measures

Federal listing under the Act provided considerable protection to the Sonora tiger salamander and its habitat. Section 9 of the ESA prohibits take of any listed wildlife species, including the Sonora tiger salamander. Because most of the land, cattle ponds, and salamander populations in the San Rafael Valley are on federal lands, most activities that might affect the salamander or its habitat are also subject to Section 7 consultation.

Collecting *Ambystoma* in the San Rafael Valley is prohibited under Arizona Game and Fish Commission Orders 40 and 41, except under special permit. Furthermore, transport and stocking of live bullfrogs and fishing with live bait fish or *Ambystoma* within the range of the Sonora tiger salamander in Arizona are prohibited (R1-316). Sale of live waterdogs at Parker Canyon Lake is prohibited under the same regulation. In the San Rafael Valley, live crayfish can be used as bait, but only at the place of capture. Transported crayfish must be dead. The Sonora tiger salamander is included in AGFD's Draft Species of Special Concern (Arizona Game and Fish Department 1996); however, this designation affords the species and its habitat no legal protection. State of Arizona Executive Order Number 8-16 (Streams and Riparian Resources), signed on June 10, 1989, directs state agencies to evaluate their actions and implement changes, as appropriate, to allow for restoration of riparian resources.

Biological opinions and incidental take statements were issued in 1997 and 1999 by the FWS during section 7 consultations with the Coronado NF. This consultation process resulted in the development of a "Stock Pond Management and Maintenance Plan" addressing cattle pond maintenance guidelines in order to minimize incidental take of salamanders associated with cleaning out ponds (U.S. Fish and Wildlife Service 1997b, 1999a). The 1997 consultation also provided measures to reduce the possibility that salamanders might be unintentionally killed or moved among cattle ponds by fire suppression activities.

A Sonora tiger salamander recovery plan was completed in 2002, which outlines goals and objectives for downlisting to threatened status by 2007 (U.S. Fish and Wildlife Service 2002a). Part of the recovery plan describes recovery actions the Coronado NF could implement in order to assist recovering the species. In addition, the "Stock Pond Management and Maintenance Plan" is included as an appendix to the Recovery Plan.

Ownership of the historic San Rafael Cattle Company Ranch in the center of the San Rafael Valley is currently divided between the Arizona State Parks Board and a private owner. The ranch originally covered approximately 8,700 hectares (21,498 acres). In 1999 it was split into three sections: 1) The 6,850 hectare (16,927 acres) San Rafael de la Zanja Mexican land grant; 2) the 450 hectare (1,112 acres) "Upper 17" north of the land grant (San Rafael Ranch); and 3) 1,400 hectares (3,459 acres) south of the land grant and bordering the Mexican state of Sonora. The land grant and "Upper 17" are privately owned and operated as a working ranch. Arizona State Parks Board holds a conservation easement over the land grant and The Nature Conservancy holds a conservation easement on the San Rafael Ranch. The conservation easements prohibit subdivision of the affected property; sale, diversion, or transfer of ground and surface waters; mining; stocking or transfer of non-native organisms; activities that use excessive amounts of water; planting of non-native vegetation; and includes other provisions to maintain the property in a relatively undisturbed condition. We are working with the landowner of the San Rafael Ranch to obtain funding to enhance habitats for salamanders and other sensitive species. Arizona State Parks Board owns the 1,400 hectares (3,459 acres) between the land grant and the international border and operates it as a state park. The park is closed to the public pending planning and development of visitor facilities.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Within the action area, fifty three of the 58 (91%) ponds known to have contained Sonora tiger salamanders occur on the Coronado NF. Of the 40 ponds known currently to be occupied (within the last five years) by Sonora tiger salamanders rangewide, 38 (95%) are located on the Coronado NF (U.S. Forest Service 2004). The 38 Sonora tiger salamander populations located on the Coronado NF are within 12 allotment boundaries on the Sierra Vista Ranger District.

Factors Affecting the Species within the Action Area

Considering that the vast majority of known Sonora tiger salamander sites are on the Coronado NF, this National Forest encompasses the range of the species, and the rangewide concerns addressed above are all applicable in the action area.

The majority of lands occupied by the Sonora tiger salamander are in Management Area 4, which emphasizes a high level of grazing. A proper grazing system in this Management Area will "insure renewal of desired vegetative species for livestock forage, big and small game habitat, and to improve soil and water resources." These activities cannot supersede Forest-wide S&Gs, which give preference to riparian-dependent resources and federally-listed species. Because nearly all occupied and potential salamander breeding habitats are used as livestock

watering holes, the fate of the salamander is meshed with that of livestock grazing in the San Rafael Valley and adjacent areas.

Allotments that have ponds occupied (currently or historically) by Sonora tiger salamander incorporate the “Stock Pond Management and Maintenance Plan” as part of their plan of operations under the guidance of the LRMP. In addition, the 1996 Regional Amendment S&Gs state that the NF should “emphasize maintenance and restoration of healthy riparian ecosystems” and that management strategies should move “degraded riparian vegetation toward good condition.” This is more specifically considered in relation to domestic livestock grazing where S&Gs should “maintain and restore riparian ecosystems.”

All of the allotments are largely in federal ownership (remaining lands are privately owned). Thus, management of grazing on many or most of the private inholdings within the allotments is likely affected by how the public lands are grazed, and as a result, grazing on the private lands within the allotments are likely interrelated and interdependent to grazing on the public lands. According to the definition of the “effects of the action” (which includes effects of interrelated and interdependent activities – 50 CFR 402.02), effects of grazing on both public and private portions of the allotments are considered herein as effects of the action.

The effects of grazing activities on the salamander have been the subject of several previous consultations and a conference, including: 1) August 14, 1995, letter from the FWS concurring that construction of 4.5 km (2.8 mi) of electric fence on the San Rafael allotment is not likely to jeopardize the continued existence of the Sonora tiger salamander (a conference, file 2-21-95-I-383); 2) September 18, 1995, letter from the FWS concurring that issuance of grazing permits on the Duquesne and Campini allotments are not likely to jeopardize the continued existence of the salamander (a conference, file 2-2-95-I-412); 3) June 17, 1997, concurrence that sediment removal from two tanks on the Lone Mountain allotment may affect, but is unlikely to adversely affect the salamander (file 2-21-97-I-296); 4) December 19, 1997, Biological Opinion on Land and Resource Management Plans, as amended, for Eleven National Forests and National Grasslands in the Southwestern Region (U.S. Fish and Wildlife Service 1997b), 5) July 29, 1999, Biological Opinion on the Coronado NF’s Ongoing and Long-term Grazing (U.S. Fish and Wildlife Service 1999a), and 6) October 24, 2002, Biological Opinion on the Continuation of Livestock Grazing (U.S. Fish and Wildlife Service 2002b).

The December 19, 1997, biological opinion addressed grazing at a plan level. The 1999 and 2002 opinions addressed grazing to the project level in batch consultations. All found that grazing and other activities proposed were not likely to jeopardize the continued existence of the salamander. The opinions provided several terms and conditions to minimize take, including detailed protocols on how to manage and maintain stock tanks where the salamander may occur. Salamander breeding occurs in livestock tanks, most of which are in Forest Service allotments. These tanks require periodic maintenance to remain viable as both salamander breeding sites and as functional livestock waters. Thus, the survival of the salamander is currently intertwined with that of the Coronado NF’s grazing program, and depends on management and periodic maintenance of livestock waters.

Prescribed fire across the southwest has seen an increasing trend since the WUI initiative in 2000. On the Coronado NF, which has a relatively small area treated, hazardous fuels treatments annually average 12,087 ha (29,867 ac). While the FWS is not aware of any studies that evaluated the effects of fire on salamanders, fire could potentially result in direct death or injury of salamanders, and reduced habitat quality or quantity.

Degradation of watershed condition immediately after fires can result in dramatically increased runoff, sedimentation, and debris flow that can scour aquatic habitats in canyon bottoms or bury them in debris (DeBano and Neary 1996). In degraded watersheds, less precipitation is captured and stored, thus perennial aquatic systems downstream may become ephemeral during dry seasons or drought (Rinne and Neary 1996). Fire could result in degradation of the immediate watershed around a pond, and result in erosion, sedimentation, and ash flow into the pond. Although effects on salamanders are unknown, in salmonid fish, ash and slurry flow into streams can be toxic and populations of macroinvertebrates (salamander prey species) can be drastically reduced after a fire (Rinne 1996), at least temporarily (Roby and Azuma 1995). Smoke diffusion into water and ash flow can result in high levels of phosphorus and nitrogen (Spencer and Hauer 1991) with unknown effects to salamanders.

Siltation of a pond due to erosion and runoff following a fire could also eliminate habitat. However, the effects of siltation may also be more subtle. Lefcort et al. (1997) examined the effects of silt on growth and metamorphosis of larval mole salamanders (*Ambystoma opacum*) and *A. tigrinum tigrinum*. Salamanders in silty water grew more slowly, metamorphosed sooner, and were more susceptible to infection by a water mold (*Saprolegnia parasitica*) than salamanders in non-silty water.

Possibly the greatest threat to terrestrial salamander populations is fire. Erosion and increased runoff could bury or flood burrows, burrow entrances, rock shelters, or other cover sites. Fire may also reduce surface cover such as logs and debris, resulting in reduced invertebrate populations and reduced prey densities for salamanders (U.S. Fish and Wildlife Service 1999b). Reduced cover may also result in heating and dessication of moist cover sites that salamanders require.

Grazing immediately after a fire can retard recovery of grasses and other plants, and facilitate erosion of slopes through hoof action and reduced vegetation cover. Erosion in the watersheds of occupied breeding sites could contribute to sedimentation or erosion of tanks and loss of habitat. Dan Robinett (Natural Resource Conservation Service, Tucson, Arizona) recommends resting burned sites above 4,000 feet from grazing for a period of two years to facilitate recovery (U.S. Fish and Wildlife Service 1999b). In line with these recommendations, the Coronado NF proposed resting the burned areas in the Maverick Prescribed Fire, Peloncillo Mountains, for two growing seasons (July, August, and September) following the fire.

If aquatic populations of salamanders are eliminated due to disease, ash flow, increased turbidity, or collection, but the habitat remains suitable (i.e. the tank is not silted in or erodes away, and fish are not introduced), the tank is likely to be recolonized by terrestrial salamanders. As a result, effects of the action that result in destruction of breeding sites or introduction of non-

native predators are much more serious to the viability of the species than death or injury of individuals.

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Sonora tiger salamander and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Sonora tiger salamander.

Table 83. Summary of the S&Gs considered for the Sonora tiger salamander.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-638, 644, 645, 648-653, 666-669, 672-682, 692-696, 698, 702-704, 707-713, 727, 774, 778-780, 782-785, 786, 788, 790-792, 794-800, 803-805, 807-812
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1486-1492, 1495, 1500, 1501, 1505, 1507-1515

Coronado National Forest

The following table summarizes the effects to the Sonora tiger salamander from the applicable S&Gs within the Coronado NF LRMP. Most of the applicable S&Gs are likely to result in beneficial effects to the Sonora tiger salamander; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in Sonora tiger salamanders. The majority, if not all of the S&Gs for Management Area 1 and Management Area 2, were considered to have no effect on the Sonora tiger salamander due to the lack of the species presence in these areas. In summary, less than four percent of the applicable S&Gs are likely to cause negative responses of Sonora tiger salamanders, while 80 percent of the S&Gs have positive effects to the species. The remaining 16 percent of the applicable S&Gs have no effect to the Sonora tiger salamander or are too vague or ill-defined to analyze.

Table 84. Effects of the S&Gs analyzed for the Sonora tiger salamander – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	2.4
-2	S&G is causing sublethal response	1	1.2
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	9	10.7
1	S&G is maintaining habitat & providing at least minimal recovery	57	67.9

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	5	6.0
3	S&G is implementing species recovery plan	5	6.0
Y	S&G has no application to the species	2	2.4
Z	S&G implementation is non-discretionary	2	2.4
X	S&G is a heading	1	1.2
Total		84	100 %

Some S&Gs were presented for analysis for the Coronado NF which were not assigned a Consultation Resource Program; however, these S&Gs were categorized as Chemical Management under the LRMP Resource Program heading. Standard and Guideline 703 allows for herbicide and pesticide use for forest management. Use of these chemicals in occupied habitat is likely to result in mortality or injury to salamanders, as well as reduced feeding success and reduced vegetation cover if applied on or near water. Similarly, S&G 702 allows for the use of cyanide leaching ponds during mining operations. If implemented in the San Rafael Valley, these ponds would likely result in lethal take of Sonora tiger salamanders that disperse into these areas.

Engineering Program

No applicable S&Gs in the Engineering Program are likely to have direct negative effects on the Sonora tiger salamander. Closing, draining, and revegetating existing roads deemed unneeded in Management Area 4 would have the potential to beneficially affect the Sonora tiger salamander if the roads are in areas where the Sonora tiger salamander is located. Road closures could benefit the Sonora tiger salamander if roads are near or lead to ponds with Sonora tiger salamanders, thereby reducing the likelihood of road kills (although no salamanders have been observed on roads in the San Rafael Valley), protecting water quality, and, most importantly, reducing disturbance, potential disease transmission, collection, and introduction of non-native predators associated with recreation or other activities.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in direct negative effects to the Sonora tiger salamander. However, the use of prescribed fire managed by this program as a whole is likely to have a variety of effects on the Sonora tiger salamander. As a benefit, prescribed fire could be used to protect Sonora tiger salamander ponds by reducing the risk of catastrophic wildfire in the surrounding areas. At the project level, there are likely to be negative effects associated with prescribed fire in the form of lethal incidental take of individuals associated with humans, tools, machinery, and burning.

Forestry and Forest Health Program

Only one applicable S&G in this program is likely to have a negative effect on the Sonora tiger salamander. Standard and Guideline 698 allows for the use of herbicides in aquatic fishing lakes. Any use of chemical agents could affect the Sonora tiger salamander, as discussed above.; however, because Sonora tiger salamanders are currently only found in stock tanks, there is not likely to be an impact from S&G 698.

Lands and Minerals Program

No applicable S&Gs in the Lands and Minerals Program are likely to result in negative effects to the Sonora tiger salamander. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

Within this program, S&G 780 allows for grazing in Management Area 4. Managing for a proper grazing system to insure renewal of desired vegetative species for livestock forage, big and small game habitat, and to improve soil and water resources and giving priority allotment planning could potentially be beneficial to the Sonora tiger salamander by minimizing the impacts to stock tanks, thereby minimizing impacts to the Sonora tiger salamander. However, there are likely to be impacts to the populations during the time that these areas are improving. The adverse effects from grazing could include: 1) trampling or ingestion of metamorphs, aquatic branchiata, larvae, and eggs; 2) trampling and browsing of vegetation at and near tanks resulting in reduced salamander escape cover and forage potential; 3) increased turbidity and reduction of aquatic cover and egg deposition sites at tanks due to cattle wading into the water; 4) increased likelihood of disease transmission; 5) watershed degradation and resulting increased runoff and sedimentation, requiring more frequent maintenance of tanks; 6) construction of range projects that may result in direct mortality of terrestrial salamanders or that facilitate access to tanks with subsequent increased chance of introduction of non-native predators, collection or translocation of salamanders, and disease transmission; and 7) maintenance of stock tanks; which although needed for stock tanks to remain as viable breeding habitats can result in injury or mortality of salamanders. The FWS assumes that the Coronado NF will continue to implement the conservation measures and terms and conditions from previous grazing opinions, discussed above, and the Stock Pond Management and Maintenance Plan outlined in the Recovery Plan, which will minimize many of these effects.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in the Recreation Program are likely to result in negative effects to the Sonora tiger salamander. However, there may be negative effects from this program not captured in the applicable S&Gs. One of the goals for this program is to, “Maintain the current spectrum of developed, dispersed, and primitive recreation opportunities and increase those opportunities within the capability of the resources and the framework of this plan as needs and funds develop (Coronado NF LRMP)”. This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the Sonora tiger salamander, they are likely to involve some incidental take of individual salamanders in the form of as disturbance, avoidance of impacted recreation areas, and even mortality if stepped on by humans. Additionally, as these recreational users move through the environment, they might collect salamanders as bait, or contribute to the spread of non-native predators and disease, especially anglers transporting and/or collecting non-native fishes, salamanders, and bullfrogs.

Watershed Management Program

No applicable S&Gs in this program are likely to result in negative effects to the Sonora tiger salamander. In addition, no negative impacts are anticipated from this program as a whole.

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in this program are likely to result in direct negative effects to the Sonora tiger salamander. However, S&G 667 allows for projects to be implemented which would improve habitat for T&E species. Some of these projects could include prescribed burning, which would help to reduce the risk of catastrophic fire, but are also likely to result in short-term adverse effects to the Sonora tiger salamanders as discussed under the Fire Management Program.

Standard and Guideline 668 allows for maintenance of stock tanks and development of water structures. Sonora tiger salamanders have adapted to successfully breeding in human-made stock ponds due to the disappearance of natural springs and cienegas. However, they are now dependent on humans to maintain this habitat and to maintain it in such a way as to not adversely impact the Sonora tiger salamander. This further increases the threat to Sonora tiger salamanders because of their limited range.

Stock tank maintenance can offset some adverse effects of degraded watersheds and is necessary to maintain suitable breeding habitats for the Sonora tiger salamander. However, maintenance activities can also result in direct or indirect effects to salamanders. If Sonora tiger salamanders are present, equipment may crush animals, they may desiccate if isolated in drying pools, or be killed during maintenance activities. Maintenance may also eliminate bank and aquatic cover and egg deposition sites, as well as increase turbidity. Typically maintenance is accomplished when tanks are dry or nearly dry. As tanks dry out, many larval salamanders over two months of age and some branchiate salamanders metamorphose and move to upland habitats. Thus, salamander populations are likely to be small or nonexistent at the time maintenance is needed. Most take will be in the form of capture, holding of salamanders, and re-release back into the tank in accordance with the Stock Pond Management and Maintenance Plan; however, some take will be in the form of incidental mortality or injury.

A number of S&Gs in the Wildlife Program provide a great deal of benefit to the Sonora tiger salamander. For example, S&G 634 establishes the maintenance of T&E species habitat as a priority over other species habitats forest-wide. Standards and Guidelines 629 and 779 provide for actions which work towards delisting of T&E species by implementing recovery plans. These S&Gs should not only minimize the effects of other projects, but also result in increased population numbers and sizes. In addition, these S&Gs should help the Forest to prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical salamander areas.

In summary, the applicable S&Gs in the Coronado NF LRMP allow for a variety of effects to the Sonora tiger salamander. To a large extent, activities conducted under the positive S&Gs should benefit the Sonora tiger salamander and/or help to eliminate or minimize the effects of activities conducted under the negative S&Gs. However, the positive S&Gs do not eliminate the possibility of take, thus take of Sonora tiger salamanders is reasonably certain to occur as a result of implementation of the Coronado NF LRMP.

1996 Regional Amendment

All of the S&Gs analyzed for the 1996 Regional Amendment fall under the Wildlife Program. This Amendment implemented the Mexican spotted owl recovery plan, Northern goshawk guidelines, and some additional grazing guidelines. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 85. Effects of the S&Gs analyzed for the Sonora tiger salamander – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	10.4
1	S&G is maintaining habitat & providing at least minimal recovery	25	52.1
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	10	20.8
Z	S&G implementation is non-discretionary	2	4.2
X	S&G is a heading	6	12.5
Total		48	100 %

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs analyzed for the Wildlife Program under the 1996 Regional Amendment are likely to result in direct negative effects to the Sonora tiger salamander. Standards and Guidelines 1432, 1445, 1455, 1458, 1468, 1476, and 1508 all allow for some use of prescribed fire and fuels reduction. These S&Gs provide great benefit to the Sonora tiger salamander by reducing the risk of catastrophic wildfire. However, the fuels treatment projects are likely to result in incidental take of individuals, as discussed under the Coronado NF’s Fire Management Program.

Cumulative Effects

Cumulative effects are those adverse effects of future state, tribal, local, or private actions that are reasonably certain to occur in the project area. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Federal agencies manage much of the land in the project area, particularly the Coronado NF, Fort Huachuca, and the Coronado National Memorial. Thus, most of the actions that are reasonably expected to occur in the project area that may adversely affect the Sonora tiger salamander would be subject to future section 7 consultations. However, some occupied breeding localities are on private lands or state lands in the center of the San Rafael Valley. Compliance with the ESA for activities on private lands that may result in incidental take of the Sonora tiger

salamander, but are not addressed by section 7 consultation, could occur through section 10(a)(1)(B) of the ESA. Some activities on private lands may require permits or funding from federal agencies, consequently section 7 consultation would be required. These private lands are used primarily for grazing, but potentially could be used for other purposes. Effects from the current use of lands for grazing could result in improper livestock grazing on private range land leading to degraded cover habitat for terrestrial Sonora tiger salamanders, degraded water quality for aquatic larvae and branchiate adults, and trampling of various life stages by cattle. Other land uses that could be implemented on private land could include: housing subdivisions, oil and gas exploration and extraction, mining, agriculture, and division into ranchettes. The largest private parcel in the center of the valley (San Rafael Ranch) is covered by a conservation easement that prohibits most of these activities. In addition, there is the potential for anglers on private land to collect salamanders as bait or contribute to the spread of non-native predators, although these activities are prohibited by state law. Furthermore, anglers may contribute to the spread of disease on private lands by moving contaminated bait or equipment between aquatic sites.

Additional cumulative impacts to the Sonora tiger salamander may result from cross-border activities along the U.S./Mexico border. Cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increased fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference with survey, monitoring, and research efforts.

CONCLUSION

After reviewing the current status of the Sonora tiger salamander, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonora tiger salamander. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS anticipates incidental take of the Sonora tiger salamander is reasonably certain to occur as a result of activities authorized under the Coronado NF LRMP and 1996 Regional Amendment. However, the FWS does not believe that such activities will rise to the level of jeopardy for this species for the following reasons:

- The majority (approximately 90%) of Sonora tiger salamander populations occur in stock tanks within the Coronado NF. In cooperation with the FWS, the Coronado NF has developed the "Stock Pond Management and Maintenance Plan for Sonora Tiger Salamander in the San Rafael Valley and Surrounding Areas". This document outlines actions which should minimize the impacts of stock tank use and maintenance to the Sonora tiger salamander. Livestock grazing allotments on the Coronado NF that have ponds occupied by the Sonora tiger salamander incorporate

the “Stock Pond Management and Maintenance Plan for Sonora Tiger Salamander in the San Rafael Valley and Surrounding Areas” as part of their plan of operations. Furthermore, the livestock permittees are also dependent upon these stock ponds for livestock production; therefore, it is in the interest of the permittees to keep and maintain these stock ponds.

- Although range and soil conditions are degraded to some extent in most of the allotments where the Sonora tiger salamander occurs, many S&Gs provide for the improvement of range conditions as needed, minimization of roads, appropriate levels of dispersed recreational use, restoration of native riparian habitat, and buffers or filters around water and drainages.
- Arizona Game and Fish Department regulations prohibit collecting *Ambystoma* in the San Rafael Valley, except under special permit, which protects the species from impacts by recreational collectors or anglers on the Coronado NF. In addition, transport and stocking of live bullfrogs and fishing with live bait fish or *Ambystoma* within the range of the Sonora tiger salamander in Arizona is prohibited, thus providing added protection to the species from recreational activities.
- The Coronado NF LRMP includes S&Gs which direct the Coronado NF to prioritize threatened and endangered species over other species, work towards recovery, and even to delist species. These S&Gs should only increase the availability and quality of Sonora tiger salamander habitat on the Coronado NF.

In summary, although the evaluation of the numeric effects analysis does not involve balancing or averaging the rankings, the full suite of S&Gs in the Coronado NF LRMP and 1996 Regional Amendment creates a decision-making framework within which the Coronado NF can continue to implement their LRMP without appreciably reducing the likelihood of the survival or recovery of the Sonora tiger salamander in the wild.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity conducted by the federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require any applicant, permittee, or contractor to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement [50 CFR 402.14(i)(3)].

Amount of Extent of Take

Incidental take of the Sonora tiger salamander is reasonably certain to occur from the continued implementation of the Coronado NF LRMP and the 1996 Regional Amendment. As discussed in the Effects of the Action, this incidental take is expected to be in the forms of harm (i.e., direct mortality) and harassment due to prescribed fire, mechanical fuels treatments, chemical use, rangeland management, recreation, and impacts of surface disturbing projects from various programs. Incidental take attributable to the proposed action will likely be difficult to detect and often the cause of any observed mortality will be impossible to determine (i.e., dead and dying diseased salamanders may be found, but the cause of disease transmission will likely be unknown).

As stated previously, the historic, extant, and current records indicate 58 ponds rangewide have been known to contain Sonora tiger salamanders. Of these, 53 (91%) occur on the Coronado NF. Forty ponds are currently known to be occupied (within the last five years) by Sonora tiger salamanders, 38 (95%) of which are located on Coronado NF (U.S. Forest Service 2004). The FWS expects that numbers and locations of occupied ponds will vary from year to year depending upon disease outbreaks, drought, and other factors. However, in the long-term, we anticipate no decline in habitat. Therefore, the FWS defines incidental take in terms of the condition and amount of Sonora tiger salamander ponds, and is using this surrogate measure to identify when take has been exceeded. The FWS concludes that the incidental take of Sonora tiger salamanders will be considered to be exceeded if the number of occupied ponds on the Coronado NF falls below 38 for a period of two consecutive years as a result of the proposed action.

Effect of the Take

In the accompanying biological opinion, the FWS has determined that this level of anticipated take is not likely to result in jeopardy to the Sonora tiger salamander. Although the FWS anticipates the temporary loss of entire aquatic populations as a result of several aspects of the proposed action, tank populations extirpated by disease or drought are typically recolonized by terrestrial salamanders (Ziembra 1998). The likelihood of aquatic populations being eliminated is greatly reduced by the reasonable and prudent measures and terms and conditions.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Sonora tiger salamander:

1. Protect Sonora tiger salamanders on the Coronado NF.
2. Protect Sonora tiger salamander habitat on the Coronado NF.
3. Monitor Sonora tiger salamander populations on the Coronado NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline the reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following Term and Condition will implement reasonable and prudent measure 1:

- 1.1 Design fire use, chemical use, range management, and recreational projects to minimize or eliminate adverse effects to the Sonora tiger salamander.
- 1.2 Implement educational programs for recreational users discouraging the use of non-native salamanders and fishes in Sonora tiger salamander sites.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Continue implementation of the “Stockpond Management and Maintenance Plan for the Sonora Tiger Salamander in the San Rafael Valley and Surrounding Areas” as developed in the FWS’s December 19, 1997, subsequent biological opinions, and as portrayed in Attachment 2 of the recovery plan.
- 2.2 Design projects in occupied Sonora tiger salamander habitat to incorporate the appropriate components of the Sonora Tiger Salamander Recovery Plan with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the salamander and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor populations of Sonora tiger salamander on the Coronado NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Sonora tiger salamanders, pursuant to 50 CFR 402.14(i)(3). In combination with term and condition 3.1 above, this information will be used to assess when the amount or extent of take is being

approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the Sonora tiger salamander.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the action, the level of anticipated incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation. Meanwhile, the Forest Service must cease the activity resulting in the take if it is determined that the impact of additional taking will cause an irreversible and adverse impact on the species. The Forest Service must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures. This biological opinion does not authorize any form of take not incidental to implementation of the proposed action. Note that this opinion anticipates but does not authorize take of Sonora tiger salamanders due to illegal activities such as illegal transport and release of fish or salamanders, capture of Sonora tiger salamanders, and off-road vehicle activity.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA direct federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The FWS recommends the following conservation activities:

1. The Forest Service is encouraged to participate in, implement, and/or help fund studies of vectors of disease transmission, salamander metapopulation dynamics, distribution of the *mavortium* genome in the San Rafael Valley, the movements and habitat use of terrestrial salamanders, and other topics that may improve our understanding of the conservation and recovery needs of the Sonora tiger salamander.
2. Many S&Gs call for watershed, range, and/or habitat improvements. These improvements are not given a timeframe, thus populations may be impacted and individuals may be taken over time. It is recommended that the Forest Service prioritize the projects using some combination of factors which recognize extreme environmental degradation and T&E occupied sites.
3. Implement the Sonora Tiger Recovery Plan (U.S. Fish and Wildlife Service 2002a) per the implementation schedule in that document.
4. Implement area or route closures in important breeding populations to reduce impacts on breeding success and dispersing Sonora tiger salamanders.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitat, the FWS requests notification of the implementation of any conservation recommendations.

APACHE TROUT

STATUS OF THE SPECIES

Description

Apache trout (*Oncorhynchus gilae apache*, formerly *Salmo apache*) is one of two salmonid species native to Arizona (the other is Gila trout, *Oncorhynchus gilae gilae*). Apache trout are yellow or yellow-olive with large dark spots on their body. Dorsal, anal, and caudal fins are edged with white. A yellow cutthroat mark is present. Apache trout have a body that is deep and compressed. The pronounced spots on the body are often uniformly spaced, round in outline, and medium-sized (Minckley 1973).

Legal Status: In 1966, Apache trout was considered endangered under the Federal Endangered Species Preservation Act of 1966 (AGFD 2005). Apache trout became federally protected with the passage of the ESA in 1973. In 1975, the Apache trout was one of the first endangered species to be down-listed from endangered to threatened (U.S. Fish and Wildlife Service 1975). As a result, Apache trout is currently listed as threatened, without critical habitat (40 FR 29864) with a 4(d) rule that permits limited recreational fishing.

Distribution and Abundance

Historical distribution of Apache trout is unclear. Once Apache trout were recognized as a species separate from Gila trout (Miller 1972), their original distribution was described as the upper Salt River drainage (Black and White Rivers) and headwaters of Little Colorado River in Arizona above 1,800 m (5,905 ft) in elevation (Miller 1972). Historic distribution has been estimated at approximately 965 km (603 mi) of stream in Arizona (Harper 1978).

Apache trout now exist primarily in headwater areas upstream from natural and artificial barriers (U.S. Fish and Wildlife Service 1983). This environment is subject to extreme variations in both temperature and stream flow. Apache trout generally require water temperatures below 77°F (25°C) (U.S. Fish and Wildlife Service 1983).

At least 20 unhybridized and uncompromised (i.e., no non-native trouts) populations exist within historic range in Gila, Apache, and Greenlee counties of Arizona, on lands of the Fort Apache Indian Reservation (FAIR) and Apache-Sitgreaves National Forest. These 20 populations represent 13 discrete natural stocks (lineages) of pure Apache trout. An additional three populations contain pure Apache trout coexisting with brook trout (*Salvelinus fontinalis*) (Lee Valley Creek) or brown trout (*Salmo trutta*) (Hayground, and Stinky creeks). Nine populations were introduced beyond what is now considered the home range, however only one of those nine (Coleman Creek, on the Apache-Sitgreaves) was recently confirmed as pure (U.S. Forest Service 2004). North Canyon Creek is suspected as pure, but is unconfirmed. Seven streams within historic range on Apache-Sitgreaves and four streams on FAIR have been confirmed as having introgressed populations of Apache trout [e.g., crossed with rainbow trout (*Oncorhynchus mykiss*) or cutthroat trout (*Oncorhynchus clarki*)].

Habitat

Apache trout is endemic to high elevation streams in the upper Black, White, and Little Colorado River drainages in east-central Arizona. Apache trout evolved in low to moderate/high gradient mountain streams primarily above 5,900 feet elevation, within mixed conifer and ponderosa pine forests. Alcorn (1976) and Lee and Rinne (1980) studied temperature tolerances of Apache trout and found that critical upper limits were similar to data reported for other species of trout. Robinson and Tash (1979) reported on feeding of Apache trout in relation to light intensity and contrasted findings with brown trout, which were found to be more nocturnal.

Information concerning specific stream habitat requirements for all life stages of Apache trout is limited. In Squaw and Flash Creeks on the FAIR, juvenile (<130 mm or <5.1 in Total Length) Apache trout used shallow water (<20 cm or <7.9 in) most frequently, while adults preferred water depth >20 cm (7.9 in) (Kitcheyan 1999). Juvenile fish were closely associated with cover such as surface turbulence, overhanging vegetation, and objects less than 150 mm (5.9 in) in diameter, while adults used cover less frequently (Kitcheyan 1999). In general, juveniles preferred faster moving water than adults, while both groups used substrates in proportion to their availability (Kitcheyan 1999).

Wada (1991) reported that instream cover and bank cuts are important variables defining Apache trout habitat. In general, Apache trout selected areas with the greatest depths and cover in the absence of other non-native trout (Wada 1991). Nursery areas for fry were miniature pools in runs or shallow areas on the edges of pools in Firebox and Sun Creeks (Wada 1991). Wada (1991) reported that current velocities in nursery areas were low, with a mean of 0.96 cm/sec; depths were shallow, with a mean of 3.31 cm (1.30 in); and substrates tended to be composed of fines. Kitcheyan (1999) noted that trout were predominantly captured in areas exposed to direct sunlight. Similarly, Wada et al. (1995) reported that Apache trout spend a considerable portion of the day feeding and residing in portions of pools exposed to direct sunlight, rarely entering cover.

Kitcheyan (1999) reported that maximum movement of tagged Apache trout was 2,100 m (6,890 ft) upstream and 2,385 m (7,825 ft) downstream, but that most fish were recaptured within 750 m (2,461 ft) of the initial capture site. Harper (1978) reported that 41 tagged adults in Big Bonito Creek were recaptured within 100 m (328 ft) of where they were marked. Post-emergent fry in Bit Bonito Creek moved primarily at night, and primarily downstream between August and October. Rinne (1982) reported similar results for the closely-related Gila trout, noting that they are sedentary under normal population levels, moving little even with high population densities.

Life History

Spawning in White Mountain streams is known to occur from March through mid-June, varying with stream elevation. Redd construction commences as water temperatures reach 8°C (46°F; Harper 1978). Egg production in Apache trout is positively related to size, ranging from 72 to 4,215 eggs (Harper 1978, Roselund 1974). The smallest mature male studied was less than 150 millimeters (6 in) in total length, corresponding to a spawning age of three years (Harper 1978). Harper (1978) suggested that each female may deposit eggs in several redds during a single spawning season. Redds are constructed primarily at downstream ends of pools in pool tail

crests in coarse gravel. Eggs hatch in about 60 days (Harper 1978). Behnke (2002) reported the maximum known age for Apache trout as six years.

Apache trout are largely opportunistic feeders and eat a variety of aquatic and terrestrial organisms (U.S. Fish and Wildlife Service 1983). Prey is typically invertebrates, but varies depending on Apache trout size (Harper 1978). Fish 6 - 9 cm (2.3 to 3.5 in) in length primarily feed on Ephemeroptera, whereas fish 15 cm (5.9 in) and larger consumed more Trichoptera. Terrestrial insects are consumed by all size classes of Apache trout. Utilization of Diptera, Trichoptera, and terrestrial insects changed with the season (U.S. Fish and Wildlife Service 1983). Clarkson and Dreyer (1996) found that Apache trout they examined from Lee Valley Reservoir (Apache-Sitgreaves NF) were omnivorous. Apache trout fed on organisms found at both the surface and bottom, including both aquatic and terrestrial insects, zooplankton, crustaceans, snails, leeches, nematodes and fish (Clarkson and Dreyer 1996).

Reasons for Listing

According to the 1975 Federal Register notice, major threats to this species at the time of listing included habitat alterations, competition, hybridization and predation by non-indigenous fish. The 1975 Federal Register notice noted logging operations in the headwaters of the Salt and Little Colorado rivers in the White Mountains as causing destruction, modification, or curtailment of its habitat and range. The notice also indicated that introduced rainbow trout hybridized with Apache trout in some streams, and that reintroductions presented a continued threat to the species.

Threats: The 1983 Recovery Plan (U.S. Fish and Wildlife Service) concluded that hybridization between rainbow and Apache trout was the major factor limiting persistence of Apache trout. Other threats to Apache trout habitat include grazing, reservoir construction, and road construction (U.S. Fish and Wildlife Service 1983).

Conservation Measures

The initial recovery plan for Apache trout was released in 1979, and was revised in 1983. The second revision has gone through several drafts and is currently pending. The overall objective of recovery is to secure existing populations and planned future populations of Apache trout and their stream habitat until the species can be delisted.

Recovery and management efforts for Apache trout have been on-going since the 1940's. Since 1976, recovery efforts have expanded the range of pure Apache trout populations from 30 occupied stream miles to approximately 93 miles, reclaiming 63 miles of habitat since the fish was listed as threatened. On the Apache-Sitgreaves NF, 14 streams have been proposed for re-introduction, with five currently containing Apache trout (Coyote/Mamie, Home, Thompson, West Fork Black, and Wildcat).

Secure Apache trout populations primarily occur in headwater areas upstream of natural or artificial barriers. Maintaining these habitats in high quality condition is necessary to provide viable populations and species recovery. Various efforts accomplished, primarily between 1982 and 2003, have been completed on the Apache-Sitgreaves NF to improve habitat conditions by protecting stream courses, implementing watershed restoration projects, constructing in-stream

enhancement projects, and building and maintaining barriers. Over 82 km (51 mi) of occupied or proposed to be occupied stream habitat has been protected from livestock grazing through the following practices: livestock exclosures (51.8 km; 32.2 mi), no permitted grazing until livestock exclosures are completed (21.2 km; 13.2 mi), and pasture retirement (9.0 km; 5.6 mi). Watershed restoration includes riparian planting (over 9.7 km; 6 mi), road closure and reseeded (over 129 km; 80 mi), and spring protection (over 25 springs).

Instream habitat improvements implemented by the Forest Service in the late 1980s into the 1990s, include over 200 rock and wood structures (U.S. Forest Service 2004). Construction of new barriers, maintaining all barriers, coordinating with the AGFD on removing non-native fish, and habitat and population inventories has been the focus of the past decade of recovery actions. Coordination with the Service's Arizona Fisheries Resources Office in Pinetop has also been integral in accomplishing recovery actions, since their efforts to cooperate with the White Mountain Apache Tribe on Apache trout recovery are critical to overall recovery of the fish.

Genetic analysis work is also targeted at identifying the status of Apache trout in regards to variability of wild populations and extent of hybridization with rainbow trout (U.S. Forest Service 2004).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The Apache trout occurs on the Apache-Sitgreaves, Coronado, and Kaibab NFs. At least 14 known pure populations currently exist within Apache, Gila, and Greenlee counties, on lands administered by the Forest and by the White Mountain Apache Tribe (U.S. Forest Service 2004). These 14 populations represent 13 discrete natural stocks of Apache trout. One introduced population, established out of the historical range in the late 1960s, has been confirmed as un-hybridized through genetic analysis. Ten additional reintroduced populations currently await genetic testing to confirm their status. Historically, Apache trout inhabited most of the streams in east-central Arizona's White Mountains above 5,899 ft (Minckley 1973).

The Apache-Sitgreaves NF contains 22 streams with Apache trout (U.S. Forest Service 2004). Sixteen streams within the NF (or shared with the Fort Apache Indian Reservation, which are Thompson Creek and the West Fork Black River) currently contain Apache trout. Six of these streams contain pure Apache trout and are protected by barriers. Soldier Creek is one of the 13 natural stocks and has been estimated to contain 200 adults (U.S. Forest Service 2004). Only the West Fork Black is estimated to have over 500 adults. The remaining streams on the Apache-Sitgreaves NF are estimated to contain between zero and 300 adult Apache trout (U.S. Forest Service 2004).

There are three populations of Apache trout on the Coronado NF and one population on the Kaibab NF. The Coronado NF populations may eventually be replaced with Gila trout based on discussions of both the Apache trout and Gila trout recovery teams. North Canyon Creek within the wilderness on the Kaibab NF was stocked with pure Apache trout in 1967. While this is outside of its historic range, this population was used as brood stock for a re-introduction project in 1996 (U.S. Forest Service 2004) and there is no plan to remove it from North Canyon Creek.

Factors Affecting the Species within the Action Area

Within the action area, one factor that could be affecting the Apache trout is the threat of hybridization with both native and non-native fish. In addition, habitat alterations from ash flows and unsatisfactory watershed conditions could also be affecting Apache trout habitat. Competition from non-native species is a possible limiting factor as well. Drought is most likely having an impact on this species where it exists on the Forests, particularly because of the species restriction to small streams that restrict population and individual fish growth.

EFFECTS OF THE ACTION

The Apache trout occurs on the Apache-Sitgreaves, Coronado, and Kaibab NFs. The S&Gs listed in these National Forest’ LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Apache trout and its habitat. These S&Gs may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Apache trout.

Table 86. Summary of S&Gs considered for the Apache trout.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1-9, 14-17, 19-22, 24, 26, 29, 32, 33, 34, 37, 38, 40, 43-53, 55, 58-63, 65, 42, 80, 84, 93, 98, 99, 104-123, 125, 130, 132-140, 144, 145, 150, 151, 152, 153, 155, 156, 157, 160, 161, 162, 166, 171-174, 177-180
Coronado	612, 613, 626-629, 631-634, 637, 638, 644, 645, 648-653, 667, 668, 669, 672-679, 681, 682, 693-696, 704, 703, 707, 709-713, 719, 720, 721, 724, 727, 749, 750, 751, 786, 789, 790, 791, 792, 794, 795, 797-800, 803, 804, 805, 807, 808, 811, 812, 825, 827-830
Kaibab	960-964, 959, 1034-1038
1996 Regional Amendment	1425, 1426, 1427, 1432, 1438, 1440, 1443, 1445, 1449, 1453-1456, 1458, 1461-1465, 1468, 1473, 1474, 1476, 1487-1491, 1496-1499, 1502, 1503, 1504, 1506, 1508-1512, 1514, 1515

Apache-Sitgreaves National Forest

Several S&Gs with the Apache-Sitgreaves NF LRMP may have lethal or sublethal effects to the Apache trout (see Table 87 below). In addition, several were found to cause a negative behavioral response. However, the majority of the S&Gs were ranked positive (i.e., as

maintaining habitat for the species or providing minimal recovery) and many S&Gs directed the Forest to move towards recovery or implement recovery plans for listed species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 87. Effects of the S&Gs analyzed for the Apache trout - Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	2.7
-2	S&G is causing sublethal response	3	2.7
-1	S&G is causing negative behavioral response	6	5.4
0	S&G is ill-defined and/or open to interpretation	20	17.9
1	S&G is maintaining habitat & providing at least minimal recovery	63	56.3
2	S&G is moving towards recovery	5	4.5
3	S&G is implementing species recovery plan	5	4.5
Y	S&G has no application to the species	1	0.9
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	4	3.6
Total		112	100 %

Engineering Program

Standard and Guideline 63 relates to both total road and open road densities. This S&G states that total road density should average 3.5 mi/mi² or less, while open road densities should average 2.0 mi/mi² or less. As stated in the biological assessment (U.S. Forest Service 2004), road density is defined as the total kilometers (miles) of road in a defined area divided by the defined area in square kilometers (miles). The analysis in the biological assessment recognizes that the numbers that were being evaluated were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by the FWS and NOAA Fisheries as one way to measure watershed condition as it relates to resident fish in the Pacific Northwest. The joint agencies recommendation is that a given watershed should have less than 2.5 mi/mi² of road system; if in excess, the watershed may not be properly functioning.

On the Apache-Sitgreaves, the known road densities are below the 2.5 mi/mi² recommended by Service and NOAA Fisheries. However, the Apache-Sitgreaves NF is the third largest Forest in the Southwestern Region and has the greatest number of classified roads at almost 7,500 miles. High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to Apache trout is watershed deterioration. This could potentially lead to increased erosion into trout habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. Sedimentation can contribute to poor water quality which can reduce quantity and quality of spawning and rearing areas, altering stream flow and temperature, and influence stream productivity and food supply (e.g., stream dwelling insects).

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in negative effects to the Apache trout. However, there may be negative effects from this program not captured in the applicable S&Gs. In the Apache-Sitgreaves NF Plan there is not a specific Fire Management Program listed; however, there is a Protection Program listed which deals with fire. The goal for the Protection Program includes the following “Fire is used as a resource management tool where it can effectively accomplish resource management objectives (Apache-Sitgreaves LRMP)”. It can be inferred that prescribed fire would be utilized in this capacity. The use of prescribed fire and other fuels treatment methods are useful in reducing the risk of catastrophic wildfire. However, these projects may result in adverse affects associated with humans, tools, machinery, and burning. Additionally, ash flows and erosion/sedimentation in burn areas may have adverse effects to fish species.

Forestry and Forest Health Program

Standard and Guideline 64 allows for controlling mistletoe by clear-cutting. As stated in the biological assessment (U.S. Forest Service 2004), clear cutting in this region has undergone a major reduction over the past decade. On the Apache-Sitgreaves, a total of 704 acres have been clear cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibit the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to the watershed condition from clear-cutting may be increased erosion resulting in sedimentation into the stream channel. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standard and Guidelines 93 advises the Forest to reduce susceptibility of Englemann Spruce stands to Englemann bark beetle and to salvage windthrown trees as soon as possible. Included in this are skid trails, disturbance of soils and vegetative ground cover and roads. All of these activities may lead to increased erosion and increased sediment into the stream channel occupied by Apache trout. Sedimentation from tributary canyons and streams leading into occupied drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average mi/mi² or less. High road densities could contribute to poor water quality which can reduce quantity and quality of spawning and rearing areas, altering stream flow and temperature, and influence stream productivity and food supply (e.g., stream dwelling insects).

Rangeland Management Program

As per our analysis, there were no negative S&Gs within the Apache-Sitgreaves LRMP for Apache trout. All of the S&Gs that were analyzed had positive effects to the species. However, during the meeting with the Forest, they pointed out that they had numerous formal consultations

on grazing activities. Presently, the Apache-Sitgreaves is in formal consultation with the AZESFO on the 27 Bar Allotment that will likely result in take of Apache trout.

Wildlife, Fish and Rare Plants Program

Standards & Guidelines 39, 114-118, 123, and 152 all provide guidance for management of the riparian resources. All of these S&Gs allow a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, you could potentially see degraded streambank conditions begin to move downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Coronado National Forest

While the Coronado National Forest had a large number of S&Gs that maintained habitat and provided for minimal recovery for the Apache trout, we found several that caused lethal or sublethal effects if implemented. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 88. Effects of the S&Gs analyzed for the Apache Trout - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing a lethal response	2	2.1
-2	S&G is causing a sublethal response	2	2.1
-1	S&G is causing a behavioral response	0	0.0
0	S&G could be interpreted in many ways that could cause a negative or a positive response by the species	13	13.7
1	S&G is maintaining habitat & providing at least minimal recovery	55	57.9
2	S&G is moving species toward recovery	8	8.4
3	S&G is implementing species recovery plan	6	6.3
Y	S&G has no application to the species	5	5.3
Z	S&G is in compliance with existing law, implementation is none discretionary	2	2.1
X	S&G is only a heading	2	2.1
Total		95	100 %

Fire Management Program

Standard and Guideline 695 allows the Forest to conduct fire suppression activities in a way that will protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Standard and Guideline 713 states that prescribed fire will be used to reduce fuel hazards, enhance wildlife values, and enhance visual resources. In addition, S&G 798 and 812 allow prescribed fire to be used to reduce fuel hazard, enhance wildlife habitat, and improve livestock forage, and watershed condition. All three of these S&Gs are the same but are applied for different management areas. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standard and Guideline 697 allows the Forest to use chemicals within guidelines approved by other agencies for the following purposes: insecticides and rodenticides in recreation areas and administrative sites. Pesticides (e.g., insecticides) are selected for their biocidal properties and are applied to kill or control organisms. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee *et al.* 2003).

Rangeland Management Program

Standards and Guidelines 792 (Management Area 7A) and 805 (Management Area 7B) allow the Forest to manage suitable rangeland at Level D. If level D is not achievable, manage at Level A (i.e., no livestock). Management seeks full utilization of forage allocated to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. The following acres for projected range conditions were provided within the S&G 805: 15,412 acres within satisfactory and 1,712 in unsatisfactory conditions in Management Area 7B.

The LRMP predicts no change in the number of acres of unsatisfactory condition for

Management Area 7B over a period of 50 years. Unsatisfactory range conditions may contribute to un-healthy watersheds resulting in adverse effects to the species. As stated in the recovery plan, one of the primary threats to this species is watershed deterioration. As a result of poor upstream watershed condition, downstream effects could potentially lead to increased erosion into Apache trout habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. Potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 829 states that riparian areas will be managed to achieve and maintain satisfactory riparian conditions as described in the Forest-wide prescription. This may be accomplished through the use of structural improvements, movement of livestock, or the exclusion of livestock. This S&G may result in some short-term adverse effects during the construction of structural improvements. In addition the movement of livestock could also cause adverse effects if they are trailed through the riparian area. However, these effects would be localized and short-term and would contribute to the overall health of the riparian habitat in the long-term.

Watershed Management Program

Standard and Guideline 678 discusses aquatic resources and states the following: (1) Maintain at least 80 percent of natural shade over water surfaces in fish bearing streams; (2) Maintain at least 80 percent of natural bank protection; (3) Maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G (678) provides guidance for management of the riparian resources. The Service recognizes that the intent of this S&G is positive; however, this S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the natural bank is 80 percent, then the assumption is that 20 percent of the streambank is allowed to deteriorate to less than stable conditions. If this were the case, potential degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 677 guides the Forest to complete classifications and inventories of all riparian areas by the end of the first time period and complete action plans to improve all unsatisfactory riparian areas to satisfactory or better condition by the end of Period 5. Such satisfactory conditions are specified below, expressed as a percentage of "natural" conditions (that is, what each site can produce if not further disturbed by man). Twenty-five percent of all riparian areas must be in satisfactory condition by Period 2. Although this S&G is definitely beneficial as it is moving toward satisfactory riparian conditions, there may be some short-term adverse effects that could be occurring and may continue to occur until the riparian habitat reaches satisfactory conditions.

Standard and Guideline 711 guides the Forest to restore to satisfactory watershed condition, on an emergency basis, watersheds or portions of watersheds when damaged. Watershed treatment

is a low priority in this Management Area (MA1). Water and soil resource improvements may consist of channel stabilization and revegetation using native or non-native species.

Standards and Guidelines 794 and 807 guide the Forest to restore damaged watersheds to satisfactory watershed condition. Watershed treatment is a high priority in this Management Area. Watershed maintenance and improvement may consist of channel stabilization and revegetation using native or non-native species. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. All these S&Gs (711, 794, and 807) are the same but they are applied to different management units. They allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Wildlife, Fish, and Rare, Plants Program

Standard and Guideline 667 discusses the use of structural and nonstructural improvement guidelines intended to meet the specific wildlife habitat objectives for each Management Area. Nonstructural wildlife improvements include the following: (1) Prescribe burn in feasible areas on a 20-year cycle; (2) seed suitable wildlife forage species as needed in fuelwood and timber areas; (3) transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding; (4) revegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available) and; (5) thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year.

Standard and Guideline 668 states the following: (1) construct water developments or potholes to accomplish one per section within four decades; (2) consider structural improvements and maintenance for threatened and endangered species as technology develops; (3) construct fish habitat improvement structures as needed for threatened and endangered species and; (4) fence riparian areas where prescribed by approved allotment management plans.

The S&Gs (667 & 668) could potentially result in short-term adverse effects although the goal is a net beneficial effect. Standard and Guideline 667, allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may have short-term impacts on water quality in adjacent streams inhabited by Apache trout. Standard and Guideline 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish as well as indirect impacts to the habitat such as temporary alterations of stream flow, or short-term isolated increases in sediment entering the stream.

Kaibab National Forest

The majority of the S&Gs within the Kaibab NF LRMP maintain habitat and provide minimal recovery for the Apache trout. However, one S&G if implemented could potentially result in a lethal effect to the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 89. Effects of the S&Gs analyzed for the Apache Trout – Kaibab NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	8.3
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	8.3
1	S&G is maintaining habitat & providing at least minimal recovery	7	58.3
2	S&G is moving towards recovery	2	16.7
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	8.3
X	S&G is a heading	0	0.0
Total		12	100 %

Watershed Management Program

Standard and Guideline 1036 discusses riparian vegetation and directs the Forest to: 1) inventory all riparian areas and collect data regarding location, size, classification and condition of the riparian area; 2) maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings; 3) maintain not less than 90 percent of the potential shrub cover in riparian areas; 4) maintain not less than 90 percent of total linear streambank in stable condition; 5) woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are to rate in satisfactory or better condition by the end of decade one; and 6) select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment.

Standard and Guideline 1036 provides guidance for management of the riparian resources within Management Area 19. Management Area 19 occurs within the wilderness. It is unlikely that the watershed program would initiate any projects within the wilderness, however this S&G could be used as mitigation in conjunction with another program such as fire or range that may currently be implementing projects within the wilderness, therefore it is analyzed as such. The FWS recognizes that the intent of this S&G is positive; however, S&G 1036 may allow a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the natural bank is 90 percent, then the assumption is that 10 percent of the streambank is allowed to deteriorate to less than stable conditions. If this were the case, potential degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

1996 Regional Amendment

No applicable S&Gs within the 1996 Regional Amendment are likely to have a direct adverse effect on Apache trout. Over half of the S&Gs provide direction for maintaining habitat and

providing for at least minimal recovery of the species. Yet, a few of these beneficial S&Gs are likely to have a short-term adverse effect on Apache trout. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 90. Effects of the S&Gs analyzed for the Apache Trout - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	5.5
1	S&G is maintaining habitat & providing at least minimal recovery	35	63.6
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	9	16.4
Z	S&G implementation is non-discretionary	2	3.6
X	S&G is a heading	6	10.9
Total		55	100 %

Standards and Guidelines 1432, 1445, 1455, 1458, 1468, 1476 and 1508 are all related to the fuels treatment for fire risk abatement. All these S&Gs direct the Forests to use prescribed fire as a tool for fire risk abatement as well as thinning and other fuels management activities. Potential short-term effects include those associated with ground disturbance (i.e., sedimentation) as well as those from the fire itself. See previous discussions under the Fire Management Programs for discussion of those effects. Although the implementation of all of these S&Gs will have short-term effects from using prescribed fire, there will be a long-term beneficial effect in the reduced risk of catastrophic wildfire

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as the trespass of livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are

declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the American Fisheries Society (AFS) adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, that statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the Apache trout, the environmental baseline for the action area, all the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Apache trout. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the Apache trout from the implementation of the Apache-Sitgreaves, Coronado, and Kaibab NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- The environmental baseline for the Apache trout has improved since the time of listing, due in part to proactive action by the Forest Service to protect the species.
- The Forest Service has implemented and continues to maintain many projects to protect and recover the trout. These include the following:
 - The Apache-Sitgreaves NF, which has the most populations of Apache trout, has accomplished various efforts since 1982, including protecting over 51 mi (82 km) of stream courses from livestock grazing through the following practices: livestock exclosures- 32.2 mi (51.8 km); no permitted grazing until livestock exclosures are completed on 13.2 mi (21.2 km); and pasture retirement that includes 5.6 mi (9.0 km).

- The Apache-Sitgreaves has implemented watershed restoration activities including riparian planting of 6 mi (9.7 km) of stream, road closure and reseeding 80 mi (129 km), and spring protection (over 25 springs).
- Instream habitat improvements implemented by the Forest Service in the late 1980s into the 1990s, include over 200 rock and wood structures (U.S. Forest Service 2004). Construction of new barriers, maintaining all barriers, coordinating with the AGFD on the removal of non-native fish, and habitat and population inventories have been the focus of recovery actions for the past decade.
- There are several S&Gs within the Apache-Sitgreaves, Coronado and Kaibab LRMPs that support the conservation and recovery of Apache trout. These are, S&Gs 4, 19, 21, 22, and 150 within the Apache-Sitgreaves LRMP; S&Gs 633, 709, 719, 724, 791, and 800 within the Coronado LRMP; and S&Gs 960 and 1035 within the Kaibab LRMP. Most of these S&Gs guide the Forest to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species. Standard and Guideline 22 guides the Apache-Sitgreaves NF to carry out the appropriate management activities outlined in the Apache Trout Recovery Plan. In addition, S&G 150 guides the Forest to manage waters to perpetuate Apache Trout in order that this species can be delisted from the endangered category. Standard and Guideline 828 within the Coronado LRMP guides the Forest to manage to maintain habitat for Apache trout.

Although several S&Gs may cause lethal or sublethal responses to the Apache trout and result in take of individuals, implementation of these S&Gs would not cause jeopardy to the species because the improving baseline, together with the implementation of the beneficial S&Gs outlined above should continue to improve habitat conditions and increase populations of Apache trout on National Forest System lands in the southwest. For these reasons the FWS concludes that the proposed action is not likely to jeopardize the Apache trout.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA

provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of Apache trout is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Coronado, and Kaibab NFs LRMPs. On the Apache-Sitgreaves NF, take in the forms of harm and harassment is expected from the Engineering, Forestry and Forest Health, and Wildlife programs. On the Coronado NF, take in the forms of harm and harassment is expected from the Forestry and Forest Health, Rangeland Management, and Watershed Management programs. On the Kaibab NF, take in the form of harm is expected from the Watershed Management Program. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support Apache trout.

The FWS anticipates, however, that incidental take of Apache trout will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, the FWS uses the number of extant populations on National Forest System lands to identify when take has been exceeded. The FWS concludes that the incidental take of Apache trout will be considered to be exceeded if, after a period of two consecutive years, there is a loss of any one population (recovery stream) on National Forest System lands as a result of the proposed action. The two-year period begins on the date the biological opinion is signed, and will be replicated every two years thereafter for the life of the biological opinion.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Apache trout. The continued implementation of the 11 LRMPs for the Southwestern Forests accomplished through the implementation of the S&Gs as analyzed within this opinion indicates that most S&Gs are positive for T&E species and although there are some S&Gs that could cause adverse effects there are other S&Gs that minimize those effects. If the S&Gs are implemented as written, the risk of jeopardy at this programmatic level is unlikely. In the past, jeopardy opinions may have been issued at the project level. Those were a result of the proposed action not following the Forest plans.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Apache trout:

1. Protect Apache trout on National Forest System lands.
2. Protect Apache trout habitat on National Forest System lands.
3. Monitor Apache trout populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the US Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Apache trout populations for conditions to eliminate direct affects and minimize indirect effects to Apache trout and its habitat.
- 1.2 Design projects within the Engineering, Forestry and Forest Health, Rangeland Management, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the Apache trout.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and presence of non-native fish species within Apache trout habitat.

The following term and condition will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Apache trout habitat to incorporate appropriate components of the Apache Trout Recovery Plan with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the Apache trout and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Apache trout populations on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Apache trout, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this

information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. In cooperation with AGFD, NMDGF, and FWS, remove all non-native species affecting the Apache trout and take measures to prevent reoccurrence of non-native species into Apache trout habitat.
2. The Forest Service should renovate more streams to improve habitat for Apache trout.
3. Populations of Apache trout should continue to be replicated into streams that are geographically separate to ensure that natural or human-induced disasters do not extirpate the populations.
4. The Forest Service should implement the Apache Trout Recovery Plan.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

CHIHUAHUA CHUB

STATUS OF THE SPECIES

Description

The Chihuahua chub (*Gila nigrescens*) was first discovered in 1851 by J.H. Clark in the Mimbres River of New Mexico and by B.C. Kennedy in the Rio Casas Grandes of Mexico. The chub can be described as a medium-sized fish (5-6 inches in length) belonging to the minnow family (Cyprinidae). Coloration ranges from dusky brown above to whitish below. During the breeding season, an orange-red color develops around the mouth and lower fins, with more colorful individuals developing this coloration on the pelvic and pectoral fins and lower sides of the head and body. Typical habitat for the chub are pools (3 ft in depth) or small to medium sized streams with associated cover such as undercut banks, submerged trees, or shrubs.

Legal Status: In 1983, the FWS listed the Chihuahua chub as a threatened species under the ESA, as amended, without critical habitat designated. In 1976, the Chihuahua chub was listed as endangered by New Mexico and is considered threatened by the Republic of Mexico. Additionally, the AFS considers the Chihuahua chub a threatened species (Williams et al. 1989).

Distribution and Abundance

Historically, the chub is native to the Mimbres River drainage in New Mexico and the Guzman and Laguna Bustillos basins in Chihuahua (Smith and Miller 1986). Currently, the chub is found in about 12 miles of the Mimbres River from Allie Canyon downstream to the NMDGF property south of Mimbres, New Mexico. The Nature Conservancy has acquired the Archuleta/Moreno Spring near the Mimbres River, which is inhabited by the chub. These springs are the stronghold for the Chihuahua chub (D. Propst, NMDGF, 2004, unpublished data). On National Forest System lands (Gila NF), chub occur in a short segment of McKnight Creek below a fish passage barrier.

Habitat

Currently, the Chihuahua chub is found only in McKnight Creek and the Mimbres River. The Mimbres drainage is a closed river system of southwestern New Mexico. Historically, the Mimbres River drained into the Guzman basin, also a closed river system, which drained mainly into northern Chihuahua, Mexico. Perennial flowing water of the Mimbres River lies in two discrete segments and is separated by about 7 mi (11 km) of normally dry river bed. One segment occurs in the headwaters of the drainage, where the water continues to flow for about 3 mi (5 km) before it disappears underground. Antisell (1857) characterized the terminus of the Mimbres as being a series of pools and lagoons surrounded by dense thickets of willows (*Salix* spp.). At this time, the Mimbres was said to have been up to 2.5 ft (0.76 m deep), with a summer flow of 3.6 ft/s (4 km/hr). By the late 1800s, the river became wider and shallower, largely due to improper livestock grazing (Boles and Dick-Peddie 1983). Currently, the terminus of the Mimbres is usually dry, with measurements averaging 13 ft (4 m) wide and less than 1 ft (0.3 m) in depth at high water. Diversions, uneven flow, flooding, and repeated stream modifications by local landowners have significantly reduced the quantity of water and the conditions first described by Antisell (1857). Within current times, water from the Mimbres River has never reached Lake Guzman (Sublette et al. 1990).

Waters inhabited by Chihuahua chub are comprised of deep pools associated with undercut banks (Sublette et al. 1990) or overhanging vegetation which provides cover and foraging habitat (U. S. Fish and Wildlife Service 1986). Occupied pools are 3.28-6.56 ft (1-2 m) deep with water velocity ≤ 0.49 ft/sec (15 cm/sec) (Propst 1999). The pools are located adjacent to runs with flows ≥ 1.97 ft/sec (60 cm/sec) and downstream from cobble-bottomed riffles (Propst 1999). Substrate in the pools occupied by Chihuahua chub is typically pea-gravel and sand (Propst 1999).

Life History

Little is known of the reproductive biology of the Chihuahua chub. However, Propst and Stefferud (1994) suggest that the spawning season for the chub could extend from early spring through autumn over its entire range. In New Mexico, spawning occurs from spring to summer, eggs are probably scattered randomly over sandy or silt substrates, with young likely to occupy quiet backwaters (New Mexico Department of Game and Fish 1988). Chihuahua chub likely mature at age two or three in captivity (Propst 1999) and can live up to seven or eight years (U.S. Forest Service 2004:256), whereas the lifespan of wild chub ranges between four and five years (Propst and Stefferud 1994). Feeding behavior of the chub consists of consuming terrestrial insects, aquatic invertebrates, and some fish and vegetation (Sublette et al. 1990).

The Chihuahua chub has declined substantially in abundance and range (Miller and Chernoff 1979, Propst and Stefferud 1994). Until 1975, it was believed to have been extirpated from New Mexico (Koster 1957, Rogers 1975). Currently, Chihuahua chub population numbers are typically less than 300 adults in its current range (Propst 1999). However, it was reported to FWS that chub populations have remained stable at 200 to 300 individuals (D. Propst, NMDGF, 2004, unpubl. data).

Reasons for Listing

The Chihuahua chub was listed as threatened on October 1, 1983 (U.S. Fish and Wildlife Service 1983). The decline of the chub in the Mimbres River is primarily related to habitat modification or loss. Improper grazing, irrigation diversion, stream modification (channelization and levees), and poor watershed conditions causing severe flooding and loss of riparian vegetation have been identified as causes leading towards the loss of chub habitat (U.S. Fish and Wildlife Service 1986).

Threats: Habitat loss and modification is the primary threat to the Chihuahua chub in the Mimbres River. Historically, the Mimbres River was described as a relatively deep (2.5 ft or 0.76 m), slow moving river with a series of pools or lagoons at its terminus, bordered with thickets of native willows (*Salix spp.*) (Anistel 1857). Today river conditions have been drastically altered through numerous diversions and stream modifications, reducing both the quantity of water in the river and the quality of its adjacent riparian habitat. Additionally, ash flows from recent wildfires in the Mimbres River drainage have reduced riverine chub populations (Propst 1999) by modifying water chemistry and increasing sedimentation. The presence of the parasitic yellow grub (*Clinostomum complanatum*) in Moreno Springs is a threat (Propst 1999) due to the possibility of reduced survival caused by excessively infected fish.

Conservation Measures

The NMDGF purchased property on the Mimbres River specifically to provide and protect habitat for the Chihuahua chub (Propst 1999). The Nature Conservancy has also purchased properties with a combined 3.1 mi (5 km) stretch of the Mimbres River occupied by Chihuahua chub (Propst 1999). In 1994, The Nature Conservancy created the Mimbres River Preserve by purchasing a significant area of the remnant chub habitat as part of a Natural Lands Protection Act project. Conservation strategies have been implemented to maintain and enhance the fish population and also to provide access to visitors.

Cooperative efforts have been made by the FWS, Forest Service, and NMDGF personnel to increase the range of Chihuahua chub in the Mimbres River. McKnight Creek on the Gila NF was stocked downstream from a fish barrier with Chihuahua chub from Dexter National Fish Hatchery and Technology Passage Center (Propst 1999). The goal of Chihuahua chub captive propagation is to supplement current populations and expand the occupied range in New Mexico (U.S. Forest Service 2004:258). However, stocking efforts have not occurred in McKnight Creek since 2001 (J. Brooks, FWS, 2005, unpubl. data) It is vital to the survival of the Chihuahua chub to continue collaborative efforts to supplement chub populations within its native and historical range.

The Gila NF has excluded livestock grazing from the entire upper Mimbres River drainage in order to improve watershed conditions, which indirectly provides protection for both the Gila trout and the Chihuahua chub. Two additional areas have been identified for potential reintroduction sites on or near the Gila NF. They include the upper Mimbres River and perennial waters of East Canyon (U.S. Forest Service 2004:258).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The Gila NF encompasses the majority of the historic range of the species in the U.S. Within the action area, Chihuahua chub occur in McKnight Creek below a fish passage barrier for Gila trout. McKnight Creek was first stocked in October 1992 with approximately 450 4-7 inch Chihuahua chub adults. McKnight Creek was identified for chub stocking efforts by the Recovery team because it is one of two areas with a perennial water source on the Gila NF that drains into the Mimbres River (D. Propst, NMDGF, 2005, unpubl. data). Subsequently, in April 1993, four chub were sampled in good condition in the McKnight Creek stretch. However, in March 1997, the reach was sampled again and no chub were found (J. Monzingo, Forest Service, 2005, unpubl. data). Although habitat found in McKnight Creek may not be optimal for Chihuahua chub, deterioration of the chub population in this area may be a result of concentrated ash, sediment, and debris flow stemming from the 1996 Pigeon Wildfire in the upper watershed

of the Mimbres River (D. Propst, NMDGF, 2005, unpubl. data). In 2000, a performance report for a Section 6 grant (Conservation of Chihuahua Chub) was submitted by the NMDGF to FWS. In May 2000, five Chihuahua chub were collected in McKnight Creek downstream of the fish passage barrier and were found to be 140-165 mm in total length and 25.5-55 g in mass (D. Propst 2000). In 2001, three chub were collected by the NMDGF in McKnight Creek below the barrier. Habitat was characterized as consisting of several pools and overhanging willows (J. Brooks, FWS, 2005, unpubl. data).

In 1975, a small reproducing population was found in Moreno Spring (Propst 1999), which is located off Gila NF lands but is directly downstream of the forest. Chihuahua chub are reported to occur regularly at Moreno Spring, and irregularly along an approximate 9.3 mi (15 km) reach of the Mimbres River from Allie Canyon southward to the NMDGF property south of Mimbres, New Mexico (Propst 1999).

Factors Affecting the Species within the Action Area

Management activities conducted by the Gila NF that could affect Chihuahua chub within the action area include wildland fire use, recreation, and off-highway vehicle use. Additionally, riparian habitat fragmentation could result from such activities. Grazing effects to the species should be minimal because the Gila NF has excluded grazing from the entire upper Mimbres River drainage.

EFFECTS OF THE ACTION

Within the Southwestern Region of the Forest Service, the Chihuahua chub only occurs on the Gila NF. Although it is difficult to quantify population numbers for Chihuahua chub on the Gila NF, it is likely that the majority of individuals occur in stream reaches off Gila NF lands, where all existing U.S. populations occur within 20 stream km of the Gila NF boundary. However, it is estimated that about 74 percent or 152,811 acres (61,841 ha) of the watershed that drains into Chihuahua chub occupied habitat occurs on the Gila NF (U.S. Forest Service 2004:258).

Table 91. Summary of S&Gs considered for the Chihuahua chub.

National Forest	Standards and Guidelines
Gila	840, 841, 842, 844-851, 854, 857-876, 878, 880, 881, 948, 950, 952-954
1996 Regional Amendment	1425-1428, 1432, 1434, 1436, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1486-1492, 1495, 1499-1501, 1504-1515

Gila National Forest

Table 92 below provides a summary of the effects of S&Gs analyzed for the Chihuahua chub on the Gila NF. There are 31 applicable S&Gs that maintain habitat or provide at least minimal recovery to the species. Those applicable S&Gs either work towards maintaining current riparian conditions or towards improving riparian conditions to a satisfactory level. Several of these S&Gs also point towards improving and/or maintaining watershed condition. If implemented, those S&Gs that are directed at improving or maintaining habitat will circumvent

further habitat loss and modification, which is the primary threat to the Chihuahua chub in the Mimbres River. Additionally, there are six S&Gs that implement the Chihuahua chub recovery plan.

Table 92. Effects of the S&Gs analyzed for the Chihuahua chub-Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	2.5
1	S&G is maintaining habitat & providing at least minimal recovery	31	77.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	6	15.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	5.0
X	S&G is a heading	0	0.0
Total		40	100 %

Engineering Program

Only one forest-wide S&G is applicable to the Chihuahua chub within this program. Standard and Guideline 842 is specific to non-wilderness riparian areas and new road construction. This is a positive S&G which maintains and improves riparian habitat chub populations located in non-wilderness areas.

Fire Management Program

Potential effects from fire were not listed as a threat to the Chihuahua chub within the 1986 Recovery Plan. However, since the formulation of the plan, fire has been identified as a major threat to the species (Propst 1999). Based on the resulting effect of the Pigeon Wildfire of 1996 that occurred in the upper watershed of the Mimbres River, Propst (1999) included fire among the threats to the chub due to ash, debris, and sediment flows produced by post-fire rains that resulted in direct mortality of many chub for several miles downstream (U.S. Forest Service 2004:260).

Standard and Guideline 845 states that decisions to use prescribed fire in wilderness shall not be based on benefits to wildlife, maintenance of vegetation types, improvements [to] forage production, or enhancement of other resource values. It states that these can be additional benefits that can result from a decision to use prescribed fire, but are not objectives for managing fire in wilderness. Regional trends associated with wildland fire use and prescribed fire vary yearly due to available funding and climatic conditions. Prescribed fire use appears to be increasing and will continue increasing in order to reduce high fuel loads and threats to communities/private property at the WUI (U.S. Forest Service 2004:260). Forest-wide trends associated with fire management on the Gila NF suggest that threats to the chub from the risk of

high severity burns will be reduced (U.S. Forest Service 2004:260). If forest-wide trends on the Gila NF for fire management prove to be true in the long-term, only short-term adverse effects to the Chihuahua chub will result and the risk of catastrophic wildfires will be reduced. Although most applicable fire management S&Gs provide guidance that seeks to minimize the amount of high severity burns forest-wide, conditions currently exist in parts of the upper Mimbres River watershed that could lead to intense fires and high severity burns given the appropriate combination of conditions (U.S. Forest Service 2004:260). Additional concern arises due to potential concentrated ash, debris, and sediment flows that may affect downstream chub populations and habitat. Thus, management direction provided in the Fire Management Program is likely to have a short-term adverse effect on the Chihuahua chub.

Standard and Guideline 874, which is listed under the Watershed Management Program, allows fire rehabilitation to protect water resources from losses and to prevent unacceptable downstream damage. This S&G could minimize the effects from concentrated ash, debris, and sediment flow to downstream chub populations. Additionally, S&Gs 844 and 865 could reduce downstream impacts from S&G 845.

Forestry and Forest Health Program

Only one Management Area S&G is applicable to the Chihuahua chub within the Forestry and Forest Health Program. Management Area S&G 954 limits forage utilization to 10 percent in the upper Mimbres and McKnight Creek drainages. Improper livestock grazing has been identified as a threat to the species existence (U.S. Fish and Wildlife Service 1986) and is influenced by National Forest management. However, limiting forage utilization is an indirect positive S&G for the chub and its habitat; grazing has been precluded from the upper Mimbres River drainage (U.S. Forest Service 2004:258).

Lands and Minerals Program

Within this program, only one non-wilderness forest-wide S&G is applicable to the Chihuahua chub. Standard and Guideline 854 allows acquisitions of fee lands within wilderness areas and lands containing threatened and endangered species. This is considered as a positive S&G for the chub and its habitat.

Rangeland Management Program

Standard and Guideline 858 allows grazing in riparian zones to be managed so as to provide maintenance and improvement of these areas, and guides the Forest to manage for maintenance of current conditions or improve conditions to a satisfactory level. This S&G still allows for grazing within riparian areas. Thus, although beneficial in the long-term, this S&G has the potential for short-term behavioral effects associated with habitat degradation. However, grazing effects to the Chihuahua chub are unlikely to occur because the Gila NF has excluded livestock from the entire Mimbres River Drainage.

Recreation, Heritage, and Wilderness Program

Potential effects stemming from OHV use was not considered a threat to the Chihuahua chub when the 1986 Recovery Plan was developed. However, indirect effects associated with OHV use may result in damage to riparian vegetation. Off-highway vehicle use is prohibited only from research natural areas, wilderness, or those areas identified the Amendment #1 (U.S. Forest

Service 2004:260). Standard and Guideline 857 addresses OHV prohibition in research natural areas. Two riparian areas in the upper Mimbres have been closed to off-highway vehicle use and include approximately four mi (6.5 km) in the Mimbres River and Powderhorn riparian zones (U.S. Forest Service 2004:260). Additionally, S&G 859 states that recreation use in riparian areas will be managed to avoid damage to riparian resources; however, it does not mention complete prohibition of OHV use in riparian zones. Standard and Guideline 859 only states that damage will be avoided, but it doesn't fully eliminate the possibility of damage; therefore, a potential for adverse effects to chub populations in downstream reaches exists.

Watershed Management Program

There are several applicable S&Gs (860, 861, 862, 863, 864, and 873) that work towards improving watershed/riparian conditions. Standard and Guidelines 874 and 875 are addressed in the Fire Management Program section.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 848 states that within the first decade all riparian areas will be completely classified and inventoried and all unsatisfactory riparian areas will have completed action plans to improve these conditions. "Satisfactory conditions" are further explained in the S&G and are represented as percentages of "natural" conditions. Standard and Guideline 848 goes on to state that all riparian areas will be improved to satisfactory or better condition by the year 2030, with 25 percent of all riparian areas in "satisfactory condition" by the year 2000. Habitat loss and modification is the primary threat to the Chihuahua chub in the Mimbres River. The time frame stated by S&G 848 to improve riparian areas is quite lengthy. Additionally, the percentage designated by S&G 848 may not adequately represent suitable chub habitat. However, since this S&G is working towards improving riparian areas, it is considered to have a long-term positive effect on the chub and its habitat. However, unsatisfactory riparian conditions are likely to have adverse effects to the chub. Therefore, management direction provided in the Wildlife Program is likely to have a short-term adverse effect on the Chihuahua chub.

Several S&Gs (840, 841, 842, 846, 847, 850, 851, 880) place emphasis on riparian management and riparian dependant resources. Other S&Gs for this program (868, 871, 953) are positive for threatened and endangered species in general. Standard and Guideline 878 specifically addresses non-native species management on the Gila NF, which is an objective stated in the 1986 recovery plan. Six S&Gs (869, 870, 872, 881, 948, and 952) contain language that specifically points to implementing species recovery plans.

In summary, on the Gila NF, our effects analysis shows take of the Chihuahua chub is reasonably certain to occur from the Fire Management and Wildlife programs.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. These S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Most of the applicable S&Gs within the 1996 Regional Amendment maintain habitat and provide minimal recovery for the Chihuahua chub. Further, we found that the

guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 93. Effects of the S&Gs analyzed for the Chihuahua chub - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	30	58.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	15.7
Z	S&G implementation is non-discretionary	2	3.9
X	S&G is a heading	6	11.8
Total		51	100 %

Of the 51 S&Gs applicable to the species, 31 provide at least minimal recovery or habitat maintenance, mostly by reducing indirect upland effects and improving watershed condition. Important S&Gs are 1473, 1477, and 1510. Standard and Guideline 1473 applies directly to riparian areas and states that healthy riparian ecosystems will be emphasized within LRMP S&Gs, so as to avoid damage to riparian vegetation, stream banks, and channels. Standard and Guideline 1477 states all National Forests in the Basin and Range-West Mexican Spotted Owl recovery units (i.e., Apache-Sitgreaves, Coronado, Gila, Prescott, and Tonto NFs) emphasize the restoration of lowland riparian habitats. Standard and Guideline 1510 allows National Forests to maintain grazing at or above conditions assuring recovery and the continued existence of threatened and endangered species.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Chihuahua chub occurs in about 10 to 12 miles of Mimbres River in New Mexico. On National Forest System lands, the chub occurs on a small portion of land located in the upper Mimbres River at McKnight Creek. Downstream from Gila NF lands, The Nature Conservancy and the NMDGF own about three to four miles of chub habitat. Riverine populations of chub are maintained by both entities and no habitat destruction occurs in this stretch of river. The rest of chub habitat (downstream from federally-owned lands) is privately owned. However, the NMDGF is trying to acquire about one mile of the Mimbres River drainage and its water rights from a private landowner (D. Propst, NMDGF, 2004, unpubl. data). On the privately-owned

areas of the Mimbres River, much of the natural stream configuration of the river has been extensively altered due to severe flooding. Actions taken to prevent flood damage to private property have resulted in a straight, shallow, levee-lined channel. Currently, The Nature Conservancy and the NMDGF are working with local landowners to reverse some of the damages (D. Propst, NMDGF, 2004, unpubl. data). Additionally, grazing may occur on the privately-owned stretch of river (Allie canyon to the town of Mimbres).

CONCLUSION

After reviewing the current status of the Chihuahua chub, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's opinion that the Gila NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Chihuahua chub. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS's non-jeopardy opinion is based on the analysis of the Gila NF LRMP S&Gs, as well as the 1996 Regional Amendment and their possible effects to the Chihuahua chub and its habitat. Our analysis of the Gila NF Plan determined that no activities authorized under the S&Gs would negatively affect Chihuahua chub so as to jeopardize its existence in the Mimbres River. The FWS reached this conclusion for the following reasons:

- The continued implementation of the Gila NF LRMP and 1996 Regional Amendment are not expected to result in further decline of the Chihuahua chub.
- The effects analysis shows no behavioral, sublethal or lethal effects to Chihuahua chub from S&Gs within the Gila NF LRMP and 1996 Regional Amendment.
- Conservation efforts by the Forest Service have included stocking chubs to increase the range of Chihuahua chub in the Mimbres River drainage through controlled (captive) propagation and augmentation of current populations continue.
- Property purchased on the Mimbres River specifically to provide and protect habitat for the Chihuahua chub by the NMDGF and The Nature Conservancy will continue to maintain and enhance chub populations and its habitat.

Therefore, with the implementation of these conservation efforts and the management direction provided by the Gila NF LRMP, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Chihuahua chub.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined

as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Chihuahua chub is reasonably certain to occur as a result of the continued implementation of the Gila NF LRMP, specifically within the Fire Management and Wildlife programs. However, the FWS anticipates incidental take of the Chihuahua chub will be difficult to identify because population numbers for chub in the upper Mimbres drainage within McKnight Creek are uncertain. In addition, finding a dead or impaired specimen is unlikely and losses may be masked by seasonal fluctuations in environmental conditions and fish population numbers. Therefore, it is not possible to provide exact numbers of Chihuahua chub that will be harassed, harmed, or killed from the implementation of the Gila NF LRMP. The FWS concludes that incidental take of Chihuahua chub will be considered to be exceeded if one self-sustaining population is no longer maintained on the Gila NF as a result of the proposed action.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Chihuahua chub. The majority of the S&Gs within the Gila NF LRMP were found to be beneficial to the Chihuahua chub and its habitat; therefore, the projects authorized under this plan should not further impact Chihuahua chub populations within the upper Mimbres watershed nor adversely affect downstream populations.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Chihuahua chub:

1. Protect Chihuahua chub on the Gila NF.
2. Protect Chihuahua chub habitat on the Gila NF.
3. Monitor Chihuahua chub populations on the Gila NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary. Fire management activities occurring on the Gila NF, particularly in the upper Mimbres River drainage, have potential to directly impact chub populations downstream. It is the FWS's position that fire-associated reasonable and prudent measures rank among the highest in priority for implementation by Forest Service personnel on the Gila NF because of the chub's highly restricted range and tenuous status/distribution in the Mimbres River.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Chihuahua chub populations for conditions to eliminate direct effects and minimize indirect effects to Chihuahua chub and its habitat.
- 1.2 Design projects within the Fire Management, Rangeland Management, Recreation, and Wildlife programs to minimize or eliminate adverse effects to the Chihuahua chub.
- 1.3 Continue efforts among the Forest Service, FWS, and the NMDGF to augment and maintain the chub population.
- 1.4 Develop a fire contingency plan in cooperation with FWS that includes pre-planning efforts to prevent adversely impacting the McKnight Creek population and downstream populations.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Chihuahua chub habitat to incorporate appropriate components of the Chihuahua Chub Recovery Plan with the goal of implementing projects that will have beneficial, insignificant, or discountable effects to the chub and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Chihuahua chub populations on the Gila NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Chihuahua chub, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Continue to increase and expand the Chihuahua chub range on Gila NF lands by evaluating habitats stocking in the Gallinas and East Canyon areas and Upper Mimbres River, and stocking Chihuahua chub if feasible.
2. Determine the suitability of stock tanks to support Chihuahua chub populations.
3. Collaborate with FWS, NMDGF, and others to implement needed research pursuant to the Chihuahua Chub Recovery Plan.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

DESERT PUPFISH

STATUS OF THE SPECIES

Description

The desert pupfish (*Cyprinodon macularius macularius*) can be described as a small, chubby, rounded cyprinodontid fish with a narrow body shape and dark vertical bars on its sides. Breeding males appear blue in coloration on their top and sides and exhibit yellow fins. Females and juveniles range from tan to olive in coloration on their backs with silvery sides.

The species was first described by Baird and Girard (1853) from specimens collected in the San Pedro River, Arizona and included two recognized subspecies, *Cyprinodon macularius macularius* and *Cyprinodon macularius eremus* and an undescribed species, Monkey Spring pupfish (*Cyprinodon* sp.) Based on genetics, morphology, color pattern, and geological history, both the desert pupfish (*C. macularius macularius*) and the Quitobaquito pupfish (*C. eremus*) are recognized as separate species (Echelle et al. 2000).

Legal Status: In 1986, the FWS listed the desert pupfish as an endangered species under the ESA of 1973, as amended. This listing includes both *C. macularius* and *C. eremus*. Additionally, the FWS designated critical habitat for desert pupfish in Imperial Valley, California, and Pima County, Arizona. A recovery plan for the species was established in 1993 and identifies downlisting criteria for the desert pupfish.

Distribution and Abundance

Historical distribution of desert pupfish in Arizona included the Gila, San Pedro, Salt, and Santa Cruz rivers, and likely the Hassayampa, Verde, and Agua Fria rivers. However, collections are lacking for the latter three drainages. The desert pupfish is also found in the lower Colorado River, Salton Sink basin, and Laguna Salada basin (Eigenmann and Eigenmann 1888; Garman 1895; Gilbert and Scofield 1898; Evermann 1916; Thompson 1920; Jordan 1924; Coleman 1929; Jaeger 1938; Miller 1943; Minckley 1973, 1980; Black 1980; Turner 1983; Hendrickson and Varela 1989; Echelle et. al 2000). Historic collections occurred in Baja California and Sonora, Mexico, and in the United States in California and Arizona.

The desert pupfish appears to go through cycles of expansion and contraction due to natural climatic variations (U.S. Fish and Wildlife Service 1986, 1993; Weedman and Young 1997). In very wet years, populations can rapidly expand into new habitats (Hendrickson and Varela 1989). However, historic times demonstrate that this scenario would have led to panmixia among populations over a very large geographic area (U.S. Fish and Wildlife Service 1993).

Presently, natural populations of desert pupfish are restricted in the United States to California within San Felipe Creek and its associated wetland, San Sebastian Marsh, upper Salt Creek, and a few isolated pools and irrigation drains along the Salton Sea (Lau and Boehm 1991). Within Mexico, the species is found at scattered localities along the Colorado River Delta and in the Laguna Salada basin (Hendrickson and Varela-Romero 1989, Minckley 2000). To date, no natural populations of desert pupfish exist in Arizona. However, in Arizona, 17 transplanted populations of the species exist in the wild, three of which are outside historic range for the

species (U.S. Fish and Wildlife Service 1993). Only two reestablished populations remain extant, Cold Springs and Lousy Canyon (Voeltz and Bettaso 2003).

Habitat

The desert pupfish occupies a diverse variety of habitats, ranging from cienagas and springs to small streams and portions of larger bodies of water. The desert pupfish can survive in a variety of habitats, specifically those habitats with harsh or extreme environmental fluctuations in oxygen, temperature, and salinities (Lee et al. 1981). Characteristic habitats include springs, marshes, flowing streams, and also backwaters and other complex, lateral habitats of large rivers (Minckley 1973). At present, desert pupfish persist on river deltas, typically in highly saline pools associated with the inflowing springs and seeps Minckley (1991). Typical habitats occupied by the species are shallow with soft substrates and clear water (U.S. Fish and Wildlife Service 1993).

Water regimes considered essential to the species include slow-moving desert streams and spring pools with marshy backwaters. These specific areas provide adequate food, cover, and more importantly, isolation or partial isolation from predators and competing non-native fishes (U.S. Fish and Wildlife Service 1986).

Critical Habitat: As described in the Federal Register (Vol.51, No. 61) on March 31, 1986, critical habitat for the desert pupfish satisfies all known criteria for the ecological, behavioral, and physiological requirements for the species. Designated critical habitat includes Quitobaquito Spring, Organ Pipe Cactus National Monument located in Pima County, Arizona, and portions of San Felipe Creek, Carrizo Wash, and Fish Creek Wash located in Imperial County, California. These areas include approximately one-half acre of aquatic habitat at Quitobaquito Spring with a 100-foot riparian buffer around the spring, and approximately 11 miles of stream channel along San Felipe Creek and two of its tributaries with a riparian buffer zone of 100-feet on both sides of the stream channel. Riparian buffer areas adjacent to both of these aquatic systems are also considered critical habitat due to potential impacts on aquatic habitat quality from these respective areas. No critical habitat occurs within National Forest Systems lands in New Mexico or Arizona; thus, critical habitat does not occur within the action area.

Life History

Spawning occurs from spring through autumn, but reproduction may occur year-round if conditions remain at a warm, constant temperature (Constanz 1981). Females produce a single, relatively large egg, but can repeat spawning in quick succession to deposit several more eggs. Depending on body size, a female pupfish can produce between 50 to 800 eggs per season (Constantz 1981). Eggs appear to be randomly deposited over loose, soft substrates within the territory of a given male. Males may exhibit territoriality by patrolling and defending their territories due to limited breeding habitat and high population densities.

The life span of an individual pupfish is highly variable, ranging from one to three years (Minckley 1973). Predation by aquatic insects, birds, and mammals is a likely source of mortality for the pupfish. The desert pupfish is an opportunistic omnivore that consumes invertebrates, algae, and organic debris (Minckley 1973, Naiman 1979).

Reasons for Listing

The desiccation of viable aquatic habitat through groundwater pumping, water impoundments, and diversions remains prevalent in both historic and current pupfish localities. These activities continue to promote the ubiquitous reduction and/or elimination of natural flow regimes necessary for pupfish viability.

Threats: According to the Recovery Plan, threats to the desert pupfish include habitat loss, habitat modification, pollution, and competition and predation from non-native fish. Since the 19th century, desert pupfish habitat has been steadily destroyed by streambank erosion, the construction of water impoundments that lead to dewatering of downstream habitat, excessive groundwater pumping, the application of pesticides to adjacent agricultural areas, and the introduction of non-native species (Matsui 1981, Hendrickson and Minckley 1985, Minckley 1985, Schoenherr 1988).

Another threat imposed upon the species includes the establishment of non-native fish species in pupfish-occupied habitat. Pupfish populations exhibit difficulty in the presence of non-native fishes, where invasions by these fishes have typically resulted in the decline or extirpation of the pupfish. Difficulties imposed on the pupfish by these non-native fish species include predation, aggression, and behavioral activities interfering with reproduction (Matsui 1981, Schoenherr 1988). Additionally, the non-native bullfrog may also prove problematic in the management of desert pupfish. The bullfrog is an opportunistic omnivore with a diet that includes fish (Frost 1935, Cohen and Howard 1958, Brooks 1964, McCoy 1967, Clarkson and deVos 1986).

Rising concern over introduced salt cedar (tamarisk) (*Tamarisk* spp.) adjacent to pupfish habitat remains high due to a lack of water at critical times (Bolster 1990; R. Bransfield, FWS, 1999, unpubl. data). Evapotranspiration from salt cedar growth may especially impact smaller habitats with limited water supply.

Conservation Measures

Critical habitat for the desert pupfish was designated at the time of listing in 1986. This designation is an official notification to all federal agencies of their responsibilities pursuant to Section 7 of the ESA within designated critical habitat.

Pima County, located in Arizona, is in the process of drafting a multi-species conservation plan to include the desert pupfish. The plan will consider actions to reduce negative impacts on the species, identify potential habitat, and promote re-establishment of the species through conservation and recovery actions.

A number of potentially viable sites have been identified by federal and state agencies that could potentially support desert pupfish. These sites have not been stocked, but several were evaluated.

Populations of pupfish at the FWS's Dexter National Fish Hatchery and Technology Center in New Mexico have also been used for reintroduction efforts in Arizona. Transplant sites included natural habitats, livestock watering tanks, constructed refugia, and aquaria under state, federal, or private ownership.

Additionally, the Arizona Department of Transportation has completed a Safe Harbor Agreement for the desert pupfish and the Gila topminnow (Arizona Department of Transportation 2000). This agreement covers all properties managed by Arizona Department of Transportation. Arizona Game and Fish Department is also developing a Safe Harbor Agreement with the FWS, which will allow desert pupfish and Gila topminnow populations to be established on non-federal lands. Implementation of this Safe Harbor Agreement will allow for the establishment of new populations and maintenance of genetic stocks and refugia populations in natural, semi-natural, or manmade habitats, which will aid in recovery efforts for the two species.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Extant populations of desert pupfish currently do not occur on the National Forest System lands. The desert pupfish failed to survive at location sites within National Forest boundaries. An effort to translocate populations to several locations on National Forest System lands failed due to a myriad of reasons unrelated to land management. The fish currently does not occur within the action area; however, near-future plans call for the re-introduction of desert pupfish to locations on the Tonto NF and possibly other National Forests in Arizona.

Factors Affecting the Species within the Action Area

The most-recent consultation regarding a National Forest's effects on the desert pupfish was the November 5, 2004, biological opinion on activities at Walnut Spring (spring maintenance, reestablishment of desert pupfish, continued use of a 10-year term permit to graze livestock on the surrounding Cross F Allotment, and other activities (02-21-95-F-0303 R1). This action is considered reasonably foreseeable to occur within the term of this biological opinion. The action included measures to reduce the adverse effects of livestock grazing on the Walnut Spring pond as well as measures to increase the volume of water entrained in the pond. The proposed action is expected to improve the condition under which Walnut Spring's Gila topminnow population has flourished for over 20 years and thus, help ensure the success of the desert pupfish reestablishment effort. The FWS anticipated that incidental take of desert pupfish, once reestablished, would be exceeded if the post-project pool depth was reduced to six inches or less, if said decline was due to cattle grazing or maintenance activities. Terms and conditions were prescribed to ensure maintenance and monitoring of the enclosure and new pond structures.

Until such time that desert pupfish are reestablished in Walnut Spring, the only two extant reestablished sites exist on BLM lands; Cold Springs along the Gila River near Safford, and Lousy Canyon in the Agua Fria drainage on the Agua Fria National Monument. The Cold Springs site is situated within BLM and downstream of San Carlos Apache Tribal trust lands. Lousy Canyon may be affected by downstream effects and is therefore, within the action area.

The Cold Springs and Lousy Canyon sites are managed by the BLM’s Safford and Phoenix field offices, respectively, and represent critical efforts in the recovery of the desert pupfish. Both sites appear stable, with Lousy Canyon being notable in containing an intact fish fauna of desert pupfish, Gila topminnow, and Gila chub.

EFFECTS OF THE ACTION

As stated above, the desert pupfish does not currently occur on National Forest System lands. However, we were requested by the Forest Service to analyze the LRMPs for this species because efforts to transplant fish to waters on the Tonto NF are currently underway. Additional efforts to establish populations may take place in the future on two additional Forests (i.e., the Prescott and Coronado NFs). As a result, our effects analysis addresses potential habitats available for reestablishment of pupfish. Designated critical habitat for the desert pupfish does not occur within the action area; thus, no critical habitat for this species will be affected as a result of the proposed action.

Table 94. Summary of S&Gs considered for the desert pupfish.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-638, 644, 645, 648-653, 666-678, 672-682, 692-698, 700, 703-713, 774, 777-780, 782-786, 788-792, 794-800, 802-805, 807, 808, 810-812, 827
Prescott	1115-1138, 1142-1163, 1165-1167, 1169-1176, 1178-1182
Tonto	1340-1342, 1344, 1345, 1348-1350, 1352-1357, 1359, 1361-1368, 1371, 1373-1378, 1382, 1384-1386, 1391-1393, 1398-1403, 1407, 1410, 1416-1418, 1420-1423,
1996 Regional Amendment	1497, 1498, 1510-1515

Coronado National Forest

Although the desert pupfish currently does not occur on the Coronado NF, the FWS analyzed the effect of the S&Gs on the pupfish at the request of the Forest Service. The FWS ranked several S&Gs for the Coronado NF as potentially having a lethal or sublethal response to the desert pupfish if it were to occur on the Forest. One would cause a negative behavioral response. However, sixty-eight were found to maintain habitat and provide minimal recovery. Several S&Gs direct the Forest Service to move listed species towards recovery or implement recovery plans. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 95. Effects of the S&Gs analyzed for the desert pupfish – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.0
-2	S&G is causing sublethal response	3	2.9
-1	S&G is causing negative behavioral response	1	1.0
0	S&G is ill-defined and/or open to interpretation	13	12.6

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	68	66.0
2	S&G is moving towards recovery	6	5.8
3	S&G is implementing species recovery plan	7	6.8
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	2	1.9
Total		103	100 %

Fire Management Program

Standard and Guideline 695 guides the Forest to conduct fire suppression activities in a way that will protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Many S&Gs (713, 789, 812) allow the Forest to use prescribed fire to reduce fuel hazards, enhance wildlife values, and enhance visual resources. All three of these S&Gs are the same for different management areas. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standard and Guideline 697 allows the Forest to use chemicals within guidelines approved by other agencies for the following purposes: insecticides and rodenticides in recreation areas and administrative sites. Pesticides (i.e., insecticides) are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already

small population as those characterized by an endangered or threatened species (Pattee et al. 2003).

Rangeland Management Program

Standard and Guideline 762 guides the Forest to manage suitable rangeland at Level A (no livestock), Level B (some livestock), Level C, and Level D within MA3. The following acres were provided within this S&G: 716 acres in Level A; 4,840 acres in Level B; 2,395 acres in Level C; and 6,821 acres in Level D.

This S&G continues to allow the Forest to, “manage livestock numbers so that livestock use is within present grazing capacity. Improvements are constructed to the extent needed to protect and maintain the other resources in the presence of grazing. Riparian areas in Cave Creek are grazed only during period November 1 to June 30. No grazing in Madera Canyon and Carr Canyon Reef Area.” The following projected acres of range condition were provided: 14,181 acres within satisfactory range condition and 591 in unsatisfactory range condition for both the first and fifth decade. This implies that no change in the number of acres of unsatisfactory condition will occur over a period of 50 years. Unsatisfactory range conditions may contribute to unhealthy watersheds resulting in adverse effects to the species.

This S&G states that suitable rangeland could be managed at any one of several different levels from Level A to Level D. Livestock management activities on the Coronado NF can have indirect effects, through upland/watershed effects on riparian and aquatic habitats. As stated in the Recovery Plan, one of the primary threats to desert pupfish is habitat deterioration. Although the pupfish does not currently occur on the Coronado NF, these watersheds contain historic habitats and occur upstream of occupied habitat.

Watershed Management Program

Standard and Guideline 678 discusses aquatic resources and states the following: (1) maintain at least 80 percent of natural shade over water surfaces in fish bearing streams; (2) maintain at least 80 percent of natural bank protection; and (3) maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G provides guidance for management of the riparian resources. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species, were it present, may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 677 states that the Forest will complete classifications and inventories of all riparian areas and complete action plans to improve all unsatisfactory riparian areas by the end of the first time period. In addition, this S&G states that the Forest will improve all riparian areas to satisfactory or better condition by the end of Period 5 and that 25 percent of all riparian areas must be in satisfactory condition by Period 2.

Although S&G 677 is definitely beneficial as it is moving toward satisfactory riparian conditions, there may be some short-term adverse effects that could be occurring and may continue to occur until such a time as that riparian habitat reaches satisfactory conditions.

Many S&Gs discussed restoration of damaged watersheds so that they obtain satisfactory conditions. For instance, S&G 711 directs the Forest to restore to satisfactory watershed condition, on an emergency basis, watersheds or portions of watersheds when damaged but that watershed treatment is a low priority in this Management Area. Standard and Guideline 711 further states that water and soil resource improvements may consist of channel stabilization and that revegetation efforts will use native or non-native species. Similar guidance is contained within 782, 784, 794, and 807. All these S&Gs are similar but they are applied to different management units. They allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 667 directs the Forest Service to follow structural and nonstructural improvement guidelines intended to meet the specific wildlife habitat objectives as shown for each Management Area. They may not be applicable for every Management Area.

Nonstructural wildlife improvements include the following: (a) prescribe burn feasible areas on a 20-year cycle; (b) seed suitable wildlife forage species as needed in fuelwood and timber areas; (c) transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding; (d) revegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available); and (e) thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year.

Similarly, S&G 668 states that structural wildlife improvements will include the following: (a) construct water developments or potholes to accomplish 1 per section within 4 decades; (b) consider structural improvements and maintenance for threatened and endangered species as technology develops; (c) construct fish habitat improvement structures as needed for threatened and endangered species; and (d) fence riparian areas where prescribed by approved allotment management plans.

Standards and Guidelines 667 & 668 were ranked as activities that cause short-term adverse effects in order to achieve long-term positive effects; a net beneficial effect. S&G 667, allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may have short-term impacts on water quality in adjacent streams inhabited by desert pupfish. S&G 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish as well as indirect impacts to the habitat such as temporary alterations of stream flow, or short-term isolated increases in sediment entering the stream.

In summary, the Coronado NF had mostly positive S&Gs with regards to desert pupfish. Yet, if desert pupfish were to be reintroduced on the Forest, S&Gs within with the Forestry and Forest

Health Program (i.e., use of chemicals, such as pesticides) and Rangeland Management Program (i.e., grazing) may have lethal affects to the desert pupfish.

Prescott National Forest

The desert pupfish does not currently occur on the Prescott NF, however it was analyzed at the request of the Forest Service. The FWS found one S&G having a lethal effect and one having a sublethal effect if the species were to occur on the Forest. Over 50 of the S&Gs we analyzed maintain habitat or provide minimal recovery for the species if it were to occur on the Forest. Additionally, there were several S&Gs that were beneficial in the long-term but could have some short-term adverse effects were the pupfish to occur on the Forest.

Table 96. Effects of the S&Gs analyzed for the desert pupfish – Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.6
-2	S&G is causing sublethal response	1	1.6
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.8
1	S&G is maintaining habitat & providing at least minimal recovery	51	82.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.2
Y	S&G has no application to the species	1	1.6
Z	S&G implementation is non-discretionary	2	3.2
X	S&G is a heading	1	1.6
Total		62	100 %

Lands and Minerals Program

Standard and Guideline 1169 states that roads needed for private land access, special uses or mineral activities will be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use.

This S&G could potentially cause short-term adverse effects in the process of implementing an activity that will provide an overall beneficial effect to the landscape in the long-term. The effects of closing roads are discussed under the Engineering Program for the Coronado NF.

Rangeland Management Program

Standard and Guideline 1151 guide the Forest to maintain riparian communities by providing water for wildlife and livestock away from sensitive areas. Standard and Guideline 1154 directs the Forest to bring all grazing allotments to satisfactory management by the end of the first decade. Satisfactory management occurs on allotments where management actions are proceeding according to a schedule (i.e., within the Allotment Management Plan), which lead to fair or better range condition with upward trend. Acres of satisfactory management are the total full capacity acres for a complete allotment within a management area being operated satisfactorily. Acres of unsatisfactory management are the total full capacity acres for complete allotments within a management area being operated unsatisfactorily. These S&Gs (1151 and

1154) are positive management activities to manage livestock grazing and reduce adverse effects to the landscape in the long-term, however there may be short-term adverse effects associated with this management.

Standard and Guideline 1162 states that when using pesticides, avoid direct application to water. Do not mix or load chemicals near streams or wet areas. Pesticides (i.e., insecticides) are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e. non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee *et al.* 2003).

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1136 states that trail access is restricted to non-motorized use except where indicated on the Forest visitor maps and signed on the ground, and where discrepancies occur, on the ground signing will prevail. Once again this S&G is an attempt to minimize the effect of roads and trails on the landscape in the long-term. This action could mean a potential for some short-term adverse effects to this species.

Watershed Management Program

Standard and Guideline 1147 directs the Prescott NF to meet the following riparian standards in the Regional Guide for 80 percent of riparian areas by 2030 and to maintain at least 80 percent to the potential overstory crown closure of obligate riparian species. The S&G also directs the Forest to manage resources to create or maintain at least three age classes of woody riparian species with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings where site potential exists, and to maintain at least 80 percent of the potential stream shading along perennial cold-water streams. In addition, adequate emergent vegetation should be maintained to ensure compliance with the goals of the strategic plan and 80 percent of spawning gravel surface free of occlusive inorganic sediment should be maintained. Finally, the Forest is to maintain at least 80 percent of stream bank linear distance in stable condition. Retain snags in riparian areas that are not a safety hazard.

Standard and Guideline 1166 directs the Forest to minimize impacts to the soil and water resources in all ground disturbing activities and where disturbance cannot be avoided, provide stabilization and revegetation as part of the project. The S&Gs listed above provide guidance for management of the riparian resources and thus, appear to be intended to be positive for fish such as desert pupfish.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 1149 directs the Forest to cooperate with AGFD on population control of aquatic plants and undesirable fish species. In addition, this S&G permits fish stocking to meet state fisheries goals. For purposes of this analysis, the FWS assumes that fish stocking could include both native and non-native fish. Competition with non-native fishes is often cited as perhaps the major factor in the decline of desert pupfish. Populations now are drastically reduced due to the introduction of exotic predators and competitors (Minckley and Deacon 1968, Deacon and Minckley 1974, Schoenherr 1981 and 1988, Meffe 1985, Miller and Fuiman 1987). Desert pupfish are relatively intolerant of competition and predation and are easily displaced by introduced fishes (U.S. Fish and Wildlife Service 1993).

Tonto National Forest

The desert pupfish does not currently occur on the Tonto NF, however it was analyzed at the request of the Forest Service. The FWS found only one lethal S&G for this species if it were to occur on the Forest. The FWS found two that would cause a negative behavioral response if the implemented and if the desert pupfish were to occur on the Forest. Additionally, there were several S&Gs that were beneficial in the long-term but could have some short-term adverse effects if the pupfish occurred on the Forest.

Table 97. Effects of the S&Gs analyzed for the desert pupfish – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.9
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	2	3.8
0	S&G is ill-defined and/or open to interpretation	5	9.6
1	S&G is maintaining habitat & providing at least minimal recovery	40	76.9
2	S&G is moving towards recovery	1	1.9
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	2	3.8
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		52	100 %

Forestry and Forest Health Program

The Forestry and Forest Health Program seeks to maintain a sustainable timber program consisting of vertical and horizontal diversity while protecting the watershed, riparian areas, stream channels, and water quality (U.S. Forest Service 2004). Overall, the S&Gs within this

program have little effect on desert pupfish because the species generally occurs in habitats not affected by the implementation of S&Gs within this program.

With the above in mind, S&G 1400 guides the Forest to restrict tractor skidding to those areas that have sustained slopes of 40 percent or less in MA4D. Although this S&G restricts skidding to less than 40 percent slopes, this does not eliminate the possibility of sediment coming off the slope and entering the stream. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standards and Guideline 1398 says that timber sale road systems should be designed to minimize impacts on stream channels and water quality. In addition, roads should be located on slopes less than 60 percent and should have sustained gradients of less than eight percent and roads should not be located on unstable slopes where mass movement is likely to occur. Standard and Guideline 1401 states that skidding and hauling should be restricted to soil moisture conditions which do not cause excessive soil compaction, displacement, or puddling. Further, S&G 1403 directs the Forest to raise lead ends of logs when skidding to minimize gouging and to restrict skidding during wet weather if necessary to prevent watershed damage and to rehabilitate skid trails and landings when logging is completed (provide drainage, repair ruts and gullies, and seed if necessary). These are all actions to reduce the impacts of soil disturbing activities to the watershed in the long-term. However, if the species was present on the Forest, fish could be displaced or harmed from these activities.

Rangeland Management Program

Standard and Guideline 1376 allows the Forest to manage suitable rangelands at Level C and that rangeland in less than satisfactory condition will be treated with improved grazing management in MA2D. In addition, Standard and Guideline 1423 directs the Forest to manage suitable rangelands at Level D in MA6J, except South Thompson Mesa managed at Level A until the area returns to satisfactory productivity. Further, rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements and projected changes in range condition acreages will be as follows: satisfactory range condition - 44,664 acres (current) to 67,599 acres (decade 1); unsatisfactory range condition - 229,350 acres (current) to 206,415 acres (decade 1). In the event desert pupfish are reestablished on the Tonto, livestock grazing may need to be assessed for its affects on the species.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 1355 states that within all riparian areas, to rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80 percent of the potential overstory crown coverage. Natural regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas. While the intent of this S&G appears positive, it is not certain if 80 percent meets the needs of this species.

Standard and Guideline 1364 states that stream crossing approaches should avoid steep pitches and grades in order to prevent sedimentation and S&G 1365 states that where channel crossings are necessary, select an area where the channel is straight and cross the channel at right angles.

Again, while these S&Gs are meant to minimize resource damage, adverse affects to the desert pupfish may occur if the species were present on the Forest.

1996 Regional Amendment

There are no adverse effects to the desert pupfish from the implementation of the S&Gs within the 1996 Regional Amendment. All applicable S&Gs were determined to provide habitat maintenance or at least minimal recovery for the species. Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 98. Effects of the S&Gs analyzed for the desert pupfish – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as the trespass of livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to desert pupfish are similar to those described below. There are no additional cumulative effects occurring in either of the desert pupfish localities. Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, the statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the desert pupfish, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the desert pupfish if the species were to occur on National Forest System lands. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Designated critical habitat for the desert pupfish does not occur within the action area; thus, no destruction or adverse modification of critical habitat is anticipated. The FWS bases this conclusion on the fact that the desert pupfish does not currently occur on National Forest System lands and that many S&Gs specifically direct the Forest Service to implement recovery plans and/or to move towards recovery of listed species.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

If the desert pupfish occurred on National Forest System lands, adverse effects would be expected as a result of the continued implementation of the Coronado, Prescott, and Tonto NF LRMPs. On the Coronado NF, adverse effects may result from implementation of the Forestry and Forest Health, Rangeland Management, and Watershed Management programs. On the Prescott NF, adverse effects may result from the implementation of the Rangeland Management and Wildlife programs. On the Tonto NF, adverse effects may result from the implementation of the Forestry and Forest Health, Rangeland Management, and Recreation programs.

Although potential adverse effects to the desert pupfish have been identified for the programs described above, no pupfish currently occur on National Forest System lands. Therefore, no incidental take of desert pupfish is anticipated. However, if desert pupfish are reintroduced on National Forest System lands in the future, effects of the proposed action will be assessed in order to evaluate whether reinitiation of this consultation is needed

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue efforts to develop and implement reintroduction of the desert pupfish into suitable historic habitat on the Forests mentioned above.
2. Coordinate desert pupfish reintroduction efforts with the FWS and the AGFD.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

GILA CHUB

STATUS OF THE SPECIES

Description

The Gila chub is a moderately-sized, deep-bodied, darkly-colored cyprinid that typically attains a size of 150 mm (5.9 in) total length; females may exceed 200 mm (7.88 in) in length (Minckley 1973, Propst 1999, Rinne 1976, and Weedman et al. 1996). Gila chub occupy smaller streams, springs, cienegas and some artificial impoundments (Minckley 1973, Rinne 1975, and Weedman et al. 1996). Minckley (1973) describes them as highly secretive, usually found in deeper water or close to cover. Spawning may occur over beds of aquatic plants (Minckley 1973).

Legal Status: The Gila chub has been listed as a candidate since December 30, 1982 (U. S. Fish and Wildlife Service 1982), and was proposed for listing as endangered with critical habitat on August 9, 2002 (U. S. Fish and Wildlife Service 2002). Taxonomy of the *Gila* complex of the Gila River Basin has led to delays in recognizing the vulnerability to extinction of this species. In an August 3, 2004 settlement agreement, the FWS was directed to submit a final listing and critical habitat determination on the Gila chub by October 21, 2005.

Distribution and Abundance

Historically, the Gila chub was found in approximately 30 headwater streams of the Gila River basin in Arizona and New Mexico, and within the Santa Cruz and San Pedro River systems of Arizona and Sonora, Mexico (Miller and Lowe 1967; Rinne and Minckley 1970; Minckley 1973; Rinne 1976; DeMarais 1986; Bestgen and Propst 1989). The Gila chub is currently restricted to small isolated populations scattered throughout its historical range. Currently, it is thought to occur in Turkey Creek on the Gila National Forest in New Mexico. In Sonora, it was recently found in two cienegas near the headwaters of the San Pedro River. In Arizona, populations have been extirpated from Monkey Spring; Arnett, Cave, Fish, and Queen Creeks; San Simon, San Pedro, and Santa Cruz Rivers; and Post Canyon. Gila Chub are found in fewer than 15 streams in central and southern Arizona and are abundant at no more than 10 of these locations.

In Arizona, small remnant populations remain in several tributaries of the upper Verde, San Pedro, San Carlos, Blue, San Francisco, Agua Fria, and Gila rivers. The San Pedro River Basin has three extant populations in Redfield Canyon (Graham and Pima counties), O'Donnell Creek (Santa Cruz County), and Bass Canyon (Graham and Cochise counties). Reestablishment of Gila chub has been attempted in three Arizona sites; two are believed to be extant: Lousy Canyon and Larry Creek (Yavapai County). These two creeks are tributaries to the Agua Fria River and were stocked with 200 Gila chub from Silver Creek in July 1995. The third site, Gardner Canyon (Cochise County), was stocked from Turkey Creek (Santa Cruz County) with 150 Gila chub in July 1988. In May 1995, no Gila chub or any other fish were captured during sampling surveys in Gardner Canyon. Gila chub in Sabino Creek in the Santa Catalina Mountains were translocated to rearing facilities following the 2003 Aspen Fire, though some fish are known to have persisted through the post-fire flooding in that stream.

Eighty-five to 90 percent of Gila chub habitat has been degraded or destroyed, and much of it is unrecoverable (Minckley 1991). Only 29 extant populations of Gila chub remain; all but one is

small, isolated, and threatened. The current status of the Gila chub is poor and declining. Fifty-nine percent of the land supporting all of the extant populations occurs on BLM and Forest Service lands. Other ownership includes the San Carlos Apache Indian Tribe, Arizona State Land Department, the Audubon Society, The Nature Conservancy, and multiple private landowners.

Habitat

Gila chub commonly inhabit pools in smaller streams, springs, and cienegas, and can survive in small artificial impoundments (Miller 1946; Minckley 1973; Rinne 1975). Gila chub are highly secretive, preferring quiet, deeper waters, especially pools, or remaining near cover including terrestrial vegetation, boulders, and fallen logs (Rinne and Minckley 1991). Undercut banks created by overhanging terrestrial vegetation with dense roots growing into pool edges provide ideal cover (Nelson 1993). Gila chub can survive in larger stream habitat such as the San Carlos River and artificial habitats like the Buckeye Canal (Stout et al. 1970; Rinne 1976). Gila chub interact with spring and small stream fishes regularly (Meffe 1985), but adults are usually restricted to deeper waters (Minckley 1973). They are often found in deep pools and eddies below areas with swift current, as in the Gila chub habitats found in Bass Canyon and Hot Springs in the Muleshoe Preserve area along the western slopes of the Galiuro Mountains. Young-of-the-year inhabit shallow water among plants or eddies, while older juveniles use higher velocity stream areas and then retire to pools when adults (Minckley 1973, 1991).

Critical Habitat: Proposed Gila chub critical habitat reaches are defined in the proposed rule to list the species (U.S. Fish and Wildlife Service 2002) with linear endpoints and laterally as the stream at bankfull width including a 300-foot buffer on either side of the stream. Critical habitat includes tributaries of the Gila, San Francisco, San Pedro, Santa Cruz, Upper Verde, and Agua Fria Rivers in Cochise, Gila, Graham, Greenlee, Pima, Pinal, Santa Cruz, and Yavapai counties in Arizona and in Catron, Grant, and Hidalgo counties, New Mexico.

The specific biological and physical features, otherwise referred to as the PCEs, proposed as essential to the conservation of the Gila chub include, but are not limited to, the habitat components that provide: (1) perennial pools, areas of higher velocity between pool areas, and areas of shallow water among plants or eddies all found in small segments of headwaters, springs, or cienegas of smaller tributaries, (2) water temperatures for spawning ranging from 20 to 26.5°C (68 to 79.7°F) with sufficient dissolved oxygen, nutrients, and any other water-related characteristic needed, (3) water quality with reduced levels of contaminants or any other water quality characteristics, including excessive levels of sediments, adverse to Gila chub health, (4) a food base consisting of invertebrates, filamentous algae, and insects; (5) sufficient cover consisting of downed logs in the water channel, submerged large tree root wads, undercut banks with sufficient overhanging vegetation, and large rocks and boulders with overhangs; (6) habitat devoid of non-native aquatic species detrimental to Gila chub or habitat in which detrimental non-natives are kept at a level that allows Gila chub to continue to survive and reproduce (e.g., the Muleshoe Preserve and Sabino Canyon Gila chub populations are devoid of non-native aquatic species; however, the O'Donnell Canyon Gila chub population has continued to survive and reproduce despite the current level of non-native aquatic species present); and (7) streams that maintain a natural unregulated flow pattern including periodic natural flooding; if flows are

modified, then the stream should retain a natural flow pattern that demonstrates an ability to support Gila chub (U. S. Fish and Wildlife Service 2002).

Life History

In stable, spring-fed systems, reproduction of Gila chub may take place from late winter to early autumn, but the peak season in other areas occurs during late spring and summer (Minckley 1973). Most Gila chub become sexually mature in their second or third year (Griffith and Tiersch 1989). Optimal water temperature for spawning appears to be between 20 and 24°C (Griffith and Tiersch 1989). They feed mainly on aquatic and terrestrial insects, filamentous and diatomaceous algae (Minckley 1973), organic debris, and other fish (Griffith and Tiersch 1989, Rinne and Minckley 1991). They have been observed chasing Gila topminnow (Minckley 1969). The presence of gravel in the gastrointestinal tract suggests the Gila chub may be benthic feeders (Weedman et al. 1996). Adults feed primarily during the crepuscular hours, whereas the young can be observed feeding during daylight hours (Minckley 1973, Griffith and Tiersch 1989). No information is available on dietary feeding habits between size or age classes (NatureServe Explorer 2001).

Reasons for Proposed Listing

According to the proposed rule, the FWS states that Gila chub have been extirpated or reduced in numbers and distribution in the majority of its historical range (Minckley 1973, Weedman et al 1996). Where it is still present, populations are often small, scattered, and at risk from known and potential threats and from random events.

Threats: Continued degradation of habitat and non-native species are considered the major threats to Gila chub. The decline of this fish is due to habitat loss and invasion of nonindigenous fish species. Habitat loss has included past and current dewatering of rivers, springs, and cienegas; diversion of water channels; impoundments; regulation of flow; and land management practices. All of these activities have promoted erosion and arroyo formation and the introduction of predacious and competing nonindigenous fish species (Miller 1961, Minckley 1985).

The presence of green sunfish (*Lepomis cyanellus*) in areas occupied by Gila chub or within the watershed presents a considerable threat to several populations. Green sunfish have been observed to affect recruitment of Gila chub (Dudley and Matter 2000). Predation on young-of-year Gila chub by green sunfish is probably greatest during times of drought when available habitat is reduced to a few pools (Dudley and Matter 2000). Meffe (1984, 1985) found that downstream displacement of mosquito fish (*Gambusia affinis*) occurred during severe flooding, while native Gila topminnow (*Poeciliopsis occidentalis*) was not displaced. Similar displacement of green sunfish did not appear to take place disproportionately as a result of flooding in Sabino Canyon during the early 1990s (Dudley and Matter 1999). However, the Aspen Fire threatened this population in July 2003 and subsequent months due to post-fire runoff. Nine-hundred and forty nine individuals were salvaged and held at several facilities to be returned when conditions become suitable after the effects of the fire had dissipated (U.S. Forest Service 2004).

Conservation Measures

Although the Gila chub is currently not federally listed, activities have occurred in the past in an attempt to reduce the decline of the species. Sabino Canyon Creek, Coronado NF, Arizona, was renovated using piscicides to eliminate exotic green sunfish in June of 1999 (U.S. Forest Service 2004). Sabino Canyon continues to be monitored for invasion by non-native green sunfish which persist downstream on non-Forest Service lands (U.S. Forest Service 2004). In June 2002, the persistent drought resulted in the available habitat for Gila chub in Sabino Canyon being reduced to a few isolated pools (U.S. Forest Service 2004). The District Biologist set up an emergency holding facility for Gila chub if the pools dried. The Biologist also transported water to drying pools that resulted in retention of this potentially distinct population of Gila chub.

Additionally, Romero Canyon and Paige Creek on the Coronado NF were treated in June 2003 to remove non-native species of fish that compete with and prey upon native fish. This project is described in an Environmental Assessment for the Paige Creek and Romero Creek native fish renovation project (U.S. Forest Service 2003).

A cooperative effort among the Forest Service, BLM, and The Nature Conservancy to remove non-native green sunfish from O'Donnell Creek occurred in 2002. Gila chub were reintroduced to O'Donnell Creek. The population will be monitored. Cienega Creek occurs primarily on BLM lands. Efforts to recover the riparian community have significantly benefited the Gila chub. The BLM and The Nature Conservancy entered into a cooperative agreement to manage the Muleshoe preserve under the Muleshoe Ecosystem Management Plan. The plan addresses management activities for the maintenance and improvement of watershed conditions necessary for primary constituent elements important to the Gila chub (U. S. Fish and Wildlife Service 2002). The plan also provides conservation goals for Gila chub. The Nature Conservancy holds a conservation easement for private and state park lands in the San Rafael Valley which constitutes the headwaters of the Santa Cruz River. The conservation easement prohibits activities which would be detrimental to Gila chub habitat and the watershed and assures the properties will remain undeveloped and in natural condition (U. S. Fish and Wildlife Service 2002). Two apparent successful reintroductions were conducted by the BLM in Lousy and Larry Creeks near the western boundary of the Prescott NF.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

It must be noted that the Gila chub is a secretive species (Rinne and Minckley 1991). Most of the known recent and historical locations described above and in the proposed rule continue to lack extensive surveys, at least since the comprehensive status review by Weedman et al. (1996). The Gila chub may thus persist in some of the locations now considered extirpated, and may occur in

localities as yet undiscovered. Although Gila chub have not been found in some of the localities listed in the Final Rule in recent years, these streams may still be occupied.

The majority of consultations for this species have been in the form of conference opinions associated with recovery efforts for the Gila chub. Approximately half of all known Gila chub occupied habitat occur on National Forest System lands. Most of these populations are considered small, isolated, and threatened by factors that threaten the species across its entire range (see threats discussion in Reasons for Proposed Listing section above). Only two populations of Gila chub occur outside the action area for this consultation: Blue and Bonito Creeks on the San Carlos Reservation.

Factors Affecting the Species within the Action Area

The FWS has conducted five conference consultations on projects affecting the Gila chub and/or its proposed critical habitat. None of these conference consultations found jeopardy to the species nor destruction or adverse modification of proposed critical habitat. Additional consultations are currently underway (or soon will be) with the BLM regarding Resource Management Plans for the Safford, Tucson, and Phoenix Field Offices.

The most recent conference consultation that examined effects on Gila chub was the September 3, 2004, Biological and Conference Opinion for the BLM Arizona Statewide Land Use Plan Amendment for Fire, Fuels, and Air Quality Management (02-21-03-F-0210). The BLM Land Use Plan Amendment consultation analyzed the effects of a statewide amendment to each Field Office within Arizona and considered the effects of wildfire suppression, wildland fire use, prescribed fire, and the physical, chemical, and biological treatments of fuels and vegetation. The statewide scope of the BLM Land Use Plan Amendment included lands adjacent to and downstream of various National Forests and thus, its effects are likely to influence the status of the Gila chub on National Forest System lands. The BLM's proposed action was accompanied by conservation measures that minimized the effects of the proposed action. Incidental take was anticipated to occur as a result of runoff effects and salvage of imperiled subpopulations following fire suppression and fire management treatments and was quantified in terms of the significance of effects upon a discrete Gila chub population. Terms and conditions directed the BLM to coordinate actions with FWS, salvage Gila chub where practicable, and monitor various aspects of post-fire habitat effects.

The FWS is also in consultation on other projects that are likely to be implemented during the life of this consultation that will affect baseline conditions for the Gila chub and/or its proposed critical habitat. Among these are two informal consultations; tamarisk removal in Williamson Valley Wash and prescribed fire in the Silver Creek drainage and grazing in Mineral Creek.

The Coronado NF is currently in the scoping phase of a project to reestablish the species in Peck Canyon and is considering reestablishing the species in Bear and Romero Canyons and augmenting the population in Sabino Canyon. While these actions have not yet been completed, they will, if implemented, enhance baseline conditions for the species in the Santa Cruz watershed.

EFFECTS OF THE ACTION

The Gila chub occurs on and, in cases, downstream of the Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto National Forests. The S&Gs listed in these National Forest’s LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Gila chub and its habitat. These S&Gs may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Gila chub.

Table 99. Summary of S&Gs considered for the Gila chub.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4-9, 13, 14, 16-18, 20, 27-29, 31-34, 37-40, 42-53, 55, 58-64, 84, 97-99, 104-117, 120-125, 130, 132-140, 143, 144, 149, 151, 171, 177-179
Coconino	311-325, 327-329, 331, 336-339, 341-345, 348, 353-358, 361-391, 393-395, 398-402, 404, 406-408, 411, 413-417, 433, 434, 458-462, 464. 466, 469, 472, 473, 479, 481, 483, 484-507, 520
Coronado	612, 613, 626-638, 644, 645, 648-653, 666-670, 672-682, 692-698, 700, 703-713, 715, 727, 757, 759-762, 764, 765, 767-774, 780, 782-785, 786, 788-792, 794-800, 802-805, 807-830,
Gila	841, 842, 844-851, 854, 857-871, 873-876, 878, 880, 925, 927, 928
Prescott	1115-1119, 1121-1129, 1131-1138, 1142-1163, 1165-1167, 1169-1176, 1178-1182
Tonto	1341-1345, 1348-1350 1352-1357 1359-1368, 1371
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1486-1492, 1495, 1499-1501, 1504-1515

Apache-Sitgreaves National Forest

The FWS found three S&Gs that would have a lethal response to the species if implemented and one that was found to cause a sublethal response. Five of this Forest’s S&Gs were found to have a negative behavioral response if implemented. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 100. Effects of the S&Gs analyzed for the Gila Chub – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	3.4
-2	S&G is causing sublethal response	1	1.1
-1	S&G is causing negative behavioral response	5	5.6
0	S&G is ill-defined and/or open to interpretation	21	23.6
1	S&G is maintaining habitat & providing at least minimal recovery	51	57.3
2	S&G is moving towards recovery	2	2.2
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	3	3.4
X	S&G is a heading	3	3.4
Total		89	100 %

Engineering Program

Standard and Guideline 63 states that total road density should average 3.5 mi/mile² or less with open road densities averaging 2.0 mi/mile² or less (U.S. Forest Service 2004). The FWS ranked this as being sublethal to the species because of run-off and other pollutants from high road densities possibly entering occupied chub habitat.

As stated in the biological assessment, road density is defined as the total miles of road in a defined area divided by the defined area in square kilometers (miles). The analysis in the biological assessment recognizes that the numbers that were being evaluated were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by FWS and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) as one way to measure watershed condition as it relates to resident fish in the Pacific Northwest. The joint agencies recommendation is that a given watershed should have less than 2.5 mi/mile² of road system; if in excess, the watershed is said to be not properly functioning. High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to Gila chub is watershed deterioration.

On the Apache-Sitgreaves NF, the known road densities are below the 2.5 mi/mile² recommended by FWS and NOAA fisheries. Road density on the Apache-Sitgreaves is about 1.1 km/square km., however this number doesn't include the non-classified roads (U.S. Forest Service 2004:33). Standard and Guideline 63, if implemented as written, allows for the total road density to reach 3.5 mi/mile². High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to Gila chub is watershed deterioration. This could potentially lead to increased erosion into Gila chub habitat (including critical habitat), thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct

mortality. Moreover, the relatively short lifespan of the Gila chub, coupled with the comparatively low fecundity of the species and the small population sizes makes it vulnerable to serious adverse effects from activities which may only impact the species' habitat for relatively short time periods, especially during the spawning season. Any situation that eliminated or greatly reduced a year-class would severely deplete recruitment to a population. For example, excessive sedimentation during the spawning season might suffocate a large portion of that year's reproductive effort. In the succeeding year, total reproductive effort would be diminished. The net effect would be a major reduction in population size (Propst 1988).

Implementation of S&G 63 may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Forestry and Forest Health Program

Standard and Guideline 64 allows the Forest to remove infected overstories (i.e., infected with dwarf mistletoe) and to thin understories to densities which will maximize fiber production over the length of the rotation, using yield simulation models as guides. This S&G allows for control of mistletoe by clear cutting (in conformance with Regional Standards for clear cut size) and regenerating artificially when yield simulation models indicate that stands will not reach maturity because of dwarf mistletoe. (U.S. Forest Service 2004:117).

This S&G allows for controlling mistletoe by clear cutting. Clear cutting in this region has undergone a major reduction over the past decade (U.S. Forest Service 2004). On the Apache-Sitgreaves, a total of 704 acres have been clear cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibit the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to the watershed condition from clear cutting may be increased erosion resulting from new road construction, soils exposed to runoff, and heightened runoff from reduced ground cover and compacted surfaces in staging areas.

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average 2.0 mi/mi² or less. This S&G 97 as written could potentially allow total road densities to reach 3.0 mi/mi² or above if needed to economically remove timber. The FWS's recommendation is that in order to maintain a properly functioning watershed, total road densities should be 2.5 mi/mi². Both S&G 64 and 97, when implemented, may result in a negative behavioral response by the species that may include displacement.

Implementation of these Forest Health program S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 39 states that within each diversity unit, maintain or achieve at least 40 percent of the potential habitat capability for the management indicator species selected for each vegetation type. Again, this S&G could cause a negative behavioral response to the species such as displacement because habitat conditions may not be sufficient for this species.

The FWS identified a number of S&Gs within the Wildlife Program that may cause adverse effects if implemented. Standard and Guideline 115, 117, and 123 were all ranked as capable of causing a negative behavioral response. Standard and Guideline 115, 117, and 123 rank as negative responses due to their emphasis on various states of partial habitat maintenance in Gila chub habitat. For example, S&G 117 directs the National Forest to limit siltation of streams to no more than 20 percent. While this standard represents a worthwhile target for improving stream health, it interpreted to mean that up to 20 percent siltation may be permitted. Excessive sediment loading is detrimental to aquatic species (Newcombe and MacDonald 1991). Such a level of siltation may adversely affect Gila chub, primarily through lost spawning and foraging habitat (i.e., embedded gravel), reduced predator avoidance (i.e., increased turbidity), and gill occlusion (i.e., suspended fines). Standard and Guideline 114 does not specifically direct the Apache-Sitgreaves NF to maintain habitat potential for Gila chub, as the species was proposed subsequent to plan approval. Regardless, we assume implementation of this S&G may occur in waters containing the proposed endangered species.

One of the S&Gs within the Wildlife Program may result in a sublethal response by the species. Standard and Guideline 118 guides the Forest to maintain 80 percent of a stream's spawning gravel surface free of inorganic sediment. As we did with S&Gs 39, 115, 117, and 123, we have interpreted this S&G to allow up to 20 percent inorganic sediment in spawning gravels. The loss of such an appreciable proportion of spawning gravels could restrict the ability of Gila chub to recover their diminished numbers following chronic drought or stochastic events (e.g., flash floods, post-fire runoff).

The FWS ranked two S&Gs in this program as causing a lethal response to the chub (i.e., S&G 114 and 116). Standard and Guideline 114 guides the Forest to manage for at least 60 percent of habitat capability for Apache trout, rainbow trout, brook trout, brown trout, loach minnow, and Gila chub. This S&G presents two sources of concern; first that it implicitly permits up to a 40 percent loss of habitat capability for the Gila chub, and second, that it promotes management of habitat for non-native, competitive/predatory salmonids, particularly the piscivorous brown trout.

Standard and Guideline 116 directs the Forest to maintain at least 80 percent of streambank total linear distance in stable condition. The FWS is concerned with the inverse implications, that allowing up to 20 percent of streambank to exist in unstable condition will adversely affect the Gila chub. The FWS also notes that 20 percent unstable banks could allow sedimentation over the remaining 80 percent, bank stability in those reaches notwithstanding.

Collectively, implementation of these S&Gs may have varying degrees of adverse effects to the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies; (2) by increasing water temperatures for spawning due to insufficient cover; (3) by reducing water quality and increasing contamination due to increased sediment levels; (5) by reducing sufficient hiding cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (6) by encouraging habitat condition that are favorable to non-native aquatic species.

Coconino National Forest

The FWS found only one S&G that could cause a sublethal response within the Coconino NF's LRMP. The majority of the S&Gs received a positive rating with regards to maintaining habitat or providing minimal recovery. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 101. Effects of the S&Gs analyzed for the Gila Chub – Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	0.8
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	13	10.7
1	S&G is maintaining habitat & providing at least minimal recovery	82	67.8
2	S&G is moving towards recovery	2	1.7
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	3	2.5
Z	S&G implementation is non-discretionary	8	6.6
X	S&G is a heading	12	9.9
Total		121	100 %

Engineering Program

Standard and Guideline 400 allows the Forest to operate and maintain roads in accordance with objectives as specified in road prescriptions. Roads not needed for industry, public, and/or administrative use are closed or returned to resource production through obliteration. Obliteration includes restoring the original land contour to the degree practical, scarifying, providing proper drainage, and revegetating with appropriate species. These activities could cause short-term adverse effects from run-off.

Standard and Guideline 404 allows management of road densities to achieve an average of 1.1 mile of open road per section in the woodland zone, such as pinyon-juniper, desert, and grassland vegetation types and an average of two miles of open road per section in the ponderosa pine/mixed conifer zone. These densities reflect all system roads in maintenance categories 2 through 5, but do not include federal, state, and county systems. Temporary roads that are only for short-term use and will then be fully obliterated and long-term closure roads are not a part of the calculated density. In calculating densities by vegetative type do not include areas having legal or administrative restrictions on roads, e.g., wilderness and research natural areas. Again, short-term adverse affects could be occurring to the species if these activities are implemented.

Standard and Guideline 408 guides the Forest to locate new roads out of riparian areas and water collecting features such as swales. However, in wet meadows existing roads may also be reconstructed and maintained in accordance with Best Management Practices as defined in the Standards and Guidelines. This S&G allows for relocation or elimination of roads that are presently in these locations, and the obliteration of poorly located segments. Also, the S&G directs crossing of stream courses perpendicular to the flow to minimize bank disturbance and sediment production. However, because the activity has the potential to occur in occupied chub habitat, we ranked this S&G as having a positive intent, but with some short-term adverse affects associated with it.

Standard and Guideline 460 allows the Forest to locate or relocate roads out of riparian areas, except at designated crossings and to obliterate unnecessary roads in riparian areas. While this S&G is positive in the long-term, some short-term, adverse affects associated with relocating or obliterating roads are likely.

Five S&Gs within the Coconino NF Engineering Program could cause short-term adverse effects in order to achieve long-term positive effects; a net beneficial effect. Standard and Guideline 400, for example, provides for road removal. While it is advantageous to reduce road density, the work associated with “putting roads to bed” may have short-term impacts on water quality in adjacent streams inhabited by Gila chub (see above for discussion on the effects of sediment instreams). The remaining S&Gs (404, 408, 460, and 534) also allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Implementation of these S&Gs under the Engineering Program may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by a reduction in sufficient cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Fire Management Program

Standard and Guideline 411 guides the Forest to plan fuel treatments that have the least impact on sites, meet resource management needs, are cost effective, and meet fuel treatment objectives. In addition, S&G 414 limits the treatment of natural fuels to areas where fuel buildups are a threat to life, property, adjacent to old-growth areas, or specifically identified high resource values. The FWS expects that reduced fuel loading will contribute to a reduced risk of catastrophic wildfire. Given the severity of post-fire effects on aquatic systems, this S&G can be expected to reduce adverse impacts to Gila chub over the long-term. Fuel treatments, however, can result in short-term degradation of water quality and direct mortality. Fuel treatments could include prescribed fire and physical, chemical, or biological treatment of vegetation. This S&G has long-term benefits, with short-term adverse effects to the Gila chub.

Prescribed fire is a relatively well-managed activity that could be managed somewhat effectively to minimize effects to Gila chub. Nonetheless, prescribed fire can directly affect fishes. Fish mortalities can occur from increases in water temperatures to lethal levels, fire induced changes in pH, increased ammonium levels from smoke gases absorbed into surface waters, and increased phosphate levels leached from ash (Brown 1989, Gresswell 1999, Norris et al. 1991, Rinne 1996, Rieman and Clayton 1997, Spencer & Hauer 1991). Most negative effects to aquatic species after fire are indirect, and are due to the immediate loss or alteration of habitat. Fire removes vegetation and consumes organic components of ground cover, thus changing the physical and chemical properties of watersheds and the streams and wetlands to which they contribute.

Forestry and Forest Health Program

Standard and Guideline 458 allows the Forest to evaluate K-V soil and water and wildlife resource improvement opportunities on sale areas. Plan projects to improve areas in unsatisfactory condition and to maintain those in satisfactory or better condition. Priorities for use of K-V funds will be; (1) regenerate stands, (2) correct serious problems that have been identified such as erosion that needs to be stopped to preserve soils, needed threatened and endangered habitat improvement, and treatment of dwarf mistletoe infected stands; (3) Timber Stand Improvement (TSI) where needed to manage stocking levels and where the site justifies the costs; (4) restoring riparian areas and closing roads by revegetation, channel restoration, blocking, providing drainage, obliteration, or combination of these types of activities (5) seeding to improve forage in areas where additional forage is needed; and (6) all other work. Exceptions below priority 2 may be made by the Forest Supervisor based on documented results of an environmental analysis. This entire S&G, we believe, would have an overall beneficial effect to the species, but with short-term adverse effects from potentially altering habitat.

Standard and Guideline 461 guides the Forest to avoid or designate stream course crossings for skid trails, limit crossings to the minimum needed. This S&G suggests the Forest to choose crossings with stable conditions or stable bed and bank material such as cobble or rock. There may be short-term adverse effects if this S&G is implemented.

Two Coconino NF Forestry and Forest Health program S&Gs were ranked as having some short-term effects even though the overall intent of the S&Gs was positive. Standard and Guideline 458 allows the Forest to evaluate soil and water and wildlife resource improvement opportunities

on timber sale areas and to plan projects to improve areas in unsatisfactory condition and to maintain those in satisfactory or better condition. Among the planning priorities are arresting of erosion, habitat improvement for listed species, riparian restoration, and forage improvement. The FWS anticipates that timber harvest and/or mechanical treatment to improve conditions is likely to have short-term adverse effects on aquatic and riparian habitat; the stated goals allow that such projects are undertaken for longer-term resource enhancement.

Standard and Guideline 461 guides the Coconino NF to avoid or designate stream course crossings for skid trails and limit the trails to the minimum needed. The Forest is also directed to choose crossings with stable conditions or stable bed and bank material such as cobble or rock. While skidding of timber is likely to cause short-term, adverse effects on water quality, the FWS recognizes that mechanical removal of logs is likely to be implemented to reduce fire hazard and/or improve overall forest health. The FWS is particularly amendable to forest health projects in which canopy cover is reduced, allowing increased herbaceous ground cover to become established. Increased ground cover can be expected to reduce downstream sedimentation. See the various program-area effects discussions for the Apache-Sitgreaves NF, above, for a discussion on the adverse effects of sedimentation.

Implementation of the Coconino NF Forestry and Forest Health Program S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Lands and Minerals Program

Standard and Guideline 391 calls for the Forest to prepare a mined area, reclamation implementation schedule in the first decade. It directs implementation of 20 percent of the top priority work in the second decade. This S&G is expected to have short-term adverse effects during the first decade as mine sites currently requiring rehabilitation continue to contribute sediment and contaminants to streams. Second-decade implementation of top-priority site reclamation is expected to minimize such effects to the benefit of Gila chub.

Standard and Guideline 393 guides the Forest to evaluate requests for transmission corridors based on public need, economics, and environmental impacts of the alternatives. This S&G allows the Forest to use existing corridors to capacity with compatible utilities where additions are environmentally and visually acceptable before evaluating new routes. Overbuilding and underbuilding are considered for additions. This S&G was ranked as indicating that while long-term adherence to its conditions would lessen impacts on the Gila chub, short-term effects (i.e., emanating from construction, clearing, and vegetation removal) could harm individuals of the species.

Standard and Guideline 505 allows mineral material excavation within the riparian zone after environmental analysis. Authorized mineral activities will maintain or improve riparian conditions. Standard and Guideline 505 may result in a sublethal response by the Gila chub, as it permits the Forest to consider material excavation within riparian zones. Though the stated goal of the S&G is that such activities will maintain or improve riparian conditions, the S&G does not specifically specify that water quality or quantity will be maintained, or that sediment loads will not increase or, conversely, that moderately-fine bed materials required by Gila chub will not be removed.

Implementation of the aforementioned Lands and Minerals program S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Rangeland Management Program

Standard and Guideline 338 allows the Forest to manage grazing use to maintain or enhance condition classes of full capacity rangelands. Standard and Guideline 339 states that full capacity rangeland in unsatisfactory condition that has potential for improvement is treated through appropriate structural and nonstructural range improvements and pasture stocking rate adjustments as described in the AMP'S. And, S&G 341 states that salt is used to help achieve proper livestock grazing distribution, permanent salt is not placed within 1/4 of a mile of the edge of any riparian area or tree plantation, and temporary salting may be approved if it will help to achieve a specific management objective for enhancement of riparian areas. All of the above S&Gs are for implementation Forestwide. Further, S&G 483 for MA11 states that where seral grasslands are maintained as juniper woodland, invading vegetation may be eliminated through mechanical, chemical, and prescribed fire treatments on a maintenance schedule averaging once every 25 years.

A large body of research and literature exists on the effects of improper livestock grazing-- positive, negative, or neutral-- on numerous parts of many ecosystems and can be found in several bibliographies (Ffolliott et al. 2004, Willoughby 1997, Burgess 1999). The following section identifies some of the general effects that livestock grazing has on ecosystems, habitat types, and species groups. This analysis encompasses Coconino NF Rangeland Management program S&Gs 338, 339, 341, and 483 as mentioned above. The S&Gs within other National Forests' Rangeland Management Program, as well as any S&Gs peripherally related via similar effects of sedimentation, access, and contamination, will tier to this comprehensive analysis.

Adverse effects of livestock grazing on native fishes of the Southwest, and of Gila chub in particular, have long been recognized (Chamberlain 1904, Miller 1961, Henderickson and Minckley 1984, Minckley 1985, Williams et al. 1985, Clarkson and Wilson 1995). While some

of the most serious of those effects took place in the late 1800s, ongoing livestock grazing continues to exert adverse effects on the remaining native fish species. Effects of ongoing grazing inhibit recovery from, and are exacerbated by, the underlying habitat alteration and destruction that occurred as a result of serious improper livestock grazing of the late 1800s and early 1900s.

Effects of the livestock grazing program on Gila chub can be segregated into direct effects to fish and effects to Gila chub habitat that result in indirect impacts to the species. Direct effects of livestock grazing in the aquatic habitats of the above-mentioned drainages include trampling (Roberts and White 1992) of Gila chub, particularly eggs and larval fish in the shallow margins of the creeks. Direct effects could also occur to Gila chub as a result of range improvement project construction or vegetation management projects in all of the occupied drainages.

Indirect effects include impacts from livestock grazing and associated activities that alter Gila chub habitat quality or quantity. Indirect effects could occur in aquatic habitats where Gila chub occur or in the watershed of such habitats. Post Canyon, O'Donnell Creek, Cienega Creek, Turkey Creek, Bass Springs, and Double R Creek are all within watersheds with riparian areas located upstream of currently occupied Gila chub habitat where livestock grazing does occur.

Loss of riparian shade results in increased fluctuation in water temperatures with higher summer and lower winter temperatures (Karr and Schlosser 1977, Platts and Nelson 1989). Increased water temperature fluctuations may adversely affect larval Gila chub. Larvae have a much more limited thermal range than do adults and exhibit subtle habitat shifts to accomplish thermal regulation. Increasing temperature fluctuations in shallow edgewater areas may cause direct mortality of larvae through thermal shock or may cause larvae to move out into deeper, faster water where they are more vulnerable to predation or to being swept downstream.

Increases in nutrients in streams have been documented to result from livestock grazing (Kauffman and Krueger 1984). Increased nutrients may beneficially affect Gila chub through increased food production. Given the habitat used by Gila chub, the species apparently requires a high level of dissolved oxygen. Excessive nutrient input and resulting algal growth may result in temporary conditions of oxygen depletion with resulting stress or death to individual Gila chub.

Increased sediment production and transport is probably the most commonly acknowledged effect of livestock grazing (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994). Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy et al. 1981, Wood et al. 1990, Newcombe and MacDonald 1991, Barrett 1992, Megahan et al. 1992). Adult and juvenile Gila chub are not inordinately sensitive to moderate amounts of sediment; however, excessive sedimentation may cause channel changes that are adverse to the species. Excessive sediment may fill backwaters that provide larval and juvenile Gila chub habitat. Excessive sediment may smother invertebrates, reducing Gila chub food production and availability, and related turbidity may reduce Gila chub ability to see and capture food.

The S&Gs encompassed by the proposed action also include range improvement projects, such as fence maintenance and construction and water developments. These projects are primarily designed to distribute cattle and allow greater management capability. They can result in improved range condition and watershed condition if stocking rates are not increased. Localized temporary disturbance from construction of pipelines, fences, and other projects would cause negligible and localized increases in erosion and runoff. Of greater concern are development and maintenance of stock tanks, which may support populations of non-native fishes, or may provide habitat into which non-native fishes may be introduced as sport fish or for other purposes. These fish may subsequently be introduced into occupied Gila chub habitat or may traverse drainages between stock tanks and the creek during storm events. Of particular concern would be introduction of a non-native species into areas where Gila chub currently occur. Any new construction or reconstruction of roads to stock tanks would facilitate public access and increase the chance that non-native fish may be introduced or moved among tanks.

Standards and Guidelines 338, 339, 341, and 483 were assigned positive numeric effects ratings due to their stated goals of improving range conditions Forest-wide. While improperly-managed grazing can elicit a host of adverse effects, the improvements in range condition (e.g., increased ground cover, reduced erosion, improved riparian condition) expected to occur through implementation of these S&Gs can be expected to be accompanied by improvements in stream health (e.g., reduced sediment loads, increased bank stability, greater shade and allochthonous input of nutrients). Thus, there is a short-term impact (grazing has and is likely to continue to have adverse effects) and a longer-term benefit (reduced adverse effects).

Implementation of the full suite of Rangeland Management S&G may directly or indirectly affect, to varying degrees, all seven Gila chub proposed critical habitat PCEs listed in the preamble to the Effects of the proposed Action section, above as follows: (1) reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; (6) by creating habitat that is favorable to non-natives; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Watershed Management Program

Standard and Guideline 361 discusses streamcourses; it allows the Forest to locate new roads out of stream courses and water-collecting features such as swales and to relocate roads out of bottom positions and obliterate poorly located segments as they are identified. Angermeier et al. (2004) discussed the effects of roads on aquatic biota. Proper road design can minimize the adverse effects of roads on Gila chub. The stated goal of S&G 361 is to reduce the impacts of the existing transportation system on the Coconino National Forest. The numeric effects' rating reflecting short-term adverse effects and long-term beneficial effects is assigned because: (1) the existing road system will continue to impact streams; (2) the rehabilitation of roads may involve

temporary increases in sediment loading as soil is disturbed and vegetation reestablished; and (3) longer-term conditions will include lessened contributions of sediment.

Standard and Guideline 363 states to maintain at least 80 percent of the potential crown cover in the riparian area. The objective of the Coconino National Forest's S&G 361 is to maintain riparian condition at some proportion of potential. These criteria are poorly understood; existing and potential riparian crown cover has not been assessed Forest-wide. Regardless, once assessed, we feel that 80 percent of potential cover is likely higher than existing conditions.

Standard and Guideline 377 allows the Forest to implement emergency fire rehabilitation measures where necessary to protect soil and water resources from intolerable losses or to prevent unacceptable downstream damage. The implementation of Burned Area Emergency Rehabilitation/Response (BAER) measures is critical for minimizing post-fire delivery of sediment, organic compounds, and newly-liberated contaminants to aquatic systems inhabited by Gila chub. Salvage of fish, as occurred when Gila chub were evacuated from Sabino Creek following the 2003 Aspen Fire, is necessarily considered an adverse effect, but is preferable to loss of the population. Other BAER treatments, such as the replacement of culverts to accommodate bulked runoff, may also trade short-term impacts for long-term stability.

Standard and Guideline 378 guides the Forest to enhance watershed condition by obliterating roads causing resource damage. A total of 400 miles of roads will be obliterated by the end of the first decade (average of 40 miles annually). The obliteration of roads is expected to reduce sedimentation, increased flood-flow volumes, and other adverse effects of roads as discussed by Angermeier et al. (2004). As discussed in the analysis of Watershed S&G 361, above, there are likely to be short-term increases in sediment as heavy equipment is used to obliterate road beds and as the sites become revegetated.

Implementation of S&Gs within the Watershed Management Program may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 490 guides the Forest to meet the following riparian standards in the Regional Guide for 80 percent of riparian areas above the Rim and 90 percent below the Rim by the year 2030: (1) maintain at least 80 percent of the potential overstory crown coverage; (2) maintain at least three age classes of woody riparian species, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings; (3) maintain at least 80 percent of the potential stream shading from June to September along perennial cold and cool water streams; (4) maintain at least 80 percent of the potential shrub cover in high elevation areas; (5) maintain

at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands; (5) maintain at least 80 percent of the spawning gravel surface free of inorganic sediment; (6) maintain at least 80 percent of streambank total linear distance in stable condition; and (7) retain snags in riparian areas that are not a safety hazard. In addition, S&G 496 within Management Area 12 states to maintain riparian and meadow communities by providing waters for wildlife and livestock away from these sensitive areas.

This S&G was rated as primarily beneficial with short-term adverse affects because benefits will not occur until the target year of 2030, with potential impacts to Gila chub in the interim if 20 percent utilization occurs within the riparian zone at occupied sites. Overutilization of vegetation, including riparian vegetation, can cause changes to plant root structures, and alter plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio et al. 1994). These conditions may increase sediment delivery into the stream (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994), change the way in which flood flows interact with the stream channel, and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation.

Standard and Guideline 496 allows the Forest to protect meadow communities, riparian areas, or other sensitive areas in Management Area 9 and Management Area 12, respectively, from the effects of spring development by piping water to water developments in adjacent, less sensitive areas. Again, the long-term goal of reduced wildlife and stock water use in habitats which may contain Gila chub is beneficial, but some fish may be taken from occupied sites during development and minimal numbers may also be taken during subsequent operations and maintenance of the sites.

Implementation of the Wildlife Program S&Gs identified above may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Coronado National Forest

The FWS found two S&Gs that could cause a lethal response, three that could cause a sublethal response, and one that could cause a negative behavioral response to the species. However, many were found to be maintaining habitat or moving towards recovery for the species on this Forest. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 102. Effects of the S&Gs analyzed for the Gila Chub – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	1.6
-2	S&G is causing sublethal response	3	2.4
-1	S&G is causing negative behavioral response	1	0.8
0	S&G is ill-defined and/or open to interpretation	17	13.7
1	S&G is maintaining habitat & providing at least minimal recovery	79	63.7
2	S&G is moving towards recovery	16	12.9
3	S&G is implementing species recovery plan	2	1.6
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.6
X	S&G is a heading	2	1.6
Total		124	100 %

Fire Management Program

Standard and Guideline 695 allows the Forest to conduct fire suppression activities in a way to protect watershed and visual resource values and S&G 798 states that prescribed fire will be used to reduce fuel hazards and enhance wildlife habitat. Further, S&G 812 states that prescribed fire will be used to reduce fuel hazards and maintain or improve wildlife habitat, livestock forage, and watershed condition. Each of the Coronado NF Fire Management Program S&Gs trades short-term adverse effects for long-term improvements in upland condition and reduced risk of catastrophic fire. See affects of fire to the species above as discussed in the Coconino NF analyses.

Implementation of these Fire Management S&Gs may have varying degrees of effects to the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Forestry and Forest Health Program

Standard and Guideline 697 allows the Forest to use chemicals within guidelines approved by other agencies for the following purposes: use of insecticides and rodenticides in recreation areas and administrative sites. The FWS ranked this as potentially causing a lethal response to the chub. First, pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e.,

non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Standard and Guideline 713 states that prescribed fire will be used to reduce fuel hazards, enhance wildlife values, and enhance visual resources. Again, short-term adverse effects could occur to the species for long-term improvements in upland condition and reduced risk of catastrophic fire.

Implementation of these Forest Health S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Rangeland Management Program

Standard and Guideline 762 allows the Forest to manage suitable rangeland at Level A (no livestock), Level B (some livestock), Level C, and Level D in MA3. Rangeland Management Levels are as follows: 716 acres in Level A; 4,840 acres in Level B; 2,395 acres in Level C; and 6,821 acres in Level D. In addition, it guides management of livestock numbers so that livestock use is within present grazing capacity. Improvements are constructed to the extent needed to protect and maintain the other resources in the presence of grazing. Riparian areas in Cave Creek are grazed only during period November 1 to June 30. There is no grazing in Madera Canyon and Carr Canyon Reef Area.

Standard and Guideline 792 and 805 (within Management Area 7A and 7B) allows the Forest Service to manage suitable rangeland at Level D, and if level D is not achievable, manage at Level A (no livestock). Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. The LRMP predicts no change in the number of acres of unsatisfactory condition for Management Area 7B over a period of 50 years. Unsatisfactory range conditions along with high intensity grazing may contribute to un-healthy watersheds resulting in adverse effects to the species.

Standard and Guideline 829 guides the Forest to manage riparian areas to achieve and maintain satisfactory riparian conditions as described in the Forest-wide prescription. This may be accomplished through the use of structural improvements, movement of livestock, or the exclusion of livestock.

Implementation of the three Coronado NF range Management S&Gs (762, 792, and 805) may result in sublethal responses from Gila chub. The FWS made this determination based on the S&Gs collective direction to manage livestock production with no minimization measures

(within the S&G). Absent minimization measures, much of the adverse effects discussed in the aforementioned Coconino NF section are likely to occur. The FWS does recognize, however, that other S&Gs, particularly in the Wildlife and Watershed Management programs, are likely to be implemented concurrent with the adverse Rangeland Management S&Gs, thus minimizing the effects.

Rangeland Management S&G 829 guides the Coronado NF to achieve and maintain satisfactory riparian conditions in riparian areas. This may be accomplished through the use of structural improvements, movement of livestock, or the exclusion of livestock. As we have determined in prior analyses, structural improvements such as fences, cattle guards, and water developments can cause short-term adverse effects on water quality to the detriment of Gila chub, though the longer-term effects of better livestock distribution are beneficial. The FWS also notes that driving of cattle, while potentially desirable from a forage-utilization standpoint, may involve mortality of Gila chub should the driving require crossing occupied streams.

Implementation of these S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a stream's natural unregulated flow pattern including periodic natural flooding.

Watershed Management Program

Standard and Guideline 677 guides the Forest to complete classifications and inventories of all riparian areas by the end of the first time period and complete action plans to improve all unsatisfactory riparian areas, improve all riparian areas to satisfactory or better condition by the end of Period 5. Such satisfactory conditions are specified below, expressed as a percentage of "natural" conditions (that is, what each site can produce if not further disturbed by man). Twenty-five percent of all riparian areas must be in satisfactory condition by Period 2.

This S&G (677) may have short-term adverse impacts due to its lengthy implementation schedule. Current riparian conditions that may be adversely affecting Gila chub can persist until such time that action plans can be developed and implemented to the benefit of the species.

Standard and Guideline 678 discusses aquatic resource and states the following: (1) maintain at least 80 percent of natural shade over water surfaces in fish bearing streams; (2) maintain at least 80 percent of natural bank protection; (3) maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G could potentially be lethal to the chub because, it does not take into consideration the species habitat needs (see below).

Standard and Guideline 679 discusses vegetative resources and states to maintain the following (where the site is capable of supporting woody plants): (1) maintain at least 60 percent of the

woody plant composition in three or more riparian species; (2) maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species; and (3) maintain at least 60 percent of natural shrub and tree crown cover. This S&G may result in an adverse behavioral response (see below).

The FWS identified multiple S&Gs within the Wildlife Program (39, 114, 115, 116, 117, and 123) with adverse effects in our analysis of the Coronado NFs' S&Gs, above. All but S&G 116 were ranked as causing a negative behavioral response. Standard and Guideline 116 was considered capable of causing lethal effects. These negative responses were due to the S&Gs emphasis on various states of partial habitat maintenance in Gila chub habitat, and the rationale applies here for Coronado NF S&Gs 678 and 679. Standard and Guideline 678 is interpreted to permit 20 percent natural shade cover loss, 20 percent impairment of natural bank protection, and up to 20 percent deviance from natural levels of sand, silt, and clay in streams. Excessive sediment loading is detrimental to aquatic species (Newcombe and MacDonald 1991). Such a level of siltation may adversely affect Gila chub, primarily through lost spawning and foraging habitat (embedded gravel), reduced predator avoidance (increased turbidity), and gill occlusion (suspended fines). Standard and Guideline 114 does not specifically direct the Coronado NF to maintain habitat potential for Gila chub as the species was proposed subsequent to plan approval. Regardless, we assume implementation of this S&G in waters containing the proposed-endangered species. Standard and Guideline 679 was interpreted similarly; the remainder of the targeted percentage below (100 percent) was considered an allowable level of impact.

Standard and Guideline 711 guides the Forest to restore to satisfactory watershed condition, on an emergency basis, watersheds or portions of watersheds when damaged. Watershed treatment is a low priority in MA1. Water and soil resources improvements may consist of channel stabilization and revegetation using native or non-native species.

Standard and Guideline 764 guides the Forest to restore damaged watersheds to a satisfactory watershed condition. Watershed treatment is a high priority in MA3. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species.

Both S&Gs 711 and 764 may cause short-term adverse affects to the species due to their direction to employ channel stabilization. While the end results of geomorphic adjustment may be beneficial to Gila chub, interim effects are expected to include sedimentation, potential contamination from vehicular entry into streams, and reduced riparian abundance as revegetated areas recover.

Standard and Guideline 767 guides the Forest to provide, to the extent possible, conservation pools and minimum streamflows in authorizing or developing water storage impoundments and diversion projects. Standard and Guideline 767 is positive but may have short-term effects due to its direction to retain conservation pools and minimum streamflows when authorizing or developing water storage impoundments. Gila chub are a species of fluvial, not lacustrine systems, though impoundments may serve as refuges or source populations. The commitment to maintain instream flows, however, ensures that streams will not be dewatered. The FWS is concerned with the potential for impoundments to become colonized by non-native species, i.e., centrarchids (sunfish) and ictalurids (catfish) in particular.

Standard and Guideline 782 allows the Forest to restore damaged watersheds to a satisfactory watershed condition. Watershed treatment is a high priority in this MA4. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. This S&G is overall positive but may have short-term effects due to the direction to employ channel stabilization.

Standard and Guideline 784 guides the Forest to provide, to the extent possible, conservation pools and minimum streamflows in authorizing or developing water storage impoundments and diversion projects. Standard and Guideline 794 guides the Forest to restore damaged watersheds to satisfactory watershed condition. Watershed treatment is a high priority in MA7. Watershed maintenance and improvement may consist of channel stabilization and revegetation using native or non-native species. And, S&G 807 states that watershed treatment is a high priority in MA7B and that watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. This S&G is overall positive but may have short-term effects due to the direction to employ channel stabilization.

Implementation of the suite of Watershed Management Program S&Gs may temporarily affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 667 states that the following structural and nonstructural improvement guidelines are intended to meet the specific wildlife habitat objectives as shown for each Management Area. They may not be applicable for every Management Area. Nonstructural Wildlife Improvements include: (a) prescribe burn feasible areas on a 20-year cycle; (b) seed suitable wildlife forage species as needed in fuelwood and timber areas; (c) transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding; (d) revegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available) and (e) thin or patch cut an average of 10 acres of aspen, Gambel oak, and timber species per year.

Standard and Guideline 668 states that the following structural and nonstructural improvement guidelines are intended to meet the specific wildlife habitat objectives as shown for each Management Area. They may not be applicable for every Management Area. Structural wildlife improvements include: (a) constructing water developments or potholes to accomplish 1 per section within 4 decades; (b) considering structural improvements and maintenance for threatened and endangered species as technology develops; (c) constructing fish habitat improvement structures as needed for threatened and endangered species; and (d) fencing

riparian areas where prescribed by approved allotment management plans. Miles of fence constructed will vary with the management plan.

The S&Gs (667 and 668) may cause some short-term adverse effects; however, these effects may be outweighed by longer-term improvements in the baseline conditions for the Gila chub. The implementation of structural improvements can result in increased sedimentation and temporarily-reduced vegetative ground cover. The construction of fish barriers, in particular, can involve salvage of Gila chub and repatriation once the feature has been completed. In such a situation, all Gila chub captured and held off-site are considered taken, though they will be returned to a habitat free of non-native fishes.

Implementation of these S&Gs may temporarily affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Gila National Forest

The FWS ranked only one S&G as being negative for this species. The majority of the S&Gs were ranked as maintaining or providing minimal recovery for the Gila chub. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 103. Effects of the S&Gs analyzed for the Gila Chub – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	3.1
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	6.3
1	S&G is maintaining habitat & providing at least minimal recovery	24	75.0
2	S&G is moving towards recovery	3	9.4
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	6.3
X	S&G is a heading	0	0.0
Total		32	100 %

Fire Management Program

Standard and Guideline 844 states that prescribed fire implementation plans (unplanned and planned ignition) will be initiated on vegetative types where the natural role of fire has been identified. In addition, S&G 845 states that a decision to use prescribed fire in wilderness shall not be based on benefits to wildlife, maintenance of vegetation types, improvements [to] forage production, or enhancement of other resource values. These can be additional benefits which may result from a decision to use prescribed fire but are not objectives for managing fire in wilderness. These S&Gs have an overall positive effect but some possible short-term adverse affects to the species. Our determination regarding Gila NF S&Gs 844 and 845 was reached with the same rationale as applied to our analyses of the Coconino NF's Fire Management S&Gs 411 and 414, and the Coronado NF's Fire Management S&Gs 798 and 812. These prior analyses are incorporated here by reference.

Implementation of the Gila National Forest's Fire Management S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Rangeland Management Program

Standard and Guideline 858 states that in non-wilderness areas, grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas. This S&G may cause short-term adverse affects to the species if implemented. To reiterate, we anticipate that management of livestock use to maintain and improve riparian areas will include some level of adverse effects from the grazing itself, but that the overall trend in habitat conditions will be upward.

Implementation of this S&G may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 848 states that, within non-wilderness areas, within the first decade, complete classification and inventories of all riparian areas, and complete action plans to

improve all unsatisfactory riparian areas. This S&G guides the Forest to improve all riparian areas to satisfactory or better condition by 2030. Such satisfactory conditions are specified below, and expressed as a percentage of "natural" conditions. Twenty-five percent of all riparian areas must be in satisfactory condition by 2000. Aquatic Resources: 1) maintain at least 80 percent natural shade over water; 2) maintain at least 80 percent bank protection; 3) maintain sand, silt, clay composition within 20 percent of natural levels. Vegetation Resources: 1) Maintain at least 60 percent woody plant composition in 3 or riparian species; 2) maintain at least 3 age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species; and 3) maintain at least 60 percent of natural shrub and tree crown cover. Wildlife Resource: maintain at least 60 percent natural shade over land surface.

As stated previously, any S&G which establishes target habitat conditions beneficial to a species but which defers implementation until a later timeframe may have a potential to cause some adverse affects even though the intent may be positive. While we remain concerned that the partial attainment of desired habitat conditions equates with an implicitly-permitted percentage of habitat disturbance, we recognize that improved fluvial and riparian conditions will, over the long-term, benefit Gila chub.

Implementation of this S&G may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Prescott National Forest

The FWS ranked several S&G for the Gila chub on the Prescott NF as having both lethal and sublethal response if these particular S&Gs were implemented. However, overall most S&Gs were ranked as having beneficial affects (i.e., maintaining habitat and providing minimal recovery). Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 104. Effects of the S&Gs analyzed for the Gila Chub – Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	3.3
-2	S&G is causing sublethal response	1	1.6
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.9
1	S&G is maintaining habitat & providing at least minimal recovery	50	82.0

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	1	1.6
Y	S&G has no application to the species	1	1.6
Z	S&G implementation is non-discretionary	2	3.3
X	S&G is a heading	1	1.6
Total		61	100 %

Lands and Minerals Program

Standard and Guideline 1169 states roads needed for private land access, special uses or mineral activities will be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use. This S&G involves both beneficial effects (e.g., closure, drainage, and revegetation) and adverse effects (e.g., emanating from the actual presence of such roads, and minimal standards which may not be as stable as higher standards).

Implementation of this S&G may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Rangeland Management Program

Standard and Guideline 1151 guides the maintenance of riparian communities by providing water for wildlife and livestock away from sensitive areas. The FWS considers this action beneficial overall but with some adverse effects. The provision of water away from riparian areas reduces, but does not necessarily eliminate the effects of livestock on those areas. Livestock may continue to seek shade in the riparian areas, upland conditions may remain compromised, or the water development may reduce streamflows. Another potential scenario involving a tradeoff between adverse and beneficial effects would be the placing of Gila chub in a stock and/or wildlife water habitat from which water was piped away. Please refer to the discussion regarding Walnut Spring on the Tonto NF in the desert pupfish section of this document.

Standard and Guideline 1154 directs the Forest to bring all grazing allotments to satisfactory management by the end of the first decade. Satisfactory management occurs on allotments where management actions are proceeding according to a schedule (Allotment Management Plan), which lead to fair or better range condition with upward trend. Acres of satisfactory management are the total full capacity acres for a complete allotment within a management area being operated satisfactorily. Acres of unsatisfactory managed range are the total full capacity acres for complete allotments within a management area being operated unsatisfactorily. As

stated previously (Gila NF S&G 848 and elsewhere), any S&G which establishes target habitat conditions beneficial to a species but which defers implementation until a later timeframe is considered to have short-term adverse effects to the species.

Standard and Guideline 1162 states that when using pesticides, avoid direct application to water, and to not mix or load chemicals near streams or wet areas. This S&G is not protective enough to prevent the intrusion of pesticides into streams nor does it specify what pest species are to be targeted or what effects their removal will have on Gila chub. Thus, this S&G may result in a sublethal response by the chub.

Implementation of this S&G may affect, via the potential for short-term or chronic watershed-scale degradation, the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1136 in the Recreation Program allows trail access to be restricted to non-motorized use except where indicated on the Forest visitor maps and signed on the ground. Where discrepancies occur, on the ground signing will prevail.

The effects of the Prescott National Forest's trail system can be considered a subset of the effects of roads discussed by Angermeier et al. (2004). The FWS anticipates some level of adverse effects from the existing network, but we also anticipate that these effects will be minimized as restrictions on motorized use are implemented on the ground, updated in Forest maps, and indicated by signage.

Implementation of this S&G may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Watershed Management Program

Standard and Guideline 1147 guides the Forest to meet the following riparian Standards in the Regional Guide for 80 percent of riparian areas by 2030: maintain at least 80 percent to the

potential overstory crown closure of obligate riparian species. Manage resources to create or maintain at least three age classes of woody riparian species with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings where site potential exists. Maintain at least 80 percent of the potential stream shading along perennial cold-water streams. Maintain adequate emergent vegetation to ensure compliance with the goals of the strategic plan. Maintain 80 percent of spawning gravel surface free of occlusive inorganic sediment. Maintain at least 80 percent of stream bank linear distance in stable condition. Retain snags in riparian areas that are not a safety hazard. Implementation of this S&G (1147) may result in lethal effects on Gila chub because 80 percent potential stream shading may not be adequate to maintain the optimal stream temperatures required by this species. Once again, partial attainment of habitat conditions is interpreted to result in some level of adverse effects to the Gila chub.

Standard and Guideline 1166 guides the minimization of impacts to the soil and water resources during all ground disturbing activities. Where disturbance cannot be avoided, provide stabilization and revegetation as part of the project. Minimization of impacts to soil and water resources does not necessarily equate with avoidance of such impacts. Regardless, S&G 1166 implicitly commits to the implementation of BMPs that will reduce adverse effects to Gila chub, particularly from sedimentation. The FWS also anticipates longer-term benefits as stabilization and revegetation efforts achieve their success criteria.

Implementation of these Prescott NF Watershed S&Gs may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 1149 allows the Forest to cooperate with AGFD on population control of aquatic plants and undesirable fish species. This S&G directs the Forest to permit fish stocking to meet state fisheries goals. The effects of non-native fish on native fishes, including Gila chub, are almost entirely deleterious and have been documented in numerous publications (Minckley 1985, Williams et al. 1985, Minckley and Deacon 1991). Dudley (1995) correlated green sunfish presence with Gila chub declines in Sabino Canyon on the Coronado National Forest. The FWS considers the introduction or maintenance of non-native fishes in habitats occupied by Gila chub, or habitats into which the species may be reestablished, to be highly adverse.

Implementation of S&G 1149 may affect PCE (6); by not providing a habitat devoid of non-native aquatic species detrimental to Gila chub or its habitat.

Tonto National Forest

The FWS found no S&Gs that would cause a negative effect to the species. The majority were ranked as maintaining habitat and providing minimal recovery. However, many of the S&Gs in the Wildlife Program could potentially result in short-term adverse effects.

Table 105. Effects of the S&Gs analyzed for the Gila Chub – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	7.7
1	S&G is maintaining habitat & providing at least minimal recovery	23	88.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	3.8
X	S&G is a heading	0	0.0
Total		26	100 %

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 1355 allows the Forest to rehabilitate and maintain riparian areas through improved management practices. Mixed broadleaf riparian should achieve 80 percent of the potential overstory crown coverage. Natural regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas. The FWS recognizes that this S&G implicitly allows up to 20 percent of potential overstory crown coverage to remain unachieved and moreover, that existing and potential overstory crown coverage is likely indeterminate at this time. Regardless, we anticipate that management direction could result in increased canopy cover and that artificial regeneration may result in abbreviated recovery times for degraded areas.

Standard and Guideline 1364 states that stream crossing approaches should avoid steep pitches and grades in order to prevent sedimentation. Standard and Guideline 1365 allows the Forest to select an area where the channel is straight and cross the channel at right angles where channel crossings are necessary. These S&Gs 1364 and 1365 each involve the implicit assumption that roads could be built in or near habitat occupied by Gila chub. While the effects of such roads will be reduced by the design criteria contained in the S&Gs, the effects of the roads themselves cannot be entirely eliminated without avoiding road construction in and near streams entirely.

Implementation of these S&Gs within the Tonto NF Wildlife Program may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and

insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

1996 Regional Amendment

There are no adverse effects to the Gila chub from the implementation of the S&Gs within the 1996 Regional Amendment. However, several beneficial S&Gs may have short-term adverse effects to the species. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect the Gila chub.

Table 106. Effects of the S&Gs analyzed for the Gila Chub – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	30	58.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	15.7
Z	S&G implementation is non-discretionary	2	3.9
X	S&G is a heading	6	11.8
Total		51	100 %

Standard and Guideline 1432 allows no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years. Standard and Guideline 1445 allows treatment of fuel accumulations to abate fire risk. Standard and Guideline 1455 directs the Forests to use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire. Standard and Guideline 1458 allows prescribed fire where appropriate within Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas). Standard and Guideline 1468 encourages prescribed and prescribed natural fire to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire. Standard and Guideline 1476 directs the Forest to apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines.

Each of the aforementioned S&Gs permits short-term adverse effects on forested environments in order to secure long-term stability and/or to create conditions more desirable for the Northern Goshawk and/or Mexican Spotted Owl. The range of the Gila chub is generally situated

downstream of much of the habitat occupied by (or suitable for) these raptors and thus, the fish can be expected to experience indirect, short-term adverse effects in exchange for long-term habitat stability or improvement.

Standard and Guideline 1508 allows for low intensity ground fires at any time in all forested cover types, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas. This S&G directs the Forests to avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree.

Collectively, implementation of the Mexican Spotted Owl and Northern Goshawk guidelines may affect the following proposed Gila chub critical habitat PCEs: (1) by reducing the availability of perennial pools; areas of higher velocity between pool areas; and areas of shallow water among plants or eddies by increasing sedimentation into pool habitat; (2) by opening up the overstory resulting in increased water temperatures; (3) by increasing sedimentation resulting in contamination of water quality; (4) by reducing the food base including invertebrates; filamentous algae; and insects; (5) by reducing sufficient hiding and spawning cover consisting of downed logs in the water channel; submerged large tree root wads; undercut banks with sufficient overhanging vegetation; and large rocks and boulders with overhangs; and (7) by altering a streams natural unregulated flow pattern including periodic natural flooding.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Cumulative effects to Gila chub include ongoing activities in the watershed such as livestock grazing and associated activities outside of the allotments addressed herein, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization, and recreation. Some of these activities, such as irrigated agriculture, are declining and are not expected to contribute substantially to cumulative long-term adverse effects to the Gila chub.

Other activities, such as recreation are increasing. Increasing recreational, residential, or commercial use of the private lands near the riparian areas will likely result in increased cumulative adverse effects to occupied Gila chub habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). That statement concludes that accumulation of localized or small impacts, often from unrelated human actions, pose a serious threat to fisheries. It also points out that some improvement efforts to fish habitat may not result in cumulative

increases in status of the species but instead may simply mitigate cumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the Gila chub, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our conference opinion that the proposed action is not likely to jeopardize the continued existence of the Gila chub, and is not likely to destroy or adversely modify proposed critical habitat. Pursuant to 50 CFR 402.02, to “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Effects to the Gila chub from the Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto NF LRMPs, and the 1996 Regional Amendment were analyzed. Potential adverse effects from the implementation of these LRMPs and associated S&Gs were found likely to occur from five of the six Forests’ LRMPs. The Tonto NF LRMP had no S&Gs that resulted in adverse affects to the Gila chub. In addition, short-term adverse effects were identified for activities associated with S&Gs that have a long-term benefit to the species. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- There are several S&Gs within the Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto LRMPs that support conservation and recovery of Gila chub. These are S&Gs 1 and 4 within the Apache-Sitgreaves LRMP; S&G 321 within the Coconino LRMP that states that management of sensitive species will take precedence over other species except threatened and endangered; S&Gs 629, 633, 707, 709, 757, 770, 774, 779, 786, 791, 800, 814, 821, 825, and 828 within the Coronado LRMP; S&Gs 870 and 925 within the Gila LRMP; and S&G 1119 within the Prescott LRMP. All of these S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species.
- Although the Gila chub is not currently federally listed, the Forest Service has taken proactive measures in an attempt to reduce the decline of the species. For example, during the last several years Sabino Canyon, Romero Canyon and Paige Creeks on the Coronado NF have been treated using piscicides to remove non-native species of fish that compete with and prey upon native fish (U.S. Forest Service 2004). Monitoring of all three areas continues in order to detect invasion by non-native green sunfish which persist downstream on non-Forest Service lands (U.S. Forest Service 2004).
- Across the range of the species, there are other conservation efforts underway, such as a cooperative agreement between the BLM and The Nature Conservancy to manage the Muleshoe preserve under the Muleshoe Ecosystem Management Plan.

The plan addresses management activities for the maintenance and improvement of watershed conditions necessary for primary constituent elements important to the Gila chub (U. S. Fish and Wildlife Service 2002).

Due to the fact that the Gila chub is a hard-to-find, secretive species and because there have been no extensive survey efforts for this species since the comprehensive status review by Weedman *et al.* (1996), it is possible that Gila chub still persist in areas thought to be extirpated and may occur in localities yet to be discovered. Proactive efforts by the Forest Service in the past and the continued monitoring of those actions contribute positively to the overall status of the Gila chub. In addition, there are activities being conducted by other land management agencies to enhance habitat for the chub that benefit its status rangewide. All these actions together with the implementation of the beneficial S&Gs outlined above should continue to improve habitat conditions and increase populations of Gila chub on National Forest System lands in the southwest. For these reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Gila chub.

Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, proposed critical habitat for the Gila chub will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify proposed critical habitat for the Gila chub.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined in section 3 of the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined at 50 CFR 17.3 to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined at 50 CFR 17.3 as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action, is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The prohibitions against taking species found in section 9 of the ESA do not apply until the species is listed. However, we advise the Forest Service to consider implementing the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following listing, these measures, with their implementing terms and conditions, will be nondiscretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to any permittee, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity

covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require any permittee to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Forest Service or the permittee must report the progress of the action and its impact on the species to us as specified in the incidental take statement [50 CFR '402.14(I)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Gila chub is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto NFs LRMPs, as well as the 1996 Regional Amendment. On the Apache-Sitgreaves NF, incidental take is expected to be in the forms of harm, harassment, and mortality to the species from the Engineering, Forestry and Forest Health, and Wildlife programs. On the Coconino NF, incidental take is expected to be in the forms of harm and harassment to the species from the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Fire Management, Watershed Management, and Wildlife programs. On the Coronado National Forest, incidental take is expected to be in the forms of harm, harassment, and mortality to the species from the Forestry and Forest Health, Fire Management, Rangeland Management, Watershed Management, and Wildlife programs. On the Gila NF, incidental take is expected to be in the forms of harm and harassment to the species from the Rangeland Management, Fire Management, and Wildlife programs. On the Prescott NF, incidental take is expected to be in the forms of harm, harassment, and mortality to the species from the Lands and Minerals, Recreation, Rangeland Management, Watershed Management, and Wildlife programs. On the Tonto NF, incidental take is expected to be in the forms of harm and harassment to the species from the Wildlife Program.

The FWS anticipates, however, that the aforementioned incidental take will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, it is not possible to provide precise numbers of Gila chub that will be harassed, harmed, or killed as a result of the proposed action. In such instances where take is difficult to detect and/or quantify, take may be quantified in terms of an aspect of the species' habitat that may be diminished or removed by the action. Therefore, the FWS is quantifying incidental take to include habitat characteristics important to Gila chub (e.g., pool habitat), and is using this habitat surrogate measure to identify when take has been exceeded. In fluvial systems, pool habitat is defined as open pools with undercut banks and/or boulders with water depths of up to 2 meters over bedrock, sand, gravel, cobble, and mud (Miller 1963, Minckley and Carufel 1967) and capable of hydrologic connection to other such habitats at the reach and watershed scale. In lentic systems (i.e., ponds and tanks), the feature itself is the wetted pool to be conserved. The FWS concludes that the incidental take of Gila chub will be considered to be exceeded if currently occupied pool habitat is diminished at either the reach scale (i.e. number of pools reduced) or the scale of an individual pool (i.e. quality of pools degraded) on National Forest System lands as a result of the proposed action. The amount of pool habitat as measured during field surveys at base flow conditions (outside of extreme drought) must be maintained for chub. Standard protocol, such as

the Forest Service Region 3 Stream Inventory Methodology (Version 3.1, 2005), can be used to document the amount and quality of pool habitat.

Effect of the Take

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the Gila chub.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measure is necessary and appropriate to minimize take of Gila chub:

1. Protect Gila chub on National Forest System lands.
2. Protect Gila chub habitat on National Forest System lands.
3. Monitor Gila chub populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Gila chub populations for conditions to eliminate direct effects and minimize indirect effects to Gila chub and its habitat.
- 1.2 Design projects within the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Recreation, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the Gila chub.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and the continued presence of non-native species within Gila chub habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Gila chub habitat to incorporate important characteristics of pool habitats with the goal of implementing projects that will have beneficial, insignificant, or discountable effects to the Gila chub and its habitat..
 - a. Pools shall be retained in their current frequency or increased in incidence in each occupied reach, even if only a single pool is occupied by Gila chub.
 - b. The physical characteristics of the pools in each reach shall be retained or

improved. Important characteristics include, but are not limited to: length, width, depth, residual depth, bank shape, bed material, instream cover type, presence of submergent or emergent vegetation, and absence of non-native fish or amphibians.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Gila chub and Gila chub pool habitat on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service will track and report the effects of the proposed action on Gila chub, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to identify factors that limit the recovery potential of the Gila chub on lands under their jurisdiction and work to correct them.
2. Acquire instream flow water rights to ensure perennial flow in streams within Gila chub habitat.
3. Work with the FWS and state conservation agencies to remove non-native species and reestablish Gila chub throughout its historic range in both Arizona and New Mexico.
4. Continue to investigate the presence of Gila chub on the National Forests and to determine to what extent the headwater chub (*Gila nigra*) may occupy those streams.

5. Work cooperatively with the FWS, BLM, NMDGF, and AGFD to establish refugia populations of Gila chub wherever possible.
6. Work with FWS, NMDGF, and AGFD to establish an emergency salvage protocol such as exists for Apache trout. Such a salvage effort should be accompanied by a commitment to repatriate the fish as soon as conditions allow. The emergency salvage operation undertaken in Sabino Creek following the Aspen Fire should serve as a model for interagency cooperation.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

GILA TOPMINNOW

STATUS OF THE SPECIES

Description

Gila topminnow (*Poeciliopsis occidentalis occidentalis*) is a small live-bearing minnow belonging to the family Poeciliidae. The Gila topminnow is a subspecies of *Poeciliopsis occidentalis* that also includes the Yaqui topminnow (*Poeciliopsis occidentalis sonoriensis*) and are collectively known as the Sonoran topminnow. Males are rarely greater than 1 inch in length, while females are larger, reaching 2 inches in length. Both males and females range in coloration from tan to olive bodies, usually with white on the belly. Breeding males are often blackened, with a golden coloration about the midline, and have orange or yellow at the base of their dorsal fin.

General topminnow habitat includes quiet, warm waters with slow current and abundant aquatic vegetation. However, topminnow can survive in swiftly flowing streams with vegetation providing adequate cover.

Legal Status: The Gila topminnow was listed as endangered in 1967 without critical habitat (U.S. Fish and Wildlife Service 1967). The species was later revised to include two subspecies, *P. o. occidentalis* and *P. o. sonoriensis* (Minckley 1969, 1973). Both subspecies are protected under the ESA. Only Gila topminnow populations in the United States, and not in Mexico, are listed under the ESA.

The original Recovery Plan for the Gila and Yaqui topminnows was completed on March 15, 1984. The Recovery Plan calls for the downlisting or delisting of both species. Criteria for downlisting were met for a short period. However, due to concerns regarding the status of several populations, downlisting was delayed. Subsequently, the number of reintroduced populations dropped below that required for downlisting, where it has remained.

Distribution and Abundance

Historically, the Gila topminnow occupied larger streams and rivers including the Gila, Salt, Santa Cruz, San Pedro, San Carlos, and their respective tributaries. The Gila topminnow was once the most common fish in the Gila River Basin but is presently restricted to about 14 populations in separated, isolated locations (Minckley 1973). Three of these support Gila topminnow at disjunct locations: Sonoita Creek, Santa Cruz River, and Cienega Creek. Only 12 of these natural topminnow populations are considered extant (Weedman and Young 1997).

Since 1936, at least 178 wild localities have been stocked with Gila topminnow or populated by natural dispersal from release sites. Only 19 sites are known to support Gila topminnow. Of the 19, one site is outside topminnow historical range and three now contain non-native fish. The other 15 reestablished Gila topminnow populations within historic range coexist with other species of native fishes or without other fishes present (Voeltz and Bettaso 2003).

In Mexico, the species occurs in the Rio Sonora, Rio de la Concepcion, and the Santa Cruz River, but these cross-border populations are not listed under the ESA.

Habitat

Gila topminnow historically occupied shallow margins of main river channels, backwaters, larger tributaries, and natural springs located adjacent to main rivers or their respective tributaries. Overall, habitat requirements for the topminnow are broad, where most topminnow prefer shallow, warm, quiet waters (Weedman 1999). Both lentic and lotic habitats with moderate current are tolerated. Topminnow live in a broad range of water chemistries, with values of pH ranging from 6.6 to 8.9, dissolved oxygen readings from 2.2 to 11 mg/L (Meffe et al. 1983), and salinities approaching those of sea water (Schoenherr 1974). Water loss is tolerated by burrowing into the mud (Meffe et al. 1983). Preferred burrowing habitats contain dense mats of algae and debris in stream margins or below riffles, with organic muds and debris covering sandy substrates (Minkley 1973). Although Gila topminnow may occupy pools and ponds that are up to 6 ft (2 m) deep, they are normally found in the upper one-third of the water column (Forrest 1992).

Life History

Gila topminnow are viviparous fish, where embryos grow and mature within the female and are born living. Fertilization also occurs internally through deposition of spermatophores (packets of sperm). Breeding generally occurs from January to August, but can occur throughout the year in thermally constant springs (Heath 1962, Minkley 1973, Schoenherr 1974). Brood size ranges from one to 31, dependant upon standard length of the female (Constantz 1974, Schoenherr 1974, 1977), with 21.5 days as a mean interval between broods (Schoenherr 1974).

Gila topminnow are opportunistic omnivorous feeders (Schoenherr 1974), consuming detritus, vegetation, amphipods, ostracods, and insect larvae; and rarely, other fishes (Schoenherr 1974, Gerking and Plantz 1980, Meffe et al. 1983, Meffe 1984).

Presently, the Gila topminnow is extant in only 32 localities (Voelts and Bettaso 2003). Thirteen of these populations occur on National Forest System lands: 10 on the Tonto NF, two on the Prescott NF, and one on the Coronado NF. The two populations on the Prescott NF have recently been confirmed as extirpated (U.S. Forest Service 2004).

Reasons for Listing

The Gila topminnow was listed as endangered in 1967 without critical habitat (U.S. Fish and Wildlife Service 1967). The listing stated the species was threatened with extinction based on declining populations.

Threats: According to the Recovery Plan, threats to the Gila topminnow include habitat loss and predation by introduced mosquitofish. Habitat destruction and introduction of non-native species are the primary reasons for reductions in Gila topminnow populations, and are the causes for its listing as an endangered species (U.S. Fish and Wildlife Service 1984, Williams et al. 1985, 1989, Simmons et al. 1989).

During the early 20th century, several factors caused widespread habitat changes throughout the Southwest. These events include both biotic and abiotic factors, such as loss of vegetation through improper livestock grazing and timber wood harvesting, periods of flooding and drought, and the construction of water diversions and dams (Minkley 1993).

Although historic events occurring in the early 20th century permanently altered much of the aquatic habitat in the southwest, it is current and future activities that threaten the continued existence and reestablishment of this species. Current land use practices such as livestock grazing, mining, timber harvesting, road maintenance and recreation pose major threats to habitat as well as existing and future populations. Additionally, population growth and development continue to affect potential recovery of the species through increased groundwater pumping and diversions to supply the growing populations, stream and river channelization, and increased water pollution (Weedman 1999).

The subspecies is highly vulnerable to adverse effects from non-native aquatic species (Johnson and Hubbs 1989), including non-native crayfish (Fernandez and Rosen 1996) and bullfrogs. Predation and competition from these species have resulted in Gila topminnow declines and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). Bullfrogs (*Rana catesbiana*) are widespread and abundant throughout Gila topminnow historic range and are known to prey on fishes (Rosen and Schwalbe 1996). However, Meffe et al. (1983) identify the introduction of the western mosquitofish as causing the most problems for the Gila topminnow because mosquitofish can tolerate similar environmental extremes, and can therefore occupy similar habitats as Gila topminnow. It has been documented that mosquito fish can eliminate a population of topminnow within a year (Minckley and Deacon 1968, Schoenherr 1974). To date, the spread of mosquito fish has continued virtually unchecked since their introduction to Arizona in 1926 (Minckley et al. 1977, Meffe et al. 1983).

Because the native fish fauna of the Gila basin and of the Colorado basin in general was naturally depauperate and contained few prey fish (Carlson and Muth 1989), the Gila topminnow was unable to evolve mechanisms for protection against predation or competition. In the riverine backwater and side-channel habitats that formed the bulk of Gila topminnow natural habitat, predation and competition from other fishes was essentially absent. Therefore, the introduction of large numbers of predatory and competitive non-native fish, frogs, crayfish, and other species, provided conditions within which the Gila topminnow could no longer survive in many of their former habitats, or the small pieces of those habitats that had not been lost to human alteration.

Conservation Measures

A number of potentially viable sites have been identified by federal and state agencies that could support Gila topminnow. These sites have not been stocked, but several have been evaluated.

The Arizona Department of Transportation has completed a Safe Harbor Agreement for the Gila topminnow and the desert pupfish (Arizona Department of Transportation 2000). This agreement covers all properties managed by Arizona Department of Transportation. The Arizona Game and Fish Department is also developing a Safe Harbor Agreement with the FWS, which will allow Gila topminnow and desert pupfish populations to be established on non-federal lands. Implementation of this Safe Harbor Agreement will allow for the establishment of new populations and maintenance of genetic stocks and refugia populations in natural, semi-natural, or manmade habitats, which will aid in recovery efforts for the two species.

As discussed previously, there have been over 175 sites stocked with Gila topminnow. However, topminnow persist at only 18 of these localities. Thirteen of the 18 sites occur on National Forest System lands. There are many reasons for failure of many of the stocked populations, but flooding, desiccation, water development, livestock, and non-native species have been identified as the major reasons (Brooks 1985).

Additional efforts have identified suitable sites for stocking the topminnow on National Forest System lands. The draft recovery plan revision, due to be finalized by the end of 2005, has identified numerous sites to establish populations of Gila topminnow. These sites can be found on all the National Forests' analyzed below for effects (U.S. Forest Service 2004).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species in the Action Area

As stated above, 13 populations of Gila topminnow exist on National Forest System lands in Arizona: 10 populations on the Tonto NF, two occurring on the Prescott NF, and one occurring on the Coronado NF. Two populations on the Prescott NF have recently been confirmed as extirpated (U.S. Forest Service 2004).

The Coronado NF population in Redrock Canyon (Sierra Vista Ranger District) is the only natural relict population; all others on the Coronado NF are the result of reintroductions (U.S. Forest Service 2004). The Redrock population is the only extant population on the Coronado NF (U.S. Forest Service 2004). Stocked sites on other National Forest System lands include Charlebois, Hidden Water, Mud, Walnut, Kayler and Dutchman Grave springs; Campaign and Lime creeks; and Unnamed Drainage #68B on the Tonto NF (U.S. Forest Service 2004). Two additional sites occur at Lower Mine and Johnson Wash springs on the Prescott NF (U.S. Forest Service 2004). Nearly all other occupied Gila topminnow sites' watersheds contain or closely adjoin National Forest System lands (i.e. Redfield Canyon, Bass Canyon, and Aravaipa Creek downstream from the Coronado NF; Larry Creek and Lousy Canyon downstream from the Tonto NF.)

Factors Affecting the Species within the Action Area

The most-recent consultation regarding a National Forest's effects on the Gila topminnow was our November 5, 2004, biological opinion on activities at Walnut Spring (spring maintenance, reestablishment of desert pupfish, continued use of a 10-year term permit to graze livestock on the surrounding Cross F Allotment, and other activities (02-21-95-F-0303 R1)). The action included measures to reduce the adverse effects of livestock grazing on the Walnut Spring pond as well as measures to increase the volume of water entrained in the pond. The proposed action is expected to improve the condition under which Walnut Spring's Gila topminnow population

has flourished for over 20 years and thus, contribute incrementally to recovery. The FWS anticipates that incidental take would be exceeded if the post-project pool depth was reduced to six inches or less, if said decline was due to cattle grazing or maintenance activities. Terms and conditions were prescribed to ensure maintenance and monitoring of the enclosure and new pond structures.

The FWS transmitted a Biological Opinion on Livestock Grazing on the Kunde and Papago Allotments (02-21-98-F-0339 R2) to the Coronado National Forest on January 2, 2004. The biological opinion examined the effects of livestock grazing in two allotments on Gila topminnow and/or the species' habitat in Redrock Canyon, Cienega Creek, and O'Donnell Canyon. The FWS anticipates that incidental take would be exceeded if enclosure fencing was compromised, riparian utilization exceeded five percent, and if alterable bank impacts exceeded 10 percent. Terms and conditions focused on measures to ensure monitoring of incidental take, maintenance of the fenced enclosures, and implementation of minimization measures.

The FWS transmitted a biological opinion to the Coronado NF regarding the continuation of livestock grazing (2-21-98-F-0399 R1) on October 24, 2002. The Status of the Species section of the prior biological opinion represents a comprehensive, site-by-site assessment of Gila topminnow status on the Coronado NF. For the general on-going livestock grazing and its management, all Gila topminnow outside of enclosures in periodically occupied habitat may be taken through harm from livestock grazing. In addition, direct take of Gila topminnow will occur when livestock are on occupied habitat.

The Gila topminnow's status within the action area is not necessarily secure; the currently-occupied sites have not demonstrated occupancy over a sufficiently long-term, and may lack the ability to survive the current, chronic drought. The reestablishment history of Gila topminnow illustrates that even sites that were thought to be secure may fail for various reasons. Mud Tank was stocked with Gila topminnow (and desert pupfish) under authorization of our November 24, 1998, *Formal Consultation on the Reintroduction of Gila Topminnow and Desert Pupfish into Three Tributaries of the Agua Fria River* (File number 2-21-99-F-031). Gila topminnow on federal lands is widely dispersed and in some cases vulnerable to events beyond the respective land management agencies' control. Such actions would include invasions or unauthorized introductions of non-native fishes and stochastic events such as floods. Infrequent yet large floods have transported topminnow (BLM's AD Wash) or destroyed structures intended to minimize the effects of livestock use (BLM's Tule Creek). The risk associated with maintaining Gila topminnow for the long-term across such a diversity of sites renders the species' status within the action area as tenuous as it is rangewide.

EFFECTS OF THE ACTION

The Gila topminnow occurs on the Coronado, Prescott, and Tonto NFs. The S&Gs listed in these National Forest' LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Gila topminnow and its habitat. These S&Gs may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Gila topminnow.

Table 107. Summary of S&Gs considered for the Gila topminnow.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-638, 644, 645, 648-653, 666-678, 672-682, 692-698, 700, 703-713, 774, 777-780, 782-786, 788-792, 794-800, 802-805, 807, 808, 810-812, 827
Prescott	1115-1138, 1142-1163, 1165-1167, 1169-1176, 1178-1182
Tonto	1340-1342, 1344, 1345, 1348-1350, 1352-1357, 1359, 1361-1368, 1371, 1373-1378, 1382, 1384-1386, 1391-1393, 1398-1403, 1407, 1410, 1416-1418, 1420-1423,
1996 Regional Amendment	1497, 1498, 1510-1515

Coronado National Forest

There were five S&Gs within the Coronado NF that resulted in adverse effects to the Gila topminnow. Although the majority of S&Gs are positive and provide for some level of recovery of the species, there were several that were beneficial in the long-term but had some short-term adverse effects.

Table 108. Effects of the S&Gs analyzed for the Gila topminnow – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.0
-2	S&G is causing sublethal response	3	2.9
-1	S&G is causing negative behavioral response	1	1.0
0	S&G is ill-defined and/or open to interpretation	15	14.3
1	S&G is maintaining habitat & providing at least minimal recovery	69	65.7
2	S&G is moving towards recovery	5	4.8
3	S&G is implementing species recovery plan	7	6.7
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	2	1.9
Total		105	100 %

Fire Management Program

Overall, there is weak direction within the Coronado NF LRMP to address conflicts between fire management and its effects to the Gila topminnow. Fire is often used to meet management objectives, such as improving wildlife habitat and livestock forage, reducing fuel hazards, and improving watershed condition. The Fire Management Program within the Coronado NF LRMP seeks to improve forest health, watershed condition, and wildlife habitat. Although fire management will result in many beneficial effects to the Gila topminnow, prescribed burning may result in direct and indirect short-term effects.

Standard and Guideline 695 seeks to conduct fire suppression activities in a manner that protects both watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Additionally, S&Gs 713, 798, and 812 deal with the use of prescribed fire, but would occur within different management areas. Prescribed fire may result in short-term negative effects to Gila topminnow, yet decreases the likelihood of catastrophic burns in the future. Thus, short-term adverse effects are anticipated with the implementation of the above S&Gs.

Forestry and Forest Health Program

Standards and Guidelines within the Forestry and Forest Health program are aimed at addressing land management practices, such as vegetation manipulation for disease control or insect outbreaks, removing slash/dead and down material to prevent catastrophic wildfires, or using pesticides to control outbreaks.

Standard and Guideline 697 allows for the use of pesticides in recreation and administrative sites, and it does not offer alternative land management practices to that of pesticide use. Pesticides are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995). Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee et al. 2003).

Rangeland Management Program

The Coronado NF LRMP seeks to provide livestock grazing on a sustainable basis and maintaining or improving riparian and watershed conditions (U.S. Forest Service 2004). Within this Forest, guidance for rangeland management is directed at the management area level rather than Forest-wide (e.g., 710, MA1; 780, MA4; 805, MA7B; 792, MA7A). Standard and Guideline 762 allows for various levels of grazing within suitable rangelands of Management Area 3. This S&G was noted for possible sublethal effects to Gila topminnow. Additionally,

S&Gs 792 and 805 seek to manage suitable rangeland at either Level A (no grazing) or Level D (intensive livestock management with higher density of water developments and interior fencing). Livestock management activities on the Coronado NF can have indirect effects, through upland/watershed effects on riparian and aquatic habitats. As stated in the recovery plan, one of the primary threats to Gila topminnow is loss of habitat.

Gila topminnow is adversely affected by activities which contribute to altering the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). The way in which the effects of livestock grazing are manifested and the magnitude of the effects in the watershed, is also dependant on local site conditions.

Watershed Management Program

The Watershed Management Program seeks to maintain or improve watershed conditions and maintain water quality. This program in particular provides beneficial guidance for the Gila topminnow within the Coronado LRMP.

Standard & Guideline 678 provides guidance for management of the aquatic-riparian resources, and seeks to perform the following objectives: (1) maintain at least 80 percent of natural shade over water surfaces in fish bearing streams. (2) maintain at least 80 percent of natural bank protection. (3) maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. Hypothetically, degraded streambank conditions could extend downstream until the majority of the streambank is unstable. This could result in increased sedimentation into the stream channel, thus lowering water quality and integrity. As a result, potential effects to the species include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 677 intends to classify all riparian areas within a certain time period, while completing plans to improve all unsatisfactory areas. This S&G is beneficial because it is moving toward satisfactory riparian conditions; however, there may be some short-term adverse effects that may continue to occur until the riparian habitat reaches satisfactory conditions.

Several S&Gs (711, 782, 784, 794, and 807) deal with improving watershed conditions, but apply to different management areas. They allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Wildlife, Fish and Rare Plants Program

Standards and Guidelines 667 & 668 are likely to cause short-term adverse effects in order to achieve long-term beneficial goals. Standard and Guideline 667 allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may

have short-term impacts on water quality in adjacent streams inhabited by Gila topminnow. Standard and Guideline 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish as well as indirect impacts to the habitat such as temporary alterations of stream flow, or short-term isolated increases in sediment entering the stream.

Prescott National Forest

There were two S&Gs within the Prescott NF’s LRMP that resulted in adverse effects to the Gila topminnow. Although the majority of S&Gs are positive and provide for some level of recovery of the species, there were several that were beneficial in the long-term but had some short-term adverse effects.

Table 109. Effects of the S&Gs analyzed for the Gila topminnow - Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.6
-2	S&G is causing sublethal response	1	1.6
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	4.8
1	S&G is maintaining habitat & providing at least minimal recovery	51	82.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.2
Y	S&G has no application to the species	1	1.6
Z	S&G implementation is non-discretionary	2	3.2
X	S&G is a heading	1	1.6
Total		62	100 %

Lands and Minerals Program

Standard and Guideline 1169 seeks to limit the amount of disturbance created by multiple roads to private land inholdings by allowing only one access road. This S&G could potentially cause short-term adverse effects in the process of implementing an activity that will provide an overall beneficial effect to the landscape in the long-term.

Rangeland Management Program

Overall, most of the S&Gs applicable within the Rangeland Management Program provide guidance to protect riparian areas, watersheds, soils, water quality, wildlife habitat, and listed species. However, certain S&Gs within this program were noted for their adverse effects to the Gila topminnow.

Standard and Guideline 1162 allows for the use of pesticides, but cautions against direct application to water. Pesticides are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. A number of generalizations can be made about

pesticides. First, effective pesticides are designed to be selective in their effects-- they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee et al. 2003).

Although S&Gs 1151 and 1154 are positive management activities directed at livestock grazing that would reduce long-term adverse effects to the landscape, there may be short-term adverse effects associated with this management.

Recreation, Heritage, and Wilderness Program

Overall, S&Gs within the Recreation Program provide guidance to ensure resource protection. Under this guidance, sites occupied by Gila topminnow should be protected from adverse effects associated with the implementation of S&Gs within this program. Standard and Guideline 1136 allows the Forest to restrict trail access to non-motorized use except in areas where designated by Forest visitor maps or signed on the ground. Once again this S&G is an attempt to minimize the effect of roads and trails on the landscape in the long-term. This action could mean a potential for some short-term adverse effects to this species.

Watershed Management Program

The S&Gs 1147 and 1166 provide guidance for management of riparian resources. The FWS recognizes that the intent of these S&Gs is positive; however, there may be some short-term adverse effects to Gila topminnow during the implementation of these S&Gs.

Standard and Guideline 1147 allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. Hypothetically, degraded streambank conditions could extend downstream until the majority of the streambank is unstable. This could result in increased sedimentation into the stream channel, thus lowering water quality and integrity. As a result, potential effects to the species include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Wildlife, Fish, and Rare Plants Program

The overall intent of S&Gs within Wildlife Program is to maintain or improve conditions for wildlife habitat region-wide. The S&Gs within this program often seek to restrict or encourage

activities relating to listed species within other LRMP programs. However, S&G 1149 permits fish stocking to meet state fisheries goals. For purposes of this analysis, the FWS assumes that fish stocking could include both native and non-native fish. Gila topminnow are highly vulnerable to adverse effects from non-native aquatic species (Johnson and Hubbs 1989), including non-native crayfish (Fernandez and Rosen 1996) and bullfrogs. Predation and competition from non-native fishes has been a major factor in their decline and continues to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985, Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman 1999). Populations of the Gila topminnow have been drastically reduced due to the introduction of exotic predators such as the mosquitofish and other competitors. It has been documented that mosquitofish can eliminate a population of topminnow within a year (Minckley and Deacon 1968, Schoenherr 1974). The spread on mosquito fish has continued virtually unchecked since their introduction to Arizona in 1926 (Minckley et al. 1977, Meffe et al. 1983).

Tonto National Forest

There are three S&Gs within the Tonto NF LRMP that may result in adverse effects to the Gila topminnow. Although the majority of S&Gs are positive and provide for some level of recovery of the species, there were several that were beneficial in the long-term but had some short-term adverse effects.

Table 110. Effects of the S&Gs analyzed for the Gila topminnow - Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.9
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	2	3.8
0	S&G is ill-defined and/or open to interpretation	5	9.6
1	S&G is maintaining habitat & providing at least minimal recovery	40	76.9
2	S&G is moving towards recovery	1	1.9
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	2	3.8
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		52	100 %

Forestry and Forest Health Program

The Forestry and Forest Health Program seeks to maintain a sustainable timber program consisting of vertical and horizontal diversity while protecting the watershed, riparian areas, stream channels, and water quality (U.S. Forest Service 2004). Overall, the S&Gs within this program have little effect on Gila topminnow because the species generally occurs in habitats not affected by the implementation of S&Gs within this program.

With the above in mind, S&G 1400 seeks to restrict skidding to less than 40 percent slopes, but does not eliminate the possibility of sediment input into stream channels. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river

downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standards and Guidelines 1398, 1401, and 1403 will implement actions to reduce the impacts of soil disturbing activities to the watershed in the long-term, however this may result in short-term adverse effects.

Rangeland Management Program

Standards and Guidelines 1376 and 1423 seek to manage suitable rangelands at Level C and Level D, respectively. The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland/watershed effects, have been well documented and discussed in recent years (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994).

Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel. The riparian vegetation and streambank condition in tributaries, including intermittent and ephemeral channels, form important buffers between upland impacts and the mainstem or perennial stream. A healthy riparian zone with substantial herbaceous cover is a very effective buffer for filtering sediment and pollutants before they can reach the stream (Erman et al. 1977, Mahoney and Erman 1984, Lowrance et al. 1984, Bisson et al. 1992, Osborne and Kovacic 1993).

Although Gila topminnow is highly tolerant of a wide range of environmental conditions, it may still be adversely affected by activities which contribute to the alteration of the flow regime (i.e., water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). The way in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Wildlife, Fish and Rare Plants Program

Region-wide S&Gs within this program seek to maintain/improve habitat for listed and sensitive species, implement recovery plans, or ensure that beneficial activities occur for fish, wildlife, and plants. Within the Tonto NF LRMP, this program seeks to minimize or resolve conflicts between programs while maintaining a level of use compatible with federally listed species, healthy riparian areas watersheds, and stream channels (U.S. Forest Service 2004). However, little guidance is included in the Tonto NF LRMP that addresses the Wildlife Program

Standards and Guideline 1355, 1364, and 1365 discuss rehabilitation and maintenance of riparian areas and include projects allowing for stream crossing and channel approaches. While the intent of these S&Gs is overall beneficial to the Gila topminnow, the implementation of these S&Gs may result in short-term take of Gila topminnow.

1996 Regional Amendment

Table 111 below shows no adverse effects to the Gila topminnow from the implementation of the S&Gs for the 1996 Regional Amendment. All applicable S&Gs were determined to maintain habitat for the Gila topminnow. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk donot appreciably affect this species.

Table 111. Effects of the S&Gs analyzed for the Gila topminnow - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	3	37.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	62.5
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		8	100 %

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as the trespass of livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Additional cumulative effects to Gila topminnow include ongoing activities in watersheds such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

Additional cumulative impacts to the species may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the Gila topminnow, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the FWS's opinion that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the Gila topminnow from the implementation of the Coronado, Prescott, and Tonto NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- Continuing efforts to stock Gila topminnow in various wild sites and within National Forest System lands have allowed the status of topminnow populations to remain stable.
- The Coronado and Tonto NF's LRMPs specifically state that habitat for Gila topminnow will be maintained at current levels of occupied habitat.
- The Prescott NF's LRMP directs the Forest to maintain and/or improve habitat for threatened or endangered species and work toward the eventual recovery and delisting of species through recovery plan implementation.

Therefore, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which

include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Gila topminnow is reasonably certain to occur as a result of the continued implementation of the Coronado, Prescott, and Tonto NFs LRMPs. On the Coronado NF, incidental take may result from implementation of the Forestry and Forest Health, Rangeland Management, and Watershed Management programs. On the Prescott NF, incidental take may result from implementation of the Rangeland Management and Wildlife Programs. On the Tonto NF, incidental take may result from the implementation of the Rangeland Management Program and Forestry and Forest Health Program. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support Gila topminnow.

The FWS anticipates incidental take of Gila topminnow will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Although we cannot estimate the number of individual topminnows that will be incidentally taken, the FWS is providing a mechanism to quantify when take would be considered to be exceeded at the population level. For purposes of this biological opinion, the FWS defines incidental take in terms of the number of extant populations. The FWS concludes that the incidental take of Gila topminnow will be considered to be exceeded if, after a period of two consecutive years, there is a loss of any currently extant population of Gila topminnow on National Forest System lands as a result of the proposed action. The two-year period begins on the date this biological opinion is signed, and will be replicated every two years thereafter for the life of the biological opinion.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila topminnow.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Gila topminnow.

1. Protect Gila topminnow on National Forest System lands.
2. Protect Gila topminnow habitat on National Forest System lands.
3. Monitor Gila topminnow populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Gila topminnow populations for conditions to eliminate direct effects and minimize indirect effects to Gila topminnow and its habitat.
- 1.2 Design projects within the Forestry and Forest Health (i.e., pest management), Rangeland Management, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the Gila topminnow.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and presence of non-native fish species within Gila topminnow habitat.

The following term and condition will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Gila topminnow habitat to incorporate appropriate components of the Gila Topminnow Recovery Plan with the goal of implementing projects that have beneficial, insignificant, or discountable effects to the Gila topminnow and its habitat.

The following term and condition will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Gila topminnow populations on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of proposed action on Gila topminnow, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Assist with the development of a Gila topminnow monitoring plan that addresses all actions occurring within pertinent watersheds on the Coronado, Prescott, and Tonto NFs.
2. In cooperation with the AGFD and academia, assess habitat dynamics and fish- habitat relationships of the Gila topminnow.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

GILA TROUT

STATUS OF THE SPECIES

Description

Gila trout (*Oncorhynchus gilae*) is a moderate-sized salmonid that typically attains lengths of 20-25 cm (8-10 in); older individuals can exceed 35.5 cm (14 in) in total length. Gila trout are deep-bodied, with fine, profuse black spotting on their body, and dorsal and adipose fins. Adults are golden to greenish-yellow in color. Dorsal, anal, and pelvic fins are edged in white. The golden coloration of the body, parr marks, and fine, profuse spots above the lateral line distinguish Gila trout from other co-occurring non-native trout species in the field (U.S. Fish and Wildlife Service 2003).

Legal Status: Gila trout was originally recognized as endangered under the Federal Endangered Species Preservation Act of 1966 (U.S. Fish and Wildlife Service 1967). Federal designated status of the fish as endangered was continued under the ESA of 1973 (U.S. Fish and Wildlife Service 1975). On May 11, 2005, the FWS published a proposed rule to reclassify the Gila trout as threatened (U.S. Fish and Wildlife Service 2005). Gila trout was listed as endangered by the NMDGF in 1975 under the Wildlife Conservation Act and was downlisted to threatened in 1988. Gila trout are considered a Species of Concern by the AGFD. No critical habitat has been designated for Gila trout.

Distribution and Abundance

Historically, Gila trout were believed to occupy the upper Gila in New Mexico and parts of the San Francisco systems of Arizona and New Mexico (Behnke 2002). The Arizona populations were believed to be extirpated around the turn of the 20th century (U.S. Fish and Wildlife Service 1993). The New Mexico populations were depleted to five populations in the headwaters of the Gila drainage by the 1960's (Minckley 1973, Propst and Stefferud 1997).

A native trout identified as Gila trout in spotting, but as Apache trout from other characteristics, once occurred in the Verde and Agua Fria drainages in Arizona (Behnke and Zarn 1976, Behnke 2002). Trout collected in Oak Creek (1888-89), a tributary of the Verde River, were originally identified as Gila trout. Trout collected in Sycamore Creek (1975), a tributary of the Agua Fria, were reported to be Gila hybrids (Behnke and Zarn 1976, U.S. Fish and Wildlife Service 1993). Distribution of both Gila and Apache trout is not known for certain, but Behnke (2002) theorizes that Gila and Apache trout may have come together in the Verde River during the last glacial period to hybridize and produce a form intermediate to the two still existing trout.

By the 1960's the Gila trout range had been severely fragmented into small isolated populations in five headwater streams: Main Diamond, South Diamond, McKenna, Spruce, and Iron Creeks (U.S. Fish and Wildlife Service 1993). Main Diamond Creek was the largest of the five populations, which has been attributed to numerous pools formed by log dams built by the Civilian Conservation Corps in the 1930s (Behnke 2002). Beginning in 1970, Gila trout from each of the five relict populations were translocated into other streams. Iron Creek and McKenna fish were later found to be hybridized with rainbow trout (Riddle et al. 1998, Leary and Allendorf 1998). In 1992, a relict population in Whiskey Creek was discovered. There are

now four relict lineages: Main Diamond, South Diamond, Spruce Creek, and Whiskey Creek. A hatchery program was also developed for Gila trout (U.S. Fish and Wildlife Service 2003).

In 1988, a flood eliminated more than 90 percent of the Gila trout in McKnight Creek (Propst and Stefferud 1997). In 1989, a forest fire and associated impacts eliminated the Main Diamond Creek population. Later that same year, drought combined with impacts of a fire reduced the South Diamond Creek population by 95 percent (U.S. Fish and Wildlife Service 1996). Wildfires and subsequent ash-laden runoff have decimated Gila trout populations in New Mexico many times over the years (e.g., U.S. Fish and Wildlife Service 1993, Propst et al. 1992).

Currently there are 12 populations of Gila trout in the wild. Of the four relict populations (Main Diamond, South Diamond, Spruce, and Whiskey Creek), only Main Diamond, South Diamond and Spruce are secure. Whiskey Creek is no longer considered a viable replicated population due to the fires of 2003. The total population size in 1998 was estimated to be approximately 37,000 fish (U.S. Fish and Wildlife Service 2003) and approximately 62 miles (100 km) of stream were occupied in June 2000 (U.S. Fish and Wildlife Service 2003). Replication involves stocking juvenile or adult fish from a relict and/or a hatchery population and releasing them into a suitable renovated stream. Downlisting evaluation due to current population status is again being considered by the FWS.

Habitat

Gila trout are a typical cold-water species requiring well-oxygenated water; coarse sand, gravel, and cobble substrate; stable stream bank conditions; and abundant overhanging banks, pools, and cover for optimal habitat. They are found in moderate to high gradient (from 1 percent to over 14 percent gradient) perennial streams above 5400 feet (1660 m) to over 9200 ft (2838 m) in elevation (McHenry 1986, Propst and Stefferud 1997). The species requires water temperatures below 77°F (25°C), adequate stream flow to maintain survivable conditions, and clean gravel substrates for spawning (U.S. Fish and Wildlife Service 2003).

Gila trout are generally insectivorous; however, there is some evidence of piscivory (Van Eimeren 1988). Regan (1964) reported that the most abundant food items in Gila trout stomachs for Main Diamond Creek included adult dipterans, trichopteran larvae, ephemeropteran nymphs, and aquatic coleoperans. Food items did not vary significantly for different size classes sampled. The 2003 Recovery Plan (U.S. Fish and Wildlife Service 2003) notes that the same food items were predominant for other (non-native) trout species in the Gila River drainage, indicating that there is potential for interspecific competition for food resources. Hanson (1971) noted that larger fish aggressively guarded their feeding stations, chasing away smaller fish in pools during a low flow period in Main Diamond Creek.

Stream flow in Gila trout habitat is characterized by a snowmelt dominated hydrograph. Snowmelt runoff typically begins in February, peaks in March, and gradually decreases in May, with base flow conditions continuing in June and into July. Convectional summer thunderstorms increase the mean monthly discharges characteristically found in July through September. Sporadic periods of winter rain runoff may result in flows slightly higher than base level for December and January. This general pattern is found over years of records, but any year may show substantial deviation, and total annual discharge during wet years may exceed that of

subsequent dry years by as much as 500 percent (U.S. Fish and Wildlife Service 2003). Stream conditions are dynamic, and suitability for Gila trout can vary greatly. During years of lower flow, marginal habitats may become too warm to support trout, or stream segments may run dry. Pool depths can decrease to the point that winter mortality of Gila trout is increased. Conversely, large magnitude flood events during high flow years can scour stream channels and eliminate year classes of trout (U.S. Fish and Wildlife Service 2003).

Over wintering habitat, or habitat that provides shelter during periods of minimal water temperatures between November and February, generally consists of deep pools with cover such as boulders or root wads, or deep beaver ponds. Access to larger mainstem habitats from headwater streams may be an important function of over-winter survival where perennial surface water connection between streams exists (U.S. Fish and Wildlife Service 2003).

Adult Gila trout are considered sedentary, with movement influenced by population density and territoriality (Rinne 1982); however, individual fish may move distances exceeding 0.9 mi (1.44 km).

In South Diamond Creek, Gila trout showed a tendency to move upstream, possibly to reach perennial reaches with suitable pool habitat in response to low summer discharge. Conversely, Gila trout movement for Main Diamond and McKnight creeks was predominantly in a downstream direction. It should be noted that a high density of log structures in Main Diamond Creek appeared to reduce mobility in that stream (U.S. Fish and Wildlife Service 2003). Data from White creek in 1999 and 2000 noted that Gila trout dispersal is slow, even when physical barriers are absent (U.S. Fish and Wildlife Service 2003).

The carrier of Bacterial Kidney Disease (BKD) occurs in very low amounts in the upper Whiskey Creek population of Gila trout, as well as in rainbow x Gila trout hybrid populations in Iron Creek, McKenna Creek, and White Creek. Although the carrier bacterium (*Renicbacterium salmoniarum*) is present, there were no signs of BKD in any trout populations (U.S. Fish and Wildlife Service 2003). Whirling disease, caused by the metazoan parasite *Myxobolus cerebralis*, has been a serious problem in hatchery and wild populations of rainbow trout throughout the western U.S. However, there have been no documented cases of whirling disease in the Gila River drainage in New Mexico, and all wild and hatchery populations of Gila trout tested for whirling disease were negative (U.S. Fish and Wildlife Service 2003).

Life History

Spawning begins when temperatures reach about 47°F (8°C), but day length may also be an important trigger. Stream flow is apparently of secondary importance in triggering spawning. Spawning begins in early April at the lowest elevations and continues through June at the highest elevations. Gila trout use substrates of fine gravel and coarse sand (0.07-1.5 in; 0.8-3.8 cm) during spawning (Rinne 1980). Spawning habitat of Gila trout in Main Diamond, South Diamond, and McKnight creeks average substrate composition consisted of 6.6 percent silts, clays, and very fine to coarse sands (<1mm diameter), 14.4 percent very coarse sand (1 to 2mm); 27.4 percent very fine to medium gravels (2 to 9 mm); 20.1 percent medium to coarse gravels (9 - 18mm); 17.8percent coarse gravels (18 to 38 mm); 6.9 percent very coarse gravels (38 to 63 mm), and 6.7 percent cobbles (64 to 256 mm) (Rinne 1980, Rosgen 1998).

Redds are 1.2 to 1.6 inches (3 to 4 cm) deep in fine gravel and coarse sand substrate (i.e., particle size ranging from 0.08 to 1.5 inches (0.2 to 3.8 cm) diameter) (Rinne 1990, U.S. Fish and Wildlife Service 2003). Redd size varies from less than 1.1 to 21.5 ft² (0.1 to 2.0 m²). Spawning activity typically occurs between 1300 to 1600 hours. Rinne (1980) noted one pair of fish normally occurred over a redd and spawning behavior was typical of other salmonids.

Fry emerge from redds in 56 to 70 days at 0.8 to 1.0 inches (2.0 to 2.54 cm) total length (Rinne 1980). They attain a length of 2.7 to 3.5 inches (6.9 to 8.9 cm) by the end of their first summer at lower elevations, and 1.6 to 2.0 inches (4.04 to 5.08 cm) at higher elevations (Rinne 1980, Turner 1986). Gila trout generally reach 7.1 to 8.7 inches (18 to 22.1 cm) total length by the end of the third growing season except in the highest elevation streams. Females may reach maturity between age 2 and 5 (U.S. Fish and Wildlife Service 2003), with a minimum length of 5 inches (130 mm) reported for mature fish. Most individuals are mature at a length of 150 mm (6 inches) or greater (U.S. Fish and Wildlife Service 2003). Males typically reach maturity at age two or three.

Mean survival rates for life stages of Gila trout range from 0.128 to 0.497, where survival rate is defined as the proportion of individuals of age x that survive to age $x + 1$ (Ricklefs 1990, Brown et al. 2001). On average, approximately half of every 100 eggs will survive to the juvenile life stage. Of the surviving fish, only approximately six will make it to the subadult stage, and of those six subadults, only two will survive to the adult life stage. The average life expectancy of an adult Gila trout is five years (Turner 1986), with a maximum age of nine reported by Nankervis (1988). As a result of these survival rates, the majority of the adult female Gila trout will only spawn twice before dying, while males will spawn three to four times before dying (U.S. Fish and Wildlife Service 2003).

Reasons for Listing

The Gila trout was listed as endangered in 1967 without critical habitat (U.S. Fish and Wildlife Service 1967). The listing stated the species was threatened with extinction based on declining populations.

Threats: According to the 1987 Federal Register notice, major threats to this species include habitat alterations, competition, hybridization and predation by non-indigenous fish.

The decline in Gila trout populations and available habitat is due to a multitude of factors: 1) habitat degradation, including the impacts of grazing and logging; 2) uncontrolled angling; 3) predation from and competition with non-native trout, especially piscivory of brown trout; 4) inadequacy of legal protections up to 1967 when federal listing occurred; and 5) introgressive hybridization with non-native rainbow trout (U.S. Fish and Wildlife Service 2003).

Conservation Measures

The initial Recovery Plan for Gila trout was released in 1979, and was revised in 1984, 1993 and 2003. Initial efforts to conserve Gila trout began in the 1920's with attempts to propagate Gila trout in hatchery settings (U.S. Fish and Wildlife Service 2003). By the late 1940's the hatchery efforts were abandoned and NMDGF implemented a policy of not stocking non-native trout into known Gila trout streams. In the 1960's study of Gila trout ecology began (Regan 1966). In the

1970's taxonomic analyses (David 1976, Beamish and Miller 1977) and population and habitat evaluations were conducted (Rinne 1978), and comprehensive distribution assessments (Mello and Turner 1980). In the 1980's the focus was on stream renovation and barrier construction, along with the establishment of new populations by direct transfer from both wild and hatchery populations. Further studies on ecology and systematics were also conducted (Rinne 1980, Lee and Rinne 1980, Rinne 1981, Rinne 1982, Loudenslager et al. 1986, Pittenger 1986, Medina and Martin 1988, Nankervis 1988, and Van Eimeren 1988).

The range of the Gila trout was expanded in the 1990's, although controversy around the use of antimycin A stalled expansion efforts from 1994-1997 (U.S. Fish and Wildlife Service 2003). Brood stock kept at Mescalero National Fish Hatchery, were transferred to Mora National Fish Health and Technology Center in the late 1990's. The Mora facility continues to play a critical role in maintaining Gila trout for broodstock, as well as holding populations rescued from wildfire impacts. The Mora facility is currently investigating enhancement of rearing to mimic more natural conditions, which is hoped to better maintain the wild characteristics of Gila trout held in a hatchery environment (U.S. Forest Service 2004).

In 1999, Gila trout were stocked into Dude Creek and in 2000 they were stocked into lower Little Creek, upper Little Creek, and Raspberry Creek. However, the upper Little Creek population was lost in 2003 due to ash flow from a wildland fire use fire. The remaining populations are currently being monitored for survival and impacts on the populations due to drought and overall stream condition.

The Gila NF, in cooperation with the NMDGF and the FWS recently completed the West Fork Gila Environmental Assessment which will add five populations and approximately 21.3 mi (34.3 km) of occupied streams in the Gila Recovery Unit (Blue Earth Ecological Consultants 2002). The 2003 Recovery Plan proposes 23 new populations for re-introduction. Nearly half (11) are proposed on the Gila NF (including the 34.3 km above), which would result in occupancy of about an additional 53.7 mi (83.3 km) (U.S. Fish and Wildlife Service 2003).

Recovery efforts have included waters in Arizona where Gila trout had been extirpated until 1999. An expansive proposed effort includes reestablishing viable populations in 12 different stream segments in Arizona. These 12 segments are on three National Forests. The Apache-Sitgreaves NF has 7 population segments proposed which would occupy streams in the Blue, Campbell Blue and Eagle drainages, totaling 31.9 mi (51.4 km). The Coronado NF has three population segments proposed which would occupy streams in the Gila and Aravaipa drainages, totaling 6.2 mi (10.0 km). The Coconino NF has two population segments proposed which would occupy streams in the Verde drainage, totaling 33.0 mi (53.1 km) (U.S. Fish and Wildlife Service 2003). Current efforts are focused on the Apache-Sitgreaves NF which has begun to cooperate with AGFD to analyze introduction into Chitty Creek, and the Coconino NF in cooperation with AGFD and the Federation of Fly Fishers has begun to analyze introduction into the West Fork of Oak Creek.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species in the Action Area

All wild Gila trout populations are currently located on National Forest System lands with 10 populations on Gila NF, one on the Apache-Sitgreaves NF (Raspberry Creek), and one on the Tonto NF (Dude Creek). Successful recruitment has occurred in Raspberry Creek; however, there has been no measurable reproduction or recruitment in Dude Creek likely due to the lingering effects of the Dude Fire 10 years ago.

Potential streams for a mixed San Francisco-Gila River lineage are under consideration by the Gila Trout and Chihuahua Chub Recovery Team (U.S. Fish and Wildlife Service 2003). The potential streams include three on the Coronado NF (now occupied by Apache trout), one on the Apache-Sitgreaves NF, and two on the Coconino NF. The latter three streams now contain rainbow, brown, brook or mixed hybrid trout.

Factors Affecting the Species within the Action Area

In 1988, a flood eliminated more than 90 percent of the Gila trout in McKnight Creek (Propst and Stefferud 1997). In 1989, a forest fire and associated impacts eliminated the Main Diamond Creek population. Later that same year, drought combined with impacts of a fire reduced the South Diamond Creek population by 95 percent (U.S. Fish and Wildlife Service 1996). Wildfires and subsequent ash-laden runoff have decimated Gila trout populations in New Mexico many times over the years (U.S. Fish and Wildlife Service 1993, Propst et al. 1992).

Between listing and November 2004, there have been seven formal consultations completed on the Gila trout. These include: Forest Service and FWS's reintroductions of Gila trout into Dude Creek and Raspberry Creek and the Forest Service's subsequent land management; the Forest Service's renovation of West Fork of the Gila River for reintroduction of Gila trout; the FWS's proposed closure of the Mescalero National Fish Hatchery; the Forest Service's Sedona Forest Plan Amendment; the Environmental Protection Agency's approval of the Arizona Pollutant Discharge Elimination System; and the Bureau of Reclamation's transportation and delivery of Colorado River water into the Gila River Basin through the Central Arizona Project (CAP). Three of these projects identified incidental take of the species, though none resulted in a determination that the proposed action would likely jeopardize the continued existence of the Gila trout.

EFFECTS OF THE ACTION

The S&Gs listed in the National Forest LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Gila trout and its habitat. These S&Gs may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Gila trout.

Table 112. Summary of S&Gs considered for the Gila trout.

National Forest	Standard and Guidelines
Apache-Sitgreaves	1-9, 14-17, 19-22, 24, 26, 28, 29, 32-34, 37, 38, 40, 42-53, 55, 58-65, 80, 84, 93, 97-99, 104-123, 125, 130, 132-140, 144, 145, 151, 152, 166, 171, 172, 177-180
Coconino	311-325, 327, 328, 329, 331, 336-339, 341-345, 350, 353-391, 393, 394, 395, 398-402, 404-408, 410, 411, 413-417, 419, 421, 422, 424, 425, 433, 434, 458-462, 464, 466, 469, 472, 473, 486-520, 535-537, 545, 547, 548, 551, 552, 561-567, 582, 587-589, 604
Coronado	612, 613, 626-629, 631-634, 637, 638, 644, 645, 648-653, 667, 668, 669, 672-679, 681, 682, 693-696, 704, 703, 707, 709-713, 719, 720, 721, 724, 727, 749, 750, 751, 786, 789, 790, 791, 792, 794, 795, 797-800, 803, 804, 805, 807, 808, 811, 812, 825, 827-830
Gila	841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 854, 857, 858, 859, 860-871, 873-878, 880, 840, 872, 881, 883-894, 903-908, 918-920, 930, 932-936, 938-941, 943-948, 950-954,
Tonto	1341, 1342, 1344, 1345, 1348, 1349, 1350, 1353, 1354, 1355, 1356, 1357, 1359, 1361, 1362, 1363, 1364, 1365, 1366, 1367, 1368, 1375, 1391, 1392, 1393, 1398-1403
1996 Regional Amendment	1425, 1426, 1427, 1432, 1438, 1440, 1443, 1445, 1449, 1453-1456, 1458, 1461-1465, 1468, 1473, 1474, 1476, 1487-1491, 1496-1499, 1502, 1503, 1504, 1506, 1508-1512, 1514, 1515

Apache-Sitgreaves National Forest

Several S&Gs with the Apache-Sitgreaves NF LRMP may have a lethal or sublethal affect to the Gila trout (see Table 113 below). In addition, several were found to cause a negative behavioral response. However, the majority of the S&Gs were ranked positive (i.e., as maintaining habitat for the trout or providing minimal recovery) and many S&Gs directed the Forest to move towards recovery or implement recovery plans for listed species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 113. Effects of the S&Gs analyzed for the Gila Trout - Apache Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	3.0
-2	S&G is causing sublethal response	3	3.0
-1	S&G is causing negative behavioral response	6	6.0
0	S&G is ill-defined and/or open to interpretation	19	19.0
1	S&G is maintaining habitat & providing at least minimal recovery	57	57.0
2	S&G is moving towards recovery	4	4.0
3	S&G is implementing species recovery plan	1	1.0
Y	S&G has no application to the species	1	1.0
Z	S&G implementation is non-discretionary	2	2.0
X	S&G is a heading	4	4.0
Total		100	100 %

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in negative effects to the Gila trout. However, there may be negative effects from this program not captured in the applicable S&Gs. In the Apache-Sitgreaves NF Plan there is not a specific Fire Management Program listed; however, there is a Protection Program listed which deals with fire. The goal for the Protection Program includes the following “Fire is used as a resource management tool where it can effectively accomplish resource management objectives (Apache-Sitgreaves LRMP)”. It can be inferred that prescribed fire would be utilized in this capacity. The use of prescribed fire and other fuels treatment methods are useful in reducing the risk of catastrophic wildfire.

However, these projects may result in adverse affects associated with humans, tools, machinery, and burning. Additionally, ash flows and erosion/sedimentation in burn areas may have adverse effects to fish species.

Engineering Program

Standard and Guideline 63 relates to both total road density and open road densities. This S&G states that total road density should average 3.5 mi/mi² or less, while open road densities should average 2.0 mi/mi² or less. As stated in the biological assessment, road density is defined as the total kilometers (miles) of road in a defined area divided by the defined area in square kilometers (miles). The analysis in the biological assessment recognizes that the numbers that were being evaluated were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by FWS and NOAA Fisheries as one way to measure watershed condition as it relates to resident fish in the Pacific Northwest. The joint agencies recommendation is that a given watershed should have less than 2.5 mi/mi² of road system; if in excess, the watershed may not be properly functioning.

On the Apache-Sitgreaves, the known road densities are below the 2.5 mi/mi² recommended by FWS and NOAA fisheries. Road density on the Apache-Sitgreaves is about 1.1 km/km², however this number does not include the non-classified roads (U.S. Forest Service 2004:33).

Standard & Guideline 63, if implemented as written, allows for the total road density to reach 3.5 mi/sq. mi. High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to Gila trout is watershed deterioration. This could potentially lead to increased erosion into trout habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Forestry and Forest Health Program

Standard and Guideline 64 allows for controlling mistletoe by clear-cutting. As stated in the biological assessment, clear-cutting in this region has undergone a major reduction over the past decade. On the Apache-Sitgreaves NF, a total of 704 acres have been clear-cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibit the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to the watershed condition from clear cutting may be increased erosion resulting in sedimentation into the stream channel. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standard and Guideline 93 advises the Forest to reduce susceptibility of Englemann Spruce stands to Englemann bark beetle and to salvage windthrown trees as soon as possible. Effects to Gila trout as a result of implementation of this S&G include those effects resulting from the activities associated with salvage sales. Included in this are skid trails, disturbance of soils and vegetative ground cover and roads. All of these activities may lead to increased erosion and increased sediment into the stream channel. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average 2.0 mi/sq mi. or less. High road densities could contribute to poor water quality which can reduce quantity and quality of spawning and rearing areas, altering stream flow and temperature, and influence stream productivity and food supply (e.g., stream dwelling insects).

Wildlife, Fish and Rare Plants Program

Standards & Guidelines 39, 114-118, 123, and 152 all provide beneficial guidance for management of the riparian resources. All of these S&Gs allow a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, degraded streambank conditions could expand downstream until the majority of the streambank is

unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Coconino National Forest

Most of the S&Gs on the Coconino LRMP were beneficial to the Gila trout and maintained habitat and provided for minimal recovery, however, there are a few S&Gs that could have potential sublethal effects if they are implemented. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 114. Effects of the S&Gs analyzed for the Gila Trout – Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	2	1.2
-1	S&G is causing negative behavioral response	1	0.6
0	S&G is ill-defined and/or open to interpretation	16	9.5
1	S&G is maintaining habitat & providing at least minimal recovery	117	69.2
2	S&G is moving towards recovery	1	0.6
3	S&G is implementing species recovery plan	2	1.2
Y	S&G has no application to the species	5	3.0
Z	S&G implementation is non-discretionary	8	4.7
X	S&G is a heading	17	10.1
Total		169	100 %

Engineering Program

Standard and Guideline 400 allows the Forest to operate and maintain roads in accordance with objectives as specified in road prescriptions and to close or obliterate those roads not needed for industry, public, and/or administrative use. Obliteration includes restoring the original land contour to the degree practical, scarifying, providing proper drainage, and revegetating with appropriate species. Standard and Guideline 404, directs the Forest to manage road densities to achieve an average of 1.1 mile of open road per section in the woodland zone, such as pinyon-juniper, desert, and grassland vegetation types and an average of two miles of open road per section in the ponderosa pine/mixed conifer zone. These densities reflect all system roads in maintenance categories 2 through 5, but do not include federal, state, and county systems. Standards and Guidelines 408, 460, and 547 all direct the Forest to locate new roads out of riparian and other sensitive resource areas and to relocate or eliminate roads that are presently in these locations. In addition they direct that streamcourse crossing be done so that there is minimal bank disturbance and sediment production.

All of these S&Gs are intended to address the road issue within the Forest and reduce the impacts of roads on the landscape. In the long-term, implementation of these S&Gs would benefit the watershed; however, there could be the potential for short-term effects from construction activities involved in relocating or obliterating a road. Such impacts may include

heavy machinery in the stream potentially resulting in increased turbidity as well as the actual crushing of fish. In addition, there may be an increase in sediment due to ground disturbing activities adjacent to or upstream of Gila trout habitat.

Fire Management Program

Standards and Guidelines 411 and 414 provide direction for fuels treatments in order to have the least impact on a site while meeting other resource management needs and reducing the threat to life, property, old-growth areas, or specifically identified high resource values. The effects of fuels treatment projects include effects of the actual fire, including a reduction of the vegetative cover contributing to the possibility of ash and sediment entering the stream channel. Other effects include the effect of fireline construction, the potential for presence of machinery within or immediately adjacent to the stream channel. These effects are all localized and short-term and are outweighed by the benefit in the reduction of the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standards and Guidelines 460 and 461 provide guidance to minimize resource damage due to management activities such as timber sales and also allows for the use of KV funds to correct resource damage caused by timber sale activities. Once again these S&Gs are beneficial in the long-term but could potentially result in some short-term effects to the Gila trout from surface disturbance activities.

Lands and Minerals Program

Standard and Guideline 505 allows for mineral material excavation within the riparian zone after the completion of an environmental analysis as long as those mineral activities maintain or improve riparian conditions. Mineral material excavation within the riparian zone may involve excavation within the stream channel or immediately adjacent. This could result in potential direct effects to Gila trout from crushing by people or machinery in the stream. In addition, there may be some potential sedimentation into the stream resulting from work that would occur on the stream bank. Other effects could include the potential for heavy metals that may be extracted or may be a byproduct of the excavation to leech into the stream.

Standard & Guidelines 391 and 393 address minimizing the impacts of non-discretionary special use projects (i.e., mining and transmission corridors) across the Forest. Although they are implemented to reduce or eliminate long-term resource damage, to improve areas in unsatisfactory condition, and to maintain those in satisfactory or better condition, they could potentially result in short-term adverse effects to the Gila trout. These effects could result from construction activities including relocating or obliterating roads. These effects are short-term and are outweighed by the benefit of minimizing long-term impacts to the landscape.

Rangeland Management Program

Standard and Guideline 424 allows for grazing in the Wilderness. See discussion found under the grazing program within the analysis for spikedace on the Coconino NF.

Standards and Guidelines 338, 339, and 341 provide positive direction to the Forest for the managing the impacts of grazing and improve grazing conditions. Although the intent is beneficial, they could have some short-term effects from things such as livestock in the channel

to manipulate riparian vegetation or the effects from heavy machinery disturbing the soil as well as all the effects from prescribed fire. All these effects are short-term and localized and are outweighed by the benefit of improved range conditions in the long-term.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 515 allows for an increase in the opportunities for people to access the water and encourages nature-based activities such as hiking, picnicking, bird watching, photography, fishing and interpretation. There could potentially be some effects from people fishing within occupied Gila trout habitat if they are unaware of restrictions or prohibitions.

Watershed Management Program

There is a potential for adverse short-term effects from the implementation of the following S&Gs: 361, 363, 377, and 378. They all provide direction for resource improvements such as locating/relocating roads out of stream courses and maintaining riparian vegetation as well as doing emergency fire rehabilitation where needed to protect the soil and water resources. Some of the effects include short-term ground disturbing activities that may temporarily increase sedimentation into the stream channel. These effects would be temporary and would eventually contribute to the overall watershed health.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 490 provides guidance for management of the riparian resources. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the Gila trout across its range, it is imperative that all habitat that is currently occupied or is capable of supporting Gila trout be maintained in optimal conditions. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Coronado National Forest

The majority of S&Gs within the Coronado LRMP maintain habitat and provide minimal recovery for the Gila trout; however, there were several S&Gs that if implemented may have some potential lethal and sublethal effects. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 115. Effects of the S&Gs analyzed for the Gila Trout – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.2
-2	S&G is causing sublethal response	2	2.5
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	10	12.3

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	49	60.5
2	S&G is moving towards recovery	7	8.6
3	S&G is implementing species recovery plan	6	7.4
Y	S&G has no application to the species	2	2.5
Z	S&G implementation is non-discretionary	2	2.5
X	S&G is a heading	2	2.5
Total		81	100 %

Fire Management Program

Standard and Guideline 695 guides the Forest to conduct fire suppression activities in a way that will protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Standard and Guideline 713 states that prescribed fire will be used to reduce fuel hazards, enhance wildlife values, and enhance visual resources. In addition, S&G 798 and 812 state that prescribed use of fire will be used to reduce fuel hazard, enhance wildlife habitat, and improve livestock forage, and watershed condition. All three of these S&Gs are the same for different management areas. Short-term effects of prescribed fire include effects of the fire itself in addition to those effects similar to fire suppression activities described above.

Rangeland Management Program

Standards and Guidelines 792 and 805 allows the Forest to manage suitable rangeland at Level D. If level D is not achievable, manage at Level A (no livestock) in MA7A and MA7B. Management seeks full utilization of forage allocated to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. The following acres for projected range conditions were provided within the S&G: 15,412 acres within satisfactory and 1,712 in unsatisfactory conditions.

The LRMP predicts no change in the number of acres of unsatisfactory condition for Management Area 7B over a period of 50 years. Unsatisfactory range conditions may contribute to unhealthy watersheds resulting in adverse effects to the species. As stated in the Recovery Plan, one of the primary threats to this species is watershed deterioration. As a result of poor upstream watershed condition, downstream effects could potentially lead to increased erosion into Gila trout habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. Potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 829 states that riparian areas will be managed to achieve and maintain satisfactory riparian conditions as described in the Forest-wide prescription. This may be accomplished through the use of structural improvements, movement of livestock, or the exclusion of livestock. This S&G may result in some short-term adverse effects during the

construction of structural improvements. In addition, the movement of livestock could also cause adverse effects if they are trailed through the riparian area. However, these effects would be localized and short-term and would contribute to the overall health of the riparian habitat in the long-term.

Watershed Management Program

Standard and Guideline 678 discusses aquatic resources and states the following: (1) maintain at least 80 percent of natural shade over water surfaces in fish bearing streams; (2) maintain at least 80 percent of natural bank protection; and (3) maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G provides guidance for management of the riparian resources. The FWS recognizes that the intent of this S&G is positive; however, this S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the natural bank is 80 percent, then the assumption is that 20 percent of the streambank is allowed to deteriorate to less than stable conditions. If this were the case, degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 677 guides the Forest to complete classifications and inventories of all riparian areas by the end of the first time period and complete action plans to improve all unsatisfactory riparian areas. The Forest is directed to improve all riparian areas to satisfactory or better condition by the end of Period 5. Such satisfactory conditions are specified below, expressed as a percentage of "natural" conditions (that is, what each site can produce if not further disturbed by man). Twenty-five percent of all riparian areas must be in satisfactory condition by Period 2. Although this S&G is definitely beneficial as it is moving toward satisfactory riparian conditions, there may be some short-term adverse effects that could be occurring and may continue to occur until such a time as that riparian habitat reaches satisfactory conditions.

Standards and Guidelines 711, 794, and 807 direct the Forest to restore to satisfactory watershed condition (on and emergency basis) of damaged watersheds or portions of watersheds. Watershed treatment is a low priority in MA1, MA7A, and MA7B. Water and soil resource improvements may consist of channel stabilization and revegetation using native or non-native species. These S&Gs are the same but they are applied to different management units. They allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Wildlife, Fish, and Rare, Plants Program

Standard and Guideline 667 discusses the use of structural and nonstructural improvement guidelines intended to meet the specific wildlife habitat objectives as shown for each Management Area. Nonstructural Wildlife Improvements include: (a) prescribe burn feasible areas on a 20-year cycle; (b) seed suitable wildlife forage species as needed in fuelwood and timber areas; (c) transplant listed threatened and endangered and other identified species into

suitable habitat following guidelines of species recovery plans and Memoranda of Understanding; (d) revegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available); and (e) thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year.

Standard and Guideline 668 states the following: (1) construct water developments or potholes to accomplish one per section within four decades; (2) consider structural improvements and maintenance for threatened and endangered species as technology develops; (3) construct fish habitat improvement structures as needed for threatened and endangered species and; (4) fence riparian areas where prescribed by approved allotment management plans. Miles of fence constructed will vary with the management plan.

The above S&Gs may cause short-term adverse effects in order to achieve long-term positive effects-- a net beneficial effect. Standard & Guideline 667, allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may have short-term impacts on water quality in adjacent streams inhabited by Gila trout. Standard and Guideline 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish as well as indirect impacts to the habitat such as temporary alterations of stream flow or short-term isolated increases in sediment entering the stream.

Gila National Forest

There is only one S&G that has the potential to have a lethal effect to the Gila trout within the Gila LRMP. The majority of the S&Gs within this Forest maintain habitat and provide for minimal recovery of this species. Additionally, there are several S&Gs that are beneficial in the long-term but have some short-term adverse effects.

Table 116. Effects of the S&Gs analyzed for the Gila Trout – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.4
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	1.4
1	S&G is maintaining habitat & providing at least minimal recovery	46	63.9
2	S&G is moving towards recovery	4	5.6
3	S&G is implementing species recovery plan	18	25.0
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.8
X	S&G is a heading	0	0.0
Total		72	100 %

Fire Management Program

Standard and Guideline 844 states that prescribed fire implementation plans (unplanned and planned ignition) will be initiated on vegetative types where the natural role of fire has been

identified. In addition, S&G 845 directs the Forest to decide to use prescribed fire in wilderness based on benefits other than those to wildlife, maintenance of vegetation types, improvements [to] forage production, or enhancement of other resource values. These can be additional benefits which may result from a decision to use prescribed fire but are not objectives for managing fire in wilderness. These S&Gs allow the use of prescribed fire. Although it is recognized that fire has a role in the ecosystem and that using prescribed fire is one way to re-introduce fire into the system and reduce the risks of catastrophic wildfire in the long run, there are short-term effects of prescribed fire associated with humans, tools, machinery, and burning. Additionally, ash flows and erosion/sedimentation in burn areas may have adverse effects to fish species.

Rangeland Management Program

Standard and Guideline 858 allows for the use of grazing in riparian zones for the maintenance and improvement of riparian areas. There is evidence that grazing can be used to manipulate vegetation within riparian habitats; however, there could be some short-term effects such as increased turbidity to the water, or trampling of eggs in redds by livestock present within the stream channel.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 848 states that complete classification & inventories of all riparian areas, and complete action plans to improve all unsatisfactory riparian areas will be accomplished within the first decade. In addition, all riparian areas will reach a satisfactory or better condition by 2030. Such satisfactory conditions are specified [below], expressed as a percentage of "natural" conditions. Twenty-five percent of all riparian areas must be in satisfactory condition by 2000. Aquatic Resources: 1) maintain at least 80 percent natural shade over water; 2) maintain at least 80 percent bank protection; and 3) maintain sand, silt, clay composition within 20 percent of natural levels. Vegetation Resources: 1) maintain at least 60 percent woody plant composition in 3 or riparian species; 2) maintain at least 3 age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species; and 3) maintain at least 60 percent of natural shrub and tree crown cover. Wildlife Resources: Maintain at least 60 percent natural shade over land surface.

This S&G provides guidance for management of the riparian resources. The FWS recognizes that the intent of this S&G is positive; however, this S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the natural bank is 80 percent then the assumption is that 20 percent of the streambank is allowed to deteriorate to less than stable conditions. If this were the case, degraded streambank conditions could expand downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 885 directs that habitat improvement emphasis be placed on game fish. Activities associated with habitat improvement projects could have potential short-term negative

effects to Gila trout. Those effects would be short in duration and localized and would contribute to the overall beneficial effects of improved habitat.

Tonto National Forest

The majority of the S&Gs within the Tonto LRMP will maintain habitat and provide for minimal recovery of the Gila trout. There is one S&G that if implemented, may result in lethal effect to the species. Additionally, there are several S&Gs that are beneficial in the long-term but have some short-term adverse effects.

Table 117. Effects of the S&Gs analyzed for the Gila Trout – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	3.1
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	3	9.4
1	S&G is maintaining habitat & providing at least minimal recovery	26	81.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	1	3.1
Z	S&G implementation is non-discretionary	1	3.1
X	S&G is a heading	0	0.0
Total		32	100 %

Forestry and Forest Health Program

Standard and Guideline 1400 allows the Forest to restrict tractor skidding to those areas that have sustained slopes of 40 percent or less. Although, this S&G restricts skidding to less than 40 percent slopes, this does not eliminate the possibility of sediment coming off the slope and entering the stream. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standard and Guideline 1398 states that, “Timber sale road systems should be designed to minimize impacts on stream channels and water quality. Roads should be located on slopes less than 60 percent, and should have sustained gradients of less than 8 percent. Roads should not be located on unstable slopes where mass movement is likely to occur.” In addition, S&G 1401 states that skidding and hauling should be restricted to soil moisture conditions which do not cause excessive soil compaction, displacement, or puddling. Standard and Guideline 1403 guides the Forest to raise lead end of logs when skidding to minimize gouging, restrict skidding during wet weather, and rehabilitate skid trails and landings when logging is completed (provide drainage, repair ruts and gullies, and seed if necessary). These are all actions to reduce the impacts of soil disturbing activities to the watershed in the long-term, however they may be result in short-term adverse effects from soil disturbing activities.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1371g allows the Forest to construct or reconstruct trails in either former or new locations to prevent resource degradation and provide public safety. Although this is a positive attempt to reduce resource degradation, constructing and reconstructing trails may have some short-term adverse affect from ground disturbing activities.

Wildlife, Fish, and Rare Plants Program

Standards and Guidelines 1364 and 1365 provide for guidance in the construction of stream channel crossings to prevent sedimentation. Although these S&Gs will provide the least amount of resource damage, there may still be some short-term effects from the ground disturbance that may occur while these crossing are created in addition to the effects from the presence of heavy machinery within the stream channel.

1996 Regional Amendment

There are no lethal or sublethal effects to the Gila trout as a result of the implementation of the 1996 Regional Amendment. Yet, some S&Gs may have a short-term adverse effects on the species. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 118. Effects of the S&Gs analyzed for the Gila Trout - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	8.6
1	S&G is maintaining habitat & providing at least minimal recovery	36	62.1
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	9	15.5
Z	S&G implementation is non-discretionary	2	3.4
X	S&G is a heading	6	10.3
Total		58	100 %

Standards and Guidelines 1432, 1445, 1455, 1458, 1468, 1476 and 1508 are all related to the fuels treatment for fire risk abatement. As discussed previously, there are potential short-term effects from fuels treatments; however, the beneficial effect of reduced catastrophic fire risk far outweighs those short-term adverse effects.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as the trespass of livestock, inappropriate use of OHVs, introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, the statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, poses a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the Gila trout, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Gila trout. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the Gila trout from the implementation of the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- The status of the Gila trout is such that it is currently proposed for downlisting because three of the four original pure population lineages are currently protected and replicated in 62 mi (100 km) of stream, each replicate is geographically separate from its original pure population.

- An Emergency Plan has been developed and implemented. The Emergency Plan addresses wildfire-related impacts and discovery of non-native salmonid invasions.
- Recovery actions by the Forest Service in the past have included stocking Gila trout into lower Little Creek, Whiskey Creek, upper Little Creek, Dude Creek, and Raspberry Creek in 2000. These populations are currently being monitored for survival, and impacts on the populations due to drought and overall stream condition.
- The Gila NF, in cooperation with the NMDGF and the FWS, has recently completed the *West Fork Gila Environmental Assessment*, which will add five populations and approximately 21.3 mi of occupied streams in the Gila RU. These are five of the eleven new populations proposed for reintroduction by the 2003 Recovery Plan. Recovery efforts also include waters in Arizona where Gila trout had been extirpated until 1999. These efforts include re-establishing viable populations in 12 different stream segments on three Forests. This includes seven population segments in the Apache-Sitgreaves NF, totaling 31.9 stream mi; three population segments on the Coronado NF, totaling 6.2 stream mi; and two population segments on the Coconino NF, totaling 33.0 stream mi.
- There are several S&Gs within the Apache-Sitgreaves, Coconino, Coronado, Gila, and Tonto LRMPs that support conservation and recovery of Gila trout. These are S&Gs 4, 19, 21, and 26 within the Apache-Sitgreaves LRMP; S&Gs 321 and 324 within the Coconino LRMP; S&Gs 629, 633, 707, 709, 719, 724, 786, 791, 800, 804, 825, and 828 within the Coronado LRMP; and S&Gs 843, 870, 877, 881, 883, 886, 889, 892, 903, 905, 907, 920, 930, 932, 934, 941, 945, 947, 948, and 952 within the Gila LRMP. All of these S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species.

Proactive efforts by the Forest Service in the past and the continued monitoring of those actions have contributed positively to the overall status of the Gila trout such that the trout is currently proposed for downlisting. Although several S&Gs may cause lethal or sublethal responses to the Gila trout and result in take of individuals, implementation of these S&Gs would not cause jeopardy to the species because all the actions described above, together with, the implementation of the beneficial S&Gs outlined above should not result in a decline in population numbers or habitat conditions of Gila trout on National Forest System lands in the southwest. For these reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Gila trout.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat

modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of Gila trout is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves, Gila, and Tonto NFs LRMPs. On the Apache-Sitgreaves NF, take in the forms of harm and harassment is expected from the Engineering, Forestry and Forest Health, and Wildlife programs. On the Gila NF, take in the form of harm to Gila trout is expected from the Wildlife Program. In addition, take in the form of harm is expected to occur from the Forestry and Forest Health Program on the Tonto NF. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support Gila trout.

Although there is the potential for adverse effects to Gila trout (if it were present) from the Land and Minerals, Rangeland Management, and Recreation programs on the Coconino NF, as well as the Rangeland Management and Watershed Management programs on the Coronado NF, no incidental take is anticipated because the species does not occur on these two Forests. If Gila trout are reintroduced on the Coronado or Coconino NF in the future, this consultation will be reinitiated and the potential for take will be reassessed.

The FWS anticipates incidental take of Gila trout will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Although we cannot estimate the number of individual trout that will be incidentally taken, the FWS is providing a mechanism to quantify when take would be considered to be exceeded at the population level. For purposes of this biological opinion, the FWS defines incidental take in terms of the number of extant populations. Extant populations include Main Diamond Creek, South Diamond Creek, Black Canyon, McKnight Creek, Spruce Creek, Big Dry Creek, Whiskey Creek, Upper White Creek,

Mogollon Creek, and Lower Little Creek on the Gila NF; Dude Creek on the Coconino NF; and Raspberry Creek on the Apache-Sitgreaves NF. The FWS concludes that incidental take of Gila trout will be considered to be exceeded if, after a period of two consecutive years, there is a loss of any currently extant population of Gila trout on National Forest System lands as a result of the proposed action. The two-year period begins on the date the biological opinion is signed, and will be replicated every two years thereafter for the life of the biological opinion.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila trout.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the Gila trout:

1. Protect Gila trout on National Forest System lands.
2. Protect Gila trout habitat on National Forest System lands.
3. Monitor Gila trout populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the US Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Gila trout populations for conditions to eliminate direct effects and minimize indirect effects to Gila trout and its habitat.
- 1.2 Design projects within the Engineering, Forestry and Forest Health (i.e. pest management), Rangeland Management, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the Gila trout.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and current presence of non-native fish species within Gila trout habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Gila trout habitat to incorporate appropriate components of the Gila Trout Recovery Plan with the goal of implementing projects with beneficial, insignificant, or discountable effects to the Gila trout and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with other state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Gila trout populations on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service will track and report the effects of the proposed action on Gila trout, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with AGFD, NMDGF, and FWS, remove all non-native species affecting the Gila trout and take measures to prevent reoccurrence of non-native species from identified recovery stream segments.
2. In cooperation AGFD, NMDGF, and FWS to secure, renovate, and maintain streams in order to provide additional habitat for Gila trout.
3. Populations of Gila trout should continue to be replicated into streams that are geographically separate to increase the range of the species and to ensure that natural or human-induced disasters do not extirpate the populations.
4. Populations of Gila trout should continue to be replicated into streams that are within watersheds of currently occupied habitat.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

LITTLE COLORADO RIVER SPINEDACE

STATUS OF THE SPECIES

Description

The Little Colorado River spinedace (*Lepidomeda vittata*) is a small (about 4 inch) minnow native to the Little Colorado River drainage. This fish occurs in disjunct populations throughout much of the Little Colorado River drainage in Apache, Coconino, and Navajo counties. Portions of the Little Colorado River's watershed exist in Catron County, New Mexico, but the species is not currently known from there. Miller (1963) suggested the species may have occurred in New Mexico in the Zuni River drainage system. Extensive collections summarized by Miller (1963) indicated that the Little Colorado spinedace had been extirpated from much of the historical range during the period 1939 to 1960. Although few collections were made of the species prior to 1939, the species is believed to have inhabited the northward flowing Little Colorado River tributaries of the Mogollon Rim, including the northern slopes of the White Mountains.

Mitochondrial DNA work on the spinedace was initiated in the 1990's and indicated the existence of three sub-groups identifiable by geographic area (Tibbets et al. 1994): the East Clear Creek drainage, Chevelon Creek, and the upper Little Colorado River including Nutrioso and Rudd creeks. The study concluded that the genetic patterns seen were likely the result of populations isolated and differentiated by both natural and human-caused events. The East Clear Creek and Chevelon Creek subgroups are more individually distinctive, likely the result of a higher degree of isolation, and possess unique haplotypes. Individuals from the upper Little Colorado subgroup are more similar to each other. Possibly, until recent time, there was one population with considerable gene flow until various dams and diversions increased local isolation. The cause and exact time of the isolation of the three subgroups are not known, but Tibbets et al. (1994) recommend that all of these populations be maintained to conserve genetic variation in this species. It is unknown at this time if spinedace from Silver Creek fall within one of these genetic subgroups or are a distinct subgroup.

Legal Status: The Little Colorado River spinedace was listed as threatened with critical habitat designated on October 16, 1987 (U.S. Fish and Wildlife Service 1987). Forty-four stream miles of critical habitat were designated: 18 miles of East Clear Creek immediately upstream and 13 miles downstream from Blue Ridge Reservoir in Coconino County; eight miles of Chevelon Creek in Navajo County; and five miles of Nutrioso Creek in Apache County. Primary constituent elements of critical habitat consist of clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate.

Distribution and Abundance

The Little Colorado River spinedace is still found in the streams it is known from historically (Chevelon, Silver, Nutrioso, East Clear Creek, and the Little Colorado River proper). However, populations are generally small and the true population size for any occupied stream is unknown due to the yearly fluctuations and difficulty in locating fish. Spinedace have a tendency to disappear from sampling sites from one year to the next and may not be found for several years. For example, the Silver Creek population was considered extirpated until fish were collected from the creek again in 1997. Unfortunately, though we have surveyed Silver Creek in 2003 and

2004, we have been unable to locate any fish since 1997. This ephemeral nature makes management of the species difficult since responses of the population to changes within the watershed cannot be measured with certainty.

Spinedace are currently considered rare in East Clear Creek (Denova and Abarca 1992). However, recent conservation actions in 2000 by the AGFD and the Coconino NF have led to the reintroduction of Little Colorado spinedace into three tributaries (Yeager Canyon, Houston Draw, and General Springs) of this drainage. Houston Draw and General Springs dried up and have not been monitored to determine the success of the stocking effort, though it is believed these stockings were unsuccessful. However, sampling of Yeager Canyon in October 2001, located seven young of the year and eight adult Little Colorado spinedace.

The current drought conditions are confounding cooperative recovery efforts for the Little Colorado spinedace in the East Clear Creek watershed. Recent inspections have found drying of the stream courses within the watershed. Of particular concern at this point are Dines Tank, West Leonard Canyon, and Yeager Canyon. The Forest Service and AGFD salvaged Little Colorado spinedace from both sites in 2002. A pool in Dane Canyon held water throughout the summer of 2002 and 57 of the Little Colorado spinedace salvaged from West Leonard Canyon were stocked into Dane Canyon in August 2002.

Since the spinedace was listed, the Rudd Creek population was discovered. There is currently one refugial population of East Clear Creek Little Colorado spinedace (located at the Flagstaff Arboretum), totaling about 340 individuals. There are no refugial populations for the other two genetic sub-groups. All of the known populations have decreased since 1993 and drought conditions continue to put additional strain on all known populations.

Habitat

As would be expected for a species adapted to fluctuating physical conditions, the Little Colorado spinedace is found in a variety of habitats (Blinn and Runck 1990, Miller 1963, Miller and Hubbs 1960, Nisselson and Blinn 1989). It is unclear whether occupancy of these habitats reflect the local preferences of the species or its ability to tolerate less than optimal conditions. Available information indicates that suitable habitat for the Little Colorado spinedace is characterized by clear, flowing pools with slow to moderate currents, moderate depths and gravel substrates (Miller 1963, Minckley and Carufel 1967). Cover from undercut banks or large rocks are often a feature. Spinedace have also been found in pools and flowing water conditions over a variety of substrates, with or without aquatic vegetation, in turbid and clear water (Denova and Abarca 1992, Nisselson and Blinn 1991). Water temperatures in occupied habitats ranged from 58 to 78 degrees Fahrenheit (Miller 1963). Miller (1963) called the Little Colorado spinedace “trout like” in behavior and habitat requirements, and it is likely that prior to 1900 the Little Colorado spinedace used habitats now dominated by non-native salmonids.

As with most aquatic habitats in the southwest, the Little Colorado River basin contains a variety of aquatic habitat types and is prone to rather severe seasonal and yearly fluctuations in water quality and quantity. Both mountain streams and lower gradient streams and rivers have provided habitat for the Little Colorado spinedace. Residual pools and spring areas are important refuges during periods of normal low water or drought. From these refuges, Little

Colorado spinedace are able to recolonize other stream reaches during wetter periods. This ability to quickly colonize an area has been noted in the literature (Minckley and Carufel 1967) as well as in observations by others familiar with the species. Populations seem to appear and disappear over short time frames and this has made specific determinations on status and exact location of populations difficult. This tendency has been observed by both researchers and land managers (Miller 1963, Minckley 1965, Minckley 1973) and has led to concerns for the species' survival.

Life History

Spawning generally occurs during late spring and early summer, although some evidence indicates it may also occur into the autumn and more than once during the year (Minckley and Carufel 1967, U. S. Fish and Wildlife Service 1998). Females broadcast eggs over the stream bottom or on aquatic vegetation, laying 650 to 1,000 eggs per female (U. S. Fish and Wildlife Service 1998). Growth of juvenile spinedace is rapid, with individuals reaching sexual maturity in about three months and living at least three years (U. S. Fish and Wildlife Service 1998).

Food habits of Little Colorado spinedace include chironomid larvae, dipterians, filamentous green algae, and crustaceans (Runck and Blinn 1993, Blinn and Runck 1990). Spinedace are late spring to early summer spawners (Blinn 1993, Blinn and Runck 1990, Miller 1961, Minckley 1973, Minckley and Carufel 1967) although some females have been found to contain mature eggs as late as October (Minckley and Carufel 1967). A complete discussion of the taxonomic, distributional, and life history information of the Little Colorado spinedace has been compiled in the Little Colorado Spinedace Recovery Plan (U.S. Fish and Wildlife Service 1998).

Reasons for Listing

The Little Colorado River spinedace was listed as threatened with critical habitat designated on October 16, 1987. The U. S. Fish and Wildlife Service (1987) surmised that the decline of Little Colorado spinedace had resulted from "habitat alteration and loss due to impoundment, removal of water from streams, channelization, grazing, road building, urban growth, and other activities" all of which have cumulatively resulted in "dewatering, erosion and channel downcutting, chemical and organic pollution, alteration of flow regimes, alteration of stream temperature, and excessive siltation." No fewer than 20 dams have been constructed in drainages occupied or historically occupied by Little Colorado spinedace. The impoundment of rivers and streams has directly destroyed spinedace habitat inundated by the resulting reservoirs, and indirectly degraded habitat downstream by altering natural flow regimes. Poisoning of some streams to facilitate the establishment of non-native trout fisheries in reservoirs may have adversely affected some populations of Little Colorado spinedace (U. S. Fish and Wildlife Service 1987, Minckley and Deacon 1991). Impoundments have also facilitated the establishment of non-native fish species, both upstream and downstream of the impounded waters that, themselves, may adversely impact Little Colorado spinedace (U. S. Fish and Wildlife Service 1987).

Threats: Threats were identified as habitat alteration and destruction, predation by and competition with non-native aquatic organisms, and recreational fishery management. The introduction and spread of exotic predatory and competitive fish species, and the use of fish toxins in many of its native streams are also indicated as major threats to the species (U. S. Fish and Wildlife Service 1987). Non-native aquatic species threaten Little Colorado spinedace

through predation and competition. Prior to the introduction of non-native fish, Little Colorado spinedace likely co-existed with speckled dace, bluehead and Little Colorado suckers, roundtail chub, and Apache trout (U. S. Fish and Wildlife Service 1998). Little Colorado spinedace now must contend with at least thirteen species of non-native fish, all of which are potential predators of spinedace eggs, larvae and adults (U. S. Fish and Wildlife Service 1998). In addition to direct predation on spinedace, non-native, predatory fish such as rainbow trout may also significantly affect the geographic distribution and habitat use of the species (Blinn et al. 1993; Rinne and Alexander 1995; Robinson et al. 2000; Sweetser et al. 2002). Under experimental conditions, Rinne and Alexander (1995) reported that although water turbidity “may reduce the effectiveness of predation [by non-native, rainbow trout],...potential loss [of Little Colorado spinedace] to predation is yet significant.” The continued maintenance of non-native fisheries within drainages occupied by spinedace, in addition to exposing the species to predation and competition (Blinn et al. 1993), also limits options available for the recovery of the Little Colorado spinedace in their historical range (Young et al. 2001). Crayfish (*Orconectes virilis*, synonymous with *O. causeyi*), introduced into Little Colorado spinedace habitats in the 1960s (Dean 1969), are also likely to threaten spinedace by altering vegetative and structural characteristics of channels, by modifying spinedace behavior, and by feeding on spinedace eggs (Robinson et al. 2000; White 1995).

Although not mentioned in either the final rule listing the species as threatened (U. S. Fish and Wildlife Service 1987) or in the Recovery Plan (U. S. Fish and Wildlife Service 1998), wildfire may also pose a threat to Little Colorado spinedace, particularly given the fragmented, isolated, and reduced numbers of the species. Ash-flow and altered hydrologic regimes resulting from severe impacts to watersheds may result in changes detrimental to both the quality and quantity of aquatic habitats occupied by Little Colorado spinedace.

Conservation Measures

Recovery efforts for Little Colorado spinedace have included stream surveys (East Clear Creek, Chevelon Creek, Nutrioso Creek, Silver Creek, Little Colorado River); limited repatriation efforts and supplemental stockings (East Clear Creek lineage). In addition, emergency salvage efforts arising from drought conditions (East Clear Creek) and post-fire runoff (Chevelon Creek) have also occurred. The establishment of a refugium to maintain the genetic sub-groups (Arboretum in Flagstaff); and the protection of some habitats from threats associated with land-use practices such as livestock grazing (Nutrioso Creek, Rudd Creek, portions of upper Willow Creek, portions of East Clear Creek) also have occurred (U.S. Fish and Wildlife Service 1998; U. S. Forest Service 1999; S. Hedwall, FWS, 2005, unpubl. data).

In 1994, the Apache-Sitgreaves NF initiated a challenge-cost share agreement with the AGFD, the purpose of which was to, “systematically inventory selected lotic environments on the Sitgreaves portion of the Apache-Sitgreaves NF to determine the status of spinedace, document existing fish communities, and evaluate opportunities to improve existing habitat conditions for native fish species.” In addition, the project was intended to identify portions of the Clear Creek and Chevelon Creek drainages on the Apache-Sitgreaves NF that might be suitable for the repatriation of Little Colorado spinedace. This effort, augmented by additional AGFD surveys, identified locations in both the Willow Creek (a tributary to East Clear Creek) and Chevelon Creek systems that would likely be suitable for the reintroduction of the species. In 2003, a

recommendation was made by the Recovery Team to pursue translocations of the Chevelon Creek population into West Chevelon Creek, using wild fish as the source. The Forest Service, AGFD, and the FWS are currently planning for this future translocation. Sites in Willow Creek may similarly be pursued in the near future, using captive fish at the Flagstaff Arboretum as a source.

During the late-1990s, the Black Mesa Ranger District analyzed livestock allotments in the Chevelon Creek (west-side of the watershed) and Willow Creek watersheds. Reductions in livestock numbers (30% to 75%), continued absence of livestock on about 20,234 ha (50,000 ac) (“Wildlife Area”) in the upper, middle, and lower reaches of Chevelon and Willow Creek watersheds, and the continued preclusion of livestock from the mainstream of Chevelon Creek are likely to facilitate watershed recovery and the future reintroduction of the species in both drainages. Similarly, direct impacts from livestock were eliminated on all portions of Nutrioso and Rudd creeks (managed by the Springerville Ranger District (U.S. Forest Service 2004).

In 1997, the Forest Service funded the implementation of several actions intended to address “short-term” needs for the conservation of Little Colorado spinedace as part of the “seven species direction”. Although not all of the actions described in the seven species direction were implemented, a few immediate and short-term actions were implemented including fencing to preclude livestock from Dines Tank (Apache-Sitgreaves NF), adding large, woody debris to Dines Tank (Apache-Sitgreaves NF), fencing a portion of Picnic Allotment (Apache-Sitgreaves NFs), fencing a portion of East Clear Creek (Coconino NF), and revising several allotment management plans (Coconino NF).

In 1997, the Apache-Sitgreaves NF acquired roughly 4 miles (6.4 km) of Little Colorado spinedace habitat along Nutrioso Creek. Since then, these lands have not been grazed by permitted livestock since then.

The AGFD has purchased properties in the White Mountains area that either include occupied spinedace habitat along Rudd Creek (Sipe White Mountain Wildlife Area) and upper Little Colorado River (Wenima Wildlife Area, Becker Lake (Enders) Wildlife Area), or provide opportunity for establishing refugia populations (e.g., Grasslands Wildlife Area). The AGFD and the FWS have also worked with a private landowner to protect about 2 miles (3 km) of spinedace habitat in Nutrioso Creek (U.S. Forest Service 2004). The AGFD has also increased hunting pressure on elk in some areas in an effort to reduce impacts from the species to riparian habitats and meadows in watersheds occupied by spinedace, at least in the East Clear Creek system (U.S. Forest Service 2004). Finally, the AGFD has altered fish stocking at Nelson Reservoir (Nutrioso Creek), Blue Ridge Reservoir (East Clear Creek) and Knoll Lake (Leonard Canyon), to reduce the likelihood of rainbow trout moving downstream into occupied spinedace habitat (U. S. Fish and Wildlife Service 1995).

In 2002, ash flow from the Rodeo-Chediski wildfire on the Apache-Sitgreaves NF impacting the Chevelon Creek population of Little Colorado spinedace (through Black Canyon) led the AGFD to salvage spinedace from this population to prevent the potential extirpation of the Chevelon Creek populations. Although the ash flow did not reach occupied habitats in Chevelon Creek as of June 2003, all of the salvaged spinedace subsequently died in captivity (U.S. Forest Service

2004). Also, in 2002, the AGFD, with assistance from the Coconino NF, salvaged spinedace from Dines Tank. Dines Tank subsequently dried.

A captive population of Little Colorado spinedace from Nutrioso Creek had been established in the Flagstaff Arboretum until its demise from disease in the mid-1990s. Presently, the Flagstaff Arboretum holds a small captive population of Little Colorado spinedace from East Clear Creek. Captive spinedace from the East Clear Creek system kept at the Flagstaff Arboretum have been critical in maintaining the continued existence of this population (i.e., for future stocking in the wild) because captive populations do not exist for the Chevelon Creek, Silver Creek, Little Colorado River, or Nutrioso Creek populations.

The Coconino NF has provided the following summary of recovery efforts for the Little Colorado spinedace (U.S. Forest Service 2004): The 1999 *East Clear Creek Watershed Recovery Strategy for the Little Colorado spinedace and Other Riparian Species* identifies those activities that would assist in the recovery of the Little Colorado spinedace and its habitat within the East Clear Creek Watershed. This strategy was initiated to address the environmental baseline for the spinedace and its habitat with regards to the Buck Springs grazing allotment analysis. The strategy was developed around the goals and step down process outlined in the 1998 Little Colorado River Spinedace Recovery Plan.

Specifically, the strategy includes a suggested implementation schedule and a Little Colorado Spinedace supplemental stocking program. The implementation schedule contains activities that would meet the Recovery Plan goals of 1) protecting existing spinedace populations, 2) restoring depleted and extirpated spinedace populations, 3) protecting and enhance existing habitats, and 4) ensuring that spinedace continues to exist in the future.

Described below are the activities completed on the Coconino NF that contribute to the Recovery Plan goals and strategy implementation schedule.

The Coconino NF was awarded a Heritage Grant through the AGFD on September 8, 1999. This grant funding, combined with Forest Service matching dollars, was used to accomplish two activities toward meeting spinedace recovery goals within the East Clear Creek Watershed. First, stream habitat inventory surveys were conducted within five main tributaries to East Clear Creek. The purpose of the stream surveys was to locate and identify occupied spinedace habitat and/or potential future spinedace stocking sites. Second, elk exclosures were constructed within two headwater drainages (Merritt Draw and General Springs Canyon) to East Clear Creek. These exclosures will enhance spinedace habitat through protection of meadow habitat, and associated spring sources, from elk grazing.

Grazing allotment analysis for the Buck Springs Allotment was initiated in 1998, but did not begin in earnest until 1999, after completion of the East Clear Creek Watershed Recovery Strategy for the spinedace. Currently, the preferred alternative for the Buck Springs Allotment is being implemented until an appeal from the permittee regarding the AMP is dealt with. The preferred alternative for Buck Springs Allotment contains protection of headwater meadows, reduction in amount of acres open to livestock grazing, reduction in permitted livestock, and additional fencing to help protect Little Colorado spinedace habitat (occupied and unoccupied

suitable habitat, and designated critical habitat). An analysis for the Bar T Bar Allotment also began in 1999. The decision for the Bar T Bar Allotment EIS is expected in early 2005. Proposed piñon-juniper treatments in the preferred alternative are expected to provide improved watershed conditions in the uplands above East Clear Creek.

The AGFD increased cow elk permits in Hunt Unit 5A (Coconino NF – East Clear Creek Watershed) for the fall elk hunts in 1999 and 2000. The Department made this increase in hunt permits in direct response to the recovery strategy. The increase in permits was made in hopes of reducing elk impacts to the meadows and riparian drainages within the East Clear Creek Watershed.

The Flagstaff Arboretum pond is currently being used as refugia for the East Clear Creek spinedace population. To date, only a few spinedace have been stocked back into the East Clear Creek Watershed from the Arboretum pond. The pond currently contains substantial numbers of spinedace to begin moving them back into the watershed.

Ninety-nine spinedace that were temporarily held in an aquarium at a AGFD Office were stocked into Yeager Canyon (main tributary to East Clear Creek) on November 2, 2000. An early October 2001 monitoring effort in Yeager Canyon collected very few adult spinedace, but did collect young-of-year spinedace from one pool. Yeager Canyon received an additional 25 spinedace from West Leonard Canyon on October 25, 2001. Drought conditions in 2002 forced the salvage of nine spinedace from Yeager Canyon, 38 spinedace from Dines Tank, and 361 spinedace from West Leonard Canyon. These salvage operations were conducted by personnel from the FWS, Forest Service, and the AGFD. A portion of the salvaged spinedace were held in a “living stream” aquarium at the Rocky Mountain Research Station’s Aquatics Lab, while the great majority were put in the Flagstaff Arboretum pond.

Late summer rains in 2002, were sufficient to recharge some of the tributaries to East Clear Creek. As a result of the renewed flows, 58 spinedace from the Aquatics Lab were stocked into Dane Canyon on August 15, 2002.”

Finally, in the February 2, 2005 supplement to the biological assessment, the Forest Service provided additional conservation measures meant to benefit the spinedace. They are as follows:

Conservation Measure #1: Design projects in occupied Little Colorado spinedace habitat on National Forest System lands which address the appropriate components of the Little Colorado spinedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to Little Colorado spinedace.

Conservation Measure #2: Over the next two years, the Forest Service, in cooperation with other state agencies and federal agencies, universities/colleges, Forest Service research facilities, and FWS will assess and prioritize habitat stream and river segments on National Forest System lands for potential Little Colorado spinedace reintroduction. Cooperatively document the results in an annual report to FWS.

Conservation Measure #3: To the extent feasible within the mission and capabilities of the Forest Service, assist the FWS and AGFD with any Little Colorado spinedace reintroduction efforts.

Conservation Measure #4: With state agencies and other researchers (i.e., academic and Forest Service), who are currently monitoring Little Colorado spinedace populations, participate in the development of a consistent monitoring methodology for spinedace, their associated habitat, and co-occurring aquatic species. Cooperatively document the results in an annual report to the FWS.

Conservation Measure #5: The long-term benefits directly attributable to wildland fire use for resource benefits, is the reduction of catastrophic fire. This is very significant to long-term land management goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems.

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in GIS layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

- b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed (i.e., spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc).

During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.

- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

In summary, these Conservation Measures should go a long way towards not only minimization of projects impacts, but also towards recovery of spinedace populations on Forest Service lands. Conservation Measure #1 attempts to reduce and/or remove adverse impacts at the project level. It is understood that not all projects will be able to meet this standard, but as a goal statement, this measure can be very powerful and should help alleviate some of the threats to the spinedace.

Conservation Measure #5 is similar to Conservation Measure #1 in that it minimizes impacts, but is aimed specifically at minimizing threats of fire use. Finally, Conservation Measures #2, #3, and #4 address recovery actions that will be required to actually recover the spinedace. As much of the historical habitat for the spinedace has been lost and population numbers have been declining, beneficial actions such as these will be required in order to reverse this trend.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Our information indicates that, rangewide, 17 formal consultations have been completed or are underway for actions affecting Little Colorado spinedace. Adverse effects to Little Colorado spinedace have occurred due to these projects and many of these consultations have required reasonable and prudent measures to minimize effects to Little Colorado spinedace. However, the species is still declining.

Table 119. Consultations regarding actions that adversely affected Little Colorado spinedace and/or its critical habitat.

Consultation #	Date	Name	Conclusion - Anticipated Take
02-21-88-F-0029	22-May-89	US Route 180/Arizona 666	No Jeopardy - Approximately 8% of the population and loss of 500 linear feet of habitat
02-21-88-F-0029 R1	30-Apr-91	Reinitiaion of US Route 180/Arizona 666	No Jeopardy - Approximately 8% of the population and loss of 275 linear feet of habitat
02-21-92-F-0403	2-Aug-95	Federal Aid’s Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	No Jeopardy – Take anticipated, but take is not quantifiable so surrogate measures are provided

Consultation #	Date	Name	Conclusion - Anticipated Take
02-21-92-F-0403	20-Nov-95	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-96-F-339	31-Jul-96	Greer River Reservoir Dam	No Jeopardy – No take anticipated
02-21-01-F-0425	6-May-97	Buck Springs Range Allotment Management Plan	Draft opinion – Jeopardy; project was subsequently modified. No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-88-F-167	30-Mar-98	Phoenix Resource Management Plan for the Bureau of Land Management	No Jeopardy – No take anticipated
02-21-97-F-343	31-Mar-98	Bank Stabilization on the Little Colorado River South of St. Johns, Arizona	No Jeopardy - Take of 5 adults or juveniles Little Colorado spinedace anticipated
000089RO	2-Feb-99	Regional ongoing grazing activities on allotments (Buck Springs, Colter Creek, Limestone, South Escudilla)	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
2-21-96-F-422 and 423	16-Apr-99	Amendment No 1 Phoenix District AZ Grazing EIS Upper Gila San Simon	No Jeopardy – No take anticipated
02-21-99-F-0167	1-Jul-99	McCain and Sears Whip Bank Stabilization on the Little Colorado River	No Jeopardy – Take anticipated; however, take is not quantifiable so surrogate measures are provided

Consultation #	Date	Name	Conclusion - Anticipated Take
02-21-92-F-0403	25-May-01	Federal Aid's Transfer of Funds to the Arizona Game and Fish Department for Exotic Fish Stocking in Nelson Reservoir, Blue Ridge Reservoir, and Knoll Lake	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
2-21-01-F-218	21-Aug-01	Upper Little Colorado River Riparian Enhancement Demonstration Project	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-02-0220	4-Oct-02	Crayfish Study in Nutrioso Creek *	No Jeopardy - Take of 10 Little Colorado spinedace anticipated
02-21-01-101	19-Apr-02	Apache trout reintroduction	No Jeopardy – No take anticipated
2-21-01-F-0425	30-Apr-03	Buck Springs Allotment Management Plan	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided
02-21-03-0369	16-Oct-03	Replacement of Little Colorado River Bridge #1184 State Route 87	No Jeopardy - Take anticipated; however, take is not quantifiable so surrogate measures are provided

* The project "Crayfish Study in Nutrioso Creek" never occurred.

The following subsections will address the respective environmental baseline conditions (i.e., abundance, watershed and riparian health, threats, and interactions with non-native fishes) for each of the three genetically-distinct Little Colorado spinedace sub-groups described by Tibbetts et al. (1994): (1) East Clear Creek; (2) Chevelon Creek; and (3) the upper Little Colorado River, including Nutrioso and Rudd creeks.

East Clear Creek

Elevations in the Clear Creek watershed range from approximately 7,800 feet near the Mogollon Rim, to approximately 6,400 feet at the confluence with Clear Creek. The land slopes generally downward towards the north and the Little Colorado River. The terrain surrounding East Clear

Creek is characterized by deep, steep-sided, narrow canyons, and broad, relatively flat ridge tops. Major drainages within the area include portions of Leonard Canyon, Barbershop Canyon, Yeager Canyon, Bear Canyon, General Springs Canyon, Miller Canyon, Dane Springs Canyon, and Buck Springs Canyon.

The southern portions of the watershed are adjacent to the Mogollon Rim escarpment and are dominated by multi-storied, mixed conifer habitat. The northern portion of the watershed receives less precipitation and is dominated by ponderosa pine habitats. The canyons are occupied by pockets of mixed-conifer, which extend into the northernmost pastures.

The status of the Little Colorado spinedace has been declining within the East Clear Creek watershed since its 1987 listing and faces the potential of extirpation. The Little Colorado Spinedace Recovery Plan lists the East Clear Creek population as second in order of those populations in imminent danger of extinction, and states that the loss of any population of Little Colorado spinedace significantly increases the risk of extinction for the species (U.S. Fish and Wildlife Service 1998). Therefore, any effects to this species in this watershed are considered extremely serious and warrant careful monitoring. The East Clear Creek population of Little Colorado spinedace has been recorded primarily from the mainstem of the creek and in portions of Leonard Canyon. As stated previously, this population fluctuates widely and is usually found in small, isolated pockets of habitat. A key factor in the presence of the fish appears to be the quantity of water in the systems. Over the past several years, personnel from the Coconino NF, the Forest Service's Rocky Mountain Forest and Range Experiment Station, the AGFD, the FWS, and Northern Arizona University have conducted surveys for Little Colorado spinedace. These surveys have indicated that Little Colorado spinedace population levels in the East Clear Creek system have continued to decline.

Little Colorado spinedace have been observed at six locations within the Buck Springs Allotment in recent years. Observations within critical habitat, adjacent to the allotment include: (1) the Jones Crossing population (1993, 1994, 1995); (2) near the mouth of Miller Canyon (1994); and (3) below Blue Ridge Reservoir (1995 through 1997). Three populations, which are not in critical habitat, have been observed in Leonard Canyon and its tributaries: (1) in Dines Tank (1969 through 1993, 1999, 2002); (2) in West Leonard Canyon (1994, 1999, 2000, 2001, 2002); and (3) in Leonard Canyon between the confluences of Buck Springs Canyon and West Leonard Canyon (1997). Of all the drainages surveyed in 1999 and 2000, West Leonard Canyon was the only drainage to contain Little Colorado spinedace. The pools containing Little Colorado spinedace in West Leonard Canyon were located within the same general vicinity as those found in 1994 (White 1995). One survey occurred in 2003 in Bear Canyon and no surveys were done in 2004 within these areas.

Since the summer of 2002, of all the drainages inventoried within the East Clear Creek watershed, Little Colorado spinedace were only known to exist in West Leonard and Leonard Canyons (Dines Tank). Surveys completed in 2002 found that West Leonard Canyon and its major tributaries were all virtually dry due to drought conditions. All but one pool in West Leonard Canyon that contained Little Colorado spinedace in 2001 were non-existent in 2002 and the pool in West Leonard Canyon that has consistently contained a significant number of Little Colorado spinedace almost completely dried. Given those conditions, Forest Service and AGFD

Region II personnel salvaged approximately 128 Little Colorado spinedace from this pool on June 27, 2002.

Thirty-one miles of critical habitat for the Little Colorado spinedace has been designated in East Clear Creek within the Coconino NF. Constituent elements of critical habitat consist of clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate. Critical habitat is designated from Potato Lake in the headwaters to Blue Ridge Reservoir (8 miles) and below Blue Ridge Dam to the confluence with Leonard Canyon (6 miles). Critical habitat is not designated for Leonard Canyon.

Little Colorado spinedace habitats in the East Clear Creek drainage and within the action area have been altered by the construction of dams on the mainstem and tributaries such as Blue Ridge Reservoir, Knoll Lake, and Bear Lake. Past land-management activities have included timber harvest, livestock grazing, road construction and maintenance, recreational development and usage, fire management, and inter-basin water diversions that have altered the habitat. These activities have affected watershed function, runoff patterns, peak flows, seasonal flows, riparian vegetation, wet meadow functions, bank erosion, siltation, and water quality. Wildlife and fisheries management largely associated with providing hunting or fishing opportunities has altered the faunal component of the habitat. Introduction of non-native trout, baitfish, and crayfish at Blue Ridge Reservoir and Knoll Lake have increased competition for available resources and possibly predation on Little Colorado spinedace. In addition, there is concern that elk (*Cervus elaphus*) are much more abundant in the East Clear Creek drainage than they were historically, and that they may have an appreciable effect on the existing riparian and aquatic habitats. The Forest Service is working with the AGFD to determine the carrying capacity for elk and the appropriate adjustment of elk numbers within the East Clear Creek watershed.

Studies in the East Clear Creek areas indicate that past intensive grazing by ungulates has resulted in considerable change to the historical condition of aquatic and riparian habitats and thus the habitat available for Little Colorado spinedace (Hydro Science 1993). In some areas, the channels are moving toward, or have achieved, stability although it is not the same as the pre-overuse stability. Recovery of the streams and associated floodplains and riparian areas to those historical conditions may be extremely difficult, if not impossible, to attain.

Chevelon Creek

Chevelon Creek is considered to be occupied by the Little Colorado spinedace, although distribution is patchy and dependent upon the presence of water, and absence or low levels of non-native fishes and crayfish. None of the Chevelon Creek habitat known to be occupied by Little Colorado spinedace is within National Forest System lands. The final rule listing the Little Colorado spinedace (U.S. Fish and Wildlife Service 1987) states that only an 8-mile reach of Chevelon Creek from Bell Cow Canyon to the confluence with the Little Colorado River contains the species. This 8-mile reach is also critical habitat. The occupied reach and critical habitat are approximately 25 to 30 stream miles from the Apache Sitgreave NF's northern boundary. The great distance between the National Forest and the occupied habitat reduces the magnitude of downstream indirect effects such as sedimentation from land management practices (i.e., livestock, timber, recreation, and roads) and escape of non-native trout from Chevelon Canyon Lake.

The BLM administers land adjacent to Chevelon Creek downstream from the Apache-Sitgreaves NF. The BLM is currently contracting with the AGFD to conduct surveys in Silver Creek. As of July 8, 2004, AGFD had located only three native fish (two Little Colorado suckers and one bluehead sucker) and no Little Colorado spinedace. They continued to conduct surveys throughout the summer of 2004. The AGFD has not finished their report; however, no spinedace were located, but a pool with native fish was found. It is unclear if all suitable habitat within private land was surveyed. However, we are very concerned about the status of the Silver Creek Little Colorado spinedace since we have not located fish in the drainage since 1997 and we do not have a refugium population for these fish. In 1999, BLM personnel surveyed the reaches of the Little Colorado River that traverse BLM-administered land and no Little Colorado spinedace were located. However, it is still possible that spinedace exist in Silver Creek.

Upper Little Colorado River, Nutrioso Creek, Rudd Creek

The third sub-group of Little Colorado spinedace proposed by Tibbets et al. (1994) resides in the upper Little Colorado River and its eastern watersheds: Nutrioso and Rudd creeks. These streams drain the White Mountains, the highlands spanning Mt. Baldy on the west and Escudilla Mountain on the east. South of this divide are the headwaters of the upper Salt River with its distinctive fish fauna.

The Little Colorado River originates at the confluence of the East and West Forks of the Little Colorado River immediately south of the town of Greer. Elevations in the East and West Fork watersheds within the Mt. Baldy Wilderness Area reach over 10,000 feet. The Little Colorado River is perennial in its upper reaches, but becomes intermittent from the old Zion Reservoir to Silver Creek. Most of the Little Colorado River from its confluence with Silver Creek downstream to Winslow is perennial. Major tributaries to the middle reaches of the Little Colorado River include Cottonwood Wash, Clear Creek, and Chevelon Creek, all of which are located upstream of the SR 87 bridge. The Little Colorado River proper flows through a variety of jurisdictions: the Apache-Sitgreaves NF, private land, the Navajo and Hopi reservations, BLM, and NPS.

Spinedace are currently known from areas in the Little Colorado River near St. Johns upstream to near the town of Greer, upstream of its confluence with Nutrioso Creek and near the confluence of Chevelon Creek and the Little Colorado River. There are records from the 1990's from the area upstream of the State Route 260 bridge crossing and near the rest area on U.S. Route 180/666 north of Springerville (Dorum and Young 1995).

Approximately five miles of Nutrioso Creek from the Apache-Sitgreaves NF boundary upstream to the Nelson Reservoir dam are designated critical habitat for the Little Colorado spinedace. This stream was designated because it supports healthy, self-perpetuating populations of Little Colorado spinedace (U.S. Fish and Wildlife Service 1998). It provides all of the ecological, behavioral, and physiological requirements necessary for the survival of the species. Any action that would deplete the flow, significantly alter the natural flow, alter the channel morphology, or alter the water chemistry of Nutrioso Creek would adversely affect critical habitat within (U.S. Fish and Wildlife Service 1998). Critical habitat within the action area is thought to be degraded physically and inhabited by many non-natives (U.S. Forest Service 2004). Little Colorado spinedace were last collected upstream of Nelson Reservoir in 2000 (Lopez et al. 2001). The

Little Colorado River population in the Nutrioso Creek watershed is stable and fairly common only within a portion of Nutrioso Creek. Little Colorado spinedace habitat is limited by perennial flows and non-native aquatic species in the tributaries of Nutrioso Creek.

The Little Colorado River population of spinedace in the Nutrioso Creek watershed is stable and fairly common only within a portion of Nutrioso Creek. Spinedace habitat is limited by perennial flows and non-native aquatic species in the tributaries of Nutrioso Creek. Little Colorado spinedace are found in the stream from about the Milk Creek/town of Nutrioso area downstream to Nelson Reservoir south/southeast of Springerville. Water quality and quantity is affected by the dam and close proximity of the highway and road cuts. Stream alteration, watershed modification, and introduction of non-native fishes pose an increasing threat to the Little Colorado spinedace (U.S. Fish and Wildlife Service 1998). Sport fish management in Nelson Reservoir indirectly affects the Little Colorado spinedace.

Rudd Creek is a tributary to Nutrioso Creek and enters the former approximately 0.75 mile below the dam that impounds Nelson Reservoir. The Little Colorado spinedace inhabiting Rudd Creek were detected subsequent to the species' 1987 listing. Rudd Creek thus did not receive consideration for critical habitat designation. Spinedace occurred in Rudd Creek on AGFD's Sipe White Mountain Wildlife Area until the drought in 1996, when the known site dried completely. Baseline Conditions in Rudd Creek resemble those in Nutrioso Creek, to which it is a tributary, although AGFD ownership conveys a level of protection not found in privately-owned reaches. AGFD has acquired water rights on Rudd Creek within their lands.

EFFECTS OF THE ACTION

The Little Colorado spinedace occurs on the Coconino NF and the Apache-Sitgreaves NF, and downstream of the Gila NF. Relevant S&Gs were identified and analyzed for the Apache-Sitgreaves and Coconino NFs and for the 1996 Regional Amendment. No effects matrix was prepared for the Gila NF due to its great distance (ca. 30 river miles) from the nearest Little Colorado spinedace site (U.S. Forest Service 2004).

The proposed action's effects on Little Colorado spinedace critical habitat will be analyzed based on the respective S&G's impact on the primary constituent elements (PCEs) within each critical habitat unit (CHU) identified in the final rule. The PCEs for Little Colorado spinedace critical habitat include: (1) aquatic systems with perennial flow; (2) free of non-native fishes; (3) natural hydrographs; and (4) good water quality, free of pollutants. Since these PCEs relate directly to the life history requirements of the species itself, the effects section will seek primarily to identify which PCEs are being affected by each S&G which has received an adverse numeric effects rating.

Table 120. Summary of S&Gs considered for the Little Colorado Spinedace.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4, 5, 6, 8, 9, 14, 16-21, 25, 26, 28, 29, 30-34, 37, 38, 39, 40, 42-53, 55, 58-64, 70, 80, 84, 97-99, 104-118, 120-123, 125, 130, 132, 133-140, 144, 149, 150,

National Forest	Standards and Guidelines
Apache-Sitgreaves	150a, 151, 152, 158-162, 165, 166, 171, 172, 177-180
Coconino	311,314-319,321-325,327-329,331,336-338,341,343-345,353-358,361-367,369-379,382-390,394,395,398-400,402,404, 406,408,411,413,414
1996 Regional Amendment	1425-28, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-56, 1458, 1459, 1461-65, 1468, 1473, 1474, 1476, 1486; 1487-92, 1495, 1496, 1499, 1501, 1502, 1504, 1506, 1508, 1509; 1510-15.

Apache-Sitgreaves National Forest

The FWS ranked three S&Gs as causing a lethal response to this species and three that would cause a sublethal response to the spinedace. Six S&Gs were found to cause a negative behavioral response. However, the majority were found to maintain habitat and provide minimal recovery. Several S&Gs have direction to recover listed species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 121. Effects of the S&Gs analyzed for the Little Colorado spinedace – Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	2.9
-2	S&G is causing sublethal response	3	2.9
-1	S&G is causing negative behavioral response	6	5.9
0	S&G is ill-defined and/or open to interpretation	20	19.6
1	S&G is maintaining habitat & providing at least minimal recovery	58	56.9
2	S&G is moving towards recovery	4	3.9
3	S&G is implementing species recovery plan	1	1.0
Y	S&G has no application to the species	1	1.0
Z	S&G implementation is non-discretionary	2	2.0
X	S&G is a heading	4	3.9
Total		102	100 %

Engineering Program

Standard and Guideline 63 guides the management of total road density to average 3.5 mi/mi² or less. Open road densities should average 2.0 mi/mi² or less. As stated in the biological assessment (U.S. Forest Service 2004), road density is defined as the total kilometers (miles) of road in a defined area divided by the defined area in square kilometers (miles). The analysis in the biological assessment recognizes that the numbers that were being evaluating were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by FWS and NOAA Fisheries as one way to measure watershed condition as it relates to resident fish in the Pacific Northwest. The joint agencies recommendation is that a given watershed should have less than 2.5 mi/mi² of road system; if in excess, the watershed is

said to be not properly functioning. This S&G may result in a sublethal effect to the spinedace because of sediments and pollutants from high road densities.

On the Apache-Sitgreaves NF, the known road densities are below the 2.5 mi/sq.mi. recommended by FWS and NOAA Fisheries. Road density on the Apache-Sitgreaves is about 1.1 km/km², however this number does not include the non-classified roads (U.S. Forest Service 2004:33). Standard and Guideline 63, if implemented as written, allows for the total road density to reach 3.5 mi/mi². High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to Little Colorado spinedace is watershed deterioration. This could potentially lead to increased erosion into Little Colorado spinedace habitat (including critical habitat), thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality. Moreover, the relatively short lifespan of the Little Colorado spinedace, coupled with the comparatively low fecundity of the species and the small population sizes makes it vulnerable to serious adverse effects from activities which may only impact the species' habitat for relatively short time periods, especially during the spawning season. Any situation that eliminated or greatly reduced a year-class would severely deplete recruitment to a population. For example, excessive sedimentation during the spawning season might suffocate a large portion of that year's reproductive effort. In the succeeding year, total reproductive effort would be diminished. The net effect would be a major reduction in population size (Propst et al. 1988).

Implementation of this S&G may affect Little Colorado spinedace critical habitat PCEs: (3) by altering the natural hydrograph and (4) by reducing water quality due to increased sedimentation into the Chevelon Creek and Nutrioso Creek CHUs.

Forestry and Forest Health Program

Standard and Guideline 64 allows the Forest to remove infected overstories (i.e., dwarf mistletoe) as soon as regeneration is accomplished. In addition, it allows the Forests to thin understories to densities which will maximize fiber production over the length of the rotation, by using yield simulation models as guides and to control mistletoe by clear-cutting (in conformance with Regional Standards for clear-cut size) and regenerating artificially when yield simulation models indicate that stands will not reach maturity because of dwarf mistletoe. This S&G may result in a negative behavioral response by the spinedace.

This S&G (64) allows for controlling mistletoe by clear-cutting. As stated in the biological assessment, clear-cutting in this region has undergone a major reduction over the past decade. On the Apache-Sitgreaves, a total of 704 acres have been clear-cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibit the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to the watershed condition from clear-cutting may be increased erosion resulting from new road construction and heightened soil runoff from reduced ground cover and compacted surfaces in staging areas. Implementation of this S&G may affect Little Colorado spinedace critical

habitat PCEs: (3) by altering the natural hydrograph and (4) by reducing water quality due to increased sedimentation into the Chevelon Creek and Nutrioso Creek CHUs.

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average 2.0 mi/mi² or less. This S&G may cause a sublethal effect.

The S&G (97) as written could potentially allow total road densities to reach 3.5mi/sq mi. or above if needed to economically remove timber. The FWS's recommendation is that in order to maintain a properly functioning watershed that total road density be 2.5 mi/mi². See the discussion above for S&G 63 for the discussion on the effects of high road densities.

Implementation of this S&G may affect Little Colorado spinedace critical habitat PCEs: (3) by altering the natural hydrograph and (4) by reducing water quality due to increased sedimentation into the Chevelon Creek and Nutrioso Creek CHUs.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 114 guides the Forest to manage for or maintain at least 60 percent of potential habitat capability for Apache trout, rainbow trout, brook trout, brown trout, loach minnow, and Little Colorado spinedace. Standards and Guidelines 115 and 116 discusses aquatic resources directing the Forest to manage for and maintain at least 80 percent of near natural shade over water surfaces and stream bank total linear distance in stable condition. These S&Gs may cause a potentially lethal effect to the spinedace. The FWS is concerned with the inverse implications, that allowing up to 20 percent of streambank to exist in unstable condition will adversely affect the Little Colorado spinedace. The FWS also notes that 20 percent unstable banks could allow sedimentation over the remaining 80 percent, bank stability in those reaches notwithstanding.

Three S&Gs within this program may cause a lethal response; 114, 116, and 152. Standards and Guidelines 114 and 152 both direct the Forest to manage for at least 60 percent of habitat capability for Apache trout, rainbow trout, brook trout, brown trout, loach minnow, and Little Colorado spinedace. These S&Gs presents two sources of concern; first that it implicitly permits up to a 40 percent loss of habitat capability for the Little Colorado spinedace, and second, that it promotes management of non-native, competitive/predatory salmonids, particularly the piscivorous brown trout. Implementation of this S&G may affect Little Colorado spinedace critical habitat PCEs: (2) by increasing the likelihood of non-native presence; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the Chevelon Creek and Nutrioso Creek CHUs.

Standard and Guideline 118 allows the Forest to maintain 80 percent of a stream's spawning gravel surface free of inorganic sediment. This S&G may cause sublethal effects to the spinedace. Like S&Gs 39, 115, 117, and 123, we have interpreted this S&G to allow up to 20 percent inorganic sediment in spawning gravels. The loss of such an appreciable proportion of spawning gravels could restrict the ability of Little Colorado spinedace to recover their diminished numbers following chronic drought or stochastic events (e.g., flash floods, post-fire runoff).

The FWS identified a host of Wildlife Program S&Gs with adverse effects. Specifically, S&Gs 39, 115, 117, 123, and 150a were all ranked as causing a negative behavioral response. Standards and Guidelines 39, 115, 117, and 123 received negative rankings due to their emphasis on various states of habitat maintenance in Little Colorado spinedace habitat. For example, S&G 117 guides the Forest to limit siltation of streams to no more than 20 percent. While this standard represents a worthwhile target for improving stream health, it has been interpreted by us to mean that up to 20 percent siltation may be permitted. Excessive sediment loading is detrimental to aquatic species (Newcombe and MacDonald 1991). Such a level of siltation may adversely affect Little Colorado spinedace, primarily through lost spawning and foraging habitat (embedded gravel), reduced predator avoidance (increased turbidity), and gill occlusion (suspended fines). Standard and Guideline 39 states that within each diversity unit maintain or achieve at least 40 percent of the potential habitat capability for the management indicator species selected for each vegetation type. This may result in a negative behavioral response. The remaining S&Gs ranked as adversely affecting spinedace because they allow the Forest to manage habitat to maintain a fishery. For purposes of this analysis, the FWS assumes that a “fishery” could include both native and non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of native fishes (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of native cyprinids (Minckley and Deacon 1968; Minckley 1973). While not necessarily a fishery, red shiners are a legal bait fish in Arizona. The existence of a sport fishery thus renders the introduction of red shiner (and fathead minnow) likely. Introduced trout (Salmonidae) may co-occur and prey on Little Colorado spinedace, though it is likely that the native Apache trout co-existed historically with Little Colorado spinedace at some elevations in the Little Colorado River. It is likely, however, that the piscivorous tendencies of brown trout render coexistence between the species less certain. These non-native fish may also impact Little Colorado spinedace populations through competition for food and space.

Coconino National Forest

The FWS found one S&G within the Coconino NF LRMP to be sublethal to the spinedace. The majority of the S&Gs maintained habitat and provided minimal recovery for the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 122. Effects of the S&Gs analyzed for the Little Colorado spinedace - Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	1	0.7
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	16	11.7
1	S&G is maintaining habitat & providing at least minimal recovery	91	66.4
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	1.5

Ranking	Explanation of Ranking	Total	Percentage
Y	S&G has no application to the species	3	2.2
Z	S&G implementation is non-discretionary	7	5.1
X	S&G is a heading	17	12.4
Total		137	100 %

Engineering Program

Five S&Gs within the Coconino NF Engineering Program were ranked as causing short-term adverse effects in order to achieve long-term positive effects; a net beneficial effect. S&G 400, for example, provides for road removal. While it is advantageous to reduce road density, the work associated with “putting roads to bed” may have short-term impacts on water quality in adjacent streams inhabited by Little Colorado spinedace (see above for discussion on the effects of sediment instreams). The remaining S&Gs (404, 408, 460, and 534) also allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status. Implementation of this S&G may affect Little Colorado spinedace critical habitat PCEs: (3) by altering the natural hydrograph and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Forestry and Forest Health Program

Standard and Guideline 461 guides the Coconino NF to avoid or designate stream course crossings for skid trails and limit the trails to the minimum needed. The Forest is also directed to choose crossings with stable conditions or stable bed and bank material such as cobble or rock. While skidding of timber is likely to cause short-term, adverse effects on water quality, we recognize that mechanical removal of logs is likely to be implemented to reduce fire hazard and/or improve overall forest health. The FWS is particularly amendable to forest health projects in which canopy cover is reduced, allowing increased herbaceous ground cover to become established. Increased ground cover can be expected to reduce downstream sedimentation.

Wildlife, Fish and Rare Plants Program

Three S&Gs within the Coconino LRMP are considered to have an overall beneficial effect but with short-term adverse affects. Standards and Guidelines 475 and 496 guide the Forest to protect meadow communities, riparian areas, or other sensitive areas in Management Areas 9 and 12, respectively, from the effects of spring development by piping water to water developments in adjacent, less sensitive areas (U.S. Forest Service 2004:159). Again, the long-term goal of reduced wildlife and stock water use in habitats which may contain Little Colorado spinedace is beneficial, but some fish will be taken from occupied sites during development and minimal numbers may also be taken during subsequent operations and maintenance of the sites.

Standard and Guideline 490 was discussed in the analysis of S&G 492, above, and guides the Forest to meet the following riparian standards in the Regional Guide for 80 percent of riparian areas above the Rim and 90 percent below the Rim by the year 2030: maintain at least 80 percent of the potential over-story crown coverage; maintain at least three age classes of woody riparian species, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings; maintain at least 80 percent of the potential stream shading from June to September along

perennial cold and cool water streams; maintain at least 80 percent of the potential shrub cover in high elevation areas; maintain at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands; maintain at least 80 percent of the spawning gravel surface free of inorganic sediment; maintain at least 80 percent of streambank total linear distance in stable condition; retain snags in riparian areas that are not a safety hazard. This S&G was rated as having short-term adverse effects primarily because of its prospective benefits at the target year of 2030 are thought to outweigh the interim period in which standards are not met as well as the 20 percent impacts it implicitly permits. Overutilization of vegetation, including riparian vegetation, can cause changes to plant root structures, and alter plant species composition and overall biomass (Martin 1975, Menke 1988, Vallentine 1990, Popolizio et al. 1994). These conditions may increase sediment delivery into the stream (Platts 1990, Meehan 1991, Johnson 1992, Weltz and Wood 1994), change the way in which flood flows interact with the stream channel, and may exacerbate flood damage to banks, channel bottoms, and riparian vegetation.

Implementation of these S&Gs may affect Little Colorado spinedace critical habitat PCEs: (1) by altering perennial flows of streams; (2) by increasing the opportunities for non-native fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Lands and Minerals Program

Two Coconino NF S&Gs were determined to be capable of adversely affecting Little Colorado spinedace in the short-term. S&G 393, applied forest-wide, guides the Forest to evaluate requests for transmission corridors based on public need, economics, and environmental impacts of the alternatives and to use existing corridors to capacity with compatible utilities where additions are environmentally and visually acceptable before evaluating new routes. This S&G has short-term adverse effects, indicating that while long-term adherence to its conditions would lessen impacts on the Little Colorado spinedace, short-term effects could harm individuals of the species.

Standard and Guideline 505 was determined to be capable of creating a sublethal response (harm) in Little Colorado spinedace, as it permits the Forest to consider material excavation within riparian zones. Though the stated goal of the S&G is that such activities will maintain or improve riparian conditions, the S&G does not specify that water quality or quantity will be maintained, or that sediments loads will not increase or, conversely, that moderately-fine bed materials required by Little Colorado spinedace will not be removed.

Implementation of these S&Gs may affect Little Colorado spinedace critical habitat PCEs: (1) by altering perennial flows of streams; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Fire Management Program

Standard and Guideline 411 guides the Forest to plan fuel treatments that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives. The FWS expects reduced fuel loading to reduce the risk of catastrophic wildfire. Given the potential severity of post-fire effects on aquatic systems (Dunham et al. 2003, Rinne 1996, Bozek and Young 1994), this S&G can be expected to reduce adverse effects on Little

Colorado spinedace over the long-term. Fuel treatments, however, can result in short-term degradation of water quality and direct mortality. In addition, S&G 414 directs the Coconino NF to limit the treatment of natural fuels to areas where fuel buildups are a threat to life, property, adjacent to old-growth areas, or specifically identified high resource values. Fuel treatments could include prescribed fire and physical, chemical, or biological treatment of vegetation.

Prescribed fire is a relatively well-managed activity that could be managed somewhat effectively to minimize effects to the spinedace. Nonetheless, prescribed fire can directly affect fishes. Fish mortalities can occur from increases in water temperatures to lethal levels, fire induced changes in pH, increased ammonium levels from smoke gases absorbed into surface waters, and increased phosphate levels leached from ash (Brown 1989, Gresswell 1999, Norris et al. 1991, Rinne 1996, Rieman and Clayton 1997, Spencer & Hauer 1991). Most negative effects to aquatic species after fire are indirect, and are due to the immediate loss or alteration of habitat. Fire removes vegetation and consumes organic components of ground cover, thus changing the physical and chemical properties of watersheds and the streams and wetlands to which they contribute.

Implementation of these S&Gs may affect Little Colorado spinedace critical habitat PCEs: (1) by altering perennial flows of streams; (2) by increasing the opportunities for non-native fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

1996 Regional Amendment

None of the S&Gs within the 1996 Regional Amendment had solely adverse affects to the spinedace; however, several S&Gs have the potential for short-term effects in an overall beneficial action. Also, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 123. Effects of the S&Gs analyzed for the Little Colorado spinedace - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	30	58.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	15.7
Z	S&G implementation is non-discretionary	2	3.9
X	S&G is a heading	6	11.8
Total		51	100 %

The following S&Gs within the 1996 LRMP Amendment could have potential short-term adverse effects to the Little Colorado River spinedace:

Standard and Guideline 1432 allows no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years. Standard and Guideline 1445 guides the Forests to treat fuel accumulations to abate fire risk. Standard and Guideline 1455 guides the Forests to use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire in Mexican Spotted Owl protected areas. Standard and Guideline 1458 permits National Forests to allow prescribed fire within Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally-recognized Wilderness Study Areas). Standard and Guideline 1468 encourages the Forest to utilize prescribed and prescribed natural fire to reduce hazardous fuel accumulation and further states that thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire. Standard and Guideline 1476 allows the Forests to apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines. Standard and Guideline 1508 permits the Forests to pursue low-intensity ground fires at any time in all forested cover types inhabited by Northern Goshawks, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas and further guides the Forests to avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree.

Each of the aforementioned S&Gs permits short-term adverse effects on forested environments in order to secure long-term stability and/or to create conditions more desirable for the Northern Goshawk and/or Mexican Spotted Owl. The range of the Little Colorado spinedace coincides with or is downstream of much of the habitat occupied by (or suitable for) these raptors and thus, the fish can be expected to experience short-term adverse effects in exchange for long-term habitat stability or improvement.

Implementation of these S&Gs may affect Little Colorado spinedace critical habitat PCEs: (1) by altering perennial flows of streams; (2) by increasing habitat conditions preferred by non-native fishes; (3) by altering the natural hydrograph; and (4) by reducing water quality due to increased sedimentation into the East Clear Creek CHU.

Cumulative Effects

Cumulative effects include the effects of future state, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

A large proportion of the range of the Little Colorado spinedace exists on federal lands. Future projects undertaken by the respective federal agencies managing those lands would thus be subject to interagency consultation under section 7 of the ESA. Further, it is expected that a portion of the projects occurring on non-federal lands would nonetheless be considered federal action by nature of their funding (i.e., Federal Highway Administration road projects, Natural Resource Conservation Service restoration actions). The effects of any remaining actions occurring within the range of the Little Colorado spinedace but lacking discretionary involvement by a federal agency would thus be considered cumulative. Future actions within the action area that are reasonably certain to occur include increased water use, development, road maintenance, private fuels-reduction treatments, ungulate grazing on pastures adjacent to streams, and other associated actions. It is currently unknown whether state or private lands in the project area will be subject to future state or private projects; however, large-scale development of the area is not reasonably certain to occur in the near future because of the rural nature and economy of much of the area.

These cumulative actions, though potentially limited in extent, have the potential to reduce the quality of habitat for the Little Colorado spinedace and contribute as cumulative effects to the proposed action. In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, the statement concludes that accumulation of and interaction between localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the Little Colorado spinedace, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the proposed action is not likely to jeopardize the continued existence of the Little Colorado spinedace, and is not likely to destroy or adversely modify designated critical habitat. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS anticipates adverse effects to the Little Colorado spinedace from the implementation of the Apache-Sitgreaves and Coconino NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- Actions implemented by the Forest Service for the conservation of Little Colorado River spinedace include numerous stream surveys, limited repatriations and supplemental stockings, emergency salvage efforts arising from drought conditions or post-fire runoff, the establishment of captive "broodstock" populations for some of

- the lineages, and the protection of some habitats from threats associated with land-use practices such as livestock grazing.
- The Apache-Sitgreaves NF initiated a cost-share agreement with AZG&FD to inventory selected lotic habitats to determine the status of spinedace, document existing fish communities, and evaluate opportunities to improve existing habitat conditions for native fish. In addition, the project was intended to identify drainages on the Apache-Sitgreaves NF that might be suitable for the repatriation of Little Colorado spinedace. As a result, in 2003, a recommendation was made by the Recovery Team to pursue translocations of the Chevelon Creek population into West Chevelon Creek, using wild fish as the source. Sites in Willow Creek may similarly be pursued in 2004, using captive fish at the Flagstaff Arboretum as a source.
 - During the late-1990s, the Black Mesa Ranger District analyzed livestock allotments in the Chevelon Creek (west-side of the watershed) and Willow Creek watersheds and reduced livestock numbers 30 to 75 percent. The continued absence of livestock on about 50,000 ac (“Wildlife Area”) in the upper, middle, and lower reaches of Chevelon and Willow Creek watersheds, and the continued preclusion of livestock from the mainstream of Chevelon Creek will likely facilitate watershed recovery and the future reintroduction of the species in both drainages. Livestock grazing was also eliminated on all portions of Nutrioso and Rudd Creeks on the Springerville Ranger District.
 - In 1997, Region 3 of the Forest Service funded the implementation of several actions intended to address “short-term” needs for the conservation of Little Colorado spinedace as part of the “Seven Species Effort”. These actions included fencing to preclude livestock from Dines Tank (Apache-Sitgreaves NFs), adding large, woody debris to Dines Tank (Apache-Sitgreaves NFs), fencing a portion of Picnic Allotment (Apache-Sitgreaves NFs), fencing a portion of East Clear Creek (Coconino NF), and revising several allotment management plans (Coconino NF).
 - Additionally AGFD has been very proactive in recovery efforts for Little Colorado spinedace. Their efforts include cost-share projects with the Forest Service; funding survey and inventory efforts, as well as assisting in those efforts; maintaining captive populations at their Region II facility and at the Flagstaff Arboretum; leading emergency salvage efforts; and they have purchased properties in the White Mountains with occupied habitat or potential habitat that may be used for future use as refugia. In addition, they have altered stocking rates for rainbow trout at three reservoirs to limit the migration of the trout downstream to occupied spinedace habitat.
 - There are several S&Gs within the Apache-Sitgreaves and Coconino LRMPs that support conservation and recovery of Little Colorado spinedace. These are S&Gs 1, 4, 19, 21, and 26 within the Apache-Sitgreaves LRMP and S&Gs 321 and 324 within the Coconino LRMP. All of these S&Gs guide the Forests to implement recovery

plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species.

Despite the effects of drought and fire, on-going conservation efforts conducted by the Forest Service have contributed positively to the overall status of the Little Colorado River spinedace. In addition, AGFD has been committed to conservation efforts for this species. Within this analysis, we identified several S&Gs that have a potential to negatively affect the spinedace; however, none of these S&Gs should result in jeopardy to the spinedace or adverse modification of its critical habitat. In addition, the Forest Service has committed to the implementation of conservation measures that together with the implementation of the beneficial S&Gs outlined above should not result in a decline in population numbers or habitat conditions of spinedace on National Forest System lands in the southwest. For these reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Little Colorado River spinedace.

Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Little Colorado River spinedace will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the Little Colorado spinedace.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined in section 3 of the ESA as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is defined at 50 CFR 17.3 to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined at 50 CFR 17.3 as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of the agency action, is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of

the action and its impact on the species to us as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Little Colorado spinedace is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves and Coconino NFs LRMPs, as well as the 1996 Regional Amendment. This incidental take is expected to be in the forms of harm (i.e., mortality) and harass of Little Colorado spinedace from the Engineering, Forestry and Forest Health, and Wildlife programs on the Apache-Sitgreaves NF. On the Coconino NF, incidental take is expected to be in the forms of harm and harassment from projects implemented under Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, and Wildlife programs.

However, the FWS believes that the aforementioned incidental take will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, it is not possible to provide precise numbers of Little Colorado spinedace that will be harassed, harmed, or killed during projects implemented under the plan amendment.

Although we cannot estimate the number of individual spinedace that will be taken as a result of the proposed action, the FWS is providing a mechanism for when take would be considered exceeded at the population level. The FWS concludes that incidental take of Little Colorado spinedace will be considered to be exceeded if there is a loss of one population in the current number of spinedace populations on National Forest System lands as a result of the proposed action, without being offset by newly established populations.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Little Colorado spinedace.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Little Colorado spinedace.

1. Protect Little Colorado River spinedace on National Forest System lands.
2. Protect Little Colorado River spinedace habitat on National Forest System lands.
3. Monitor Little Colorado River spinedace populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measure described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of spinedace populations for potential natural vegetation conditions to eliminate direct effects and minimize indirect effects to spinedace.
- 1.2 Design projects within the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Wildlife programs to minimize or eliminate adverse effects to the Little Colorado River spinedace.
- 1.3 Cooperatively work to eliminate the presence of non-native aquatics within occupied habitat of the spinedace on Forest Service System lands and when designing fish habitat improvement projects, give consideration to native fish species.

The following term and condition will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, and Wildlife programs to reduce negative effects (direct and indirect) with the goal of implementing projects that have beneficial, insignificant, or discountable effects within occupied spinedace habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Little Colorado River spinedace populations on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service will track and report the effects of the proposed action on Little Colorado River spinedace, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the subspecies.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and

threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue implementing the East Clear Creek Watershed Recovery Strategy for the Little Colorado Spinedace and Other Riparian Species (U.S. Forest Service 1999).
2. Consider collaborating with the AGFD and FWS to establish a research program to study the effects of elk on the livestock-excluded pastures within the Buck Springs Range Allotment.
3. The FWS recommends that the Apache-Sitgreaves NF adopt the monitoring protocol described by the Coconino NF for the Buck Springs Allotment and apply said protocol to the Rudd Creek, Nutrioso Creek, and Chevelon Creek systems.
4. Continue to identify factors that limit the recovery potential of the spinedace on lands under their jurisdiction and work to correct them.
5. Acquire instream flow water rights to ensure perennial flow in streams with Little Colorado spinedace habitat.
6. Reestablish Little Colorado spinedace throughout its historic range in both Arizona and New Mexico.
7. Work cooperatively with the BLM and AGFD to locate Little Colorado spinedace in Silver Creek and to manage (or establish) the site as a refuge population.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

LOACH MINNOW

STATUS OF THE SPECIES

Description

The loach minnow (*Rhinichthys* (= *Tiaroga*) *cobitis*) is a small, slender, elongate fish rarely exceeding 60 mm (2.4 in) long, with eyes that are directed upward and a terminal mouth that has no barbels (Minckley 1973). Loach minnow have an olivaceous coloration that is highly blotched with darker pigment; whitish spots are present at the origin and insertion of the dorsal fin as well as the dorsal and ventral portions of the caudal fin base. Breeding males develop bright red-orange coloration at the bases of the paired fins, on adjacent fins, on the base of the caudal opening, and often on the abdomen. Breeding females become yellowish in color on their fins and lower body (Minckley 1973, Sublette et al. 1990).

Biochemical genetic work on loach minnow indicates that there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

Legal Status: Loach minnow was listed as a threatened species on October 28, 1986 (U.S. Fish and Wildlife Service 1986). Critical habitat was designated for loach minnow on April 25, 2000 (U.S. Fish and Wildlife Service 2000). Critical habitat was vacated by the 9th Circuit Court on August 31, 2004. The Loach Minnow Recovery Plan (U.S. Fish and Wildlife Service 1990) was approved in September 1991.

Distribution and Abundance

Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila Rivers (Minckley 1973, Sublette et al. 1990). Habitat destruction plus competition and predation by non-native species have reduced the range of the species by about 85 percent (Miller 1961, Williams et al. 1985, Marsh et al. 1989).

Historically in Arizona, the loach minnow occupied up to 2,250 stream km (1,400 mi), but it is now found in less than 225 km (140 mi) (Propst et al. 1988).

In New Mexico, the loach minnow historically occupied about 330 stream km (205 mi); now it is found in about 258 stream km (160 mi). The loach minnow has become very rare in substantial portions of this remaining range.

The status of loach minnow is declining rangewide. As noted in the final rule designating critical habitat, loach minnow are restricted to 419 miles of streams, and their current range represents only 15 to 20 percent of their historical range (U.S. Fish and Wildlife Service 2000). Although it is currently listed as threatened, the FWS has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending; however, work on it is precluded due to work on other higher priority listing actions (U.S. Fish and Wildlife Service 1994).

Habitat

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne 1989, Propst and Bestgen 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst et al. 1988; Rinne 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley 1966).

Life History

Spawning occurs in March through May (Britt 1982, Propst et al. 1988); however, under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley 1990). The first spawn of loach minnow generally occurs in their second year, primarily from March through May (Britt 1982, Propst et al. 1988). Loach minnow may also spawn in autumn (Vives and Minckley 1990). Spawning occurs in the same riffles occupied by adults during the non-spawning season (Propst et al. 1988). The adhesive eggs of the loach minnow are attached under the downstream side of a rock that forms the roof of a small cavity in the substrate (Propst et al. 1988). The number of eggs per rock ranges from 5 to more than 250, but is usually between 52 and 63 (Propst et al. 1988). Eggs incubated at 18-20°C (66.2-68°F) hatched in five to six days (Britt 1982). Limited data indicate that the male loach minnow may guard the nest during incubation (Propst et al. 1988, Vives and Minckley 1990). Longevity is typically 15 months to two years, although loach minnow can live as long as three years (Britt 1982, Propst et al. 1988, Propst and Bestgen 1991).

Loach minnow feed exclusively on aquatic insects (Abarca 1987, Barber and Minckley 1983, Britt 1982, Schreiber 1978). They are opportunistic benthic insectivores, feeding primarily on riffle-dwelling larval mayflies (Ephemeroptera), blackflies (Simuliidae), and midges (Chironomidae) (Propst 1999, Arizona Game and Fish Department 2002). They actively seek their food on bottom substrates, rather than pursuing food items in the drift (Arizona Game and Fish Department 2002).

Reasons for Listing

Loach minnow was listed as a threatened species on October 28, 1986 (U.S. Fish and Wildlife Service 1986). Habitat destruction and competition and predation by non-native species are described in the Final Rule listing the loach minnow as a threatened species as the primary reasons for the species decline (U.S. Fish and Wildlife Service 1986).

Threats: As stated in the Recovery Plan, major threats to this species include dams, water diversion, watershed deterioration, channelization, and introduction of non-native predatory and competitive fishes. During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout the species' range (Propst et al. 1988). Both historic and present landscapes surrounding loach minnow habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, recreation, development, or impoundments (Hendrickson and Minckley 1984; Belsky et al. 1999). These activities degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion and thus sedimentation, and adding contaminants to streams and rivers (Belsky

et al. 1999). As a result, these activities may affect loach minnow through direct mortality, interference with reproduction, and reduction of invertebrate food supplies.

Competition with non-native fishes is often cited as a major factor in the decline of loach minnow (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968; Minckley 1973). The red shiner out-competes loach minnow for food items and habitat; and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). Channel catfish (*Ictalurus punctatus*) and flathead catfish (*Pylodictis olivaris*) frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed (Propst 1999) and may prey on loach minnow. In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomis cyanellus*), and introduced trout (Salmonidae) may co-occur and prey on loach minnow. These non-native fish may also impact loach minnow populations through competition for food and space.

Conservation Measures

The Loach Minnow Recovery Plan (U.S. Fish and Wildlife Service 1990) was approved in September 1991. The recovery goal is the protection of existing populations, restoration of populations in portions of historic habitat, and eventual delisting, if possible.

The following recovery efforts for the loach minnow have been conducted by National Forests in Region 3 (U.S. Forest Service 2004). Many of these recovery efforts were implemented as part of the “seven species direction” (U.S. Forest Service 1997). Riparian areas on National Forest System lands have been excluded from livestock grazing to protect habitat along the Gila, San Francisco, Verde, Blue, North Fork East Fork Black Rivers, and Eagle Creek.

Forest Road 586 on the Apache-Sitgreaves NF was obliterated to reduce sediment input to Boneyard Creek which is a tributary to occupied habitat in the North Fork East Fork Black River. A feasibility study on the Blue River has taken place to install a fish barrier which could prevent the upstream movement of non-native predators and competitors. The Bureau of Reclamation has commenced the analysis as required by the NEPA. Off-highway vehicles can cause significant damage. Areas to focus efforts to control and enforce existing regulations on the Prescott NF have been identified.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Our information indicates that, rangewide, approximately 250 consultations have been completed or are underway for actions affecting loach minnow. The majority of these opinions concerned the effects of grazing, but also covered roads, bridges, and agency planning efforts.

Approximately one third of the total consultations dealt with a variety of projects such as timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues.

Status of the Species within the Action Area

The status of loach minnow is declining range wide. Although it is currently listed as threatened (U. S. Fish and Wildlife Service 1986), the U.S. Fish and Wildlife Service found that a petition to list the species as endangered is warranted. A reclassification proposal is pending because work is precluded due to higher priority listing actions (U.S. Fish and Wildlife Service 1994).

Currently in Arizona, the loach minnow is generally rare to uncommon where it is found in the following areas: Aravaipa Creek (Pinal and Graham counties); limited reaches of the White River (Gila County) and the North and East forks of the White River (Navajo County); Three Forks area of the Black River; throughout the Blue River; Campbell Blue Creek; sporadic in Eagle Creek; and in the San Francisco River between Clifton and the New Mexico border (Greenlee County) (Marsh et al. 1990; Velasco 1994; Bagley et al. 1995, 1996). In New Mexico, the species is extant in the upper Gila River, including the East, Middle, and West forks, the San Francisco and Tularosa rivers, and Dry Blue Creek (U.S. Forest Service 2004).

During the last century, both the distribution and abundance of the loach minnow have been greatly reduced throughout the species' range (Propst et al. 1988). Competition and predation by non-native fish and habitat destruction have reduced the historic range of the loach minnow by about 85 percent (Miller 1961; Hendrickson and Minckley 1984; Williams et al. 1985; Marsh et al. 1989; U.S. Fish and Wildlife Service 1986, 1994). Both historic and present landscapes surrounding loach minnow habitats have been impacted to varying degrees by domestic livestock grazing, mining, agriculture, timber harvest, recreation, development, or impoundments (Hendrickson and Minckley 1984; Belsky et al. 1999). These activities degrade loach minnow habitats by altering flow regimes, increasing watershed and channel erosion and thus sedimentation, and adding contaminants to streams and rivers (Belsky et al. 1999). As a result, these activities may affect loach minnow through direct mortality, interference with reproduction, and reduction of invertebrate food supplies.

Factors Affecting the Species Environment within the Action Area

Within the action area, there may be several factors that affect the loach minnow. Competition with and predation by non-native aquatic species continues to be a major factor in the decline of loach minnow. In addition, wildfires and drought are most likely having impacts where the species occurs on the Forests particularly because the species is restricted to small streams.

Our information indicates that, for Arizona, we have completed approximately 217 consultations on projects with potential effects to loach minnow. Of those 217 projects, there were eight emergency consultations, eight technical assistance projects, 115 informal consultations, and 86 formal consultations.

Loach minnow populations continue to decline in many areas in Arizona. Loach minnow have been extirpated from the Verde River, those portions of the Gila River in Arizona, the San Pedro River, and presumably Tonto Creek. More recently, populations in the North Fork East Fork

Black River appear to have declined. Loach minnow have not been located in Eagle Creek since 1997.

In New Mexico, the loach minnow historically occupied about 205 stream mi (330 km); it is currently found in 160 stream mi (258 km). The loach minnow has become very rare in substantial portions of this remaining range. The species is extant in the upper Gila River, including the East, Middle, and West forks, the San Francisco and Tularose rivers, and Dry Blue Creek (U.S. Forest Service 2004:344). Recent biochemical work on this species indicates that there are substantial differences in genetic composition between the remnant loach minnow populations that occupy isolated fragments of the Gila River basin (Tibbets 1992).

EFFECTS OF THE ACTION

The S&Gs listed in the National Forest LRMPs and the 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the loach minnow and its habitat. These S&Gs may result in both indirect and direct effects to the species. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the loach minnow.

Table 124. Summary of S&Gs considered for the loach minnow.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4-9, 13, 14, 16-21, 25, 26, 28-33, 38-40, 42-48,50-52, 55, 58-64, 84, 97-99, 104-118, 120-123, 125, 130, 132-140, 144, 150a-152, 155-157, 163-166, 171,172, 176-180
Coronado	612, 613, 626-635, 637, 638, 640, 644, 645, 648-653, 657, 659-661, 663, 666-682, 692-696a, 698-707, 709-713, 774, 779, 780, 782, 783, 785, 785a, 786, 788-792, 792a, 792b, 794-800, 802-805, 807-812, 825-830
Gila	841, 842, 845-851, 854, 857-876, 878, 880, 881, 883-889, 892-894,909-930, 932, 933, 935,936,938, 939, 940, 940c-940s, 941,943-946, 948, 950, 952,953, 954a-954k, 957h, 957n,-957q
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1448, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1479, 1486-1492, 1495, 1499-1501, 1504-1515

Apache-Sitgreaves National Forest

The Apache-Sitgreaves NF has several S&Gs that have lethal and sublethal effects to the loach minnow. In addition, several were found to cause a negative behavioral response. The majority of the S&Gs, however, were found to maintain habitat and provide for minimal recovery of the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 125. Effects of the S&Gs analyzed for the loach minnow - Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	7	7.1
-1	S&G is causing negative behavioral response	5	5.1
0	S&G is ill-defined and/or open to interpretation	19	19.4
1	S&G is maintaining habitat & providing at least minimal recovery	53	54.1
2	S&G is moving towards recovery	6	6.1
3	S&G is implementing species recovery plan	1	1.0
Y	S&G has no application to the species	1	1.0
Z	S&G implementation is non-discretionary	2	2.0
X	S&G is a heading	4	4.1
Total		98	100 %

Engineering Program

Standard and Guideline 63 relates to both total and open road densities. This S&G states that total road density should average 3.5 mi/mi² or less while open road densities should average 2.0 mi/mi² or less. Road density is defined as the total miles of road in a defined area divided by the defined area in square kilometers miles (U.S. Forest Service 2004). The analysis in the biological assessment recognizes that the numbers that were being evaluating were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by the Service and NOAA Fisheries as one way to measure watershed condition as it relates to resident fish in the Pacific Northwest. The joint agencies recommendation is that a given watershed should have less than 2.5 mi/mi² of road system; if in excess, the watershed is said to be not properly functioning. High road densities on the landscape have the potential to deteriorate watershed conditions. One of the primary threats to loach minnow is watershed deterioration.

On the Apache-Sitgreaves, the known road densities are below the 2.5 mi/mi² recommended by FWS and NOAA Fisheries. Although the allowable road density on the Apache-Sitgreaves is 3.5 mi/mi², the forest-wide level is below the level determined by FWS and NOAA Fisheries to result in a deteriorated watershed. Nonetheless, the site-specific location of roads may have impacts on populations or segments of individual populations. This could potentially lead to increased erosion into loach minnow habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result,

potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in negative effects to the loach minnow. However, there may be negative effects from this program not captured in the applicable S&Gs. In the Apache-Sitgreaves NF Plan there is not a specific Fire Management Program listed; however, there is a Protection Program listed which deals with fire. The goal for the Protection Program includes the following “Fire is used as a resource management tool where it can effectively accomplish resource management objectives (Apache-Sitgreaves LRMP)”. It can be inferred that prescribed fire would be utilized in this capacity. The use of prescribed fire and other fuels treatment methods are useful in reducing the risk of catastrophic wildfire. However, these projects may result in adverse affects associated with humans, tools, machinery, and burning. Additionally, ash flows and erosion/sedimentation in burn areas may have adverse effects to fish species.

Forestry and Forest Health Program

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding cost. Permanent road densities should average 3.5mi/mi² or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after timber sale activities cease should average 2.0 mi/mi² or less. This S&G, if implemented, could potentially allow total road densities to reach 3.5 mi/mi² or above if needed to economically remove timber. The FWS recommendation is that in order to maintain a properly functioning watershed that total road density be 2.5 mi/mi². See the discussion above for S&G 63 for the discussion on the effects of high road densities.

Standard and Guideline 64 allows for the control of mistletoe by clear-cutting. As stated in the biological assessment, clear-cutting in this region has undergone a major reduction over the past decade. On the Apache-Sitgreaves, a total of 704 acres have been clear-cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibit the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to the watershed condition from clear-cutting may be increased erosion resulting from sedimentation into the stream channel. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Rangeland Management Program

As per our analysis, there were no negative S&Gs within the Apache-Sitgreaves LRMP. All of the S&Gs that were analyzed had positive effects to the loach minnow. However, during meetings with the Forest, it was reiterated that the Apache-Sitgreaves NF had numerous formal consultations on grazing activities.

Wildlife, Fish and Rare Plants Program

Standards & Guidelines 39, 114-118, 123, and 152 all provide guidance for management of the riparian resources. All of these S&Gs allow a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, you could potentially see degraded streambank conditions begin to move downstream until the majority of the streambank is unstable. This could result in the streambank collapsing into the stream, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 150a allows the Forest to manage waters capable of supporting fish to maintain a fishery. For the purposes of this analysis, the FWS assumes that a “fishery” could include both native and non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of loach minnow (Propst 1999). The red shiner (*Cyprinella lutrensis*), in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968; Minckley 1973). The red shiner out-competes loach minnow for food items and habitat; and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). Channel catfish and flathead catfish frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed (Propst 1999) and may prey on loach minnow. In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout (Salmonidae) may co-occur and prey on loach minnow. These non-native fish may also impact loach minnow populations through competition for food and space.

Coronado National Forest

The loach minnow is not currently found on the Coronado NF; however, a population does occur downstream in Aravaipa Creek, Arizona. At the request of the Forest Service, the applicable S&Gs were analyzed for their effects on the loach minnow in the event this species were to become established on the Coronado NF or it is present but currently undetected. Were the loach minnow in fact currently present on the Coronado NF, most of the S&Gs would maintain habitat and provide for minimal recovery of this species. There are a few S&Gs that may result in potential lethal and sublethal effects to the species. Additionally, there were several S&Gs that are beneficial in the long-term, but would likely have some short-term adverse effects. As is stands, no applicable S&Gs are likely to result in either direct or indirect downstream effects to the loach minnow.

Table 126. Effects of the S&Gs analyzed for the loach minnow - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.9
-2	S&G is causing sublethal response	4	3.7
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	16	14.7
1	S&G is maintaining habitat & providing at least minimal recovery	71	65.1

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	6	5.5
3	S&G is implementing species recovery plan	6	5.5
Y	S&G has no application to the species	1	0.9
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	2	1.8
Total		109	100 %

Fire Management Program

Standard and Guideline 695 allows the Coronado NF to conduct fire suppression activities in a way to protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Standards and Guidelines 713, 798, and 812 allow for the use of prescribed fire to reduce fuel hazards, enhance wildlife values and visual resources, improve livestock forage and watershed condition. All three of these S&Gs are the same for different management areas. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standard and Guideline 699 and 702 allow for the use of chemicals within the guidelines approved by other agencies for the purpose of insect and disease control on timber and rangelands as well as allowing the use of cyanide leaching as part of mining operations.

Pesticides and herbicides are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. In the case of S&G 697, these pesticides and herbicides could potentially be introduced into aquatic systems to kill undesirable pests such as weeds and algae in order to enhance fishing opportunities.

A number of generalizations can be made about pesticides and herbicides. First, effective pesticides and herbicides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides and herbicides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides

may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee et al. 2003).

Watershed Management Program

Standard and Guideline 678 provides guidance in the management of the aquatic resources on the Coronado NF. The FWS believes the intent of this S&G to be positive. However, due to the conditions of these arid landscapes, the continued decline of the species, and the continual threat of drought, this S&G may be no longer adequate for maintaining habitats capable of supporting loach minnow.

Standard and Guideline 677 directs the Forest to complete classifications and inventories of all riparian areas, and complete action plans to improve all unsatisfactory riparian areas. In addition it directs the Coronado to improve all riparian areas to satisfactory or better condition by the end of Period 5. Although this S&G is definitely beneficial as it is moving toward satisfactory riparian conditions, there may be some short-term adverse effects that could be occurring and may continue to occur until such a time as that riparian habitat reaches satisfactory conditions. Refer to the discussion under the Wildlife Program, Apache-Sitgreaves NF for adverse effects to fish from less than satisfactory riparian habitats.

Standard and Guideline 711, 782, 794, and 807 direct the Forest to restore damaged watersheds to satisfactory watershed condition. Water and soil resources improvements may consist of channel stabilization and revegetation using native or non-native species. All these S&Gs are the same but they are applied to different management units. They allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status.

Rangeland Management Program

Standards and Guidelines 792 and 805 allow the Forest to manage suitable rangeland at Level D in MA7A and MA7B. If level D is not achievable, manage at Level A (no livestock). Management seeks full utilization of forage allocated to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. The following acres for projected range conditions were provided within the S&G: 15,412 acres within satisfactory and 1,712 in unsatisfactory conditions.

The LRMP predicts no change in the number of acres of unsatisfactory condition for Management Area 7B over a period of 50 years. Unsatisfactory range conditions may contribute to un-healthy watersheds resulting in adverse effects to the species. As stated in the recovery plan, one of the primary threats to this species is watershed deterioration. As a result of poor upstream watershed condition, downstream effects could potentially lead to increased erosion into loach minnow habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. Potential effects to the

species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality. Although loach minnow do not occur on the Coronado NF, these watersheds occur upstream of occupied loach minnow habitats.

The short lifespan of the loach minnow, coupled with the comparatively low fecundity of the species and the small population sizes makes it vulnerable to serious adverse effects from activities which may only impact the species' habitat for relatively short time periods, especially during the spawning season. Any situation that eliminated or greatly reduced a year-class would severely deplete recruitment to a population. For example, excessive sedimentation during the spawning season might suffocate a large portion of that year's reproductive effort. In the succeeding year, total reproductive effort would be diminished. The net effect would be a major reduction in population size (Propst et al. 1988).

Loach minnow are adversely affected by activities that contribute to altering the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). The way in which the effects of livestock grazing are manifested and the magnitude of the effects in the watershed, is dependent on local site conditions.

Standard and Guideline 829 states that riparian areas will be managed to achieve and maintain satisfactory riparian conditions as described in the forest-wide prescription. This may be accomplished through the use of structural improvements, movement of livestock, or the exclusion of livestock. This S&G may result in some short-term adverse effects during the construction of structural improvements. In addition the movement of livestock could also cause adverse effects if they are trailed through the riparian area. However, these effects would be localized and short-term and would contribute to the overall health of the riparian habitat in the long-term.

Wildlife, Fish, and Rare, Plants Program

Standard and Guideline 667 allows for the use of structural and nonstructural improvements to meet the specific wildlife habitat objectives as shown for each Management Area. Nonstructural Wildlife Improvements may include: 1) prescribe burn feasible areas on a 20-year cycle, 2) seed suitable wildlife forage species as needed in fuelwood and timber areas, 3) transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding, 4) revegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available), and 5) thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year. Standard and Guideline 668 also allows for the use structural and nonstructural improvement guidelines as follows: 1) construct water developments or potholes to accomplish one per section within four decades, 2) consider structural improvements and maintenance for threatened and endangered species as technology develops, 3) construct fish habitat improvement structures as needed for threatened and endangered species, and 4) fence riparian areas where prescribed by approved allotment management plans. Miles of fence constructed will vary with management plan.

The S&Gs 667 & 668 fall into the category of activities that cause short-term adverse effects in order to achieve long-term positive effects; a net beneficial effect. Standard and Guideline 667 allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may have short-term impacts on water quality in adjacent streams inhabited by loach minnow. Standard and Guideline 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish as well as indirect impacts to the habitat such as temporary alterations of stream flow, or short-term isolated increases in sediment entering the stream. However, in the long-term implementation of these S&Gs should reduce the risk of catastrophic wildfire.

Gila National Forest

There are several S&Gs within the Gila NF LRMP that if implemented have the potential to cause lethal and sublethal effects to the loach minnow. The majority of the S&Gs within the plan maintain habitat and provide for minimal recovery of the loach minnow. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 127. Effects of the S&Gs analyzed for the Loach minnow – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	2.8
-2	S&G is causing sublethal response	15	14.0
-1	S&G is causing negative behavioral response	1	0.9
0	S&G is ill-defined and/or open to interpretation	3	2.8
1	S&G is maintaining habitat & providing at least minimal recovery	56	52.3
2	S&G is moving towards recovery	4	3.7
3	S&G is implementing species recovery plan	22	20.6
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	1	0.9
Total		107	100 %

Fire Management Program

Standards and Guideline 844, 845, and 940r all allow the Forest to use prescribed fire. Although it is recognized that fire has a role in the ecosystem and that using prescribed fire is one way to re-introduce fire into the system and reduce the risks of catastrophic wildfire in the long run, there are short-term effects. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Rangeland Management Program

Standard and Guideline 940g, 940m, 940n, 940s, 954e, 954d, 954j, and 957n all guide the Gila NF in their grazing management. The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland/watershed effects, have been well documented and discussed in recent years (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994).

Loach minnow are adversely affected by activities which contribute to the alteration of the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Some effects to loach minnow and their habitat may be restricted within a small area, other effects extend downstream. The ways in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Standard and Guideline 858 states that grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas. Although the majority of occupied loach minnow habitat has been excluded from cattle grazing this S&G exists and will be analyzed. There is evidence that grazing can be used to manipulate vegetation within riparian habitats. However, there could be some short-term effects such as increased turbidity to the water, or crushing of the fish by livestock within the stream channel.

Watershed Management Program

Standard and Guideline 909, 913, and 917 guides the Forest to identify and implement channel and land treatment structures in conjunction with other resource activities. These S&Gs are all the same but they are directed to different management areas and they allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status. In addition effects to fish may include crushing during construction activity.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 885, 939, 940c, 940d, 940k, 940p, 944, 954b, and 954g place the management emphasis on game fish. For purposes of this analysis, the FWS assumes game fish could include both native and non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of loach minnow (Propst 1999). Channel catfish and flathead catfish frequent riffles occupied by loach minnow, especially at night when catfish move onto riffles to feed (Propst 1999) and may prey on loach minnow. In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass, green sunfish, and introduced trout (Salmonidae) may co-occur and prey on loach minnow. These non-native fish may also impact loach minnow populations through competition for food and space.

1996 Regional Amendment

Short-term adverse effects to the loach minnow may occur from the implementation of the 1996 Regional Amendment. However, the majority of the S&Gs within the 1996 Regional Amendment maintain habitat and provide for minimal recovery of the species. Also, we found

that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 128. Effects of the S&Gs analyzed for the Loach minnow – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	8.6
1	S&G is maintaining habitat & providing at least minimal recovery	37	63.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	13.8
Z	S&G implementation is non-discretionary	2	3.4
X	S&G is a heading	6	10.3
Total		58	100 %

The following S&Gs under the 1996 amendment are those that will ultimately result in a long-term beneficial effect; however there may be some potential short-term adverse effects. They are 1432, 1445, 1448, 1455, 1458, 1468, 1476, and 1508. All these S&Gs direct the Forests to use prescribed fire as a tool for fire risk abatement as well as thinning and other fuels management activities. Potential short-term effects include those associated with ground disturbance (i.e., sedimentation) as well as those from the fire itself. See previous discussion under the Fire Management Program, Coronado NF for discussion of those effects.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as trespass livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, the statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the loach minnow, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the loach minnow. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the loach minnow from the implementation of the Apache-Sitgreaves, Coronado, and Gila NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- As part of the Seven Species Regional Direction implemented by the Southwestern Region of the Forest Service, riparian areas on Forest Service lands have been excluded from livestock grazing to protect habitat along the Gila, San Francisco, Verde, Blue, North Fork East Fork Black Rivers, and Eagle Creek.
- As part of the on-going consultation in 1999, cattle have been excluded from all known occupied loach minnow habitat.
- Forest Road 586 on the Apache-Sitgreaves NF was obliterated to reduce sediment input to Boneyard Creek, which is a tributary to occupied habitat in the North Fork East Fork Black River. A feasibility study on the Blue River has taken place and NEPA has started to install a fish barrier to prevent the upstream movement of non-native predators and competitors.
- The conservation measures within the proposed action for the spikedace will also improve the status for the loach minnow.

- There are several S&Gs within the Apache-Sitgreaves, Coronado, and Gila LRMPs that support conservation and recovery of the loach minnow. All of these S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species. In addition, S&Gs 163 and 164 within the Apache-Sitgreaves LRMP guide the Forest to manage for loach minnow so that it can eventually be delisted and S&Gs 940L, 940q, 954c, and 957p within the Gila LRMP guide the Forest to specifically manage for loach minnow habitat.

With the continuing exclusion of livestock grazing from occupied loach minnow habitat and the benefits from the Forest Service's conservation measures for the spinedace (i.e., as part of the proposed action) loach minnow habitat is expected to improve. These conservation measures direct the Forest Service to implement projects that will improve spinedace habitat. Since both species occupy mid-elevation stream habitats within the Gila River drainage, and in several instances are sympatric, several populations of loach minnow will benefit significantly from conservation measures applied to spinedace populations. Improved habitat for loach minnow due to implementation of the conservation measures, continued exclusion of livestock grazing in all occupied habitats on National Forest lands, consideration given to recovery of the loach minnow within the proposed action, in combination with the relative widespread distribution of populations (of which the majority are substantial in numbers of individuals) within the Gila River drainage, ensure that the proposed action will not reduce appreciably the likelihood of both survival and recovery of the loach minnow. Although some take is reasonably certain to occur through time, incidental take of individuals during site-specific project activities is not expected to be appreciable. For these reasons, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of loach minnow.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for

the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of loach minnow is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves and Gila NFs LRMPs. On the Apache-Sitgreaves NFs, take in the form of harassment is expected from the Engineering, Forestry and Forest Health, Rangeland Management, and Wildlife programs. On the Gila NF, take in the forms of harm and harassment is anticipated from the Rangeland Management and Wildlife programs. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support loach minnow.

The FWS anticipates incidental take of loach minnow will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Although we cannot estimate the number of individual loach minnow that will be incidentally taken, the FWS is providing a mechanism to determine when take would be considered to be exceeded. The FWS concludes that the incidental take of loach minnows will be considered to be exceeded if, after a period of two consecutive years, there is a loss in the current number of loach minnow sites on National Forest System lands as a result of the proposed action, without being offset by newly established sites. The two-year period begins on the date this biological opinion is signed, and will be replicated every two years thereafter for the life of the biological opinion.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the loach minnow.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loach minnow:

1. Protect loach minnow on National Forest System lands.
2. Protect loach minnow habitat on National Forest System lands.
3. Monitor loach minnow sites on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the US Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent

measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of loach minnow populations for conditions to eliminate direct effects and minimize indirect effects to loach minnow and its habitat.
- 1.2 Design projects within the Engineering, Forestry and Forest Health (i.e., pest management), Rangeland Management, and Watershed Management programs to minimize or eliminate adverse effects to the loach minnow.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and continued presence of non-native species within loach minnow habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied loach minnow habitat to incorporate appropriate components of the Loach Minnow Recovery Plan with the goal of implementing projects that will have beneficial, insignificant, or discountable effects to the loach minnow and its habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor loach minnow sites on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on loach minnow, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with AGFD, NMDGF, and FWS, remove all non-native species affecting the loach minnow and take measures to prevent reoccurrence of non-native species into loach minnow habitat.
2. Manage streams to create additional habitat for loach minnow.
3. Cooperate with state conservation agencies, FWS, and universities to conduct field studies and in-stream experiments to qualitatively and quantitatively describe indirect interactions among loach minnow and non-native fishes.
4. Cooperate with state conservation agencies, FWS, and universities to plan and conduct investigations on captive holdings, propagation, and rearing.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SONORA CHUB

STATUS OF SPECIES

Description

The Sonora chub (*Gila ditaenia*) is a stream-dwelling member of the minnow family (Cyprinidae) endemic to streams of the Rio del la Concepcion drainage of Sonora, Mexico and Arizona. The Sonora chub is a tenacious, desert-adapted species that exploits small habitats (Hendrickson and Juarez-Romero 1990), and is able to survive under severe environmental conditions. This fish species can achieve total lengths of 7.8 inches (Hendrickson and Juarez-Romero 1990). In the U.S., it typically does not exceed 5.0 inches (Minckley 1973). The body is moderately chubby and dark-colored, with two prominent, black, lateral bands above the lateral line (whence the specific epithet, *ditaenia*) and a dark, oval basicaudal spot. Breeding individuals are brilliantly colored (Miller 1945).

Legal Status: The FWS listed the Sonora chub in U.S. and Mexico as threatened on April 30, 1986, with critical habitat (U.S. Fish and Wildlife Service 1986). Reasons for listing included possible introduction of exotic fishes and their parasites into its habitat, and potential mining activities. In addition, it is particularly sensitive to these threats because of its very limited range, and because of the intermittent nature of the stream.

Distribution and Abundance

The distribution of Sonora chub appears little changed from its historic range although few collections are available. In the U.S., it has remained locally abundant in Sycamore Creek (Minckley and Deacon 1968, Minckley 1973, Minckley 1985), where it occurs in an 8.4 km reach from about 0.1 km below Yanks Spring, downstream to about 1.0 km above the international border (AGFD unpub. data). Flow within that reach is intermittent except during the rainy season; surface discharge from Sycamore Creek usually sinks into the streambed before reaching Mexico (Hendrickson and Juarez-Romero 1990). Other records of occurrence within the Sycamore drainage include Yanks Spring, Penasco Canyon, Atascosa Canyon, and an unnamed tributary to Sycamore Creek (Bell 1984). Yanks Spring has been impounded in a concrete tank for more than half a century (Miller 1949), and contains a population that was introduced from the adjacent creek (Minckley and Brooks 1985).

A California Gulch population was discovered in March of 1995 by the AGFD surveyors. At that time, the fish was inhabiting a 0.5 mile reach above the International Border and flow appeared to be continuous. Surveys during 1996 discovered pools upstream of the International Border had dried. Surveys in 1997 discovered pools had been re-occupied by Sonora chub. Thus, the California Gulch population is considered ephemeral.

Habitat

In Sycamore Creek, Sonora chub are found in the largest, deepest, most permanent pools (Carpenter 1992). Analysis of habitat use by Sonora chub showed this species preferring deep pools and some amount of floating cover (U.S. Fish and Wildlife Service 1992:11). In Mexico, Sonora chub were not randomly distributed, but were concentrated in deeper areas and under cover. Preferred cover reportedly was fallen logs, areas of dense aquatic vegetation, and

undercut root-masses (Miller 1945). These forms of cover were used if associated with intermediate to low current velocity.

Although Sonora chub is regularly confined to pools during arid periods, it prefers riverine habitats. In lotic (i.e., slow moving) waters in Mexico, Hendrickson and Juarez-Romero (1990) found it commonly in pools less than 2 feet deep, adjacent to or near areas with a fairly swift current, over sand and gravel substrates. It was less common in reaches where pools with low velocities and organic sediments were predominate. Sonora chub are adept at exploiting small marginal habitats, and they can survive under severe environmental conditions. It is also apparent that they can maneuver upstream past small waterfalls and other obstructions to colonize newly-wetted habitats (Carpenter and Maughan 1993).

The species evidently maintains a population through use of perennially watered reaches during droughts and is redistributed by dispersal of small individuals during periods of greater discharge (Hendrickson and Juarez-Romero 1990). For example, following periods of drought, Sonora chub recolonized California Gulch from permanent pools located downstream in Mexico, although the fish have dispersed from pools located further upstream in California Gulch.

Critical Habitat: Critical habitat was designated at the time of federal listing to include Sycamore Creek, extending downstream from and including Yank Spring (= Hank and Yank Spring), to the International border. Also designated was the lower 1.2 mile of Penasco Creek, and the lower 0.25 mile of an unnamed stream entering Sycamore Creek from the west, about 1.5 mile downstream from Yank Spring. In addition to the aquatic environment, critical habitat includes a 40-foot wide riparian area along each side of Sycamore and Penasco creeks. This riparian zone is believed essential to maintaining the creek ecosystem and stream channels, and to conservation of the species (U.S. Fish and Wildlife Service 1986).

Critical habitat was designated at the time of federal listing to include areas of land and water in the Coronado NF, consisting of the following:

1. Sycamore Creek, and a riparian zone 25 feet wide along each side of the creek, from Yank's Spring downstream approximately 5 stream miles to the International Border with Mexico;
2. Yank's Spring;
3. Penasco Creek, including a riparian zone 25 feet wide along each side of the creek, from the confluence with Sycamore Creek; and
4. An unnamed tributary to Sycamore Creek, from its confluence with Sycamore Creek. Primary constituent elements were not identified in the 1986 Final Rule. However, habitat characteristics important to this species of chub include clean permanent water with pools and intermediate riffle areas and/or intermittent pools maintained by bedrock or by subsurface flow in areas shaded by canyon walls.

Life History

Information on life history of this species is incomplete. Sonora chub spawn at multiple times during spring through summer, most likely in response to flood or freshets during the spring and summer rains (Hendrickson and Juarez-Romero 1990). Bell (1994) suggested that post-flood spawning is a survival mechanism evolved by this species. During spawning, chub apparently broadcast their eggs onto fine gravel substrates in slowly flowing water where the eggs develop and hatch. There are no nests built or parental care given.

Based on collection dates of young-of-the-year, spawning occurs in early spring (Minckley 1973). However, larval and juvenile Sonora chub were found in Sycamore Creek and in a tributary to Rio Altar in November; which indicated breeding was apparently not limited by season. Adults with breeding coloration were also taken during these periods (Hendrickson and Juarez-Romero 1990). In Sycamore Creek, adults with breeding colors were seen from April through September in 1990 and 1991. Larvae and juveniles 0.6 to 0.7 inches were seen in April, May, and September (Carpenter 1992), suggesting that spawning occurred after the spring and summer rains. Larvae likely use shallow habitats at pool margins where they feed on microscopic organisms and algae. As adults they can exploit shallow to deep pools, and runs and riffles as available. In 2000, apparent multiple spawning in California Gulch was documented (U.S. Forest Service 2000).

The Sonora chub is a tenacious, desert adapted species, adept at exploiting small, marginal habitats (Hendrickson and Juarez-Romero 1990), and can survive under severe conditions. As stated above, seasonally, Sonora chub may disperse widely during high streamflow events.

The only information on food habits was based on examination of stomach contents from a few Sonora chub in early summer from Sycamore Creek (U.S. Fish and Wildlife Service 1992). In decreasing order of volume, food consisted of aquatic and terrestrial insects, and algae. Like other chubs, Sonora chub is probably an opportunistic feeder that takes advantage of seasonally available resources (Minckley 1973).

Reasons for Listing

The FWS determined the Sonora chub to be threatened on April 30, 1986 (U.S. Fish and Wildlife Service 1986:16042). The rule stated that the fish was threatened by the possible introduction of exotic fishes and their parasites into its habitat, and by potential mining activities. The rule also stated that it is particularly vulnerable to these threats because of its very limited range, and because intermittent nature of streams.

Threats: According to the 1992 recovery plan for this species, distribution of Sonora chub in the U.S. is intact and should remain secure, barring major environmental change (C.O. Minckley 1983, Minckley 1985). The limited distribution of Sonora chub in the U.S. places inordinate importance on the quality of habitat in Sycamore Creek (U.S. Fish and Wildlife Service 1992:14) and California Gulch. The Sycamore drainage has been highly modified by human activities, including grazing, mining, recreation, and the introduction of exotic taxa. It regularly sustains large floods and severe droughts. A series of environmental perturbations made worse by degraded watershed conditions could cumulatively result in extirpation of the species from the U.S.

Sycamore Creek is at the edge of the range of the species, is isolated from other populations of Sonora chub, and has marginal habitat (Hendrickson and Juarez-Romero 1990). Channel degradation, siltation, and water pollution caused primarily by livestock grazing, roads, and mining have probably affected the habitat of Sonora chub. Cattle regularly gain access to Sycamore Canyon through an un-maintained section of fence along the international border (U.S. Fish and Wildlife Service 1999), and degrade the riparian vegetation in the lower 4.0 kilometers (2.5 miles) of the stream (Carpenter 1992). In 1981, exploration for uranium occurred along an approximate 12 kilometer stretch of the upper eastern slopes of the Sycamore drainage. According to the 1992 Recovery Plan for the Sonora chub, uranium was found and claims are being maintained; however, no active mining was planned at that time.

Native fishes appear adept at maintaining populations during severe conditions so long as their habitats are unaltered (Minckley and Meffe 1987). Thus, a single catastrophic event, such as severe flood, fire or drought, is unlikely to eliminate Sonora chub from the U.S.

Predation by non-native vertebrates is also a threat to populations of Sonora chub. Green sunfish (*Lepomis cyanellus*) is a known predator on native fishes in Arizona (Minkley 1973) and has been found in Sycamore Creek below the entrance of Penasco Canyon (Brooks 1982). Coincidental introductions of exotic parasites that infest native faunas is possible when non-native fishes are brought into a drainage. Although little information is available on parasites and diseases of Sonora chub, the effects of exotic parasites that infest native fish fauna is often adverse (U.S. Fish and Wildlife Service 1992).

Conservation Measures

All waters occupied by this species in the U.S are within the Coronado NF and about one-half of the drainage is within Pajarita Wilderness and Goodding Research Natural Area. These special designations were placed on the area because it had biological community characteristics of Mexican floral and faunal elements that did not otherwise occur, or were elsewhere rare in the U.S. (Goodding 1961, Curran 1973, Smith 1984, U.S. Forest Service 1988). Management direction for these special units is to maintain the area in climax vegetation. Removal of minerals, livestock grazing, use of motorized vehicles, and harvest of timber or fuelwood is not permitted, and recreation is limited to non-developed and dispersed use. Livestock grazing is permitted within Pajarita Wilderness outside of Goodding Research Natural Area. The remainder of Sycamore drainage and California Gulch is open to multiple uses according to the Coronado NF's LRMP. In addition, the Coronado NF is continuing to manage fenceline maintenance along the international border in Sycamore Canyon (U.S. Fish and Wildlife Service 1992:20).

As part of the 1997 consultation for all LRMPs, the Forest Service implemented conservation measures for the Sonora chub. Roadways in Sycamore Canyon south of Ruby road have been obliterated and closed to OHV traffic. Furthermore, livestock has been eliminated from the riparian corridor of Sycamore Canyon, and in portions of the riparian corridor of California Gulch. Sonora chub are also now a primary consideration in the development of allotment management plans for grazing allotments in both Sycamore Canyon and California Gulch, south of Ruby road. In addition a bridge was constructed on Ruby Road to replace the low-water crossing that was causing adverse impacts to the Sonora chub.

A recovery plan for the Sonora chub was written in October 1992. A summary of recovery objectives include the following; (1) protect remaining populations of Sonora chub by recognizing critical habitat, removing non-native fish, ensuring habitat integrity, and surveying all existing and potential habitats; (2) monitor and assess populations and habitat dynamics; (3) maintain captive reserves of Sonora chub; and (4) produce information for public education in the U.S. and Mexico.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

All waters occupied by this species in the U.S. are within the Coronado NF. The majority of the extant range and habitat of the Sonora chub in the U.S. occurs in Sycamore/Penasco canyons downstream of Ruby Road within the action area. The Sycamore/Penasco canyon area supports floral and faunal associations that are unique enough to require special management practices, including identified riparian ecotypes and known essential habitats for threatened and endangered plants and animals. The species also occurs in California Gulch. Two grazing allotments (Montana and Bear Valley Allotments) contain the entire U.S. distribution of Sonora chub (U.S. Fish and Wildlife Service 1999:198).

Factors Affecting the Species in the Action Area

The overall estimated current chub habitat is 10 stream miles in Sycamore/Penasco Creek and California Gulch including a 40-foot wide riparian area along each side of Sycamore and Penasco creeks. In Sycamore Canyon, the chub occurs within the Pajarita Wilderness and Goodding Research Natural Area of the Coronado NF. These special designations help protect a biological community characterized by Mexican floral and faunal elements that do not otherwise occur, or are rare elsewhere, in the U.S. (Goodding 1961, Curran 1973, Smith 1984, U.S. Forest Service 1986). Management direction for these special units is to maintain the area in climax vegetation. Removal of minerals, livestock grazing, use of motorized vehicles, and harvest of timber or fuelwood is not permitted, and recreation is limited to non-developed and dispersed use. Livestock grazing is permitted within Pajarita Wilderness outside of Goodding Research Natural Area. This management direction is applicable to Sycamore Canyon portions of habitat within the Goodding Research Natural Area and /or wilderness. The remainder of Sycamore drainage and California Gulch is open to multiple uses (U.S. Forest Service 1986).

Sonora chub have been able to survive in this watershed by expanding into riffles, runs, and pools during wet periods, and then shrinking back to deep pools as the stream dries. Mean annual precipitation ranges from about 12 to 22 inches, which comes from gentle rains in winter and high intensity localized thunderstorms in summer (U.S. Forest Service 1988). On an individual basis, a substantial number of Sonora chub die when they become trapped in habitats

that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survive dry periods. This species has an amazing capacity for reproduction and recruitment as its habitat expands; it can seemingly explode from a small number of individuals occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of its habitat, which has allowed the Sonora chub to survive to the present (Bell 1984).

Native fishes appear adept at maintaining populations during severe conditions so long as their habitats are unaltered (Minckley and Meffe 1987). Thus, a single catastrophic event, such as severe flood, fire or drought, is unlikely to eliminate Sonora chub from the U.S. However, floods in combination with other catastrophic events, such as wildfire, have caused the loss of isolated fish populations in other areas (Propst et al. 1992). Hale and Jarchow (1988) documented the recent and sudden extirpation of Tarahumara frog from the U.S (including Sycamore Canyon). The cause of that extirpation was thought to be an environmental toxicant, possibly associated with acid precipitation.

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within the Coronado NF LRMP are applicable to the Sonora chub and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species.

Table 129. Summary of S&Gs considered for the Sonora Chub – Coronado NF LRMP.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-638, 644, 645, 648-653, 666-669, 672-682, 692-696, 697, 698, 700, 703-713, 715, 727, 774, 779, 780, 782-786, 788-792, 794-800, 802-805, 807-829, 830
1996 Regional Amendment	1511-1515

Coronado National Forest

The current distribution of the Sonora chub is limited to the Coronado NF. Thus, the Coronado NF LRMP and applicable S&Gs were analyzed for effects to the species. Several S&Gs provide for the implementation of the recovery plan and/or the recovery of the Sonora chub. Approximately 60% of the S&Gs analyzed have a positive impact on the chub. Yet, several S&Gs found to be beneficial to the Sonora chub have a short-term adverse effect on the species. Additionally, one S&G is likely to have a lethal effect to the Sonora chub, and four S&Gs are likely to have sublethal effects on the species (see Table 130 below.)

Table 130. Effects of the S&Gs analyzed for the Sonora Chub – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.1
-2	S&G is causing sub-lethal response	4	3.2
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	16	17.9
1	S&G is maintaining habitat & providing at least minimal recovery	55	57.9
2	S&G is moving towards recovery	6	6.3
3	S&G is implementing species recovery plan	9	9.5
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.1
X	S&G is a heading	2	2.1
Total		95	100 %

Engineering Program

Standard and Guideline 694 states that road maintenance activities will be conducted primarily for protection of the Forest road investment, resource protection, user safety, and user economy. The S&G goes on to state that funding will continue to be the primary constraint on the intensity of road maintenance efforts. We assessed this S&G as potentially causing a sublethal affect to the Sonora chub from decreased water quality due to run-off from the Forest’s transportation system. The recovery plan for the Sonora chub states that roads should be constructed and maintained to avoid excessive surface erosion.

Fire Management Program

Standard and Guideline 695 allows the Forest to conduct fire suppression activities in a way that will protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Forestry and Forest Health Program

Standard and Guideline 697 allows chemicals (insecticides and rodenticides) to be used within guidelines approved by other agencies for the purposes of use in recreation areas and administrative sites. This S&G is Forest-wide and thus, could potentially be lethal to the Sonora chub. Agents within chemicals used as insecticides or rodenticides have been shown to be toxic to fish.

Lands and Minerals Program

No S&Gs were found to be negative for the Sonora chub within the Lands and Minerals Program. However, the Coronado NF’s LRMP states that extraction of minerals has a potential to disrupt other Forest values. In a few sensitive areas it is necessary to exclude mineral activity. The LRMP further states that identification of sensitive areas and formulation of recommendations for needed withdrawals from mineral entry. The intent of these statements appears to be positive for the chub if implemented with needs of the species in mind. Mineral

extraction has the potential to directly alter habitat through by-products entering the species habitat. Spillage from mines and tailings ponds has eliminated fish and other aquatic biota in some areas within the Southwest (Jackson et al. 1987). The 1986 final rule to list the Sonora chub states that mining is active in California Gulch which is three miles west of Sycamore Canyon (U.S. Fish and Wildlife Service 1986). Mining activities upstream of occupied Sonora chub habitat could have detrimental effects to this species.

Rangeland Management Program

Standard and Guideline 792 allows the Forest to manage suitable rangeland at Level D (high intensity livestock grazing), and if not achievable, to manage at Level A (no livestock). This S&G is within Management Area 7A and is directed at riparian areas. Standard and Guideline 805 also states to manage suitable rangeland at Level D and if not achievable, to manage at Level A. Livestock grazing activities can contribute to changes in surface runoff quantity and intensity, sediment transport, and water holding capabilities of the watershed. This occurs especially where cattle tend to congregate, often near water sources (Holcheck 19xx). As stated in the Recovery Plan for this species, livestock grazing in riparian areas is usually detrimental to fish habitat (U.S. Fish and Wildlife Service 1992).

Recreation, Heritage, and Wilderness Program

Standard and Guideline 626 states that transportation and recreation planning will consider existing and future needs for both motorized and non-motorized recreation opportunities. This S&G appears to reflect an emphasis on recreation. Sycamore Canyon receives considerable visitor use, particularly in the riparian area. Hikers and campers desiring to view plants and animals normally associated with habitats in Mexico are drawn to the area. Yanks Spring is the site of a parking area for trailhead access into Sycamore Canyon (U.S. Forest Service 1988a, 1988b). Adverse effects to the species could occur through habitat alteration from increases in human inhabiting the area, or from inadvertently spreading non-natives (e.g., bullfrogs, green sunfish).

Watershed Management Program

Standard and Guideline 678 guides the Forest to maintain at least 80 percent of natural shade over water surfaces in fish bearing streams and at least 80 percent of natural bank protection. In addition, this S&G states to maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams. This S&G is Forest-wide. The limited range of Sonora chub in Arizona places inordinate importance on ensuring the integrity of riparian conditions in Sycamore drainage. Maintaining 80 percent of natural shade and bank protection may not be sufficient for protection of the chub. However, knowledge of the relationship between the occurrence of Sonora chub and various habitat parameters (e.g., substrate, overhead and instream cover, habitat type, etc) is lacking and needs to be determined (U.S. Fish and Wildlife Service 1992:35).

Standard and Guideline 677 describes improving unsatisfactory riparian areas to satisfactory or better conditions “by the end of Period 5” (i.e., 50 years from the time the LRMP was developed). While we believe that the overall intent of this S&G is positive for the species, the length of time to achieve satisfactory conditions appears long and thus, the species could be affected by unsatisfactory watershed conditions. The importance of a stable, undisturbed

watershed for maintaining the environment cannot be overstated (U.S. Fish and Wildlife Service 1992). Channel degradation, siltation, and water pollution caused primarily by livestock grazing, roads, and mining have probably affected the habitat of Sonora chub. In addition, within the species' critical habitat, characteristics such as clean permanent water with pools and intermediate riffle areas and/or intermittent pools could be altered.

Wildlife, Fish, and Rare Plants Program

Both S&Gs 667 and 668 allows the Forest to use prescribed burning and to construct fish habitat improvement structures as needed for threatened and endangered species. The FWS determined that these S&Gs are overall positive for the chub but with some possible short-term effects. Prescribed burning will be beneficial to the species with regards to a reduction in the risk of catastrophic wildfire. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). Fish habitat improvement structures that will benefit the chub could have short-term negative effects (i.e., from disturbance and displacement). Short-term effects could also affect the species critical habitat.

Standard and Guideline 709 guides the Forest to delist threatened and endangered species and to reoccupy historic habitat with other identified species following guidelines in approved recovery plans. Further, S&G 707 states to maintain and improve current habitat for federally listed plant and animal species and work toward delisting. Obviously, if implemented, the Sonora chub will benefit from these S&Gs and perhaps no longer need the protection of the ESA.

In summary, the Coronado NF's LRMP contains many opportunities to implement recovery efforts for the Sonora chub. Several S&Gs were extremely positive for the species; however, several others had lethal or sublethal effects to the species. Specifically, run-off from erosion associated with activities within the Rangeland Management and Lands and Minerals programs could cause serious water quality issues. Pesticide and rodenticides used in the Forestry and Forest Health Program could be lethal if used near occupied Sonora chub habitat. Short-term adverse effects could occur from the Coronado NF Fire Management and Watershed Management programs. Thus, take of the Sonora chub is reasonably certain to occur from Forest Service activities on the Coronado NF in the form of harm and harassment.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Northern Goshawk management areas and occupied Mexican Spotted Owl habitats, along with restricted and protected areas for the owl do not coincide with the range of the Sonora chub. Thus, all but one S&G within the 1996 Regional Amendment is applicable to the species. The effects ranking of this S&G is provided in Table 131 below. Further, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 131. Effects of the S&Gs analyzed for the Sonora chub - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sub-lethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Trespass cattle from Mexico have been known to be problematic and be contributing to adverse affects to the chub, as stated above with regards to improper livestock grazing. The International Border fence is remote and difficult to maintain. Although trespass livestock problem has existed in the past due to cattle from Mexico, in 1998, the Coronado NF rebuilt the border fence which has reduced the number of trespass cattle. In addition, according to the Forest Service, the Permittee on that allotment (i.e., Bear Valley allotment) is very attentive to this problem and has reacted quickly when trespass cattle from Mexico were found in the allotment.

Additional cumulative impacts to the species may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to, the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

Ponds associated with mining operations on private property within the action area may contain non-native fish providing a source of non-native fish into Sonora chub habitat. Natural events such as floods spread non-native species.

CONCLUSION

After reviewing the current status of the Sonora chub, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Sonora chub, and is not likely to destroy or adversely modify designated critical habitat. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

The FWS concludes that the continued implementation of the Coronado NF LRMP and 1996 Regional Amendment is not likely to jeopardize the Sonora chub for the following reasons:

- The Forest Service has designated areas where the Sonora chub exists as Wilderness and Research Natural Area.
- The Sonora chub is specifically mentioned within the LRMP (see page 72) directing the Forest to maintain and improve habitat for the species.
- Our analysis determined relatively few S&Gs that could cause lethal or sublethal effects to the species but many that would be positive for the species (e.g., S&Gs 707 and 709), which state that the Forest Service will work to delist listed species, including the Sonora chub.
- The Forest Service implemented the following which will continue to provide conservation for the species: roadways in Sycamore Canyon south of Ruby road have been obliterated and closed to OHV traffic; livestock has been eliminated from the riparian corridor of Sycamore Canyon, and in portions of the riparian corridor of California Gulch; and Sonora chub are also now a primary consideration in the development of allotment management plans for grazing allotments in both Sycamore Canyon and California Gulch, south of Ruby road.

As stated previously, native fishes appear adept at maintaining populations during severe conditions so long as their habitats are unaltered. Thus, a single catastrophic event, such as severe flood, fire or drought, is unlikely to eliminate Sonora chub from the U.S. However, floods in combination with other catastrophic events, such as wildfire, have caused the loss of isolated fish populations in other areas (Propst et al. 1992). On an individual basis, a substantial number of Sonora chub die when they become trapped in habitats that do not sustain perennial water during arid periods (Carpenter and Maughan 1993). Recolonization is dependent on individuals that survive dry periods. This species has an amazing capacity for reproduction and recruitment as its habitat expands; it can seemingly explode from a small number of individuals occupying newly-wetted habitats in just a few weeks or months. The capability of the population to increase by several orders of magnitude within a few months is most likely an adaptation to the harsh climate and intermittent nature of its habitat, which has allowed the Sonora chub to survive to the present (Bell 1984). Based on this, and the above conservation being provided by

the Forest Service, as well as numerous beneficial S&Gs within the Coronado NF LRMP, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Sonora chub.

Based on the above analyses, it is the FWS's biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Sonora chub will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the Sonora chub.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental take of the Sonora chub is reasonably certain to occur as a result of the continued implementation of Coronado NF LRMP for all programs, and all take is expected to be in the form of harm. Harm occurs through direct habitat alterations and indirectly from pollutants and run-off from activities adjacent to or upstream of the species. The FWS anticipates, however, that incidental take of Sonora chub will be difficult to detect because finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, the FWS defines incidental take in terms of habitat characteristics, and is using this surrogate measure to identify when take has been exceeded. The

FWS concludes that the incidental take of Sonora chub will be considered to be exceeded if currently occupied pool or spring habitats are measurably reduced or diminished as a result of the proposed action.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Sonora chub.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of the Sonora chub.

1. Protect Sonora chub on the Coronado NF.
2. Protect Sonora chub habitat on the Coronado NF.
3. Monitor Sonora chub populations on the Coronado NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Sonora chub populations for conditions to eliminate direct effects and minimize indirect effects to Sonora chub and its habitat.
- 1.2 Design projects within the Engineering, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Watershed Management, and Recreation programs to minimize or eliminate adverse effects to the Sonora chub.
- 1.3 Cooperate with Arizona Game and Fish Department to eliminate the introduction and presence of non-native fish and frog species within Sonora chub habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Sonora chub habitat to incorporate important characteristics of pool habitats with the goal of implementing projects that will have beneficial, insignificant, or discountable effects to the Sonora chub and its habitat
 - a. Pools shall be retained in their current frequency or increased in incidence in each occupied reach, even if only a single pool is occupied by Sonora chub.
 - b. The physical characteristics of the pools in each reach shall be retained or

improved. Important characteristics include, but are not limited to: length, width, depth, residual depth, bank shape, bed material, instream cover type, presence of submergent or emergent vegetation, and absence of non-native fish or amphibians.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Sonora chub and Sonora chub pool habitat on the Coronado NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on Sonora chub, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ACT by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with the Border Patrol and other appropriate parties, continue efforts to construct a stronger border fence strategically located to reduce trespass cattle from Mexico in the occupied or designated critical habitat for the Sonora chub.
2. Evaluate ways to eliminate all non-native fish that threatened the Sonora chub.
3. Assess habitat dynamics and determine fish-habitat relationships for the Sonora chub.
4. Assess the possibilities of mineral withdrawals in California Gulch that would directly benefit the Sonora chub.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SPIKEDACE

STATUS OF THE SPECIES

Description

Spikedace (*Meda fulgida*) is a small silvery fish whose common name alludes to the well-developed spine in the dorsal fin (Minckley 1973). Adult spikedace are 2.5-3.0 inches (63-75 mm) in length (Sublette et al. 1990). The eyes are large, the snout fairly pointed, and the mouth is slightly sub-terminal with no barbel present. The species is slender, somewhat compressed anteriorly. Scales are present only as small deeply embedded plates. The first spinous ray of the dorsal fin is the strongest and most sharp-pointed. Spikedace are olive-gray to light brown above with brilliant silver sides and black specks and blotches on the back and upper side. Breeding males have bright brassy yellow heads and fin bases, with yellow bellies and fins (Minckley 1973, Page and Burr 1991).

Recent taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic makeup between remnant spikedace populations. Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Anderson and Hendrickson (1994) found that spikedace from Aravaipa Creek is morphologically distinguishable from spikedace from the Verde River, while spikedace from the upper Gila River and Eagle Creek have intermediate measurements and partially overlap the Aravaipa and Verde populations. Mitochondrial DNA and allozyme analyses have found similar patterns of geographic variation within the species (Tibbets 1992, Tibbets 1993).

Legal Status: Spikedace was listed as a threatened species on July 1, 1986 (U.S. Fish and Wildlife Service 1986). Spikedace is listed by New Mexico as an endangered species, which provides the protection of the New Mexico Wildlife Conservation Act. On July 11, 1994, the FWS published a petition finding the petitioners had presented substantial information indicating reclassification of spikedace from threatened to endangered may be warranted. The Service had previously found that reclassification of spikedace was warranted, but precluded by work on other pending listing action of higher priority on which expeditious progress is being made (U.S. Fish and Wildlife Service 1994:35303). Critical habitat was designated for spikedace on April 25, 2000, yet subsequently vacated in 2004. The Spikedace Recovery Plan (U.S. Fish and Wildlife Service 1990) was approved in September 1991.

Distribution and Abundance

Spikedace historically occurred throughout the mid-elevations of the Gila River drainage, but is currently known only from the middle Gila and upper Gila rivers, and Aravaipa and Eagle creeks (Barber and Minckley 1966, Minckley 1973, Anderson 1978, Marsh et al. 1990, Sublette et al. 1990, Jakle 1992, Knowles 1994, Rinne 1999). The species also occurs in the upper Verde River, but appears to be declining in numbers. It has not been documented in the Verde River since 1999 despite annual surveys, and additional survey work is needed to determine its current status. Habitat destruction along with competition and predation from introduced non-native species are the primary causes of the species decline (Miller 1961, Williams et al. 1985, Douglas et al. 1994).

The status of spikedace is declining rangewide. Within occupied areas, it is presently common only in Aravaipa Creek (13 miles) in Arizona and within the Gila Bird Area (7 miles) portion of the Gila River in New Mexico (U.S. Fish and Wildlife Service 2000).

In addition, spikedace occur in low numbers above the Gila Bird Area in New Mexico and sporadically in the Verde River and Eagle Creek in Arizona. We continue to assume the species is extant due to the small population size and difficulties in surveying effectively.

Habitat

Spikedace occupy mid-water habitats usually less than 1 m deep, with slow to moderate water velocities over sand, gravel, or cobble substrates (Propst et al. 1986, Rinne and Kroeger 1988). Adults often aggregate in shear zones along gravel-sand bars where rapid water borders slower flow, quiet eddies on the downstream edges of riffles, and broad shallow areas above gravel-sand bars (Propst et al. 1986). The preferred habitat of the spikedace varies seasonally and with maturation (Propst et al. 1986). Recurrent flooding and a natural hydrograph are very important in maintaining the habitat of spikedace and in helping maintain a competitive edge over invading non-native aquatic species (Propst et al. 1986, Minckley and Meffe 1987). Further, the erratic flow patterns of southwestern streams that include periodic spates and recurrent flooding are essential to the feeding and reproduction of the spikedace by scouring the sands and keeping gravels clean (Propst et al. 1986). In winter, the species congregates along stream margins with cobble substrates. Spikedace larvae and juveniles tend to occupy shallow, peripheral portions of streams that have slow currents and sand or fine gravel substrates, but will also occupy backwater habitats (Sublette et al. 1990). The young typically occupy stream margin habitats, where the water velocity is less than 8 cm/sec (0.26 ft/sec) and the depth is less than 30 cm (0.98 ft.) (Propst 1999).

Critical Habitat: Critical habitat was designated on April 25, 2000 (U.S. Fish and Wildlife Service 2000) and included portions of the Verde, middle Gila, San Pedro, San Francisco, Blue, and upper Gila rivers and Eagle, Bonita, Tonto, and Aravaipa creeks and several tributaries of those streams. Critical habitat was subsequently vacated on August 31, 2004 (New Mexico Cattle Growers Association, and Coalition of Arizona/New Mexico Counties for Stable Economic Growth v. United States Fish and Wildlife Service, No. CIV 02-0199 JB/LCS).

Life History

Spawning extends from mid-March into June and occurs in shallow (less than 15 cm [5.9 in] deep) riffles with gravel and sand bottoms and moderate flow (Barber et al. 1970, Anderson 1978, Propst et al. 1986). By mid-May, most spawning has occurred, although in years of high water flows, spawning may continue into late May or early June (Propst et al. 1986). Spikedace can live up to 24 months, although few survive more than 13 months (Propst et al. 1986). Reproduction occurs primarily in one-year-old fish (Barber et al. 1970, Anderson 1978, Propst et al. 1986).

Reproduction is apparently initiated in response to a combination of declining stream discharge and increasing water temperature. The ova are adhesive and demersal (i.e., sink to the bottom) and adhere to the substrate (Barber et al. 1970). The number of eggs produced varies from 100 to over 800, depending on the size of the individual (Minckley 1973, Propst et al. 1986). The

young grow rapidly, attaining a length of 1.5 inches (38 mm) by autumn of the year spawned (Propst 1999).

Spikedace feed primarily on aquatic and terrestrial insects (Barber and Minckley 1983, Marsh et al. 1989, Propst et al. 1986). In addition, Barber et al. (1970) reported that spikedace feed on food items in the drift including some fish fry. Diet composition is largely determined by type of habitat and time of year (Minckley 1973).

Population Status

Although surveys data for spikedace presence has occurred since 1997, survey methodologies have differed between field scientists. These data are reported in Table 132 below. Surveys have been conducted on the East, West, Middle Forks, and mainstem Gila River within New Mexico, and on the Verde River and Eagle Creek within Arizona. Although numbers were relatively high in 2004, these data indicate that the status of spikedace has declined precipitously over the last 15 years. Although occurrences of spikedace in the Verde River and Eagle Creek have not been reported in several years (Marsh 1996), these sites have not been declared extirpated. Surveys have also found spikedace in Aravaipa Creek, a tributary of the San Pedro River, administered by the Bureau of Land Management and private ownership. Thus, our data indicate that the spikedace is currently limited to two remaining populations: Aravaipa Creek in Arizona and the upper Gila River (i.e., Gila Bird Area on the Gila National Forest) in New Mexico.

Table 132. Spikedace survey data for New Mexico.

Researcher	Site	2004	2003	2002	2001	2000	1999	1998	1997
D. Miller	Gila bird area	1653	1633	520	2392	1016	634	6	61
J. Rinne	Gila bird area	109	188	102	47	20	50		
	WF at Little Creek	0	0	0	0	ns	ns		
	Middle Fork	0	21	0	0	0	0		
	WF at GCD	0	0	3	0	16	0		
	WF site 1	0	0	0	ns	ns	ns		
	WF site 2	0	0	0	ns	ns	ns		
	EF Grapevine	0	0	0	7	21	69		
	Allum Camp	0	6	0	0	14	ns		
	Nichols Canyon	0	0	5	9	5	14		
	Fred's Place	50	4	19	11	5	41		
	Red Rock	0	0	42	1	9	58		
	Sunset Diversion	0	0	5	17	1	12		
	211 Bridge	0	0	0	ns	ns	6		
	Ft. West Ditch	0	0	0	4	0	ns		
	Bennet Place	0	0	0	0	0	8		
D. Propst	Tularosa River	extirpated							
	San Francisco River, Glenwood	extirpated							
	MF Gila	(not captured since 1995)							
	EF Gila	0	0	0	7	5	20	0	0
	Riverside	2	5	0	193	ns	1	45	25
	WF Gila @ Cliff Dwellings	0	1	5	14	8	12	12	19

Researcher	Site	2004	2003	2002	2001	2000	1999	1998	1997
	Middle Box	1	1	0	54	ns	y	y	39
	Lower Box (Fisherman's Lookout)	0	0	0	0	ns	0	0	0
	Mangus Creek	assumed spikedace present, but not sampled regularly							
	Total sites occupied	5	8	8	12	11	13		
	Percent occupied	23	38	38	67	78	81		

ns – no survey

The spikedace is present in Mangus Creek but because this area has not been sampled regularly, survey information is not included in the table.

Reasons for Listing

The spikedace was listed as a threatened species on July 1, 1986 (U.S. Fish and Wildlife Service 1986). The final rule for the listing states that approximately 6 percent of the total historic range supports spikedace populations. In addition, the rule states the spikedace continues to be threatened by proposed dam construction, water losses, and habitat alteration.

Threats: As stated in the 1986 Final Rule listing the spikedace as threatened, the distribution and numbers of the spikedace have been severely reduced by habitat destruction due to damming and channel alteration, riparian destruction, channel downcutting, water diversion, and ground water pumping (U.S. Fish and Wildlife Service 1986:23769-23781). The listing rule also stated that survival of the species is threatened by the introduction and spread of exotic predatory and competitive fish species (U.S. Fish and Wildlife Service 1986:23769). Currently, habitat destruction, and competition and predation from introduced non-native fish are the primary causes of the species' decline (Miller 1961, Williams et al. 1985, Douglas et al. 1994). These threats are detailed below.

Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner (*Cyprinella lutrensis*), in particular, is frequently indicated in the decline of the spikedace (Minckley and Deacon 1968, Minckley 1973) because it out-competes spikedace for food items and habitat and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). In addition, largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*), green sunfish (*Lepomis cyanellus*), and introduced trout (*Salmo trutta* and *Oncorhynchus mykiss*) may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

Much of the flow in the middle Gila River is highly controlled by releases from San Carlos Reservoir (U.S. Fish and Wildlife Service 2004). While a semblance of a natural hydrograph remains due to the input from the San Pedro River, the base flow is highly variable and depends upon downstream demand for irrigation water. Dams on the Salt, Verde, and Aqua Fria rivers have fragmented historic habitat, changed the natural hydrograph, and eliminated historic habitats. The unnatural flow patterns and the periods of highly depleted flow, when irrigation is not underway, are highly detrimental to spikedace and its habitat.

Streambank trailing, trampling, loss of riparian vegetation and increasing danger of fire are impacts from recreation on streams (Reid 1993, Schmidt and Stewart 1998). In the dry Gila River basin, recreational impacts are disproportionately distributed with streams a primary focus

(Briggs 1996). Essential spikedace habitat is experiencing increasing impacts from such use (Cain et al. 1997, Tellman 1997, U.S. Bureau of Land Management 1998).

Roads were historically a serious impact to Gila River basin streams (Dobyns 1981) and are a continuing and increasing threat to spikedace and its habitat (Waters 1995, Jones et al. 2000). Some new roads are being constructed (Arizona Department of Transportation 2000) and existing roads have ongoing maintenance problems that result in alterations of stream channels within spikedace habitat (U.S. Fish and Wildlife Service 2004). Bridge expansion or repair causes channel alteration and if not carefully executed, can result in serious long-term channel adjustments, altering habitats upstream and downstream. In some areas low-water ford crossings exist within the occupied habitat and cause channel modification and habitat disruption. Low-water crossings on general-use roads exist in a number of areas that potentially support spikedace.

Livestock grazing has been one of the most widespread and long-term adverse impacts to spikedace and its habitat (Miller 1961, Williams et al. 1985, Cain et al. 1997), but is one of the few areas where adverse effects to spikedace are actually decreasing due to improved management on federal lands (U.S. Fish and Wildlife Service 2004). This is primarily through exclusion of authorized grazing in the riparian and stream corridor. However, although adverse effects are less than in the past, livestock grazing within the watersheds where spikedace and its habitat are located continues to cause adverse effects through watershed alteration resulting in changes in the natural hydrograph, sediment production, and stream channel morphology (Cain et al. 1997, Belsky et al. 1999, U.S. Fish and Wildlife Service 2004). Livestock grazing management also continues to include construction and maintenance of open stock tanks which become stocked with non-native aquatic species that are harmful to spikedace (U.S. Fish and Wildlife Service 1997).

Timber harvest is one of the few threats that have substantially decreased. The timber industry in the southwest is in decline and less commercial timber is being cut. This helps reduce watershed alteration and sediment loading in spikedace habitat.

Purposeful channel modifications continue to be a major source of degradation of spikedace habitat (U.S. Fish and Wildlife Service 2004). Gravel mining, flood control channelization and diking, road and bridge construction, riparian clearing, water diversion structure and canal construction, agriculture, and many other human activities result in alteration of the stream channel to the detriment of spikedace and its habitat (Donegan 1997, Baker et al. 1998, Brown 1998, Trombulak and Frissall 2000). While some of these activities are becoming less prevalent, others are increasing, and in total the alteration of stream channels is rapidly increasing.

Conservation Measures

The Spikedace Recovery Plan (U.S. Fish and Wildlife Service 1990) calls for the protection of existing populations, restoration of populations in portions of historic habitat, and eventual delisting, if possible.

As stated in the biological assessment (U.S. Forest Service 2004), the following recovery efforts for the spikedace have been conducted by National Forests. Many of these recovery efforts were

implemented as part of the Seven Species Regional Direction pursuant to a 1997 biological opinion. Riparian areas on Forest Service lands have been excluded from livestock grazing to protect habitat along the Gila, San Francisco, Verde, Blue, North Fork and East Fork Black Rivers, and Eagle Creek. Forest Road 586 on the Apache-Sitgreaves NF was obliterated to reduce sediment input to Boneyard Creek, which is a tributary to critical habitat in the East Fork Black River. A feasibility study on the Blue River has taken place to install a fish barrier to prevent the upstream movement of non-native predators and competitors. In addition, as a consequence of voluntary conservation measures brought forward by the Forest Service during the ongoing grazing consultations of the late 1990s, hundreds of miles of stream within National Forest System lands were fenced for the protection of spikedace and loach minnow habitat. Other recovery efforts include the Bureau of Reclamation analysis as required by the NEPA, as well as, the Prescott NF identifying efforts to control Off-Highway Vehicle use and enforce existing regulations.

On February 2, 2005, the Forest Service provided the following conservation measures for the spikedace as part of supplemental information to this consultation. These measures are listed below.

Conservation Measure #1: Design projects in occupied spikedace habitat on National Forest System lands which address the appropriate components of the spikedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spikedace.

Conservation Measure #2: Cooperate with state game and fish agencies, other federal agencies, Forest Service research stations, FWS, and others (universities/colleges, etc.) to assess and prioritize habitat of stream and river segments for potential spikedace reintroduction. Cooperatively document the results in an annual report to the FWS.

- a. Determine necessary habitat and watershed improvements in occupied watersheds and watersheds identified as high priority reintroduction sites and implement projects needed to contribute to recovery.

Conservation Measure #3: Participate in ongoing efforts initiated in 2003 involving state agencies, other federal agencies, universities, Forest Service research facilities, and FWS to document the current state of knowledge regarding the spikedace. Cooperatively develop a conservation assessment and strategy for the spikedace. Target the completion of this effort within 1.5 years.

- a. Identify existing populations in imminent need of protection and develop and implement, to the extent possible by the Forest Service, a strategy for protecting the population and reducing threats to the population.

Conservation Measure #4: With state agencies and other researchers (i.e. academic and Forest Service), who are currently monitoring spikedace populations, participate in the development of a consistent monitoring methodology for spikedace, their associated habitat, and co-occurring aquatic species. Cooperatively document the results in an annual report to the FWS.

Conservation Measure #5: To the extent feasible within the mission and capabilities of the Forest Service, assist the FWS, AGFD and NMDGF with any spikedace reintroduction effort.

Conservation Measure #6: Within the mission and capabilities of the Forest Service, assist the FWS, other federal agencies, state agencies, universities/colleges, and others in the development of a captive spikedace propagation program designed to augment wild populations.

Conservation Measure #7: The long-term benefits directly attributable to wildland fire use for resource benefits, is the reduction of catastrophic fire. This is very significant to long-term land management goals and objectives vital to restoring fire-adapted systems. Their absence predisposes ecosystems to the undesirable effects associated with catastrophic fires, potentially at levels of severity and intensity outside historic ranges of variability which are highly detrimental to aquatic systems.

- a. Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.

Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.

- b. A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.

During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.

- c. Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a

platform to assess the effects of the action now under consultation.

Below we summarized the environmental baseline (i.e., the status of the species within the action area and the factors affecting the species on the Forests) in terms of past biological opinions. Our information indicates that, rangewide, approximately 250 consultations have been completed or are underway for actions affecting spikedace. The majority of these opinions concerned the effects of grazing, but also considered the effects of roads, bridges, and agency planning efforts. Approximately one-third of the consultations dealt with a variety of projects like timber harvest, fire, flooding, recreation, realty, animal stocking, water development, recovery, and water quality issues.

Status of the Species within the Action Area

Since the 1800s, the spikedace has declined markedly in distribution and abundance throughout its range (Propst et al. 1986, U.S. Fish and Wildlife Service 1986). By 1996, the spikedace had been eliminated from over 85 percent of its historic range (New Mexico Department of Game and Fish 1996). Recent taxonomic and genetic work on spikedace indicates there are substantial differences in morphology and genetic composition among remnant spikedace populations (Tibbets 1993).

Forest Service consultations account for 32 percent of the total consultations completed for spikedace rangewide. Of the Forest Service consultations completed, grazing projects comprised 68 percent of formal consultations. Fifty percent of planning projects resulted in formal consultation, as did 38 percent of water development projects, 33 percent of fish stocking projects, and 25 percent of flooding projects. Below, we discuss past consultations for the spikedace for Arizona and New Mexico.

Arizona

Our information indicates that, for Arizona, we have completed 197 consultations on projects with potential effects to spikedace. Of those 197 projects, there were seven emergency consultations, nine technical assistance projects, 114 informal consultations, and 67 formal consultations. Table 133 illustrates the types of projects for which spikedace consultations have been completed.

Table 133. Summary of activity types and consultations completed for projects affecting Spikedace within National Forests in Arizona.

Activity Type	Formal	Informal	Emergency	Technical Assistance	Total
Acquisition	1	4			5
Agriculture	1	5			6
Fire		9	2		11
Flood	2	4	2		8
Grazing	30	13		1	44
Mining		4			4

Activity Type	Formal	Informal	Emergency	Technical Assistance	Total
Miscellaneous	5	19	2	1	27
Planning	10	10			20
Recreation	1	8			9
Restoration	3	1		1	5
Roads	5	13	1	1	20
Stocking	1	2			3
Timber		6			6
Urban Development	1	4		1	6
Utilities	1	6			7
Water Development	6	6		4	16
Total	67	114	7	9	197

Informal consultations therefore represent the majority (58 percent) of the consultations. Formal consultations (i.e., where there is a determination of likely to adversely affect a species) represent 34 percent of total consultations. However, the data also indicate that the percentage of formal consultations is increasing. Prior to 1995, the number of formal consultations represented 31 percent of the total consultations, while informal consultations represented 69 percent. Beginning in 1995, the number of formals began to increase, so that between 1996 and 2005, formal consultations represented 42 percent of the total consultations, while informals represented 52 percent of the total consultations (with emergency consultations representing an additional three percent and technical assistance projects representing five percent). The reason for this trend is not evident; however, it is clear that the overall percentage of projects deemed likely to adversely affect the species is rising in relation to projects that are deemed not likely to adversely affect the species. As per Table 133 above, the majority of formal consultations dealt with the effects of grazing on this species.

Individual formal consultations on Forest Service actions in Arizona are listed in Table 134 below. Of the 27 formal consultations listed, 23 occurred on grazing projects. Many of the biological opinions written for these projects have included reasonable and prudent measures to minimize incidental take of spikedace.

Table 134. Formal consultations since 1987 on Forest Service actions in Arizona with effects to spikedace. This information was provided by the Arizona Ecological Services Field Office.

Consultation #	Date	Project Name	Conclusion - Anticipated Take
2-21-89-F-0071	Withdrawn	Horseshoe and West Bear/ Del Rio Allotments	Draft opinion - Jeopardy; project was subsequently withdrawn. No incidental take issued.

Consultation #	Date	Project Name	Conclusion - Anticipated Take
2-21-95-F-0020	7/20/1995	Baseline/Horsesprings Allotments	No Jeopardy - Mortality of 20 fish (of any of three species)
2-21-95-F-0020-R1	9/26/2002	Baseline/Horsesprings Allotments (Reinit.)	No Jeopardy - No incidental take issued due to lack of information.
2-21-95-F-0440-R1	12/30/2002	Prescott National Forest Ongoing Grazing - 16 Allotments (Reinit.)	No Jeopardy - No incidental take issued due to lack of information and uncertainty of species location.
2-21-95-F-0441-R1	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Beaver Creek and Bobcat-Johnson Allotments	No Jeopardy - No incidental take issued.
2-21-95-F-0442-R1	1/31/2003	Blue/San Francisco Rivers Batch Consultation – Fishhook and Steeple Mesa Allotments	No Jeopardy - No incidental take issued.
2-21-95-F-0443-R1	1/31/2003	Blue/San Francisco Rivers Batch Consultation (Reinit.) - Raspberry and KP Allotments	No Jeopardy - No incidental take issued.
2-21-95-F-0446-R1	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Upper Campbell Blue Allotment	No Jeopardy - No incidental take issued.
2-21-95-F-0447-R1	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Coyote-Whitmer and Turkey Allotment	No Jeopardy - No incidental take issued.

Consultation #	Date	Project Name	Conclusion - Anticipated Take
2-21-99-F-0300	2/28/2002	Tonto National Forest Ongoing Livestock Grazing - 25 Allotments	No Jeopardy - No incidental take issued.
2-21-00-F-0298	10/31/2000	Eagle Creek Bank Stabilization Project at Honeymoon Campground	No Jeopardy - More than 20 dead fish of any species OR machinery in water OR any toxic spills.
2-21-01-F-0105	2/26/2002	Eagle Creek Watershed Consultation	No Jeopardy - No incidental take issued due to lack of information.
2-21-01-F-0189	11/30/2001	Pleasant Valley Grazing Allotment	No Jeopardy - No incidental take issued because species absent.
2-21-01-F-0211	1/31/2003	Blue/San Francisco Rivers Batch Consultation	No Jeopardy - No incidental take issued.
2-21-01-F-0296	9/30/2002	Fossil Creek Grazing Allotment	No Jeopardy - No incidental take issued due to rarity in Verde River.
2-21-01-F-0300	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Bush Creek Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0302	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Cow Flat Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0303	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Foote Creek Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0306	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Red Hill Allotment	No Jeopardy - No incidental take issued.

Consultation #	Date	Project Name	Conclusion - Anticipated Take
2-21-01-F-0307	1/31/2003	Blue/San Francisco Rivers Batch Consultation - Stone Creek Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0308	2/26/2002	Dark Canyon Grazing Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0309	2/26/2002	East Eagle Grazing Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0310	2/26/2002	Tule Grazing Allotment	No Jeopardy - No incidental take issued.
2-21-01-F-0316	Withdrawn	Tonto National Forest Ongoing Grazing - 19 Allotments	Consultation withdrawn
2-21-03-F-0046	4/28/2003	Blue River Diversion Repair and Maintenance	No Jeopardy - No incidental take issued.
2-21-03-F-0046-R1	4/9/2004	Blue River Diversion Repair and Maintenance (Reinit.)	No Jeopardy - No incidental take issued.
2-21-03-M-0319	In process	Picture Fire	No Jeopardy - Emergency - concerned critical habitat only in Tonto Creek. No incidental take issued.

In summary, all biological opinions have been non-jeopardy to the spikedace. The draft opinion for Horseshoe and West Bear/Del Rio Allotments found jeopardy to the spikedace, however, the Forest Service later withdrew the consultation.

New Mexico

The majority (95 percent) of the consultations completed to date within New Mexico have been informal. Formal consultations represent five percent of the total number of consultations. Grazing consultations represented 35 percent of the total. Thirty consultations (71 percent) were with the Forest Service.

Table 135. Summary of activity types and consultations completed for projects affecting spikedace.

Activity Type	Formal	Informal	Emergency	Technical Assistance	Total
Fire		5		1	6
Flood		4	1		5
Grazing		15			15
Mining		1			1
Miscellaneous		1			1
Planning	1				1
Recreation		1			1
Roads	1	4			5
Stocking		1			1
Timber		2			2
Utilities		3			3
Water Development		1			1
Total	2	38	1	1	42

Only two formal consultations have been conducted on the spikedace, one with the Forest Service and one with the Bureau of Land Management. Adverse affects are expected to occur from the Forest Service project; however, this project has not yet been implemented

Table 136. Formal consultations since 1996 on Forest Service actions in New Mexico with effects to spikedace. This information was provided by the New Mexico Ecological Services Field Office.

Consultation #	Date	Project Name	Anticipated Incidental Take
2-22-96-F-0330	5/1/1996	Mimbres Resource Area Management Plan	No incidental take issued (unquantifiable amount of take)
2-22-03-F-0173	2003	West Fork Gila Natural Revetment and Bioengineering Project	Take anticipated of 250 adults and 21,250 eggs.

Factors Affecting the Species Environment within the Action Area

Within the action area, there may be several factors that affect the spikedace. As stated above, competition with non-native fishes continues to be a major factor in its decline (Propst 1999). In addition, the risk of catastrophic wildfire as well as drought is likely having impacts where the species occurs on the Forests, particularly because the species is restricted to small streams. Futhermore, resource activities that affect water quality, such as removal of riparian vegetation, sedimentation, or control of water levels, can affect spikedace habitat quality. The conservation

measures brought forth by the Forest Service that are now incorporated into the proposed action will assist with minimizing potential adverse effects to the species.

EFFECTS OF THE ACTION

This section includes analyses of the direct and indirect effects of the proposed action on the spikedace for the Apache-Sitgreaves, Coconino, Coronado, Gila, Kaibab, Prescott, and Tonto National Forests. Although presence of spikedace currently is not present on the Coronado or Kaibab National Forests, we analyzed the effects of the proposed action on these Forests at the request of the Forest Service. The S&Gs analyzed for these seven National Forests are listed in Table 137.

Table 137. Summary of S&Gs considered for the Spikedace.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4-9, 13,16-19, 21, 25, 26, 29, 30, 33, 40, 42-48, 51, 52, 53,55,58-64, 84, 97, 98, 99, 104-118, 120-123, 130, 132, 140, 144,150a, 151, 152, 156, 157, 163-166, 171, 172, 176-180
Coconino	312, 313, 315-319, 321-325, 327, 328, 331, 336-339, 341, 343-345, 353-358, 361-367, 369, 372, 375-378, 381-390, 393-395, 398-402, 404, 406-408, 411, 413, 414, 415, 417, 424-426, 428, 430-434, 458-462, 479-481, 483-487, 490-511, 513, 515-519, 545, 547, 548, 551, 552, 561-567, 570-576
Coronado	612, 613, 626-635, 637, 638, 640, 644, 645, 648-653, 657, 659-661, 663, 666-682, 692-696a, 698-707, 709-713, 774, 779, 780, 782, 783, 785, 785a, 786, 788-792, 792a, 792b, 794-800, 802-805, 807-812, 825-830
Gila	841, 842, 845-851, 854, 857-876, 878, 880, 881, 883-889, 892-894, 909-930, 932, 933, 935,936, 938, 939, 940, 940c-940s, 941, 943-946, 948, 950, 952,953, 954a-954k, 957h, 957n-957q
Kaibab	958-965, 967-973, 975-979, 981, 982, 984, 993, 995-997, 1001-1004, 1007-1009, 1011, 1013a-o, 1045a-b, 1045c-d
Prescott	1115-1119, 1122-1130, 1132-1138, 1142-1163, 1165-1167, 1169-1174, 1175-1177, 1179-1182
Tonto	1341-1342, 1344-45, 1348-50, 1352-1357, 1359, 1361-1368, 1371, 1371a-1371j, 1372, 1375, 1376a-1376d, 1381, 1387, 1388a-f, 1391, 1398-1404, 1404a-g, 1412, 1418a-b, 1420, 1422a, 1423, 1423a- 1423c,
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1448, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1479, 1486-1492, 1495, 1499-1501, 1504-1515

Apache-Sitgreaves National Forest

The FWS assumes the spikedace to be present on the Apache-Sitgreaves NF. The Eagle Creek population has not been seen for over a decade (Marsh 1996), although it is thought to still exist in numbers too low for the present sampling to detect. Our analysis found several S&Gs within the Apache-Sitgreaves LRMP that if implemented could potentially result in negative sublethal effects to the spikedace. In addition, there are five S&Gs that could result in negative behavioral responses. These include S&Gs 39, 64, 123, 150a, and 152. However, overall, the majority of the S&Gs are maintaining habitat and providing minimal recovery for the spikedace.

Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 138. Effects of the S&Gs analyzed for the Spikedace - Apache-Sitgreaves LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	7	6.6
-1	S&G is causing negative behavioral response	5	4.7
0	S&G is ill-defined and/or open to interpretation	20	18.9
1	S&G is maintaining habitat & providing at least minimal recovery	60	56.6
2	S&G is moving towards recovery	6	5.7
3	S&G is implementing species recovery plan	1	0.9
Y	S&G has no application to the species	1	0.9
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	4	3.8
Total		106	100 %

Engineering Program

Standard and Guideline 63 relates to both total and open road densities. This S&G states that total road density should average 3.5 mi/mi² or less while open road densities should average 2.0 mi/mi² or less. As stated in the biological assessment (U.S. Forest Service 2004), road density is defined as the total miles of road in a defined area divided by the defined area in square miles. The analysis in the biological assessment recognizes that the numbers that were being evaluated were the known system roads and that the non-system (unclassified) roads are unknown. Therefore, the total road densities represented in the biological assessment do not include the non-system roads. Road density is used by the FWS and NOAA Fisheries as one way to measure watershed condition as it relates to increased sedimentation and its effects on resident fish in the Pacific Northwest. As stated above in the description of the proposed action, the joint agencies recommendation is that a given watershed should have less than 2.5 mi/mi² of road system; if in excess, the watershed is said to be not properly functioning.

On the Apache-Sitgreaves, the known road densities are below the 2.5 mi/mi² recommended by FWS and NOAA fisheries. According to the biological assessment (U.S. Forest Service 2004:33), road density on the Apache-Sitgreaves is about 1.1 km/square km. However this number does not include the non-classified roads. If implemented as written, S&G 63 may allow for the total road density to reach 3.5 mi/mi². High road densities on the landscape have the

potential to deteriorate watershed conditions. One of the primary threats to spikedace is watershed deterioration, which can lead to increased erosion into spikedace habitat, thereby increasing sedimentation into the stream channel and lowering water quality. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality of demersal eggs.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in negative effects to the spikedace. However, there may be negative effects from this program not captured in the applicable S&Gs. In the Apache-Sitgreaves NF Plan there is not a specific Fire Management Program listed; however, there is a Protection Program listed which deals with fire. The goal for the Protection Program includes the following “Fire is used as a resource management tool where it can effectively accomplish resource management objectives (Apache-Sitgreaves LRMP)”. It can be inferred that prescribed fire would be utilized in this capacity. The use of prescribed fire and other fuels treatment methods are useful in reducing the risk of catastrophic wildfire. However, these projects may result in adverse affects associated with humans, tools, machinery, and burning. Additionally, ash flows and erosion/sedimentation in burn areas may have adverse effects to fish species.

Forestry and Forest Health Program

Standard and Guideline 97 states that road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 mi/mi² or less, unless topography dictates higher densities necessary to economically remove the timber. Also, open road densities after cessation of timber sale activities should average 2.0 mi/mi² or less. The S&G as written, could potentially allow total road densities to reach 3.5 mi/mi² or above, if needed, to economically remove timber. The FWS recommendation is that in order to maintain a properly functioning watershed, total road density should be 2.5 mi/mi² or less (see the discussion above for S&G 63).

Standard and Guideline 64 allows for controlling mistletoe by clear-cutting. As stated in the biological assessment (U.S. Forest Service 2004), clear-cutting in this region has undergone a major reduction over the past decade. On the Apache-Sitgreaves, a total of 704 acres have been clear-cut during that time. Although the potential for implementation of this S&G is very remote and the 1996 Regional Amendment for Mexican Spotted Owl and Northern Goshawk prohibits the use of clear-cutting within owl and goshawk habitats, this S&G still exists and will be analyzed for potential effects. One potential effect to watershed condition from clear-cutting would be increased erosion of the exposed soils into streams. In addition, if the clear-cuts remove the vegetation near the streambanks, this could result in temperature changes to the water that would be deleterious to the spikedace.

Rangeland Management Program

Within the Apache-Sitgreaves NF LRMP, there are no negative S&Gs within the Rangeland Management Program. All of the S&Gs that were analyzed have positive effects to the spikedace. However, there have been numerous formal consultations addressing the adverse effects of grazing activities on spikedace on the Apache-Sitgreaves since 1987.

Wildlife, Fish, and Rare Plants Program

Standards & Guidelines 39, 114-118, 123, and 152 all provide guidance for management of the riparian resources. The FWS recognizes that the intent of these S&Gs is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat that is currently occupied or is capable of supporting spikedace be maintained in optimal conditions. All of these S&Gs allow a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable conditions. If this were the case, potentially the degraded streambank conditions could begin to move downstream until the majority of the streambank is unstable. This could result in portions of the streambank collapsing into the stream, increasing sedimentation, widening the stream, and leading to increased summer water temperatures. In addition, the loss of riparian vegetation at a location could impair the filtering capacity of the riparian buffer leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality to demersal eggs.

Standard and Guideline 150a allows the Forest to manage waters capable of supporting fish to maintain a fishery. For the purposes of this analysis, the FWS assumes that a “fishery” could include native as well as non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968, Minckley 1973). The red shiner is a very competitive species that out-competes spikedace for food items and habitat and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

Coconino National Forest

The spikedace occurs on the Coconino NF in the Verde River. In 1994, approximately 425 individual spikedace were caught in the Verde River. This number declined precipitously to approximately 75 in 1995, with a brief peak near 150 individuals in 1996, before declining to 0 in 1997 (Rinne 1999). Spikedace in the Verde River have reached an all-time low in numbers, such that the last fish observed was in 1999 (Brouder 2002). Although spikedace have not been detected in the Verde River in several years it is still considered to be occupied because the very small population size and elusive nature of the species inhibits the effectiveness (and/or the confidence) of spikedace presence/absence survey techniques. The population of spikedace in the Verde River is thought to be the most taxonomically distinct population (U.S. Fish and Wildlife Service 2004).

Only two S&Gs (424 and 505) within the Coconino NF LRMP, if implemented, could potentially result in sublethal effects to the spikedace. The majority of the S&Gs maintain habitat and provide for minimal recovery of the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 139. Effects of the S&Gs analyzed for the Spikedace - Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	2	1.2
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	21	13.0
1	S&G is maintaining habitat & providing at least minimal recovery	107	66.5
2	S&G is moving towards recovery	1	0.6
3	S&G is implementing species recovery plan	2	1.2
Y	S&G has no application to the species	3	1.9
Z	S&G implementation is non-discretionary	8	5.0
X	S&G is a heading	17	10.6
Total		161	100 %

Engineering Program

Within the Engineering Program, S&G 400 allows the Forest to operate and maintain roads to meet objectives and to obliterate roads not needed for industry, public, and/or administrative use. Obliteration includes restoring the original land contour to the degree practical, scarifying, providing proper drainage, and re-vegetating with appropriate species.

Standard and Guideline 404 allows for management of road densities to achieve an average of 1.1 mile of open road per section in the woodland zone, such as pinyon-juniper, desert, and grassland vegetation types and an average of 2 miles of open road per section in the ponderosa pine/mixed conifer zone.

Standard and Guideline 408 and 460 guide the Forest to locate new roads out of riparian areas and water collecting features such as swales and to obliterate unnecessary roads in riparian areas.

Standard and Guideline 547 provides guidance for eliminating unneeded roads and the redesign or relocation of poorly located roads and trails to lessen impacts on such resources as cultural sites, soil, water and wildlife. This S&G also guides the Forest to reduce user conflicts and restore areas heavily damaged by vehicle or foot traffic using such methods as obliteration, barriers, closures and visitor information.

All of these S&Gs are intended to address potential negative effects of roads within the Forest and reduce the impacts of roads on the landscape. The long-term implementation of these S&Gs would benefit the watershed; however, there is the potential for short-term effects from construction activities involved in relocating or obliterating a road. Such impacts may include heavy machinery in the stream potentially resulting in increased turbidity as well as the actual crushing of fish. In addition, there may be an increase in sediment due to ground disturbing activities adjacent to or upstream of spikedace habitat.

Fire Management Program

Standards and Guidelines 411 and 414 allow the Forest to plan and implement fuels treatment projects that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives while reducing the threat to life, property, adjacent old-growth areas, or other areas of high resource value. Effects of fuels treatment projects include effects of the actual fire, including a reduction of the vegetative cover contributing to the possibility of ash and sediment entering the stream channel. Other effects include the effect of fireline construction, and the potential for damage from machinery within or immediately adjacent to the stream channel. These effects are all localized and short-term and are far outweighed by the benefit in the reduction of the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standards and Guidelines 458 and 461 provide guidance to minimize resource damage due to management activities such as timber sales, and also direct the use of Knutson-Vandenburg Act (KV) funds to correct resource damage caused by timber sale activities. Once again, these S&Gs are beneficial in the long-term but could potentially result in some short-term effects to the spikedace from surface disturbing activities.

Lands and Minerals Program

Standard and Guideline 505 allows for mineral material excavation within the riparian zone after the completion of an environmental analysis as long as those mineral activities maintain or improve riparian conditions. Mineral material excavation within the riparian zone may involve excavation within the stream channel or immediately adjacent to the channel. This could result in potential direct effects to spikedace from crushing by people or machinery in the stream. In addition, there may be some potential sedimentation into the stream resulting from work that would occur on the stream bank. Other effects could include the potential for heavy metals (i.e., the by-products of the ore extraction process) to leech into the stream, thereby causing harm to the spikedace.

Standards & Guidelines 391 and 393 address minimizing the impacts of non-discretionary special use projects (i.e., mining and transmission corridors) across the Forest. Although they are implemented to reduce or eliminate long-term resource damage, to improve areas in unsatisfactory condition, and to maintain those in satisfactory or better condition, they could potentially result in short-term adverse effects to the spikedace. These effects could result from construction activities including relocating or obliterating roads. These effects are short-term and are outweighed by the benefit of minimizing long-term impacts to the landscape.

Rangeland Management Program

Standard and Guideline 424 directs grazing management within designated wilderness areas. Designated wilderness areas adjacent to the Verde River include Munds Mountain and Sycamore Canyon Wilderness areas. According to the Coconino NF LRMP, grazing in the wilderness is generally at Level C (U.S. Fish and Wildlife 1994:110). In addition, the LRMP also states that any adjustments in the numbers of livestock permitted to graze in wilderness will be made as a result of revision in the normal grazing and land management policy, giving consideration to legal mandates, range condition, and protection of the range resource from deterioration.

Spikedace are adversely affected by activities which contribute to the alteration of the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. These impacts occur at all levels of cattle presence, regardless of season, but increase as number of livestock and length of time the cattle are present increase (Marlow and Pogacnik 1985). Some effects to spikedace and their habitat may be restricted within a small area, other effects extend downstream. The effects of the livestock grazing and the magnitude of those effects on the watershed are dependant on local site conditions.

Standards& Guidelines 338, 339, 341, and 483 all provide positive direction to the Forest for managing the impacts of grazing and improving grazing conditions. Although the intent is beneficial, they could have some short-term negative effects from the presence of livestock in the channel, manipulation of riparian vegetation, or from heavy machinery disturbing the soil, as well as effects from prescribed fire. All of these negative effects are short-term and localized and are outweighed by the benefit of improved range conditions in the long-term.

Watershed Management Program

There is a potential for adverse short-term effects from the implementation of S&Gs 361, 363, 377, and 378. They all provide direction for resource improvements such as locating/relocating roads out of stream courses and maintaining riparian vegetation as well as doing emergency fire rehabilitation where needed to protect soil and water resources. Some of the effects include some short-term ground disturbance activities that may temporarily increase sedimentation into the stream channel. These effects would be temporary and would eventually contribute to overall watershed health.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 490 provides guidance for management of riparian resources. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat that is currently occupied, or is capable of supporting spikedace, be maintained in optimal conditions. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable condition. Less than stable conditions could result in the streambank collapsing into the stream, increasing sedimentation, widening of the stream, and leading to increased summer water temperatures. In addition, the loss of riparian vegetation could impair the filtering capacity of the riparian buffer, leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Coronado National Forest

The spikedace does not currently occur on the Coronado NF. However, it occurs downstream of the Forest in Aravaipa Creek. At the request of the Forest Service, the FWS analyzed potential effects from the implementation of S&Gs within the Coronado LRMP to the spikedace. Most of the S&Gs within the Coronado NF LRMP maintain habitat and provide for minimal recovery of

spikedace. There were a few S&Gs that if implemented may result in some potential lethal and sublethal effects to the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 140. Effects of the S&Gs analyzed for the Spikedace - Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	0.9
-2	S&G is causing sublethal response	4	3.7
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	16	14.7
1	S&G is maintaining habitat & providing at least minimal recovery	71	65.1
2	S&G is moving towards recovery	6	5.5
3	S&G is implementing species recovery plan	6	5.5
Y	S&G has no application to the species	1	0.9
Z	S&G implementation is non-discretionary	2	1.8
X	S&G is a heading	2	1.8
Total		109	100 %

Fire Management Program

Standard and Guideline 695 directs the Coronado NF to conduct fire suppression activities in a way to protect watershed and visual resource values. Although this S&G exists, fire suppression is not part of the proposed action for this project and therefore will not be analyzed in this consultation. The effects of fire suppression are addressed during emergency consultations.

Standards and Guidelines 713, 798, and 812 allow for the use of prescribed fire to reduce fuel hazards, enhance wildlife values and visual resources, and improve livestock forage and watershed condition. All three of these S&Gs are the same but apply to different management areas. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Forestry and Forest Health Program

Standards and Guidelines 697, 699 and 702 allow for the use of chemicals within the guidelines approved by other agencies for the purpose of insect and disease control on recreation and administrative sites, as well as timber and rangelands and allow the use of cyanide leaching as part of mining operations.

Pesticides (i.e., insecticides, herbicides, and fungicides) are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. In the case of S&G 697, these pesticides

could potentially be introduced into aquatic systems to kill undesirable pests such as weeds and algae in order to enhance fishing opportunities.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e., non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can suppress already small populations as is typical of endangered or threatened species (Pattee et al. 2003).

Watershed Management Program

Standard and Guideline 678 provides guidance in the management of the aquatic resources on the Coronado NF. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat currently occupied or that is capable of supporting spikedace be maintained in optimal condition. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the natural bank is 80 percent, then the assumption is that 20 percent of the streambank is allowed to deteriorate to less than stable condition. Less than stable conditions could result in the streambank collapsing into the stream, increasing sedimentation, widening the stream, and leading to increased summer water temperatures. In addition, the loss of riparian vegetation could impair the filtering capacity of the riparian buffer leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 677 provides the Forest with guidance to complete classifications and inventories of all riparian areas, and complete action plans to improve all unsatisfactory riparian areas. In addition, it allows the Coronado to improve all riparian areas to satisfactory or better condition by the end of Period 5 (i.e., 50 years from the date the LRMP was signed). Although this S&G is definitely beneficial because it is moving toward satisfactory riparian conditions, there may be some short-term adverse effects that could be occurring and may continue to occur until such a time as the riparian habitat reaches satisfactory conditions.

Standards and Guidelines 711, 782, 794, and 807 all direct the Forest to restore damaged watersheds to satisfactory watershed condition. Water and soil resources improvements may consist of channel stabilization and revegetation using native or non-native species. All these S&Gs are the same but are applied to different management units. They allow for short-term,

temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and improved riparian status.

Rangeland Management Program

Standards and Guidelines 792 and 805 allow the Forest to manage suitable rangeland at Level D within MA7A and MA7B. If level D is not achievable, the S&Gs direct the Forest Service to manage at Level A (no livestock). Management seeks full utilization of forage allocated to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor. Projected range conditions include 15,412 acres in satisfactory condition, and 1,712 acres in unsatisfactory condition.

The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland/watershed effects, have been well documented and discussed in recent years (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994). Excessive sediment may smother invertebrates, reducing fish food production and availability. Spikedace are not unduly sensitive to moderate amounts of sediment, although during the spawning period egg viability may be reduced due to high substrate embeddedness and sediment loads, and larval habitat may be lost due to filling of shallow waters with sediment.

Standard and Guideline 829 states that riparian areas will be managed to achieve and maintain satisfactory riparian conditions as described in the Forest-wide prescription. This may be accomplished through the use of structural improvements, movement of livestock, of the exclusion of livestock. This S&G may result in some short-term adverse effects during the construction of structural improvements. In addition, the movement of livestock could also cause adverse effects if they are trailed through the riparian area. However, these effects would be localized and short-term and would contribute to the overall health of the riparian habitat in the long-term.

Wildlife, Fish, and Rare, Plants Program

Standard and Guideline 667 allows for the use of structural and nonstructural improvements to meet the specific wildlife habitat objectives as shown for each Management Area. Nonstructural Wildlife Improvements may include: 1) prescribe burn feasible areas on a 20-year cycle; 2) seed suitable wildlife forage species as needed in fuelwood and timber areas; 3) transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding; 4) re-vegetate wildlife areas with wildlife forage, cover, and riparian species (native species should be used when available); and 5) thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year. Standard and Guideline 668 also allows for the use of structural and nonstructural improvement guidelines as follows: 1) construct water developments or potholes to accomplish 1 per section within 4 decades; 2) consider structural improvements and maintenance for threatened and endangered species as technology develops; 3) construct fish habitat improvement structures as needed for threatened and endangered species; and 4) fence riparian areas where prescribed by approved allotment management plans. Miles of fence constructed will vary with management plan.

Standards and Guidelines 667 and 668 fall into the category of activities that cause short-term adverse effects while implementing actions that have long-term positive effects; thus, a net beneficial effect. In addition S&G 667 allows for prescribed burning. While it is advantageous to reduce the risk of catastrophic wildfire, the prescribed fire itself may have short-term impacts on water quality in adjacent streams. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire. Standard and Guideline 668 also allows for short-term, temporary impacts from the construction of habitat improvements and fencing. These impacts may include direct mortality of fish from trampling as well as indirect impacts to the habitat such as temporary alterations of stream flow, or short-term isolated increases in sediment entering the stream.

Gila National Forest

The species currently occurs within the upper Gila River in New Mexico (New Mexico Department of Game and Fish unpub. data). The most abundant site is currently within Gila Bird Area, however it does occur within other sites on the Gila National Forest.

There are several S&Gs within the Gila NF LRMP that, if implemented, have the potential to cause lethal and sublethal effects to the spikedace. The majority of the S&Gs within the plan maintain habitat and provide for minimal recovery of the spikedace. Within this plan, there are a large number of S&Gs that direct the Forest to implement recovery plans and work toward delisting of species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 141. Effects of the S&Gs analyzed for the Spikedace - Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	2	1.8
-2	S&G is causing sublethal response	15	14.0
-1	S&G is causing negative behavioral response	1	0.9
0	S&G is ill-defined and/or open to interpretation	3	2.8
1	S&G is maintaining habitat & providing at least minimal recovery	57	53.3
2	S&G is moving towards recovery	4	3.7
3	S&G is implementing species recovery plan	22	20.6
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	1	0.9
Total		107	100 %

Fire Management Program

Standards and Guidelines 844, 845, and 940r all allow the Forest to use prescribed fire. Although it is recognized that fire has a role in the ecosystem and that using prescribed fire is one way to re-introduce fire into the system and reduce the risks of catastrophic wildfire in the

long run, there are short-term effects. Short-term effects of prescribed fire include direct effects of the fire itself (ash) as well increased inputs of sediment as a result of initial soil disturbing activities from the construction of fire lines and the presence of vehicle traffic (i.e. engines). These effects are short-term and the S&Gs are considered beneficial because the long-term result is a reduction in the risk of catastrophic wildfire.

Rangeland Management Program

Standards and Guidelines 940g, 940m, 940n, 940s, 954b, 954e, 954d, 954j, and 957n all guide the Gila NF in their grazing management. The effects that livestock management activities can have on riparian and aquatic habitats, both direct and through upland/watershed effects, have been well documented and discussed in recent years (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994).

Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel. The riparian vegetation and streambank condition in tributaries, including intermittent and ephemeral channels, form important buffers between upland impacts and the mainstem or perennial stream. A healthy riparian zone with substantial herbaceous cover is a very effective buffer for filtering sediment and pollutants before they can reach the stream (Erman et al. 1977, Mahoney and Erman 1984, Lowrance et al. 1984, Bisson et al. 1992, Osborne and Kovacic 1993).

Spikedace are adversely affected by activities that contribute to the alteration of the flow regime (water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. Some effects to spikedace and their habitat may be restricted within a small area, other effects extend downstream. The way in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Standard and Guideline 858 states that grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas. There is evidence that grazing can be used to manipulate vegetation within riparian habitats; however, there could be some short-term effects such as increased turbidity to the water, or crushing of the fish from cattle presence within the stream channel.

Watershed Management Program

Standards and Guidelines 909, 913, and 917 all guide the Forest to identify and implement channel and land treatment structures in conjunction with other resource activities. These S&Gs are all the same but they are directed to different management areas and they allow for short-term, temporary impacts to water quality and watershed condition in exchange for longer-term improvement in watershed condition, sediment reduction, and riparian status. In addition, effects to fish may include crushing during construction activity. See discussion under the Watershed Management Program, Apache-Sitgreaves NF.

Wildlife, Fish, and Rare Plants Program

Standard and Guideline 848 provides guidance in the management of the riparian resources on the Gila NF. The Service recognizes that the intent of this S&G is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat currently occupied or is capable of supporting spikedace be maintained in optimal conditions. This S&G allows for a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if protection of the streambank is 80 percent, then the assumption is that 20 percent of the streambank is allowed to deteriorate to less than stable conditions. Less than stable bank conditions could result in the streambank collapsing into the stream, increasing sedimentation, widening the stream, and leading to increased summer water temperatures. In addition, the loss of riparian vegetation at that location could impair the filtering capacity of the riparian buffer leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standards and Guidelines 885, 939, 940c, 940d, 940k, 940p, 944, and 954g place the management emphasis on game fish. For purposes of this analysis, the FWS assumes that game fish could include both native and non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968, Minckley 1973). The red shiner out-competes spikedace for food items and habitat; and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout, may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

Kaibab National Forest

Although spikedace is not currently found on the Kaibab NF, the FWS analyzed potential effects herein at the request of the Forest Service. According to our analysis there is one S&G that if implemented could potentially result in a lethal effect to the spikedace. The majority of the S&Gs maintain habitat and provide for minimal recovery for the species. Additionally, there was one S&G that is beneficial in the long-term but has some short-term adverse effects.

Table 142. Effects of the S&G analyzed for the Spikedace – Kaibab NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.9
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	3.7
1	S&G is maintaining habitat & providing at least minimal recovery	42	77.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	6	11.1

Ranking	Explanation of Ranking	Total	Percentage
Z	S&G implementation is non-discretionary	2	3.7
X	S&G is a heading	1	1.9
Total		54	100 %

Engineering Program

Standard and Guideline 972 directs the Forest to maintain local terminal roads that support intermittent and short-term resource actions in a closed-to-traffic mode except during periods of intermittent use and to identify and obliterate unneeded system roads and facilities in accordance with the Management Direction for Soil and Water Resources. The Service recognizes that the intent of this S&G is positive; however, there is the potential for short-term adverse effects from the obliteration of a road. See discussion under the Watershed Management Program for the Apache-Sitgreave NF.

Wildlife, Fish and Rare Plants Program

Standard and Guideline 1045 allows for the creation of Cougar Dam to provide fishing opportunities and waterfowl and bald eagle habitat. As stated in the Final Rule (FR 51:23769-23781), one of the reasons that the spikedace was listed was because of the alteration and destruction of its historic native habitat. One way native spikedace habitat can be altered is by converting flowing waters into still waters by impoundment: alteration of flow regimes (including conversion of perennial waters to intermittent or no flow, and the reduction, elimination or modification of natural flooding pattern); alteration of water temperature (either up or down); alteration of silt and bed loads; loss of marshes and backwaters; and alteration of stream channel characteristics from well-defined, surface level, heavily vegetated channels with a diversity of substrate and habitats, into deeply cut unstable arroyos with little riparian vegetation, uniform substrate, and little habitat diversity. Damming is one way that habitat alteration may occur. In a letter provided to FWS by the Kaibab NF, they stated that Cougar Dam would never be constructed.

Prescott National Forest

As stated above, we assume this species to be present within the Verde River on the Prescott NF. There are three S&Gs within the Prescott NF LRMP that if implemented could potentially result in lethal and non-lethal effects to the spikedace. These are S&Gs 1149 and 1162. The majority of the S&Gs provide for maintaining habitat and minimal recovery of the spikedace. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 143. Effects of the S&Gs analyzed for the Spikedace – Prescott NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.6
-2	S&G is causing sublethal response	2	3.1
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	4	6.3
1	S&G is maintaining habitat & providing at least minimal recovery	51	79.6

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	3.1
Y	S&G has no application to the species	1	1.6
Z	S&G implementation is non-discretionary	2	3.1
X	S&G is a heading	1	1.6
Total		64	100 %

Lands and Minerals Program

Standard and Guideline 1169 allows the Forest to permit roads needed for private land access, special uses or mineral activities to be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and re-vegetated after use. This S&G could potentially cause short-term adverse effects (i.e., increased sedimentation into the stream channel) in the process of implementing an activity that will provide an overall beneficial effect to the landscape in the long-term. The effects of closing roads are discussed under the Engineering Program for the Coronado NF.

Rangeland Management Program

Standards and Guidelines 1151 and 1154 are positive management activities to manage livestock grazing and reduce adverse effects to the landscape in the long-term; however, there may be short-term adverse effects associated with this management. See the discussion under the Gila NF, Rangeland Management Program.

Included amongst the formal consultations in Arizona with adverse effects to the spikedace is 2-21-95-F-0440-R1 on the Prescott NF. This is a batched consultation of several allotments within the upper portion of the Verde River. Because the presence of the species within the Verde River during that time was uncertain, the biological opinion had no take associated with it.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1136 allows trail access but restricts it to non-motorized use except where indicated on the Forest visitor maps or signing on the ground. Where discrepancies occur, S&G 1136 directs on the ground signing. This S&G is an attempt to minimize the effect of roads and trails to the watershed in the long-term. This action could mean a potential for some short-term adverse effects from ground disturbing activities that may increase sedimentation into streams.

Watershed Management Program

Standard and Guideline 1147 provides guidance for management of the riparian resources. The FWS recognizes that the intent of this S&G is positive; however, due to the current status of the spikedace across its range, it is imperative that all habitat that is currently occupied, or is capable of supporting spikedace, be maintained in optimal conditions. This S&G allows a certain amount of riparian habitat to be maintained at less than optimal conditions. For example, if 80 percent of the streambank linear distance is maintained in stable condition, then the assumption is that 20 percent of the streambank is at less than stable condition. Less than stable conditions could result in the streambank collapsing into the stream, increasing sedimentation, widening of the stream, and leading to increased summer water temperatures. In addition, the loss of riparian

vegetation could impair the filtering capacity of the riparian buffer, leading to an increase in nutrients and contaminants into the creek. Loss of riparian vegetation also leads to increased summer water temperatures and lower winter water temperatures. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Wildlife, Fish and Rare Plants Program

Standard & Guideline 1149 provides guidance for permitting stocking of fish to meet AGFDs fisheries goals. For the purposes of this analysis, the FWS assumes that “fisheries” could include native as well as non-native fish. Competition with non-native fishes is often cited as a major factor in the decline of spikedace (Propst 1999). The red shiner, in particular, is frequently indicated in the decline of this fish (Minckley and Deacon 1968, Minckley 1973). The red shiner is a very competitive species that out-competes spikedace for food items and habitat and is very tolerant of many extremes found in the desert and semi-desert aquatic habitats (Matthews and Hill 1977). In addition, largemouth bass, smallmouth bass, green sunfish, and introduced trout may co-occur and prey on spikedace. These non-native fish may also impact spikedace populations through competition for food and space.

Standard and Guideline 1162 states that when using pesticides, the Forest should avoid direct application to water and directs the Forest to avoid mixing or loading chemicals near streams or wet areas. Pesticides (insecticides and fungicides) and herbicides are selected for their biocidal properties and are applied to kill or control organisms. Thus, they are all toxic to some forms of life. Pesticides may be introduced into natural aquatic systems by various means: incidentally during manufacture, during their application (i.e., through aerial spray drift), and through surface water runoff from agricultural/range land after application. In the case of S&G 697, these pesticides and herbicides could potentially be introduced into aquatic systems to kill undesirable pests such as weeds and algae in order to enhance fishing opportunities.

A number of generalizations can be made about pesticides. First, effective pesticides are designed to be selective in their effects: they are extremely toxic to some forms of life and relatively harmless to others. Few are absolutely specific to their target organisms, so other related and unrelated species may be affected. Second, the mode of application of pesticides varies according to the circumstances. Third, in stagnant lentic (i.e. non-flowing) aquatic systems, certain pesticides are more likely to be persistent at low levels (Rand et al. 1995).

Runoff that may contain pesticides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can suppress an already small population as is typical of endangered or threatened species (Pattee *et al.* 2003).

Tonto National Forest

Although the spikedace is currently not known to occur on the Tonto NF, the potential effects are analyzed herein at the request of the Forest Service. In addition, the lower Verde River and

Tonto Creek are known to have been historically inhabited by spikedace. The majority of the S&Gs within the Tonto LRMP will maintain habitat and provide for minimal recovery of the spikedace. There several S&Gs that if implemented, may result in lethal, non-lethal and behavioral effects to the species. Additionally, there were several S&Gs that were beneficial in the long-term but had some short-term adverse effects.

Table 144. Effects of the S&Gs analyzed for the Spikedace – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.4
-2	S&G is causing sublethal response	3	4.2
-1	S&G is causing negative behavioral response	12	16.7
0	S&G is ill-defined and/or open to interpretation	3	4.2
1	S&G is maintaining habitat & providing at least minimal recovery	49	68.1
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	3	4.2
Z	S&G implementation is non-discretionary	1	1.4
X	S&G is a heading	0	0.0
Total		72	100 %

Fire Management Program

Standards and Guidelines 1376a and 1376d allow the use of prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement. Although it is recognized that fire has a role in the ecosystem and that using prescribed fire is one way to re-introduce fire into the system and reduce the risks of catastrophic wildfire in the long run, there are short-term effects of prescribed fire similar to those caused by fire suppression activities as well as effects of the prescribed fire itself. Refer to the discussion under the Coronado NF, Fire Management Program section.

Forestry and Forest Health Program

Standard and Guideline 1400 guides the Forest to restrict tractor skidding to those areas that have sustained slopes of 40 percent or less. This does not eliminate the possibility of sediment being transported off the slope and entering the stream. Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel.

Standards and Guidelines 1398, 1401, and 1403 are all actions to reduce the impacts of ground disturbing activities to the watershed in the long-term, however this may result in short-term adverse effects. See discussion under the Engineering Program for the Coronado NF.

Rangeland Management Program

Standards and Guidelines 1371c, 1388a, 1388b, 1404e, 1404f, 1404g, 1418a, 1418b, 1423, and 1423a all provide the Tonto with guidance on managing its grazing program. The effects that

livestock management activities can have on riparian and aquatic habitats, both direct and through upland/watershed effects, have been well documented and discussed in recent years (Platts 1990, Bahre 1991, Meehan 1991, Fleischner 1994).

Sedimentation from tributary canyons and streams leading into drainages contributes to the condition of the river downstream. The amount of sediment in the stream system is a major force in determining the size and shape of the stream channel. The riparian vegetation and streambank condition in tributaries, including intermittent and ephemeral channels, form important buffers between upland impacts and the mainstem or perennial stream. A healthy riparian zone with substantial herbaceous cover is a very effective buffer for filtering sediment and pollutants before they can reach the stream (Erman et al. 1977, Mahoney and Erman 1984, Lowrance et al. 1984, Bisson et al. 1992, Osborne and Kovacic 1993).

Spikedace are adversely affected by activities that contribute to the alteration of the flow regime (i.e., water quality, quantity, intensity, and duration), degrading the stream channel, and modifying the floodplain and riparian vegetation structure and diversity. Some effects to spikedace and their habitat may be restricted within a small area, other effects extend downstream. The way in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Standard and Guideline 1423c allows the use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas will be identified in Allotment Management Plans and will involve areas of limited size and extent where other management practices (i.e., prescribed burning) cannot be effectively or economically utilized to achieve management objectives. Projects of this nature will be subject to environmental assessment and public involvement to insure project objectivity and public safety.

Runoff that may contain pesticides or herbicides could cause sublethal toxic effects in a species, affecting hormone regulation, reproduction, and embryonic development. Pesticides may affect not only aquatic species larval development, but also adult immune systems, rendering organisms more susceptible to disease. With fewer healthy adults in the breeding population, fewer young will be produced, and of those produced, more offspring will not develop normally. Constant pesticide applications that affect immune system development can only suppress an already small population as those characterized by an endangered or threatened species (Pattee et al. 2003).

Standards and Guidelines 1376b and 1388f provide guidance for the improvement of range condition. Methods to accomplish this could include prescribed fire and chemical and/or mechanical means.

There could be short-term adverse effects from management to improve overall landscape conditions in the long-term. See previous discussion for effects from prescribed fire, chemicals and mechanical manipulations under the Coronado NF, Fire Management Program section.

Recreation, Heritage, and Wilderness Program

Standards and Guidelines 1388c and 1404d provide guidance for ORV use within the Tonto NF. Because of its proximity to a metropolitan area, the Tonto NF receives a high degree of recreation use including ORV use. If not controlled, ORV use could result in the deterioration of watershed conditions. As stated previously, one of the primary threats to spikedace is watershed deterioration. This could potentially lead to increased erosion into spikedace habitat, thereby increasing sedimentation into the stream channel and lowering water quality by allowing contamination of those streams. As a result, potential effects to the species may include a reduction of invertebrate food supplies, interference with reproduction, and direct mortality.

Standard and Guideline 1371g allows the Forest to construct or reconstruct trails in either former or new locations to prevent resource degradation and provide public safety. Again, there are potential short-term effects due to ground disturbing activities. The assumption is that the long-term benefit of relocating the trail will outweigh any short-term effect.

Wildlife, Fish, and Rare Plants Program

Standards and Guidelines 1364, 1365, and 1388d all provide guidance for minimizing impacts from stream crossing and habitat improvement projects. Although these are considered by the FWS to be positive, there is still the potential for short-term and localized effects to individuals from crushing and sedimentation during the implementation of these projects. See discussion under the Watershed Management Program, Coronado NF.

1996 Regional Amendment

Short-term adverse effects to the spikedace may occur from the implementation of the S&Gs within the 1996 Regional Amendment. Yet, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 145. Effects of the S&Gs analyzed for the Spikedace - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.3
1	S&G is maintaining habitat & providing at least minimal recovery	33	61.1
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	14.8
Z	S&G implementation is non-discretionary	2	3.7
X	S&G is a heading	6	11.1
Total		54	100 %

The following S&Gs under the 1996 amendment are those that will ultimately have a long-term beneficial effect to the spikedace. They are 1432, 1445, 1448, 1455, 1458, 1468, 1476, and 1508. All these S&Gs allow the Forests to use prescribed fire, thinning, and other fuels

management activities as a tool for fire risk abatement. Potential short-term effects include those associated with ground disturbance (i.e. sedimentation) as well as those from the fire itself. See previous discussions under the Fire Management Program, Coconino NF for discussion of those effects. Although the implementation of all of these S&Gs will have short-term effects from using prescribed fire, there will be a long-term beneficial effect in the reduced risk of catastrophic wildfire.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Unregulated activities on federal and non-federal lands, such as trespass livestock, inappropriate use of OHVs, illegal introduction of bait and sport fishes, and residential and commercial development on lands within watersheds containing threatened and endangered native fishes, are cumulative effects and can adversely affect the species through a variety of avenues.

Cumulative effects to native fishes include ongoing activities in the watersheds in which the species occurs such as livestock grazing and associated activities outside of federal allotments, irrigated agriculture, groundwater pumping, stream diversion, bank stabilization, channelization without a federal nexus, and recreation. Some of these activities, such as irrigated agriculture are declining and are not expected to contribute substantially to cumulative long-term adverse effects to native fishes.

Other activities, such as recreation, are increasing. Increasing recreational, residential, or commercial use of the non-federal lands near the riparian areas would likely result in increased cumulative adverse effects to occupied, as well as potentially-occupied native fish habitat through increased water use, increased pollution, and increased alteration of the streambanks through riparian vegetation suppression, bank trampling, and erosion.

In 1991, the AFS adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns 1991). Though the AFS's use of the term "cumulative" differs from the definition found in the ESA, that statement concludes that accumulation of, and interaction between, localized or small impacts, often from unrelated human actions, pose a serious threat to fishes. It also points out that some improvement efforts to fish habitat may not result in accumulative increases in status of the species but instead may simply mitigate accumulative habitat alterations from other activities.

CONCLUSION

After reviewing the current status of the spikedace, the environmental baseline for the action area, the effects of the proposed action which include the various conservation measures voluntarily brought forward by the Forest Service, and the cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the spikedace. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to

engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat is designated for the species; therefore, none will be affected.

The FWS anticipates adverse effects to the spikedace from the implementation of the Apache-Sitgreaves, Coconino, Coronado, Gila, Kaibab, Prescott, and Tonto NF LRMPs, as well as the 1996 Regional Amendment. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species for the following reasons:

- Several S&Gs within these National Forest LRMPs support conservation and recovery of spikedace. These S&Gs guide the Forests to implement recovery plans, improve habitat for threatened and endangered species by structural and non-structural means, and to delist threatened and endangered species.
- As part of the Seven Species Regional Direction, the Forest Service has excluded livestock grazing on Forest Service lands to protect riparian habitats along the Gila, San Francisco, Blue, North Fork, and East Fork Black rivers, and Eagle Creek.
- The Forest Service has fenced hundreds of miles of streams within National Forest System lands for the protection of spikedace habitat.

In addition, the Forest Service will implement (i.e., as part of the proposed action) several additional conservation measures specifically for the spikedace. These conservation measures include the following:

- Designing projects in occupied spikedace habitat on National Forest System lands that address the appropriate components of the spikedace recovery plan, with the goal of implementing projects with beneficial, insignificant, or discountable effects to spikedace.
- Cooperating with state conservation agencies, other federal agencies, Forest Service research stations, FWS, and others (universities) to assess and prioritize habitat of stream and river segments for potential spikedace reintroduction. In addition, determining necessary habitat and watershed improvements in occupied watersheds and watersheds identified as high priority reintroduction sites and implement projects needed to contribute to recovery.
- Participating in ongoing efforts initiated in 2003 involving state agencies, other federal agencies, universities/colleges, Forest Service research facilities, and FWS to document the current state of knowledge regarding the spikedace. Further, developing a conservation assessment and strategy for the spikedace with a target completion of this effort within 1.5 years.

- Identifying existing populations in imminent need of protection and develop and implement, to the extent possible, a strategy for protecting the population and reducing threats to the population.
- With state conservation agencies and other researchers (i.e., academia and Forest Service), who are currently monitoring spikedace populations, participating in the development of a consistent monitoring methodology for spikedace, their associated habitat, and co-occurring aquatic species. The Forest Service will cooperatively document the results in an annual report to the FWS.
- The Forest Service will assist the FWS, AGFD, and the NMDGF with any spikedace reintroduction effort to the extent feasible within the mission and capabilities.
- The Forest Service will, within the mission and capabilities, assist the FWS, other federal agencies, state agencies, universities/colleges, and others in the development of a captive spikedace propagation program designed to augment wild populations.

The Forest Service has also agreed to implement the following conservation measures with regards to wildland fire use:

- Pre-ignition Planning: Maintain current distributions of threatened, endangered, proposed, and candidate species in Geographical Information System (GIS) layers on each National Forest in the Southwestern Region and these GIS layers will be provided to the Line Officer, Fire Management staff and/or incident commander for each species occurring in the watershed of the ignition as well as surrounding watersheds.
- Identify watersheds that are particularly susceptible to ash flow and sediment following high intensity fires. Use this information to guide fire use mitigation measures such as; delay, direct check and/or suppress.
- A Forest Service biologist for the appropriate species will be assigned and consulted during fire management activities to ensure that concerns for threatened and endangered species are addressed. For example, spawning season restrictions to protect breeding activities, appropriate buffers to filter ash and sediment, avoiding mechanical and chemical measures within the riparian corridor, etc.
- During development and implementation of operational management plans, identify potential threats to listed species and designated critical habitat and develop mitigation actions to eliminate threats.
- Develop contingency plans in cooperation with FWS, other federal agencies, state agencies, universities/colleges, and others to preserve, rescue and secure a population in imminent danger of localized extirpation due to fire use for resource benefits.

The Forest Service has committed to the implementation of these conservation measures. Therefore, implementation of these conservation measures along with the management direction provided by the beneficial S&Gs within the National Forest LRMPs should not result in a further decline in population numbers or habitat conditions of spikedace on National Forest System lands in the southwest. Habitat for the spikedace is expected to improve. Specifically, the conservation measure direct actions at eliminating threats and augmenting populations. These efforts, in combination with actions already on-going for the conservation benefit of the species, will provide sufficient protection for the spikedace. Therefore, we conclude that the continued implementation of the 11 National Forest's LRMP is not likely to jeopardize the continued existence of the spikedace.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the Incidental Take Statement. [50 CFR section 402.14(i)(3)]

Amount or Extent of Take Anticipated

Incidental Take of spikedace is reasonably certain to occur as a result of the continued implementation of the National Forest LRMPs. On the Apache-Sitgreaves NF, take in the form of harassment is expected from the Engineering, Forestry and Forest Health, and Wildlife programs. On the Coconino NF, take in the form of harassment is expected from the Lands and Minerals Program and Rangeland Management Program. On the Gila, take in the forms of harm and harassment is expected from the Rangeland Management and Wildlife programs. On the

Prescott NF, take in the forms of harm and harassment is expected to occur from the Engineering and Wildlife programs. Harassment to individual fish may occur from activities conducted within occupied streams. Harm to the species occurs through activities that alter the suitability of the habitat to support spikedace. The FWS anticipates, however, that incidental take of spikedace will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. However, we discuss when take will be considered to be exceeded below.

The FWS used survey data from the last five years of sampling by Dennis Miller (see Table 132 above) within the Gila Bird Area for our take statement. Within the Gila Bird Area along the Gila River, Dennis Miller sampled six distinct 100 meter reaches from 1997 through 2004. There have been considerable fluctuation in the number of fish collected within the Gila Bird Area since 1999. For this reason, we used the number of fish collected in 2002, rounded to the nearest hundred, as our baseline to determine the extent of take. In 2002, Miller sampled 520 spikedace within his survey area, the lowest in a period of roughly five years. Thus, incidental take of spikedace will be considered to be exceeded if, over a period of two consecutive years, the total number of spikedace sampled within the Gila NF drops below 500 spikedace as a result of the proposed action. For the purpose of this incidental take statement, the number of spikedace will be assessed using Miller's methodology, or until a replacement monitoring protocol is established.

In addition, there are three other sites on the Gila NF (i.e., East Fork, West Fork, and Middle Fork of the Gila River) that are sampled annually where spikedace have been found to occur sporadically over the last five years. Data indicates that at least two of these three sites have been occupied for the last five years; therefore, we will also use occupancy at these sites as a measure of take. In addition, two of the three sites on the Gila NF (i.e., East Fork, West Fork, and Middle Fork of the Gila River) must remain occupied with spikedace, or take will be considered exceeded.

Given the limited information available at this time, the FWS is unable to conclude that incidental take of spikedace is reasonably certain to occur within Arizona during the lifetime of the proposed action. We find this for the following reasons: the most significant factor is the very small population size and elusive nature of the species which inhibits the effectiveness (and/or confidence) of spikedace presence/absence survey techniques. Secondly, if the species is present but not detected, uncertainties on their location and abundance precludes our ability to estimate the method, timing, or location of adverse affects incurred either directly or indirectly from the proposed action.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the spikedace.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the spikedace:

1. Protect spikedace on National Forest System lands.
2. Protect spikedace habitat on National Forest System lands.
3. Monitor spikedace populations on National Forest System lands.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of spikedace populations for conditions to eliminate direct effects and minimize indirect effects to spikedace.
- 1.2 Design projects within the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the spikedace.
- 1.3 Cooperatively work to eliminate the presence of non-native aquatics within occupied habitat of the spikedace on National Forest System lands. Give consideration to native fish species when designing fish habitat improvement projects.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering, Fire Management, Forestry and Forest Health, Lands and Minerals, Rangeland Management, Watershed Management, and Wildlife programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied spikedace habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor spikedace populations on National Forest System lands.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall track and report the effects of the proposed action on spikedace, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when

the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ACT by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. In cooperation with AGFD, NMDGF, and FWS, remove all non-native species affecting the spikedace and take measures to prevent reoccurrence of non-native species into spikedace habitat.
2. Manage streams to create additional habitat for spikedace.
3. Cooperate with state conservation agencies, FWS, and universities to determine range of natural variation in absolute abundance and age-class structure pursuant to Recovery Task 2.4.
4. In cooperation with FWS, state conservation agencies, and universities conduct field studies and in-stream experiments to qualitatively and quantitatively describe indirect interactions among spikedace and non-native fishes.
5. In cooperation with FWS and state conservation agencies plan and conduct investigations on captive holdings, propagation, and rearing.
6. Work to secure funding for studies and habitat improvement projects.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effect or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

YAQUI CATFISH

STATUS OF THE SPECIES

Description

The Yaqui catfish (*Ictalurus pricei*) is a medium to large fish of the family Ictaluridae (Minckley 1973). The body is slender and streamlined with older (larger) fish appearing more thick bodied. The caudal fin is shallowly forked and the anal fin has a broadly rounded distal margin with 23-25 rays. The body is profusely speckled in young fish, while adults are more unicolored, dark gray to black dorsally, white to grayish beneath. Barbels are jet-black except on immediate chin where they are gray to whitish.

The Yaqui catfish was originally described as *Villarius pricei* by Rutter (1896) from the Rio San Bernardino, Northwestern Sonora. The name *pricei* was transferred among a number of genera before being settled in *Ictalurus* (see Hendrickson et al. 1980). *Ictalurus meeki* (Regan 1906), described from the upper Rio Papigochic, may be a synonym of *I. pricei*.

The taxonomic status of Mexican catfishes in basins other than the Rios Yaqui-Casas Grandes basin remains unclear, although Hendrickson (1984) also referred catfish from Rio San Lorenzo, Sinaloa to this species and anticipated other localities from more southern Mexican rivers as collections become available. An undescribed catfish resembling *I. pricei* has been introduced and is established in the Gila River drainage, but its morphology, status, and overall distribution have yet to be determined (U.S. Fish and Wildlife Service 1994). See Lundberg (1992) for a synthesis of recent work on the systematic relationships of Ictalurid catfishes.

Legal Status: On August 31, 1984, the FWS listed the Yaqui catfish as a threatened species and designated critical habitat (U.S. Fish and Wildlife Service 1984) under the ESA, as amended. A final Recovery Plan for the species was signed on March 29, 1995. The Yaqui catfish has a recovery priority number of 8. Recovery priority numbers range from 1 to 18, with 1 having the highest priority.

Distribution and Abundance

The historical range of the Yaqui catfish most likely included the uppermost Rio Yaqui system in Arizona, and the basins of the Rio Yaqui, Rio Sonora (Miller 1940), and Rio Casas Grandes in Mexico (U.S. Fish and Wildlife Service 1994), south through the Rio Fuerte system (Miller 1976, 1978). Historically, Yaqui catfish were collected in the San Bernardino Creek drainage just south of the border in Mexico. Surveys in 1979 found Mexican populations to be seriously depleted. Yaqui catfish were captured under permit from the Mexican Government from Rio Aros, Northwestern Sonora and Rio Sirupa, Chiquaqua in 1987 and 1990, respectively. Post-1978 distributional records were provided by Campoy-Favela et al. (1989), who also commented on its reduced relative abundance and downward population trends in Mexico.

The headwaters of the Rio Yaqui are located in the San Bernardino Valley of southeastern Arizona. The Yaqui catfish in Arizona is believed to have occurred only in San Bernardino Creek (Black Draw). Yaqui catfish were presumed to have occurred as far north as San Bernardino Ranch in southeastern Arizona; however, like many of Arizona's native fish,

numerous populations were extirpated before complete distributions were determined (Haynes and Schuetze 1997).

An introduced population existed in Arizona in the Santa Cruz River system (in a reservoir fed by Monkey Spring) from 1899 to the 1950s (Chamberlain 1904; Miller and Lowe 1964, 1967; Minkley 1973; Lee et al. 1980). The population reportedly originated from Rio Sonora in northwestern Sonora, from which basin the species is otherwise known from a single collection (Miller 1940). The introduced population in a pond at Monkey Springs was destroyed when the pond was drained. Other than from the Santa Cruz stocking, no records supported by specimens are known from the U.S. (Minckley 1973, 1985).

In 1978, the FWS contracted with biologists from Arizona State University and the University of Michigan to survey the status of fishes in the Rio Yaqui system of Mexico (Hendrickson et al. 1980). They noted range reductions for the Yaqui catfish and expressed concern for the status of this species (U.S. Fish and Wildlife Service 1984).

In 1990, about 230 individuals were collected from the Rio Sirupa (tributary of Rio Yaqui in Chihuahua) and taken to the Dexter National Fish Hatchery and Technology Center for genetic study and possible captive propagation (U.S. Fish and Wildlife Service 1990). As of the mid-1990s, stock was being held at Dexter NFH&TC for future reestablishment onto the San Bernardino NWR in Arizona. However, Yaqui catfish are no longer cultured at Dexter NFH&TC (U.S. Forest Service 2004).

The species was released in ponds on the El Coronado Ranch in 1999 (U.S. Forest Service 2004). El Coronado Ranch borders the west boundary of the Chiricahua Mountains unit of the Douglas Ranger District. The ponds on the El Coronado Ranch are within the West Turkey Creek watershed. Direct actions to pursue recovery of Yaqui catfish on the Coronado NF lands do not exist. Indirect effects may be considered through impacts to the aquifer and surface waters of the San Bernardino Valley, Sulpher Springs Valley, West Turkey Creek, and Whitewater Draw.

In Mexico, the Yaqui catfish is currently apparently extirpated from the Rio Casa Grandes (Smith and Miller 1986, Propst and Stefferud 1994). The range of the Yaqui catfish is confined to the Rio Yaqui basin in Mexico, though taxonomic uncertainties make it unclear whether the range extends to other basins.

Due to reestablishment efforts in Arizona, Yaqui catfish are currently present on the San Bernardino NWR and El Coronado Ranch, primarily in manmade ponds (U.S. Forest Service 2004). Yaqui catfish are not believed to occur on the Coronado NF, although escape from the ponds on the El Coronado Ranch is possible (U.S. Forest Service 2004).

Habitat

The Yaqui catfish's historical range throughout the Yaqui River Basin consists of intermediate to low elevation warmwater creeks, cienegas, and moderate- to large-sized rivers. Creeks typically have alternating riffles and pools in which heterogeneity is enhanced by undercut banks, boulders, and wood debris. Gravel bottoms in swift areas are vegetated with algae. Cienegas,

streams and associated marshlands with low, emergent aquatic plants and hydric-adapted trees, were historically common but have suffered severe degradation since the arrival of Europeans (Hendrickson and Minckley 1985). Rivers vary from pool-riffle types with boulder and gravel bottoms to long, strongly flowing reaches over gravel and sand (Campoy-Favela et al. 1989). Elevations in Arizona range from 3,730 to 4,620 ft (1138 to 1409 m).

In the Rio Yaqui basin, the Yaqui catfish has been found in medium to large creeks and rivers with medium to slow current over sand or rock substrates (Hendrickson et al. 1980). In small streams they prefer clear quiet pools. During the dry season they seek refuge in permanent spring-fed pools (Haynes and Schuetze 1997).

Critical Habitat: Critical habitat for the Yaqui catfish includes all aquatic habitats of San Bernardino NWR, Cochise County, Arizona. These areas provide habitat for one of the two existing populations of Yaqui catfish. Additionally, the aquatic habitats on San Bernardino NWR may provide expansion habitat for the Yaqui catfish. No critical habitat is designated on Forest Service lands.

Life History

There is little information on the life history of this species. Minckley (1985) suggested that the ecology of the Yaqui catfish and channel catfish (*Ictalurus punctatus*) are similar. Most commonly it is caught in larger rivers in areas of medium to slow current over gravel/sand substrates (Hendrickson et al. 1980). The species grows rapidly and achieves large sizes in ponds at Dexter NFH&TC (Jensen 1992, 1993). Yaqui catfish are bottom feeding omnivores that feed on other fish, insects, larvae, crustaceans, plant matter, and detritus (Haynes and Schuetze 1997). Reilly and Lochmann (2000) conducted comparative diet analysis between Yaqui catfish and channel catfish and found that weight gain, protein efficiency ratio, specific growth, and feed conversion were lower for Yaqui catfish than channel catfish for the 12 week study.

Reasons for Listing

Water development and pumping of underground aquifers constitute the greatest threat to the survival of Yaqui fishes, followed closely by introduction of non-native organisms. The range of this species has been significantly reduced, primarily due to habitat destruction and genetic introgression. Remaining populations are in danger of being subjected to intense competition and genetic swamping through the indiscriminate release of closely related non-native fishes.

The Yaqui catfish is seriously affected by a variety of habitat modifications. This species existed in San Bernardino Creek, Arizona, until the spring flows supporting the creek diminished and the remaining aquatic habitat was destroyed by cattle. Arroyo cutting, diverting stream headwaters, construction of impoundments, and excessive pumping of underground aquifers are responsible for the reduction of permanent stream habitat and for failing springs. Many river systems in Mexico, especially in lowland areas, have been highly modified into canal systems for irrigation agriculture. These alterations destroy pool habitats and have adverse impacts on fish populations.

The San Bernardino Valley is known to have potential geothermal energy resources (Hahman 1979), although the area is not a Known Geothermal Resource Area. The BLM has issued leases for geothermal resources on some of their lands adjacent to the San Bernardino NWR. Exploration and development of these leases could potentially cause depletion or pollution of the underground aquifers that supply water to the springs of the San Bernardino NWR, and could thereby result in loss or pollution of the flows of those springs. However, if exploration and development are properly designed and regulated, such effects are not expected (Cheremisinoff and Morresi 1976).

Introduced predatory fishes, such as largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black bullhead (*Ameiurus melas*), channel catfish (*Ictalurus punctatus*), and green sunfish (*Lepomis cyanellus*) are present in some portions of the remaining range of the Yaqui catfish, and probably prey opportunistically on them. The threat of such predation is likely to increase in the remaining habitats of the Yaqui catfish in Mexico. This threat is minor at present in U.S. habitats, and steps are already being taken to alleviate it.

Extant populations of the Yaqui catfish are seriously threatened by the introduction of closely related non-native species. Already established and expanding populations of channel catfish and blue catfish (*Ictalurus furcatus*) may reduce Yaqui catfish populations through competition or by genetic swamping. The introduction of non-native species has been shown to be detrimental to other native fishes, as illustrated by the rapid elimination of native Yaqui topminnow (listed as endangered and found in the same drainage) populations after introduction of the closely related common mosquito fish (*Gambusia affinis*) as documented by Minckley (1973), Schoenherr (1973), and others.

Most of the U.S.-Mexico borderlands (Gehlbach 1981, Humphrey 1986), including all of southeastern Arizona and southwestern New Mexico have been heavily used for cattle grazing and local farming. Mining and other activities also resulted in some detrimental habitat or landscape changes. Diversity of natural landscapes quickly diminished under grazing pressure, especially when ranges were overstocked (Wagoner 1960). Chihuahuan Desert scrub expanded, grasslands deteriorated or locally disappeared, and riparian and aquatic habitats were destroyed or reduced to disturbed, disjunct remnants (U.S. Fish and Wildlife Service 1994). Today's regional vegetation nonetheless remains a desert grassland, closely intermingled with Chihuahuan desert scrub on drier sites (Lanning 1981). Mesquite (*Prosopis glandulosa*) bosques are the predominant lowland communities, along with pockets of riparian broad-leaved woodlands and cienega habitats where water persists at or near the surface (Marrs-Smith 1983)

Physical and other impacts associated with watershed use and misuse led to dramatic reductions in aquatic habitats and biota. In the past, as today, water was a scarce and sought-after commodity. Relatively abundant supplies in the upper Rio Yaqui basin, especially after artesian wells were built in the later 1800's, led to large-scale cattle grazing and concentrated farming in the area. Severe grazing pressure (including trampling) also led to incision of stream channels that drained and desiccated cienegas, diversion and modification of stream channels themselves, and excessive exploitation of underground aquifers; all reduced the quantity and quality of natural surface waters.

Conservation Measures

Protection of Yaqui catfish habitat started in 1979 with the purchase of the San Bernardino Ranch by The Nature Conservancy. The property was transferred to FWS ownership in 1982 in order to establish the San Bernardino NWR (U.S. Fish and Wildlife Service 1987). The historic “Texas John” Slaughter home, outbuildings, and one major spring/pond complex were deeded to the Johnson Historical Foundation, with biological management remaining FWS responsibility. Leslie Creek was added to the NWR in 1989, again through a The Nature Conservancy purchase transferred to the FWS.

Habitat improvements commenced immediately upon acquisition of San Bernardino NWR in 1979 and Leslie Canyon NWR in 1988. Biological processes damaged by poor grazing practices, intense farming, and occasional droughts were restored. Desirable woody plants were reestablished along stream courses which, along with installation of gabion structures, reduced erosion and stabilized banks. Undesirable woody species were thinned, weeds in abandoned fields were mowed to benefit indigenous grasses, and some reseeded was implemented. Efforts to remove non-native fishes and to combat spread of western mosquitofish, which appeared in 1979, commenced with the renovation of House Pond, exclusion of undesirable species through barriers, and removal of native species by drying, diversion, or capping of artesian flows followed by reestablishment of habitat and native biota. Finally, cienegas were restored by piping water, allowing flow into suitable areas such as abandoned farm fields and constructed ponds with associated stream runs where indigenous Yaqui fishes could expand populations after natural dispersal or stocking.

In May of 1990, 400 Yaqui catfish were reestablished on San Bernardino NWR. These individuals established and expanded into today’s sub-populations. In 1999, the Yaqui catfish was released in ponds on the El Coronado Ranch (U.S. Forest Service 2004). El Coronado Ranch borders the west boundary of the Chiricahua Mountains unit of the Douglas Ranger District. The ponds on the El Coronado Ranch are within the West Turkey Creek watershed. Direct actions to pursue recovery of Yaqui catfish on Forest Service lands do not exist; however, indirect effects may be considered through impacts to the aquifer and surface waters of the San Bernardino Valley, West Turkey Creek, Sulphur Springs Valley, and Whitewater Draw.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Currently there are no known populations of Yaqui catfish within the Coronado NF boundaries. However, the species was released in ponds on the El Coronado Ranch in 1999 (U.S. Forest Service 2004). El Coronado Ranch borders the west boundary of the Chiricahua Mountains unit of the Douglas Ranger District. The ponds on the El Coronado Ranch are within the West

Turkey Creek watershed. Critical habitat exists on the San Bernardino National Wildlife Refuge approximately 16 km (10 mi) downstream. For ease of future consultations, in the event the Yaqui catfish becomes established on the Coronado NF, the S&Gs were analyzed as if this were already the case.

Factors Affecting the Species within the Action Area

Any effects to the Yaqui catfish as a result of Forest Service activities would likely be due to watershed manipulation which would alter habitat that could be occupied in the future by the species. Activities which would lower the ground water level to the extent that the water flow from springs on San Bernardino NWR would be reduced could adversely impact the critical habitat. Such activities include, but are not limited to, pumping of ground water for agricultural purposes and drilling activities associated with geothermal exploration. Any activity which would significantly alter the water chemistry of springs on San Bernardino NWR could adversely impact the critical habitat. Such activities include, but are not limited to, release of chemical or biological pollutants into surface or underground waters at a point source or by dispersal release.

The most likely activity with federal involvement that may potentially affect the Yaqui catfish or its designated critical habitat is geothermal exploration. This activity would occur beyond the boundary of the San Bernardino NWR, but could possibly affect underground aquifers supplying surface waters to the critical habitat. Geothermal exploration in the San Bernardino Valley is subject to federal regulation and licensing by the BLM. It should be emphasized that critical habitat designation may not affect geothermal exploration activities in the vicinity. The designation of critical habitat for these species does not specifically preclude geothermal development in the area. Exploration activities will be allowed to proceed in the vicinity of critical habitat as long as artesian and surface water supplies at San Bernardino NWR are adequately protected (U.S. Fish and Wildlife Service 1984).

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Yaqui catfish and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Designated critical habitat for the Yaqui catfish does not occur within the action area; thus, no critical habitat for this species will be affected as a result of the proposed action. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Yaqui catfish.

Table 146. Summary of S&Gs considered for the Yaqui catfish.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-629, 631-638, 644, 645, 648-653, 666-669, 672-682, 692-696, 697, 698, 700, 703-713, 715, 727, 774, 779, 780, 782-785, 786, 788, 790-792, 794-800, 803-805, 807-824, 825-826, 828, 829, 830

National Forest	Standards and Guidelines
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1486-1492, 1495, 1499-1501, 1504-1515

Coronado National Forest

Yaquai catfish currently do not occur on the Coronado NF. However, we analyzed the effects of the proposed action at the request of the Forest Service because they may occur on the Forest in the future. The following table summarizes the effects to the Yaqui catfish from the applicable S&Gs within the Coronado NF LRMP. The majority of the applicable S&Gs are likely to result in beneficial effects to the Yaqui catfish; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in this species. In summary, four percent of the applicable S&Gs are likely to cause mortality of Yaqui catfish, while just over 75 percent of the S&Gs have positive effects to the species. The remaining 21 percent of the applicable S&Gs have no effect to the Yaqui catfish or are too vague or ill-defined to analyze.

Table 147. Effects of the S&Gs analyzed for the Yaqui catfish – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.0
-2	S&G is causing sublethal response	3	2.9
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	17	16.7
1	S&G is maintaining habitat & providing at least minimal recovery	64	62.7
2	S&G is moving towards recovery	5	4.9
3	S&G is implementing species recovery plan	8	7.8
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	2.0
X	S&G is a heading	2	2.0
Total		102	100 %

Engineering Program

No applicable S&Gs in the Engineering Program are likely to result in negative effects to the Yaqui catfish. In general, the intent of the LRMP is to prevent damage from roads to the resources. The Coronado NF’s LRMP provides guidance to minimize damage associated with transportation systems in S&G 693. Maintenance of roads on the Coronado NF can vary depending on availability of funds. If funds are unavailable to maintain roads and resource damage is occurring, S&G 694 allows the road to be closed. Through S&Gs 712 and 797, the Coronado NF LRMP provides guidance to close, drain, and revegetate roads determined to be unneeded. This should also assist in preventing resource damage. Direction from S&G 810 also suggests the Coronado NF avoid road development in Management Area 7B.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in direct negative effects to the Yaqui catfish. Standards and Guidelines 695, 713, 98, and 812 all allow for the use of prescribed fire. These S&Gs provide great benefit to the Yaqui catfish by reducing the risk of catastrophic wildfire. However, the fuels treatment projects are likely to result in lethal take of individuals associated with humans, tools, machinery, and burning. Additionally, erosion/sedimentation and ash flows in burn areas may cause local extirpations of Yaqui catfish in the affected areas.

Forestry and Forest Health Program

Standard and Guideline 697 allows for the use of chemical agents in recreation areas. Yaqui catfish may be present in these areas, particularly riparian camping and boating areas, thus may be affected by chemical use. If chemical agents are transferred to water sources, purposefully or incidentally, the watershed would experience decreased water quality, thus decreasing the feeding and breeding success of Yaqui catfish. Activities conducted under this S&G are also potentially lethal to the species if implemented within areas occupied by the species or in areas adjacent to the species where pollutants could enter occupied habitat. Standard and Guideline 696 may provide some protection in that it requires the Coronado NF to conform to Department of Agriculture standards in the use of all pesticides and to promote development of alternative methods of control. This S&G helps to limit usage, but may not completely protect the Yaqui catfish as the Department of Agriculture standards are set up to protect humans rather than fish.

Lands and Minerals Program

No applicable S&Gs in the Lands and Minerals Program are likely to result in negative effects to the Yaqui catfish. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

There are likely to be a range of effects to the Yaqui catfish as a result of the Rangeland Management Program because many of the S&Gs allow for a range of grazing levels across Management Areas. Standards and Guidelines 792 and 805 allow for Level D grazing in Management Areas 7A and 7B, or Level A if Level D cannot be achieved. These S&Gs allow for some negative effects to the Yaqui catfish in the form of watershed degradation resulting in reduced breeding and feeding success. Range improvements such as fencing and water developments are paramount to Level D grazing. Standard and Guideline 829 allows for grazing in Management Area 9, but only if the riparian can achieve and be maintained in satisfactory condition. The manner in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in this program are likely to result in negative effects to the Yaqui catfish. However, there are likely to be negative effects from this program not captured in the applicable S&Gs. The goal for this program is to “Maintain the current spectrum of developed, dispersed, and primitive recreation opportunities and increase those opportunities within the capability of the resources and the framework of this plan as needs and funds develop (Coronado NF LRMP).” This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as

threats to the Yaqui catfish, they are likely to involve some incidental take due to interrelated effects. In the desert southwest, much recreation is centered around riparian areas. High density recreational users could lead to watershed degradation through increased erosion and water quality effects. Additionally, anglers may exacerbate the threat of non-native fishes by incidentally or purposefully releasing non-native bait fishes and salamanders in the watershed that may out-compete or prey on the native fishes. However, these effects should be reduced if West Turkey Creek remains closed to fishing.

Watershed Management Program

Only one S&G in this program has a direct negative effect on the Yaqui catfish. Standard and Guideline 678 provides some goals for watershed management including the maintenance of 80 percent of natural shade over water surfaces, 80 percent of natural bank protection, and composition of sand, silt, and clay within 20 percent of natural levels. The FWS recognizes these S&Gs as being positive. However, these habitat characteristics represent desired future conditions in many areas. Working towards these goals should benefit the Yaqui catfish in the long-term; however, until these goals are achieved, the habitat of the Yaqui catfish is still limited and may result in the catfish avoiding some areas.

Standards and Guidelines 677, 711, 782, and 784 all allow for some amount of riparian or watershed improvement. These activities should result in increased habitat quantity and quality for the Yaqui catfish, but could have some short-term effects due to project impacts. These impacts could include temporarily decreased water quality and quantity potentially leading to decreased breeding and feeding success and mortality of individuals due to crushing by humans, tools, or machinery.

In general, the Watershed Management Program should provide positive benefits for the Yaqui catfish as it seeks to maintain or improve watershed conditions and maintain good water quality. It is cross-program in orientation in its ability to mitigate impacts from activities of other programs. The guidance for the Watershed Management Program can be used to fill in the gaps for other programs with inadequate guidance. Abundant guidance is provided in the LRMPs to assist the Coronado NF in preventing adverse effects to Yaqui catfish. The Coronado NF's LRMP guides the Watershed Management Program to improve watersheds (see S&G 672), protect soils (see S&Gs 673, 674, and 675), protect water quality and quantity (see S&Gs 673, 675, 783, 795, and 808), protect and improve riparian areas (see S&Gs 675 and 679), and protect resources dependent on riparian areas (see S&Gs 676, 680, and 681). Standard and Guideline 676 is especially important because it guides the Coronado NF to "give preferential consideration to resources dependent on riparian areas...", and, most important, it can be used to protect all riparian-dependent resources. Standard and Guideline 676 also states, "Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian-dependent resources."

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in this program are likely to result in direct negative effects to the Yaqui catfish. Several S&Gs, although positive for the Yaqui catfish in the long-term, could result in short-term adverse effects. Standards and Guidelines 667 and 668 allow for structural and nonstructural habitat improvement projects. Specifically, Standard and Guideline 667 allows for

prescribed fire which is beneficial in reducing the risk of catastrophic fire, but has short-term adverse effects, as discussed under the Fire Management Program. Standard and Guideline 668 allows for structural fish habitat improvements. The construction of these structures, if built instream, could have short-term project level adverse affects, as described in the Watershed Management Program.

A number of S&Gs in the Wildlife Program may potentially provide benefit to this fish. For example, S&G 634 establishes the maintenance of T&E species habitat as a priority over other species habitats Forest-wide. Many S&Gs provide for actions which work towards delisting of listed species by implementing their recovery plans. If properly implemented, these S&Gs should not only minimize the effects of other projects, but would also result in increased population numbers and sizes. These S&Gs are particularly useful in consideration of the actual status of the Yaqui catfish on the landscape. Another listed Yaqui fish, the Yaqui chub (*Gila purpurea*), currently occupies portions of West Turkey Creek on the Coronado NF (U.S. Forest Service 2004). This is the same area where Yaqui catfish would likely disperse to from El Coronado Ranch. Thus, the Yaqui catfish should benefit from protection provided to the Yaqui chub under these S&Gs.

1996 Regional Amendment

All of the S&Gs analyzed for the 1996 Regional Amendment fall under the Wildlife Program. The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. These S&Gs promote healthy forest ecosystems, functioning watersheds, and riparian and aquatic systems (U.S. Forest Service 2004). Watersheds occupied by the Yaqui catfish co-occur with Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are applicable to the Yaqui catfish and its habitats. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 148. Effects of S&Gs analyzed for the Yaqui catfish – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	30	58.8
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	15.7
Z	S&G implementation is non-discretionary	2	3.9
X	S&G is a heading	6	11.8
Total		51	100 %

Wildlife, Fish, and Rare Plants Program

All of the S&Gs in the 1996 Regional Amendment occur within the Wildlife Program. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat and provide for minimal recovery of these species. In addition, these S&Gs may prevent adverse effects to threatened and endangered species other than the Mexican Spotted Owl and Northern Goshawk, including the Yaqui catfish.

Several S&Gs encourage prescribed fires to reduce hazardous fuels accumulation, and permit thinning before burning to reduce ladder fuels and the risk of crown fire. Such activities have the potential to cause short-term adverse effects upon Yaqui catfish, as discussed under the Fire Management Program. However, the long-term results of prescribed fire may be beneficial to the species. Prescribed fires reduce fuel loads and reduce the risk of catastrophic wildfires that would have a significant adverse effect upon the Yaqui catfish and its habitat.

In summary, the applicable S&Gs within the Coronado NF LRMP and 1996 Regional Amendment allow for a variety of effects to the Yaqui catfish. Take of Yaqui catfish would be reasonably certain to occur as a result of implementation of the Coronado NF LRMP and 1996 Regional Amendment if it were to become established on Coronado NF lands. As it stands, any effects to the Yaqui catfish on El Coronado Ranch due to the implementation of the Coronado NF LRMP and 1996 Regional Amendment would likely be insignificant or discountable. Additionally, any effects to critical habitat would also likely be insignificant or discountable due to the linear separation and intermittency of draws between Forest Service lands and critical habitat for the Yaqui catfish.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Ponds associated with mining operations on private property within the action area may contain non-native fish. Natural events such as floods may spread non-native species. Water development and pumping of underground aquifers could also occur on private land. Because ground water pumping was cited as a reason for listing, this could have appreciable negative affects to the species.

CONCLUSION

After reviewing the current status of the Yaqui catfish, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Yaqui catfish. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Designated critical habitat for the Yaqui

catfish does not occur within the action area; thus, no destruction or adverse modification of critical habitat is anticipated.

The Yaqui catfish is not currently found on the Coronado NF; thus, at this time, no direct impact to this species should occur as a result of the proposed action. In addition, the LRMP includes S&Gs which direct the Coronado NF to prioritize threatened and endangered species over other species, work towards recovery, and to help delist listed species, which may benefit the Yaqui catfish directly and indirectly as a result of conservation of the Yaqui chub. Beyond the S&Gs specific to listed species concerns, the LRMP also includes S&Gs which direct range and watershed conditions to improve. As a result, the availability and quality of Yaqui catfish habitat on the Coronado NF should only increase. Therefore, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Yaqui catfish.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take of a listed animal species that is incidental to, and not the purpose of, the carrying out an otherwise lawful activity conducted by the federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

Amount or Extent of Take Anticipated

No take is anticipated to occur as a result of the proposed action because the species is currently not found on the National Forest System lands and the potential adverse indirect effects that were analyzed in the opinion, do not rise to the level of take.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA direct federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species. The FWS recommends the following conservation activities:

1. Ameliorate effects of non-native fishes within Yaqui catfish management streams.

2. Other actions occurring in the West Turkey Creek watershed need to be analyzed for potential impacts to the Yaqui catfish. Impacts from the different forms of recreation occurring in the watershed are probably more detrimental to the Yaqui catfish and the watershed than actions previously consulted on. A watershed plan may be an appropriate means of addressing the issues. The Forest Service should cooperatively work with the FWS and interested parties to address these issues (Recovery plan task 2.0, U.S. Fish and Wildlife Service 1994c:23).
3. Designate reestablishment areas within the species' historical range on the Coronado NF and develop appropriate protective management measures.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

YAQUI CHUB

STATUS OF THE SPECIES

Description

The Yaqui chub (*Gila purpurea*) is a medium-sized minnow of the family Cyprinidae, with adults rarely exceeding 15 cm (6 in) in length (Minckley 1973). The body is generally dark over all, but usually somewhat lighter below. Some breeding males have a distinctive bluish sheen over the body while reproductive females are a straw yellow to light brown. Lateral bands are absent or scarcely developed. A vertically elongate, diffuse triangle-shaped caudal spot is usually present (Minckley 1973). Head and anterior body are thickened, thinning posteriorly. Scales are large and broadly imbricate with radii on all fields.

The Yaqui chub was first collected and described from San Bernardino Creek (Black Draw), just south of the United States-Mexico border, in the latter half of the 19th century (Girard 1857, Rutter 1896). The Yaqui chub was originally described as *Tigoma purpurea* Girard (1857). Until recently, *Gila purpurea* was thought to occur in the basins of the Río Sonora, Río Matape, and Río Yaqui in Arizona and Sonora, Mexico (Hendrickson et al. 1980). However, in 1991, it was recognized that the chub in the Ríos Sonora and Matape and the Río Yaqui system downstream from San Bernardino Creek is a different species, *Gila eremica* (DeMarais 1991).

Legal Status: On August 31, 1984, the FWS listed the Yaqui chub as an endangered species and designated critical habitat (U.S. Fish and Wildlife Service 1984) under the ESA, as amended. A final Recovery Plan for the species was signed on March 29, 1995. The Yaqui chub has a recovery priority number of 8. Recovery priority numbers range from 1 to 18, with 1 having the highest priority.

Distribution and Abundance

The Yaqui chub was once found throughout the Río Yaqui Drainage which drains western Sonora and portions of eastern Chihuahua in Mexico, and the San Bernardino Valley in the extreme southeastern corner of Arizona (DeMarais and Minckley 1993). This included San Bernardino Creek in Mexico and Arizona (Black Draw and Astin Spring) and the Morse Canyon portion of the Willcox Playa in Turkey Creek. The Yaqui chub was known from San Bernardino Creek, Arizona, until the spring flows supporting the creek diminished and the remaining aquatic habitat was destroyed by cattle. In 1974, McNatt reported the Yaqui chub persisting only in one artesian well in the San Bernardino Creek drainage.

It is believed that the Yaqui chub occurred historically in the West Turkey Creek drainage (U.S. Fish and Wildlife Service 1994) in the Chiricahua Mountains (Rutter 1896). However, the specimens' identities cannot be confirmed since they were lost in the San Francisco earthquake of 1904 (Miller and Lowe 1964, 1967; Hendrickson et al. 1980). Yaqui chub have not been collected there again. West Turkey Creek is one of two "perennial" streams on the western side of the Chiricahua Mountains in the Coronado NF that drain into the Sulphur Springs Valley. Rucker Canyon also contains perennial water. It is thought that these drainages were once tributaries to the Río Yaqui in Sonora, Mexico. The Yaqui chub was also recorded from Sulphur Springs Valley (Rutter 1896) which drains into West Turkey Creek.

The Yaqui chub was released onto the University of Arizona's Coronado Ranch in 1986. The stock of these fish originated from Astin Spring via Leslie Creek. The Yaqui chub eventually dispersed from the Coronado Ranch ponds into West Turkey Creek. The Coronado Ranch ponds function and continue to function as a refugium and a source of Yaqui chub for West Turkey Creek.

In 1978, the FWS contracted with biologists from Arizona State University and the University of Michigan to survey the status of fishes in the Rio Yaqui system of Mexico (Hendrickson et al. 1980). These workers found only one specimen of the Yaqui chub after extensive collection efforts throughout the Rio Yaqui drainage.

The Yaqui chub was reported from the short perennial reach of Rio San Bernardino (Black Draw), just south of the United States-Mexico Boundary (Varela-Romero et al. 1992). However, the current distribution in Mexico is unknown.

In 1979, The Nature Conservancy acquired San Bernardino Ranch including Blackwater Draw, various ponds, and a few springs and areas for population expansion from natural dispersal or stocking. The property was transferred to FWS ownership in 1982 in order to establish the San Bernardino NWR (U.S. Fish and Wildlife Service 1987). Habitat improvements commenced immediately upon the acquisition of San Bernardino Ranch in 1979 (U.S. Fish and Wildlife Service 1987). Yaqui chubs from Dexter National Fish Hatchery and Technology Center were stocked on San Bernardino NWR in 1980, immediately following The Nature Conservancy purchase. Reestablishments included a variety of habitats and locations in the San Bernardino Valley of the San Bernardino NWR, including artificial ponds (Haynes and Schuetze 1997).

In 1991, because secure populations were established on the San Bernardino NWR, Yaqui chub was removed from Dexter NFH&TC and stocked in West Turkey Creek (DeMarais and Minckley 1993). Electrofishing surveys conducted by the FWS and Coronado NF in 1996, 1997, and 1998 within the upper reaches of West Turkey Creek found the Yaqui chub in low numbers (two to 19 individuals) but still surviving and reproducing. Since Yaqui chub fry and young-of-the-year were found during these surveys, suitable habitat conditions were assumed to exist.

In 1998 Yaqui chub habitat within West Turkey creek was renovated downstream of the Wilderness. The creek was to be restocked from fish maintained in refugia (private ponds) by 2003 per the El Coronado Habitat Conservation Plan (U.S. Fish and Wildlife Service 1998); however, post treatment monitoring in 1999 revealed that a few Yaqui chub either survived the renovation or found their way back into the system from upstream refugia within the Chiricahua Wilderness. After the severe drought that occurred in 2002 and 2003, survey efforts indicated no chubs were present in West Turkey Creek. In November 2004, via a cooperative effort between FWS and AZG&FD, a total of 60 Yaqui chub were relocated into the perennial habitats within West Turkey Creek. Follow up monitoring is scheduled to occur in May-June 2005.

House Pond, located on the Slaughter Ranch was renovated in 1984-1985 to remove mosquito fish, an aggressive non-native species, which appeared in 1979. In 1986, House Pond was restocked with Yaqui chub (DeMarais and Minckley 1993).

Currently, the Yaqui chub only occurs in the extreme northern headwaters of the Yaqui River drainage system in Mexico and various sites in the San Bernardino Valley in southeastern Arizona. Populations in the U.S. reside primarily on the San Bernardino/Leslie Canyon NWR (Haynes and Schuetze 1997). Currently, the Yaqui chub occurs in the following areas (U.S. Fish and Wildlife Service 1995, 1999; Arizona Game and Fish Department 2001): Bathhouse Spring, Black Draw, Mesquite Pond, North Pond, Oasis Pond, Robertson Ciénega, Twin Pond, and Two PhD Ponds on the main portion of San Bernardino NWR; Leslie Creek within Leslie Creek NWR; House Pond on the Slaughter Ranch Historic Site (under easement for FWS management); El Coronado Ranch; and West Turkey Creek and ponds in the Chiricahua Mountains consisting of private and Forest Service lands.

Habitat

The Yaqui chub's historical range throughout the Yaqui River Basin consists of intermediate to low elevation warmwater creeks, cienegas, and moderate- to large-sized rivers. Creeks typically have alternating riffles and pools in which heterogeneity is enhanced by undercut banks, boulders, and wood debris. Gravel bottoms in swift areas are vegetated with algae. Cienegas, streams and associated marshlands with low, emergent aquatic plants and hydric-adapted trees, were historically common but have suffered severe degradation since the arrival of Europeans (Hendrickson and Minckley 1985). Rivers vary from pool-riffle types with boulder and gravel bottoms to long, strongly flowing reaches over gravel and sand (Campoy-Favela et al. 1989). Elevations in Arizona range from 3,730 to 4,620 ft (1138 to 1409 m).

Adult Yaqui chub live in deep freshwater pools in creeks, scoured areas of cienegas, and other stream associated quiet waters. They seek cover in daylight, especially undercut banks and in areas of accumulated debris often associated with higher aquatic plants (Lee et al. 1980). In artificial ponds, adults tend to occupy the lower part of the water column and seek shade. Young occupy near-shore zones, often near the lower ends of riffles. Maes (1995) observed a vertical stratification of age classes in both lentic and lotic environments with younger fish occupying the areas higher in the water column regardless of depth. Adult Yaqui chub avoided waters with detectable water velocity, but younger fish occasionally were found in flowing water (Maes 1995).

Critical Habitat: Critical habitat for the Yaqui chub includes all aquatic habitats of San Bernardino NWR, Cochise County, Arizona, excluding the Leslie Canyon complex. These areas provide habitat for one of the two existing populations of Yaqui chub. Additionally, the aquatic habitats on San Bernardino NWR may provide expansion habitat for the Yaqui chub. There is no Yaqui chub critical habitat on the Coronado NF.

Critical habitat is described by PCEs, which are the physical and biological features the FWS has determined are essential to the conservation of the species. For the Yaqui chub, the PCEs are: 1) clean, small, permanent streams and spring pools without any exotic fishes. The streams should have deep pool areas separated by riffles and flowing areas with moderate current; and 2) backwater areas of streams and springs with overgrown cut banks and accumulations of detritus are necessary for feeding and shelter.

Life History

Yaqui chub are oviparous (egg laying) and spawn throughout the warmer months with increased activity in spring. Spawning probably occurs in deep pools where there is aquatic vegetation (Matthews and Moseley 1990). Yaqui chub often mature within the first summer (U.S. Fish and Wildlife Service 1994). Reproductive potential is high and large populations can develop quickly from a few adults (DeMarais and Minckley 1993).

They feed mostly on algae, insects, and detritus (Galat and Gerhardt 1987). Arachnids and small fishes (Poeciliopsis) may be eaten when available (Matthews and Moseley 1990, Haynes and Schuetze 1997).

The Yaqui chub has proven to be highly resilient (DeMarais and Minckley 1991, 1993). Populations can expand rapidly from a few tens to thousands of individuals in a matter of weeks or months. Large, viable populations of Yaqui chub have established themselves almost everywhere recovery reestablishments have occurred, with far more success than other species (Hendrickson and Brooks 1991, Minckley 1995). Additionally, the Yaqui chub persist for long periods under severe conditions and rebounds dramatically when conditions improve. Thus, hundreds of individuals could be lost during a catastrophic flood, sustained drought, or extensive fire, and yet the population would be expected to re-establish so long as adequate refugia exist. For example, thousands of individuals were lost through suffocation or poisoning when runoff carrying ash and other materials from the Rattlesnake Fire swept through the system. The Yaqui chub recruited in ponds of the West Turkey Creek watershed immediately after that event. Thus, most losses, even of a catastrophic nature, are not anticipated to extirpate the population.

Reasons for Listing

The range of this species has been significantly reduced, primarily due to habitat degradation and destruction. The remaining populations are in danger of being subjected to intense competition through the indiscriminate release of non-native fish.

The Yaqui chub is seriously affected by a variety of habitat modifications. This species existed in San Bernardino Creek, Arizona, until the spring flows supporting the creek diminished and the remaining aquatic habitat was destroyed by cattle. Arroyo cutting, diverting stream headwaters, construction of impoundments, and excessive pumping of underground aquifers are responsible for the reduction of permanent stream habitat and for failing springs. The remaining U.S. populations of Yaqui chub are limited to a few springs and ponds on the San Bernardino NWR, Leslie Creek on the Leslie Canyon NWR, West Turkey Creek and ponds within the Coronado NF, and the El Coronado Ranch (Silvey 1975; U.S. Fish and Wildlife Service 1995, 1999). Both NWR populations are threatened by a gradually dwindling spring flow. Many river systems in Mexico, especially in lowland areas, have been highly modified into canal systems for irrigating agriculture. These alterations destroy pool habitats and have adverse impacts on Yaqui chub populations.

The San Bernardino Valley is known to have potential geothermal energy resources (Hahman 1979), although the area is not a Known Geothermal Resource Area. The BLM has issued leases for geothermal resources on some of their lands adjacent to the San Bernardino NWR. Exploration and development of these leases could potentially cause depletion or pollution of the

underground aquifers that supply water to the springs of the San Bernardino NWR, and could thereby result in loss or pollution of the flows of those springs.

Introduced predatory fishes such as largemouth bass (*Micropterus salmoides*), bluegill (*Lepomis macrochirus*), black bullhead (*Ameirus melas*), channel catfish (*Ictalurus punctatus*), and green sunfish (*Lepomis cyanellus*) are present in some portions of the remaining range of the Yaqui chub, and probably prey opportunistically on them. The introduction of non-native species has been shown to be detrimental to other native fishes, as illustrated by the rapid elimination of the native Yaqui topminnow populations (listed as endangered and found in the same drainage as the Yaqui chub) after introduction of the closely related common mosquitofish (*Gambusia affinis*), documented by Minckley (1973), Schoenherr (1973), and others. This threat to the Yaqui chub is minor at present in U.S. habitats, and steps are already being taken to alleviate it. The threat of such predation will continue to increase in the remaining habitats of the Yaqui chub in Mexico.

Most of the U.S.-Mexico borderlands (Gehlbach 1981, Humphrey 1986), including all of southeastern Arizona and southwestern New Mexico, has been heavily used for cattle grazing and local farming. Mining and other activities also resulted in some detrimental habitat or landscape changes. Diversity of natural landscapes quickly diminished under grazing pressure, especially when ranges were overstocked (Wagoner 1960). Chihuahuan Desert scrub expanded, grasslands deteriorated or locally disappeared, and riparian and aquatic habitats were destroyed or reduced to disturbed, disjunct remnants (U.S. Fish and Wildlife Service 1994). Today's regional vegetation nonetheless remains desert grassland, closely intermingled with Chihuahuan desert scrub on drier sites (Lanning 1981). Mesquite (*Prosopis glandulosa*) bosques are the predominant lowland communities, along with pockets of riparian broad-leaved woodlands and cienega habitats where water persists at or near the surface (Marrs-Smith 1983)

Conservation Measures

Protection of Yaqui chub habitat started in 1979 with the purchase of the San Bernardino Ranch by The Nature Conservancy. The property was transferred to FWS ownership in 1982 in order to establish the San Bernardino NWR (U.S. Fish and Wildlife Service 1987). The historic "Texas John" Slaughter home, outbuildings, and one major spring/pond complex were deeded to the Johnson Historical Foundation, with biological management responsibility remaining with the FWS. Leslie Creek was added to the NWR in 1989, again through a The Nature Conservancy purchase transferred to the FWS.

Habitat improvements commenced immediately upon acquisition of San Bernardino NWR in 1979 and Leslie Canyon NWR in 1988. Biological processes damaged by poor grazing practices, intense farming, and occasional droughts were restored. Desirable woody plants were reestablished along stream courses which, along with installation of gabion structures, reduced erosion and stabilized banks.

Undesirable woody species were thinned, weeds in abandoned fields were mowed to benefit indigenous grasses, and some reseeding was implemented. Efforts to remove non-native fishes and to combat spread of western mosquitofish, which appeared in 1979, commenced with the renovation of House Pond, exclusion of undesirable species through barriers, and removal of native species by drying, diversion, or capping of artesian flows followed by reestablishment of

habitat and native biota. Finally, cienegas were restored by piping water, allowing flow into suitable areas such as abandoned farm fields and constructed ponds with associated stream runs where indigenous Yaqui fishes could expand populations after natural dispersal or stocking.

Yaqui chub from Dexter NFH&TC were stocked on San Bernardino NWR in 1980, immediately following The Nature Conservancy purchase. House Pond was renovated in 1984-1985 to remove mosquitofish, a species incompatible with topminnow, also managed there. House pond was then restocked with Yaqui chub in 1986. Also in 1986, because secure populations were established on the NWR, Yaqui chub was removed from Dexter National Fish Hatchery and Technology Center and stocked in West Turkey Creek, where they established (DeMarais and Minckley 1993). Yaqui chub reappeared in Black Draw in 1987, either from the 1980 stocking or through upstream dispersal from Mexico.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Within the action area, Yaqui chub currently occur within the El Coronado Ranch, West Turkey Creek, private ponds in the Chiricahua Mountains, and the Coronado NF. Roughly 4 miles (6.4 km) of potential Yaqui chub habitat exists within West Turkey Creek. Of this, approximately 2.5 miles (4 km) are within the Turkey Creek Allotment on the Coronado NF. These areas coincide with Management Areas 3, 4, 7 and 9. Critical habitat exists approximately 10 miles (16 km) downstream on the San Bernardino NWR.

Factors Affecting the Species within the Action Area

A Section 10(a)(1)(B) permit was issued in 1998 approving the Habitat Conservation Plan (HCP) for the El Coronado Ranch in Cochise County, Arizona (U.S. Fish and Wildlife Service 1998). The HCP is effective for 25 years and covers 15,204 acres of the Turkey Creek basin occurring on the private lands of the El Coronado Ranch and several grazing allotments on the Coronado NF. The goals of the HCP include watershed management, improved riparian condition, continued operation of the ranch, and conservation and recovery of native species. The Section 10(a)(1)(B) permit covers incidental take of Yaqui chub, Yaqui catfish, and the Yaqui form of longfin dace, should it ever be listed. Implementation of the HCP should lead to improved watershed and habitat conditions for native fish in the watershed.

Forest Road 41 more or less parallels Turkey Creek and ends in a trailhead at the Wilderness boundary. This is one of four trailheads that accesses wilderness recreation trails from West Turkey Creek. Also, along with the El Coronado Ranch, there are 14 recreational summer homes, two semi-developed campgrounds, and several dispersed camping sites in use within the canyon on the Coronado NF. The West Turkey Creek Native Fish Habitat Renovation Project

underwent formal consultation on February 4, 1999 (U.S. Fish and Wildlife Service 1999). The goal of this project was to maintain West Turkey Creek as a native fishery and remove non-native fishes. Two treatments have been conducted so far and appear to have been successful.

In 1994, because of the Rattlesnake Fire, significant quantities of ash and other debris were transported downstream into West Turkey Creek. Nevertheless, the resident non-native rainbow trout, native longfin dace, and Yaqui chub survived. However, the event did not impact the watershed equally. The majority of the debris flows affected the lower reaches of West Turkey Creek via Saulsbury and Ward Canyons. The watershed is still continuing to heal and recover.

Within this consultation the analysis of effects to Yaqui chub critical habitat considers only indirect effects of Forest Service actions to San Bernardino NWR (10 miles downstream) because designated critical habitat does not occur within the Coronado NF. Any activity which would lower the ground water level to the extent that the water flow from springs on San Bernardino NWR would be reduced could adversely impact the critical habitat. Such activities include, but are not limited to, pumping of ground water for agricultural purposes and drilling activities associated with geothermal exploration. Any activity which would significantly alter the water chemistry of springs on San Bernardino NWR could adversely impact the critical habitat. Such activities include, but are not limited to, release of chemical or biological pollutants into surface or underground waters at a point source or by dispersal release.

The most likely activity with federal involvement that may potentially affect the designated critical habitat is geothermal exploration. This activity would occur beyond the boundary of the San Bernardino NWR, but could possibly affect underground aquifers supplying surface waters to the critical habitat. Geothermal exploration in the San Bernardino Valley is subject to federal regulation and licensing by the BLM. It should be emphasized that critical habitat designation may not affect geothermal exploration activities in the vicinity. The designation of critical habitat for these species does not specifically preclude geothermal development in the area. Exploration activities will be allowed to proceed in the vicinity of critical habitat as long as artesian and surface water supplies at San Bernardino NWR are adequately protected.

EFFECTS OF THE ACTION

Multiple S&Gs within this LRMP are applicable to the Yaqui chub and its habitat. These S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Designated critical habitat for the Yaqui chub does not occur within the action area; thus, no critical habitat for this species will be affected as a result of the proposed action. The following table summarizes the S&Gs presented to the FWS by the Forest Service as applicable to the Yaqui chub.

Table 149. Summary of S&Gs considered for the Yaqui chub.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-629, 631-638, 644, 645, 648-653, 666-669, 672-682, 692-696, 697, 698, 700, 703-713, 715, 727, 774, 779, 780, 782-785, 786, 788, 790-792, 794-800, 803-805, 807-824, 825-826, 828, 829, 830
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440, 1441, 1445, 1449, 1453-1456, 1458, 1459, 1461-1465, 1468, 1473, 1474, 1476, 1477, 1486-1492, 1495, 1499-1501, 1504-1515

Coronado National Forest

The Yaqui chub occurs on Forest Service lands within the Coronado NF in Management Areas 3, 4, 7, and 9. Multiple S&Gs within these LRMPs are applicable to the Yaqui chub and their habitats. The following tables outline the S&Gs presented to the FWS as applicable to the Yaqui chub on the Coronado NF and their summarized effects on the Yaqui chub. The majority of the applicable S&Gs are likely to result in beneficial effects to the Yaqui chub; however, we found several S&Gs that are likely to result in a lethal, sublethal, or negative behavioral response in this species. In summary, four percent of the applicable S&Gs are likely to cause mortality of Yaqui chubs, while over 76 percent of the S&Gs have positive effects to the species. The remaining 20 percent of the applicable S&Gs have no effect to the Yaqui chub or are too ill-defined to analyze.

Table 150. Effects of the S&Gs analyzed for the Yaqui chub – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	1.0
-2	S&G is causing sublethal response	3	2.9
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	17	16.3
1	S&G is maintaining habitat & providing at least minimal recovery	65	62.5
2	S&G is moving towards recovery	6	5.8
3	S&G is implementing species recovery plan	8	7.7
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	2	1.9
X	S&G is a heading	2	1.9
Total		104	100 %

Engineering Program

No applicable S&Gs within the Engineering Program are likely to result in negative effects to the Yaqui chub. In general, the intent of the LRMP is to prevent damage to resources by roads. The Coronado NF’s LRMP provides guidance to minimize damage associated with transportation systems in S&G 693. Maintenance of roads on the Coronado NF can vary depending on

availability of funds. If funds are unavailable to maintain roads and resource damage is occurring, S&G 694 allows the road to be closed. Through S&Gs 712 and 797, the Coronado NF LRMP provides guidance to close, drain, and revegetate roads determined to be unneeded. This should also assist in preventing resource damage. Direction from S&G 810 also suggests the Coronado NF avoid road development in Management Area 7B.

Fire Management Program

No applicable S&Gs in the Fire Management Program are likely to result in direct negative effects to the Yaqui chub. Standards and Guidelines 695, 713, 798, and 812 all allow for the use of prescribed fire. These S&Gs provide great benefit to the Yaqui chub by reducing the risk of catastrophic wildfire. However, the fuels treatment projects are likely to result in lethal take of individuals associated with humans, tools, machinery, and burning. Additionally, erosion/sedimentation and ash flows in burn areas may cause local extirpations of Yaqui chub in the affected areas.

Forestry and Forest Health Program

Standard and Guideline 697 allows for the use of chemical agents in recreation areas. Yaqui chub may be present in these areas, particularly riparian camping and boating areas, thus may be affected by chemical use. If chemical agents are transferred to water sources, purposefully or incidentally, the watershed would experience decreased water quality, thus decreasing the feeding and breeding success of Yaqui chub. Activities conducted under this S&G are also potentially lethal to the species if implemented within areas occupied by the species or in areas adjacent to the species where pollutants could enter occupied habitat. Standard and Guideline 696 may provide some protection in that it requires the Coronado NF to conform to Department of Agriculture standards in the use of all pesticides and to promote development of alternative methods of control. This S&G helps to limit usage, but may not completely protect the Yaqui chub as the Department of Agriculture standards are set up to protect humans rather than fish.

Lands and Minerals Program

No applicable S&Gs in the Lands and Minerals Program are likely to result in negative effects to the Yaqui chub. In addition, no negative impacts are anticipated from this program as a whole.

Rangeland Management Program

There are likely to be a range of effects to the Yaqui chub as a result of the Rangeland Management Program because many of the S&Gs call for a range of grazing levels across Management Areas. Standards and Guidelines 792 and 805 allow for Level D grazing in Management Areas 7A and 7B, or Level A if Level D cannot be achieved. These S&Gs allow for some negative effects to the Yaqui chub in the form of watershed degradation resulting in reduced breeding and feeding success. Level D grazing also allows for a great deal of fencing and water developments, allowing the riparian to be protected somewhat. Standard and Guideline 829 allows for grazing in Management Area 9, but only if the riparian can achieve and be maintained in satisfactory condition. The manner in which the effects of livestock grazing are manifested, and the magnitude of the effects in the watershed, are dependant on local site conditions.

Recreation, Heritage, and Wilderness Program

No applicable S&Gs in this program are likely to result in negative effects to the Yaqui chub. However, there are likely to be negative effects from this program not captured in the applicable S&Gs. The goal for this program is to “Maintain the current spectrum of developed, dispersed, and primitive recreation opportunities and increase those opportunities within the capability of the resources and the framework of this plan as needs and funds develop (Coronado NF LRMP).” This goal statement implies a multiple use recreation program which may include camping, hiking, boating, and fishing. Although these activities are not directly identified as threats to the Yaqui chub, they are likely to involve some incidental take due to interrelated effects. In the desert southwest, much recreation is centered around riparian areas. High density recreational users could lead to watershed degradation through increased erosion and water quality effects. Additionally, anglers may exacerbate the threat of non-native fishes by incidentally or purposefully releasing non-native bait fishes and salamanders in the watershed which out compete the native fishes for resources and even predate upon them. However, these effects should be reduced if West Turkey Creek remains closed to fishing.

Watershed Management Program

Only one S&G in this program has a direct negative effect on the Yaqui chub. Standard and Guideline 678 provides some goals for watershed management including the maintenance of 80 percent of natural shade over water surfaces, 80 percent of natural bank protection, and composition of sand, silt, and clay within 20 percent of natural levels. The FWS recognizes these S&Gs as being positive. These habitat characteristics represent desired future conditions in many areas. Working towards these goals should benefit the Yaqui catfish in the long-term; however, until these goals are achieved, the Yaqui catfish may still be experiencing adverse effects from poor habitat quality.

Standards and Guidelines 677, 711, 782, and 784 all allow some amount of riparian or watershed improvement. These activities should result in increased habitat quantity and quality for the Yaqui chub, but could have some short-term effects due to project impacts. These impacts could include temporarily decreased water quality and quantity leading to decreased breeding and feeding success and even mortality of individuals if stepped on by humans or caught in tools and machinery.

In general, the Watershed Management Program should provide positive benefits for the Yaqui chub as it seeks to maintain or improve watershed conditions and maintain good water quality. It is cross-program in orientation in its ability to mitigate impacts from activities of other programs. The guidance for the Watershed Management Program can be used to fill in the gaps for other programs with inadequate guidance. Abundant guidance is provided in the LRMPs to assist the Coronado NF in preventing adverse effects to Yaqui chub. The Coronado NF’s LRMP guides the Watershed Management Program to improve watersheds (see S&G 672), protect soils (see S&Gs 673, 674, and 675), protect water quality and quantity (see S&Gs 673, 675, 783, 795, and 808), protect and improve riparian areas (see S&Gs 675 and 679), and protect resources dependent on riparian areas (see S&Gs 676, 680, and 681). Standard and Guideline 676 is especially important because it guides the Coronado NF to “give preferential consideration to resources dependent on riparian areas...”, and, most important, it can be used to protect all riparian-dependent resources. Standard and Guideline 676 also states, “Other resource uses and

activities may occur to the extent that they support or do not adversely affect riparian-dependent resources.”

Wildlife, Fish, and Rare Plants Program

No applicable S&Gs in this program are likely to result in direct negative effects to the Yaqui chub. Several S&Gs, although positive for the Yaqui chub in the long-term, could result in short-term adverse effects. Standards and Guidelines 667 and 668 allow for structural and nonstructural habitat improvement projects. Specifically, Standard and Guideline 667 allows for prescribed fire which is beneficial in reducing the risk of catastrophic fire, but has short-term adverse effects, as discussed under the Fire Management Program. Standard and Guideline 668 allows for structural fish habitat improvements. The construction of these structures, if built instream, could have short-term project level adverse affects, as described in the Watershed Management Program.

A number of S&Gs in the Wildlife Program potentially provide substantial benefit to this fish. For example, S&G 634 establishes the maintenance of threatened and endangered species habitat as a priority over other species habitats Forest-wide. Many S&Gs provide for actions which work towards delisting of listed species by implementing their recovery plans. If properly implemented, these S&Gs should not only minimize the effects of other projects, but would also result in increased population numbers and sizes. These S&Gs should help the Forest to prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical Yaqui chub areas.

1996 Regional Amendment

All of the S&Gs analyzed for the 1996 Regional Amendment fall under the Wildlife Program. The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. These S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Yaqui chub sites co-occur with Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are applicable to the Yaqui chub and its habitats. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 151. Effects of the S&Gs analyzed for the Yaqui chub – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0.0
-2	S&G is causing sublethal response	0	0.0
-1	S&G is causing negative behavioral response	0	0.0
0	S&G is ill-defined and/or open to interpretation	5	9.8
1	S&G is maintaining habitat & providing at least minimal recovery	30	58.8
2	S&G is moving towards recovery	0	0.0

Ranking	Explanation of Ranking	Total	Percentage
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	8	15.7
Z	S&G implementation is non-discretionary	2	3.9
X	S&G is a heading	6	11.8
Total		51	100 %

Wildlife, Fish, and Rare Plants Program

All of the S&Gs in the 1996 Regional Amendment are within the Wildlife Program. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat and provide for minimal recovery of these species. In addition, these S&Gs may prevent adverse effects to threatened and endangered species other than the Mexican Spotted Owl and Northern Goshawk, including the Yaqui chub.

Several S&Gs encourage prescribed fires to reduce hazardous fuels accumulation, and permit thinning before burning to reduce ladder fuels and the risk of crown fire. Such activities have the potential to cause short-term adverse effects upon Yaqui chub, as discussed under the Fire Management Program. However, the long-term effects of prescribed fire are beneficial to the species. Prescribed fires reduce fuel loads and reduce the risk of catastrophic wildfires that would have a significant adverse effect upon the Yaqui chub and its habitat.

In summary, the applicable S&Gs within the Coronado NF LRMP and 1996 Regional Amendment allow for a variety of effects to the Yaqui chub. To a large extent, activities conducted under the positive S&Gs should benefit the Yaqui chub. However, the positive S&Gs do not eliminate the possibility of adverse effects, thus take of Yaqui chubs is reasonably certain to occur as a result of implementation of the Coronado NF LRMP and 1996 Regional Amendment. Any effects to critical habitat would likely be insignificant or discountable due to the linear separation and intermittency of draws between Forest Service lands and critical habitat for the Yaqui chub.

Cumulative Effects

Cumulative effects include the future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Along these lines, most future actions in the watershed will be on federal lands, and thus would be subject to Section 7. Actions on the El Coronado Ranch within the El Coronado Ranch’s HCP have been identified for a 25-year period. The illegal transplanting of non-native fish and amphibians will probably continue and will require periodic monitoring.

Additional cumulative impacts to the species may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and

erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the Yaqui chub, the environmental baseline for the action area, the effects of the proposed action, and cumulative effects, it is the FWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Yaqui chub. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. Designated critical habitat for the Yaqui chub does not occur within the action area; thus, no destruction or adverse modification of critical habitat is anticipated.

The Yaqui chub is currently found on and downstream of the Coronado NF. As discussed above, the FWS anticipates incidental take of the Yaqui chub is reasonably certain to occur as a result of activities authorized under the Coronado NF LRMP and 1996 Regional Amendment. However, the FWS does not believe that such activities will rise to the level of jeopardy for this species for the following reasons:

- The Coronado NF LRMP includes S&Gs that direct the Coronado NF to prioritize listed species over other species, work towards recovery, and to help delist species.
- Beyond the S&Gs specific to listed species concerns, the LRMP includes S&Gs which direct range and watershed conditions to improve. As a result, the availability and quality of Yaqui chub habitat on the Coronado NF should only increase.

In summary, although the evaluation of the numeric effects analysis does not involve balancing or averaging the rankings, the full suite of S&Gs in the Coronado NF LRMP and 1996 Regional Amendment creates a decision-making framework within which the Coronado NF can continue to implement their LRMP without appreciably reducing the likelihood of the survival or recovery of the Yaqui chub in the wild. Therefore, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Yaqui chub.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering (50 CFR 17.3). Harass is defined in the same regulation by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns that include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take

of a listed animal species that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity conducted by the federal agency or the applicant. Under the terms of sections 7(b)(4) and 7(o)(2) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued to any applicant, permittee, or contractor, as appropriate, in order for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the Incidental Take Statement. [50 CFR section 402.14(i)(3)]

Amount or Extent of Take

Incidental take of Yaqui chub is reasonably certain to occur from the implementation of the Coronado NF LRMP and the 1996 Regional Amendment. As discussed in the Effects of the Action, this incidental take is expected to be in the forms of harm (i.e., direct mortality) and harassment due to prescribed fire, mechanical fuels treatments, chemical use, rangeland management, recreation, and impacts of surface disturbing projects from various programs. The FWS anticipates, however, that incidental take of Yaqui chub will be difficult to detect because finding a dead or impaired specimen is unlikely, and losses may be masked by seasonal fluctuations in environmental conditions and fish numbers. Therefore, the FWS defines incidental take in terms of habitat characteristics, and is using this surrogate measure to identify when take has been considered to be exceeded. The FWS concludes that incidental take of Yaqui chub will be considered to be exceeded if currently occupied pool habitat is diminished at either the reach scale (i.e. number of pools reduced) or the scale of an individual pool (i.e. quality of pools degraded) on the Coronado NF as a result of the proposed action. Amount of pool habitat as measured during field surveys at base flow conditions (outside of extreme drought) must be maintained for chub. Standard protocol, such as the Forest Service Region 3 Stream Inventory Methodology (Version 3.1, 2005), can be used to document the amount and quality of pool habitat.

Effect of the Take

In the accompanying biological opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Yaqui chub.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of the Yaqui chub:

1. Protect Yaqui chub on the Coronado NF.

2. Protect Yaqui chub habitat on the Coronado NF.
3. Monitor Yaqui chub populations on the Coronado NF.

TERMS AND CONDITIONS

In order to be exempt from the prohibition of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Manage riparian areas adjacent to and upstream of Yaqui chub populations for conditions to eliminate direct effects and minimize indirect effects to Yaqui chub and its habitat.
- 1.2 Design fire use, chemical use, range management, and recreational projects to minimize or eliminate adverse effects to the Yaqui chub.
- 1.3 Cooperate with state conservation agencies to eliminate the introduction and continued presence of non-native fish species within Yaqui chub habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects in occupied Yaqui chub habitat to incorporate important characteristics of pool habitats with the goal of implementing projects that will have beneficial, insignificant, or discountable effects to the Yaqui chub and its habitat.
 - a. Pools shall be retained in their current frequency or increased in incidence in each occupied reach, even if only a single pool is occupied by Yaqui chub.
 - b. The physical characteristics of the pools in each reach shall be retained. Important characteristics include, but are not limited to: length, width, depth, residual depth, bank shape, bed material, instream cover type, presence of submergent or emergent vegetation, and absence of non-native fish or amphibians.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and ongoing research efforts, monitor Yaqui chub and Yaqui chub pool habitat on the Coronado NF.
- 3.2 In order to monitor the impacts of incidental take, the Coronado NF shall track and report the effects of the proposed action on Yaqui chub, pursuant to 50 CRF 402.14(i)(3). In combination with 3.1, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this

information shall be used to make adaptive management changes for reducing adverse effects to the species.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA direct federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of listed species. Conservation recommendations are discretionary agency activities to minimize or avoid effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information on listed species.

1. Ameliorate effects of non-native fishes within Yaqui chub management streams.
2. Other actions occurring in the West Turkey Creek watershed need to be analyzed for their potential impacts Yaqui chub. Impacts from the different forms of recreation occurring in the watershed are probably more detrimental to the Yaqui chub and the watershed than actions previously consulted on. A watershed plan may be an appropriate means of addressing the issues. The Forest Service should cooperatively work with the FWS, AGFD, and interested parties to address these issues (Recovery Plan task 2.0, U.S. Fish and Wildlife Service 1994c:23).
3. Designate reestablishment areas within the species' historical range on the Coronado NF and develop appropriate protective management measures.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

GILA SPRINGSNAIL

STATUS OF THE SPECIES

The information used to describe the Status of the Species and Environmental Baseline was gathered from the 2004 Candidate Assessment and Listing Priority Assignment Form for the Gila springsnail (*Pyrgulopsis gilae*), unless otherwise referenced.

Description

The Gila springsnail (*Pyrgulopsis gilae*) is a freshwater gastropod known from isolated springs of the upper Gila River basin in southwestern New Mexico. The springsnail is an entirely aquatic species, with an ovate-conic tan shell of medium to large size (3.1 - 4.0 mm).

Legal Status: In 1988, the FWS listed the Gila springsnail as a candidate species for addition to the List of Endangered and Threatened Wildlife and Plants under the ESA of 1973, as amended. Candidates are those species for which the FWS has gathered enough information to warrant a listing of threatened or endangered, but the listing has been precluded by other agency priorities. The Gila springsnail has been assigned a listing priority number of 11, within a range of 1-12, with 1 being the highest priority number.

The Gila springsnail is listed as a Group 2 New Mexico state endangered species. Group 2 species are those "...whose prospects of survival or recruitment within the state are likely to become jeopardized in the near future" (New Mexico Department of Game and Fish 1988). Under the New Mexico Wildlife Conservation Act, the taking of such species is prohibited except under issuance of a scientific collecting permit. The New Mexico Wildlife Conservation Act does not provide for habitat protection.

Distribution and Abundance

The Gila springsnail is known from 13 populations in Catron and Grant Counties, New Mexico. All known populations occur on Forest Service lands and private lands within the boundaries of the Gila NF. Two populations are found along Beaver Creek and Taylor Creek, which form the headwaters of the East Fork Gila River. A separate population occupies Fall Spring. The remaining eight disjunct populations are associated with a series of springs along the East Fork, Middle Fork, and mainstem of the Gila River (U.S. Forest Service 2004). In some areas, the Gila springsnail co-occurs with the federal candidate species, the New Mexico springsnail (*Pyrgulopsis thermalis*).

Populations of the Gila springsnail were reported as stable in October 2001 and June 2002 (New Mexico Department of Game and Fish 2002). To date, the springsnail species has not been extirpated from any known site.

Habitat

Gila springsnails occur within riparian habitats associated with spring systems. Springsnail populations occupy small habitats (111-278 ft² [10-25 m²]), ranging from highly degraded to relatively undisturbed thermal springs. The species exists in eurythermal waters (14-27 °C [57-81 °F]) adaptable to a wide range of temperatures. Gila springsnails located along the East Fork of the Gila River inhabit cool water temperatures of 68 °F (20 °C) in watercress-lined rivulets,

while a smaller springsnail population located in a nearby spring exists in warmer waters (90-91 °F [32-33 °C]).

Life History

Gila springsnails are herbivorous, or detritivores that consume algae, bacteria, and decaying organic material, and may passively ingest small invertebrates while feeding. The Gila springsnail is a hydrobiid species that respire via an internal gill and oxygen absorption through the mantle (soft body). Such hydrobiid snails are sexually dimorphic (females being the larger sex), and reproduce several times during the breeding period (spring-fall). Prosobranch snails (those with gills and an operculum) live 9-15 months, with females living longer than males.

Population Dynamics

Population numbers of Gila springsnails are not known to date. Last reports on the status of hydrobiid snails in the Gila River have documented the Gila springsnail population as stable.

The distribution of Gila springsnails is geographically restricted. Genetic divergence exists between the disjunctive populations, possibly warranting a taxonomic re-evaluation of the species.

Reasons for Candidate Listing

A 12-month finding for the Gila springsnail was warranted, but precluded on October 4, 1988. To date, the Gila springsnail is listed as a candidate species. The species was included in the Annual Description of Progress on Listing Actions on June 13, 2002.

Although populations of the Gila springsnail appear to be stable, the species' very limited distribution magnifies the threats imposed upon the species. The natural or human-induced destruction, modification, or curtailment of Gila springsnail habitat represents the primary threat to the species.

Threats: Gila springsnail populations are potentially impacted by factors likely to destroy, damage, or modify springs, riparian areas, upland watersheds, groundwater, or the springsnails themselves. A variety of potential threats to Gila springsnail populations and their habitats have been identified by the NMDGF, including natural stochastic events, poor watershed management, and water pollution/contaminants from recreational bathing and fire retardant chemicals (New Mexico Department of Game and Fish 2000).

Natural stochastic events including drought, forest fire, flooding, and sedimentation pose a threat to the Gila springsnail. The suppression of wildfires and the implementation of prescribed fires influence the likelihood of springsnail populations being jeopardized by catastrophic wildfire (U.S. Forest Service 2004). Chemical retardants used to suppress fires and ashes resulting from forest fires can threaten the quality of Gila springsnail habitat.

Contamination and poor watershed management practices represent a significant threat to Gila springsnails. Sites occupied by the Gila springsnail, both on private and public lands, are subject to uncontrolled recreational use and livestock grazing. Recreational bathing in and near springs

can have a significant impact on the quality of springsnail habitat. In addition, livestock use often results in the degradation and contamination of thermal springs (U.S. Forest Service 2004). Such impacts have the potential to negatively affect snail populations and result in local extirpations.

Conservation Measures

The long-term persistence of the Gila springsnail is contingent upon protection of the riparian corridor immediately adjacent to springhead and spring run habitats, thereby ensuring the maintenance of perennial, oxygenated flowing water within the species' required thermal range (Lang 1998; Taylor 1987). The FWS directs conservation efforts to species identified as candidates for listing under the ESA. Conservation efforts include species habitat and ecosystem protection, as a means to reduce the need to list candidate species as endangered or threatened. In the 1980's, attempts to develop a conservation agreement for the Gila springsnail and the New Mexico springsnail between the Forest Service and the NMDGF were not successful. Since that time, other species have been of higher priority.

Currently, all occupied Gila springsnail sites are excluded from livestock grazing. Excluding livestock from riparian areas, particularly thermal springs, helps maintain springsnail habitat and protect water quality.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Most Gila springsnail populations occur on lands administered by the Gila NF, including two sites within the Gila Wilderness. Populations of Gila springsnails also occur on private lands within watersheds that include Forest Service lands.

The New Mexico Department of Game and Fish (2002) reported populations of Gila springsnails to be stable as of June 2002. Although populations are very small at some locations, there has been no recent documentation of Gila springsnail extirpation or reduction in population numbers.

Factors Affecting the Species within the Action Area

Human activities and natural events have the potential to negatively affect Gila springsnail populations and result in local extirpations (Taylor 1987, New Mexico Department of Game and Fish 1988, Mehlhop 1993, Lang 1998). The geographically restricted distribution of the Gila springsnail limits re-colonization of the species; and increases the species' vulnerability to natural and human-induced activities within the action area.

Recreational bathing in and near hot springs threaten Gila springsnails and their habitat. Moderate recreational use of springs may result in reductions in water quality, increased sedimentation, reduced spring flow, and temperature changes. High levels of recreational activities at Alum and Jordon Springs have a significant affect on Gila springsnail populations located in the Gila Wilderness. Currently, recreational activities do not pose an imminent threat to the species. However, increased use or poor management practices may threaten Gila springsnail populations.

The current drought within the action area region could impact spring discharge and increase the frequency and severity of wildfires in the Gila NF. Large amounts of ash resulting from forest fires can affect the nutrient levels of the springs, and contribute to fluctuations in oxygen levels. In addition, retardant chemicals used for fire suppression may contaminate spring areas, potentially having a negative effect upon springsnails.

EFFECTS OF THE ACTION

The S&Gs listed in the Gila NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Gila springsnail and their habitats. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Forest Service management on the Gila NF may potentially impact Gila springsnails and their habitats by alterations to springs, riparian areas, upland watersheds, and groundwater; as well as direct impacts to the springsnails themselves.

Table 152. Summary of S&Gs considered for the Gila springsnail.

National Forest	Standards and Guidelines
Gila	841-842, 844-851, 854, 857-871, 873-876, 878, 880, 889-894, 894a, 936, 938-940, 940a-b, 957a-d
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-41, 1445, 1449, 1453-56, 1458-59, 1461-1465, 1468, 1473-74, 1476, 1486, 1487-92, 1495, 1499-1501, 1504-09, 1510-15

Gila National Forest

Gila springsnails occur on both Forest Service land and private lands. Occupied sites located on private lands (Taylor Creek site) are in watersheds that include Forest Service lands; thus all Gila springsnail sites occur within the action area. Known Gila springsnail sites on the Gila NF occur in Management Areas 8A, 5A, and 2B; two of which are located in wilderness areas of Management Area 8A and 5A. However, the Gila NF LRMP only recognizes springsnails present in Management Area 8A of the Forest.

The S&Gs within the Gila NF LRMP generally emphasize the improvement of aquatic, riparian, and upland resources within non-wilderness areas. Approximately 72 percent of the S&Gs have a positive impact upon the Gila springsnail. Yet, no forest-wide S&Gs specifically address the

conservation or protection of the species. In particular, few S&Gs are relevant to the conservation of Gila springsnails within wilderness areas. The long-term survival of Gila springsnails is dependent upon the protection of riparian habitats adjacent to springheads and spring runs.

Less than 15 percent of the S&Gs within the Gila NF LRMP have the potential for sublethal effects to the Gila springsnail. However, these S&Gs may indirectly alter the quantity or quality of spring habitats in which Gila springsnails reside, having an impact to the species. Also, these negative S&Gs may lead to activities that directly impact springsnails and their habitats by dislodging the snails from their substrate, crushing individual snails, and contaminating the aquatic habitat.

Table 153. Effects of the S&Gs analyzed for the Gila springsnail – Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0
-2	S&G is causing sublethal response	7	14.3
-1	S&G is causing negative behavioral response	0	0
0	S&G is ill-defined and/or open to interpretation	1	2.0
1	S&G is maintaining habitat & providing at least minimal recovery	35	71.5
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	3	6.1
Z	S&G implementation is non-discretionary	2	4.1
X	S&G is a heading	1	2
Total		49	100 %

Engineering Program

The Engineering Program of the Gila NF LRMP includes the construction, maintenance and operation of roads. Such activities potentially alter riparian and aquatic habitats by generating sediments, altering runoff regimes, contaminating surface waters, and facilitating access by humans to Gila springsnail habitats. However, based on an inspection of Gila NF maps, existing roads do not appear to be particularly abundant in the vicinity of Gila springsnail sites or their immediate sub-watersheds (U.S. Forest Service 2004).

No applicable S&Gs within the Engineering Program have a negative effect on Gila springsnails. Standard and Guideliness 842 and 957c direct the implementation of site-specific actions that have a positive effect on Gila springsnails. Standard and Guideline 842 is applied forest-wide in non-wilderness areas, and prohibits road construction within riparian areas. Such management direction maintains spring habitat and indirectly supports the recovery of the species in non-wilderness areas. Standard and Guideline 957c is applied within Management Area 8A, in which a large majority of springsnails sites occur. Standard and Guideline 957c of the Engineering

Program permits the relocation of trails for resource protection. Such management direction could help minimize the threat of recreational activities upon Gila springsnails at Alum Springs, which are facilitated by the close proximity of a developed trail. Gila springsnails have a positive exposure/response to Engineering S&Gs 842 and 957c.

Currently, two trails run throughout the Jordon Springs area. Occupied Gila springsnail habitat known from Jordon Springs occurs within wilderness areas of the forest in Management Area 5A. Standard and Guideline 842 is applied to non-wilderness areas and S&G 957c to Management Area 8A. Thus, spring habitat at Jordon springs is not protected from the presence and use of trails. The construction and presence of trails within the Jordon Springs area has the potential to adversely affect spring habitat and negatively impact Gila springsnails at this occupied site.

Fire Management Program

Fire management on the Gila NF includes fire prevention, fire suppression, and fire use. Wildfires in the southwest are getting larger and more intense, primarily due to the density of trees and accumulated dead woody debris on National Forest System lands (U.S. Forest Service 2004). Such catastrophic fire has been identified as a natural stochastic threat to the Gila springsnail and its spring habitat (e.g. burning riparian areas and subsequent ash and sediment flow into habitats).

No applicable S&Gs within the Fire Management Program have a negative effect on Gila springsnails. Standard and Guidelines 844, 845, and 865 have a long-term positive effect on Gila springsnails by maintaining habitat or providing at least minimal recovery to the species. Standard and Guideline 865 applies to non-wilderness areas, and emphasizes the need to rehabilitate soils following wildfires. Indirectly, such guidance protects and restores watershed conditions, including spring habitats.

Standard and Guidelines 844 and 845 are related to fire prevention activities within wilderness areas, including planned prescribed fire. Standard and Guideline 844 allows prescribed fire in wilderness areas, mimicking natural fires while helping to avoid catastrophic fire. The management direction of S&G 845 permits the use of prescribed fire, but does not consider Gila springsnails or other wildlife concerns in managing prescribed fire within wilderness areas. Gila springsnail sites at Alum Spring and along the middle fork of the Gila River occur within wilderness areas. Activities under the direction of S&Gs 844 and 845 aim to reduce the likelihood of catastrophic, high intensity fires. However, prescribed fire within or adjacent to springsnail occupied habitat may have short-term negative effects on Gila springsnail populations. Ashes resulting from forest fires can threaten the quality of Gila springsnail habitat. Although the guidance of S&G 844 and 845 aims to prevent catastrophic fire events and minimize associated adverse effects to natural resources, the implementation of such management direction is likely to have a short-term negative effect on Gila springsnails within these wilderness areas.

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on National Forest System lands (U.S. Forest Service 2004). Livestock grazing on the Gila NF can indirectly

impact Gila springsnails through the alteration of watersheds and spring habitats. Livestock grazing can also directly impact springsnails through trampling, and contamination and degradation of springs.

Applicable S&Gs 894a, 940b, and 957d within the Rangeland Management Program provide guidance on range improvement projects through the construction or reconstruction of spring developments. Range improvements may include the use of spring boxes, which provide water to cattle and wildlife. Such spring development could affect riparian and aquatic habitats by significantly altering water flow. Standard and Guidelines 894a, 940b, and 957d pertain to Management Area 2B North Black Range, Management Area 5A, and Management Area 8A respectively. These S&Gs cover the entire range of the Gila springsnail. The site-specific implementation of spring developments under these S&Gs has the potential to negatively affect spring habitat and Gila springsnails. However, the impacts of livestock grazing on springsnail habitat and/or the springsnails themselves, are currently avoided due to the exclusion of livestock within all occupied Gila springsnail sites.

Standard and Guideline 868 of the Wildlife Program allows management to incorporate habitat requirements of sensitive species into the implementation plans for range improvement projects within non-wilderness areas. The Forest Service has classified the Gila springsnail as a sensitive species. Under the direction of S&G 868, habitat requirements for the Gila springsnail are included in the implementation planning for construction or reconstruction of spring developments. This standard minimizes the negative effect of range improvement projects on Gila springsnails located within non-wilderness areas. In addition, activity trends with the Rangeland Management Program favor fewer numbers of structural improvements and acres of non-structural improvements, further reducing the effect of range improvement projects upon Gila springsnails and spring habitats (U.S. Forest Service 2004).

Standard and Guideline 858 directs the management of grazing in non-wilderness areas to provide for the improvement of riparian areas. By emphasizing the improvement and protection of riparian areas, which includes spring habitat, S&G 858 maintains Gila springsnail habitat within non-wilderness areas and provides at least minimal recovery to the species. However, the implementation of range improvement projects to improve riparian areas may also have a short-term negative effect on Gila springsnails. Yet, all occupied Gila springsnail sites are within areas closed to livestock grazing, including the Alum Springs wilderness area; thus, preventing short-term negative impacts to spring habitats and Gila springsnails.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites within the National Forests and National Grasslands of the Southwestern Region. Recreation-related activities have been identified as a potential threat to Gila springsnails through degradation and contamination of thermal springs. Recreational trends for the Gila NF show visitor use of the Forest to be relatively low in comparison to other National Forests in the Southwestern Region. However, dispersed recreation is disproportionately higher than most other National Forests in the Southwestern Region. In addition, The Gila NF Plan states, “the primary recreational use within wilderness areas occurs within areas adjacent to perennial streams and river bottoms” (U.S. Forest Service 2004).

Forest-wide S&Gs for the Gila NF include direction for managing recreational use of riparian habitats to avoid damage to riparian resources. Specifically, S&G 859 for the Recreation Program emphasizes the regulation of recreational activities within non-wilderness areas for riparian resource protection. Recreational use of springs may result in increased sedimentation, reduced spring flow, temperature changes, and poor water quality. This S&G has a positive effect upon Gila springsnails, and work towards the recovery of the species in all non-wilderness sites of the Gila NF.

Gila springsnails sites located at Alum Springs and Jordon Springs are located within the wilderness area of Management Area 8A and Management Area 5A, respectively. Both sites have been documented as threatened by recreational bathing. No guidance within the Recreation Program directs the regulation of recreation-related activities in wilderness areas that may impact Gila springsnails (U.S. Forest Service 2004). However, management direction for the Engineering Program may reduce the negative effects of recreationists at Alum Springs. Specifically, S&G 957c for Management Area 8A permits the relocation of the transportation system, including trails, for resource protection. The use of Alum Springs is facilitated by the proximity of a developed trail. The implementation of S&G 957c could support the conservation of Gila springsnails at Alum Springs by relocating the adjacent trail and reducing recreational use levels. Standard and Guideline 957c only applies to Management Area 8A, excluding implementation at Jordon Springs in Management Area 5A. Therefore, management direction related to trail use does not protect occupied Gila springsnail habitat at Jordon Springs.

Watershed Management Program

Objectives of the Watershed Management Program include improving and maintaining water quality; protecting and restoring riparian areas; and prioritizing watersheds for protection or improvement. Structural and non-structural measures are used maintain and improve watershed conditions. Measures affecting Gila springsnails and spring habitat include fencing to exclude livestock from riparian areas; prescribed burns; road obliteration; and other soil and water improvement activities (U.S. Forest Service 2004).

No applicable S&Gs within the Watershed Management Program have a negative effect on Gila springsnails. The majority of S&Gs emphasize the protection and restoration of riparian areas and associated watersheds. Forest-wide S&Gs 863, 874, and 875 emphasize the protection of water quality and the implementation of watershed restoration projects. Standard and Guidelines 864 and 876 direct activities to control and minimize erosion and soil loss. For Management Area 2B of the North Black Range, S&G 894 promotes the protection of sensitive soils. These S&Gs have a positive effect upon Gila springsnails by protecting spring habitat and associated watersheds.

Wildlife, Fish, and Rare Plants Program

No S&Gs under the Wildlife Program specifically direct the implementation of site-specific actions to protect or improve Gila springsnail habitat. Much of the guidance under the Wildlife Program applicable to Gila springsnails pertains to the restoration and protection of aquatic and riparian habitats. These S&Gs are almost entirely restricted to non-wilderness areas, thus excluding occupied sites at Alum Springs and Jordon Springs.

Standard and Guidelines 939 and 940 provide management guidance for Management Area 5A. The planning emphasis of Management Area 5A focuses on big game, small game, game fish, and threatened and endangered species; with threatened and endangered species receiving priority over other species (U.S. Forest Service 1986). Under S&G 939, direction is provided for the improvement of habitat for game fish species. More specifically, Taylor Creek is managed for trout species and Beaver Creek is managed for warm water species. Although S&G 939 directs to maintain native fish species as well, the emphasis is placed upon game fish habitat treatments including stream improvement structures and stream cover structures. These habitat improvement structures modify habitat types and increase the carrying capacity for the targeted fish species. Further, S&G 940 allows for the maintenance of habitat improvements, with game species receiving priority over sensitive species (Gila springsnails). Standard and Guidelines (939 and 940) that allow for habitat improvements structures for game fish, and the maintenance of such, may indirectly affect Gila springsnails by altering spring habitat and the species' use of the springs. However, the Gila NF is not implementing S&Gs that emphasize habitat improvement for game fish, but rather currently working with the NMDGF and the FWS Fisheries Resource Office on several non-native fish removal projects (J. Monzingo, Forest Service, 2005, unpubl. data). As a result, the potential for adverse effects to Gila springsnails from game fish habitat treatments is highly unlikely.

Standard and Guidelines 891 and 893 pertains to the management of Management Area 2B North Black Range. These S&Gs also place an emphasis on habitat improvement for game fish. Although only one Gila springsnail site occurs in Management Area 2B, the S&Gs pertaining to the North Black Range can also have an impact upon Gila springsnails of Taylor Creek in Management Area 5A; Taylor Creek drains the western slopes of the North Black Range. As a result, management direction under S&Gs 891 and 893 may negatively affect Gila springsnails and spring habitats in Taylor Creek as well as the North Black Range. However, as mentioned above, the Gila NF is not implementing S&Gs that emphasize habitat improvement for game fish.

The majority of applicable S&Gs within the Wildlife Program provide guidance for improving wildlife habitat, particularly riparian habitat. Within Management Area 8A, S&G 957b emphasizes the implementation of threatened and endangered species habitat improvements, and specifically identifies species of concern within Management Area 8A, which includes the Gila springsnail. Forest-wide S&Gs, including 846, 847, 850, 851, and 868 provide guidance for managing riparian dependent resources to protect and improve the productivity of such resources. Emphasis is placed upon the protection of soil, water, vegetation, and fish and wildlife resources within riparian areas. Standard and Guideline 851 gives preferential consideration to riparian-dependent resources over other resources (U.S. Forest Service 2004). Standard and Guideline 868 places sensitive species habitat requirements over other species requirements. These forest-wide S&Gs maintain riparian and spring habitats within non-wilderness areas, and provide at least minimal recovery to Gila springsnails.

Within the Wildlife Program, the majority of S&Gs that are applicable to Gila springsnails direct the restoration and protection of riparian habitats within non-wilderness areas. Yet two Gila springsnail sites occur in wilderness areas; Alum Spring (Management Area 8A) and Jordon Springs (Management Area 5A). Only Management Area 5A provides guidance for riparian

improvement within wilderness areas. Standard and Guideline 938 directs the implementation of riparian treatments to areas of low conditions. Such management guidance helps to maintain springsnail habitat, and provide at least minimal recovery to the species. Also, S&G 841 provides guidance for maintaining the vegetative diversity of riparian areas in wilderness areas. Such management direction promotes a healthy ecosystem, and has a positive effect upon Gila springsnails and their aquatic environment. The management direction of S&Gs 841 and 938 has a positive effect upon Gila springsnail sites in wilderness areas.

Standard and Guideline 848 provides direction on improving unsatisfactory riparian areas. The S&G directs the improvement of riparian areas, including spring habitats to satisfactory condition by the year 2030, and defines the requirements of satisfactory riparian conditions. Improvements to unsatisfactory riparian areas are beneficial to Gila springsnails. However, the satisfactory conditions and timeframe listed under S&G 848 may have short-term negative effects to spring habitats and Gila springsnails.

In summary, the management direction of the Gila NF LRMP provides for the protection of riparian areas, including the springheads and spring runs occupied by the Gila springsnail. However, a few specific guidelines within the Engineering, Recreation, and Fire Management programs are likely to adversely affect the springsnail, particularly the population at Jordon Springs, in Management Area 5A. The Jordon Springs area is not protected from the effects of trail use, which directly and indirectly affect the Gila springsnail population of this spring. Also, recreational use of Jordon Springs is likely to affect springsnails, for the Gila NF LRMP does not outline the protection of riparian resources within wilderness areas.

Additional populations of Gila springsnails are likely to be adversely affected by the management direction of the Gila NF LRMP. Riparian areas in the wilderness areas of Management Area 8A (Alum Spring) are not adequately protected from the negative impacts of recreational use. Also, short-term adverse effects of prescribed fire activities are likely to occur with the implementation of the Gila NF LRMP, potentially affecting all populations of Gila springsnails. These factors contribute to the likelihood of adverse effects to the Gila springsnail through the implementation of the Gila NF LRMP.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Gila springsnail sites occur within Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are applicable to Gila springsnails and springs habitat. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 154. Effects of the S&Gs analyzed for the Gila springsnail - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	2
-2	S&G is causing sublethal response	0	0
-1	S&G is causing negative behavioral response	2	4
0	S&G is ill-defined and/or open to interpretation	2	4
1	S&G is maintaining habitat & providing at least minimal recovery	28	56
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	9	18
Z	S&G implementation is non-discretionary	2	4
X	S&G is a heading	6	12
Total		50	100 %

All of the S&Gs in the 1996 Regional Amendment lie under the Wildlife Program; yet the content of the S&Gs applies to several program activities. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat and for minimal recovery of these species. While not a focus of the Amendment, the S&Gs have the potential to affect other threatened and endangered species. In the case of the Gila springsnail, 56 percent of the S&Gs have positive effects on the species, while 6 percent of the S&Gs adversely impact Gila springsnails and their spring habitats.

Within Mexican Spotted Owl protected areas, S&G 1438 allows for the level of recreational use that occurred prior to the threatened listing of the owl. Depending on the location of recreational activities, such a level of use adversely affects Gila springsnail habitat. Recreational activities at Alum and Jordon Springs directly impact springsnails and their habitats by dislodging the snails from their substrate and crushing individual snails. Gila springsnails are indirectly affected through poor water quality resulting from bathing contaminants. Continued recreational use of these sites has a negative affect on Gila springsnails.

Within Northern Goshawk habitat, S&Gs 1505 and 1507 apply to post-fledgling family areas and nesting areas. These S&Gs provide direction for maintaining existing canopy cover levels within woodland habitat. Existing woodland habitat consists mainly of pinion juniper, which contributes to poor watershed conditions through soil loss. Unhealthy watersheds indirectly threaten Gila springsnails through the destruction of spring habitat. Maintaining current levels of pinion juniper under S&G 1505 and 1507 is likely to have an adverse effect on Gila springsnails habitat.

In general, the S&Gs of the 1996 Regional Amendment emphasize the maintenance and restoration of healthy riparian ecosystems. In particular, S&Gs minimize the threats of livestock grazing by directing grazing management to maintain and restore riparian ecosystems (S&G

1474), and ensure the recovery and continued existence of threatened and endangered species (S&G 1510). Within Northern Goshawk habitats, S&Gs 1488 and 1490 provide guidance for maintaining satisfactory soil conditions, minimizing soil compaction, and restoring degraded riparian areas. These S&Gs have a positive impact upon Gila springsnails and their spring habitat.

Fire has been identified as a potential threat to Gila springsnails and springs habitats. Multiple S&Gs within the 1996 Regional Amendment encourage the use of prescribed fire to reduce hazardous fuel accumulation and manage for landscape diversity. Standard and Guidelines 1445, 1455, 1468, and 1476 direct the use of prescribed fire for the treatment of fuel accumulations within protected and restricted areas of Mexican Spotted Owl habitat. Standard and Guideline 1458 directs the use of prescribed fire on Reserved Lands, which include Wilderness Areas, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas. These S&Gs encourage prescribed fires to reduce hazardous fuel accumulation, and permit thinning before burning to reduce ladder fuels and the risk of crown fire. Such activities have the potential to cause short-term adverse effects upon Gila springsnails. Large amounts of ash associated with forest fires can add nutrients to spring systems, altering the balance between algae and invertebrate communities. Significant increases in algae can change the amount of dissolved oxygen available to springsnails and other invertebrates. However, the long-term effects of prescribed fire are beneficial to the species. Prescribed fires reduce fuel loads and prevent catastrophic fires that would negatively affect Gila springsnails and their spring habitat. Therefore, these S&Gs (1445, 1455, 1458, 1468, and 1476) are beneficial to Gila springsnails.

In summary, the management direction of the 1996 Regional Amendment provides for healthy functioning riparian and aquatic systems. However, a few specific guidelines associated with recreation and fire activities are likely to adversely affect Gila springsnail populations in Mexican Spotted Owl protected areas. Recreational activities occurring at Alum Springs, Jordon Springs, Wall Lake, and above Taylor Creek contribute to poor water quality and the dislodging and crushing of individual springsnails. Prescribed fire activities within protected and restricted of Mexican Spotted Owl habitat are likely to have a short-term impact on Gila springsnail habitat through poor water quality resulting from excess ash. These factors contribute to the likelihood of adverse effects to the Gila springsnail through the implementation of the Gila NF LRMP.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this conference opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Multiple tracts of private land are located within the vicinity of known Gila springsnail populations along the East Fork of the Gila River. Most of the private land is located near Taylor Creek and Wall Lake. The management of non-native game fish and livestock grazing within these private lands has the potential to impact the water quality of streams within or adjacent to Forest Service watersheds. Livestock grazing can cause an increased in sedimentation, contamination, and degradation of thermal spring habitat. By degrading the

watershed, the effects of these private actions may have a negative impact upon Gila springsnails.

Private lands are also located near Gila springsnail sites along the East Fork of the Gila River, just north of the East Fork and Main Stem confluence. Discussions have been made on the possibility of future road construction on these private lands. Such roads would parallel the East Fork of the Gila River in areas occupied by Gila springsnails (B. Lang, NMDGF, 2004, unpubl. data). Road construction and maintenance activities have the potential to alter riparian and aquatic habitats by generating sediments, altering runoff regimes, contaminating surface waters, and facilitating access by humans to Gila springsnail habitats. Therefore, such activities on private lands near occupied springsnail habitats can have a negative effect on Gila springsnails.

CONCLUSION

After reviewing the current status of the Gila springsnail (*Pyrgulopsis gilae*), the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's conference opinion that the Gila NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Gila springsnail. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The majority of Gila springsnail populations occur on lands administered by the Gila NF, including two sites within the Gila Wilderness. Although populations of Gila springsnails are very small at some locations, surveys in 2001 and 2002 show the populations to be stable (New Mexico Department of Game and Fish 2002). Also, there has been no recent documentation of Gila springsnail extirpation from any known site. Adverse effects to the Gila springsnail may occur from the continued implementation of the Gila NF LRMP and 1996 Regional Amendment. However, the FWS does not believe the impacts to the species will rise to the level of jeopardy.

Management guidance provided by the S&Gs in the Gila NF LRMP and 1996 Regional Amendment emphasizes the protection and restoration of riparian areas and associated watersheds. Thus, Forest Service activities under the direction of these S&Gs are not likely to jeopardize the continued existence of Gila springsnail populations. Eleven of the 13 Gila springsnail sites occur in non-wilderness areas. Multiple forest-wide S&Gs for non-wilderness areas (846,847,850, and 851) emphasize the protection of soil, water, vegetation, and fish and wildlife of riparian resources. Within Management Area 8A, S&G 957b specifically identifies the Gila springsnail for habitat improvement projects. Also, S&G 868 establishes the precedence of maintaining habitat for sensitive species over other species. Although fire may pose a short-term threat to Gila springsnails, S&Gs 844 and 865 provide management direction for prescribed fires in wilderness and non-wilderness areas to avoid catastrophic fires, which pose a higher, more significant risk to the species. Implementing these beneficial S&Gs helps to prevent and minimize adverse effects to Gila springsnails and their thermal spring habitat from Forest Service activities.

Two known Gila springsnail populations occur within wilderness areas. Within the Gila NF LRMP and 1996 Regional Amendment, few Standards and Guidelines direct the protection of Gila springsnails and their habitats within wilderness areas. In particular, no forest-wide S&Gs emphasize riparian and aquatic resource conservation in project planning, nor regulate recreation-related activities in wilderness areas. Only Management Area 5A provides direction for riparian protection and improvement in wilderness areas (S&G 938). However, management of the wilderness resource, as stated in the Gila NF LRMP, is directed toward protecting and restoring natural conditions and maintaining the physical and biological characteristics of the wilderness environment (U.S. Forest Service 1986). Such management direction guides for the conservation of Gila springsnails in wilderness areas through the protection and improvement of natural riparian habitat conditions. Together, the wilderness management emphasis and multiple forest-wide S&Gs for non-wilderness areas provide adequate guidance for the conservation of Gila springsnails. Therefore, the continued implementation of the Gila NF LRMP and 1996 Regional Amendment is not likely to jeopardize the continued existence of the Gila springsnail.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

As a candidate species, the prohibitions against taking the Gila springsnail found in section 9 of the ESA (as stated above) do not apply until the species is listed. However, the FWS advises the Forest Service to consider implementing the reasonable and prudent measures defined in this conference opinion to conserve the species and preclude listing. If this conference opinion is adopted as a biological opinion following a listing or designation, the measures described below, with their implementing terms and conditions, will be non-discretionary. These measures must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the

progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Gila springsnail is reasonably certain to occur as a result of the continued implementation of the Gila NF LRMP and 1996 Regional Amendment. The FWS anticipates incidental take of Gila springsnails will be in the forms of direct mortality, harm, and harassment to the species. Direct mortality and harm to the species is anticipated through death or injury from the crushing of individual snails, the poisoning (i.e., introduction of pollutants such as sunscreen) of springsnails, and the impairment of essential behavior patterns due to spring habitat modification and destruction. The proposed action is likely to take Gila springsnails in the form of harass by significantly disrupting normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

The FWS is reasonably certain that recreational use of spring habitat at Jordon and Alum Springs is likely to kill, harm, and harass Gila springsnails. Spring and trail use at Jordon Springs causes direct mortality of the species through trampling and poisoning of individual springsnails. Recreational use of Alum Springs (i.e. bathers) has been identified as disrupting water flow and correlated with localized absence of the species (Lang 2002). There are no specific S&Gs within the Gila NF LRMP or 1996 Regional Amendment that regulate recreation-related activities in wilderness areas. As a result, the proposed action is likely to kill, harm, and harass Gila springsnails at of Jordon and Alum Springs.

The FWS is also reasonably certain that prescribed fires are likely to harm Gila springsnails. Although many S&Gs manage for the protection of riparian-dependent resources, other S&Gs (844, 845, 1445, 1455, 1458, 1468, and 1476) direct the use of prescribed fires, which have the potential to disrupt watershed function and degrade water quality. Such alteration and destruction of spring habitat is likely to impair essential behavior patterns of Gila springsnails. The continued implementation of these S&Gs within the Gila NF LRMP and 1996 Regional Amendment is likely to cause direct harm to Gila springsnails.

Quantifying anticipated take of Gila springsnails at occupied sites on the Gila NF is difficult, partially because precise density estimates are not currently known for the species. In addition, the springsnail exhibits seasonal variation in numbers and occurs in patchy distributions throughout a given population. Determining an estimate of anticipated take is further complicated by the difficulty in detecting snails. Incidental take of the Gila springsnail will be difficult to detect for the following reasons: the species has small body size, losses may be masked by seasonal fluctuations in water quality, and the species occurs in habitat that makes detection difficult. Based on the high variation in density estimates, the variability in spatial and temporal distribution of the species in spring habitats, and the difficulty in detecting dead or moribund snails, the FWS can not provide an estimate of the number of individual springsnails that would be taken as a result of the proposed action.

Because it is not feasible or reasonable to anticipate the number of individual springsnails that may be taken, the FWS is providing a mechanism for when take would be considered to be exceeded at the population level (i.e., the use of springsnail populations to determine when take

is exceeded). For purposes of this conference opinion, a “population” is defined as individuals dependent upon the same water source, and separate from other individuals not directly connected to the same spring, seep, or stream (B. Lang, NMDGF, 2004, unpubl. data). Following the species listing, should population persistence surveys (see below) indicate the loss of an existing natural population of Gila springsnails on the Gila NF as a result of the proposed action, take will be considered exceeded.

As a means of determining the need for reinitiating consultation, population persistence surveys at Jordon and Alum Springs shall be conducted and reported annually to the FWS, as well as any additional impacts to Gila springsnail populations on the Gila NF as a result of the proposed action. Should the loss of one existing natural population of Gila springsnails on the Gila NF occur as a result of the proposed action, the Forest Service must reinitiate consultation for the Gila springsnail.

Effect of the Take

In the accompanying conference opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila springsnail, for the effects are not expected to appreciably reduce the survival and recovery of the species. No critical habitat has been designated for this species; therefore, none will be destroyed or adversely modified.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Gila springsnails:

1. Protect Gila springsnails on the Gila NF.
2. Protect Gila springsnail habitat on the Gila NF.
3. Monitor Gila springsnail populations on the Gila NF.

TERMS AND CONDITIONS

Following the species listing or designation, in order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering (i.e., road management), Fire Management, and Recreation programs to minimize or eliminate adverse effects to the Gila springsnail.
- 1.2 Assess trail locations and develop projects to reduce impacts of trails to Gila springsnails.
- 1.3 Develop a Jordon Springs Management Plan for recreation use. This may

include the placement of a trail head sign identifying sensitive areas, as well as other education material.

- 1.4 Remove Jordon Springs from web site list of top 5 hot springs on the Gila NF. Also include educational information on the impacts of soap, shampoo, lotions, and other recreational chemicals on Gila springsnail populations.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Manage for properly functioning riparian areas with Gila Springsnails populations, which includes the protection of soil, water, vegetation, and fish and wildlife resources.
- 2.2 Design projects within the Engineering (i.e., road management), Fire Management, and Recreation programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied Gila springsnail habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and on-going research efforts, implement a monitoring plan to survey annually for the persistence of Gila springsnail populations at Jordon and Alum Springs, as well as to monitor additional impacts to Gila springsnail populations on the Gila NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall annually track and report the effects of the proposed action on Gila springsnails, pursuant to 50 CFR §402.14(i)(3)). In combination with 3.1 above, this information will be used to determine when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to Gila springsnails.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

This conference opinion does not prohibit the Forest Service from taking an action that may have adverse effects on the Gila springsnail. However, Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation

recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS advises the Gila NF to consider implementing the following conservation recommendations to avoid likely future conflict:

1. Work cooperatively with other agencies, researchers, and other organizations to gather information on population demographics, habitat requirements, water quantity and quality, and other potentially limiting factors for the Gila springsnail.
2. Work cooperatively with the FWS to develop and implement a Candidate Conservation Agreement (CCA) for the Gila springsnail. Identify and secure funding sources and technical expertise necessary to implement a conservation strategy.
3. Continue livestock exclosures from occupied Gila springsnail sites.
4. Protect existing Gila springsnail habitat from potentially harmful activities and coordinate with interested parties regarding any future potential spring head modifications or management actions.
5. Evaluate the need to conduct reintroduction or transplantation efforts, develop captive propagation and transplantation techniques, and identify potential reintroduction and transplantation sites.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

NEW MEXICO SPRINGSNAIL

STATUS OF THE SPECIES

The information used to describe the status of the species and environmental baseline was gathered from the 2004 Candidate Assessment and Listing Priority Assignment Form for the New Mexico springsnail (*Pyrgulopsis thermalis*), unless otherwise referenced.

Description

The New Mexico springsnail (*Pyrgulopsis thermalis*) is a freshwater gastropod known from a series of thermal springs along the Gila River in southwestern New Mexico. The species is an entirely aquatic species with a broad, conical shell, 1.5 - 2.0 mm long.

Legal Status: In 1994, the FWS listed the New Mexico springsnail as a candidate species for addition to the List of Endangered and Threatened Wildlife and Plants under the ESA of 1973, as amended. Candidates are those species for which the FWS has gathered enough information to warrant a listing of threatened or endangered, but the listing has been precluded by other agency priorities. The New Mexico springsnail has been assigned a listing priority number of 11, within a range of 1-12, with 1 being the highest priority number.

The New Mexico springsnail is listed as a Group 2 New Mexico state endangered species. Group 2 species are those "...whose prospects of survival or recruitment within the state are likely to become jeopardized in the near future" (New Mexico Department of Game and Fish 1988). Under the New Mexico Wildlife Conservation Act, the taking of such species is prohibited except under the issuance of a scientific collecting permit. The New Mexico Wildlife Conservation Act does not provide for habitat protection.

Distribution and Abundance

The New Mexico springsnail is known from two separate populations within the spring-brook systems of the Gila NF. Springsnail populations occur along the East Fork of the Gila River, and at an isolated thermal spring (Alum Spring) on the main stem of the Gila River, approximately two miles (3 km) downstream of the East Fork confluence (U.S. Forest Service 2004). The New Mexico springsnail co-occurs with the federal candidate species, the Gila springsnail (*Pyrgulopsis gilae*).

Populations of the New Mexico springsnail were reported as stable in October 2001 and June 2002 (New Mexico Department of Game and Fish 2002). To date, the springsnail species has not been extirpated from any known site.

Habitat

At the isolated Alum Spring, the New Mexico springsnail inhabits thermal waters of spring outflows along vertical cliffs adjacent to the Gila River. Water temperatures range from 91-100 °F (33-38°C). Principal spring outflows are too hot (greater than 38°C) for the snails (Taylor 1987). The population of New Mexico springsnails along the East Fork of the Gila River inhabit thermal waters of vertical rock faces at temperatures of 100-102°F (38-39°C), but are more abundant in cooler, lower gradient lotic habitats with thermal conditions similar to the isolated Alum Spring (Lang 1998).

The Gila Springsnail (*Pyrgulopsis gilae*) occurs at all New Mexico springsnail sites, although the two species are typically segregated to cool and warm water microhabitats, respectively (Stefferdud 1986). Both species occur in thermal waters, yet Gila springsnails do not inhabit the warm waters of the New Mexico springsnail's vertical rock habitat.

Life History

Other than general habitat associations, little is known of the specific natural history of New Mexico springsnails. Most freshwater gastropods are herbivores or detritivores, which consume algae, bacteria, and decaying organic material, and may passively ingest small invertebrates while feeding. The New Mexico springsnail is a hydrobiid species that respire via an internal gill, with some oxygen absorption through the mantle (soft body). Hydrobiid snails are sexually dimorphic (females being the larger sex) and reproduce several times during the breeding period (spring-fall). While longevity is variable, most prosobranch snails (snails that have gills and an operculum) live nine to 15 months (Taylor 1987, Pennak 1989, Brown 1991).

Population Dynamics

The Gila River mainstem population (Alum Spring) of New Mexico springsnails occurs in the Gila Wilderness, administered by the Gila NF. Most of the East Fork Gila River populations of springsnails occur on Gila NF lands, within a corridor extending approximately two miles upstream of the Gila River mainstem (U.S. Forest Service 2004). In October of 2001 and June of 2002, the NMDGF reported populations of New Mexico springsnails to be stable. Also, the FWS has no documentation that any New Mexico springsnail populations have been extirpated.

Reasons for Candidate Listing

A 12-month finding for the New Mexico springsnail was warranted, but precluded on April 15, 1994. To date, the New Mexico springsnail is listed as a candidate species. The species was included in the Annual Description of Progress on Listing Actions on June 13, 2002.

Although populations of the New Mexico springsnail appear to be stable, the species' very limited distribution magnifies the threats imposed upon the species. The natural or human-induced destruction, modification, or curtailment of New Mexico springsnail habitat represents the primary threat to the species.

Threats: New Mexico springsnail populations are potentially impacted by factors likely to destroy, damage, or modify springs, riparian areas, upland watersheds, groundwater, or the springsnails themselves. A variety of potential threats to New Mexico springsnail populations and their habitats have been identified by the NMDGF, including "natural stochastic events (forest fire, flooding, and sedimentation), poor watershed management, and water pollution/contaminants from recreational bathing and fire suppressant chemicals..."(New Mexico Department of Game and Fish 2000).

The limited geographic range and isolation of occupied springsnail areas increases the species vulnerability to extinction, and may result in decreased genetic diversity. Because populations of the New Mexico springsnail are limited to two locations, both human-induced and stochastic events such as floods, severe droughts, contamination events, or fires could result in the extirpation of one or both populations.

Poor watershed management practices, contamination, and wetland habitat degradation represent a significant threat to the New Mexico springsnail. Recreational use and livestock grazing in and near the springs can have a significant impact on the quality of springsnail habitat. Livestock use often results in the degradation and contamination of thermal springs (U.S. Forest Service 2004). Also, New Mexico springsnails are potentially threatened by wildfires in the Gila NF. Chemical retardants used to suppress fires may be toxic to aquatic species (McDonald and Hamilton 1995). In addition, large amounts of ash resulting from forest fires can alter nutrient levels within the spring systems, affecting the amount of dissolved oxygen available to springsnails. Such impacts have the potential to negatively affect snail populations and result in local extirpations.

Conservation Measures

The long-term persistence of the New Mexico springsnail is contingent upon protection of the riparian corridor immediately adjacent to springhead and spring run habitats, thereby ensuring the maintenance of perennial, oxygenated flowing water within the species' required thermal range (Lang 1998; Taylor 1987). The FWS directs conservation efforts to species identified as candidates for listing under the ESA. Conservation efforts include species habitat and ecosystem protection, as a means to reduce the need to list candidate species as endangered or threatened. In the 1980's, attempts were made to develop a conservation agreement for the New Mexico springsnail and Gila springsnail with the Forest Service and the NMDGF. Attempts at such a conservation agreement were not successful. Since that time, other species have been of higher priority.

Currently, all occupied New Mexico springsnail sites are excluded from livestock grazing. Excluding livestock from riparian areas, particularly thermal springs, helps maintain springsnail habitat and protect water quality.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Both populations of New Mexico springsnails occur on lands administered by the Gila NF, including one site within the Gila Wilderness. The NMDGF (2002) reported populations of New Mexico springsnails to be stable as of June 2002. There has been no recent documentation of extirpation of New Mexico springsnail populations or reductions in population numbers.

Factors Affecting the Species within the Action Area

The areas inhabited by the New Mexico springsnail are subject to recreational use. Such activities may result in reductions in water quality, increased sedimentation, reduced spring flow, and temperature changes. These impacts can alter the habitat of New Mexico springsnails and threaten their population stability. The impacts of recreational use at Alum Springs were

described in 2001 sampling results. Areas where recreational bathers created pools, the springs downstream of these pools yielded empty shells of New Mexico springsnails. Such physical disturbance and potential for water contamination from personal hygiene cleansers, may limit the species' ability to re-colonize the spring run from up gradient source populations where the species is more abundant (U.S. Forest Service 2004).

With increasing frequency and severity of wildfires in the Gila NF, contamination of spring areas from retardant chemicals used for fire suppression may negatively affect springsnails. In addition, large amounts of ash resulting from forest fires can affect the nutrient levels of the springs. Large amounts of ash add nutrients to spring systems, which alter the balance between algae and invertebrate communities. Significant increases in algae can change the amount of dissolved oxygen available to springsnails and other invertebrates. These factors, when combined with natural events such as drought, forest fire, sedimentation, and flooding may further imperil springsnail populations (McDonald and Hamilton 1995).

EFFECTS OF THE ACTION

The S&Gs listed in the Gila NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the New Mexico springsnail and their spring habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Forest Service management on the Gila NF may potentially impact New Mexico springsnails and their habitats by alterations to springs, riparian areas, upland watersheds, and groundwater; as well as direct impacts to the springsnails themselves.

Table 155. Summary of S&Gs considered for the New Mexico springsnail.

National Forest	Standards and Guidelines
Gila	841-842, 844-851, 857-871, 873-876, 878, 880, 957c-d, 957a-b
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-41, 1445, 1449, 1453-56, 1458-59, 1461-1465, 1468, 1473-74, 1476, 1486, 1487-92, 1495, 1499-1501, 1504-09, 1510-15

Gila National Forest

New Mexico springsnails are limited to two known population sites on the Gila NF. Thus, all occupied sites occur within the action area. Each of the springsnail sites occur in Management Area 8A; one occupied site occurs in wilderness area and the other site in non-wilderness area.

The S&Gs within the Gila NF LRMP emphasize the protection and improvement of riparian habitats and riparian-dependent resources in non-wilderness areas. Approximately 86 percent of the S&Gs have a positive impact on the New Mexico springsnail. Yet, no forest-wide S&Gs specifically address the conservation or protection of the species. In particular, few S&Gs are relevant to the conservation of New Mexico springsnails within wilderness areas. No management direction is identified to regulate or eliminate recreation-related activities in

wilderness areas that may impact this species. In addition, Management Area 8A does not provide specific S&Gs that emphasize riparian and aquatic resource consideration or conservation in project planning (U.S. Forest Service 2004). The long-term survival of New Mexico springsnails is dependent upon the protection of riparian habitats adjacent to springheads and spring runs.

Less than 3 percent of the S&Gs within the Gila NF LRMP have the potential for sublethal effects to the New Mexico springsnail. However, these S&Gs may potentially destroy, damage, or modify springs, riparian areas, upland watersheds, groundwater, or the springsnails themselves (U.S. Forest Service 2004). Direct effects may include dislodging and crushing of individual springsnails.

Table 156. Effects of the S&Gs analyzed for the New Mexico springsnail - Gila NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	0	0
-2	S&G is causing sublethal response	1	2.8
-1	S&G is causing negative behavioral response	0	0
0	S&G is ill-defined and/or open to interpretation	1	2.8
1	S&G is maintaining habitat & providing at least minimal recovery	31	86.1
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	1	2.8
Z	S&G implementation is non-discretionary	2	5.6
X	S&G is a heading	0	0
Total		36	100 %

Engineering Program

The Engineering Program of the Gila NF LRMP includes the construction, maintenance and operation of roads. Such activities could potentially result in alterations to riparian and aquatic habitats by generating sediments, altering runoff regimes, contaminating surface waters, and by facilitating access by humans to occupied springsnail habitats. However, based on a cursory inspection of Gila NF maps, existing roads do not appear to be particularly abundant in the vicinity of New Mexico springsnail sites or their immediate sub-watersheds (U.S. Forest Service 2004).

No applicable S&Gs within the Engineering Program have a negative effect on New Mexico springsnails. Standard and Guidelines 842 and 957c direct the implementation of site-specific actions that have a positive effect on New Mexico springsnails. Standard and Guideline 842 maintains spring habitat in non-wilderness areas by restricting road construction in riparian areas. This management direction has a positive effect on springsnail habitat, and indirectly supports the recovery of the species in non-wilderness areas. The New Mexico springsnail site at

Alum Spring (Management Area 8A) has been specifically identified as threatened by recreational bathing. Recreational use of Alum Spring is facilitated by the close proximity of a developed trail. Facilities management S&G-957c of the Engineering Program permits the relocation of the transportation system, including trails, for resource protection within or outside of wilderness areas. This S&G could help minimize the threat of recreational activities, and reduce the likelihood of spring contamination. New Mexico springsnails have a positive exposure/response to S&Gs 842 and 957c.

Fire Management Program

Fire management on the Gila NF includes fire prevention, fire suppression, and fire use. Wildfires in the southwest are getting larger and more intense, primarily due to the density of trees and accumulated dead woody debris on National Forest System lands (U.S. Forest Service 2004). Such catastrophic fire has been identified as one of the primary threats to the New Mexico springsnail and its habitat (e.g. burning riparian areas and subsequent ash and sediment flow into habitats).

No applicable S&Gs within the Fire Management Program have a negative effect on New Mexico springsnails. Standard and Guidelines, 844, 845, and 865 cause a positive response in New Mexico springsnails by maintaining habitat or providing at least minimal recovery to the species. Standard and Guideline 865 applies to non-wilderness areas, and emphasizes the need to rehabilitate soils following wildfires. Indirectly, such guidance protects and restores watershed conditions, including spring habitats.

Standard and Guidelines 844 and 845 are related to fire prevention activities within wilderness areas, including planned prescribed fire. Such activities aim to reduce the likelihood of catastrophic, high intensity fires. However, prescribed fire on the Gila NF may have short-term negative effects on New Mexico springsnail populations. Ash resulting from forest fires can threaten the quality of New Mexico springsnail habitat. Standard and Guideline 844 directs prescribed fire in wilderness areas, mimicking natural fires. The management direction of S&G 845 also directs the use of prescribed fire, but does not consider New Mexico springsnails or other wildlife concerns in managing prescribed fire within wilderness areas (Alum Spring). Although the guidance of S&Gs 844 and 845 aims to prevent catastrophic fire events, the implementation of such management direction may have a short-term negative effect upon New Mexico springsnails within these wilderness areas.

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on National Forests lands (U.S. Forest Service 2004). Livestock grazing on the Gila NF can indirectly impact New Mexico springsnails through the alteration of watersheds and spring habitats. Livestock grazing can also directly impact springsnails through trampling, and contamination and degradation of springs.

Standard and Guideline 957d provides guidance for range improvements projects through the construction or reconstruction of spring developments. Range improvements may include the use of spring boxes, which provide water to cattle and wildlife. Such spring development affects riparian and aquatic habitats by altering water flow. Standard and Guideline 957d applies to

Management Area 8A, which covers the entire range of the New Mexico springsnail. Site-specific implementation of spring developments under S&G 957d may have a negative effect upon spring habitat and New Mexico springsnails. However, the impacts of livestock grazing on springsnail habitat and/or the springsnails themselves are currently avoided due to the exclusion of livestock in occupied New Mexico springsnail habitat.

Standard and Guideline 868 of the Wildlife Program directs management to maintain or enhance habitat requirements of sensitive species into the implementation plans for range improvement projects within non-wilderness areas. The Forest Service has classified the New Mexico springsnail as a sensitive species. Under the direction of S&G 868, habitat requirements for the New Mexico springsnail are included in the implementation planning for construction or reconstruction of spring developments. This standard minimizes the negative effect of range improvement projects on New Mexico springsnails located within non-wilderness areas. In addition, activity trends with the Rangeland Management Program favor fewer numbers of structural improvements and acres of non-structural improvements, further reducing the effect of range improvement projects upon New Mexico springsnails and spring habitats (U.S. Forest Service 2004).

Standard and Guidelines for non-wilderness areas include rangeland management direction for protecting riparian resources. Standard and Guideline 858 directs the management of grazing in non-wilderness areas to provide for the improvement of riparian areas. By emphasizing the protection of riparian areas, which includes New Mexico springsnail habitat, S&G 858 has a positive effect upon the species. However, the implementation of range improvement projects to improve riparian areas may also have a short-term negative effect upon New Mexico springsnails. Yet, all occupied New Mexico springsnail sites (Management Area 8A) are within areas closed to livestock grazing, including the Alum Springs wilderness area; thus, preventing short-term negative impacts to spring habitats and New Mexico springsnails.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites within the National Forests and National Grasslands of the Southwestern Region. Recreation-related activities have been identified as a potential threat to New Mexico springsnails through degradation and contamination of thermal springs. Recreational trends for the Gila NF show visitor use of the Forest to be relatively low in comparison to other National Forests in the Southwestern Region. However, dispersed recreation is proportionately higher than most other National Forests in the Southwestern Region. In addition, The Gila NF Plan states, “the primary recreational use within wilderness areas occurs within areas adjacent to perennial streams and river bottoms” (U.S. Forest Service 2004).

Forest-wide S&Gs for the Gila NF include direction for managing recreational use of riparian habitats to avoid damage to riparian resources. Specifically, S&G 859 limits recreational use of riparian habitats in non-wilderness areas to those activities that do not adversely affect riparian resources. Recreational use of springs may result in increased sedimentation, reduced spring flow, temperature changes, and poor water quality. S&G 859 will have a positive effect upon New Mexico springsnails, and work towards the recovery of the species in all non-wilderness sites of the Gila NF.

No management direction in the Recreation Program relates to recreational use in wilderness areas. The New Mexico springsnail site at Alum Springs is located within the wilderness area of Management Area 8A, and has been documented as threatened by recreational bathing. The use of Alum Springs is facilitated by the proximity of a developed trail. No guidance within the Recreation Program directs the regulation of recreation-related activities in wilderness areas that may impact New Mexico springsnails (U.S. Forest Service 2004). However, management direction for the Engineering Program may reduce the negative effects of recreationists at Alum Springs. Specifically, S&G 957c for Management Area 8A permits the relocation of the transportation system, including trails, for resource protection. This S&G provides direction that would support the conservation of New Mexico springsnails at Alum Springs by reducing recreational use levels.

Watershed Management Program

Objectives of the Watershed Management Program include improving and maintaining water quality; protecting and restoring riparian areas; and prioritizing watersheds for protection or improvement. Structural and non-structural measures are used maintain and improve watershed conditions. Measures affecting New Mexico springsnails and spring habitats include fencing to exclude livestock from riparian areas; prescribed burns; road obliteration; and other soil and water improvement activities (U.S. Forest Service 2004).

No S&Gs for the Watershed Management Program have a negative effect upon New Mexico springsnails. The majority of S&Gs emphasize the protection and restoration of riparian areas and associated watersheds. Forest-wide S&Gs 863, 874, and 875 emphasize the protection of water quality and the implementation of watershed restoration projects. Standard and Guidelines 864 and 876 direct activities to control and minimize erosion and soil loss. These S&Gs have a positive effect upon Gila springsnails by protecting spring habitat and associated watersheds.

Wildlife, Fish, and Rare Plants Program

No S&Gs under the Wildlife Program specifically direct the implementation of site-specific actions to protect or improve New Mexico springsnail habitat. Much of the guidance under the Wildlife Program pertains to the restoration and protection of aquatic and riparian habitats. The S&Gs are almost entirely restricted to non-wilderness areas; thus excluding the occupied Alum Springs site.

A majority of applicable S&Gs within the Wildlife Program provide guidance for maintaining species habitat or providing minimal recovery of the species. For Management Area 8A, S&Gs 957a and 957b focus on improving wildlife habitat. Standard and Guideline 957b emphasizes the implementation of threatened and endangered species habitat improvements, and specifically identifies the species of concern within Management Area 8A, which includes the New Mexico springsnail. Additional forest-wide S&Gs, including 846, 847, 850, 851, and 868 also provide guidance for managing riparian dependent resources to protect and improve the productivity of such resources. Emphasis is placed upon the protection of soil, water, vegetation, and fish and wildlife resources within riparian areas. Standard and Guideline 851 gives preferential consideration to riparian-dependent resources over other resources (U.S. Forest Service 2004). Standard and Guideline 868 directs the precedence of sensitive species habitat requirements over other species. Standard and Guideline 870 provides direction for site-specific activities that

work towards recovery of the species. This S&G directs the reintroduction of threatened and endangered species, and proposed species such as the New Mexico springsnail, into suitable habitats to improve the status of the species.

Under the Wildlife Program, most of the S&Gs applicable to New Mexico springsnails direct the restoration and protection of riparian habitats within non-wilderness areas. Yet, one of the two New Mexico springsnail sites occurs in wilderness areas; the occupied site at Alum Springs. Also, no guidance for Management Area 8A emphasizes riparian and aquatic resource conservation. However, forest-wide S&G 841 provides guidance for maintaining the vegetative diversity of riparian areas in wilderness areas. Such management direction promotes a healthy ecosystem, and has a positive effect upon New Mexico springsnails and their aquatic environment.

Standard and Guideline 848 provides direction on improving unsatisfactory riparian areas. The S&G directs the improvement of riparian areas, including spring habitats to satisfactory condition by the year 2030, and defines the requirements of satisfactory riparian conditions. Improvements to unsatisfactory riparian areas are beneficial to New Mexico springsnails. However, the satisfactory conditions and timeframe listed under S&G 848 may have short-term negative effects to spring habitats and New Mexico springsnails.

In summary, the management direction of the Gila NF LRMP provides for the protection of riparian areas, including the springheads and spring runs occupied by the New Mexico springsnail. However, a few specific guidelines within the Recreation and Fire Management programs are likely to adversely affect the springsnail. Riparian areas in non-wilderness and wilderness areas of Management Area 8A are not adequately protected from the negative impacts of recreational use. Continued recreational activities at Alum Springs are likely to directly crush springsnails and alter spring habitat by contributing to poor water quality. The implementation of the Gila NF LRMP is also likely to have a short-term adverse effect on both New Mexico springsnail populations from the effects of prescribed fire activities. Prescribed fire contributes to poor water quality resulting from excess ash. The implementation of the Gila NF LRMP's Recreation and Fire Management programs contribute to the likelihood of adverse effects to the New Mexico springsnail.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). New Mexico springsnail sites occur within the Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are applicable to New Mexico springsnails and springs habitat. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 157. Effects of the S&Gs analyzed for the New Mexico springsnail - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	2
-2	S&G is causing sublethal response	0	0
-1	S&G is causing negative behavioral response	2	4
0	S&G is ill-defined and/or open to interpretation	2	4
1	S&G is maintaining habitat & providing at least minimal recovery	28	56
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	9	18
Z	S&G implementation is non-discretionary	2	4
X	S&G is a heading	6	12
Total		50	100 %

All of the S&Gs in the 1996 Regional Amendment lie under the Wildlife Program; yet the content of the S&Gs applies to several program activities. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat, and provide for minimal recovery of these species. While not a focus of the Amendment, the S&Gs have the potential to affect other threatened and endangered species. In the case of the New Mexico springsnail, 56 percent of the S&Gs have positive effects on the species while 6 percent of the S&Gs adversely impact New Mexico springsnails and their spring habitats.

Within Mexican Spotted Owl protected areas, S&G 1438 allows for the level of recreational use that occurred prior to the threatened listing of the owl. Depending on the location of recreational activities, such a level of use adversely affects New Mexico springsnail habitat. Recreational activities at Alum Springs directly impact springsnails and their habitats by dislodging the snails from their substrate and crushing individual snails. New Mexico springsnails are indirectly effected through destruction of spring habitat and poor water quality resulting from bathing contaminants. Continued recreational use of these sites may negatively affect on New Mexico springsnails.

Within Northern Goshawk habitat, S&Gs 1505 and 1507 apply to post-fledgling family areas and nesting areas. These S&Gs provide direction for maintaining existing canopy cover levels within woodland habitat. Existing woodland habitat consists mainly of pinion juniper, which contributes to poor watershed conditions through soil loss. Unhealthy watersheds indirectly threaten New Mexico springsnails through the destruction of springs habitat. Thus, maintaining current levels of pinion juniper under S&G 1505 and 1507 guidance is likely to have an adverse effect on New Mexico springsnails.

In general, the S&Gs of the 1996 Regional Amendment emphasize the maintenance and restoration of healthy riparian ecosystems. In particular, S&Gs minimize the threats of livestock

grazing by directing grazing management to maintain and restore riparian ecosystems (S&G 1474), and ensure the recovery and continued existence of threatened and endangered species (S&G 1510). Within Northern Goshawk habitats, S&Gs 1488 and 1490 provide guidance for maintaining satisfactory soil conditions, minimizing soil compaction, and restoring degraded riparian areas. These S&Gs of the 1996 Regional Amendment have a positive impact upon Gila springsnails and their spring habitat.

Fire has been identified as a potential threat to New Mexico springsnails and springs habitats. Standard and Guidelines 1468 and 1474 permit the implementation of prescribed fire within protected and restricted areas of Mexican Spotted Owl habitat, respectively. Standard and Guideline 1458 applies to Reserved Lands, which include Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas. These S&Gs encourage prescribed fires to reduce hazardous fuel accumulation, and permit thinning before burning to reduce ladder fuels and the risk of crown fire. Such activities have the potential to cause short-term adverse effects upon New Mexico springsnails. Large amounts of ash associated with forest fires can add nutrients to spring systems, altering the balance between algae and invertebrate communities. Significant increases in algae can change the amount of dissolved oxygen available to springsnails and other invertebrates. However, the long-term effects of prescribed fire are beneficial to the species. Prescribed fires reduce fuel loads and prevent catastrophic fires that would negatively affect New Mexico springsnails and their spring habitat. Therefore, S&Gs 1468, 1458, and 1474 have a long-term positive effect on New Mexico springsnails.

In summary, the management direction of the 1996 Regional Amendment provides for healthy functioning riparian and aquatic systems. However, a few specific guidelines associated with recreation and fire activities are likely to adversely affect New Mexico springsnail populations in Mexican Spotted Owl protected areas. Recreational activities occurring at Alum Springs contribute to poor water quality and the dislodging and crushing of individual springsnails. Prescribed fire activities within protected and restricted of Mexican Spotted Owl habitat are likely to have a short-term impact on New Mexico springsnail habitat through poor water quality resulting from excess ash. These factors contribute to the likelihood of adverse effects to the New Mexico springsnail through the implementation of the Gila NF LRMP.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this conference opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

No cumulative effects upon the New Mexico springsnail are anticipated. All occupied New Mexico springsnail sites are located on Forest Service lands. Therefore, all effects to the species are associated with the S&Gs of the Gila NF and 1996 Regional Amendment.

CONCLUSION

After reviewing the current status of the New Mexico springsnail (*Pyrgulopsis thermalis*), the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's conference opinion that the Gila NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the New Mexico springsnail. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

All known populations of New Mexico springsnails occur on lands administered by the Gila NF. Although populations of New Mexico springsnails are small, surveys in 2001 and 2002 show the populations to be stable (New Mexico Department of Game and Fish 2002). Also, there has been no recent documentation of New Mexico springsnail extirpation from any known site. Adverse effects to the New Mexico springsnail may occur from the continued implementation of the Gila NF LRMP and 1996 Regional Amendment. However, the FWS does not believe that impacts to the species will rise to the level of jeopardy.

The majority of S&Gs in the Gila NF and 1996 Regional Amendment emphasize the protection and restoration of riparian areas and associated watersheds. Forest Service activities under the direction of these S&Gs are not likely to affect the continued existence of New Mexico springsnails. Within Management Area 8A, S&G 957b specifically identifies the New Mexico springsnail for habitat improvement projects. Also, S&G 868 directs the precedence of maintaining sensitive species habitat over other species. Although fire may pose a short-term threat to New Mexico springsnails, S&Gs 844 and 865 provide management direction for prescribed fires in wilderness and non-wilderness areas to avoid catastrophic fires, which pose a higher, more significant risk to the species. Implementing the management guidance provided in these S&Gs would maintain and protect New Mexico springsnails and spring habitat, as well as minimize adverse effects of Forest Service activities.

New Mexico springsnails at Alum Springs occur within a wilderness area. Within the the Gila NF and 1996 Regional Amendment, few S&Gs direct the protection of New Mexico springsnails and their habitats within wilderness areas. In particular, no forest-wide S&Gs emphasize riparian and aquatic resource conservation in project planning, or the regulation of recreation-related activities in wilderness areas. However, management of the wilderness resource, as stated in the Gila NF LRMP, is directed toward protecting and restoring natural conditions and maintaining the physical and biological characteristics of the wilderness environment (U.S. Forest Service 1986). Such management direction guides for the conservation of New Mexicopringsnails in wilderness areas through the protection and improvement of natural riparian habitat conditions. In addition, multiple forest-wide S&Gs emphasize restoring and protecting riparian dependent resources. Therefore, the continued implementation of the Gila NF and 1996 Regional Amendment is not likely to jeopardize the continued existence of the New Mexico springsnail.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

As a candidate species, the prohibitions against taking the New Mexico springsnail found in section 9 of the ESA (as stated above) do not apply until the species is listed. However, the FWS advises the Forest Service to consider implementing the reasonable and prudent measures defined in this conference opinion to conserve the species and preclude listing. If this conference opinion is adopted as a biological opinion following a listing or designation, the measures described below, with their implementing terms and conditions, will be non-discretionary. These measures must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the New Mexico springsnail is reasonably certain to occur as a result of the continued implementation of the Gila NF LRMP and the 1996 Regional Amendment. The FWS anticipates incidental take of New Mexico springsnails will be in the forms of direct mortality, harm, and harassment to the species. Direct mortality and harm to the species is anticipated through death or injury from the crushing of individual snails, the poisoning of springsnails, and the impairment of essential behavior patterns, including but not limited to, breeding, feeding, or sheltering, due to spring habitat modification and destruction. The proposed action is likely to take New Mexico springsnails in the form of harass by significantly disrupting normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

The FWS is reasonably certain that high recreational use of Alum Springs is likely to kill, harm and harass the species. The use of Alum Spring by bathers and recreationists has been identified

as disrupting water flow and correlated with localized absence of the species (Lang 2002). There are no specific S&Gs within the Gila NF LRMP or 1996 Regional Amendment that regulate recreation-related activities in wilderness areas. Although management guidance included in the Gila NF LRMP permits the relocation of trails for resource protection, it does not ensure protection of New Mexico springsnail habitat in wilderness areas from the adverse effects associated with allowed recreational activities. As a result, the proposed action is likely to kill, harm, or harass New Mexico springsnails.

The FWS is also reasonably certain that prescribed fires are likely to harm New Mexico springsnails. These activities disrupt watershed function and degrade water quality. The alteration and destruction of spring habitat is likely to impair essential behavior patterns of New Mexico springsnails. Although many S&Gs manage for the protection of riparian-dependent resources, S&Gs also direct the use of prescribed fires. As a result, direct harm to New Mexico springsnails is likely to occur with the continued implementation of the Gila NF LRMP and 1996 Regional Amendment.

Quantifying anticipated take of New Mexico springsnails at occupied sites on the Gila NF is difficult; partially because precise density estimates are not currently known for the species. In addition, the springsnail exhibits seasonal variation in numbers and occurs in patchy distributions throughout a given population. Determining an estimate of anticipated take is further complicated by the difficulty in detecting snails. Incidental take of the New Mexico springsnail will be difficult to detect for the following reasons: the species has small body size, losses may be masked by seasonal fluctuations in water quality, and the species occurs in habitat that makes detection difficult. Based on the high variation in density estimates, the variability in spatial and temporal distribution of the species in spring habitats, and the difficulty in detecting dead or moribund snails, the FWS can not provide an estimate of the number of individual springsnails that would be taken as a result of the proposed action.

Because it is not feasible or reasonable to anticipate the number of individual springsnails that may be taken, the FWS has defined the extent of take to include all springsnails within the pools utilized by recreational bathers at Alum Springs. These areas occur downstream of the springhead, which supports the core population of springsnails. Upon listing of the species, the status of New Mexico springsnail populations on the Gila NF and the impacts of the proposed action will be assessed annually for the life of the biological opinion. Density estimate surveys for both populations of New Mexico springsnails on the Forest shall be conducted and reported annually to the FWS, as a means of determining the need for reinitiating consultation. Should annual density estimates of the core population at Alum Spring or the population along the East Fork of the Gila River show a downward trend within a three consecutive year period, as a result of the proposed action, the Forest Service must reinitiate consultation for the New Mexico springsnail.

Effect of the Take

In the accompanying conference opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the New Mexico springsnail, for the effects are not expected to appreciably reduce the survival and recovery of the species. No critical habitat has been designated for this species; therefore, none will be destroyed or adversely modified.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of New Mexico springsnails:

1. Protect New Mexico springsnails on the Gila NF.
2. Protect New Mexico springsnail habitat on the Gila NF.
3. Monitor New Mexico springsnail populations on the Gila NF.

TERMS AND CONDITIONS

Following the species listing or designation, in order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering (i.e., trail management), Fire Management, and Recreation programs to minimize or eliminate adverse effects to the New Mexico springsnail.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design projects within the Engineering (i.e., trail management), Fire Management, and Recreation programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied New Mexico springsnail habitat.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and on-going research efforts, implement a monitoring plan to conduct annual density estimate surveys of known New Mexico springsnail populations on the Gila NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall annually track and report the effects of the proposed action on New Mexico springsnails, pursuant to 50 CFR §402.14(i)(3)). In combination with 3.1 above, this information will be used to determine when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to New Mexico springsnails.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed

action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

This conference opinion does not prohibit the Forest Service from taking an action that may have adverse effects on the Gila springsnail. However, Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS advises the Gila NF to consider implementing the following conservation recommendations to avoid likely future conflict:

1. Work cooperatively with other agencies, researchers, and other organizations to gather information on population demographics, habitat requirements, water quantity and quality, and other potentially limiting factors for the New Mexico springsnail.
2. Work cooperatively with the FWS to develop and implement a Candidate Conservation Agreement (CCA) for the New Mexico springsnail. Identify and secure funding sources and technical expertise necessary to implement a conservation strategy.
3. Continue livestock exclosures from occupied New Mexico springsnail sites.
4. Protect existing New Mexico springsnail habitat from potentially harmful activities and coordinate with interested parties regarding any future potential spring head modifications or management actions.
5. Evaluate the need to conduct reintroduction or transplantation efforts, develop captive propagation and transplantation techniques, and identify potential reintroduction and transplantation sites.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

THREE FORKS SPRINGSNAIL

STATUS OF THE SPECIES

The information used to describe the Status of the Species and Environmental Baseline was gathered from the 2004 Candidate Assessment and Listing Priority Assignment Form for the Three Forks springsnail (*Pyrgulopsis trivialis*), unless otherwise referenced.

Description

The Three Forks springsnail (*Pyrgulopsis trivialis*) is a freshwater gastropod limited to two spring complexes within the Apache-Sitgreaves NF in east central Arizona. The species inhabits the springs and spring outflows of Boneyard Bog Springs and Three Forks Springs within the North Fork East Fork Black River watershed (NFEFBR). Three Forks springsnails are approximately 1.5 - 4.5 mm in shell height.

Legal Status: In 2000, the FWS listed the Three Forks springsnail as a candidate species for addition to the List of Endangered and Threatened Wildlife and Plants under the ESA of 1973, as amended. Candidates are those species for which the FWS has gathered enough information to warrant a listing of threatened or endangered, but the listing has been precluded by other agency priorities. The Three Forks springsnail has been assigned a listing priority number of 2, within a range of 1-12, with 1 being the highest priority number.

The Three Forks springsnail is listed under Arizona Game and Fish Commission Order 42, which establishes no open season for the species. The Order prohibits the direct taking of the springsnail, but does not prohibit spring modification or habitat destruction.

Distribution and Abundance

The Three Forks springsnail is an endemic species with distribution limited to Three Forks Springs and Boneyard Springs. These two spring complexes are separated by approximately 5 miles (8 km), and lie in different sub-watersheds of the NFEFBR watershed. The springsnail has been known from the Three Forks Springs complex since the 1970s and from the Boneyard Bog Springs complex since 1994 (Landye 1981). Within each of these complexes, the Three Forks springsnail is known from free-flowing spring heads, concrete boxed spring heads, spring runs, and spring seepage.

Boneyard Bog Springs consists of a series of undeveloped springs, the outflows of which flow approximately 32.8 ft (10 m) to 328 ft (100 m) into Boneyard Creek. Three Forks Springsnails located at Boneyard Bog Springs are associated with springheads and outflows at varying distances from the springheads (Nelson et al. 2002). The species is occasionally found in portions of the mainstream (i.e. Boneyard Creek) into which the spring outflows enter. The springs at Boneyard Bog are generally smaller with less flow than those at Three Forks Spring. The Three Forks Springs complex consists of more than 10 spring heads, confined to an area of approximately 0.1 km².

No historical data is available to quantify the long-term trends in abundance or distribution of springsnails at Boneyard Bog Springs or Three Forks Springs. However, recent sampling suggests the species may be more abundant at Boneyard Bog than at Three Forks.

Habitat

Three Forks springsnail habitats are isolated, permanently saturated, spring fed aquatic communities. The most common habitat for the species is a rheocrene, or a spring emerging from the ground as a free-flowing stream. While observations during the winter at Three Forks Springs suggest water temperature at the spring heads are warmer than nearby waters not influenced by the springs, there is no indication of any temperature-related affinity of the species (U.S. Forest Service 2004). Three Forks snails are rarely found on or in soft sediment typically associated with seeps, and low-gradient, low-flow springheads. Firm substrates such as cobble, gravel, woody debris, and aquatic vegetation are more typical of springsnail habitat. Aquatic vegetation within the Three Forks Springs habitat includes watercress (*Nasturtium* spp.), buttercup (*Ranunculus* sp.), and filamentous green algae.

Life History

Three Forks springsnails are entirely aquatic and little is known of their specific biology and natural history. Information relative to habitat requirements, such as water depth, velocity, chemistry, temperature, substrate type, and food base is minimal (U.S. Fish and Wildlife Service 2000). The primary food source for the species is believed to be periphytic diatoms which are scraped from hard surfaces (Taylor 1987, U. S. Fish and Wildlife Service 2003).

Population Dynamics

Prior to being listed as a candidate species, Three Forks springsnails have been exposed to prolonged, and intensive disturbance to their habitats. In the 1930s, Civilian Conservation Corps activities at the Three Forks Springs complex likely impacted the springs and surrounding habitat with the construction of spring-boxes, road use, and human habitation (U.S. Forest Service 2004). Road development and road reconstruction has continued to occur in close proximity to the Three Forks Springs complex for many decades. Despite such disturbances, springsnails have continued to inhabit the springs and spring outflows at Three Forks Springs (Nelson et al. 2002).

Prior to 1999, springsnails at the Three Forks Springs complex were routinely observed inhabiting human-built spring-boxes, in addition to natural habitats. However, with the appearance of crayfish in 1999, Three Forks springsnails disappeared from the spring-boxes. Three Forks springsnails at the Boneyard Bog Springs complex have shown no significant decline in population numbers since the species' discovery there.

Recent monitoring surveys in 2001 and 2002 by the AGFD, Forest Service, and the FWS suggest the species may be more abundant, or at least occurs in higher densities at Boneyard Bog Springs than at Three Forks Springs. Sampling results revealed a preliminary estimate of average springsnail density at the Three Forks complex (samples pooled from 3 springs) to be approximately 60 snails/m² during the summer (Nelson et al. 2002). Individually, springs at Three Forks varied in snail densities of zero to nearly 300 snails/m². The preliminary estimate of average springsnail density at the Boneyard Bog complex (samples pooled from 6 springs) was approximately 790 snails/m² during the summer (Nelson et al. 2002). Individually, springs at Boneyard Bog varied in snail densities of approximately 90 to 9300 snails/m². Most springsnails at Boneyard Bog Springs were found within the first 5 m of the drainage from the springhead. In

contrast, springsnails at Three Forks Springs appear to have lower densities throughout the spring drainages, not concentrated near the springheads (Nelson et al. 2002).

Reasons for Candidate Listing

The FWS assigned candidate status to the Three Forks springsnail in 2000 due to the threats posed by non-native crayfish, elk impacts to habitat, and the susceptibility of the Three Forks spring complex to negative impacts from recreationists. The species was included in the Annual Description of Progress on Listing Actions on June 13, 2002.

Threats: Three Forks springsnails and their associated spring habitats are threatened by multiple factors, including non-native aquatic species, ungulates, recreational use, and natural events.

Interactions with non-native snails and other aquatic species may affect the distribution and abundance of Three Forks springsnails. Non-native crayfish (*Oronectes viriles*) have invaded springs complexes occupied by Three Forks springsnails and may pose a threat to the continued existence of the species. Crayfish are known to directly prey upon aquatic invertebrates such as springsnails. Crayfish are also known to consume aquatic macrophytes and algae that springsnails rely on for grazing and egg laying. Due to its geographic isolation, the Three Forks springsnail is not evolutionarily adapted to cope with crayfish, perhaps making the species particularly susceptible to crayfish predation.

Currently, livestock is restricted from occupied springsnail habitat. However, free-ranging elk (*Cervus elaphus*) have access to all spring areas containing Three Forks springsnails. Elk wallowing contributes to bank degradation of springs and changes in substrate composition. Specifically, wallowing may result in the filling of gravel substrates with fine sediments, which data suggests are less conducive to occupation by springsnails. Elk impacts appear benign at habitats in the Three Forks Springs complex. Yet, elk are known to congregate seasonally at Boneyard Bog Springs, resulting in soil disturbance that may alter substrate quality or directly impact springsnails.

Recreational activities affect springsnails through habitat degradation, introduction of pollutants or other contaminants, and introduction and spread of non-native aquatic organisms (U.S. Forest Service 2004). Campers and day hikers have been known to wash dishes and other camping equipment along “pull-off” areas above the spring heads of the Three Forks Springs complex. Such recreation-related activities result in the introduction of detergents, bleach, and other pollutants that can impair essential physiological processes of springsnails.

The restricted geographic distribution of Three Forks springsnails increases the species’ susceptibility to stochastic extinction. Catastrophic natural disasters such as wildfires, flooding, extreme drought, and changes in spring water chemistry may significantly alter watershed conditions within the Three Forks Creek or upper Boneyard Creek drainage systems, resulting in qualitative or quantitative changes to springsnail habitats (U.S. Forest Service 2004).

Conservation Measures

A standardized monitoring protocol for Three Forks springsnails was developed by interagency cooperators in the summer of 2001 and refined in the summer of 2002. In 2002, the AGFD, in

coordination with the Apache-Sitgreaves NF, began an intensive crayfish removal program at Three Forks Springs (Nelson et al. 2002). By 2003, thousands of crayfish had been removed from the Three Forks area. Recently, the AGFD secured a State Wildlife Grant for the conservation and management of mollusks of greatest conservation need in Arizona—which includes the Three Forks springsnail.

The Alpine Ranger District has made efforts to eliminate direct impacts on Three Forks springsnails from livestock grazing. The last permitted livestock use at Three Forks Springs (Black River allotment) was in 1997. From 1998 through 2001, the permittee voluntarily did not stock livestock on the Black River allotment. In February 2002, the permittee waived his grazing permit back to the Forest Service, restricting livestock use on the entire allotment, including all of Three Forks Creek and upstream to include Boneyard Creek immediately adjacent to the downstream side of Boneyard Bog Springs (U.S. Forest Service 2004). In 1998, the Alpine Ranger District constructed a fence around Boneyard Bog to eliminate any direct impacts to the area from permitted livestock on the Nutrioso Summer allotment. Since 2002, livestock have been precluded from direct access to Boneyard Creek upstream of Boneyard Bog Springs (U.S. Forest Service 2004).

To reduce the negative impacts associated with recreational activities, the Apache-Sitgreaves NF closed the Three Forks Springs area to public access in 2000. The administrative closure does not apply to federal, state, or local officers in the performance of an official duty, and to those persons with a permit specifically authorizing entrance to the site (U.S. Forest Service 2004). The public closure reduces the likelihood of adverse effects associated with dispersed recreation. The closure will remain in effect until rescinded by the National Forest Supervisor.

The Apache-Sitgreaves NF has contracted with the New Mexico Museum of Natural History to survey springs in the East Fork Black River watershed for springsnails and suitable springsnail habitat (U.S. Forest Service 2004).

The FWS is in the process of working with the Forest Service, AGFD, and TNC to develop a Candidate Conservation Agreement for the Three Forks springsnail.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The entire range of the Three Forks springsnail is within the action area of the Apache-Sitgreaves NF. Past and current surveys have shown springsnails to be more abundant at Boneyard Bog Springs than at Three Forks Springs. Recently, the populations of springsnails known from the Three Forks Springs complex have declined.

Factors Affecting the Species within the Action Area

Non-native crayfish have invaded several spring heads within the Three Forks Springs complex. In May 2000, field investigations at Three Forks Springs revealed the Three Forks springsnail to be entirely absent from at least two boxed spring heads, previously abundant with springsnails. The extirpation of the species from these spring boxes seems to coincide with the invasion of crayfish. The indirect effects of crayfish on the integrity and structure of aquatic habitats is well documented, and have the potential to threaten the habitat of Three Forks springsnails (Olsen et al. 1991, Biota Information System of New Mexico 2000). Also, springsnails are directly threatened by the crayfish predation. Crayfish do not occur in large numbers at Boneyard Springs.

Presently, livestock grazing is restricted from the Three Forks and Boneyard Bog Springs complexes. However, since the summers of 1999 and 2000, potential impacts of elk at Boneyard Bog Springs have become a concern for Forest Service and FWS biologists. Observations of elk within the Boneyard Bog Springs complex correlate with elk wallows, heavy grazing, and soil disturbance within the livestock enclosure. Elk impacts at the Three Forks Springs complex appear to be less damaging to riparian and aquatic habitats than those at Boneyard Bog Springs.

The NFEFBR watershed is a popular area for public recreation such as fishing, hiking, hunting, and wildlife viewing. Recreational activities have the potential to affect populations of Three Forks springsnails, particularly at the Three Forks Springs complex. This complex lies adjacent to Forest Service Road 249, and a large vehicle “pull off”. The aesthetics of the area, in conjunction with such access roads, makes the area well suited for recreationists (U.S. Forest Service 2004). To minimize the negative effects of recreation, the Apache-Sitgreaves NF closed the Three Forks Springs area to public access in 2000. Boneyard Bog Springs is less susceptible to recreational threats due to its isolation, and restricted access.

EFFECTS OF THE ACTION

The S&Gs listed in the Apache-Sitgreaves NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to Three Forks springsnails and their habitats. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Forest Service management on the Apache-Sitgreaves NF may potentially impact Three Forks springsnails and their habitats if that direction is likely to direct actions that alter the quantity or quality of waters at spring sources and rheocrene habitats (outflow streams from the springs); influence the presence of non-native species, or directly impact the snails, themselves (U.S. Forest Service 2004).

Table 158. Summary of S&Gs considered for the Three Forks springsnail.

National Forest	Standards and Guidelines
Apache-Sitgreaves	1, 2, 4, 5, 7, 9, 14, 16-18, 20, 27, 28, 31-33, 37, 39-40, 42-53, 55, 58-64, 84, 97, 99, 104, 106-08, 111-113, 115-117, 120, 130-37, 139-44, 147, 151, 166, 171-72, 177-79
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-41, 1445, 1449, 1453-56, 1458-59, 1461-1465, 1468, 1473-74, 1476, 1486, 1487-92, 1495, 1496, 1499, 1501-02, 1504, 1506, 1508-15

Apache-Sitgreaves National Forest

The entire range of the Three Forks springsnail occurs within the action area of the Apache-Sitgreaves NF. The majority of occupied springsnail habitat occurs in Management Area 3 within non-wilderness areas. The emphasis of Management Area 3 focuses on the importance and distinctive values of riparian areas. This area is managed to maintain or improve riparian areas to satisfactory condition (U.S. Forest Service 1987).

The long-term survival of the Three Forks springsnail is dependent upon the protection of riparian habitats, spring sources, and rheocrene habitats. In general, the S&Gs of the Apache-Sitgreaves NF LRMP provides management direction that promotes the conservation of soil, water, and riparian resources. Approximately 60 percent of the S&Gs are likely to have a positive impact on the Three Forks springsnail. Yet, no S&Gs within the Apache-Sitgreaves NF LRMP specifically address the conservation of the species.

Less than 12 percent of the S&Gs within the Apache-Sitgreaves NF LRMP have the potential for negative effects to the Three Forks springsnail. However, these S&Gs may alter the quantity or quality of spring habitats in which Three Forks springsnails reside, having an indirect impact to the species. Specific S&Gs may lead to activities that directly impact springsnails and their habitats by dislodging the snails from their substrate, crushing individual snails, and support the presence of non-native species.

Table 159. Effects of the S&Gs analyzed for the Three Forks springsnail - Apache-Sitgreaves NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	3	3.9
-2	S&G is causing sublethal response	2	2.6
-1	S&G is causing negative behavioral response	4	5.3
0	S&G is ill-defined and/or open to interpretation	13	17.1
1	S&G is maintaining habitat & providing at least minimal recovery	44	57.9

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	1	1.3
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	3	3.9
Z	S&G implementation is non-discretionary	3	3.9
X	S&G is a heading	3	3.9
Total		76	100 %

Engineering Program

The Engineering Program of the Apache-Sitgreaves NF LRMP includes the construction, maintenance and operation of roads. Such activities have the potential to indirectly affect Three Forks springsnails by disrupting watershed function. Road associated activities affect riparian and spring habitats by generating sediments, altering runoff regimes, contaminating surface waters, and facilitating access by humans to aquatic habitats.

Standard and Guideline 63 directs total road density within the Apache-Sitgreaves NF to average 3.5 mi/mi² or less. The S&G also directs open road density to average 2.0 mi/mi² or less. The recommended road density standard is 2.5 mi/mi²; yet, S&G 63 allows road density on the Forest to average above this standard, thus having the potential to adversely affect Three Forks springsnail habitat. In particular, road maintenance activities on Road 249 threaten the quality of springsnail habitat near the Three Forks Spring complex.

Standard and Guideline 62 provides direction for the management of roads on the Apache-Sitgreaves NF. Standard and Guideline 62 directs the seasonal or permanent closure of existing roads and prohibits off-road vehicle use when conflicts occur with wildlife and soil resource objectives. The guidance of S&G 62 also recommends limiting local road closures in erosive soil areas, riparian areas, or wildlife areas that require specific management practices. The implementation of such management guidance for the protection of wildlife resources would be beneficial to Three Forks springsnails and their spring habitat. Standard and Guideline 62 minimizes the impact of road use on Three Forks springsnails by reducing public access to Boneyard Creek and prohibiting off-road vehicle use near the Three Forks Spring complex.

Forestry and Forest Health Program

The Forestry and Forest Health Program includes timber harvest, forest product extraction, and forest health. Areas within and adjacent to Three Forks springsnail habitat are not suitable for timber harvest. Management Area 3 directs the use of vegetation manipulations when needed to enhance riparian objectives.

Few S&Gs within the Forestry and Forest Health Program are applicable to Three Forks springsnails and their spring habitats. However, S&G 64 has the potential to affect springsnail habitat by authorizing the use of clear-cutting for mistletoe control. Clear-cutting activities increase sediment run-off and erosion potential. The implementation of S&G 64 may have a negative impact on Three Forks springsnails through the alteration of spring habitat and water quality. However, according to the Forest Service (2004), there has been a major reduction in

the number of clear cut acres over the past decade. Therefore, threats to the Three Forks springsnail from clear-cutting activities are significantly reduced.

Many S&Gs within the Forestry and Forest Health Program allow for special consideration of riparian areas, which include spring habitat. Standard and Guideline 42 requires riparian areas to be mapped as separate areas when they are at least 10 acres. Defined and mapped riparian areas are managed as a sensitive resource. Therefore, Three Forks springsnail habitat is specifically managed as a riparian area receiving special consideration for the protection of riparian resources.

Lands and Minerals Program

The Lands and Minerals Program manages purchases, withdrawals, land exchanges, mining, oil, gas, and geothermal leases, and the issuance of non-recreational special use authorizations. The management and administration of minerals includes surface disturbances associated with underground mining operations, such as exploration drill holes, road construction, and active mining. These activities, if conducted within areas occupied by the Three Forks springsnail, have the potential to affect the species and spring habitats.

Standard and Guidelines associated with surface disturbances within or adjacent to occupied Three Forks springsnail habitat may have a negative impact to the species. Forest-wide S&G 51 restricts streambed alteration or the removal of material if the action significantly affects riparian-dependent resources, channel morphology, or streambank stability. However, if such factors are not significantly affected, streambed alterations and material removal is permitted. Such activities may cause direct mortality of Three Forks springsnails through the crushing of springsnails. S&G 178 restates S&G 51 and has the same effect on the species.

Management activities associated with the use of pesticides may have an adverse effect upon Three Forks springsnails. Standard and Guideline 52 limits the use of herbicides, insecticides, rodenticides, or other chemical agents to times and places where possible transport to or by surface or groundwater has a low probability of occurrence. Although this S&G aims to minimize the negative effects associated with chemical use, the guidance also allows for the possibility of chemicals to degrade surface waters. Poor water quality would have an adverse effect upon Three Forks springsnails.

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on National Forest System lands (U.S. Forest Service 2004). Livestock grazing on the Apache-Sitgreaves NF can directly impact Three Forks springsnails through trampling and crushing. Grazing impacts also include the contamination and degradation of springs.

No applicable S&Gs within the Rangeland Management Program have a negative effect on Three Forks springsnail. The S&Gs incorporate the protection of riparian resources with the use of livestock. For Management Area 3, S&Gs 132 and 133 guide allotment plans and grazing strategies towards the improvement of riparian habitat and the recovery of both biological systems (vegetative diversity and structure) and physical systems (channel characteristics and hydrology). These S&Gs indirectly benefit Three Forks springsnails by maintaining and

improving riparian areas, which include spring habitats. In addition, S&Gs 134 and 135 have a positive impact on Three Forks springsnails. Standard and Guideline 143 directs the grazing capability to consider other resource objectives and riparian recovery goals. Standard and Guideline 135 supports the implementation of management plans to limit grazing in unsatisfactory riparian conditions to allow such areas to recover. Such management direction helps minimize adverse effects to riparian areas by livestock grazing.

Livestock grazing is currently restricted from occupied springsnail habitat at Three Forks and Boneyard Bog Springs complexes. This restriction has removed a significant stressor to the springsnail and its spring habitats, and contributed to the protection of the Three Forks springsnail. Positive S&Gs and the restriction of livestock grazing eliminate the threats to Three Forks springsnails associated with livestock.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites within the National Forests and National Grasslands of the Southwestern Region. Recreational activities (both developed and dispersed) are an important public function of National Forest System lands, and recreational demands on National Forests continue to increase. The Apache-Sitgreaves NF experienced over 2,000,000 visitors in 2001 (U.S. Forest Service 2004). Recreation-related activities have been identified as a potential threat to Three Forks springsnails through degradation and contamination of thermal springs.

The management direction of S&G 112 has the potential to negatively affect Three Forks springsnails. Within Management Area 3, S&G 112 emphasizes maximum possible recreation use. The S&G also directs the protection of riparian characteristics. Maximum recreational use is not likely to coincide with the protection of riparian resources. Recreational activities at the Three Forks Springs complex are known to have an adverse effect on Three Forks springsnails; thus, the reason for closing the spring to recreation. However, the spring's close proximity to Forest Service Road 249 and large vehicle "pull-off" has continued to attract recreationists. Recreational activities at Boneyard Bog Springs have been less frequent than those activities conducted at the Three Forks Springs complex due to its geographic isolation and limited access.

Management direction for Management Area 3 provides guidance for managing recreation to protect natural resources. Standard and Guideline 113 prohibits recreation in areas of unsatisfactory condition, when recreation was a significant factor in causing the condition. S&G 113 would have a positive affect upon Three Forks springsnails by minimizing threats caused by recreational activities.

Multiple S&Gs within the Recreation Program provide direction for the management of ORV use. These S&Gs restrict or limit ORV use for the protection of riparian-dependent resources. Forest-wide S&Gs 7 and 9 allow for ORV closures when needed to protect soil characteristics and water quality. Standard and Guideline 14 restricts ORV use for the protection of wildlife. Also, S&Gs 16 and 17 impose ORV closures to prevent adverse effects to watercourses, wetlands, and watersheds. These S&Gs provide direction for managing ORV in ways that are beneficial to Three Forks springsnail and spring habitats.

Watershed Management Program

Objectives of the Watershed Management Program include improving and maintaining water quality; protecting and restoring riparian areas; and prioritizing watersheds for protection or improvement. Structural and non-structural measures are used to maintain and improve watershed conditions. These measures include fencing to exclude livestock from riparian areas; prescribed burns; road obliteration; and other soil and water improvement activities (U.S. Forest Service 2004).

Multiple S&Gs within the Watershed Management Program provide management direction for protecting and restoring riparian habitat areas. Standard and Guidelines 45, 47, 48, 49, 171, and 177 allow for the protection of soil and water resources (temperature, water quality, erosion) during Forest Service projects. These S&Gs also direct the closure and obliteration of roads causing resource damage. In addition, forest-wide S&G 53 guides improvement projects to protect and restore downstream riparian resources. Standard and Guidelines for Management Area 2 and Management Area 3 provide further protection of riparian-dependent resources by requiring buffer strips and BMPs to prevent water quality degradation. These S&Gs of the Watershed Management Program indirectly affect Three Forks springsnails by protecting and improving spring habitats. As a result, these S&Gs have a positive impact upon the species.

Standard and Guideline 43 provides management direction for preventing and improving water quality degradation through the implementation of BMPs. However, S&G 43 also permits temporary water degradation from road crossing construction and similar activities. Temporary road construction activities may have a short-term effect on spring habitats. S&G 43 minimizes impacts to aquatic species; yet, the guideline is likely to have a short-term negative effect on Three Forks springsnails.

Wildlife, Fish, and Rare Plants Program

The Wildlife Program involves a variety of activities including inventory and monitoring, habitat assessments, habitat improvements through land treatments and structures, species reintroductions, development of conservation strategies, research, and information and education (U.S. Forest Service 2004). The majority of S&Gs within the Wildlife Program emphasize the protection and improvement of fish and wildlife habitat. However, a few S&Gs may directly or indirectly have a negative effect to Three Forks springsnails.

Forest-wide S&G 39 provides management direction for maintaining a minimum of 40 percent potential habitat capability for the management indicator species selected for each vegetative type. As a macro-invertebrate, the Three Forks springsnail is an indicator species. Maintaining a minimum 40 percent habitat capability adversely affects the quality and availability of spring habitat, thus having a negative effect on the species.

Standard and Guidelines 116 and 117 apply to Management Area 3. These S&Gs outline habitat requirements for Priority 1 and 2 Riparian Areas. Standard and Guideline 116 directs for at least 80 percent of stream bank total linear distance be maintained in stable condition. Standard and Guideline 117 establishes the limit for siltation at 855mm. These habitat requirements do not provide for quality spring habitat. The S&Gs set habitat standards that indirectly have a negative effect on Three Forks springsnails.

Standard and Guideline 143 applies to Management Area 4. The S&G provides management direction for the development of springs. Standard and Guideline 143 emphasizes the redirecting of water to non-sensitive areas outside of meadows and riparian habitat. Although minimizing direct adverse effects to Three Forks springsnails, altering water flow affects the spring system. Thus indirectly, S&G 143 has a negative impact on Three Forks springsnails.

In general, management direction within the Wildlife Program promotes the conservation of soil, water, and riparian resources. The S&Gs provide guidance for minimizing adverse effects on riparian-dependent resources when implementing Forest Service activities. Standard and Guideline 142 applies within Management Area 4, and emphasizes the protection of key meadows from grazing. The S&G directly benefits the Three Forks springsnail by authorizing the use of fences to protect sensitive riparian habitat from livestock.

Standard and Guidelines within the Wildlife Program also provide direction on managing TES habitat. In particular, S&Gs 4, 20, and 33 emphasize habitat management of threatened, endangered, and sensitive species. Standard and Guideline 4 directs management to improve TES habitat and work towards recovery and declassification of the species. Standard and Guideline 20 outlines the priority of habitat management, with endangered species taking precedence over threatened species, and sensitive species taking precedence over non-sensitive species. Standard and Guideline 33 allows for areas closures, as needed to protect habitat of listed, sensitive, or proposed threatened and endangered species. These S&Gs establish management direction that directly and indirectly benefits Three Forks springsnails.

Management direction in S&Gs 107 and 108 emphasizes riparian areas and riparian resources. Standard and Guideline 107 directs action to maintain or improve riparian areas to satisfactory riparian condition. Such guidance has a positive effect upon the spring habitats of Three Forks springsnails. However, while conducting activities that contribute to the conservation of springsnails, negative impacts may occur. As a result, S&G 107 may have short-term negative effects to Three Forks springsnails while managing for the long-term conservation of the species. Standard and Guideline 108 provides direction for managing riparian dependent resources, placing an emphasis on threatened and endangered species before other riparian dependent resources. Such guidance has a positive effect on Three Forks springsnails. In addition, the implementation of S&G 108 helps reduce the threat of non-native crayfish on populations of springsnails inhabiting the Three Forks Springs complex.

In summary, the management direction of the Apache-Sitgreaves NF LRMP promotes the conservation of soil, water, and riparian resources, including the spring sources and rheocrene habitats occupied by the Three Forks springsnail. However, a few specific guidelines within the Lands and Minerals, recreation, and watershed programs are likely to adversely affect the springsnail. Streambed alteration and sediment removal within springs occupied by Three Forks springsnails alters spring habitat and its function, as well as cause the crushing of individual springsnails. Also, the use of chemical agents within occupied springs or adjacent stream reaches is likely to degrade water quality and adversely affect Three Forks springsnail populations.

Management direction emphasizing maximum recreational use does not provide for the protection of riparian resources. The impacts of recreationists using the Road 249 “pull-off” threaten Three Forks springsnails through the degradation and contamination of the Three Forks Springs complex. Thus, without management guidance to limit or prevent such threats, Three Forks springsnails are likely to be adversely affected by the Apache-Sitgreave NF LRMP.

Although many S&Gs within the Watershed Management Program of the Apache-Sitgreaves NF LRMP provide for the protection and restoration of riparian habitats, specific S&Gs also allow for temporary water degradation from road crossing construction and maintenance activities. Such activities are likely to have a short-term adverse effect on spring habitat. Poor water quality conditions resulting from road construction and maintenance are likely to affect Three Forks springsnails at both locations.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Three Forks springsnail sites occur within the Mexican Spotted Owl restricted and protected areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional Amendment are applicable to Three Forks springsnails and springs habitat. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 160. Effects of the S&Gs analyzed for the Three Forks springsnail – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-3	S&G is causing lethal response	1	2
-2	S&G is causing sublethal response	0	0
-1	S&G is causing negative behavioral response	0	0
0	S&G is ill-defined and/or open to interpretation	2	4.1
1	S&G is maintaining habitat & providing at least minimal recovery	29	59.1
2	S&G is moving towards recovery	0	0
3	S&G is implementing species recovery plan	0	0
Y	S&G has no application to the species	9	18.4
Z	S&G implementation is non-discretionary	2	4.1
X	S&G is a heading	6	12.2
Total		49	100 %

All of the S&Gs within the 1996 Regional Amendment lie under the Wildlife Program; yet the content of the S&Gs applies to several program activities. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat, and at least minimal recovery of these species. While not a focus of the Amendment, the S&Gs have

the potential to affect other threatened and endangered species. In the case of the Three Forks springsnail, 59 percent of the S&Gs have positive effects on the species, while 2 percent of the S&Gs adversely impact Three Forks springsnails and their spring habitats.

Within Mexican Spotted Owl protected areas, S&G 1438 allows for the level of recreational use that occurred prior to the threatened listing of the owl. Depending on the location of recreational activities, such a level of use may adversely affect Three Forks springsnails. Although closed to recreational users, Three Forks Springs lies within close proximity to FR 249, which offers a “pull-off” area frequented by recreational users. Contaminants associated with bathing, cooking, etc. are often introduced at these pull-off areas, which lie directly above the Three Forks springhead. These recreational activities indirectly affect Three Forks springsnails through poor water quality. Standard and Guideline 1438 allows for continued recreation use of areas adjacent to the Three Forks Springs complex and springs within the Boneyard Bog Springs complex. The S&G has a negative effect on Three Forks springsnails.

In general, the S&Gs of the 1996 Regional Amendment emphasize the maintenance and restoration of healthy riparian ecosystems. In particular, S&Gs minimize the threats of livestock grazing by directing grazing management to maintain and restore riparian ecosystems (S&G 1474), and ensure the recovery and continued existence of threatened and endangered species (S&G 1510). Within Northern Goshawk habitats, S&Gs 1488 and 1490 provide guidance for maintaining satisfactory soil conditions, minimizing soil compaction, and restoring degraded riparian areas. These S&Gs of the 1996 Regional Amendment have a positive impact upon Three Forks springsnails and their spring habitat.

Multiple S&Gs within the 1996 Regional Amendment encourage the use of prescribed and prescribed natural fire to reduce hazardous fuel accumulation and manage for landscape diversity. Wildfires in the southwest are getting larger and more intense, largely due to the density of trees and accumulated dead woody debris on National Forest System lands (U.S. Forest Service 2004). Standard and Guidelines 1445, 1455, 1468, and 1476 direct the use of prescribed fire for the treatment of fuel accumulations within protected and restricted areas of Mexican Spotted Owl habitat. Standard and Guideline 1458 directs the use of prescribed fire on Reserved Lands, which include Wilderness Areas, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas. Standard and Guideline 1508 guides the use of low-intensity ground fires in all forested cover types within nesting areas of Northern Goshawk habitat. These S&Gs encourage prescribed fires to reduce hazardous fuel accumulation, and permit thinning before burning to reduce ladder fuels and the risk of crown fire. Such activities have the potential to cause short-term adverse effects upon Three Forks springsnails. However, the long-term effects of prescribed fire are beneficial to the species. Prescribed fires reduce fuel loads and prevent catastrophic fires that would negatively affect Three Forks springsnails and their spring habitat. Therefore, these S&Gs (1445, 1455, 1458, 1468, 1476, and 1508) are beneficial to Three Forks springsnails.

In summary, the management direction of the 1996 Regional Amendment provides for healthy functioning riparian and aquatic systems. However, a few specific guidelines associated with recreation and fire activities are likely to adversely affect Three Forks springsnail populations in Mexican Spotted Owl protected areas. Standard and Guideline 1438 allows for the continued

recreational use of Boneyard Bog Springs and areas adjacent to the Three Forks Springs complex. Recreational activities, particularly near the Three Forks Springs complex, introduce contaminants into the watershed, reducing water quality. Prescribed fire activities within protected and restricted of Mexican Spotted Owl habitat are likely to have a short-term impact on springsnail habitat through poor water quality resulting from excess ash. Thus, both recreation and fire activities contribute to the likelihood of adverse effects to the Three Forks springsnail through the implementation of the Apache-Sitgreave NF LRMP.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Nature Conservancy owns private land near Boneyard Bog Springs. The AGFD has conducted surveys for springsnail occupancy on Nature Conservancy lands. No springsnails have been found to occupy the spring runs on this land. Therefore, activities on Nature Conservancy land are unlikely to affect Three Forks springsnails.

The AGFD has management authority for game populations on federal lands. Elk herds located near Boneyard Bog Springs are known to wallow throughout the springs. Visual inspections of elk wallowing have shown reduced bank stability of spring-runs. Such bank disturbance causes filling of gravel and pebble substrates with sand and silt, which preliminary unpublished data suggests is less conducive to occupation by springsnails. This change in spring substrate may reduce fecundity of springsnails because it is believed that Three Forks springsnails lay eggs on large substrates such as gravel and pebble (M. Martinez, FWS, 2005, unpubl. data). Therefore, state managed activities related to game species (elk) have a negative effect on Three Forks springsnails.

CONCLUSION

After reviewing the current status of the Three Forks springsnail, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's conference opinion that the Apache-Sitgreaves NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Three Forks springsnail. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The Three Forks springsnail is limited to two known populations on the Apache-Sitgreaves NF. Recent sampling data suggest the population at Boneyard Bog Springs is more abundant than the population at Three Forks Springs. Threats to the Three Forks springsnail include non-native aquatic species, ungulates, recreational activities, and natural events. Prolonged, and intensive habitat disturbances have occurred in close proximity to the species for decades; yet, the

spring snails have continued to inhabit springs and spring outflows on the Apache-Sitgreaves NF. Although adverse effects to the springsnail may occur from the continued implementation of the Apache-Sitgreaves NF LRMP and 1996 Regional Amendment, the FWS does not believe the impacts to the species will rise to the level of jeopardy.

The management direction provided in the Apache-Sitgreaves NF LRMP emphasizes the conservation of soil, water, and riparian resources. Although no S&Gs specifically address the conservation of the Three Forks springsnail, guidance through multiple S&Gs (S&Gs 4, 20, 33, 45, 47, 48, 49, 108, 113, 142, 171, and 177) provides for the protection and improvement of riparian habitats, spring sources, and rheocrene habitats. In addition, a few of these S&Gs prioritize habitat management of threatened and endangered species over nonlisted species. Forest Service activities under the direction of such S&Gs minimize or eliminate adverse effects on springsnails and their spring habitats.

Although somewhat general in relation to Three Forks springsnails, management direction provided in the 1996 Regional Amendment is not likely to limit the conservation of Three Forks springsnails and their spring habitats. The majority of S&Gs (1473, 1488, and 1490) direct the maintenance of healthy riparian ecosystems by requiring actions within riparian areas to protect and improve riparian dependent resources. Implementation of such management direction will likely minimize threats to the species and contribute to the species' conservation.

The Apache-Sitgreaves NF has implemented additional management practices specifically designed to protect Three Forks springsnails and its habitat. In coordination with the AGFD, the Apache-Sitgreaves NF has removed thousands of non-native crayfish from the Three Forks Springs complex. Also, the Alpine Ranger District has restricted grazing from the Three Forks and Boneyard Bog Springs complexes. Further conservation efforts include the closure of Three Forks Springs to public access. With the implementation of these conservation measures, as well as the management standards and guidelines outlined above, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Three Forks springsnail.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

As a candidate species, the prohibitions against taking the Three Forks springsnail found in section 9 of the ESA (as stated above) do not apply until the species is listed. However, the FWS advises the Forest Service to consider implementing the reasonable and prudent measures defined in this conference opinion to conserve the species and preclude listing. If this conference opinion is adopted as a biological opinion following a listing or designation, the measures described below, with their implementing terms and conditions, will be non-discretionary. These measures must be undertaken by the Forest Service so that they become binding conditions of any grant or permit issued, as appropriate, for the exemption in section 7(o)(2) to apply. The Forest Service has a continuing duty to regulate the activity covered by this incidental take statement. If the Forest Service (1) fails to assume and implement the terms and conditions or (2) fails to require adherence to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grand document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Forest Service must report the progress of the action and its impact on the species to the FWS as specified in the incidental take statement. [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

Incidental take of the Three Forks springsnail is reasonably certain to occur as a result of the continued implementation of the Apache-Sitgreaves NF LRMP and the 1996 Regional Amendment. The FWS anticipates incidental take of Three Forks springsnails will be in the forms of direct mortality, harm, and harassment to the species from the Engineering, Fire Management, Lands and Minerals, Recreation, Watershed Management, and Wildlife programs. Direct mortality and harm to the species is anticipated through crushing and trampling of individual springsnails, and the impairment of essential behavior patterns, including but not limited to, breeding, feeding, or sheltering, due to spring habitat modification and destruction. The proposed action is likely to take Three Forks springsnails in the form of harass by significantly disrupting normal behavior patterns including, but not limited to, breeding, feeding, or sheltering.

The FWS is reasonably certain that road construction and maintenance, prescribed fires, sediment removal, recreation activities, and pesticide use are likely to kill and harm Three Forks springsnails. Recreational use at the springs may result in direct mortality of springsnails through crushing, burying, and suffocation. Harm to the springsnails is likely to occur as a result of recreation-related activities, road activities, sediment removal, pesticide use, and prescribed fires, which all disrupt watershed function and degrade water quality. This alteration and destruction of spring habitat is likely to impair essential behavior patterns of Three Forks springsnails. Within the Apache-Sitgreave NF LRMP and 1996 Regional Amendment, S&Gs manage for recreational use, road construction and maintenance, sediment and mineral removal, use of pesticides, and prescribed fires. As a result, direct mortality and harm to Three Forks springsnails is reasonably certain to occur with as a result of the proposed action.

Quantifying anticipated take of Three Forks springsnails at occupied sites on the Apache-Sitgreaves NF is difficult, partially because precise density estimates are not known for the species. In addition, the springsnail exhibits seasonal variation in numbers and occurs in patchy distributions throughout a given population. Determining an estimate of anticipated take is further complicated by the difficulty in detecting snails. Incidental take of the Three Forks

springsnail will be difficult to detect for the following reasons: the species has small body size, losses may be masked by seasonal fluctuations in water quality, and the species occurs in habitat that makes detection difficult. Based on the high variation in density estimates, the variability in spatial and temporal distribution of the species in spring habitats, and the difficulty in detecting dead or moribund snails, the FWS cannot provide an estimate of the number of individual springsnails that would be taken as a result of the proposed action.

Because it is not feasible or reasonable to anticipate the number of individual springsnails that may be taken, the FWS is providing a mechanism for when take would be considered exceeded. Upon listing of the species, the status of springsnail populations on the Apache-Sitgreaves NF and the impacts of the proposed action will be assessed annually for the life of the biological opinion. Density estimate surveys for both populations of Three Forks springsnails on the Forest shall be conducted and reported annually to the FWS, as a means of determining the need for reinitiating consultation. Should annual density estimates of the population at Boneyard Bog Springs or Three Forks Springs show a downward trend within a three consecutive year period, as a result of the proposed action, the Forest Service must reinitiate consultation for the Three Forks springsnail.

Effect of the Take

In the accompanying conference opinion, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Three Forks springsnail, for the effects are not expected to appreciably reduce the survival and recovery of the species. No critical habitat has been designated for this species; therefore, none will be destroyed or adversely modified.

REASONABLE AND PRUDENT MEASURES

The FWS believes the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of Three Forks springsnails:

1. Protect Three Forks springsnails on the Apache-Sitgreaves NF.
2. Protect Three Forks springsnail habitat on the Apache-Sitgreaves NF.
3. Monitor Three Forks springsnail populations on the Apache-Sitgreaves NF.

TERMS AND CONDITIONS

Following the species listing or designation, in order to be exempt from the prohibitions of section 9 of the ESA, the Forest Service must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

The following terms and conditions will implement reasonable and prudent measure 1:

- 1.1 Design projects within the Engineering (i.e., road management), Fire Management, Lands and Minerals, Recreation, Watershed Management, and Wildlife programs to minimize or eliminate adverse effects to the Three Forks springsnail.

- 1.2 Consider alternative measures when using chemicals for noxious weed control, insect control, and other pest control within or adjacent to occupied Three Forks springsnail habitat.

The following terms and conditions will implement reasonable and prudent measure 2:

- 2.1 Design Engineering (i.e., road management), Fire Management, Lands and Minerals, Recreation, Watershed Management, and Wildlife programs to reduce negative effects (direct and indirect) with the goal of implementing projects that will have beneficial, insignificant, or discountable effects within occupied Three Forks springsnail habitat.
- 2.2 Reinstate road closure to Clabber City to protect springsnail site.

The following terms and conditions will implement reasonable and prudent measure 3:

- 3.1 In cooperation with state conservation agencies, Forest Service research stations, FWS, and on-going research efforts, implement a monitoring plan to conduct annual density estimate surveys for known Three Forks springsnail populations on the Apache-Sitgreaves NF.
- 3.2 In order to monitor the impacts of incidental take, the Forest Service shall annually track and report the effects of the proposed action on Three Forks springsnails, pursuant to 50 CRF §402.14(i)(3). In combination with 3.1 above, this information will be used to assess when the amount or extent of take is being approached or exceeded. In addition, this information shall be used to make adaptive management changes for reducing adverse effects of the proposed action to the Three Forks springsnail.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The federal agency must immediately provide an explanation of the causes of the taking and review with the FWS the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

This conference opinion does not prohibit the Forest Service from taking an action that may have adverse effects on the Three Forks springsnail. However, section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to

develop information. The FWS advises the Apache-Sitgreaves NF to consider implementing the following conservation recommendations to avoid likely future conflict:

1. Work cooperatively with the FWS to develop a Candidate Conservation Agreement for the Three Forks springsnail. Identify and secure funding sources and technical expertise necessary to implement a conservation strategy.
2. Maintain the Three Forks Creek Area Closure to minimize the effects of recreation.
3. Continue the use of livestock exclosures to protect the springsnail site at Boneyard Bog Springs.
4. Work with the AGFD to evaluate and implement management techniques to manage elk herds within the Boneyard Bog Springs area to minimize the effects of elk wallowing.
5. Manage to eradicate non-native predators (e.g., crawfish) that prey on Three-Forks Springsnails.
6. Restrict removal of material within occupied Three Forks springsnail habitat.
7. Reduce road densities to recommended standard to protect Three Forks springsnail sites.
8. Close road to Boneyard to protect springsnail site.
9. Evaluate the need to conduct reintroduction or transplantation efforts, develop captive propagation and transplantation techniques, and identify potential reintroduction and transplantation sites.
10. Gather information and conduct research on population demographics, habitat requirements, water quantity and quality, and other potentially limiting factors for the Three Forks springsnail.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

ARIZONA AGAVE

STATUS OF THE SPECIES

Description

The Arizona agave is a succulent perennial, with somewhat flattened, globular rosette leaves growing from its base. Its slender, branching flowers can be characterized as small, pale yellow, and jar-shaped. The species may be of hybrid origin, having *Agave chrysantha* and *Agave toumeyana* var. *bella* as its parental species (DeLamater and Hodgson 1987).

The Arizona agave occurs on open rocky slopes in Sonoran desert scrub, chaparral, or juniper-grassland communities (U.S. Forest Service 2004). Preferred soil for the species ranges from a mixed gravelly loam to Mazatzal quartzite (U.S. Fish and Wildlife Service 1984).

Legal Status: The Arizona agave was listed as endangered May 18, 1984 (U.S. Fish and Wildlife 1984) without critical habitat designation. On May 7, 1985, a petition was prepared by the Forest Service asking the FWS to delist the Arizona agave due to its questionable taxonomic status. The FWS then initiated a peer review off all available data and consulted with 15 plant taxonomists and agave experts. After thorough assessment, the FWS decided that the data was inconclusive and the action requested by the petition was not warranted (U.S. Fish and Wildlife Service 1987).

Since that time, Hodgson (1999) has concluded that Arizona agave is a hybrid. Hybrids do not warrant federal protection and a proposed rule to delist Arizona agave was published in the Federal Register on January 11, 2005 (U.S. Fish and Wildlife Service 2005).

Additionally, the Arizona agave is protected from illegal international trade by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The agave is also protected by Arizona Native Plant Law.

Distribution and Abundance

Arizona agaves occur in the Arizona counties of Yavapai, Maricopa, and Gila, with the majority of the plants occurring in the New River Mountains north of Phoenix (U.S. Forest Service 2004). These areas range in elevations from 3,600-5,800 ft (1,100-1,750 m) (Arizona Rare Plant Committee 2001). To date, less than 100 Arizona agaves are known to exist (U.S. Fish and Wildlife Service 2004).

Habitat

Arizona agave occurs in the transition zone between oak-juniper woodland and mountain mahogany-oak scrub (U.S. Fish and Wildlife Service 1984). Agave habitats are described by steep rocky slopes, but can occur on drainage bottoms, relatively gentle slopes, or saddles.

Life History

The Arizona agave occurs as isolated plants or clusters of plants near its putative parents (U.S. Forest Service 2004). Reproduction occurs from offshoots (pups) that develop around the base of the parent plant.

Arizona agaves have poor seed production, and are often eaten by cattle and deer before the flower stalks mature. Rodents, snout-weevil beetles, and other insects cause serious plant damage and increase susceptibility to disease.

Historically, 19 Arizona agave populations were known to occur in the Tonto NF; now only 13 populations exist, with clusters ranging from one to seven individual agaves (U.S. Fish and Wildlife Service 1984). However, some plants are located on private lands (Fenner 1990).

Reasons for Listing

Populations of Arizona agave are extremely rare; and thus their limited distribution and low numbers amplify the threats to the species. As such, the present or threatened destruction, modification, or curtailment of its habitat and range represents the chief threat to the species.

Threats: Cattle and deer herbivory on the flower stalks reduce the reproductive potential of Arizona agave. Damage produced by the snout-weevil beetle is also prevalent, resulting in increased susceptibility to fungal disease. Rodents burrow under the plant and will eat the caudexes and roots (U.S. Forest Service 2004). Other concerns are potential illegal collecting and loss of plants from livestock management activities (U.S. Fish and Wildlife Service 1984).

Conservation Measures

An Allotment Management Plan for the New River Allotment on the Tonto NF was signed in 1989, directing that new water developments be placed more than 0.8 km (0.5 mi) and fences be built more than 0.4 km (0.25 mi) from Arizona agave clones to ease livestock trailing and trampling in areas supporting Arizona agave (U.S. Forest Service 2004). In order to reduce livestock herbivory on Arizona agave flowering stalks, cattle are excluded from pastures during the flowering period (Kvale et al. 1989). Additionally, a Cooperative Agreement was developed between the Tonto NF and the Desert Botanical Garden, where the Garden has introduced cultivated plants into an enclosure in the New River Mountains. In addition, enclosures to protect Arizona agave have been established on Benchmark Mountain and Parker Creek in the Sierra Ancha Mountains.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The majority of Arizona agave clusters occur on the Tonto NF. Arizona agave occurs in three limited areas of the Tonto NF. The key management emphasis for these areas is wildlife habitat improvement, livestock forage production, and dispersed recreation. Present Forest Service regulations prohibit removing, destroying, or damaging any plant that is classified as a threatened, endangered, rare or unique species (36 CFR 261.9).

Factors Affecting the Species within the Action Area

Livestock management within the action area is the only National Forest activity likely to affect the Arizona agave. The clusters are widely scattered and in remote locations, but they are within grazing allotments and can be affected by livestock grazing on the flowering stalks, trampling associated with water developments, and the placement of pasture fences. These actions all have the potential to adversely affect the Arizona agave.

EFFECTS OF THE ACTION

This plant only occurs on the Tonto NF. The S&Gs listed in the Tonto NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions (Table 161). Multiple S&Gs within these LRMPs are applicable to the Arizona agave and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the agave.

Table 161. Summary of S&Gs considered for the Arizona agave.

National Forest	Standards and Guidelines
Tonto	1341, 1342, 1344, 1345, 1354, 1359, 1362, 1363, 1367, 1375, 1386, 1387, 1391, 1420, 1423, 1423a-d
1996 Regional Amendment	1510-1515

Tonto National Forest

The Arizona agave only occurs on one National Forest (i.e., the Tonto NF), so only those S&Gs were analyzed. Habitat for Arizona agave is found in management areas 1F, 4F, and 6J on the Tonto NF. Livestock grazing is the only activity that is likely to affect Arizona agave. In general, those S&Gs associated with the range program have negative effects to Arizona agave, while those associated with the Wildlife Program are positive. The remaining S&Gs analyzed are not applicable to Arizona agave. The effects of the S&Gs within the applicable program areas are discussed below.

Table 162. Effects of the S&Gs analyzed for the Arizona agave – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	5	26.3
-1	S&G is causing sublethal response	1	5.3
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	5	26.3
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	7	36.8
Z	S&G implementation is non-discretionary	1	5.3

Ranking	Explanation of Ranking	Total	Percentage
X	S&G is a heading	0	0.0
Total		19	100 %

Table 162 provides a summary of the effects of S&Gs analyzed for the Arizona agave on the Tonto NF. There are five S&Gs that, when implemented, maintain habitat or provide at least minimal recovery for the species. Six S&Gs have negative effects on the habitat and species, of which five can lead to mortality of Arizona agave.

Rangeland Management Program

Management direction for management areas 1F, 4F, and 6J is to manage suitable rangeland at Level D. Level D grazing management seeks to optimize production of utilization and forage consistent with maintaining the environment and providing for the multiple use of the range. It also describes various treatments (e.g., brush control, type conversion) that may be employed to meet these goals (1423, 1423a). Three additional S&Gs within the range program (1423b-d) have the potential to negatively affect Arizona agave. These S&Gs deal with creating structural improvements, guided by direction in allotment management plans, to maintain utilization at levels appropriate with management intensity, using herbicides when brush encroachment is interfering with forage production, and managing the chaparral on a 30 year prescribed fire rotation. All of the S&Gs discussed above have the potential to adversely affect Arizona agave. Livestock are authorized to graze in occupied and suitable habitat for Arizona agave. Livestock can trample Arizona agave, especially near waters, where livestock tend to congregate. Livestock eat the flowering stalks, reducing the reproductive potential of the plants. Structural (fences) and nonstructural (seeding) improvements to optimize forage production, ground disturbing activities such as brush control, fires, and seeding with non-native plants can remove plants, destroy habitat, or alter the habitat in ways that may make it unsuitable for Arizona agave.

Wildlife, Fish, and Rare Plant Program

Five S&Gs in this program area offer positive benefits to Arizona agave. These include standards to identify, survey, and map habitat for listed species; conduct clearances by qualified wildlife biologists for projects in listed species' habitat (1341, 1342); that habitat requirements for endangered species take precedence over other species' habitat requirements (1345); forage will be managed to maximize listed species' habitat (1354); and road dimensions will be reduced to the minimum needed (1367). These S&Gs maintain Arizona agave habitat and can offset the negative effects of the S&Gs associated with the Rangeland Management Program.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Table 163 summarizes the effects of S&Gs from the 1996 Regional Amendment that apply to Arizona agave. There is only one S&G that applies to Arizona agave (1510). In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 163. Effects of the S&Gs analyzed for the Arizona agave - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species. The implementation of this S&G, which is applicable to the Rangeland Management Program, should preserve and protect, at a minimum, the known locations of Arizona agave on the Tonto NF.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The majority of Arizona agave locations are on the Tonto NF. There are a few known locations on private property, but the exact locations are unknown. It is possible that development, grazing, and mining activities may affect those Arizona agave plants on private property.

CONCLUSION

After reviewing the current status of the Arizona agave, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s biological opinion that the S&Gs within the Tonto NF LRMP and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Arizona agave. Pursuant to 50 CFR 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for this species; therefore, none will be affected.

Arizona agave occurs in the Arizona counties of Yavapai, Maricopa, and Gila, with the majority of the plants occurring in the New River Mountains north of Phoenix. To date, less than 100 Arizona agaves are known to exist, most of which occur on the Tonto NF. Populations of Arizona agave are extremely rare; thus, their limited distribution and low numbers are a concern. Cumulative effects considered in our analysis include possible development, grazing, and mining activities that may affect those Arizona agave plants on private property. Yet, the majority of occupied habitat is located on the Tonto NF, so cumulative effects are not likely to result in a significant decrease to the overall population. As such, the present or threatened destruction, modification, or curtailment of its habitat and range represents the chief threat to the species.

Arizona agave habitat may be disturbed and plants have the potential to be negatively affected, with possible mortality, as a result of the proposed action. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Tonto NF LRMP, which conserves Arizona agave populations with the following:

- Arizona agave plants have benefited from exclosures constructed by the Forest Service, which protect Arizona agave inflorescences from livestock herbivory.
- Management direction of S&G 1341 permits Arizona agave habitat to be surveyed and plants to be mapped. This S&G allows for avoidance of known agave plants during site-specific activities.
- In accordance with S&G 1342, ground disturbing projects are to be evaluated by qualified biologists in order to develop ways to minimize the effects of projects on Arizona agave.
- Under S&G 1510, the habitat needs of federally listed species will be taken into consideration and forage use is not to preclude the recovery or continued existence of listed species.

With the implementation of these beneficial S&Gs within the Tonto NF LRMP, along with livestock exclosures constructed by the Forest Service, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Arizona agave.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. During the period that Arizona agave remains listed, the Tonto NF should continue survey efforts in areas where the putative parents occur; continue to provide protection for plants in grazing allotments, especially during the flowering period; and ensure the placement of waters and fences are a suitable distance away from known locations to minimize trampling.
2. Continue to provide protection for the known locations and habitat of Arizona agave, even after the species is delisted. This action will allow the hybrid to continue along its evolutionary pathway, possible leading to the establishment of a new species. These evolutionary processes can only take place if the biological integrity of the surrounding ecosystem remains intact.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

ARIZONA CLIFFROSE

STATUS OF THE SPECIES

Description

Arizona cliffrose is an evergreen shrub that is a member of the rose family (Rosaceae), reaching 5-6 ft (1.5-1.5 m) in height. Its bark is pale gray with young twigs covered with dense, soft, glandless, white hairs. Leaves are also glandless and simple, having one to five lobes, with smooth and revolute leaf margins. Flowers contain white or yellow petals about 0.4 in (1 cm) long.

Arizona cliffrose is a rare Arizona edaphic endemic, restricted to nutrient deficient calcareous soils (Anderson 1986, 1993). The species grows on gentle to steep slopes, open basins, and limestone ledges and outcrops.

Each of the four populations of Arizona cliffrose is genetically variable, having distinct biological, ecological, and morphological characteristics (Mount and Logan 1992). Certain morphological characteristics, especially the frequency and degree of leaf lobing, and the density of leaf and flower stipitate glands, differ among the populations (Reichenbacher 1992). Studies have been conducted on Arizona cliffrose morphometrics by Reichenbacher (Southwestern Field Biologists, Tucson) and an analysis of Arizona cliffrose DNA using the RAPD marker method was undertaken by Mount (University of Arizona, Tucson). These studies (Reichenbacher 1992, Mount and Logan 1992) are consistent with the observations of others (Denham 1992, Reichenbacher 1987 and 1989, J. Hendrickson, California State University in Rutman 1992b) and demonstrate that species of the genus *Purshia* tend to be phenotypically plastic, and can respond to long-term and seasonal changes in climate by producing leaves and shoots that have adapted to local or seasonal climatic conditions. This type of phenotypic plasticity does not mean that the plants are hybrids or of hybrid origin (Reichenbacher 1987, Rutman 1992b, U.S. Fish and Wildlife Service 1995).

Legal Status: On May 29, 1984, the Arizona cliffrose was listed as endangered under the ESA, without critical habitat designation (U.S. Fish and Wildlife Service 1984). The Arizona Native Plant Law (A.R.S. Chapter 7, Article 1) also protects the Arizona cliffrose. The provisions of the Arizona Native Plant Law significantly strengthen the protections offered by section 9 of the ESA because a violation of the Arizona Native Plant Law is also a violation of the ESA. Additionally, the Lacey Act, as amended in 1982, provides some protection for the Arizona cliffrose. Under this ESA, it is prohibited to import, export, sell, receive, acquire, purchase, or engage in the interstate or foreign commerce of this plant. The Arizona Cliffrose Recovery Plan was completed in 1995.

Distribution and Abundance

This species has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas (Graham County), the Horseshoe Lake vicinity (Maricopa County), near Burro Creek (Mohave County), and near Cottonwood in the Verde Valley (Yavapai County) (Rutman 1992a). These four known populations are spread across a 200-mile zone of central Arizona. The species occurs within an elevational range of 2,100-3,600 ft (650-1,100 m).

The largest known population of Arizona cliffrose is the Burro Creek population, occurring on Bureau of Land Management (BLM) administered lands. The 1,113-acre Clay Hills Area of Environmental Concern (ACEC) contains the largest subpopulation of Arizona cliffrose in the Burro Creek area, but not two smaller, more recently discovered, subpopulations (U.S. Bureau of Land Management 1990).

Little is known of the Arizona cliffrose population near Bylas on the San Carlos Apache Indian Reservation. However, based on the presumed extent of appropriate habitat, this population may be rather large. The Horseshoe Lake population includes several subpopulations and is found on the Tonto NF. A portion of the Verde Valley population is found on the Coconino NF; the remaining habitat is managed by Yavapai County (formerly Arizona State Land Department), Dead Horse Ranch State Park, and private individuals.

Habitat

The sites described above differ slightly in elevation and associated vegetation, but all sites have limestone soils (generally white but also reddish in color) derived from Tertiary lakebed deposits, and contain a locally unique vegetative community (Anderson 1993).

Life History

The Arizona cliffrose appears to be a long-lived shrub, capable of a large reproductive output. Plants with this life history strategy tend to have low recruitment rates and few seedlings and juveniles in each population. Mature plants are capable of producing several seeds per year and bloom in late March to early May. Hundreds of flowers are produced on each mature plant, with pollination occurring on any of the first three days after flower opening. Major pollinators include native bees as well as introduced bees (Fitts et al. 1993). According to Fitts et al. (1993), flowers are mainly cross-pollinated, but are partially self-compatible, with fruits occurring during April and seeds dispersed as a result of summer rains.

Reasons for Listing

Major reasons for listing the Arizona cliffrose as endangered include urbanization, recreation, road and utility line construction, mineral exploration, mining, and livestock and wildlife browsing. The Cottonwood population occurs in a developing urban/suburban area, where the most serious impacts stem from land development, road construction, and recreational activities. Soils supporting Arizona cliffrose populations contain high quality bentonite, a type of clay with numerous commercial uses. Mining and mineral exploration has impacted the Burro Creek and Horseshoe Lake populations. Additionally, many Arizona cliffrose populations are subject to impacts from livestock and/or wildlife grazing.

Threats: Threats to the species include livestock and burro grazing, mineral exploration and development, construction and maintenance of roads and utility rights-of-way, recreation, off-road vehicle use, urbanization, pesticides, and poor reproduction. The relative importance of these threats varies from population to population.

Conservation Measures

According to the Forest Service (2004), conservation measures undertaken by the Coconino NF include:

- Numerous surveys have been conducted for Arizona cliffrose in the Cottonwood area.
- The closure and rehabilitation of unofficial target shooting ranges, which destroyed an unknown number of plants and acres of habitat.
- Occupied habitat has been protected by the construction of fences, parking areas, and signs, reducing the impact from off-highway vehicle users.
- Continuing coordination with Dead Horse Ranch State Park regarding the impacts from existing and proposed trails, types of recreation uses, and proposed development (with participation of FWS and others).
- Working with state and local planners, and other entities such as Dead Horse Ranch State Park, Arizona Department of Transportation, and private landowners to develop comprehensive and ecosystem-based plans for the Verde Valley.
- The Coconino NF revised the Windmill Allotment Management Plan in 1992, to better accommodate Arizona cliffrose recovery needs. This included excluding livestock from the Rocking Chair and Cornville pastures of that allotment (U.S. Fish and Wildlife Service 1995).
- The Coconino NF LRMP established the 470 ha (1,140 ac) Verde Valley Botanical Area for the protection of this unique plant community, including Arizona cliffrose.
- The Coconino NF has supported the continuing research efforts to establish and monitor Arizona cliffrose populations conducted by staff from the Arboretum at Flagstaff.
- The Red Rock Ranger District of the Coconino NF has initiated several actions since 1996 that benefited Arizona cliffrose habitat, including trail re-routing and rock placement to protect Arizona cliffrose along several trails in the area of Dead Horse State Park, photo monitoring along trails, and maintenance of fences to exclude cattle and off highway vehicles from the Verde Valley Botanical Area.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

The Cottonwood population occurs mainly on the Coconino NF, with the Horseshoe Lake population occurring on the Tonto NF. Recruitment rates to maintain viable populations of Arizona cliffrose are not well documented or known; the Cottonwood population is shown to support a relatively large number of established seedlings (U.S. Forest Service 2004). The Horseshoe Lake population includes several subpopulations. The Horseshoe Lake population was the subject of a biological opinion issued on March 10, 1987, for the Central Arizona Water Control Study Plan 6. This 1987 biological opinion determined that 250 plants would be affected due to construction and operation of the Cliff Dam (33 percent of the Horseshoe Dam population) (U.S. Forest Service 1987). However, Cliff Dam was never constructed. The Cottonwood population has been the subject of several biological opinions. Among these, one was issued on July 8, 1996 for the State Route 89A Cottonwood to Sedona Construction Segment 2 project. Another was issued on March 9, 2001 for the Mingus Avenue Extension Project.

Factors Affecting the Species within the Action Area

Impacts on the Coconino NF near Cottonwood are typical of public lands near an urban fringe. Activities that are affecting Arizona cliffrose plants and habitat include informal roads and trails, unofficial sites for target shooting, and off-road vehicles. The Cottonwood population occurs in the Gyberg, Rocking Chair, and Cornville pastures of the Windmill Grazing Allotment. Since 1992, livestock have been excluded from the Rocking Chair and Cornville pastures. Additionally, the allotment management plan allows for 25 percent utilization on forage species. This is below the amount allowed in the Forest Plan (30%).

On the Tonto NF, Mining activities in the 1960s and 1970s have occurred near Chalk Mountain and Lime Creek in the Horseshoe Lake population on the Tonto NF. Activities included varying levels of surface disturbance, but the effects to Arizona cliffrose are not known.

Also on the Tonto NF, the Horseshoe Lake populations are in an area closed to off-highway vehicle use, except where posted as open. Despite the presence of a lake and campground, no off-highway vehicle use has occurred in the subpopulations. The Horseshoe Lake populations occur mostly in the Sears Club-Chalk Mountain grazing allotment, which is grazed with a five-pasture rest-rotation system. The management plan for this allotment was written before Arizona cliffrose was discovered here. The subpopulation near Horseshoe Dam is divided between the Sears Club-Chalk Mountain Allotment to the north and the St. Clair Allotment to the south (U.S. Forest Service 2004). The grazing permit for the St. Clair Allotment was cancelled in 1992.

EFFECTS OF THE ACTION

The S&Gs listed in the Coconino and Tonto NF LRMPs and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Arizona cliffrose and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the cliffrose.

Table 164. Summary of S&Gs considered for the Arizona cliffrose.

National Forest	Standards and Guidelines
Coconino	312-319, 321, 322, 324, 325, 327-329, 332-334, 336-339, 341, 342, 344, 345, 347, 364, 369, 375-378, 380-390, 392-395, 397-400, 402, 404, 406, 413, 479, 479a, 480, 484, 485, 524-534
Tonto	1341, 1342, 1344, 1345, 1354, 1359, 1362, 1363, 1367, 1370d, 1375, 1384b, 1391, 1410, 1422a, 1423b-e
1996 Regional Amendment	1510-1515

Coconino National Forest

On the Coconino NF, Arizona cliffrose populations are in management areas 11 and 17. The management emphasis for management area 11 is watershed condition, range management, wildlife habitat for upland game birds, and dispersed recreation. In management area 17 (which includes the Verde Valley Botanical Area), the emphasis is to maintain existing conditions and natural processes for public enjoyment, demonstration, and study.

Table 165. Effects of the S&Gs analyzed for the Arizona cliffrose – Coconino NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	15	20.8
-1	S&G is causing sublethal response	1	1.4
0	S&G is ill-defined and/or open to interpretation	15	20.8
1	S&G is maintaining habitat & providing at least minimal recovery	23	32
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	2	2.8
Y	S&G has no application to the species	4	5.6
Z	S&G implementation is non-discretionary	6	8.3
X	S&G is a heading	6	8.3
Total		72	100 %

Table 165 summarizes the effects to Arizona cliffrose from the applicable S&Gs on the Coconino NF. Less than 23 percent of the S&Gs could cause mortality of Arizona cliffrose plants, while 34 percent of the S&Gs have positive effects for this species. The remaining 44 percent of the S&Gs have no effect on Arizona cliffrose or the S&Gs are too vague to analyze.

Engineering Program

The S&Gs (400, 402, 404, and 406) in this program area apply Forest wide and concern road maintenance, road densities, and road closures to minimize or prevent resource damage. Most of these S&Gs provide benefits to Arizona cliffrose because habitat intrusion is minimized or avoided.

Lands and Minerals Program

Forest wide S&Gs for this program area deal with mining operations (381-384). Standards and Guidelines 381-383 tend to allow for mineral operations while trying to resolve conflicts with listed species habitat requirements. Standard and Guideline 384 does not allow surface occupancy where listed species exist. Standard and Guidelines 389-390 allow mining operations to consider environmental concerns and work cooperatively with proposed operations to reduce impacts on forest resources. Overall, these S&Gs do not provide enough detail to allow for adequate analysis. The S&Gs dealing with utility corridors and urban development (392-395, 397, 398) do not have enough protections in place for listed species' habitat and can lead to the destruction of plants and habitat.

Rangeland Management Program

The continued implementation of S&Gs (333, 336) within the Rangeland Management area will have negative effects on Arizona cliffrose. Plants are palatable and grazing is authorized in cliffrose habitat. These S&Gs allow for the use of seeding and prescribed burns to increase forage. These actions can lead to habitat modification and possible mortality of plants. Standard and Guidelines 339, 341, 342 and 344 direct grazing actions to maximize full range capacity, and recommend the use of salt to redirect livestock away from riparian areas, possibly moving them into upland areas that support cliffrose populations. These are actions that can degrade habitat and cause plant mortality. Most of the S&Gs in this program area result in adverse effects to Arizona cliffrose.

Recreation, Heritage, and Wilderness Program

The S&Gs in this program area (312-319) deal primarily with trail and off-road vehicle use. They allow for the evaluation of areas for overuse, along with the ability to close roads and areas that are causing resource damage. The majority of these S&Gs benefit Arizona cliffrose populations by minimizing resource damage and maintaining habitat. Standard and Guidelines specific to management area 11 (479a, 480) allow for dispersed recreation, an activity that can degrade habitat. Standard and Guideline 529 applies to management area 17 and prohibits off-road vehicle use. This has positive benefits for cliffrose habitat.

Watershed Management Program

These forest-wide S&Gs allow for projects to repair damaged watersheds and to obliterate roads contributing to watershed degradation. All of these S&Gs will benefit cliffrose populations by maintaining healthy ecosystems.

Wildlife, Fish, and Rare Plants Program

The majority of the protection for listed species resides in this program area. Standard and Guidelines to evaluate, inventory, protect listed species' habitat, and recover listed species are covered in S&Gs 321, 322, and 324. There are some S&Gs in this program area (332-334) directing the Forest to use seeding and prescribed burns to improve forage. These actions may degrade cliffrose habitat and can result in mortality of Arizona cliffrose. These latter S&Gs have negative consequences.

Tonto National Forest

On the Tonto NF, Arizona cliffrose populations are in management areas 1E and 1F. Emphasis for management area 1E is developed and dispersed water-oriented recreation in association with Horseshoe and Bartlett reservoirs. Management area 1F emphasis is wildlife habitat improvement, livestock forage production, and dispersed recreation.

Table 166. Effects of the S&Gs analyzed for the Arizona cliffrose – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	5	26.3
-1	S&G is causing sublethal response	1	5.3
0	S&G is ill-defined and/or open to interpretation	2	10.5
1	S&G is maintaining habitat & providing at least minimal recovery	6	31.6
2	S&G is moving towards recovery	1	5.3
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	3	15.7
Z	S&G implementation is non-discretionary	1	5.3
X	S&G is a heading	0	0.0
Total		19	100 %

Table 166 summarizes the effects to Arizona cliffrose from the applicable S&Gs on the Tonto NF. A little more than 30 percent of the S&Gs could result in mortality of Arizona cliffrose and habitat destruction, while 37 percent of the S&Gs offer protection and some recovery opportunities to the species. The remaining 32 percent of the S&Gs are not applicable to the species or were too vague to analyze.

Rangeland Management Program

All of the S&Gs (1423b-e) for management areas 1E and 1F manage activities in support of the range program. These actions include seeding, burning the chaparral on a 30-year rotation, building structures (fences) to distribute livestock, and land treatments to improve forage conditions. All of these can lead to habitat disturbance and mortality of cliffrose plants. The notable exception is S&G 1370d, directing the Forest to maintain forage use at a level that assures the continued existence and recovery of listed species.

Recreation, Heritage, and Wilderness Program

Standard and Guideline 1422a states that off-road vehicle is prohibited unless posted as open. This S&G could be interpreted in several ways; therefore, it could not be analyzed.

Wildlife, Fish, and Rare Plants Program

All of the S&Gs in this program area provide benefits to Arizona cliffrose. They allow for survey and inventory, and provide for project evaluation and clearances by biologists. These are the S&Gs that minimize and offset impacts from the other program areas.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems ((U.S. Forest Service 2004). Table 167 summarizes the effects of S&Gs from the 1996 Regional Amendment that apply to Arizona cliffrose. There is only one S&G that applies to Arizona cliffrose (1510). In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 167. Effects of the S&Gs analyzed for the Arizona cliffrose - 1996 Regional Amendment

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	16.7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.3
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	0	0.0
Total		6	100 %

Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species. The implementation of this S&G, which is applicable to the Rangeland Management Program, should preserve and protect, at a minimum, the known locations of Arizona cliffrose on the Coconino and Tonto NFs.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Arizona cliffrose locations on the Tonto NF are restricted to federal ownership. There would be no cumulative effects. Arizona cliffrose populations are not restricted to the Coconino NF, but also occur on adjacent state trust lands and lands managed by a state park. The Cottonwood population has already been affected by urban development and road maintenance and construction. These activities are likely to continue in the future as the Verde Valley continues to grow. The Bylas population is on the San Carlos Indian Reservation. That population will most likely be affected by development and infrastructure demands on the reservation. Livestock grazing on the reservation may be affecting the Bylas population.

CONCLUSION

After reviewing the current status of the Arizona cliffrose, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the S&Gs within the Coconino NF LRMP, Tonto NF LRMP, and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Arizona cliffrose. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for this species; therefore, none will be affected.

Arizona cliffrose has narrow habitat requirements and occurs in four widely separated areas in central Arizona: near Bylas (Graham County), the Horseshoe Lake vicinity (Maricopa County), near Burro Creek (Mohave County), and near Cottonwood in the Verde Valley (Yavapai County). These four known populations are spread across a 200-mile zone of central Arizona. The population near Burro Creek is on BLM land and is within a protected area. The Horseshoe lake population is on the Tonto NF and a portion of the Verde Valley population is on the Coconino NF, with the remaining portion on lands managed by the Arizona State Land Department. The Bylas population is on the San Carlos Apache Reservation. The BLM and Coconino NF populations have the highest level of protection and are monitored on a regular basis. Those populations seem to be stable. The status of the other two populations is unknown.

Cumulative effects considered in our analysis include the impacts of urban development, road maintenance, and road construction on the Cottonwood population located on state lands. These activities are likely to continue in the future as the Verde Valley continues to grow. the Bylas population on th San Carlos Indian Reservation will most likely be affected by development and infrastructure demands of the reservation. Livestock grazing on the reservation may also be affecting the Bylas population.

The continued implementation of the Coconino and Tonto LRMPs may result in habitat modification and mortality of Arizona cliffrose plants. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Coconino NF LRMP, which conserves Arizona cliffrose populations with the following:

- The Coconino NF has conducted many activities to conserve and protect Arizona cliffrose. These include, but are not limited to, numerous surveys, support of research on this species on Forest Service lands, and the creation of a botanical area with management prescriptions designed to protect this species and the fragile habitat on which it occurs.
- Standard and guideline 324 permits Arizona cliffrose habitat to be surveyed and evaluated. This S&G also allows for the reintroduction of threatened and endangered species in accordance with approved recovery plans.

- According to S&G 384, surface occupancy is prohibited where listed species exist.
- In accordance with S&Gs for Management Area 17 (Verde Valley Botanical Area), off-road driving is prohibited and timber harvest and fuelwood cutting are prohibited.
- Under S&G 1510, the habitat needs of listed species will be taken into consideration and forage use will not preclude recovery or the continued existence of listed species.

The FWS also bases the non-jeopardy conclusion on the management direction of the Tonto NF LRMP, which conserves Arizona cliffrose populations with the following:

- Standard and guideline 1341 allows Arizona cliffrose habitat to be surveyed and plants to be mapped. This S&G allows for avoidance of known plants during site-specific activities.
- In accordance with S&G 1342, ground disturbing projects are to be evaluated by qualified biologists in order to develop ways to minimize the effects of projects on Arizona cliffrose.
- Under S&G 1370d and 1510, the habitat needs of federally listed species will be taken into consideration and forage use is not to preclude the recovery or continued existence of listed species.

With the implementation of these beneficial S&Gs within the Coconino and Tonto NF LRMPs, along with the conservation efforts conducted by the Coconino NF, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Arizona cliffrose.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Develop a monitoring plan for populations of Arizona cliffrose on both the Coconino and Tonto NFs.
2. Implement the recommendations in the 1995 Arizona Cliffrose Recovery Plan.
3. Consider hiring a botanist to address concerns to listed plant species.
4. On the Tonto NF, determine if Arizona cliffrose plants in the Sears Club-Chalk Mountain Allotment need protection from livestock or activities associated with livestock grazing.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

ARIZONA HEDGEHOG CACTUS

STATUS OF THE SPECIES

Description

The Arizona hedgehog cactus (*Echinocereus triglochidiatus* var. *arizonicus*) is a succulent, perennial plant with diploid, perfect-flowers, occurring in a limited area of central Arizona. Distinguishing characteristics of the cactus include its thick stems and spines. The Arizona hedgehog cactus has a dark green cylindroid stem (2.5-12 in, 6.4-30.5 cm) with smooth spines. Stems occur singly or in clusters, with one to three gray or pinkish spines. Flowers are bright red and are produced along the side of the stem, appearing in late April to mid-May.

Plants are found on dacite or granite bedrock, open slopes, narrow cracks, between boulders, and in the understory of shrubs in the ecotone between Madrean Evergreen Woodland and Interior Chaparral.

Legal Status: The Arizona hedgehog cactus was listed as endangered on October 25, 1979, without critical habitat designation (U.S. Fish and Wildlife Service 1979). No recovery plan has been established for the cactus. The Arizona Native Plant Law protects Arizona hedgehog cactus and the species is also protected from international trade by the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Distribution and Abundance

The main population of Arizona hedgehog cactus occupies 18,900 acres (7,650 ha) in the Arizona counties of Gila and Pinal between Miami and Superior, Arizona (U.S. Forest Service 1996). Two small subpopulations occur outside this area: Apache Peak subpopulation north of Globe, Arizona and the El Capitan subpopulation south of Globe, Arizona. These populations (main and two subpopulations) are “classical var. *arizonicus*” and are the only populations of the Arizona hedgehog cactus subject to the protection and restrictions of the ESA.

Surveys for Arizona hedgehog cactus on Schultze granite and dacite formations showed densities of 64.05 and 5.72 plants per acre (25.9 and 2.3 plants per hectare) (U.S. Forest Service 2004). The estimated main population is about 257,500 cacti.

Habitat

The Arizona hedgehog cactus occurs in the Upper Sonoran Life Zone in the Interior Chaparral community at elevations of 3,300-5,700 ft (1,000-1,700 m). The preferred habitat is composed of parent materials of Schultze granite and Apache Leap Tuff (dacite, both of igneous origin) (U.S. Forest Service 2004). Pinal Schist and the Pioneer Formations can serve as additional habitat if they are exposed as bedrock near dacite and granite formations (U.S. Forest Service 1996).

Life History

The Arizona hedgehog cactus produces flowers in late April to mid-May and fruits from May to June (Arizona Game and Fish Department 1992). It is an obligate out crosser that is pollinated by hummingbirds, carpenter bees, solitary bees, and honeybees (U.S. Forest Service 2004).

About 100 seeds are produced per fruit (Arizona Game and Fish Department 1992) and mature cacti can produce many fruits per year.

Reasons for Listing

Reasons for listing the Arizona hedgehog cactus include the limited distribution of the plant, its vulnerability to mining operations, off-road vehicle use, illegal collecting, and road and utility construction.

Threats: Threats identified for the Arizona hedgehog cactus are mining, livestock damage, highway and utility corridor construction, collection, recreation activities, insect and disease damage, and wildfire.

Conservation Measures

In 1996, a Conservation Assessment and Plan was developed for the Arizona hedgehog cactus on the Tonto NF. The main recommendations of this plan are the identification of “safe areas” with selection of a protection option for each area, application of the conservation plan during projects and planning, conducting surveys for additional plants and monitoring existing cacti (U.S. Forest Service 1996).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

This plant is only found on the Tonto NF. Surveys conducted in conjunction with the Carlota Mine Project documented observations of 1,150 cacti (U.S. Forest Service 2004). These surveys determined a recruitment ratio of 1.65 new recruits to each loss showing that the population was both healthy and increasing during the 1992-1994 surveys (U.S. Forest Service 1996).

Factors Affecting the Species within the Action Area

Grazing is a minor threat to the Arizona hedgehog cactus, but it could possibly have adverse effects. Observations of physical damage to the cactus from livestock were estimated at a rate of one plant in 400-500 observations (U.S. Forest Service 2004). Only those cacti growing in a soil matrix on slopes less than 60 percent risk physical damage from livestock.

Mining activities have the potential to destroy Arizona hedgehog cactus habitat and plants. Almost half of the cacti habitat has some active mining claims and about 28 percent of the habitat has over nine active mining claims per quarter section (U.S. Forest Service 1996).

EFFECTS OF THE ACTION

The S&Gs listed in the Tonto NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Arizona hedgehog cactus and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the hedgehog cactus.

Table 168. Summary of S&Gs considered for the Arizona hedgehog cactus.

National Forest	Standards and Guidelines
Tonto	1341, 1342, 1344, 1345, 1354, 1359, 1362, 1363, 1367, 1370d, 1375, 1379, 1379a, 1380-1382, 1384, 1384a-b, 1385, 1385a-b, 1420, 1423, 1423b-e
1996 Regional Amendment	1432, 1434, 1437, 1438, 1445, 1453, 1454, 1455, 1458, 1465, 1489, 1509-1511

Tonto National Forest

Arizona hedgehog cactus occurs in management areas 2A and 2F on the Tonto NF. Management area 2A is in the Superstition Wilderness. The emphasis is to manage for wilderness values while providing livestock grazing and recreation opportunities that are compatible with maintaining wilderness values and protecting resources. Level B is the range resource management level for this area; meaning management controls livestock numbers so that livestock use is within present grazing capacity. Improvements are minimal and constructed only to the extent needed to protect and maintain the range resource in the presence of grazing. Management Area 2F is mostly desert and chaparral on the Globe Ranger District. It comprises about 385,000 ac (155,800 ha). The emphasis is to manage for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, water quality maintenance, livestock forage production, and dispersed recreation. Level D is the range resource level for this area; meaning management seeks to optimize production and utilization of forage allocated for livestock use consistent with maintaining the environment and providing for multiple use of the rangeland. From all existing rangeland and livestock management technology, practices may be selected and used to develop cost effective methods for achieving improved forage supplies and uniform livestock distribution and forage use. Cultural practices such as brush control, type conversion, fertilization, site preparation and seeding of improved forage species may be used to improve quality and quantity of forage. Cultural practices may be combined with fencing and water developments to implement complex grazing systems and management methods.

Table 169. Effects of the S&Gs analyzed for the Arizona hedgehog cactus – Tonto NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	7	25
-1	S&G is causing sublethal response	2	7.1
0	S&G is ill-defined and/or open to interpretation	2	7.1

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	6	21.5
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	10	35.7
Z	S&G implementation is non-discretionary	1	3.6
X	S&G is a heading	0	0.0
Total		28	100 %

Table 169 summarizes the effects to Arizona hedgehog cactus from the applicable S&Gs on the Tonto NF. Over 30 percent of the S&Gs could result in the destruction of plants and habitat. Twenty-one percent of the S&Gs offer some habitat protection for Arizona hedgehog cactus, while the remaining 47 percent of the S&Gs are not applicable to this species or are too vague to analyze.

Lands and Minerals Program

Most of the S&Gs (1385a-b) within this program area are too vague to analyze, but, depending on their interpretation, could result in adverse effects to Arizona hedgehog cactus. Standard and Guideline 1384a, which applies to management area 2A, allows for surface occupancy and has no provisions to protect listed species. Adverse effects to Arizona hedgehog cactus could result with the implementation of this standard.

Rangeland Management Program

The majority of the adverse effects to Arizona hedgehog cactus are found in this program area. Livestock grazing is allowed in both management areas where the plant occurs, and S&Gs 1423b-e directs the Tonto NF to develop structural improvements, revegetate areas using prescribed burns, and chemical or mechanical means. Treatments of this nature could adversely affect Arizona hedgehog cactus and habitat. Standard and Guideline 1379a allows the Tonto NF to study and assess the effects of grazing on the cactus by fencing plots and to correct management conflicts in hedgehog cactus range. This S&G could offset the adverse effects from other S&Gs in this program area.

Wildlife, Fish and Rare Plants Program

Most of the S&Gs in this program area provide benefits to Arizona hedgehog cactus. They allow for survey and inventory, and provide for project evaluation and clearances by biologists. These are the S&Gs that minimize and offset impacts from the other program areas. Two of the S&Gs (1362, 1363) discourage road placement in sensitive areas (riparian). Although this is generally considered a good management practice for general ecosystem health, it could redirect roads into areas that support Arizona hedgehog cactus, resulting in adverse effects.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy

forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Table 170 summarizes the effects of S&Gs from the 1996 Regional Amendment that apply to Arizona hedgehog cactus. There is only one S&G that applies to Arizona hedgehog cactus (1510). The other S&Gs are not applicable. In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 170. Effects of the S&Gs analyzed for the Arizona hedgehog cactus - 1996 Regional Amendment

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	7
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	11	79
Z	S&G implementation is non-discretionary	2	14
X	S&G is a heading	0	0.0
Total		14	100 %

Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species. The implementation of this S&G, which is applicable to the Rangeland Management Program, should preserve and protect, at a minimum, the known locations of Arizona hedgehog cactus on the Tonto NF.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Most of the populations of Arizona hedgehog cactus occur on the Tonto NF, but there is habitat and a few known locations off the Forest on adjacent lands. These locations most likely exist in areas that can be mined and plants and habitat may be destroyed.

CONCLUSION

After reviewing the current status of the Arizona hedgehog cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s biological opinion that the S&Gs within the Tonto NF LRMP and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Arizona

hedgehog cactus. Pursuant to 50 CFR 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for this species; therefore, none will be affected.

The main population of Arizona hedgehog cactus occupies 7,650 ha (18,900 ac) in the Arizona counties of Gila and Pinal between Miami and Superior, Arizona. Two small subpopulations occur outside this area: Apache Peak subpopulation north of Globe, Arizona and the El Capitan subpopulation south of Globe, Arizona. These populations (main and 2 subpopulations) are “classical var. *arizonicus*” and are the only populations of the Arizona hedgehog cactus subject to the protection and restrictions of the ESA. The majority of the locations occur on the Tonto NF. The estimated main population is approximately 257,500 cacti.

Cumulative effects considered in our analysis include the possibility of mining activities adjacent to Forest Service lands that could result in the loss of plants and habitat. The majority of occupied habitat is located on the Tonto NF, so cumulative effects are not likely to result in a significant decrease to the overall population. In addition, we know of very few activities that have significantly affected Arizona hedgehog cactus populations on the Tonto NF. In 1996, a Conservation Assessment and Plan was developed for the Arizona hedgehog cactus on the Tonto NF. The main recommendations of this plan include the identification of “safe areas” with selection of a protection option for each area, application of the conservation plan during projects and planning, conducting surveys for additional plants, and monitoring existing cacti.

The continued implementation of the Tonto LRMP may result in habitat modification and mortality of the Arizona hedgehog cactus. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Tonto NF LRMP, which conserves Arizona hedgehog cactus populations with the following:

- Standard and guideline 1341 permits Arizona hedgehog cactus habitat to be surveyed and plants to be mapped. This S&G allows for avoidance of known plants during site-specific activities.
- A conservation strategy for this species has been prepared and conservation measures are available to minimize adverse effects to this species from site-specific projects.
- In accordance with S&G 1342, ground disturbing projects are to be evaluated by qualified biologists in order to develop ways to minimize the effects of projects on Arizona hedgehog cactus.
- Under S&G 1510, the habitat needs of federally listed species will be taken into consideration and forage use is not to preclude the recovery or continued existence of listed species.

With the implementation of these beneficial S&Gs within the Tonto NF LRMP, along with the Conservation Assessment and Plan to protect the Arizona hedgehog cactus, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of Arizona hedgehog cactus.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Implement the species and habitat management objectives outlined in the conservation strategy for Arizona hedgehog cactus.
2. Incorporate management objectives from the Arizona hedgehog cactus conservation strategy into the future revised Tonto NF Land and Resource Management Plan.
3. Identify areas supporting dense populations of Arizona hedgehog cactus and propose such areas for mineral withdrawal in the future revised Tonto NF Land and Resource Management Plan.
4. Consider hiring a botanist to address concerns to listed plant species.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

FICKEISEN PLAINS CACTUS

STATUS OF THE SPECIES

Description

The Fickeisen plains cactus is a globose, perennial succulent known from the desert scrub communities of northern Arizona. The cactus is relatively small, up to 2.36 in (6 cm) tall and 2.17 in (5.5 cm) in diameter (U.S. Forest Service 2004). The Fickeisen plains cactus occurs on lands managed by the Bureau of Land Management, National Park Service, Forest Service, Arizona State Land Department, the Navajo Nation, and possibly on private land.

Legal Status: In 2000, the FWS listed the Fickeisen plains cactus (*Pediocactus peeblesianus* var. *fickeiseniae*) as a candidate species for addition to the Lists of Endangered and Threatened Wildlife and Plants under the ESA, as amended. Candidates are those species for which the FWS has gathered enough information to list as threatened or endangered, but the listing has been precluded by other agency priorities. The Fickeisen plains cactus has been assigned a listing priority number of 6, within a range of 1-12, with 1 being the highest priority number.

This Fickeisen plains cactus is protected under the Arizona Native Plant Law, which prohibits the collection of members of the genus *Pediocactus* in particular, and all members of the family Cactaceae (Phillips et al. 1982). The species is also protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); however, CITES does not regulate take or domestic trade.

Distribution and Abundance

The Fickeisen plains cactus occurs in widely scattered populations throughout Coconino and Mohave Counties, Arizona. The plains cactus inhabits desert scrub and grassland communities at elevations of 4,400-5,400 ft (1,300-1,660 m). Distinct clusters of populations are often isolated by long distances (Hughes undated.) Populations of this taxon occur to the south and west of Cameron, in the House Rock Valley, west of Marble Canyon, and in northwestern Arizona from Kaibab Creek westward to Mainstream Valley (Arizona Game and Fish Department 1998). In 1998, AGFD noted 23 element occurrences for the Fickeisen plains cactus range-wide. Limited populations occur near the National Forest boundary of the North Kaibab Ranger District below the eastern and western edges of the Kaibab Plateau.

Habitat

The Fickeisen plains cactus is a narrow endemic restricted to Kaibab limestone derived soils. Habitat for the species includes canyon margins and well-drained hills of desert and grassland communities.

Life History

The life span of the Fickeisen plains cactus is unknown. Yet, the closely related *Pediocactus peeblesianus* var. *peeblesianus* is projected to live at least 30 years based on 20 years of monitoring data (Phillips and Phillips 2004). The cactus flowers in April and sets fruit in May to June. The fruits and seed have no special dispersal mechanisms (U.S. Forest Service 2004). Dispersal most likely occurs by way of rodents, birds, ants, and water. Germination and seedling

establishment has not been well-studied. The plains cactus is known to shrink into the soil in response to drought; thus making field sampling and studies more difficult.

The Fickeisen plains cactus appears to have a low reproductive capacity (low seed production). Thus, rapid increases in population numbers do not occur often, even in favorable weather conditions. Yet, moderate increases in population numbers have been known to occur two to three times every ten years. Given its small population size, low reproductive output, and limited distribution, the Fickeisen plains cactus is likely to continue to be a rare species.

Reasons for Listing

The Fickeisen plains cactus is listed as a candidate species due to its rarity and limited distribution; thus making the species vulnerable to extirpation.

Threats: Fickeisen plains cacti are threatened by collecting, livestock trampling, recreational activities, rodent predation, road construction and maintenance, and uranium exploration. Recreational hiking and off-highway vehicle use associated with scenic canyon overlook areas are a constant threat to the plains cactus. Also, illegal collection is a potential threat to the species. Although uranium mining is not a current threat, past mining activities have affected the species and may potentially affect the species in the future.

Conservation Measures

A conservation agreement is under consideration in cooperation with the BLM. However, the proposed conservation strategy and agreement is in need of additional development. Currently, the proposed conservation agreement does not include landowners other than the BLM. The Fickeisen plains cactus is protected by state and federal laws; yet no other conservation activities are currently being implemented to protect the species. The BLM (Arizona Strip Field Office) has established five monitoring plots for this species.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Only a small portion of the Fickeisen plains cactus' distribution is located on National Forest System lands. Two occurrences of this taxon are known on the North Kaibab Ranger District of the Kaibab NF near the eastern and western boundaries of the Forest in remote areas where the roads dead end at canyon rims.

Factors Affecting the Species within the Action Area

The western population of Fickeisen plains cactus is part of a grazing allotment where livestock may be present in the winter months, but cattle are not expected to spend much time in the desert

scrub habitat due to its relatively little forage. The Fickeisen plains cactus retracts into the soil during this time and it is unlikely that trampling would directly affect the species. The site is over 3 km from water and shows no signs of cattle use in the vicinity (B. Phillips, Forest Service, 2004, unpubl. data). On the east side, the known habitat area is within the Grand Canyon National Game Preserve with no livestock grazing. Developed water currently is over 4 km from the known location of the cactus. Plans to develop a wildlife drinker will still leave water over 1 km from the site. In addition, wildlife does not pose a threat to the taxon.

The population on the west side can only be approached by a non-maintained forest road where shrubs are growing in the road itself (D. Smith, pers comm. to B.G. Phillips, 2004). The site on the east side showed no sign that a human had ever been there: the closest overlook is at the end of a remote road, approximately 1 km cross-country over rough terrain (Phillips and Roth 2004).

Predation by rodents is a source of mortality for the Fickeisen plains cactus. It is unknown whether the occasional high numbers of cacti eaten by rodents and other herbivores is due to drought (Hughes 1996).

EFFECTS OF THE ACTION

The S&Gs listed in the Kaibab NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Fickeisen plains cactus and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the plains cactus.

Table 171. Summary of S&Gs considered for the Fickeisen plains cactus.

National Forest	Standards and Guidelines
Kaibab	958, 960, 961, 964, 965, 967-974, 976-981, 983, 997, 998, 1001, 1003, 1004, 1011
1996 Regional Amendment	1432, 1434, 1437, 1438, 1445, 1453-1455, 1458, 1465, 1489, 1509-1515

Kaibab National Forest

The cactus occurs in management areas 12 and 16 on the Kaibab NF. These areas are managed for multiple uses, but the predominant uses are wildlife habitat, livestock grazing, and recreation. The areas provide critical winter habitat for the North Kaibab mule deer herd. Livestock graze the area mostly as winter range. Recreation includes big game hunting and access to Grand Canyon scenic overlooks and trail heads.

Table 172. Effects of the S&Gs analyzed for the Fickeisen plains cactus – Kaibab NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	5	19.0
-1	S&G is causing sublethal response	1	4.0

Ranking	Explanation of Ranking	Total	Percentage
0	S&G is ill-defined and/or open to interpretation	1	4.0
1	S&G is maintaining habitat & providing at least minimal recovery	12	46.0
2	S&G is moving towards recovery	1	4.0
3	S&G is implementing species recovery plan	1	4.0
Y	S&G has no application to the species	4	15.0
Z	S&G implementation is non-discretionary	1	4.0
X	S&G is a heading	0	0.0
Total		26	100 %

Table 172 summarizes the effects to Fickeisen plains cactus from the applicable S&Gs on the Kaibab NF. Twenty-three percent of the S&Gs could cause mortality of Fickeisen plains cactus, while 54 percent of the S&Gs have positive effects for this species. The remaining 23 percent of the S&Gs have no effect on Fickeisen plains cactus or the S&Gs are too vague to analyze.

Lands and Minerals Program

Standard and Guideline 1011 restricts the use and occupancy yearlong in areas supporting populations of threatened, endangered, and sensitive plants. Implementation of this S&G will protect habitat and populations of Fickeisen plains cactus that may occur in areas subject to mining. Management Area 12 is located within the Grand Canyon National Game Preserve and is withdrawn from mineral entry.

Rangeland Management Program

Standard and Guideline 969 allows for intensive livestock use in management areas 12 and 16. Livestock grazing can affect these small cacti and can lead to habitat modification and mortality. Standard and Guideline 1001 allows the Kaibab NF to revise allotment management plans based on forage conditions. This S&G could have beneficial effects for the cactus if resource damage can be corrected through allotment plan revisions.

Recreation, Heritage, and Wilderness Program

The S&Gs in this program area (958, 967, 976, and 977) direct the Kaibab NF to close roads to protect resources, have seasonal road closures to protect resources, and prohibits off-road competition events in management areas 12 and 16. All of these S&Gs protect suitable and occupied habitat of Fickeisen plains cactus.

Watershed Management Program

Standard and Guideline 964 directs the Forest to maintain soil productivity and watershed condition. Implementation of this S&G leads to healthy ecosystems which will benefit this taxon's habitat.

Wildlife, Fish and Rare Plants Program

The Kaibab NF direction is to improve habitats for listed and sensitive species (Fickeisen plains cactus is listed as a Forest Service sensitive species) (960); to identify and protect areas that

contain listed species (961); and develop resource habitat management plans for all listed species (968). All of the S&Gs provide protective measures and minimize negative effects from the other program areas.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems ((U.S. Forest Service 2004). Table 173 summarizes the effects of S&Gs from the 1996 Regional Amendment that apply to Fickeisen plains cactus. There is only one S&G that applies to Fickeisen plains cactus (1510). In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 173. Effects of the S&Gs analyzed for the Fickeisen plains cactus - 1996 Regional Amendment

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	6.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	14	77.0
Z	S&G implementation is non-discretionary	2	11.0
X	S&G is a heading	1	6.0
Total		18	100 %

Standard and Guideline 1510 applies to this species, and as for all the other plant species, is found to have beneficial effects to the species and its habitat.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Kaibab NF supports a very small population of Fickeisen plains cactus. The remaining populations are in federal ownership (BLM, National Park Service) or occur on state, tribal, and private lands. It is not known if any of the non-federal locations are adjacent to Forest Service lands.

CONCLUSION

After reviewing the current status of the Fickeisen plains cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the S&Gs within the Kaibab NF LRMP and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Fickeisen plains cactus. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for this species; therefore, none will be affected.

Only a small portion of the Fickeisen plains cactus' distribution is located on National Forest System lands. The plains cactus is known to occur on the western edge of the North Kaibab Ranger District of the Kaibab NF. Plains cactus habitat is present near the eastern boundary of the Ranger District. Population estimates are not available.

Cumulative effects considered in our analysis include the remote possibility of development that may affect populations on private property and state lands. However, the majority of the populations are in federal and tribal ownership. A conservation agreement is under consideration in cooperation with the BLM. However, the proposed conservation strategy and agreement is in need of additional development. Currently, the proposed conservation agreement does not include landowners other than the BLM (Arizona Strip Field Office), which has established five monitoring plots for this species. State and federal laws protect the Fickeisen plains cactus; yet no other conservation activities are currently being implemented to protect the species.

The continued implementation of the Kaibab LRMP may result in habitat modification and mortality of the Fickeisen plains cactus. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Kaibab NF LRMP, which conserves Fickeisen plains cactus populations with the following:

- Standard and guideline 960 allows for the improvement of threatened, endangered, and sensitive species habitat, with the goal of recovery and delisting of the species.
- Under S&G 961, the Kaibab NF will identify and protect areas that contain listed or sensitive species.
- As noted above, there is no cattle grazing in the portions of Management Area 16 where the Fickeisen plains cactus occurs.

With the implementation of these beneficial S&Gs within the Kaibab NF LRMP, as well as the exclusion of livestock grazing where the species occurs, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Fickeisen plains cactus.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to survey for the presence of Fickeisen plains cactus on the Kaibab NF.
2. Monitor populations of Fickeisen plains cactus to determine plant trends.
3. Continue working on the conservation agreement for this species. Upon completion of the assessment, consider incorporating the recommendations into the future revised Kaibab NF Land and Resource Management Plan.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

HOLY GHOST IPOMOPSIS

STATUS OF THE SPECIES

Description

Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) is an herbaceous, biennial to short-lived perennial known from a single canyon along the southern edge of the Sangre de Cristo Mountains of north-central New Mexico. Ipomopsis is 30-80 cm (12-31 in.) tall, with mostly solitary stems, occasionally branched from the base. The plant's leaves are oval, 3-6 cm (1-2.4 in.) long, with 9-15 linear divisions. The basal leaves form a loose to compact rosette that dies back at flowering (U.S. Fish and Wildlife Service 1994). Ipomopsis flowers are pink, tubular, and terminate in five spreading lobes.

Holy Ghost Ipomopsis is in the phlox family, Polemoniaceae, and a member of the *Ipomopsis aggregata* complex of species and subspecies (U.S. Fish and Wildlife Service 2002). Holy Ghost Ipomopsis was first collected by Dr. Edward F. Castetter in 1929. In 1988, Dr. Dieter Wilken, an expert on the phlox family, along with Reggie Fletcher, a Forest Service botanist, described the plant as a species distinct from the closely related *Ipomopsis aggregata* (U.S. Fish and Wildlife Service 1994). *Ipomopsis arizonica* is also a close relative of *I. sancti-spiritus*, but occurs in north-central Arizona and south-central Utah.

Legal Status: On March 23, 1994, the FWS listed Holy Ghost Ipomopsis as an endangered species under the authority of the ESA. Critical habitat for the species has not been designated.

The FWS completed a recovery plan for Holy Ghost Ipomopsis on September 26, 2002. Ipomopsis was assigned a recovery priority number of 2C, for the high threat level to the species, and potential for immediate conflict, as well as a relatively high potential for recovery.

Holy Ghost Ipomopsis is a New Mexico state endangered plant species. Under the New Mexico Endangered Plant Species Act, the removal with intent to possess, transport, export, sell, or offer for sale any state-listed plants is prohibited (U.S. Fish and Wildlife Service 2002). State-listed species may be legally collected with a permit issued by the State Forester, for scientific studies and impact mitigation.

Distribution and Abundance

Holy Ghost Ipomopsis occurs as a single population within Holy Ghost Canyon in San Miguel County, New Mexico. Approximately 80 percent of the population grows on, or immediately adjacent to, the west-facing cut slopes along Forest Road 122 in the Santa Fe NF. Plants are relatively continuous, occurring in scattered patches for approximately 3.5 km (2.2 miles), beginning 1.6 km (1.0 mile) above the confluence with the Pecos River, along Holy Ghost Creek to the confluence with Doctor Creek (U.S. Fish and Wildlife Service 2002). The Santa Fe NF manages the 200 acres (80 ha) of occupied habitat.

The number of flowering Ipomopsis plants has varied greatly in past decades. Anecdotal accounts indicate the highest densities occurred in the 1920s and 1940s. Plant density varies from small dense patches (5 plants/m²) to single, isolated plants found greater than 50 m from

others (U.S. Fish and Wildlife Service 2002). The plant density of Holy Ghost Ipomopsis increases in forest openings, yet the number of openings has decreased with the progressive closure of the forest canopy (U.S. Forest Service 2004).

Habitat

Holy Ghost Ipomopsis occurs at elevations of 2,350-2,500 m (7,730-8,220 ft), on the relatively dry, steep, west to southwest-facing slopes of the canyon. The geologic substrate is partly weathered Terrero limestone. Holy Ghost Ipomopsis appears to grow best in bare mineral soils, with the highest densities occurring on disturbed sites such as road cuts (U.S. Fish and Wildlife Service 2002).

Holy Ghost Ipomopsis inhabits the Rocky Mountain montane conifer forest plant community. The species usually grows in open areas free of dense grass cover. Occasionally, plants are in the understory of trees and shrubs. Commonly associated species are ponderosa pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga menziesii*), aspen (*Populus tremuloides*), Gambel oak (*Quercus gambelii*), mountain mahogany (*Cercocarpus montanus*), Wood's rose (*Rosa woodsii*), big head bricklebush (*Brickellia grandiflora*), poison ivy (*Toxicodendron rydbergii*), Indian hemp (*Apocynum cannabinum*), western yarrow (*Achillea millefolium*), white ragweed (*Hymenopappus newberryi*), and nodding onion (*Allium cernuum*) (U.S. Fish and Wildlife Service 2002).

Life History

Holy Ghost Ipomopsis is often a biennial plant, yet the species may live for several years as a non-reproductive rosette before producing a flowering stem. Average maturation time is 1.86 years; the plant flowers only once then dies. Ipomopsis flowers sequentially up the stem, with some fruits maturing as other flowers are just opening (U.S. Forest Service 2004). Fruits develop in the late summer and early autumn. Germination studies have shown seed germination to occur during the spring and early summer months, after the winter cold period (Maschinski 1996).

Holy Ghost Ipomopsis must have pollinators for either self-or-outcross fertilization. Pollination studies have documented eight species of arthropods as potential pollinators. Three species, the Snow's skipper (*Paratrytone snowi*), the golden skipper (*Poanes taxiles*), and the sphinx moth (*Hyles lineate*) appear to be the primary pollinators, while butterflies and hawkmoths have also been observed to probe the flowers of Holy Ghost Ipomopsis (U.S. Fish and Wildlife Service 2002). Studies have also shown discrimination for the paternal pollen source.

While no studies have been conducted, Holy Ghost Ipomopsis is thought to have a compensating growth response to herbivory, similar to that of *I. aggregata*. Grazed Ipomopsis may produce more flowers and fruits than an un-grazed plant when the maturing flowers stalk is removed early in the season and nutrients are not limited (U.S. Fish and Wildlife Service 2002).

Plant density of the Holy Ghost Ipomopsis is difficult to determine because young plants are indistinguishable from *Ipomopsis aggregata* spp. *formosissima*, which also grows in the area. Past surveys have estimated young plants to outnumber adults three to one, with 150-650 adults (flowering plants) during various years (U.S. Fish and Wildlife Service 2002). Maschinski

(1996) monitored 10 transects in Holy Ghost Canyon and documented the total number of plants ranging from 2,047 in 1996 to 250 in 2001. During this period, rainfall patterns greatly influenced seedling recruitment and population size. Currently, the only known population of Holy Ghost Ipomopsis is estimated to have 2,500 plants.

Reasons for Listing

The FWS listed the Holy Ghost Ipomopsis as a federally endangered species due to its extremely limited distribution, heavy recreational use in the single canyon where the plant is found, inadequate protection by existing regulations, management activities, and exclusion of fire and timber harvest.

Threats: Potential immediate threats to Holy Ghost Ipomopsis include small population size, road maintenance, recreation impacts, and catastrophic forest fire (U.S. Fish and Wildlife Service 2002). The limited size and distribution of Holy Ghost Ipomopsis increased the species' vulnerability to factors affecting the species' environment. The heavy recreational use within the plant's range and its attractive flower makes it vulnerable to unauthorized picking (U.S. Fish and Wildlife Service 2002). Also, land use activities associated with recreation such as road maintenance and expansion threaten the existing population of Ipomopsis.

Catastrophic wildfire poses a significant threat to Holy Ghost Ipomopsis. Catastrophic fires burn hot, sterilizing the soil (U.S. Fish and Wildlife Service 2002). Fire suppression within the range of Holy Ghost Ipomopsis has led to an accumulation of fuels that can produce an unnatural catastrophic wildfire. Fire suppression activities have also led to a decrease in forest openings, which may have contributed to the reduced density of the plants.

Conservation Measures

The FWS's recovery plan for Holy Ghost Ipomopsis identifies the management actions needed to protect and manage the species towards self sustainability in its natural habitat. The major actions needed include: 1) establish a management plan to protect current populations from existing threats; 2) study the species' biology and ecology; 3) establish a botanical garden population and a seed bank; 4) search for new populations; and 5) reintroduce Holy Ghost Ipomopsis in the upper Pecos River Basin and protect the reintroduced populations (U.S. Fish and Wildlife Service 2002). Currently, the Santa Fe NF is coordinating with Bob Skivinski from the New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division, to monitor populations of Holy Ghost Ipomopsis on the Santa Fe NF (Bob Skivinski, N.M. Energy, Minerals, and Natural Resources Department, 2005, unpubl. data).

In 1998, the New Mexico Forestry Division, Forest Service, and the FWS identified several potential sites for Holy Ghost Ipomopsis seeding trials. The reintroduction sites had more variation in soils, exposure, elevation, vegetation structure, and plant community than Holy Ghost canyon (U.S. Fish and Wildlife Service 2002). The aim of the seeding trials was to establish new populations, and test the ecological amplitude of Holy Ghost Ipomopsis. The seeded sites were visited in August of 1999, 2000, 2001, and 2002; two, three, four, and five growing seasons after planting (Sivinski 2004). The seeding effort was unsuccessful, for only one mature Holy Ghost Ipomopsis plant was found.

At present time, the Forest Service, FWS, and New Mexico Heritage Program are working together to reintroduce Ipomopsis plants outside of Holy Ghost Canyon. Field surveys for new transplant sites were conducted in 2004, with the goal of finding more mesic sites with wetter soil conditions than at the sites used for the seedling trials (Sivinski 2004). Four potential transplant locations have been identified: one each in Indian Creek, Winsor Creek, Panchuela Creek, and Cow Creek (Sivinski 2004). Planning is currently underway to reintroduce Ipomopsis plants at these four sites in the spring of 2005.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Holy Ghost Ipomopsis is found in a single population of approximately 2,500 plants within Holy Ghost Canyon in the Santa Fe NF in New Mexico. Approximately 80 percent of the plants grow on the cut-slopes of Forest Road 122. The population is vulnerable to recreational impacts, and stochastic events such as wildfire, disease, and drought.

Factors Affecting the Species within the Action Area

The Forest Service maintains a campground and leases land in Holy Ghost Canyon as the Holy Ghost Summer Home Area. Recreational use associated with the Forest Service campground and the summer cabins have the potential to negatively impact Ipomopsis and its habitat. Impacts are mostly attributed to the residents and campers who walk the forest road and occasionally pick native wildflowers (U.S. Fish and Wildlife Service 2002). An increase in recreation in Holy Ghost Canyon has increased the volume of traffic on Forest Road 122. Widening of the road to accommodate traffic, or a fireline during future attempts to control wildfires in the canyon would likely threaten existing population of Holy Ghost Ipomopsis.

Soil disturbances in the canyon open up areas to weedy non-native plants, making the habitat unsuitable for Ipomopsis. Although occupied Ipomopsis habitat is closed to livestock grazing, forest managers and ranchers have traditionally supported the spread of non-native pasture grasses, such as smooth brome (*Bromus inermis*) and Kentucky bluegrass (*Poa pratensis*), for forage production and erosion control (U.S. Fish and Wildlife Service 2002). Such grasses produce sodbound areas that appear to exclude Holy Ghost Ipomopsis.

Periodic forest fires, at a low intensity, may play a significant role in maintaining suitable open habitat for the Holy Ghost Ipomopsis. Studies in Arizona with *I. aggregata* have shown low-intensity fires increase seed germination (U.S. Fish and Wildlife Service 2002). Recurrent low-intensity fires were a normal occurrence in the Santa Fe NF, until fire suppression became a primary focus of forest management. Fire suppression in Holy Ghost Canyon has extended over 80 years. Yet, extended fire suppression reduces favorable Ipomopsis habitat by producing dense

thickets and suppressing the herbaceous understory (U.S. Fish and Wildlife Service 2002). In addition, the extended period of fire exclusion has led to an accumulation of fuels that could produce an unnatural catastrophic wildfire. Survival of Holy Ghost ipomopsis from a catastrophic wildfire could be very low, and much of its habitat rendered unsuitable (U.S. Fish and Wildlife Service 2002).

EFFECTS OF THE ACTION

The S&Gs listed in the Santa Fe NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Holy Ghost Ipomopsis and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Forest Service management on the Santa Fe NF may potentially impact Holy Ghost Ipomopsis through habitat loss and modification, as well as direct impacts to individual plants from recreation activities, road maintenance, and catastrophic fire. The following table outlines the S&Gs presented to the FWS as applicable to the Ipomopsis.

Table 174. Summary of S&Gs considered for the Holy Ghost Ipomopsis.

National Forest	Standards and Guidelines
Santa Fe	1183-85, 1190-94, 1198, 1200, 1202, 1204-06, 1208-10, 1214-15, 1224-25, 1227,1229-34, 1247, 1253, 1258-59, 1261-64, 1269-70, 1272-74, 1277, 1283-85, 1289-90, 1297, 1299, 1302, 1318, 1321, 1324, 1327, 1329, 1331-32, 1334
1996 Regional Amendment	1425-28, 1432, 1434, 1437-38, 1440-45, 1453-56, 1458-59, 1461-72, 1474-76, 1481, 1483-84, 1486-89, 1491-95, 1497-98, 1501, 1508-17

Santa Fe National Forest

The single population of Holy Ghost Ipomopsis occurs within ponderosa pine and mixed conifer habitats along Forest Service Road 122 in Holy Ghost Canyon. Management guidance provided by the S&Gs within the Santa Fe NF LRMP mainly supports the long-term conservation and recovery of the Ipomopsis. The S&Gs address a few of the key threats to the species, and provide direction for minimizing such threats.

Table 175. Effects of the S&Gs analyzed for the Holy ghost Ipomopsis – Santa Fe NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	1.7
1	S&G is maintaining habitat & providing at least minimal recovery	38	65.5

Ranking	Explanation of Ranking	Total	Percentage
2	S&G is moving towards recovery	2	3.4
3	S&G is implementing species recovery plan	4	6.9
Y	S&G has no application to the species	7	12.1
Z	S&G implementation is non-discretionary	2	3.4
X	S&G is a heading	4	6.9
Total		58	100 %

Table 175 summarizes the effects to Holy Ghost Ipomopsis from the applicable S&Gs within the Santa Fe NF LRMP. No S&Gs cause mortality of Ipomopsis plants, while 75 percent of the S&Gs have positive effects on the species. The remaining 25 percent of the S&Gs have no effect on Holy Ghost Ipomopsis, or are too vague and ill defined to analyze.

Engineering Program

The Engineering Program of the Santa Fe NF LRMP includes the construction, maintenance and operation of roads. Due to the limited distribution of Holy Ghost Ipomopsis along Forest Service Road 122, the species is vulnerable to road activities such as road construction, use, and maintenance. Forest-wide S&Gs 1297 and 1321 provide management direction for minimizing effects of road activities to T&E species and natural resources. Standard and Guideline 1297 directs the management of roads to include the protection of T&E species. Standard and Guideline 1321 provides guidance limiting open road density and closing unneeded roads. These S&Gs provide benefits to the ipomopsis by minimizing adverse effects to the species and species’ habitat.

Fire Management Program

Fire management on the Santa Fe NF includes fire prevention, fire suppression, and fire use. Applicable S&Gs within the Fire Management Program (1273, 1302, and 1334) direct for the use of prescribed fires to minimize the risk of high intensity, catastrophic fires. The S&Gs are used to minimize the effects of wildfires on threatened, endangered, and sensitive species habitat, which burn the soil and may eliminate the seed bank. Although short-term effects to the Holy Ghost Ipomopsis may result from the implementation of prescribed fire, these S&Gs may have a long-term positive effect on the species.

Forestry and Forest Health Program

The Forestry and Forest Health Program includes timber harvest, forest product extraction, and forest health. Areas within and adjacent to Holy Ghost Ipomopsis habitat are not suitable for timber harvest.

The applicable S&Gs within the Forestry and Forest Health Program have a positive effect on the Holy Ghost Ipomopsis. Standard and Guideline 1274 places habitat requirements for threatened, endangered, and sensitive species over disease/insect treatment needs and cover requirements for non-threatened, endangered, and sensitive species. Standard and Guideline 1332 allows for vegetation management to be implemented in ways consistent with TE&S species needs. The implementation of these S&Gs positively affects the Holy Ghost Ipomopsis because it maintains the species’ habitat.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites within the National Forests and National Grasslands of the Southwestern Region. Recreation-related activities have been identified as a potential threat to Holy Ghost Ipomopsis from wildflower picking, and through the concentration of activities, which lead to the need for road improvement and maintenance. Standard and Guidelines 1193, 1284, and 1285 benefit Holy Ghost Ipomopsis by minimizing resource damage and maintaining habitat. Standard and Guideline 1193 emphasizes the need to study threatened, endangered, and sensitive species, and S&Gs 1284 and 1285 direct for the protection of threatened, endangered, and sensitive species habitat. Standard and Guideline 1284 directs for no adverse effect determinations to be made prior to a site-specific project, and existing recreational facilities be managed to protect threatened, endangered, and sensitive species habitat. Standard and Guideline 1285 directs ORV restrictions and closures contributing to the degradation of threatened, endangered, and sensitive species habitat. These S&Gs related to recreation facilities and activities have a positive effect on Holy Ghost Ipomopsis through the protection of Ipomopsis habitat.

Watershed Management Program

Objectives of the Watershed Management Program include improving and maintaining water quality; protecting and restoring riparian areas; and prioritizing watersheds for protection or improvement. The applicable S&Gs within the Watershed Management Program mainly benefit the Holy Ghost Ipomopsis by improving degraded watersheds and maintaining health ecosystems. Standard and Guideline 1232 directs for road closures or ORV restrictions to improve unsatisfactory watershed conditions to a satisfactory state. This S&G has a positive effect on the Ipomopsis.

Many S&Gs guide the use of prescribed fires and support re-vegetation projects to restore and maintain healthy watersheds. Standard and Guideline 1231 allows for the use of large equipment and prescribed fires for plant control and re-vegetation projects. While this S&G has long-term benefits for the Holy Ghost Ipomopsis, short-term adverse effects may occur. Standard and Guidelines 1247 and 1253 direct for re-vegetation following closure of temporary roads, and along landings and skid trails. These S&Gs help maintain healthy watersheds and have a positive effect on the Holy Ghost Ipomopsis. However, negative impacts may occur from the introduction of persistent non-native plant species during the re-vegetation process.

Wildlife, Fish and Rare Plants Program

Many S&Gs within the Wildlife Program provide direction for delisting threatened and endangered species through the implementation of approved recovery plans. Forest-wide S&Gs 1204, 1205, and 1209 direct for the management of threatened and endangered species through practices identified in recovery plans, and to monitor such practices to sustain species viability. In addition, S&G 1184 allows for management to identify, protect and enhance habitat that contains threatened, endangered, and sensitive species to work towards the goal of species recovery. Following implementation, these S&Gs have a positive effect on the Holy Ghost Ipomopsis.

Additional S&Gs within the Wildlife Program provide guidance for cooperating with other agencies to protect threatened, endangered, and sensitive species. Standard and Guideline 1198

and 1202 suggest cooperation with the New Mexico Natural Resource Department and the NMDGF to achieve objectives for threatened, endangered, and sensitive sensitive flora and manage for indigenous species. In addition, S&G 1327 prohibits the introduction of non-native plant species. Such management direction has a positive impact on Holy Ghost Ipomopsis.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Holy Ghost Ipomopsis sites do not occur within Mexican Spotted Owl protected areas; yet, the species does overlap Mexican Spotted Owl restricted areas, as well as the nesting and post-fledgling family areas of Northern Goshawks. As a result, the S&Gs associated with the 1996 Regional are applicable to Holy Ghost Ipomopsis and its habitat. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 176. Effects of the S&Gs analyzed for the Holy Ghost Ipomopsis – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	4	6.6
0	S&G is ill-defined and/or open to interpretation	1	1.6
1	S&G is maintaining habitat & providing at least minimal recovery	16	26.2
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	34	55.7
Z	S&G implementation is non-discretionary	2	3.3
X	S&G is a heading	4	6.6
Total		61	100 %

Table 176 summarizes the effects to Holy Ghost Ipomopsis from the applicable S&Gs within the 1996 Regional Amendment. Less than seven percent of the S&Gs could cause mortality of Ipomopsis plants, while 26 percent of the S&Gs have positive effects on the species. The remaining 67 percent of the S&Gs have no effect on Holy Ghost Ipomopsis, or are too vague and ill defined to analyze.

All of the S&Gs in the 1996 Regional Amendment are within the Wildlife Program. The majority of these S&Gs provide management direction for maintaining Mexican Spotted Owl and Northern Goshawk habitat and for at least minimal recovery of these species. While not a focus of the LRMP, the S&Gs have the potential to affect other threatened and endangered species. In the case of the Holy Ghost Ipomopsis, some S&Gs have positive effects on the species while others adversely impact the Ipomopsis and its habitats.

Standards and Guidelines 1495 and 1501 provide guidance for a healthy sustainable forest environment for the post-fledgling family needs of Goshawks. Standard and Guideline 1495 applies to areas outside of Goshawk post-fledgling family areas, while S&G 1501 applies to areas within Goshawk post-fledgling family areas. Both of these S&Gs provide direction for levels of canopy cover and opening size within Goshawk habitat. However, the level of canopy cover desirable by Goshawks is unfavorable by Holy Ghost Ipomopsis plants. The canopy cover for Goshawks is too high for Ipomopsis plants to thrive. Therefore, S&Gs 1495 and 1501 have a negative effect on Holy Ghost Ipomopsis.

Additional S&Gs (1461 and 1463) emphasize the need to allow natural disturbance patterns and natural canopy gap processes to occur. These S&Gs support irregular tree spacing, various patch sizes, and horizontal variation in stand structure. Such elements have a positive effect on Holy Ghost Ipomopsis and help minimize the effects of excessive canopy cover.

Many S&Gs (1468, 1476, and 1508) within the 1996 Regional Amendment direct the use of prescribed fire and thinning to reduce fuel accumulation and avoid catastrophic wildfires. Standard and Guidelines also allow for an ecosystem approach to managing landscape diversity, which includes the use of fire. Although needed to avoid catastrophic wildfires, prescribed fire may have a short-term adverse effect on the Holy Ghost Ipomopsis. Therefore, the long-term benefits of prescribed fire activities outlined in S&Gs 1468, 1476, and 1508 have a positive effect on the Ipomopsis.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. The entire population of Holy Ghost Ipomopsis is restricted to public lands managed by the Santa Fe NF. Thus, no cumulative effects to the species are anticipated.

CONCLUSION

After reviewing the current status of the Holy Ghost Ipomopsis, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Santa Fe NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Holy Ghost Ipomopsis. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

Holy Ghost Ipomopsis occurs in a single population of approximately 2,500 plants on lands administered by the Santa Fe NF. The population is vulnerable to recreational impacts, and natural events such as wildfire, disease, and drought. Although adverse effects to the Ipomopsis may occur from the implementation of the Santa Fe NF LRMP and 1996 Regional Amendment,

the FWS does not believe the impacts to the species will rise to the level of jeopardy for the following reasons:

- Standard and guidelines within the Santa Fe NF LRMP manage for the conservation and recovery of the Holy Ghost Ipomopsis.
- Standard and guidelines 1193 and 1274 allow for threatened, endangered, and sensitive species habitat needs to take precedence over visual resource management, disease/insect treatment needs, and cover requirements for non-threatened and endangered species. These S&Gs allow for the protection of Holy Ghost Ipomopsis plants and habitat.
- Standard and guideline 1184 allows management to identify, protect and enhance habitat containing threatened, endangered, and sensitive species to contribute toward the goal of species recovery.
- Standard and guideline 1204 directs the Santa Fe NF to accomplish recovery projects included in approved recovery plans to sustain species viability and delist the species.
- Standard and guidelines 1273, 1302, and 1334 direct prescribed fire to minimize high intensity fire risk in essential threatened and endangered species habitat, reducing adverse effects of catastrophic fire.
- Standard and guideline 1284 manages new developed recreation facilities within threatened and endangered species habitat to have no adverse effects on threatened and endangered species, and existing facilities to be managed to protect threatened and endangered habitat. This S&G minimizes the adverse effects of recreation facilities on the Holy Ghost Ipomopsis.
- Standard and guideline 1285 supports ORV restrictions or closures to minimize degradation of threatened, endangered, and sensitive species habitat. This S&G minimizes the impacts of ORV use alongside the cut-slopes of Forest Road 122, where the majority of Ipomopsis plants occur.
- Standard and guideline 1321 limits open road density from zero to 1.0 miles per square mile to minimize resource damage.
- The Santa Fe NF is working cooperatively with the New Mexico Heritage Program to reintroduce Ipomopsis plants outside of Holy Ghost Canyon. Four transplant location have been identified and planning is underway to reintroduce Ipomopsis plants at these sites in 2005.

With the implementation of these management standards outlined above, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Holy Ghost Ipomopsis.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue monitoring populations of Holy Ghost Ipomopsis on the Santa Fe NF.
2. Continue implementing recommendations in the 2002 Holy Ghost Ipomopsis Recovery Plan.
3. Implement practices to ensure prescribed fires are kept outside of occupied Ipomopsis areas (eg., manually clear areas around Ipomopsis plants)
4. Use natives or non-persistent non-natives for re-vegetation projects.
5. Keep direct impacts from large equipment outside of occupied plant areas.
6. Implement best management practices to protect Ipomopsis plants from activities related to road construction, use, and maintenance.
7. Implement disease/insect treatment needs compatible to the protection of Holy Ghost Ipomopsis plants.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

HUACHUCA WATER UMBEL

STATUS OF THE SPECIES

Description

The Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*) is an herbaceous, semi-aquatic to occasionally fully aquatic, perennial plant with slender, erect leaves that grow from creeping rhizomes. The leaves are cylindrical, hollow with no pith, and have septa (thin partitions) at regular intervals. The yellow/green or bright green leaves are generally 0.04-0.12 inch (1-3 mm) in diameter and often 1-2 inches (3-5 cm) tall, but can reach up to 8 inches (20 cm) tall under favorable conditions. Three to ten very small flowers are borne on an umbel that is always shorter than the leaves. The fruits are globose, 0.06-0.08 in (1.5-2 mm) in diameter, and usually slightly longer than wide (Affolter 1985).

The Huachuca water umbel was first described by A.W. Hill based on the type specimen collected near Tucson in 1881 (Hill 1926). Hill applied the name *Lilaeopsis recurva* to the specimen, and the name prevailed until Affolter (1985) revised the genus. Affolter applied the name *L. schaffneriana* var. *recurva* to plants found west of the continental divide.

Legal Status: On January 6, 1997, the FWS listed the Huachuca water umbel as an endangered species under the ESA of 1973, as amended (U.S. Fish and Wildlife Service 1997). Critical habitat was designated for the species on the upper San Pedro River, Garden Canyon on Fort Huachuca, and other areas of the Huachuca Mountains, San Rafael Valley, and Sonoita Creek on July 12, 1999 (U.S. Fish and Wildlife Service 1999).

Distribution and Abundance

Huachuca water umbel has been documented from 27 sites in Santa Cruz, Cochise, and Pima counties, Arizona, and in adjacent Sonora, Mexico, west of the continental divide (Haas and Frye 1997, Saucedo 1990, Warren et al. 1989, Warren et al. 1991, Warren and Reichenbacher 1991). The plant has been extirpated from six of the 27 sites. The 21 extant sites occur in four major watersheds - San Pedro River, Santa Cruz River, Rio Yaqui, and Rio Sonora. All sites are between 3,500 and 6,500 feet in elevation.

Before 1890, the spatially intermittent, perennial flows on the middle Santa Cruz River most likely provided a considerable amount of habitat for Huachuca water umbel and other aquatic plants. The middle section of the Santa Cruz River mainstem is an approximate 80 mile (130 km) reach that flowed perennially from the Tubac area south to the U.S./Mexico border and intermittently from Tubac north to the Tucson area (Davis 1986). Davis (1986) quotes from the July 1855, descriptive journal entry of Julius Froebel while camped on the Santa Cruz River near Tucson: “rapid brook, clear as crystal, and full of aquatic plants, fish, and tortoises of various kinds, flowed through a small meadow covered with shrubs.” This habitat and species assemblage no longer occurs in the Tucson area.

Habitat

The Huachuca water umbel grows in cienegas (marshy wetlands), and along streams, rivers, and springs in southern Arizona and northern Sonora, Mexico, typically in mid-elevation wetland

communities often surrounded by relatively arid environments (U.S. Fish and Wildlife Service 1997). These wetland communities are usually associated with perennial springs and stream headwaters, have permanently or seasonally saturated highly organic soils, and have a low probability of flooding or scouring (Hendrickson and Minckley 1984). The Huachuca umbel can grow in saturated soils or as an emergent in water depths up to about 10 in (25 cm). Cienegas support diverse assemblages of animals and plants, of which many species are of limited distribution, such as the Huachuca water umbel (Hendrickson and Minckley 1984). The surrounding non-wetland vegetation can be desert scrub, grassland, oak woodland, or conifer forest at elevations of 2,000-7,100 ft (610-2,160 m) (Arizona Game and Fish Department 1997).

Cienegas, perennial streams, and rivers in the desert southwest are extremely rare. The AGFD (1993) recently estimated that riparian vegetation associated with perennial streams comprises about 0.4 percent of the total land area of Arizona, with present riparian areas being remnants of what once existed. The state of Arizona (1990) estimated that up to 90 percent of the riparian habitat along Arizona's major desert watercourses has been lost, degraded, or altered.

The physical and biological habitat features essential to the conservation of Huachuca water umbel include a riparian plant community that is fairly stable over time and not dominated by non-native plant species, a stream channel that is relatively stable but subject to periodic, nonscouring flooding, refugial sites (sites safe from catastrophic flooding), and a substrate (soil) that is permanently wet or nearly so, for growth and reproduction of the plant.

Critical Habitat: Critical habitat is defined in section 3 of the ESA as (i) the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management consideration or protection and; (ii) specific areas outside the geographic area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species. "Conservation" means the use of all methods and procedures that are necessary to bring an endangered species or a threatened species to the point at which listing under the ESA is no longer necessary.

Seven critical habitat units have been designated for Huachuca water umbel; all areas are in Santa Cruz and Cochise counties, Arizona, and include stream courses and adjacent areas out to the beginning of upland vegetation. The Scotia, Sunnyside, and Bear canyon units (3, 4, and 6) are within the Forest Service boundary of the Coronado NF. The remaining critical habitat units are in lands adjacent to the Forest Service. The following general areas are designated as critical habitat (see legal descriptions for exact critical habitat boundaries):

Unit 1 - approximately 1.25 mi (2.0 km) of Sonoita Creek southwest of Sonoita;

Unit 2 - approximately 2.7 mi (4.4 km) of the Santa Cruz River on both sides of Forest Road 61, plus approximately 1.9 mi (3 km) of an unnamed tributary to the east of the river;

Unit 3 - approximately 3.4 mi (5.4 km) of Scotia Canyon upstream from near Forest Road 48;

Unit 4 - approximately 0.7 mi (1.1 km) of Sunnyside Canyon near Forest Road 117 in the

Huachuca Mountains;

Unit 5 - approximately 3.8 mi (6.1 km) of Garden Canyon near its confluence with Sawmill Canyon;

Unit 6 - approximately 1.0 mi (1.6 km) of Rattlesnake Canyon and 0.6 mi (1.0 km) of an unnamed canyon, both of which are tributaries to Lone Mountain Canyon; approximately 1.0 mi (1.6 km) of Lone Mountain Canyon; and approximately 1.0 mi (1.6 km) of Bear Canyon; an approximate 0.6-mi (0.9-km) reach of an unnamed tributary to Bear Canyon; and

Unit 7 - approximately 33.7 mi (54.2 km) of the San Pedro River from the perennial flows reach north of Fairbank (Arizona Department of Water Resources 1991) to 0.13 mi (200 m) south of Hereford, San Pedro Riparian National Conservation Area.

The specific biological and physical features, otherwise referred to as the primary constituent elements, essential to the conservation of the Huachuca water umbel include, but are not limited to, the habitat components that provide:

1. Sufficient perennial base flows to provide a permanently or nearly permanently wetted substrate for growth and reproduction of Huachuca water umbel;
2. A stream channel that is relatively stable, but subject to periodic flooding that provides for rejuvenation of the riparian plant community and produces open microsites for water umbel expansion;
3. A riparian plant community that is relatively stable over time and in which non-native species do not exist or are at a density that has little or no adverse effect on resources available for water umbel growth and reproduction; and
4. In streams and rivers, refugial sites in each watershed and in each reach, including but not limited to springs or backwaters of mainstem rivers, that allow each population to survive catastrophic floods and recolonize larger areas.

Activities that may result in the destruction or adverse modification of critical habitat include those that alter the PCEs ability to function properly and serve the intended conservation role for the species. Such activities may include, but are not limited to:

1. Activities such as damming, water diversion, channelization, excess groundwater pumping, or other actions that appreciably decrease base flow and appreciably reduce the wetted surface area of rivers, streams, cienegas, or springs;
2. Activities that alter watershed characteristics in ways that would appreciably reduce groundwater recharge or alter natural flooding regimes needed to maintain natural, dynamic riparian communities. Such activities adverse to Huachuca water umbel critical habitat could include, but are not limited to: vegetation manipulation such as

- chaining or harvesting timber; maintaining an unnatural fire regime either through fire suppression, or too-frequent or poorly-timed prescribed fires; mining; military maneuvers, including bombing and tank operations; residential and commercial development; road construction; and improper livestock grazing that reduces fire frequency or otherwise degrades watersheds;
3. Activities that appreciably degrade or destroy native riparian communities, including but not limited to improper livestock grazing, clearing, cutting of live trees, introducing or encouraging the spread of non-native species, and heavy recreational use; and
 4. Activities that appreciably alter stream channel morphology such as sand and gravel mining, road construction, channelization, impoundment, improper livestock grazing, watershed disturbances, off-road vehicle use, heavy or poorly planned recreational use, and other uses.

Life History

The Huachuca water umbel flowers from March through October with most flowering in June through August (Arizona Game and Fish Department 1997). The species reproduces sexually through flowering and asexually from rhizomes, the latter probably being the primary reproductive mode (U.S. Fish and Wildlife 1999). The Huachuca water umbel is also suspected of self-pollination (Johnson et al. 1992). An additional dispersal opportunity occurs as a result of the dislodging of clumps of plants, which then may re-root in a different site along aquatic systems (U.S. Fish and Wildlife Service 1999). Fruits develop from July through September and water disperses the seeds (Arizona Game and Fish Department 1997). Seeds from plants grown in an aquarium have been seen sticking to the aquarium sides and germinating 1-2 weeks after falling from the parent plant (Johnson et al. 1992).

Huachuca water umbel has an opportunistic strategy that ensures its survival in healthy riverine systems, cienegas, and springs. In upper watersheds that generally do not experience scouring floods, the umbel occurs in microsites where interspecific plant competition is low. At these sites, the umbel occurs on wetted soils interspersed with other plants at low density, along the periphery of the wetted channel, or in small openings in the understory. The upper Santa Cruz River and associated springs in the San Rafael Valley, where a population of Huachuca water umbel occurs, is an example of a site that meets these conditions. The types of microsites required by the umbel were generally lost from the main stems of the San Pedro and Santa Cruz rivers when channel entrenchment occurred in the late 1800s to early 1900s. Habitat on the upper San Pedro River is recovering, and Huachuca water umbel has recently been found along short reaches of the main channel.

Population Dynamics: Density of umbel plants and size of populations fluctuate in response to both flood cycles and site characteristics. Some sites, such as Black Draw, have a few sparsely distributed clones, possibly due to the dense shade of the even-aged overstory of trees, dense non-native herbaceous layer beneath the canopy, and deeply entrenched channel. The Sonoita Creek population occupies 14.5 percent of a 5,385 ft² (500.5 m²) patch of habitat (Gori et al. 1990). Some populations are as small as 11-22 ft² (1-2 m²). The Scotia Canyon population, by

contrast, has dense mats of leaves. Scotia Canyon contains one of the larger Huachuca water umbel populations, occupying about 57 percent of the 4,756 ft (1,450 m) perennial reach (Gori et al. 1990, Falk and Warren 1994).

After a flood, Huachuca water umbel can rapidly expand its population and occupy disturbed habitat until interspecific competition exceeds its tolerance. This response was recorded at Sonoita Creek in August 1988, when a scouring flood removed about 95 percent of the *water* umbel population (Gori et al. 1990). One year later, the umbel had recolonized the stream and was again codominant with watercress, *Rorippa nasturtium-aquaticum* (Warren et al. 1991). The expansion and contraction of Huachuca water umbel populations appear to depend on the presence of “refugia” where the species can escape the effects of scouring floods, a watershed that has an unaltered hydrograph, and a healthy riparian community that stabilizes the channel.

While the extent of occupied habitat can be estimated, the number of individuals in each population is difficult to determine because of the intermeshing nature of the creeping rhizomes and the predominantly asexual mode of reproduction. A “population” of Huachuca water umbel may be composed of one or many genetically distinct individuals.

Reasons for Listing

The FWS listed the Huachuca water umbel as an endangered species under the ESA on January 6, 1997. The primary threat was habitat alterations.

Threats:

Improper livestock grazing, mining, hay harvesting, timber harvest, fire suppression, and other activities in the nineteenth century led to widespread erosion and channel entrenchment in southeastern Arizona streams and cienegas when above-average precipitation and flooding occurred in the late 1800s and early 1900s (Bahre 1991, Bryan 1925, Dobyms 1981, Hastings and Turner 1980, Hendrickson and Minckley 1984, Martin 1975, Sheridan 1986, Webb and Betancourt 1992, Hereford 1993). A major earthquake near Batepito, Sonora, approximately 40 miles south of the upper San Pedro Valley, resulted in land fissures, changes in groundwater elevation and spring flow, and may have preconditioned the San Pedro River channel for rapid flood-induced entrenchment (Hereford 1993, Geraghty and Miller, Inc. 1995). These events contributed to long-term or permanent degradation and loss of cienega and riparian habitat on the San Pedro River and throughout southern Arizona and northern Mexico. Much habitat of the Huachuca water umbel and other cienega-dependent species was presumably lost at that time.

Wetland degradation and loss continues today. Human activities such as groundwater overdrafts, surface water diversions, impoundments, channelization, improper livestock grazing, chaining, agriculture, mining, sand and gravel operations, road building, non-native species introductions, urbanization, wood cutting, and recreation all contribute to riparian and cienega habitat loss and degradation in southern Arizona. The local and regional effects of these activities are expected to increase with the increasing human population.

Livestock grazing potentially affects Huachuca water umbel at the ecosystem, community, population, and individual levels. Livestock grazing can affect the umbel through trampling and changes in stream hydrology and loss of stream bank stability; however, existence of the umbel

appears to be compatible with well-managed livestock grazing (U.S. Fish and Wildlife Service 1997). Cattle generally do not eat water umbel because the leaves are too close to the ground, but they can trample plants. Huachuca water umbel is capable of rapidly expanding in disturbed sites and could recover quickly from light trampling by extending undisturbed rhizomes (Warren *et al.* 1991). Light trampling also may keep other plant density low, providing favorable *Lilaeopsis* microsites. Well-managed livestock grazing and Huachuca water umbel are compatible. In overgrazed areas, stream headcutting can threaten cienegas where the umbel occurs. Such headcutting occurs at Black Draw just south of the international boundary and at Los Fresnos, in the San Rafael Valley, Sonora, Mexico.

Groundwater pumping has eliminated habitat in the Santa Cruz River north of Tubac, and threatens habitat in the San Pedro River. Portions of the San Pedro River occupied by the umbel could be dewatered within a few years unless measures are implemented very soon to halt or mitigate groundwater pumping in the Sierra Vista-Fort Huachuca area (ASL 1998). Severe recreational impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of the Huachuca water umbel. Populations in Bear Canyon in the Huachuca Mountains have been impacted by trampling and off-highway vehicles.

A suite of non-native plant species has invaded wetland habitats in southern Arizona (Stromberg and Chew 1997); including those occupied by the Huachuca water umbel (Arizona Department of Water Resources 1994). In some cases their effect on the umbel is unclear; however, in certain microsites, the non-native Bermuda grass, *Cynodon dactylon*, may directly compete with the umbel. Bermuda grass forms a thick sod in which many native plants are unable to establish. Watercress is another non-native plant now abundant along perennial streams in Arizona. It is successful in disturbed areas and can form dense monocultures that can outcompete Huachuca water umbel populations.

Riparian areas and cienegas offer oasis-like living and recreational opportunities for residents of southern Arizona and northern Sonora. Riparian areas and cienegas such as Sonoita Creek, the San Pedro River, Canelo Hills cienega, and the perennial creeks of the Huachuca Mountains receive substantial recreational visitation, and this is expected to increase with an increasing southern Arizona population. While well-managed recreational activity is unlikely to extirpate water umbel populations, severe impacts in unmanaged areas can compact soils, destabilize stream banks, and decrease riparian plant density, including densities of Huachuca water umbel.

Limited numbers of populations and the small size of populations make the Huachuca water umbel vulnerable to extinction as a result of stochastic events that are often exacerbated by habitat disturbance. For instance, the restriction of this taxon to a relatively small area in southeastern Arizona and adjacent Sonora increases the chance that a single environmental catastrophe, such as a severe tropical storm or drought, could eliminate populations or cause extinction. Populations are in most cases isolated, as well, which makes the chance of natural recolonization after extirpation less likely. Small populations are also subject to demographic and genetic stochasticity, which increases the probability of population extirpation (Shafer 1990, Wilcox and Murphy 1985).

Conservation Measures

Introduction of Huachuca water umbel into ponds on the San Bernardino National Wildlife Refuge, Arizona, appears to be successful (Warren and Reichenbacher 1991). In 1991, Huachuca water umbel was transplanted from Black Draw into new ponds and other wetlands at San Bernardino Refuge. Transplants placed in areas with low plant density expanded rapidly (Warren and Reichenbacher 1991). In 1992, Huachuca water umbel naturally colonized a pond created in 1991. However, as plant competition increased around the perimeter of the pond, the water umbel population decreased. This response seems to confirm observations (U.S. Fish and Wildlife Service 1997) that other species such as *Typha* sp. will out-compete Huachuca water umbel. A recent introduction of Huachuca water umbel to Leslie Canyon Refuge was successful and the plant appears to be expanding its distribution there (U.S. Fish and Wildlife Service 2004).

Permanent monitoring transects have been established that include the entire occupied habitat in Scotia and Bear canyons. Seven exclosures have been constructed to protect the species from livestock grazing and, in one case, recreation. Stricter than usual utilization standards were implemented on the Lone Mountain allotment to protect this plant (U.S. Forest Service 2004). The Forest Service has requested water rights for two springs in Scotia Canyon, one for 10.3 ac ft and the other for 0.3-ac ft. These are in the claims process and will be finalized when the San Pedro River adjudication process is completed. The Forest Service has a water right on Bear Spring for 0.2-ac ft and two claims in process for Van Horn Spring and the Bear Creek-Cave Creek confluence (1.5 ac ft) near the Forest Service boundary (U.S. Forest Service 2004).

The Forest Service has recently acquired the headwaters of Scotia Canyon through a land exchange. This land exchange brought several more sites of occupied and critical habitat for *Lilaeopsis* into Forest Service ownership and management.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Of the 21 extant sites, 12 sites are under the management of BLM (Tucson Field Office), Department of Defense (Fort Huachuca), FWS (San Bernardino National Wildlife Refuge), Arizona State Park Department, and private citizens (Arizona Rare Plant Committee 2001). Four sites are under management of the Forest Service (Coronado NF, Sierra Vista Ranger District).

The Coronado NF, Sierra Vista Ranger District, manages four Huachuca water umbel sites in the Huachuca Mountains. These are the Scotia, Bear, Sunnyside, and Sycamore canyon sites. Scotia Canyon has one of the largest populations with plants occupying most of the suitable habitat along the 4,800 ft (1,500 m) perennial reach of the stream. These four sites are at the

highest known elevations for Huachuca water umbel. They are in the upper parts of the watershed and relatively secure from water withdrawals or water diversions. The sites are grazed, but monitoring shows no adverse effects to Huachuca water umbel.

Factors Affecting the Species within the Action Area

Water withdrawals, diversions, stream channelization, and levies in southern Arizona and Sonora have reduced the habitat available for Huachuca water umbel. Several historical locations no longer provide any suitable habitat because perennial stream flows have ceased due to lowered water tables. Continued human population growth in southern Arizona is expected to put greater pressure on water resources. Widespread watershed degradation occurred in southern Arizona in the late 1800s due to uncontrolled livestock grazing, mining, hay harvesting, timber harvesting, and other practices such as fire suppression. This led to widespread erosion and channel entrenchment that has contributed to long-term or permanent degradation and loss of cienega and riparian habitats throughout southern Arizona and northern Mexico. Poor livestock management can destabilize stream channels and disturb cienega soils creating conditions unfavorable to Huachuca water umbel, which requires stable stream channels and cienegas. Such management can also change riparian structure and diversity causing a decline in watershed conditions. However, livestock grazing that is well managed can be compatible with Huachuca water umbel. Cattle generally do not eat the plants because the leaves are too close to the ground, but they can trample plants. Huachuca water umbel is capable of rapidly expanding from rhizomes and can recover quickly from light trampling. Light trampling may also keep other plant density low thus providing favorable Huachuca water umbel micro sites (U.S. Fish and Wildlife Service 1997).

EFFECTS OF THE ACTION

The S&Gs listed in the Coronado NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Huachuca water umbel and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the water umbel.

Table 177. Summary of S&Gs considered for the Huachuca water umbel.

National Forest	Standards and Guidelines
Coronado	612, 613, 626-629, 631-638, 644, 645, 648-654, 660, 661, 663, 666-669, 672-682, 692-696, 703, 704, 712, 713, 727, 774, 778-780, 781a-b, 782-786, 788, 790-792, 794-800, 803-805, 807-819
1996 Regional Amendment	1425, 1427, 1428, 1432, 1434, 1438, 1440-1445, 1453-1456, 1458, 1459, 1461-1476, 1486-1499, 1501-1517

Coronado National Forest

Huachuca water umbel occurs in four locations on the Coronado NF. They are all within Management Area 7a, which includes all Forest riparian areas. The primary management emphasis is to perpetuate the unique wildlife or vegetative species in this management area and

to improve and manage riparian areas to benefit riparian dependent resources. Dispersed recreation and other uses may be allowed to the extent they do not degrade the unique values. The lands surrounding these riparian areas are in Management Area 4 and the primary emphasis is the sustained harvest of livestock forage and fuelwood while maintaining and improving game and animal habitat. All umbel habitat on the Coronado NF is within grazing allotments.

Table 178. Effects of the S&Gs analyzed for the Huachuca water umbel – Coronado NF LRMP

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	6	7.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	7	8.0
1	S&G is maintaining habitat & providing at least minimal recovery	26	29.0
2	S&G is moving towards recovery	6	7.0
3	S&G is implementing species recovery plan	1	1.0
Y	S&G has no application to the species	40	45.0
Z	S&G implementation is non-discretionary	2	2.0
X	S&G is a heading	1	1.0
Total		89	100 %

Table 178 summarizes the effects to Huachuca water umbel from the applicable S&Gs on the Coronado NF. Less than seven percent of the S&Gs could cause mortality of Huachuca water umbel plants, while 37 percent of the S&Gs have positive effects for this species. The remaining 56 percent of the S&Gs have no effect on Huachuca water umbel or the S&Gs are too vague to analyze.

Engineering Program

Standard and Guidelines 693 and 694 are too ill-defined to analyze. Standard and Guideline 797, specific to Management Area 7a, allows for the closure of unneeded roads. Implementation of this S&G can lead to positive effects for Huachuca water umbel habitat.

Fire Management Program

Huachuca water umbel grows in habitats that are not likely to burn, but its habitat may be altered by the post burn runoff and sedimentation in occupied habitat. Standard and Guideline 798 allows for prescribed fire, which can lead to negative effects to this species' habitat. Standard and Guideline 695 directs that fires will be conducted to protect visual and watershed values, which may have positive overall effects for umbel habitat.

Lands and Minerals Program

Standard and Guideline 692 emphasizes the need to acquire water-oriented properties for the Forest. The acquisition of these areas would promote umbel protection and possibly recovery.

Rangeland Management Program

Most of the S&Gs in this program area can lead to habitat damage and possible mortality of umbel plants. Huachuca water umbel is compatible with some types of livestock grazing. Standard and Guideline 668 calls for riparian areas to be fenced where prescribed in allotment management plans. Implementation of this S&G would have positive effects for umbel habitat. Standard and Guideline 703 deals with herbicide use to control invasive species in range allotments. Herbicide treatments may cause umbel mortality. Standard and Guideline 792, specific to Management Area 7a, gives the Forest a choice of grazing at Level D (intensive) or Level A (no grazing) if Level D is not achievable. Depending on the direction taken, umbel plants and habitat may be negatively affected or protected.

Recreation, Heritage, and Wilderness Program

Standard and Guidelines 612 and 613 can benefit Huachuca water umbel habitat because they direct the Forest to conduct evaluations of dispersed recreation activity for areas receiving high use and develop capability limits for dispersed recreation.

Watershed Management Program

In general, the S&Gs in this program area relate to maintaining riparian values and habitat (S&Gs 672-677). These will all promote umbel habitat. Those S&Gs (794) describing watershed rehabilitation techniques, especially the use of non-native seed, will likely cause the alteration of umbel habitat.

Wildlife, Fish, and Rare Plants Program

All of the protective direction for listed species is in this program area. The Coronado NF is directed to maintain or improve the habitat of listed species through mitigation of its activities (627). Additionally, the Coronado NF is to develop overall direction for listed species in cooperation with state and federal agencies (629). Conduct inventories and surveys for listed species in project areas (631). All of the S&Gs in this program area will have beneficial effects to Huachuca water umbel and aid in recovery (774, 779), in addition to minimizing the negative effects from the other program areas.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Table 179 summarizes the S&Gs from the 1996 Regional Amendment that apply to Huachuca water umbel. We found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 179. Effects of the S&Gs analyzed for the Huachuca water umbel - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	1	2.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	2.0

Ranking	Explanation of Ranking	Total	Percentage
1	S&G is maintaining habitat & providing at least minimal recovery	9	14.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	48	73.0
Z	S&G implementation is non-discretionary	2	3.0
X	S&G is a heading	4	6.0
Total		65	100 %

Overall, the S&Gs are providing for water umbel habitat maintenance and minimal recovery. Standard and Guideline 1468 deals with prescribed fire in Mexican Spotted Owl protected areas. There is one location of water umbel that is within a Mexican Spotted Owl protected area and it is possible that fire could have adverse effects on those plants. Standard and Guideline 1510 provides the most benefits to water umbel because it ensures that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species.

EFFECTS OF THE ACTION (Critical Habitat)

There are seven critical habitat units for Huachuca water umbel; three (Units 3, 4, and 6) are on the Coronado NF. These are the Scotia, Sunnyside, and Bear Canyon units. All are located in the Huachuca Mountains on the Sierra Vista Ranger District.

Springs are the source for base flows for the critical habitat units. The watersheds for the springs are contained within Management Areas 4 and 9 on the Forest. Management Area 9 is wilderness, which has minimal management, mostly directed towards maintaining wilderness values. Management Area 4 is managed primarily for sustained harvest of forage and fuelwood while maintaining and improving game animal habitat. The vegetation surrounding Scotia, Sunnyside, and Bear canyons is mostly woodland.

Seven exclosures have been built in occupied water umbel habitat to protect the species from the effects of livestock grazing. Stricter forage utilization levels are in place on the Lone Mountain allotment, where Huachuca water umbel and critical habitat is located. The Forest Service is pursuing water rights on springs in this area.

Table 180. Summary of S&Gs considered for Huachuca water umbel critical habitat.

National Forest	Standards and Guidelines
Coronado NF	612, 613, 627-629, 631-634,637, 638, 644, 645, 649-651, 653, 654, 660, 661, 667-669,672-677, 681, 682, 692-696, 703, 704, 774, 780, 781a-b, 782, 786, 788, 791, 792, 794, 795, 797, 799

Coronado National Forest

The applicable S&Gs listed above were analyzed for effects to Huachuca water umbel critical habitat. Huachuca water umbel critical habitat has four PCEs. In general, 53 percent of the S&Gs within the Coronado NF LRMP maintain the PCEs of critical habitat. Only four percent of the S&Gs negatively affect all of the PCEs, while eight percent negatively affects three or less of the PCEs. The remaining 35 percent do not affect critical habitat or were too vague to analyze.

Almost all of the S&Gs analyzed for the species apply to critical habitat; critical habitat S&Gs are a subset of the species analysis. As such, the effects from the S&Gs do not differ significantly from the effects described for the species. Refer to that section for a breakdown by program area of the effects to Huachuca water umbel critical habitat.

1996 Regional Amendment

One S&G (1510) affects critical habitat of Huachuca water umbel. This S&G maintains all four PCEs.

Adverse effects to Huachuca water umbel critical habitat may occur from the implementation of the Coronado NF LRMP. However, the proposed action will not alter the ability for the primary constituent elements to function properly. Management direction provided in the Coronado NF LRMP and 1996 Regional Amendment allows the PCEs for the Huachuca water umbel to remain functional and serve the intended conservation role for the species.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Although most of the Huachuca water umbel locales are in federal ownership, one location occurs on The Nature Conservancy preserve, and several other locations exist on private property. The private property locations are protected by conservation easements.

Cumulative impacts to the Huachuca water umbel may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the Huachuca water umbel, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Coronado NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Huachuca water umbel and are not likely to destroy or adversely modify designated critical habitat. Pursuant to 50 CFR 402.02,

“jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Of the 21 extant sites, 12 are under the management of BLM (Tucson Field Office), Department of Defense (Fort Huachuca), FWS (San Bernardino National Wildlife Refuge), Arizona State Park Department, and private citizens. No known cumulative effects are anticipated for water umbel populations on non-federal lands. The private property locations are protected by conservation easements.

The Coronado NF, Sierra Vista Ranger District, manages four Huachuca water umbel sites in the Huachuca Mountains. These are the Scotia, Bear, Sunnyside, and Sycamore canyon sites. Scotia Canyon has one of the largest populations with plants occupying most of the suitable habitat along the 1,500 m (4,800 ft) perennial reach of the stream. These four sites are at the highest known elevations for Huachuca water umbel. They are in the upper parts of the watershed and relatively secure from water withdrawals or water diversions. The sites are grazed, but monitoring shows no adverse effects to Huachuca water umbel. The Coronado NF has contributed to Huachuca water umbel conservation by fencing known locations, restricting livestock access in designated critical habitat, reducing recreation impacts in sensitive habitat, and monitoring water umbel populations.

The continued implementation of the Coronado NF LRMP may result in habitat modification and mortality of Huachuca water umbel. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Coronado NF LRMP, which conserves Huachuca water umbel populations with the following:

- Standard and guideline 627 maintains or improves occupied habitat of listed species through the mitigation of Forest activities.
- Standard and guideline 632 allows for project planning to minimize effects to listed species, prior to implementation.
- Standard and guideline 676 gives preferential consideration to riparian-dependent resources over other resources.

With the implementation of these beneficial S&Gs within the Coronado NF LRMP, as well as the continuing conservation efforts conducted by the Coronado NF, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Huachuca water umbel. Based on the above analyses, it is the FWS’s biological opinion that the proposed action will not alter the ability of the PCEs to function properly. As such, designated critical habitat for the Huachuca water umbel will remain functional to serve its intended conservation role for the species. Therefore, the FWS concludes that the proposed action is not likely to destroy or adversely modify designated critical habitat for the Huachuca water umbel.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Consider adopting a policy that uses only native species for watershed rehabilitation, post-fire seeding, and general site rehabilitation.
2. Continue monitoring Huachuca water umbel on Corando NF lands.
3. Consider hiring a botanist to address concerns to listed plant species.
4. Participate in the preparation of the recovery plan for Huachuca water umbel.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

PIMA PINEAPPLE CACTUS

STATUS OF THE SPECIES

Description

The Pima pineapple cactus is a low-growing, hemispherical plant known from the semi-desert grassland and Sonoran desert scrub of southern Arizona and northern Mexico. Pima pineapple cacti can be single-stemmed, multi-headed, or appear in clusters (U.S. Fish and Wildlife Service 1993). Adults of the species measure 4-18 inches (10-46 cm) tall and 3-7 inches (7.5-18 cm) in diameter. Spines of the pineapple cactus are very stout, and form clusters consisting of one strong, hooked central spine, and 6-15 straight radial spines (U.S. Fish and Wildlife Service 1993). The spines are initially straw colored, but become black with age. Pineapple cactus flowers are silky yellow in color, and the fruit is green ellipsoid, succulent, and sweet. The Pima pineapple cactus occurs on lands of the Tohono O'odham Nation, state of Arizona, and private lands. The cactus also occurs on federal lands under management of the Bureau of Land Management, Forest Service, FWS, and Bureau of Reclamation (Arizona Rare Plant Committee 2001).

Coryphantha scheeri var. *robustispina* was first collected in 1856 by Mr. A. Schott, from grasslands on the south side of the Baboquivari Mountains in Sonora, Mexico. These plants were originally named *Mammillaria robustispina*, and subsequently underwent several name changes (U.S. Fish and Wildlife Service 1993). Lyman Benson (1969) published the most recent revision, which split *Coryphantha scheeri* into three varieties, including the variety *robustispina*. The Pima pineapple cactus is also known as Scheer's strong-spined cory cactus.

Legal Status: On September 23, 1993, the FWS listed the Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*) as an endangered species under the authority of the ESA, as amended. Critical habitat for the species has not been designated.

The Pima pineapple cactus was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on July 1, 1975. This action requires the country of origin to obtain a permit to export species listed in under CITES. Commercial trade is permitted, but only after the country of export has determined that such trade will not harm wild populations of the species (U.S. Fish and Wildlife Service 1993). International movement of the Pima pineapple cactus is minimal.

The Pima pineapple cactus is protected as a "Highly Safeguarded Species" under the Arizona Native Plant Law. This law prohibits the illegal taking of this species on state and private lands without a permit for educational or research purposes. However, the Arizona Native Plant Law does not provide for protection of plants in situ through restrictions on development activities (U.S. Forest Service 2004).

Distribution and Abundance

Pima pineapple cactus is found at elevations of 2,300-4,500 ft (700 to 1,400 m) in Pima and Santa Cruz counties, Arizona, and northern Sonora, Mexico. The range of the species extends east from the Baboquivari Mountains, 45 miles to the western foothills of the Santa Rita

Mountains; and extends south from Tucson, Arizona, 50 miles to Sonora, Mexico (U.S. Forest Service 2004).

Pima pineapple cactus occurs in 50 townships within its U.S. range (U.S. Forest Service 2004). The species is neither common nor abundant within its habitat, but sparsely distributed where found. The pineapple cactus is distributed at very low densities throughout the Altar and Santa Cruz Valleys, as well as the low-lying areas connecting the two valleys. Minimum density estimates for areas near the Sierrita Mountains of Arizona range from a low of 0.05 plants/acre (0.12 plants/hectare) to a high of 0.22 plants/acre (0.54 plants/hectare) (Mills 1991). A considerable amount of land area within the range boundaries of the pineapple cactus does not provide habitat for the species due to elevation, topography, hydrology, plant community type, and human degradation (U.S. Fish and Wildlife Service 2004).

Habitat

Pima pineapple cacti grow in alluvial basins and hillsides of semi-desert grasslands and desert scrub. The plant occurs most commonly in open areas on flat ridge tops or areas with less than 10-15 percent slope (U.S. Fish and Wildlife Service 1993). Pima pineapple cacti are also found in the transition zone between the semi-desert grasslands and desert scrub. Vegetation within this transition zone is dominated by mid-sized mesquite trees, half shrubs, and patches of native grass and scattered succulent (U.S. Fish and Wildlife Service 2004). Soils range from shallow to deep, and silty to rocky. Dominant plant species vary, but include *Acacia constricta* (white-thorn acacia), *Larrea tridentate* (creosote bush), *Prosopis velutina* (velvet mesquite), *Ambrosia deltoidea* (triangle-leaf bursage), *Gutierrezia microcephala* (thread snakeweed), *Opuntia fulgida* (chain fruit cholla), *Isocoma tenuisecta*, *Eragrostis lehmanniana* (Lehman's lovegrass), and various other cacti and grasses (Mills 1991).

Life History

The Pima pineapple cactus is a succulent perennial plant. The species reproduces from seed or from vegetative offshoots from the parent plant. Individuals are considered adults when they reproduce sexually (U.S. Fish and Wildlife Service 2004). Plants flower one to three days each year, beginning with the onset of summer rains from mid July through August. Recent data show that Pima pineapple cacti cannot successfully self pollinate in situ and are reliant upon invertebrate pollinators (U.S. Fish and Wildlife Service 2004). Pollinators include small bees and honeybees. The fruits of pineapple cactus develop in August and September, and reach maturity within two weeks following successful pollination. Fruit set is good even in areas where plants are widely scattered. Rabbits and rodents assist in the seed dispersal.

Surveys documenting the presence of Pima pineapple cacti began as early as 1935. More intensive surveys were initiated in 1991, and additional research was conducted in 1993 to investigate the effects of various threats upon the species. Thus, the best available baseline information is relatively recent and may not represent actual changes in distribution over the species' period of decline (U.S. Fish and Wildlife Service 2004). Analyses of surveys conducted from 1992 to 1997 suggest that the Pima pineapple cactus may be more numerous than previously thought. Earlier projections based only on known individuals may have underestimated the total number of individuals. However, this information does not indicate that the cactus is not rare or endangered.

Populations are currently isolated from each other in many portions of the range, and population size and recruitment varies significantly across the range. Seedling and sub-adult size classes are uncommon in documented populations within the plant's range. This may be a function of the difficulty in finding such small, well-camouflaged plants in a large-scale survey, or because the establishment phase of the seedling may be limited in some unknown way. Research on the reproduction of the Pima pineapple cactus has suggested that the establishment phase of the cactus life history may limit recruitment within populations.

Populations of Pima pineapple cactus are patchy, widely distributed, and highly variable in density. The entire range of the Pima pineapple cactus has not been surveyed. Based upon estimated density data obtained from surveyed lands, 3,800 cacti have been located. Population densities over the remaining unsurveyed area can not be estimated due to the clumped and widely dispersed pattern of distribution of the species. The transition zone between the semi-desert grassland and Sonoran Desert scrub regions contains denser populations, better recruitment, and individuals exhibiting greater plant vigor (U.S. Fish and Wildlife Service 2004). However, this habitat type is not uniformly distributed throughout the plant's range. High population densities have only been documented at three sites. Based on surveys and habitat analysis, areas south of Tucson through the Santa Cruz Valley to the town of Amado and surrounding developed parts of Green Valley and Sahuarita, and parts of the San Xavier District of the Tohono O'odham Nation, appear to support abundant populations, some recruitment, and units of extensive habitat still remain (U.S. Fish and Wildlife Service 2004).

To date, an estimated 56,730 acres (22,959 ha) or 10-20 percent of the U.S. range of known Pima pineapple cactus locales have been surveyed. Some of this area has only been partially surveyed using small land blocks to estimate densities rather than 100 percent ground surveys. Total cacti located to date, is conservatively estimated at 3,800 individuals, the majority of which were located after 1991 (U.S. Fish and Wildlife Service 2004). It is important to clarify that the estimated 3,800 individuals represents the total number of locations ever found, and not the current population size. Field observations suggest a great deal of land area within the range boundaries would not support Pima pineapple cactus today due to historical human impacts (U.S. Fish and Wildlife Service 2004).

Reasons for Listing

The Pima pineapple cactus is threatened by habitat loss, modification, and fragmentation; limited geographic distribution and plant species rareness; illegal collection; and difficulties in protecting areas large enough to maintain functioning populations (U.S. Fish and Wildlife Service 2004). These threatening factors contributed to the endangered listing of the Pima pineapple cactus.

Threats: Major threats to the Pima pineapple cactus relate to habitat loss and degradation, including urban development activities, which cause destruction and fragmentation of existing habitat; livestock operations and crop development, which degrade habitat; and mining and aggressive non-native grasses, which result in a loss of cactus habitat.

Urban construction associated with the rapidly growing population occurs throughout the range of the species, and is the most significant cause of habitat loss and fragmentation. Home

building, commercial development, road construction and maintenance, and utility corridor construction are some of the activities that have caused and continue to cause the loss of pineapple cactus habitat (U.S. Fish and Wildlife Service 1993). Urban development and other commercial activities continue to detrimentally impact the habitat of the Pima pineapple cactus.

The entire undeveloped part of the pineapple cactus' range is used for livestock grazing. Range management practices used to modify desert communities for grass production have affected the species more than direct livestock impacts. Indirectly, livestock operations may cause the introduction of exotic grasses, including Lehmann lovegrass (*Eragrostis lehmanniana*). Up to 75 percent of Pima pineapple cactus habitat has been significantly altered by the introduction of Lehmann lovegrass, which out competes native grasses, and has created monotypic stands over large areas of mid-elevation southern Arizona (U.S. Fish and Wildlife Service 1993). Lehmann lovegrass provides abundant fine fuels, threatening the destruction of pineapple cactus habitat by wildfire.

Pima pineapple cactus habitat is also threatened by farm and crop production. The Avra and Altar valleys and the Santa Cruz River basin are currently being cultivated for farming. Such areas were most likely historical habitat for the Pima pineapple cactus (U.S. Fish and Wildlife Service 1993). Farm and crop development alter the landscape in a manner that is nearly irreversible in terms of supporting Pima pineapple cactus populations.

Conservation Measures

Varying land ownership within the range of the Pima pineapple cactus limits the efforts to protect the species and conserve pineapple cactus habitat. An estimated 10 percent of potential habitat is held in federal ownership; the remaining 90 percent is on tribal, state, and private lands. Most of the federally owned land lies at the edge of the plant's range or in scattered parcels (U.S. Fish and Wildlife Service 2004). The largest, contiguous, federally-owned land within the range of the Pima pineapple cactus is the Buenos Aires National Wildlife Refuge. The refuge is located at the southwestern edge of the plant's range, at higher elevations and lower plant densities (U.S. Fish and Wildlife Service 2004).

Recovery efforts for the Pima pineapple cactus have primarily focused on habitat preservation in the developing Tuscon area. The FWS is working with federal agencies through Section 7 consultations to conserve cactus habitat. The FWS is also working with local governments, private landowners, and developers to establish conservation banks that will preserve Pima pineapple cactus habitat (Davis 2001, U.S. Fish and Wildlife Service 2002). The FWS approved the first privately-owned conservation bank for endangered species in Arizona on December 23, 2002. The Palo Alto Ranch Conservation Bank protects, in perpetuity, 1,016 acres of valuable Pima pineapple cactus habitat in the Altar Valley, southeast of Tuscon (U.S. Fish and Wildlife Service 2002).

In 1996, the Forest Service constructed two small enclosures on the Sierra Tordilla grazing allotment (Sierra Vista Ranger District) to protect the cactus and evaluate the effects of livestock grazing (U.S. Forest Service 2004). Plants are also being monitored along the Sopori Road access to the Nogales Ranger District. The grazing evaluation and plant monitoring have not been completely analyzed at this time.

The Coronado NF has also surveyed much of the suitable habitat on the Forest. It was during these surveys that the Pima pineapple cactus were located that are in the Sierra Tordilla/Alisos grazing allotment.

The Coronado NF has spent considerable time managing the off-road vehicle use in the areas that support Pima pineapple cactus on the Sierra Vista Ranger District. Roads have been signed and areas have been closed to protect occupied habitat.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Pima pineapple cacti are located in the action area, within management area 4 of the Coronado National Forest, Nogales and Sierra Vista ranger districts. These populations lie within the southern end of the species' range, disjunct from the main distribution to the north, and represent only a minor part of the species' distribution and abundance (U.S. Forest Service 2004). Pima pineapple populations on the Coronado National Forest are not susceptible to the land development threats responsible for destroying much of the species' habitat on private lands.

There are approximately 100 Pima pineapple cactus on lands managed by the Coronado NF. The majority of the Pima pineapple cacti occur on the Sierra Vista Ranger District, but a few individuals are on the Nogales Ranger District. Most of these plants have been monitored sporadically for the last 5-10 years.

Factors Affecting the Species within the Action Area

Dispersed, patchy clusters of individual Pima pineapple cactus are becoming increasingly isolated as current land-management practices, increased recreational use when adjacent to urban expansion, and the continuing aggressive spread of non-native grasses threatens the habitat of the species. Also, the illegal collection of Pima pineapple cactus has been documented on numerous occasions throughout the range of the species. Hobbyists and commercial collectors are the two groups most likely to collect this species (U.S. Fish and Wildlife Service 1993).

Improper livestock grazing during the mid-to-late 1800s and continuing livestock grazing practices may have significantly altered the ecosystem. Effects of improper livestock grazing include: erosion, changes in hydrology and microclimate, invasion of weedy exotic plant species, shifts in density, relative abundance, and vigor of native species (U.S. Fish and Wildlife Service 1993). Also, some modern range management practices, such as imprinting, chaining, and ripping can directly damage or destroy plants, as well as reduce the shrub component of the plant community.

The seeding of non-native grasses, predominately Lehman’s lovegrass (*Eragrostis lehmanniana*), usually follows mechanical manipulation. This aggressive exotic species is introduced to provide cattle forage and soil stabilization. The exotic grass species, Mediterranean grass (*Schismus barbatus*) is also common in Sonoran desert-scrub grassland transition habitats. Mediterranean grass habitats contribute dense, fine fuels that are readily flammable and carry fires in fire-intolerant habitat. The invasion of exotic plant species alters the fire regime, resulting in the destruction of Pima pineapple cactus by fire (U.S. Forest Service 2004). Under these altered community conditions, the elimination of grazing may do more damage than its presence. Although trampled plants have been seen in grazed areas, grazing removes much of the grass that is competing for space, water, and nutrients, and removes the standing dead grass thus reducing the fire hazard (U.S. Fish and Wildlife Service 1993).

Off-road vehicle use can cause problems for Pima pineapple cactus. The cacti are small and can be covered by grass, making them difficult to see. Cacti on the Sierra Vista Ranger District occur in relatively flat areas that are very popular for off-road vehicle use. This activity is not authorized by the Forest Service, but the area was not adequately signed for non-entry. The Coronado NF increased patrols during weekends and holidays to more effectively manage this activity in occupied habitat.

EFFECTS OF THE ACTION

The S&Gs listed in the Coconino NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Pima pineapple cactus and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the pineapple cactus.

Table 181. Summary of S&Gs considered for the Pima pineapple cactus.

National Forest	Standards and Guidelines
Coconino	612, 613, 626-629, 631-638, 648-655, 666-669, 672, 674, 682, 693-696, 699, 703, 704, 707, 708, 713, 715, 727, 774, 778-780, 780a-b, 781, 782, 785
1996 Regional Amendment	1432, 1438, 1439, 1446, 1454-1456, 1459, 1466, 1491, 1510-1517

Coronado National Forest

Pima pineapple cacti occur in Management Area 4 on the Coronado NF. The primary emphasis for this area is sustained harvest of livestock forage and fuelwood while maintaining and improving game and animal habitat. Grasslands and mixed grasslands in Management Area 4 are to be managed at Level C (extensive livestock management) and D (intensive livestock management). The Coronado supports a very small population of this species relative to the remaining populations outside the Forest. Nevertheless, the Forest provides habitat that is not threatened by residential and urban development, the primary threat to Pima pineapple cactus.

Table 182. Effects of the S&Gs analyzed for the Pima pineapple cactus – Coronado NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	8	16.0
-1	S&G is causing sublethal response	2	4.0
0	S&G is ill-defined and/or open to interpretation	7	14.0
1	S&G is maintaining habitat & providing at least minimal recovery	11	22.0
2	S&G is moving towards recovery	2	4.0
3	S&G is implementing species recovery plan	2	4.0
Y	S&G has no application to the species	15	30.0
Z	S&G implementation is non-discretionary	2	4.0
X	S&G is a heading	1	2.0
Total		50	100 %

Table 182 summarizes the effects to Pima pineapple cactus from the applicable S&Gs on the Coronado NF. Twenty percent of the S&Gs could cause mortality of Arizona cliffrose plants, while 30 percent of the S&Gs have positive effects for this species. The remaining 50 percent of the S&Gs have no effect on Pima pineapple cactus or the S&Gs are too vague to analyze.

Engineering Program

Only three S&Gs have the potential to affect Pima pineapple cactus within this program area. S&Gs 693 and 694 are too vague to analyze. Standard and Guideline 785, specific to management area 4, allows the Forest to close roads that are not needed. This is considered beneficial to Pima pineapple cactus.

Forestry and Forest Health Program

Standard and Guideline 704 is determined to provide some protection for Pima pineapple cactus because it prioritizes listed species' habitat needs above the need to manipulate vegetation to control insects or disease.

Rangeland Management Program

Pesticide and herbicide application (699, 703) to control infestations of pests and invading plants on range resources may be harmful to Pima pineapple cactus. Standard and Guidelines 780 and 780a-b can lead to mortality of Pima pineapple cactus and habitat damage by allowing structural and non-structural improvements to maintain grazing capacity, use different methods (chaining, seeding, fire) to maintain range resources, and to develop proper grazing methods to benefit forage, game species, and soil and water resources. All of the S&Gs in this program area can have negative effects on Pima pineapple cactus.

Recreation, Heritage, and Wilderness Program

Standard and Guidelines 612 and 613 can benefit Pima pineapple cactus habitat because they direct the Coronado NF conduct evaluations of dispersed recreation activity for areas receiving high use and develop capability limits for dispersed recreation.

Watershed Management Program

Standard and Guidelines 672-674 direct the Coronado NF to repair watersheds in unsatisfactory condition. This direction can provide positive benefits for Pima pineapple cactus habitat. Standard and Guideline 782, specific to management area 4, allows the use of non-native seed in watershed rehabilitation projects and that is considered a negative effect to Pima pineapple cactus habitat. The use of non-native seed can introduce exotic grasses that can alter the habitat for this species.

Wildlife, Fish and Rare Plants Program

All of the protective direction for listed species is in this program area. The Coronado NF is directed to maintain or improve the habitat of listed species through mitigation of Forest activities (627). The Coronado NF is to develop overall direction for listed species in cooperation with state and federal agencies (629). Conduct inventories and surveys for listed species in project areas (631). All of the S&Gs in this program area will have beneficial effects to Pima pineapple cactus and aid in recovery (774, 779), in addition to minimizing the negative effects from the other program areas.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems ((U.S. Forest Service 2004). Table 183 summarizes the S&Gs from the 1996 Regional Amendment that apply to Pima pineapple cactus. There is only one S&G that applies to Pima pineapple cactus (1510). In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 183. Effects of the S&Gs analyzed for the Pima pineapple cactus - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	10.5
1	S&G is maintaining habitat & providing at least minimal recovery	1	5.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	14	74.0
Z	S&G implementation is non-discretionary	2	10.5
X	S&G is a heading	0	0.0
Total		19	100 %

Standard and Guideline 1510 states that forage use by grazing ungulates will be maintained at or above a condition which assures the recovery and continued existence of listed species. The

implementation of this S&G, which is applicable to the Rangeland Management Program, should preserve and protect, at a minimum, the known locations of Pima pineapple cactus on the Coronado NF.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The Coronado NF supports a very small population of Pima pineapple cactus. The majority of the range is scattered over state, tribal, and private lands in the Altar and Santa Cruz valleys of Pima and Santa Cruz Counties in southeast Arizona. Some of this land is adjacent to the Coronado NF. Actions that continue to threaten the species are residential and commercial development (many have no federal nexus), mining, and the illegal removal/collection of plants.

Additional cumulative impacts to the Pima pineapple cactus may occur from cross-border activities along the U.S./Mexico border. The following cross-border activities include, but may not be limited to the following: human traffic, deposition of trash, new trails from human traffic, soil compaction and erosion, increase fire risk from human traffic, water depletion and contamination, introduction and spread of disease, and interference of survey, monitoring and research.

CONCLUSION

After reviewing the current status of the Pima pineapple cactus, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the S&Gs within the Coronado NF LRMP and the 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Pima pineapple cactus. Pursuant to 50 CFR 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for this species; therefore, none will be affected.

Pima pineapple cactus occurs in 50 townships within its U.S. range, mainly on State Trust lands and private property. There are approximately 100 Pima pineapple cactus on lands managed by the Coronado NF, the majority of which occur on the Sierra Vista Ranger District. A few individual plants are located on the Nogales Ranger District. Most of these plants have been monitored sporadically for the last 5-10 years. The population seems relatively stable. These populations lie within the southern end of the species' range, disjunct from the main distribution to the north, and represent only a minor part of the species' distribution and abundance.

Cumulative effects considered in our analysis include residential and commercial development (many with no Federal nexus), mining, and the illegal removal/collection of plants. The baseline for the species continues to degrade as a result of these activities. Pima pineapple populations on

the Coronado NF are not susceptible to the land development threats responsible for destroying much of the species' habitat on private lands. The population on the Coronado NF represents a very small portion of the overall distribution of the species.

The continued implementation of the Coronado LRMP may result in habitat modification and mortality of the Pima pineapple cactus. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the management direction of the Coronado NF LRMP, which conserves Pima pineapple cactus populations with the following:

- The Coronado NF has carried out several actions to protect Pima pineapple cactus and its habitat. These include building exclosures that protect at least 50% of the cacti from the effects of livestock grazing; delineating potential habitat and surveying for Pima pineapple cactus; and attempting to control unauthorized off-road vehicle activity in occupied habitat.
- The Coronado NF has surveyed much of the suitable habitat on the Coronado NF.
- The Coronado constructed two small exclosures on the Sierra Tordilla grazing allotment to protect the Pima pineapple cactus and evaluate the effects of livestock grazing; plants are also being monitored along the Sopori Road access to the Nogales Ranger District.
- The Coronado NF has spent considerable time managing the off-road vehicle use in the areas that support Pima pineapple cactus on the Sierra Vista Ranger District. In addition, roads have been signed and areas have been closed to protect occupied habitat.
- Standard and guideline 627 contains guidance for maintaining or improving occupied habitat for listed threatened and endangered species through the modification of Forest Service activities.

With the conservation efforts put forth by the Coronado NF, as well as the beneficial S&Gs of the Coronado NF, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Pima pineapple cactus.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue monitoring Pima pineapple cactus on Coronado NF lands.
2. Consider hiring a botanist to address concerns to listed plant species.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SACRAMENTO MOUNTAINS THISTLE

STATUS OF THE SPECIES

Description

The Sacramento Mountains thistle (*Cirsium vinaceum*) (thistle) is a stout plant, 3.3-5.9 feet (1-1.8 m) tall. Thistle stems are brown-purple and highly branched. The basal leaves are green, 12-20 inches (30-50 cm) long, and up to 8 inches (20 cm) wide, with ragged edges. Sacramento Mountains thistle was first collected near Fresnal, New Mexico in 1899. Presently, the thistle occurs on both the eastern and western slopes of the Sacramento Mountains in Otero County, New Mexico.

E.O. Wooten and P.C. Standley first described the Sacramento Mountains thistle in 1913, and originally named the thistle, *Carduus vinaceus*, in accordance with generic concepts at that time. In 1915, Wooten and Standley combined the thistle with *Cirsium*, a common genus in the New Mexico flora. *Cirsium vinaceum* has been observed to hybridize in the wild with *C. parryi* by L. Huenneke (1996), and with *C. wrightii* and *C. inornatum* by P. Barlow-Irick (1998). P. Barlow-Irick also observed white-flowered phenotypes of *C. vinaceum* at several sites in 2003. The type specimen for *Cirsium vinaceum* is in the U.S. National Herbarium, No. 690246 (U.S. Fish and Wildlife Service 1993).

Legal Status: The FWS listed the thistle as a threatened species under the ESA, as amended, on June 16, 1987. A recovery plan for the thistle was signed September 27, 1993. Critical habitat was proposed but later withdrawn. Sacramento Mountains thistle is a New Mexico state endangered plant species listed in NMNHD Rule 85-3 of the New Mexico State Endangered Plant Species Act. The law prohibits the taking, possession, transportation and exportation, and selling or offering for sale any listed plant species (U.S. Fish and Wildlife Service 1993).

Distribution and Abundance

The thistle occurs primarily on National Forest System lands of the Lincoln NF in south central New Mexico. A few occupied sites lie on the extreme southern end of the Mescalero Apache Indian Reservation and a few private land inholdings in the Lincoln NF. Plants occur in small dense populations covering less than 40 ha (100 ac). The range extends approximately 10 km (6 mi) northeast to 27 km (17 mi) south of Cloudcroft in an area of approximately 390 sq km (150 sq mi) (U.S. Fish and Wildlife Service 1993).

The thistle requires water at the surface or immediate subsurface. Thus, thistle habitat is found in travertine substrates at springs and along soft bottomed outflow streams. The extent of occupied sites and plant numbers fluctuates with rainfall and the amount of surface flow available. Populations expand in years of higher spring flows, with plants establishing farther downstream and scattered along the springs' outflow creeks. In years of lower flow, populations contract back to the wetter areas around the springs (U.S. Forest Service 2004).

Habitat

The thistle occurs within the mixed conifer zone, between 7,500-9,500 feet (2,300-2,900m), in the limestone substrate of the Sacramento Mountains in New Mexico. Thistles occur primarily in non-forested areas and in forested areas with partial shade.

The thistle is a riparian species that requires saturated soils with surface or sub-surface water flow. Occupied soils have relatively high nitrogen and low phosphorus contents. Plants require wetland/riparian habitats along springs, seeps, and streams. Waters at these sites are rich in calcium carbonate that often precipitates out to create large areas of travertine (calcium carbonate) deposits, which occasionally become large bluffs or hills. Travertine deposits are the most common habitats of the thistle.

Life History

The thistle is a biennial (lives for two years) species. The thistle reproduces abundantly from seeds, but also has rhizomes for vegetative reproduction. In the first year, the plant develops a spiny-leaved basal rosette. Individual plants may produce more than one rosette along basal rhizomes, and damaged or cut leaves have been observed to produce roots (Thomson 1991). Thistle plants turn yellow and lie dormant in the fall and winter. The following spring, the basal rosette becomes green and bolts, producing a purple flowering stalk in late June. Flower stalks may reach 6 feet (2 m) in height and produce numerous purple flowering heads, 2 inches (5 cm) in diameter, on a widely-branched inflorescence (U.S. Fish and Wildlife Service 2004). Flower and seed production occurs in July and August. Adult plants die the second year, after flowering.

Thistle flowers are pollinated by insects, including the hawk moth and 28 species of bees, and by five species of hummingbirds. Seeds are relatively large and often do not shed readily from the flowering head (U.S. Forest Service 2004). Seeds are dispersed with water flow. Seedlings have high mortality and a low tolerance to freezing.

Historically, many thistle sites were no more than 100 m (330 ft) apart, and covered areas as small as 54 square feet (5 sq m). Thus, such occupied habitat was not identified as a “population” in the reproductive or genetic sense of the term. However, groups of thistle plants that densely occupied wet travertine deposits were referred to as “populations” in the management sense of the term (U.S. Fish and Wildlife Service 1993).

At the time of listing, the range of the thistle consisted of approximately 20 known population areas (within six large canyon drainages) containing an estimated 10,000 to 15,000 sexually reproducing individuals. Individual plants were also identified along the outflow creeks of travertine springs. It has been suggested that scattered individual plants may serve as “stepping stones” in the flow of genes between larger populations on more suitable habitats (U.S. Fish and Wildlife Service 1993).

Further surveys of suitable habitat within the range of the species have since been completed. A 1990 inventory on National Forest System lands located approximately 49,000 plants, both juvenile and mature, within 58 population sites on 66 acres of the Lincoln NF. By 1993, the number of population sites had increased to 62 known population areas (mostly subdivisions of

the original 20 populations) within 150 square miles (U.S. Forest Service 2004). In 1995, there were 77 known population areas on the Lincoln NF. All known sites, except two that are inaccessible, were monitored in 1995, documenting 342,310 plants. In 1998, 81 population areas were surveyed, locating 398,490 plants. In 2001, the number of estimated plants decreased to 347,090 within 82 population sites.

Presently, the thistle occurs in small, dense populations at 86 sites on the Lincoln NF in south-central New Mexico. The total number of plants is approximately 350,000-400,000. The number of thistles on private or Mescalero Apache Nation lands is unknown (U.S. Forest Service 2003)

Critical Habitat: Critical habitat was originally proposed for a 155 square mile area. However, the FWS determined the area included in the critical habitat proposal was non-essential to the conservation of *C. vinaceum*. Smaller tracts of occupied habitat were also considered for designation as critical habitat, but concern for vandalism caused this consideration to be dropped (U.S. Fish and Wildlife Service 2004). Thus, the proposed critical habitat has been withdrawn.

Reasons for Listing

At the time of listing, only 20 known populations, containing 10,000 to 15,000 sexually reproducing plants of thistle, occurred within the Sacramento Mountains of New Mexico. The threats imposed upon the species, including habitat destruction by livestock, water development, competition with introduced plant species, road construction, logging, and recreational activities, all contributed to the listing (U.S. Fish and Wildlife Service 1987, 1993).

Threats: Development and appropriation of water rights directly from spring habitats poses a major threat to the thistle. Presently, the watershed supporting the thistle is non-adjudicated, available to anyone wanting to appropriate water for beneficial use. New Mexico lacks an instream-flow statute, which maintains minimum flows necessary to support biological values. Thus, spring development and loss of riparian habitat continues to threaten the thistle.

Animal grazing within the Sacramento Mountains continues to impact thistle along valley bottoms and riparian areas. Trampling by livestock, wildlife, or humans can cause damage to travertine formations or out-flow creek beds, which alter water flow (U.S. Fish and Wildlife Service 2004). Livestock graze on the thistle flowering stalks and the leaves of rosettes, contributing to the loss of the entire reproductive output of the plant.

Land use impacts pose a significant threat to the thistle. Indirect effects of logging and road building can potentially affect groundwater recharge to occupied thistle habitat. Recreational activities and occasional off-road vehicle traffic also threatens Sacramento Mountains thistle.

Noxious weeds have invaded thistle sites and pose a threat to continued occupancy, relative to water availability. Decreased natural water flows at travertine springs create conditions that favor introduced weeds over the thistle.

Conservation Measures

A recovery plan for the thistle was completed in 1993. The recovery plan has outlined recovery criteria to protect and manage habitats necessary to sustain healthy populations of thistle. Recovery criteria include: 1) acquire water rights for the purpose of maintaining travertine spring habitats at a minimum of 30 percent of the occupied spring localities, including at least one occupied spring locality in each of the 20 occupied main canyon systems, 2) develop habitat management plans to alleviate threats to the species and ensure permanent protection for the thistle in at least 75 percent of the known occupied habitat, both spring and riparian sites, and 3) establish a 10-year monitoring and research program to demonstrate effectiveness of management plans (U.S. Fish and Wildlife Service 1993). Also stated in the Recovery Plan, is a detailed description of the recovery tasks needed to allow for the removal of the thistle from the federal list of threatened and endangered species.

Forty of the 86 population sites located within the Lincoln NF have been fenced to exclude livestock or are considered to be inaccessible. Enclosures total approximately 120 ha (290 ac), protecting occupied thistle habitat from the negative impacts associated with livestock use. Protection from grazing has allowed populations inside the enclosures to expand outside fenced areas (U.S. Forest Service 2004). During drought periods, plants are sometimes protected with temporary fencing.

In 2001 and 2002, a riparian improvement project in Water Canyon and the Rio Penasco improved drainage under roads. This conservation measure has increased water availability in former occupied habitat, allowing the thistle to reoccupy these sites (U.S. Forest Service 2004).

Research on the thistle has included studies on habitat requirements, competition, seed dispersal, seedling requirements, asexual reproduction, phenology, and other life history factors. Intensive monitoring of livestock herbivory was conducted in 1992 and 1993. Impacts of livestock and elk foraging is conducted twice during the summer season on the Sacramento Grazing Allotment. Systematic extensive monitoring was conducted in 1995, 1998, 2001, and 2003, which provided population estimates and observations of herbivory and noxious weeds.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Presently, the thistle occurs in small, dense populations at 86 sites on the Lincoln NF. Recent population surveys have estimated the total number of plants at 350,000-400,000 (U.S. Forest Service 2003). These thistle plants are located in Management Areas 2D, 2E, 2H, 2G, and 4J.

The primary management emphasis for these Management Areas is recreation, wildlife habitat, and timber management. Most of the above listed Management Areas are maintained at rangeland resource management Level C (moderate) or Level D (high). The Lincoln NF LRMP describes Level D management as, “Management associated with extensive improvement development, which assures yearlong rest of pastures and good distribution of livestock. [It] provides fully for plant and livestock needs. [It] may entail extensive non-structural improvement for maximization and utilization of forage production” (U.S. Forest Service 2004).

Spring desiccation has contributed to thistle site boundaries, reducing the number of individuals, and in some cases, has caused a loss of all plants at previously occupied sites. The loss of water can be: 1) naturally caused due to drought conditions, 2) caused by other factors that may cause a spring to go dry (i.e., rerouting of underground channels), or 3) human-caused impacts such as spring development or loss of water flow to an occupied site through diversion by roads or trails (U.S. Fish and Wildlife Service 2004).

Factors Affecting the Species within the Action Area

Water availability: The seasonal distribution of yearly precipitation has a significant impact on the water availability for Sacramento Mountains thistle. Drought conditions have substantially reduced the water flow at a number of springs occupied by the thistle. It is unknown what other factors may be affecting spring flow from the porous limestone parent materials which underlay the Sacramento Mountains (U.S. Fish and Wildlife Service 2004). However, a major threat to Sacramento Mountains thistle is the potential appropriation and development of water rights directly from spring habitats. At present, the watershed is un-adjudicated, and the Forest Service authorizes special use permits for spring development on National Forest System lands (U.S. Fish and Wildlife Service 1993), pursuant to issuance of a water right from the State Engineer. The intake point specified in the Special Use Permit takes into account the presence of any Sacramento Mountains thistle occurrences, to the extent allowed by state laws regulating domestic water intake.

Invasive species: Exotic species spreading throughout the Sacramento Mountains may have an impact on the thistle and its habitat. Introduced weeds growing on the Lincoln NF and at thistle occurrence sites include musk thistle (*Carduus nutans*), teasel (*Dipsacus sylvestris*), bull thistle (*Cirsium vulgare*), Canada thistle (*Cirsium arvense*), and poison hemlock (*Conium maculatum*). Decreased natural water flows at travertine springs have created conditions that favor these introduced weeds over the thistle (U.S. Fish and Wildlife Service 2004).

Greenhouse competition studies have shown that introduced teasel can reduce the fitness of the native thistle. Also, germination trials have shown thistle seed unable to germinate beneath a closed teasel canopy. These studies show the potential for native thistle to be excluded from its drier habitat by the invasive teasel. However, little evidence in the field has shown saturated travertine habitats to be suitable for teasel invasion (U.S. Fish and Wildlife Service 1993).

An exotic seed-head weevil (*Rhinocyllus conicus*) was introduced in Colorado to control musk thistle. Seed-head weevil has spread naturally to New Mexico. It has been found near Ruidoso, approximately 18 miles (29 km) from thistle occurrences. Greenhouse tests at Utah State University have shown the thistle to be susceptible to attack from the weevil. It is unknown how

the weevil will affect the thistle under natural conditions of temperature, rainfall, and plant growth (U.S. Forest Service 2004).

Livestock grazing: At the time of listing, the FWS attributed the majority of detrimental effects on thistle to ground disturbance associated with livestock use. Livestock threats to the thistle have since been described by several observers to include direct impacts such as loss of photosynthetic tissue to herbivory; damage to vulnerable seedlings, rosettes, and flowering stalks; and trampling damage to travertine and soft substrates in occupied and potential habitat (Thomson 1991). Livestock grazing is permitted from May through October, the summer grazing period, with peak use on the thistle occurring in June and again in September through October.

The Forest Service conducted an intensive monitoring study of herbivory on the thistle between 1992 and 1993. Plants were monitored to determine if herbivory was significant enough to require management action. The Forest Service's biological assessment of the Sacramento Allotment management plan summarized the conclusions of the monitoring:

1. Wildlife herbivory on the thistle was non-existent to negligible when compared to livestock herbivory. Use was reported during the monitoring only for sites accessible to livestock.
2. Herbivory occurred in all months studied, May to October.
3. During 1992, percent use peaked in June (76 percent of accessible rosettes showing some level of use), September (over 90 percent), and October (over 90 percent). In 1993, use peaked over 90 percent during September and October.
4. The thistle was found to have the ability to put on "substantial compensatory growth following herbivory when it occurred early in the growing season prior to flowering. It is assumed that this type of compensatory growth is characteristic of the thistle in all years, except possibly those of severe or prolonged drought".
5. A comparison of thistle use and other forage use was not made due to the difference in the type of data collected and the inability to conduct a statistical analysis. Use levels on other forage species were determined to have little or no obvious relationship to herbivory on the thistle. Use amounts on the thistle appeared to be more correlated to the number of plants available; time of year; and proximity to travel ways, gentle topography, and livestock congregating/resting sites.
6. Frequency of use (the number of sites with some measurable herbivory) on the thistle was generally very high throughout the study period. Within one month of cattle entering a pasture, at least 75 percent and up to 100 percent of the thistle sites visited were found to have been impacted. This indicates that the thistle is of some value to cattle. Following cattle entry onto the South Pasture in August 1993, and in spite of widely available forage, herbivory by livestock was detected at 100 percent of sites accessible to livestock. No herbivory was present when the cattle first entered (U.S. Forest Service 2003).

Between 1994 and 1996, a protocol for long-term monitoring of the thistle was developed by Dr. Laura Huenneke. The initial intensive monitoring included thirty four sampling sites, selected to represent grazed and un-grazed occurrences.

In 1996, the Forest Service contacted the FWS in regards to reaching or exceeding thresholds levels at all thistle monitoring sites due to severe drought conditions (U.S. Forest Service 2003). Emergency consultation was conducted regarding this situation in June of 1996, and temporary electric fencing was installed to minimize livestock grazing impacts to the thistle.

Beginning in 1995, 1998, 2001, and 2003, extensive monitoring of all thistle sites provided population estimates and observations of herbivory and noxious weeds. A comparison of data from 1995, 1998, and 2001 showed both increases and decreases of relatively similar magnitude in both grazed and ungrazed sites. Accessibility to grazing, precipitation, and substrate do not appear to explain these fluctuations. It is not clear what factor or factors are affecting population size (U.S. Forest Service 2003).

EFFECTS OF THE ACTION

The S&Gs listed in the Lincoln NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the thistle and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the thistle.

Table 184. Summary of S&Gs considered for the Sacramento Mountains thistle.

National Forest	Standards and Guidelines
Lincoln	1046-48, 1051, 1053-57, 1058-68, 1073-85, 1088, 1093-110, 1112-13
1996 Regional Amendment	1425-28, 1431-32, 1434, 1437-38, 1440-48, 1450-56, 1458-59, 1461-76, 1480-81, 1483-84, 1486-95, 1497-98, 1501, 1503, 1506, 1509-17

Lincoln National Forest

Table 185 summarizes the effects to the thistle from the applicable S&Gs within the Lincoln NF. Over 16 percent of the applicable S&Gs cause mortality of thistle plants, while almost 80 percent of the S&Gs have positive effects to the species. The remaining 4 percent of the applicable S&Gs have no effect to the thistle or are too vague or ill-defined to analyze.

Table 185. Effects of the S&Gs analyzed for the Sacramento Mountains thistle – Lincoln NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	8	14.8
-1	S&G is causing sublethal response	1	1.9
0	S&G is ill-defined and/or open to interpretation	1	1.9
1	S&G is maintaining habitat & providing at least minimal recovery	36	66.7
2	S&G is moving towards recovery	6	11.1

Ranking	Explanation of Ranking	Total	Percentage
3	S&G is implementing species recovery plan	1	1.9
Y	S&G has no application to the species	0	0.0
Z	S&G implementation is non-discretionary	1	1.9
X	S&G is a heading	0	0.0
Total		54	100 %

Forestry and Forest Health Program

Only one S&G in this program has a negative effect on the thistle. Standard and Guideline 1055 allows for the use of pesticides to control pest outbreaks. Use of pesticides is likely to adversely affect the thistle by reducing the populations of its pollinators, thus reducing its fecundity. Standards and Guideline 1057 should help to minimize the effects of S&G 1055 by requiring threatened and endangered species needs to be considered in Pest Management planning and by setting threatened and endangered species habitats as higher priority.

Rangeland Management Program

This program provides for grazing of domestic livestock on National Forest System lands. Standards and Guidelines 1088 and 1100 call for rangelands to be improved. This should improve habitat for the thistle by improving watershed condition, but it also implies that conditions are currently degraded thus limiting its habitat and dispersal. Standards and Guidelines 1103, 1106, 1109, and 1113 allow for structural improvements to be developed and replaced as needed to maintain level C or D management. These structures could lead to more concentrated grazing and facilitate movement through plant areas. Any grazing regime, regardless of range condition, is likely to have negative impacts to the thistle due to its palatability to livestock, trampling, and temporary habitat destruction where livestock are concentrated. However, S&Gs 1053 and 1079 should help to minimize the effects of this program by requiring that threatened and endangered species needs be met in all grazing activities.

Recreation, Heritage, and Wilderness Program

The Recreation Program oversees the management of recreation and heritage sites with the National Forests. In the southwest, recreational users tend to center their activities in or near riparian areas, thus these activities are likely to impact the thistle directly due to trampling by humans and indirectly through degraded habitat and water quality. In particular, S&G 1073 allows for dispersed recreation on the Lincoln NF. The effects of recreation to the thistle should be somewhat minimized by S&G 1094 which call for prevention of riparian degradation due to dispersed camping on the Sacramento River, and S&G 1097 which call for consideration of threatened and endangered species needs at Bluff Springs.

Watershed Management Program

The S&Gs in the Watershed Management Program have a variety of effects to the thistle. Standard and Guideline 1081 allow for chemical use in order to control plants. Herbicides are likely to have direct effects to the thistle through mortality and decreased water quality. Standard and Guideline 1082 directly offset S&G 1081 by allowing hand treatment where other methods have “unacceptable impacts”.

Standards and Guidelines 1102, 1104, 1107, and 1110 all call for watershed structural improvements. Additionally, S&Gs 1075 and 1080 provide direction to maintain or improve all watersheds to satisfactory or better conditions. These S&Gs should help to improve overall watershed condition thus maintaining and improving habitat for the thistle; however, there could be short-term impacts of the actual improvement projects in the form of temporarily decreased water quality, sedimentation, and direct mortality of plants due to trampling by humans and use of tools and machinery.

Finally, S&Gs 1093 and 1096 should help to offset some of the effects of all of the Programs under the Lincoln NF LRMP by requiring that threatened and endangered plants be protected and their habitats be maintained or improved.

Wildlife, Fish, and Rare Plants Program

Very few S&Gs in this program are likely to result in negative affects to the thistle. Standard and Guideline 1101 allows for structural improvement to be developed and replaced as needed to maintain level C and D management. Similarly, S&G 1112 allows waters to be developed as needed to provide maximum travel distance of one mile. The FWS assumes that both of these S&Gs refer to grazing management, whether by managed livestock or game herds, thus the impacts to the thistle from these S&Gs are similar to those addressed under the Rangeland Management Program.

Many of the applicable S&Gs in the Wildlife Program potentially provide substantial benefits to the thistle. For example, S&G 1051 call for use of indigenous species only in revegetation of riparian areas. Standard and Guideline 1060 states that disturbance, including public use, is prohibited in threatened and endangered species habitat. Standard and Guideline 1067 prohibits the use of pesticides, herbicides, and other harmful contaminants in threatened and endangered species areas. These S&Gs help to minimize and mitigate impacts of other forest uses discussed above. Some additional S&Gs provide for a more general protection of the thistle and some even allow for positive conservation and recovery activities to occur. Standards and Guidelines 1047, 1058, 1059, and 1065, provide that all threatened and endangered species habitat will be protected. Standard and Guideline 1064 allow for threatened and endangered species to take precedence over others, while S&G 1068 actually allows the Lincoln NF LRMP to be modified in order to protect and enhance threatened and endangered species sites. Finally, S&Gs 1062 and 1063 actually allow the Lincoln NF to contribute to recovery efforts for the thistle by managing threatened and endangered species habitats consistent with recovery plans and managing threatened and endangered species to “attain total recovery levels over time”. These S&Gs should help the Forest to minimize the effects of other projects, prioritize its projects such that negative impacts of other Forest uses could occur largely outside critical thistle areas, and may also result in increased population numbers and sizes.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexcian Spotted Owls and Northern Goshawks. These S&Gs promote healthy forest ecosystems; properly functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). There is potential for thistle sites to occur in areas occupied by the

Mexican Spotted Owl and Northern Goshawk as they may be found in riparian meadow communities within the bird areas. However, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species. Table 186 summarized the effects to the thistle from the applicable S&Gs within the 1996 Regional Amendment.

Table 186. Effects of the S&Gs analyzed for the Sacramento Mountains thistle – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	2.8
1	S&G is maintaining habitat & providing at least minimal recovery	20	28.2
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	1	1.4
Y	S&G has no application to the species	43	60.6
Z	S&G implementation is non-discretionary	0	0.0
X	S&G is a heading	5	7.0
Total		71	100 %

None of the applicable S&Gs are likely to cause negative effects to the thistle, while 30 percent of the applicable S&Gs are likely to have positive effects. The remaining 70 percent of the applicable S&Gs have no effect to the thistle, or are too vague or ill-defined to analyze.

Wildlife, Fish, and Rare Plants Program

While there is potential for the thistle to be found within these areas, there are no S&Gs which are likely to result in negative effects. In the event there were to be a conflict between Mexican Spotted Owl and thistle management, S&G 1480 allows the thistle activities to take precedence over the Mexican Spotted Owl activities.

Additionally, S&G 1510 allows the thistle to take precedence over livestock by requiring forage use to be maintained at or above a condition which assures the recovery and continued existence of threatened and endangered species. This S&G, in concert with the S&Gs discussed under the Lincoln NF LRMP, should remove the threat of all adverse impacts to the thistle which are likely to compromise its recovery potential.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Some plants may be found on private inholdings and the Mescalero Apache Indian Reservation and thus are subject to management actions on those lands; however, because the large majority of thistle sites are restricted to public lands managed by the Lincoln NF and are subject to future consultations, no known cumulative effects to the thistle are anticipated.

CONCLUSION

After reviewing the current status of the Sacramento Mountains thistle, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS's biological opinion that the Lincoln NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Sacramento Mountains thistle. Pursuant to 50 CFR 402.02, to "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

Within National Forest System lands, the Sacramento Mountains thistle is found on the Lincoln NF where it is threatened by non-native species and habitat loss/degradation as a result of livestock grazing and water availability. As discussed above, the FWS anticipates adverse effects to the Sacramento Mountains thistle are reasonably certain to occur under direction of the Lincoln NF LRMP and 1996 Regional Amendment. However, the FWS does not believe that such activities will rise to the level of jeopardy for the following reasons:

- Multiple S&Gs within the Lincoln NF LRMP allow for threatened and endangered species management to take precedence over other species, threatened and endangered species habitat to be improved to meet the goals of the ESA, and threatened and endangered species to be managed in order to attain recovery levels.
- The Lincoln NF has excluded, through fencing, almost half of the known Sacramento Mountains thistle sites from grazing. In addition, multiple S&Gs allow for threatened and endangered species needs to be met in all range or grazing activities.
- The Lincoln NF has and continues to fund and participate in surveys and research activities to identify and alleviate the threats to this plant.

Therefore, given the on-going conservation initiatives and the management direction provided by the suite of S&Gs in the Lincoln NF LRMP and 1996 Regional Amendment, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Sacramento Mountains thistle.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious

damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Adhere to the recommendations in the 1993 Sacramento Mountains Thistle Recovery Plan.
2. The Forest Service is encouraged to maintain existing exclosures protecting thistle populations from grazing and to implement additional exclusions as practicable.
3. Minimize water diversions and watershed degradation in order to protect occupied travertine substrates and to restore suitable riparian habitats.
4. In order to protect pollinators, use of pesticides should be avoided in occupied thistle areas. When insect outbreaks must be controlled in thistle habitat, alternative methods should be used. Consider adhering to the FWS's Region 2 Pesticide Use Guidelines.
5. Continue implementation the Lincoln NF Noxious Weed Control Plan which includes prescribed experimental treatments in order to eradicate non-native plant species in occupied or potentially occupied thistle habitats.
6. Recreation use should not be encouraged in thistle habitats.
7. To the extent practicable, watershed improvement projects and structures should be implemented in such a way that thistles and their habitats are not directly adversely affected.
8. Continue research and monitoring activities for this species.
9. Protect all spring ecosystems that could potentially support thistle populations.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

SACRAMENTO PRICKLY POPPY

STATUS OF THE SPECIES

Description

The Sacramento prickly poppy (*Argemone pleiakantha* ssp. *pinnatisecta*) is an herbaceous plant that commonly grows to a height of 20-60 inches. The leaves are long and narrow with box-shaped sinuses between spine-tipped lobes. The prickly poppy displays attractive flowers with numerous yellow stamens and 6 white petals, 1.2-1.6 inches long and as wide (U.S. Fish and Wildlife Service 1989). The prickly poppy is endemic to several canyons in the Sacramento Mountains of Otero County, in south-central New Mexico.

The Sacramento prickly poppy was first collected in 1953 by George Ownbey and Findley on the western slopes of the Sacramento Mountains. George Ownbey described the taxon in 1958. Prior to this description, Sacramento prickly poppy was considered part of the *Argemone platyceras* complex, which included what are now considered to be many taxa distributed throughout the western U.S. and Mexico (U.S. Fish and Wildlife Service 1994).

The Sacramento prickly poppy is distinguished from the typical subspecies by its white milky sap, as opposed to the typical yellow-orange sap color, its deeply divided leaves, and its simple capsule spines. No other species of *Argemone* occurs within the range of the *Argemone pleiakantha* ssp. *pinnatisecta*.

Legal Status: The FWS listed the Sacramento prickly poppy as an endangered species under the ESA of 1973, as amended, on August 24, 1989. No critical habitat has been proposed for the Sacramento prickly poppy. A recovery plan for the prickly poppy was signed August 31, 1994. The prickly poppy has a recovery priority of 3, based on the high degree of threat and high recovery potential for the subspecies (U.S. Fish and Wildlife Service 1994). Recovery priority numbers range from 1 to 18, with 1 having the highest priority.

The Sacramento prickly poppy is a New Mexico state endangered plant species listed in NMNHD Rule 85-3 of the New Mexico State Endangered Plant Species Act. The law prohibits the taking, possession, transportation and exportation, and selling or offering for sale of any listed plant species (U.S. Fish and Wildlife Service 1994).

Distribution and Abundance

The Sacramento prickly poppy occurs along the western face of the Sacramento Mountains between La Luz Creek and Escondido Canyon. The species' historic range covers 10 canyons in seven canyon systems of the Lincoln NF. Populations have been found in Fresnal Canyon (including Salado and La Luz canyons), Dry Canyon, Alamo Canyon (including Caballero Canyon), Mule Canyon, San Andres Canyon, Dog Canyon, and Escondido Canyon (U.S. Fish and Wildlife 1994). The subspecies is also known to occur on BLM lands, private lands, Oliver Lee State Park, and state and city right-of-ways. The entire range is estimated at 90 mi² (230 km²). Although past surveys have not found prickly poppy on the Mescalero Apache reservation, the area has been identified, in the Recovery Plan, as potential habitat for

Sacramento prickly poppy. Additional surveys are needed to determine whether this species actually occurs on the reservation.

Prior to listing, surveys documented a peak in recorded population levels of the Sacramento prickly poppy. In 1977, prickly poppies occupied La Luz, Fresnal, Alamo, and Dog Canyons. A survey conducted between May and July of 1987 identified 1,290 plants on 6,331 acres of federal, state, City of Alamogordo, and private lands (Malaby 1987). High mean annual precipitation levels are believed to have contributed to the success of prickly poppy germination and establishment during those years. In 1989, approximately 1,313 plants were known to occur in 10 canyons of the Sacramento Mountains. The limits of the species' range were La Luz Canyon and Dog Canyon.

A partial survey was conducted in 1999 within Alamo and Caballero Canyons. The survey covered two-thirds of the prickly poppy suitable habitat, locating 402 plants. This survey estimated 603 plants within the entire prickly poppy habitat. Further studies in 2002 and 2003 identified a combined total of 548 plants across the canyons historically reported as supporting the Sacramento prickly poppy. During the spring of 2004, 345 poppies were found in Alamo and Caballero Canyons (U.S. Fish and Wildlife Service 2004a). In June of 2004, 62 adults and 4 seedlings were counted at the mouth of Alamo Canyon, including 5 adults dead or dying and 32 adults with a disease on the stems (J. Martinez, Lincoln NF, 2004, unpubl. data). This marked the first discovery of a disease in Alamo Canyon (E. Hein, FWS, 2004, unpubl. data). During a cursory field visit in September 2004, 7 poppies were counted in Fresnal Canyon, and 1 healthy poppy and 3 dying poppies were found in Dog Canyon (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). No poppies were found in Salado Canyon in 2004 (U.S. Fish and Wildlife Service 2004a).

The exact number of Sacramento prickly poppies remaining rangewide is unknown, but is estimated to be approximately 425 adult plants (L. Barker, Lincoln NF, 2005, unpubl. data). As of November 30, 2004, 388 seedlings were tallied throughout the Alamo Canyon system (L. Barker, Lincoln NF, 2005, unpubl. data). The stronghold of the poppy, Alamo Canyon and its tributary, Caballero Canyon, contained 73 percent of all prickly poppies found on all ownerships in 1987, according to the Recovery Plan, and 72 percent of the plants known on National Forest System lands in 1999. Currently, 80 percent of all adult plants known on National Forest System lands are found in Alamo Canyon and Caballero Canyon (U.S. Forest Service 2004a).

Habitat

The Sacramento prickly poppy occurs in steep, rocky canyons between the pinyon/juniper zone of the Chihuahuan Desert Scrublands and Grasslands (4,300 ft), and the lower edge of the ponderosa pine community of the Great Basin Conifer Woodlands (7,100 ft). Habitats vary from xeric uplands to mesic sites, and may include arid canyon bottoms, dry terraces above riparian areas, and along streams, springs, and seep areas (U.S. Forest Service 2004). Plants grow directly in the rocks and gravel of stream beds, on vegetated bars of silt, gravel, and rock, on cut slopes, and on terraces above stream channels (U.S. Fish and Wildlife 2004).

The prickly poppy is an early succession plant, which occupies disturbed habitat. Prickly poppy plants favor conditions of enhanced soil moisture, but do not grow directly in saturated soils.

Soils are primarily derived from limestone, and may contain sandstone and gypsum. Habitat sites that collect surface water are considered favorable for seedling establishment, yet mature plants are often observed in more xeric sites (U.S. Forest Service 1992). Prickly poppy favor habitat ranging from full exposure to 50-75 percent shaded (Malaby 1987).

The western slope of the Sacramento Mountains has wide fluctuations in diurnal and seasonal temperatures. Temperatures average above 90 degrees Fahrenheit from mid-May to mid-September, and drop as low as 16 degrees Fahrenheit in the winter (U.S. Soil Conservation Service 1981). Annual precipitation averages 15 inches (38 cm), with most rains occurring from July through October.

Life History

The Sacramento prickly poppy is an herbaceous perennial that lives approximately 7-9 years. The sub-species dies back to the root crown each year. Mature plants have been known to be large and vigorous for multiple years, and then observed to not re-grow in a subsequent year (U.S. Forest Service 2004).

Germination has been observed to occur in October/November through late winter/spring, and successful recruitment into the population requires sufficient moisture for the establishment of seedlings. Seedlings grow slowly, producing a juvenile rosette the first year. Seedlings are delicate, susceptible to desiccation, and may be washed out by floods (U.S. Fish and Wildlife Service 2004). Young plants occupy open, disturbed habitat with minimal competing vegetation. It is uncertain as to which forms and how much surface disturbance is optimal for prickly poppy establishment (U.S. Fish and Wildlife 1994)

Generally, plants bloom during the second year, if moisture availability has allowed for sufficient growth. Flowering begins in May and continues throughout the summer depending on elevation and moisture conditions. The flowers have a variety of pollinators that include carpenter bees (*Xylocopa californica arizonensis*), honey bees (*Apis mellifera*), bumblebees (*Bombus ssp.*), soldier beetles (*Cantharidae*), lizard beetles (*Liguriidae*), flies (*Diptera*), and butterflies (*Lepidoptera*) (U.S. Forest Service 2004). Studies of pollination biology and subsequent fruit set and seed production show that prickly poppy will set little or no fruit unless visited by pollinators. Self-pollination, either within one flower or among flowers of the same plant, results in significantly fewer fruits and fewer seeds per fruit (Tepedino 1992).

Fruits mature and shed seeds throughout the flowering season. Prickly poppy seeds have a waxy coating and pitted vesicles on the surface. Seed dispersal occurs by water flow, soil movement, birds, or insects.

The Sacramento prickly poppy becomes established in relatively limited areas and undergoes inter- and intra-annual population fluctuations. While prickly poppy has been shown to produce a relatively large amount of seed, germination rates and seedling success are strongly influenced by available moisture. Following germination, young plants have insufficient roots to survive a prolonged dry spell. Lack of sufficient moisture at the optimal time during germination is likely to result in wide fluctuations in poppy occurrence from year to year (U.S. Fish and Wildlife Service 2004). The prickly poppy is an early successional species, but the optimal type and

amount of disturbance for maintenance of populations are not known. Cold treatment is needed to allow for successful germination. The tumbling action of the water and gravel is believed to provide scratching or scarification of the seed coat which has been found to enhance germination.

Reasons for Listing

At the time of listing in 1989, approximately 1,313 Sacramento prickly poppy plants were identified from canyons in the Sacramento Mountains occurring on Bureau of Land Management, Lincoln National Forest, Oliver Lee State Park, Otero County Highway rights-of-way, and private lands (Federal Register Notice 1989). In 1989, major threats to the prickly poppy were water diversion and pipeline construction, road construction and maintenance activities, drought, flooding, and livestock grazing (U.S. Fish and Wildlife Service 1994). By the time the Sacramento Prickly Poppy Recovery Plan was completed in 1994, off-road vehicle use was added as a threat (U.S. Fish and Wildlife Service 1994). As of 2005, an undetermined disease with symptoms similar to those of a stem canker has been added to the list of threats. Reasons for the recent substantial decline in prickly poppy numbers are not fully understood, but may involve the interaction of a variety of factors, including drought, disease, water diversion, and historic livestock impacts (U.S. Fish and Wildlife Service 2004). Although genetic studies have not been performed on this subspecies, the threat of decreasing genetic diversity is a growing concern as numbers of individuals and occupied canyon habitats decline (U.S. Fish and Wildlife 2004).

Threats: Today, threats to the prickly poppy include natural stochastic events such as drought, disease, and flooding; livestock grazing; water extraction; OHV use; and road and pipeline maintenance activities. Management concerns for Sacramento prickly poppy center on activities that might prevent seedling establishment or destroy adult plants. With the present low number of plants, it is crucial to have successful seedling recruitment and maintain seed-producing adult plants (U.S. Forest Service 2004).

Drought and disease have adversely affected the prickly poppy within the past few years, and together may be primarily responsible for the low to nonexistent current population numbers for some canyons (U.S. Fish and Wildlife Service 2004a). A link between decreased water availability and increased cases of disease may exist, as dehydration may weaken a plant's resistance to disease.

Flash flooding has been recognized as a threat to arroyo populations of Sacramento prickly poppy. Flooding often destroys many plants and its effects have been exacerbated by historic overstocking of cattle in portions of the poppy's range (U.S. Fish and Wildlife Service 2004). However, flooding can also create habitat for the plant species, and transport scarified seeds.

Livestock grazing and trampling have been identified as threats to Sacramento prickly poppy and its habitat, possibly "causing reduction in recruitment rates" (U.S. Fish and Wildlife Service 1989, U.S. Fish and Wildlife Service 1994). Monitoring has indicated that cattle will sometimes graze adult prickly poppies in the spring. However, these plants have been shown to recover with no apparent adverse effects (U.S. Forest Service 2004). Grazing and trampling of young seedlings is a greater concern, particularly during drought when forage is limited, and along

water sources where cattle tend to concentrate. Trampling by livestock also degrades prickly poppy habitat and opens it up to encroachment by weedy species. Although the relationship between livestock use and poppy numbers remains unclear, high forage utilization and/or stocking rates most likely do not have a benign effect on the species (U.S. Fish and Wildlife Service 2004). The overlap of ongoing high forage utilization with the yearly germination and establishment of the poppy may have created cumulative impacts upon the species and played a role in its current status (U.S. Fish and Wildlife Service 2004). Consequently, historical overutilization may preclude range restoration for decades, even with strict compliance with forage/range guidelines (U.S. Fish and Wildlife Service 2004).

The City of Alamogordo withdraws water at the head of Alamo and Caballero canyons, and mid-way down in Fresno and La Luz Canyons, reducing water flow to prickly poppy habitat. Water rights to these springs predate the establishment of the National Forest and the listing of the species. Prickly poppy seedlings are very sensitive to drying until they develop their taproot. If seed germination continues to occur without plant establishment, the soil seed bank could become depleted. Prolonged drought, extending beyond the 7-9 year lifespan of the plant, could prevent successful recruitment, eliminate the adult plants, and lead to a population crash. Thus, drought conditions and water extraction have a significant impact on the plant's survival.

Unauthorized OHV use and heavy equipment use associated with road and pipeline maintenance can crush individual prickly poppy plants and threaten the health of poppy habitat. Off-highway vehicles alter soils, which affect seed germination and plant growth.

Finally, decreasing genetic diversity is an indirect threat capable of extirpating the limited populations of poppies. Populations composed of smaller numbers of plants with narrow distributions are more susceptible to elimination from stochastic events, such as flooding or drought, or demographic fluctuations, such as reduced numbers of adults or diminished seed banks, than are larger, more widely distributed populations. A loss of populations or individuals may contribute significantly to a reduction in the gene pool and the ability of the species to adapt to environmental changes. With fewer, more widely spaced plants, out-crossing may become more difficult, which Tepedino (1992) has shown reduces fruit and seed set, which in turn could inhibit population recovery.

Conservation Measures

A recovery plan for the Sacramento prickly poppy was completed in 1994. The recovery plan has outlined recovery actions to protect and manage habitats necessary for sustaining healthy populations of prickly poppy. Recovery actions include: 1) ensure long-term protection (including designation of special management areas or zones) of the populations from human threats on Forest Service, City of Alamogordo, and BLM lands, 2) determine requirements for the germination and establishment of new individuals, and 3) study genetic variability within the species to provide assistance in determining how many populations are required to maintain that variability (U.S. Fish and Wildlife 1994). The Recovery Plan also contains a detailed description of the Recovery Criteria that need to be met to allow for down-listing of the Sacramento prickly poppy from endangered to threatened status. Among the criteria is the following: maintain reproducing populations of Sacramento prickly poppy within each of the 10 presently occupied canyons on the western slope of the Sacramento Mountains.

Extensive surveys have been conducted to determine the distribution and abundance of Sacramento prickly poppy within its range (U.S. Fish and Wildlife Service 1994). Past surveys and monitoring have identified population trends, however no statistical techniques have been applied. Monitoring of abundance, distribution, seedling success, herbivory, and grazing use continues as personnel and funding allow.

Since 2002, surveying has become more intensive. In 2002, contracted surveys were conducted for plants in five of the seven canyon systems historically occupied by the plant. Mule, Dry, San Andres, Dog and Escondido Canyons, plus Salado in the Fresno system, and Deadman Canyon, south of Dog Canyon, were searched. Three plants were found, two in San Andres and one in Dog Canyon. In August, 2003, a search of National Forest System lands in Fresno Canyon were searched by Forest Service personnel. By mid June, 2004, 10 monitoring visits by the Forest Service had been made in Alamo Canyon. The Alamo and Caballero Canyon system has contained up to 73 percent of all plants known in the seven canyon systems historically occupied by the poppy, and currently contains approximately 80 percent of the poppy population (J. Martinez, Lincoln NF, 2004, unpubl. data). Monitoring for the poppy is by the Forest Service is being conducted on a regular basis in Alamo Canyon this year.

A “nursery” for the Sacramento prickly poppy was established in 1987, along a City of Alamogordo water pipeline in Alamo Canyon. The nursery has provided useful biological information about prickly poppy germination and seedling establishment.

In 1996, Sacramento prickly poppy seeds were gathered under permit issued by the FWS to the Desert Botanical Garden in Phoenix, Arizona. Germination trials for the plant were unsuccessful (J. Martinez, Lincoln NF, 2004, unpubl. data).

In early February of 2004 and 2005, livestock were removed from the Alamo Pasture of the Sacramento Grazing Allotment to avoid grazing and trampling impacts to germinating poppies and poppy seedlings (U.S. Fish and Wildlife Service 2004a). This winter pasture contains Alamo and Caballero Canyons which currently have the largest number of remaining poppy plants. Traditionally, the winter grazing period runs from November 1st through May 15th, but early removal of cattle may help protect the poppy through the sensitive phase of seed germination and seedling growth which can occur as early as October/November, and possibly earlier. To continue implementing conservation measures, the Forest Service has committed to implementing a 40 percent allowable forage utilization on the winter (U.S. Fish and Wildlife Service 2004a). Early removal of livestock, in February, was provided only in 2004 and 2005 as a result of a biological opinion issued by the FWS for the Sacramento Grazing Allotment (U.S. Fish and Wildlife Service, 2004). Alamo Pasture will be monitored each December or January to determine whether an adjustment to the number of livestock, commensurate with the potential for livestock impacts on the poppy from herbivory and trampling, is necessary (U.S. Fish and Wildlife Service 2004). Adjustments could entail livestock removal, herd management, or livestock reductions for the future (U.S. Fish and Wildlife Service 2004). Minimizing the negative impacts of cattle insures that the status of the poppy in Alamo Canyon (within the Sacramento Allotment) does not further decline due to direct or indirect effects of grazing activities, and may increase the ability of the poppy to recover.

In September, 2004, the state botanist, under permit from the FWS, collected poppy seeds to begin investigating captive propagation and restoration techniques. In January, 2005, the New Mexico Energy, Minerals, and Natural Resources Department, the New Mexico Natural Heritage Program, the Forest Service, the FWS, and other botanists in the state met to discuss the development of a captive propagation program for the poppy. Under the supervision of the New Mexico Natural Heritage Program at the University of New Mexico (UNM), poppy seeds are surviving in the UNM greenhouse with radicle germination success at 80-88 percent (P. Tonne, UNM, 2005, unpubl. data). Reliable data on development after radicle emergence is unknown at this time. These activities will provide information concerning germination and seedling requirements. The captive propagation will be conducted with the intent of preserving the genetic and ecological distinctiveness of the poppy, minimizing risks to existing populations, and ensuring the long-term viability of the species (U.S. Fish and Wildlife Service 2004a).

The nature of the infestation affecting the Sacramento prickly poppy and its potential vectors is currently under investigation by Don Natvig, a mycologist at the UNM. No initial visible evidence of a fungus was found on an infected stem collected in September, 2004, from Alamo Canyon once it reached the lab (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). Insect punctures, however, were found on the stem (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). Identification of the infestation will guide the direction of possible future treatments to benefit the poppy.

Research to investigate seed viability, germination, propagation, and possible genetic depression of the Sacramento prickly poppy is currently being proposed. As part of this study, seeds will be collected and a seed bank will be developed (N. Baczek, FWS, 2004, unpubl. data).

A prickly poppy working group was formed in 2005 to find ways and means to implement recovery activities for the poppy. The working group will be convened annually by the Forest Service to discuss: the status of the prickly poppy; monitoring, particularly in response to grazing; and ongoing and new activities needed to support the species. A funding grant is being sought by the New Mexico Natural Heritage Program from the National Fish and Wildlife Foundation to support projects and research to improve the status of the poppy (U.S. Fish and Wildlife Service 2004).

As a supplement to the 2004 biological assessment for this consultation, the Forest Service included the following conservation measures for the poppy as part of their proposed action:

Conservation Measure #1: Annually protect newly emerging seedlings from trampling on National Forest System lands.

Conservation Measure #2: Within the mission and capability of the Forest Service, participate with state and federal agencies, Forest Service research and others (e.g., universities) to identify genetic factors essential to future reintroduction efforts and improve our collective understanding of the poppy's ecology in relation to habitat improvement and species recovery.

Conservation Measure #3: On National Forest System lands limit Off-Highway Vehicle use to established routes.

Conservation Measure #4: To the extent feasible within the mission and capabilities of the Forest Service assist in the propagation and reintroduction of Sacramento prickly poppy.

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Currently, the number of poppies growing in the wild is unknown. Sacramento prickly poppies may occur on lands under the management of the Forest Service, BLM, state of New Mexico (Oliver Lee State Park), City of Alamogordo, and private citizens. Prickly poppies occurring within the action area of the Lincoln NF have been located in Management Areas 2A, 2B, and 2C. Exact plant numbers within these management areas are difficult or impossible to obtain due to the broken nature of the occupied terrain and the intensity of survey effort required to do a complete count. Occupied sites have also been identified along state and county roadways and City of Alamogordo water pipelines (U.S. Fish and Wildlife Service 1994). Plant counts vary between locations and years, but a trend of a considerable decline in overall numbers and locations of mature poppies is apparent.

Consistent with trends since 1987, data from 2004 continues to document the substantial decline in poppy populations and numbers. Distribution of the poppy has decreased from 10 canyons in 1987 to 4 canyons in 2004. The most recent survey data comes from a survey for seedlings throughout Alamo Canyon and portions of the Caballero Canyon conducted in November, 2004, where 388 seedlings were counted (J. Martinez, Lincoln NF, 2005, unpubl. data). This is the first record of seedlings occurring prior to February or March, possibly a result of rains in September, October, and November that exceeded 70-year means for precipitation after years of drought (Western Regional Climate Center). These seedlings will be monitored into the summer and the start of the monsoonal rains in order to observe whether recruitment in to the population occurs.

In the spring of 2004, 32 individuals were counted in Dog Canyon, and 345 individuals were located in Alamo and Caballero Canyons (U.S. Fish and Wildlife Service 2004a). The 345 individuals counted during the spring in Alamo and Caballero Canyons represent a 38 percent drop from the total number of poppies (555) surveyed in 2003 for this area. In 2003, the population of 555 individuals in Caballero and Alamo Canyons marked a 9 percent decrease from the estimated population level of 603 in 1999 and a 42 percent decrease from a population high of 955 plants in 1987. By September, 2004, however, fewer poppies were found at all locations (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl.

data), indicating that if seedlings are produced, many may not be surviving. Plants at both upper and lower Alamo Canyon were observed to have some kind of stem infestation (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). Sivinski originally noted what he described at the time as a stem canker on plants in 1999 in Dog Canyon. The infestation first noted in Alamo Canyon in June of 2004 is better described as a gray mold without any ulceration on the stems (L. Barker, Lincoln NF, 2004, unpubl. data).

Factors Affecting the Species within the Action Area

Within the action area, the Sacramento prickly poppy is threatened by drought, water extraction, an unidentified fungal or viral infestation, livestock grazing and trampling, natural flash-flooding, off-road vehicles, and ongoing surface-disturbing activities such as road and pipeline maintenance.

Currently, the area occupied by the prickly poppy is under drought conditions. Unlike the above-average precipitation received during the 1970s and 1980s, seven of the last ten years have received less than the 54-year mean annual precipitation (Western Regional Climate Center 2003). These precipitation levels have led to low soil moisture conditions (U.S. Fish and Wildlife Service 2004a). From March into July, 2001, 210 prickly poppy seedlings were monitored at the mouth of Alamo Canyon. By early July, only two yellowing seedlings remained, indicating a seedling mortality rate of essentially 100%. Severe drought conditions were recorded in the spring, through June, 2004, when the nicking of plant leaves failed to cause the exuding of the milky latex sap, as it normally does (L. Barker, Lincoln NF, 2005, unpubl. data).

The City of Alamogordo maintains water pipelines that tap large springs on the upper western slope of the Sacramento Mountains. These pipelines occur in La Luz, Fresno, Alamo, and Caballero Canyons. The water rights for these systems pre-date the Lincoln National Forest. The pipelines in Alamo, Caballero, and Fresno Canyons, canyons occupied by Sacramento prickly poppy, have been replaced over time as the pipes become cemented in with calcium carbonate. The new pipelines no longer leak water along their route through the canyon bottoms, as they historically have, and, consequently, no longer provide water to limited areas that may have supported poppies in the past (U.S. Forest Service 2004). Municipal use of canyon water has changed the natural hydrology, making upland areas and canyons much drier, perhaps reducing prickly poppy habitat. Pipeline repair, replacement, and maintenance are ongoing in four canyons. These pipelines and associated activities continue to impact the suitability of prickly poppy habitat. Heavy equipment used to transport, excavate, position, and remove large sections of steel pipe may damage or destroy plants if not carefully controlled and monitored. The Forest Service has surveyed, consulted upon, and monitored these activities when informed of them in advance.

A stem canker or wilt fungus has been found since 1999 associated with the Sacramento prickly poppy. Although the infestation may have always coexisted with the poppy, direct evidence of this infestation was first noted in Dog Canyon in 1999 (Sivinski 1999). At the time of this discovery, the infestation caused 7 of 18 plants to fail to set fruit and die in this small population (Sivinski 1999). Subsequent surveys in Dog Canyon located 32 plants in June 2004 (D. Salas, Lincoln NF, 2004, unpubl. data), indicating that the infestation may not be fatal. This fungus

may be a *Fuserium* species, a general wilt fungus that enters the vascular system and can cause mortality (C. McDonald, Forest Service, 2004, unpubl. data).

On June 16, 2004, an infestation was found in association with adult poppies in Alamo Canyon for the first time (J. Martinez, Lincoln NF, 2004, unpubl. data). It is unclear whether this is the same infestation found in Dog Canyon or if it is a different pathogen, fungus, or virus. The infestation in Alamo Canyon turns the stem and leaf tissues gray, causing the plant to appear to lose turgor and to stop growing. Subsequent observations in November, 2004, show the plants to resume growth from lateral buds on the stems, and, in the spring of 2005, to resume normal regrowth from the rosettes (L. Barker, Lincoln NF, 2005, unpubl. data).

Concern has existed since 2004 that some prickly poppy fruits from 2003 in Alamo Canyon appeared to have aborted and failed to open, as evidenced by smaller, closed fruits, than are normally found (L. Barker, Lincoln NF, 2005, unpubl. data). It is possible that infestation may play a role here, or that the decreasing number of adult plants makes out-crossing more difficult to achieve. Infected adult poppies seen in September, 2004, in upper Alamo Canyon had arrested flower development and deformed ovaries (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). However, most infected plants produced some mature capsules and seeds in this population (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). An attempt to identify the infestation recently noted in Alamo Canyon was made at the UNM. The collected material was found to be too degenerated to be identified. A new attempt will be made earlier in the season in 2005. It is unclear whether the infestation is the same stem canker observed in other parts of the poppy's range. If it is the same fungal infestation, then the infestation appears to be spreading among the poppy populations. In addition, recent microscopy of an infected leaf from Alamo Canyon revealed evidence of wounds from sucking insects that previously punctured the poppy and could be a vector of the infestation (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). Once an identification is made, a potential treatment can be considered.

As of 2004, Alamo and Caballero Canyons contain the majority of the remaining poppies (U.S. Fish and Wildlife Service 2004a). Alamo and Caballero Canyons are located in the Sacramento Grazing Allotment. The Forest Service issues a 10-year grazing permit for livestock use of these canyons which extends from May 16–October 31 on the summer range, and November 1–May 15 on the winter range. Both canyons are included in the winter pastures. The headwaters of Fresno Canyon are included within inaccessible portions of the summer pastures of the allotment. Prickly poppy habitat in Mule, San Andres, and Escondido Canyons is either inaccessible to livestock, or occurs well below grazed areas (U.S. Forest Service 2003).

Grazing and trampling by livestock can destroy young seedlings and potentially degrade the quality of Sacramento prickly poppy habitat. Livestock grazing can affect vegetation species composition, plant density, and plant vigor. Recruitment of seedlings into the adult population is also affected by any actions that lower the moisture-holding capacity of the soil, or increase the likelihood of destructive flash floods (U.S. Fish and Wildlife Service 2004). Cattle tend to occupy canyon bottoms, where Sacramento prickly poppy seedlings are most likely to occur, because the steep sides of the canyon render most of the acreage in the pasture inaccessible. Out

of the approximately 11,000 acres on the Alamo winter pasture, only about 3000 acres are usable/accessible to livestock. Livestock may avoid mature prickly poppy due to their bitter-tasting latex, however, early season basal rosettes with spines have been observed to have been grazed (L. Barker, Lincoln NF, 2005, unpubl. data). Detrimental effects to the poppy depend on the timing, intensity, and duration of livestock use.

The Forest Service has noted that livestock use in Alamo pasture has impacted vegetation and reduced the moisture-holding capacity of soils (U.S. Forest Service 2003). A reduction in vegetative cover, plant root masses, and soil water retention can lead to increased flood-water velocity and subsequent loss of top soil which may not benefit the poppy (U.S. Fish and Wildlife Service 2004). Canyon-bottom riparian areas represent the best acres within the Alamo pasture for livestock forage because of early spring plant growth and proximity to water, when it is present. The canyon bottoms also provide shade for livestock during warm temperatures in the spring. These sites support enhanced-moisture, creating habitat most favorable to prickly poppy seedling establishment. Based on observations of prickly poppy germination, the failure to locate very many seedlings, during drought conditions, and grazing impacts after germination, the Forest Service is concerned that sites in the canyon bottoms may not be suitable for poppy survival (U.S. Forest Service 2003).

Cumulative impacts from a history of inconsistent application of forage/range guidelines and improper livestock grazing have negatively impacted the Sacramento prickly poppy (U.S. Fish and Wildlife Service 2004). Within the winter unit of the Sacramento Allotment, forage utilization levels have averaged 70 percent since 1991. Extreme forage use and drought conditions in 2001 and 2002 resulted in both significant reductions in forage production and the lowest numbers of adult prickly poppies since records have been kept (U.S. Fish and Wildlife Service 2004). The continued yearly overlap of livestock grazing with the poppy germination and seedling growth period has likely affected the ability of the species to recover during periods of low population levels, low seed production, and drought (U.S. Forest Service 2003).

Related to the presence of livestock, the placement of livestock supplements, such as water and minerals, impacts the poppy. The Forest Service has documented placement of minerals in riparian bottoms in occupied habitat several times (U.S. Forest Service 2003). Concentration of livestock in occupied poppy habitat as the result of mineral placement and water availability will impact poppies through increased trampling and herbivory (U.S. Fish and Wildlife Service 2004).

Recruitment of seedlings into the adult population is affected by any actions that lower the moisture-holding capacity of the soil or increase the rate of runoff (U.S. Fish and Wildlife Service 2004). Flooding presents a periodic threat to poppies located in canyon bottoms or exposed to flash flood events. Poppy seeds show the highest germination rates when the seed coat has been lightly nicked (Sivinski 1992) and poppy plants have been observed to rebound in years subsequent to flooding (U.S. Fish and Wildlife Service 2004). Under natural conditions, flash floods may provide the disturbances that facilitate seed scarification and preparation of a seed bed. However, historic livestock over-utilization of the poppy's habitat has played a significant role in changes to vegetative cover, riparian health, soil stability, and soil water holding capacity (U.S. Fish and Wildlife Service 2004). Exposed, compacted soil conditions can

exacerbate the damaging effects of flash floods upon the poppy. Impacts to the plant community or soil properties that result in decreased ability for poppies to withstand and recover from flooding will have significant and long-term effects on poppy sustainability and recovery.

Off-highway vehicles recently have been recognized as a potential threat to Sacramento prickly poppy. Off-highway use of motorized vehicles on established trails is permitted in Alamo, Caballero, and Dry Canyons on the Lincoln National Forest. However, Dry Canyon is no longer occupied by the prickly poppy, and the mouth and only western access route into Alamo and Caballero Canyons, through the City of Alamogordo land, is closed to motorized traffic. Motorized travel is prohibited on the Forest beyond 300' from a road, except for purposes of camping or parking. This excludes use in the channels of Fresnal and La Luz Canyons on National Forest System lands. Off-highway vehicles can crush or disturb poppy individuals and may modify the soils, local hydrology, and microclimates associated with seed germination and plant growth (U.S. Forest Service 2004). Furthermore, the creation of trails through poppy habitat can promote the spread of noxious weeds already present in the area (U.S. Forest Service 2004) into these areas which may threaten the poppy's establishment through competition. As an indication of increased interest in off-road riding in the poppy's habitat, a website exists that gives tips on how to circumvent Lincoln National Forest closures and lists detours to take in the vicinity of Alamo Canyon.

Road construction and maintenance activities, including herbicide use and mowing, may threaten the poppy. Although the poppy is adapted to disturbed habitats, and, therefore, could benefit from some ground-disturbing activities, blading along drainage ditches and the shoulders of unpaved roads has destroyed some poppy plants (U.S. Forest Service 2004). The effect of mowing on the Sacramento prickly poppy is not known. Invasive plants such as Russian thistle, tamarisk, spotted knapweed, and Russian knapweed occur in the poppy's habitat. At present, the Forest Service and New Mexico State Highway and Transportation Department coordinate efforts at weed control and implement spraying of infested sites along the highways. Because plant competition may be a limiting factor to the distribution of the poppy based on the poppy's preference for sites that are more open and less densely vegetated, eliminating invasive plants may be beneficial for the poppy (U.S. Fish and Wildlife Service 1994). However, any spraying performed near poppy individuals still may pose a threat to the survival of this species. The Lincoln National Forest has completed consultation on their Noxious Weed Control Plan for treatments of noxious weeds in the vicinity of the prickly poppy.

The Lincoln NF performs road maintenance on approximately 523 km (325 mi) of roads per year. Additional maintenance is conducted on federal, state, and county non-Forest Service roads (U.S. Forest Service 2004). In Fresnal Canyon, road maintenance by the Otero County Road Maintenance Department has resulted in the loss of prickly poppy plants along an unpaved National Forest System road. In addition, State Highway Department maintenance work along US Highway 82 has resulted in impacts to the species. Motorized trail use may affect poppies growing at the bottom of Alamo and Caballero Canyons, but no studies have been performed to assess these possible effects.

The internal threat of decreasing genetic diversity found in species with very few individuals remaining has not been proven via molecular tests, but may be influencing population trends or

one of several interactive effects to the poppy. Observations made in Alamo Canyon in 2004 of the remaining fruits on plants from 2003 revealed that 46 percent of the plants in a sample of 124 adult plants failed to mature fruits fully and release seeds (J. Martinez, Lincoln NF, 2004, unpubl. data). Of 124 plants observed, 57 plants had at least 40 percent of their fruits aborted. Of the 57 with any aborted fruits, 37 plants had at least 50 percent of their fruits aborted, and some plants had up to 100 percent of their fruits aborted (J. Martinez, Lincoln NF, 2004, unpubl. data). Although the flower is large and open and does not appear to be adapted to a particular pollinator, the plant does require cross-pollination for maximum seed set (Tepedino 1992). Self-pollination, either within one flower or among flowers of the same plant, results in significantly fewer fruits and fewer seeds per fruit in this species (Tepedino 1992). The reduction of numbers of plants and their proximity within a population (patch size) may decrease the likelihood of pollinator visits as a result of the reduction in visual or chemical cues emitted to passing pollinators (Jennersten 1988). As possible evidence of the effect of increasing isolation on reproduction, a solitary, healthy poppy found at the bottom of Dog Canyon in September, 2004, contained about 50 aborted fruits that apparently had not been cross-pollinated (B. Sivinski, N.M. Energy, Minerals, and Natural Resources Department, 2004, unpubl. data). A few small capsules with a few seeds in each did develop on this plant, possibly from self-pollination, but the viability of the seeds is unknown (B. Sivinski, 2004, N.M. Energy, Minerals, and Natural Resources Department, unpubl. data).

EFFECTS OF THE ACTION

The S&Gs listed in the Lincoln NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Sacramento prickly poppy and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. Forest Service management on the Lincoln NF may potentially impact Sacramento prickly poppy through habitat loss and modification, as a result of road and pipeline maintenance and water extraction, as well as direct impacts to individual plants from off-road vehicles and livestock grazing. The following table outlines the S&Gs presented to the FWS as applicable to the prickly poppy.

Table 187. Summary of S&Gs considered for the Sacramento prickly poppy.

National Forest	Standards and Guidelines
Lincoln NF	1046-48, 1051, 1053-57, 1058-68, 1073-77, 1079-82, 1084-85, 1088, 1089, 1090-92, 1109, 1112-13
1996 Regional Amendment	1510-1515

Lincoln National Forest

Populations of Sacramento prickly poppy occur along the western face of the Sacramento Mountains between La Luz Creek and Escondido Canyon. These populations occupy 10 canyons in seven canyon systems of the Lincoln NF. In addition, individual plants are scattered within other minor tributary canyons, on alluvial benches and slopes, and along streams. Within the action area of the Lincoln NF, prickly poppy plants occur in Management Areas 2A, 2B, and

2C. Standards and Guidelines related to range structural improvements and the use of chemical treatments (i.e., pesticides) have the potential to adversely affect Sacramento prickly poppy. However, many of the S&Gs within the Lincoln NF direct actions to maintain and improve poppy habitat, and manage towards the recovery of the species.

Table 188. Effects of the S&Gs analyzed for the Sacramento prickly poppy – Lincoln NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	5	12.8
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	1	2.6
1	S&G is maintaining habitat & providing at least minimal recovery	25	64.1
2	S&G is moving towards recovery	3	7.7
3	S&G is implementing species recovery plan	1	2.6
Y	S&G has no application to the species	3	7.7
Z	S&G implementation is non-discretionary	1	2.6
X	S&G is a heading	0	0.0
Total		39	100 %

Table 188 summarizes the effects to the Sacramento prickly poppy from the applicable S&Gs within the Lincoln NF LRMP. Less than 13 percent of the S&Gs cause mortality of individual plants, while 75 percent of the S&Gs have positive effects on the species. The remaining 12 percent of the S&Gs have no effect on Sacramento prickly poppy, or are too vague and ill-defined to analyze.

Rangeland Management Program

The Rangeland Management Program provides for grazing of domestic livestock on National Forests lands (U.S. Forest Service 2004). Livestock use on the Lincoln NF may threaten prickly poppy directly by grazing and trampling of young seedlings, as well as indirectly through the degradation of poppy habitat.

Standards and Guidelines 1109, 1112, and 1113 provide direction for the development and replacement of structural range improvements as needed for C and D level grazing management. Level D grazing management seeks to optimize utilization and forage while providing for the multiple uses of the range. Structural range improvements may include fencing, storage tanks, pipelines, and spring developments. These structures create a potential threat to Sacramento prickly poppy directly and indirectly from livestock movement related to the range improvements. Storage tanks in poppy habitat may collect the majority of the available water and simulate drought conditions in the surrounding habitat with negative impacts to the poppy.

Standard and Guideline 1088 may have a short-term adverse effect on the prickly poppy, through construction of improvements, while implementing an activity that has a long-term positive impact on the species. Standard and Guideline 1088 directs for allotment management to

improve unsatisfactory range conditions, a long-term benefit to the prickly poppy. Yet current unsatisfactory conditions are limiting poppy habitat and dispersal. The implementation of S&G 1088 also may have short-term adverse effects on the poppy from trampling associated with the movement of livestock, especially in or around water areas.

Management direction provided within the Lincoln LRMP also places an emphasis on threatened and endangered species. Standard and Guidelines 1053 and 1079 allows for threatened and endangered species needs to be managed in all range or grazing activities. As an endangered species, the implementation of these S&Gs minimizes the adverse effects of grazing on the prickly poppy. In addition, S&G 1074 directs management to place all allotments under appropriate levels of management, which may include no grazing, further reducing effects to the poppy.

Forestry and Forest Health Program

The Forestry and Forest Health Program includes timber harvest, forest product extraction, and the management of forest insects and disease. Standard and Guideline 1055 may have a lethal effect on the prickly poppy. Management provided by this S&G directs for the use of pesticides, which include herbicides and insecticides, for the prevention of or suppression of pest outbreaks. The use of herbicides for undesirable plant species, as well as the use of aerial spraying for spruce budworm or other insects, has the potential to directly and indirectly affect Sacramento prickly poppy. Aerial spraying limits the possibility of isolating chemicals to specific areas only, and may affect pollinators of the poppy, limiting plant fecundity. Thus, S&G 1055 has the potential to negatively affect the prickly poppy.

Within the Forestry and Forest Health Program, S&G 1057 considers threatened, endangered, and sensitive species and habitat needs in the implementation of pest management. Under the guidance of S&G 1057, habitat needs of threatened, endangered, and sensitive species, including the Sacramento prickly poppy, are a higher priority than insect and disease considerations. Through the implementation of this beneficial S&G, effects to the prickly poppy from the use of pesticides are minimized.

Watershed Management Program

Objectives of the Watershed Management Program include improving and maintaining water quality; protecting and restoring riparian areas; and prioritizing watersheds for protection or improvement. Few S&Gs within the Watershed Management Program are applicable to the Sacramento prickly poppy. Yet, under direction of S&G 1076, riparian areas are to be managed to provide optimum vegetation and ecological diversity. The implementation of this S&G improves watershed conditions, thus has a potential to positively affect prickly poppy.

Standards and Guidelines associated with the use of chemicals are included in the Watershed Management Program. The management direction of S&G 1081 has the potential to adversely affect prickly poppy through the use of chemical treatments for the selective control of plant species. Depending on the plants targeted, and proximity to individual poppies, the implementation of such chemical treatments may be lethal to the prickly poppy. In addition, chemical use may also degrade water quality, indirectly affecting poppy survival or viability. However, S&G 1082 directs the use of hand treatments to avoid unacceptable impacts of

chemical use. This S&G aims to eliminate and reduce the impacts of chemicals on the prickly poppy.

Wildlife, Fish, and Rare Plants Program

Multiple S&Gs within the Wildlife Program have positive impacts to the Sacramento prickly poppy. Standard and Guideline 1063 manages threatened and endangered species to attain species recovery over time. Guidance is also directed towards the re-introduction of endangered species to suitable habitat not presently occupied. Therefore, the implementation of S&G 1063 has a positive impact on the status of the prickly poppy.

Standard and Guidelines 1047, 1058, and 1064 provide for the protection of threatened, endangered, and sensitive species habitat. Specifically, S&G 1058 outlines the protection of habitats of threatened, endangered, and sensitive species, including plant and animal species. Standard and Guideline 1064 establishes the precedence of habitat management for federally listed species over unlisted species. Each of these S&Gs maintain and improve prickly poppy habitat and guides activities that contribute to the recovery of the species.

Standard and Guideline 1067 prohibits the use of pesticides, herbicides or other contaminants harmful to threatened and endangered species present within the project area or areas affecting the prey base. This S&G protects prickly poppy populations and maintains quality habitat. Also, the implementation of S&G 1067 minimizes the adverse effects of S&G 1055, which directs the use of pesticides, including herbicides and insecticides.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Sacramento prickly poppy sites do not occur within protected and restricted areas of the Mexican Spotted Owl, or the nesting and post-fledgling family areas of Northern Goshawks. Therefore, the majority of the S&Gs within the 1996 Regional Amendment are not applicable to the Sacramento prickly poppy, thus are not analyzed.

Table 189. Effects of the S&Gs analyzed for the Sacramento prickly poppy – 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	1	17.0
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	5	83.0
Z	S&G implementation is non-discretionary	0	0.0

Ranking	Explanation of Ranking	Total	Percentage
X	S&G is a heading	0	0.0
Total		6	100 %

Table 189 summarizes the effects to Sacramento prickly poppy from the applicable S&Gs within the 1996 Regional Amendment. Of those six applicable S&Gs, 83 percent have no effect on the species, one S&G has a positive effect on the species, and no S&Gs cause mortality of individual plants.

Grazing management standard 1510 regulates the use of grazing for the protection of threatened and endangered species. The S&G directs forage use to be maintained at or above a conditions that “assures recovery and continued existence of threatened and endangered species” (U.S. Forest Service 2004). Implementation of S&G 1510 minimizes the effects of livestock grazing on the prickly poppy, thus is a beneficial S&G for the species.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Activities on private lands may affect Sacramento prickly poppy. Adverse effects to the poppy may include grazing, noxious weed treatment, clearing of land, and maintenance of local dirt roads. Road construction and maintenance activities performed by the New Mexico State Highway and Transportation Department and the Otero County Road Maintenance Department may also threaten the Sacramento prickly poppy. Maintenance of water pipelines by the City of Alamogordo may adversely affect prickly poppies. Herbicide use and mowing along State Highway 82 and local dirt roads where plants occur in the rights-of-way may have adverse effects to the prickly poppy.

CONCLUSION

After reviewing the current status of the Sacramento prickly poppy, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s biological opinion that the Lincoln NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Sacramento prickly poppy. Pursuant to 50 CFR 402.02, “jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The majority of S&Gs within the Lincoln NF’s LRMP provide direction for maintaining habitat, protecting populations, and managing for the recovery of threatened and endangered species. However, a few S&Gs related to range improvement projects have the potential to negatively

impact the Sacramento prickly poppy. Also, S&Gs within the Forestry and Forest Health and Watershed Management programs allow for the use of pesticides, including herbicides and insecticides. Activities associated with this management direction have the potential to adversely affect poppy populations. In turn, S&Gs within the Wildlife Program maintain and improve poppy habitat and guide activities that contribute to the recovery of the species.

The following S&Gs support conservation and recovery of the Sacramento prickly poppy:

- Standard and guideline 1063 allows for the management of threatened and endangered species to attain total recovery levels over time;
- Standards and guidelines 1047 and 1048 provide for the improvement of habitat for threatened and endangered species, and guidance to ensure the legal and biological requirements of designated plant and animal species are met;
- Management direction of S&G 1064 permits habitat management for federally listed species to take precedence over unlisted species;
- Standard and guidelines 1053 and 1079 allows for threatened and endangered species needs to be managed in all range or grazing activities;
- Threatened, endangered, and sensitive species and habitat needs are considered in the implementation of pest management under the guidance of S&G 1057, with threatened, endangered, and sensitive species needs of higher priority than insect and disease considerations;
- S&G 1067 limits the use of pesticides, herbicides or other contaminants harmful to any threatened and endangered species present on the project area or areas affecting prey base; and
- S&G 1082 directs the use of hand treatments to avoid unacceptable impacts of chemical use.

In addition, the Forest Service will implement (i.e., as part of the proposed action) several additional conservation measures specifically for the prickly poppy. These measures are to:

- Annually protect newly emerging seedlings from trampling on National Forest System lands;
- On National Forest System lands, limit Off-Highway Vehicle use to established routes;
- Within the mission and capability of the Forest Service, participate with state and federal agencies, Forest Service research and others (e.g., universities) to identify genetic factors essential to future reintroduction efforts and improve our collective

understanding of the poppy's ecology in relation to habitat improvement and species recovery; and

- To the extent feasible within the mission and capabilities of the Forest Service, assist in the propagation and reintroduction of the Sacramento prickly poppy.

Therefore, given the implementation of these conservation measures and the management direction provided by the S&Gs listed above, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Sacramento prickly poppy.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Adhere to the recommendations in the 1994 Sacramento Prickly Poppy Recovery Plan.
2. Minimize water diversions and watershed degradation in order to protect suitable riparian habitats.
3. To the extent practical, range improvement projects and structures should be implemented in ways to avoid adverse effects to the prickly poppy.
4. Limit the use of pesticides in occupied prickly poppy areas. Should the need for chemical use arise, the Forest Service should adhere to the FWS's regional guidance criteria issued for the use of pesticides.
5. Protect adult plants and microhabitats where germination is likely to occur.
6. Place utilization cages and/or small exclosures around vulnerable poppy seedlings, adult plants, and potential germination microhabitats of prickly poppies.

7. In cooperation with other agencies and research groups, continue research and monitoring activities on prickly poppy populations.

In order for the FWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

ZUNI FLEABANE

STATUS OF THE SPECIES

Description

Zuni fleabane (*Erigeron rhizomatus*) is a perennial herb known from west-central New Mexico and eastern Arizona. The species occurs in scattered populations on the Zuni, Datil, and Sawtooth Mountains, and the Red Valley/Cove area on the Navajo Nation. The plant has numerous erect and strigose stems that arise from subterranean rhizomes. Zuni fleabane leaves are narrow, dark green, and up to 0.4 in (1.0 cm) long. The species' flowers are tinged with blue and occur in heads (clusters) 0.5-0.6 in (1.3-1.5 cm) wide (U.S. Fish and Wildlife Service 1985).

The type specimen for *Erigeron rhizomatus* was first collected by Dr. Rupert Barneby on May 16, 1943. The specimen was collected south of Fort Wingate in McKinley County, New Mexico. Dr. Arthur Cronquist of the New York Botanical Gardens, described the new species on May 26, 1947. The subglabrous leaves and involucre of *Erigeron rhizomatus* separate the species from others in the section *Wyomingia* of the genus *Erigeron*; and the peculiar growth habit of Zuni fleabane is unique in the genus (U.S. Fish and Wildlife Service 1988).

Legal Status: On April 24, 1984, the FWS listed Zuni fleabane as a threatened species under the authority of the ESA, as amended. Critical habitat for the species has not been designated.

The FWS completed a recovery plan for Zuni fleabane on September 30, 1988. Zuni fleabane is a New Mexico state endangered plant species. Under the New Mexico Endangered Plant Species Act, the removal with intent to possess, transport, export, sell, or offer for sale any state-listed plants is prohibited (U.S. Fish and Wildlife Service 1988).

Distribution and Abundance

Zuni fleabane is found on detrital clay hillsides, at elevations of 7,300-8,000 ft (2,230-2,440 m), in pinyon-juniper woodland habitat. The species is known from three locations in the Zuni Mountains, McKinley County, New Mexico; 28 locations in the Sawtooth and northwestern Datil mountains, Catron County, New Mexico; and one location in the Red Valley/Cove area on the Navajo Indian Reservation, Apache County, Arizona (McDonald 1999).

The density of Zuni fleabane can vary significantly within its distribution. Some locations consist of isolated plants, while other locales may have a dense localized cluster of plants. The number of individual plants is difficult to determine because the species is rhizomatous, making it difficult to distinguish individual plants from members of a clonal group (U.S. Fish and Wildlife Service 1988).

Habitat

Zuni fleabane is restricted to nearly barren red detrital clays of the Chinle and Baca formations along mid to low elevation mountain slopes. The species prefers slopes of up to 40 degrees, usually with a north or east-facing aspect. The Zuni fleabane occurs in an area that receives 36-40 cm (14-16 in.) of precipitation a year (U.S. Fish and Wildlife Service 1988). Zuni fleabane is

often directly associated with *Astragalus accumbens*, a rare species restricted to west-central New Mexico (U.S. Fish and Wildlife Service 1988).

Life History

The Zuni fleabane generally flowers from mid-May to June. The plant fruits from mid-June to early July, and disperse fruits by the end of July. Fruits are windborn and disperse widely. Yet, the success of fruit set is low. The establishment of new plants by seed is rare, although a large volume of seed is produced (U.S. Fish and Wildlife Service 1985). The extremely harsh soil conditions contribute to infrequent reproduction, which occurs only in years of abnormally high rainfall (Sivinski 1989). Most propagation occurs as the result of the spread of rhizomes and the subsequent development of aerial plant parts (U.S. Fish and Wildlife Service 1988).

The majority of Zuni fleabane populations are composed of mature plants tightly grouped into rhizomatous clones. Occupied sites are typically low in coverage of associated species. Population margins occur where the red-bed clay soils thin out and disperse into adjacent soil types (U.S. Fish and Wildlife Service 1988).

Reasons for Listing

Zuni fleabane survival is threatened by the low number of plants, its restricted distribution, and the potential for habitat loss. The species' is potentially susceptible to the modification of its habitat due to mineral exploration and associated development activities. The species is vulnerable to the negative effects of uranium mining and off-highway vehicles activities. Such activities are a potential threat to the fragile habitat of Zuni fleabane.

Threats: Threats to the Zuni fleabane include potential uranium mining, off-highway vehicle use, and livestock grazing. Surface disturbance activity associated with mineral development is the major threat to Zuni fleabane. Most of the Zuni fleabane populations are directly associated with historic or current mining claims for uranium (U.S. Fish and Wildlife Service 1988). Presently, the world market does not demand the mining of uranium resources. However, the possibility of future mining activities poses a significant threat to Zuni fleabane and its habitat.

Zuni fleabane habitat is potentially attractive for off-highway vehicle use. Currently, populations of fleabane are in remote areas with little off-highway vehicle activity (U.S. Forest Service 2004:647). Future impacts of off-highway vehicle use may jeopardize Zuni fleabane and its habitat.

Zuni fleabane habitat has little vegetation to attract cattle. Also, livestock do not appear to graze on fleabane. However, fleabane habitat can be adversely impacted when used as livestock holding pastures, or are near stock tanks and salting stations.

Conservation Measures

The Zuni fleabane recovery plan aims to protect and manage the species and its habitat to sustain healthy populations in their natural habitats. The following recovery tasks are listed in the recovery plan to help protect and recover Zuni fleabane and its habitat: remove threats by coordinating with the Bureau of Land Management and Forest Service, enforce existing laws and regulations, assemble documentation on mineral potential or planned development, and develop

a habitat management plan in cooperation with the involved agencies for the long-term protection of habitat; install permanent monitoring plots at population sites and initiate biological, ecological, and geological studies of the species and its habitat to develop an understanding of the requirements needed to sustain healthy populations; and develop public support for the preservation of Zuni fleabane (U.S. Fish and Wildlife Service 1988).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all federal, state, or private actions in the action area, the anticipated impacts of all proposed federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species within the Action Area

Most of the known Zuni fleabane sites occur on the Cibola National Forest, within Management Areas 13, 14, and 16. The species grows on nearly barren slopes with little forage for livestock and thus are not strongly affected by livestock grazing. The majority of Zuni fleabane populations are located in or near old uranium mining claims (U.S. Forest Service 2004:648). Future exploration and mining poses the greatest potential threat to the species.

Factors Affecting the Species within the Action Area

The greatest threat to Zuni fleabane habitat is the potential for mining development. Uranium is the primary mineral resource within the species' range. Currently, uranium mining is non-profitable, and therefore does not occur at present time. However, uranium mining may reoccur in the future, posing a threat to Zuni fleabane habitat and the species' survival.

Zuni fleabane habitat is potentially attractive for off-highway vehicle use. Approximately 87 percent of the Cibola National Forest is open to off-highway vehicle use. Yet, only 17 percent of the Forest's visitors each year participate in recreation likely to occur in Zuni fleabane habitat (U.S. Forest Service 2004:648). Most fleabane populations are located in remote areas with little off-highway vehicle activity. Future off-highway vehicle activity may negatively affect Zuni fleabane habitat.

EFFECTS OF THE ACTION

The S&Gs listed in the Cibola NF LRMP and 1996 Regional Amendment provide direction for the development of site-specific actions. Multiple S&Gs within these LRMPs are applicable to the Zuni fleabane and its habitat. The S&Gs, if applied to project-level activities, may result in both indirect and direct effects to the species. The following table outlines the S&Gs presented to the FWS as applicable to the fleabane.

Table 190. Summary of S&Gs considered for the Zuni Fleabane.

National Forest	Standards and Guidelines
Cibola	228, 229, 231-233, 236, 249-252, 254, 255, 257-259, 259a, 259b, 261, 283-285, 297-304, 308
1996 Regional Amendment	1425-1428, 1432, 1434, 1437, 1438, 1440-1445, 1453-1456, 1458, 1459, 1462-1466, 1468-1471, 1474-1476, 1481, 1483, 1484, 1486-1488, 1491-1495, 1497-1517

Cibola National Forest

Zuni fleabane occurs mostly on the Cibola NF, thus only the Cibola NF LRMP S&Gs were analyzed. The Zuni fleabane occurs in Management Areas 13, 14, and 16. The management emphasis in these areas is range and wildlife management with some fuelwood production (U.S. Forest Service 2004:648).

Table 191. Effects of the S&Gs analyzed for the Zuni Fleabane – Cibola NF LRMP.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	2	6.3
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	0	0.0
1	S&G is maintaining habitat & providing at least minimal recovery	20	62.5
2	S&G is moving towards recovery	1	3.1
3	S&G is implementing species recovery plan	1	3.1
Y	S&G has no application to the species	4	12.5
Z	S&G implementation is non-discretionary	1	3.1
X	S&G is a heading	3	9.4
Total		32	100 %

Table 191 provides a summary of the effects of S&Gs analyzed for the Zuni Fleabane on the Cibola NF. Of the 32 applicable S&Gs, the majority were determined to provide at least minimal recovery or habitat maintenance for the Zuni fleabane. Additionally, two S&Gs either work towards recovery or implement the Zuni fleabane recovery plan. However, there are two S&Gs that could cause lethal effects to Zuni fleabane.

Wildlife, Fish, and Rare Plants Program

All applicable S&Gs within the Wildlife Program provide at least minimal recovery or habitat maintenance for Zuni fleabane. Standard and Guidelines 251 and 258 provide for habitat maintenance. Standard and Guideline 249 states that habitat studies will be conducted to determine habitat requirements for federally and state listed flora and fauna. Additionally, S&G 228 moves towards recovery of Zuni fleabane and S&G 250 implements the Zuni fleabane recovery plan. Overall, the S&Gs within this program are beneficial to the Zuni fleabane.

Forestry and Forest Health Program

There is only one applicable S&G within the Forestry and Forest Health Program. S&G 284 puts habitat requirements for threatened, endangered, and sensitive species over that of insect and disease control. This S&G will maintain habitat for Zuni fleabane and thus, is a beneficial S&G.

Lands and Minerals Program

Zuni fleabane habitat occurs in areas where there is potential for uranium mining. Past mining claims have been mostly in Zuni fleabane habitat. With respect to the Land and Minerals Program, the S&Gs minimize adverse environmental impacts from mining through plans of operation and permits that provide reclamation, re-vegetation, and watershed and water quality protection. However, these S&Gs only reduce adverse effects from mining on Zuni fleabane. Presently, there are no adverse effects to Zuni fleabane from mining because uranium prices are uneconomical, but the potential for future detrimental effects exist which the Cibola NF LRMP does not preclude.

The two applicable S&Gs (259a, 259b) within the Lands and Minerals program could have lethal effects to Zuni fleabane because of potential impacts exerted by mining operations. However, S&G 259 provides habitat maintenance and could possibly minimize the effects from 259a and 259b.

Rangeland Management Program

Any livestock grazing that could occur within the range of the Zuni fleabane is incidental. Zuni fleabane habitat is considered “unattractive” to cattle and the plant itself is unpalatable to livestock. Thus, S&Gs within the Rangeland Management Program should not be considered detrimental to the Zuni fleabane itself or its habitat.

Recreation, Heritage, and Wilderness Program

The only type of recreation likely to occur in Zuni fleabane habitat is dispersed recreation (U.S. Forest Service 2004:649). Dispersed recreation is described as inconsistent, meaning it has varying levels and locality of environmental impacts from recreational vehicle camping along stream banks, hiking on sensitive soils, mudding in wet meadows, and off-highway vehicle use (U.S. Forest Service 2004:68). Because the Zuni fleabane inhabits remote areas far from human population centers, the effects of dispersed recreation on the Zuni fleabane should be minimal.

The S&Gs within the Recreation Program implement off-highway vehicle closures to protect resources (229), limit road density and restrict roads through Zuni fleabane habitat (231), control erosion (232), and protect threatened and endangered species habitat (233, 283)

Watershed Management Program

All applicable S&Gs (236, 285, 298, 302, 306, and 308) within the Watershed Management Program are beneficial to the Zuni fleabane because they provide general ecosystem health measures.

1996 Regional Amendment

The management direction provided by the S&Gs in the 1996 Regional Amendment relates to the conservation of Mexican Spotted Owls and Northern Goshawks. The S&Gs promote healthy forest ecosystems; functioning watersheds; and riparian and aquatic systems (U.S. Forest Service 2004). Table 192 summarizes the effects to Zuni fleabane from the applicable S&Gs within the 1996 Regional Amendment. In addition, we found that the guidelines used by the Forest Service for the Northern Goshawk do not appreciably affect this species.

Table 192. Effects of the S&Gs analyzed for the Zuni Fleabane - 1996 Regional Amendment.

Ranking	Explanation of Ranking	Total	Percentage
-2	S&G is causing lethal response	0	0.0
-1	S&G is causing sublethal response	0	0.0
0	S&G is ill-defined and/or open to interpretation	2	3.0
1	S&G is maintaining habitat & providing at least minimal recovery	8	12.1
2	S&G is moving towards recovery	0	0.0
3	S&G is implementing species recovery plan	0	0.0
Y	S&G has no application to the species	47	71.2
Z	S&G implementation is non-discretionary	1	1.5
X	S&G is a heading	8	12.1
Total		66	100 %

Eight S&Gs provide at least minimal recovery or habitat maintenance or improvement to the Zuni fleabane. Overall, most applicable S&Gs within the 1996 Regional Amendment have little to no application to the Zuni fleabane or its habitat.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Most of the known populations of Zuni fleabane occur on the Cibola NF. However, there are private lands adjacent to National Forest System lands. The possibility exists that undocumented populations may occur on these private lands. Within these private lands, logging and grazing may occur which may have indirect effects to the Zuni fleabane.

CONCLUSION

After reviewing the current status of the Zuni fleabane, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the FWS’s opinion that the Cibola NF LRMP and 1996 Regional Amendment, as proposed, are not likely to jeopardize the continued existence of the Zuni fleabane. Pursuant to 50 CFR 402.02, “jeopardize the

continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the species; therefore, none will be affected.

The FWS bases this non-jeopardy opinion on the analyses of the Cibola NF LRMP and the 1996 Regional Amendment, and their possible effects to the Zuni fleabane. The FWS reached this conclusion for the following reasons:

- Activities allowed under the Cibola NF LRMP are not expected to result in further decline of the Zuni fleabane.
- Adverse effects stemming from the Recreation Program are likely to be minimal due to the remote area inhabited by the Zuni Fleabane. Currently, there is little damage to Zuni fleabane habitat from activities authorized under this program.
- Although Zuni fleabane habitat has high potential for uranium mining and past mining claims exist in most of its habitat, this activity is not currently extant on the Cibola NF and no Zuni fleabane habitat has been degraded or destroyed by mining since the Cibola NF LRMP was approved in 1985.
- The Cibola NF LRMP contains guidance to protect Zuni fleabane habitat (S&Gs 229, 233, 250, 252, 257, 258, 259, 283).

Therefore, the FWS concludes that the proposed action is not likely to jeopardize the continued existence of the Zuni fleabane.

INCIDENTAL TAKE STATEMENT

Sections 7(b)(4) and 7(o)(2) of the ESA generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the ESA prohibits the removal and reduction to possession of federally listed endangered plants, or the malicious damage of such plants on areas under federal jurisdiction, or the destruction of endangered plants on non-federal areas in violation of state law or regulation, or in the course of any violation of a state criminal trespass law.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The FWS recommends the following conservation activities:

1. Continue to monitor for Zuni fleabane on Cibola NF lands.

2. Participate in the development and implementation of a habitat management plan for the Zuni fleabane.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

DISPOSITION OF DEAD, INJURED, OR SICK FEDERALLY LISTED SPECIES

Upon locating a dead, injured, or sick federally listed species, initial notification must be made to the FWS's Law Enforcement Office, 500 Gold Ave SW Room 9021, Albuquerque, NM 87102 (Telephone: 505-248-7889) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph, and any other pertinent information. The notification shall be sent to the Law Enforcement Office and a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve biological material in the best possible state. If possible, the remains of federally listed species shall be placed with educational or research institutions holding appropriate state and federal permits. If such institutions are not available, the information noted above shall be obtained and the carcass left in place.

Arrangements regarding proper disposition of potential museum specimens shall be made with the institution prior to implementation of the action. Injured animals should be transported to a qualified veterinarian by an authorized biologist. Should any treated federally listed species survive, the FWS should be contacted regarding the final disposition of the animal.

REINITIATION NOTICE

Endangered and Threatened Species

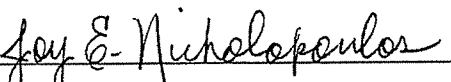
This concludes formal consultation on the actions outlined in the Forest Service's continued implementation of LRMPs for the 11 National Forests and National Grasslands of the Southwestern Region. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.


Candidate Species

This concludes the conference for the Forest Service's continued implementation of LRMPs for the 11 National Forests and National Grasslands of the Southwestern Region. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the candidate species are listed or critical habitat is designated. The request must be in writing. If the FWS reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the FWS will confirm the conference opinions as the biological opinions on the project and no further section 7 consultation will be necessary.

After listing of the candidate species as endangered/threatened and/or designation of critical habitat for the candidate species and any subsequent adoption of this conference opinion, the Forest Service shall request reinitiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

The incidental take statements provided in the conference opinions do not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the candidate species or designated critical habitat of the candidate species has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the candidate species or designated critical habitat may occur between the listing of the candidate species and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.


Assistant Regional Director


Date

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Loach minnow

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APPENDICES

Appendix A

Not Likely to Adversely Affect Determinations

Appendix A documents our concurrence with your determination of “may affect, is not likely to adversely affect” for the species listed below. In addition, the FWS has provided a brief reasoning for these concurrences.

Jaguar (*Panthera onca*)

The FWS concurs with your determination that the continued implementation of the S&Gs within the Coronado NF, as Amended, may affect, but is not likely to adversely affect the jaguar for the following reasons:

1. Overall, the Coronado NF LRMP and its implementing S&Gs are positive for the long-term conservation and recovery of the jaguar.
2. The Coronado NF has low total miles and a low road density standard, which is very positive for large carnivores such as the jaguar.
3. The Coronado NF also has the most land of any NF in the Region withdrawn from mineral entry.
4. In addition, the Coronado NF is a long standing member of the Jaguar Conservation Team, and the NF participates in the remote camera census program for jaguar detection along the international border with Mexico.

Least Tern (*Sterna antillarum*)

The FWS concurs with your determination that the continued implementation of the S&Gs within the Cibola NF LRMP, may affect, but is not likely to adversely affect the least tern for the following reasons:

1. Under the direction of the Forest-wide and Management Area 4 S&Gs, there are no activities proposed to construct reservoirs or ponds on the Canadian River or its tributaries.
2. The Canadian River has been identified by the Cibola NF (Black Kettle NG) as a priority watershed and there are a number of watershed S&Gs designed to improve watershed conditions over time.
3. The type and intensity of recreational activities on Lake Marvin suggests that these effects would be insignificant and discountable to the species.

Northern Aplomado Falcon (*Falco femoralis septentrionalis*)

The FWS concurs with your determination that the continued implementation of the S&Gs within the LRMP for 11 National Forests, may affect, but is not likely to adversely affect the northern aplomado falcon for the following reasons:

1. Currently, no nesting or foraging northern aplomado falcons are known to occur on National Forest System lands within the Southwestern Region.
2. There are provisions, including conducting surveys and protecting nesting and foraging habitats, if aplomado falcons are found within potentially suitable foraging

- and nesting habitat on the Cibola, Coronado, Gila, and Lincoln NFs over the life of the LRMPs.
3. If aplomado falcons are found on any of the aforementioned forests during the life of the plan, this consultation would be re-evaluated and reinitiation would occur if needed.

Yuma Clapper Rail (*Rallus longirostris yumanensis*)

The FWS concurs with your determination that the continued implementation of the S&Gs within the LRMP for 11 National Forests, may affect, but is not likely to adversely affect the Yuma clapper rail for the following reasons:

1. Only the Tonto has documented Yuma clapper rail occurrences, and it has two S&Gs for the protection of Yuma clapper rail habitat.
2. The Coconino has S&Gs that protect riparian and wetland habitat.
3. The Tonto NF has excluded grazing from approximately 24 km (15 mi) of Tonto Creek.
4. The NF also cooperates with the Salt River Project to implement mitigations from the Salt River Project Habitat Conservation Plan.

Razorback Sucker (*Xyrauchen texanus*)

The FWS concurs with your determination that the continued implementation of the 11 National Forest's LRMPs may affect, but is not likely to adversely affect the razorback sucker for the following reasons:

1. Established S&Gs and on-going conservation measures minimize effects from Forest Service management that may affect water quality and quantity.
2. Impoundments within Forest Service lands are not within the scope of this consultation.

Rio Grande Silvery Minnow (*Hybognathus amarus*)

The FWS concurs with your determination that the continued implementation of the LRMPs for the Cibola and Santa Fe NFs may affect, but is not likely to adversely affect the Rio Grande silvery minnow for the following reasons:

1. There are several S&Gs for the Watershed and Wildlife Programs on the Cibola and Santa Fe NF LRMPs that would eliminate adverse, indirect effects to Rio Grande silvery minnow populations located downstream from NFS lands.
2. Most activities occur many miles from occupied habitat and are connected only by intermittent flows.
3. Conchas, and other reservoirs, serve as a sink for water constituents that may impart some influence on silvery minnow populations, further minimizing effects.

Rio Grande Silvery Minnow Critical Habitat

The FWS concurs with your determination that the LRMPs for the Cibola and Santa Fe NFs will not adversely modify critical habitat of the Rio Grande silvery minnow for the following reasons:

1. The direction provided by S&Gs for the Watershed and Wildlife Programs would eliminate adverse, indirect effects to Rio Grande silvery minnow critical habitat.
2. Most activities occur many miles from critical habitat and are connected by intermittent flows.
3. Conchas reservoir also serves as a sink for water constituents that may impart some influence on silvery minnow critical habitat.

Zuni Bluehead Sucker (*Catostomus discobolus yarrowi*)

The FWS concurs with your determination that the continued implementation of the Cibola NF's LRMP is not likely to jeopardize the Zuni bluehead sucker. And if the species is listed within the life of the plan, we concur that the Cibola NF's LRMP may affect, but is not likely to adversely affect the Zuni bluehead sucker for the following reasons:

1. Standards and Guidelines 299, 303 and 304 promote protection and recovery specific to Zuni bluehead sucker in Management Area 14.
2. Forest-wide and Management Area 8 S&Gs further promote protection and recovery to threatened and endangered species, riparian areas, riparian-dependent resources as well as protecting water quality.

Alamosa Springsnail (*Psuedotryonia alamosae*)

The FWS concurs with your determination that the continued implementation of the Gila and Cibola NFs LRMPs may affect, but is not likely to adversely affect the Alamosa springsnail for the following reasons:

1. The species does not occur on Forest Service lands.
2. Management direction in the Gila and Cibola NFs LRMP emphasize the conservation of riparian habitats and riparian-dependent species, the maintenance of soil resources, and limits forage use by grazing ungulates to a level that assures recovery and continued existence of threatened and endangered species.

Huachuca Springsnail (*Pyrgulopsis thompsoni*)

The FWS concurs with your determination that the continued implementation of the Coronado NF LRMP is not likely to jeopardize the continued existence of the Huachuca springsnail. And if the species is listed within the life of the plan, the proposed action may affect, but is not likely to adversely affect the Huachuca springsnail for the following reasons:

1. The Coronado NF LRMP provides guidance to the NF to manage riparian areas "to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve riparian-dependent resources (FSM 2526)."
2. S&G 675 directs the Forest to "Emphasize protection of soil, water, vegetation and wildlife and fish resources prior to implementing projects (FSM 2526)."
3. S&G-676 provides guidance to the NF to, "Give preferential consideration to resources dependent on riparian areas over other resources. Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian-dependent resources."

Stephan's Riffle Beetle (*Heterelmis stephani*)

The FWS concurs with your determination that the continued implementation of management direction on the Coronado NF is not likely to jeopardize the Stephan's riffle beetle, and if it becomes listed within the life of the plan we concur that the continued implementation of the Coronado NF LRMP may affect, but is not likely to adversely affect the Stephan's riffle beetle for the following for the following reasons:

1. The Coronado NF LRMP provides direction to the NF to manage riparian areas "to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve riparian-dependent resources (FSM 2526)."
2. Standard and Guideline 675 directs the Forest to "Emphasize protection of soil, water, vegetation and wildlife and fish resources prior to implementing projects (FSM 2526)."
3. Standard and Guideline 676 provides direction to the NF to, "Give preferential consideration to resources dependent on riparian areas over other resources. Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian-dependent resources."

Kuenzler Hedgehog Cactus (*Echinocereus fendleri* var. *kuenzleri*)

The FWS concurs with your determination that the continued implementation of the Lincoln NF LRMP may affect, but is not likely to adversely affect the Kuenzler hedgehog cactus for the following reasons:

1. The Lincoln LRMP has an S&G that directs the Forest to meet threatened and endangered species requirements in all rangeland or grazing activities.
2. The Lincoln LRMP has an S&G that directs the Forest to evaluate all prescribed burns for coordination with other resource activity needs.
3. Surveys for Kuenzler hedgehog cactus are done in suitable habitat prior to any rangeland improvement projects and these projects are modified, if necessary, to prevent adverse affects to the cactus.

San Francisco Peaks Groundsel (*Senecio franciscanus*) and critical habitat

The FWS concurs with your determination that the continued implementation of the Coconino NF LRMP may affect, but is not likely to adversely affect the San Francisco Peaks groundsel and its critical habitat for the following reasons:

1. Conservations measures for the plant and critical habitat are addressed in the Alpine Tundra Management Plan, which was incorporated into the Coconino NF LRMP.
2. Trails have been closed to any off-trail traffic and there is no livestock grazing in the alpine tundra.
3. There are specific management directions (S&Gs 326, 418, and 423) for the protection of this species and critical habitat in the Coconino FP.
4. The alpine tundra on Agassiz Peak is closed to trail hiking; this area is within critical habitat.

Todsen's Pennyroyal (*Hedeoma todsenii*)

The FWS concurs with your determination that the continued implementation of the Lincoln NF LRMP may affect, but is not likely to adversely affect the Todsen's pennyroyal for the following reasons:

1. Grazing, logging, and fuelwood harvest have been excluded from the areas where the pennyroyal exists (steep slopes with fragile soils) to protect the watershed.
2. Watershed health will be maintained through the exclusion of potentially damaging activities rather than through restoration projects.
3. No prescribed fires or WUI fuel reductions will be carried out in these areas.
4. LRMP direction is to protect threatened and endangered species from minerals activity through surface use stipulations in operating plans and permits.

Canelo Hills Ladies'-tresses (*Spiranthes delitescens*)

The FWS concurs with your determination that the continued implementation of the Coronado NF LRMP may affect, but is not likely to adversely affect the Canelo Hills ladies'-tresses for the following reasons:

1. At this time, there is only one location of this species on the Coronado NF. That area is protected by a fence and excluded from livestock grazing.
2. Suitable habitat that may be present on the Coronado NF is protected by the S&Gs that give priority to managing these areas (Management Area 7a) to protect the productivity and diversity of riparian-dependent resources.
3. The Coronado NF has protective S&Gs in place to mitigate the effects of Forest activities on occupied habitat of listed species.

Appendix B

Abbreviations/Acronyms

The abbreviations and acronyms used throughout this biological opinion are outlined below:

ac	acre
ABENWP	Arizona Bald Eagle Nest Watch Program
Act	Endangered Species Act
ADOT	Arizona Department of Transportation
AGFD	Arizona Game and Fish Department
AFS	American Fisheries Society
AMP	Annual Management Plan
ATVs	All Terrain Vehicle
AUM	Animal Unit Month
Avg	Average
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BMPs	Best Management Practices
BOR	Bureau of Reclamation
C	celsius
CFR	Code of Federal Regulations
cm	centimeters
CPFS	U.S. Geological Survey Colorado Plateau Field Station
DPS	Distinct Population Segment
F	fahrenheit
Forest Service	U.S. Forest Service
FR	Forest Road
ft	feet
FWS	U.S. Fish and Wildlife Service
GAWS	General Aquatic Wildlife Survey
GIS	Geographic Information Systems
ha	hectare
in	inches
kg	kilograms
km	kilometer
km ²	one square kilometer
KV	Knutson-Vanderberg funds
LRMP	Land and Resource Management Plan
m	meter
MBTA	Migratory Bird Treaty Act
mi	mile
mi ²	square mile
MIS	Management Indicator Species
mm	millimeters
MMBF	Million Board Feet

MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NAU	Northern Arizona University
NEPA	National Environmental Policy Act
NF	National Forest
NFEFBR	North Fork East Fork Black River
NFH&TC	National Fish Hatchery and Technology Center
NMGFD	New Mexico Department of Game and Fish
NWR	National Wildlife Refuge
OHVs	Off Highway Vehicles
ORVs	Off-road Vehicle
PAC	Protected Activity Center (refers to Mexican Spotted Owl protected habitat)
PVA	Population Viability Analysis
RNA	Research Natural Area
RU	Recovery Unit
S&G	Standards and Guidelines
SWBEMC	Southwestern Bald Eagle Management Committee
SWWF	Southwestern Willow Flycatcher
TNC	The Nature Conservancy
UNM	University of New Mexico
U.S.	United States of America
U.S.C	United States Code
USGS	United States Geological Survey
YBCC	Yellow-billed Cuckoo
yr	year

Appendix C

**U.S. Forest Service LRMP Standards and Guidelines Considered for
 the 37 Federally Listed, Proposed, and Candidate Species and
 Their Proposed or Designated Critical Habitats**

S&G Code	Standard and Guideline
	Apache-Sitgreaves National Forest
1	Maintain habitat to maintain viable populations of wildlife and fish species and improve habitat for selected species. This is accomplished directly through habitat management and indirectly through coordination of habitat management in conjunction with other resource activities. p 14
2	Cooperate with the Arizona Game and Fish Department to achieve management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plan, and on proposals for reintroduction of extirpated species into suitable habitat. Support the Arizona Game and Fish Department in meeting its objectives for the State. No unapproved species are introduced. p 15
3	Cooperate with the Arizona Game and Fish Department to achieve management goals and objectives in the Arizona Cold Water Fisheries Strategic Plan. p 15
4	Improve habitat for listed, threatened, endangered, or sensitive species of plant and animals and other species as they become threatened or endangered. Work toward recovery and declassification of species. p 15
5	Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals. p 15
6	Trails are closed to vehicle use unless signed open (p 50).
7	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 1.) Soil groups having a high sensitivity rating: slope, erosion hazards, and run-off potential. (p 50)
8	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 2.) Soils with surface textures of clay, clay loam, and heavy silt loam, or soils where such textures are within 6” to 8” of the surface. (p 50)
9	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 3.) Effects of water quality such as increased sediment and turbidity. Also, bacteriological and chemical problems due to heavy concentration of users. (p 50)

10	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 4.) Areas receiving concentrated wildlife breeding activities. (p 50)
11	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 7.) Open parks or meadows classified as key wildlife areas. (p 50)
12	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 8.) Areas which provide essential wildlife water requirements. (Amendment 1 – Replacement Page 50)
13	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 12.) All critical areas as defined in Section 2(b) of the Rare and Endangered Species Act of 1973. (p 51)
14	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 13.) Areas inhabited by unique wildlife when ORV travel will be detrimental to the well-being of the wildlife group. (p 51)
15	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 14.) Areas where there is agreement with the AZGF to maintain a quality hunting and fishing experience. (p 51)
16	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 18.) Water courses and wetlands permanently, or intermittently wet. (p 51)
17	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 20.) Watershed restoration projects. (p 51)
18	Existing, as well as additional ORV closures are implemented when one or more of the following situations or areas exist, and ORV use is likely to occur that would result in significant adverse effects: 24.) Areas damaged due to ORV use are closed and restoration projects initiated if funding is available. (Pages 51 and 52)
19	Manage threatened and endangered animal, fish, and plant habitat to achieve declassifying in a manner consistent with the goals established by the U.S. Fish and Wildlife Service and the Arizona Game and Fish Department. (p. 69)
20	Habitat management for Federally listed species will take precedence

	over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species. (Amendment 6 – Replacement page 69)
21	Implement threatened and endangered species recovery plans. (p. 69)
22	Carry out the appropriate management activities outlined in the Rocky Mountain Southwest Peregrine Falcon and Apache Trout Recovery Plan. (p. 69)
23	Winter Bald Eagle roosts will be identified and protected during management activities. Prohibit development in Bald Eagle winter roosts and buffer zones. (p. 70)
24	Continue to identify existing and potential habitat for peregrine falcons and Apache trout as outlined in the species' recovery plan. (p. 70)
25	Monitor management practices within occupied and potential peregrine falcon, Apache trout, Bald Eagle, loach minnow, and Little Colorado River spinedace habitat, and evaluate impacts. (p. 70)
26	Recovery activities will be pursued where pertinent. (p. 71)
27	Monitor status of federal listings. If elevated to threatened or endangered status. Consult with US Fish and Wildlife Service as needed. (Page 71)
28	Monitor actions to determine effect of management practices on T&E species habitat and the need for a consultation with U.S. Fish and Wildlife Service. (p. 71)
29	Studies by appropriate, qualified personnel will be conducted to ascertain suitability of reintroduction of endangered, threatened, proposed, and State listed native species to suitable habitat where not presently occupied. (p. 71)
30	The Forest Wildlife Biologist will be consulted on all proposed activities, modifications, and other commitments of lands within known habitats of peregrine, Bald Eagle, Spotted Owl, loach minnow, Little Colorado spinedace, and Apache trout, threatened, endangered, or sensitive plants. (p. 71)
31	When management practices are proposed in listed or proposed species habitats, the Forest Wildlife Biologist will evaluate the need for consultation or conference with the FWS and AGFD. (p. 71)
32	All vegetation manipulations will be conducted with threatened and endangered species requirements. (Page 71)
33	Allow area closures to protect habitat of listed, sensitive, or proposed T&E species. (p. 71)
34	Cooperate with AGFD in evaluating proposals for reintroducing extirpated species into suitable habitat and on fish stocking and public access for fishing. (p. 73)
35	Make all livestock water available to wildlife. (p. 73)
36	Develop one permanent water source to service every 2,000 acres. (p. 73)

37	Maintain habitat capability through direct treatments of vegetation, soil, and water. (p. 73)
38	Maintain habitat for viable populations of all existing vertebrate wildlife species. (p. 74)
39	Within each diversity unit maintain or achieve at least 40 percent of the potential habitat capability for the management indicator species selected for each vegetation type. (p. 74)
40	Salt is not placed within ¼ mile of any riparian area or water. (p. 76)
41	Maximize use of road pit tanks to meet livestock water needs. (p. 79)
42	Riparian areas will be mapped as separate areas when they are at least 10 acres; otherwise, they will be considered as areas which require special consideration even though they are part of a larger stand. (p. 80)
43	Implement best management practices to prevent water quality degradation. Implement improvement action where water quality degradation does occur, except for special cases where temporary or short term degradation is occurring from road crossing construction or similar situations. (p. 81)
44	Provide adequate drainage to prevent concentrated flow and sediment laden runoff from entering water courses. (p. 81)
45	Designate streamcourses to receive protection during projects. Those streams shown on 7.5' quads as a streamcourse should be considered for designated streamcourses.
46	Roads will be located away from stream bottoms to minimize sediment delivery to the streamcourse whenever possible. (p. 81)
47	Maintain suitable filter/buffer strips between stream courses and disturbed areas and/or road locations to: a. Maintain suitable stream temperature, and b. Maintain water quality standards. (p. 83)
48	Maintain and enhance riparian vegetation along streams to maintain suitable water temperature and other conditions for streamflow. (p. 83)
49	Effectively close or obliterate roads causing intolerable resource damage (relocate roads as needed). (p. 83)
50	Control surface uses in mineral operations through plans of operations and permits which provide for: preservation of water quality, protection of watershed values, reforestation or revegetation to attain soil stability and protect threatened, endangered, and sensitive species. (p. 88)
51	No streambed alteration or removal of material is allowed if it significantly affects riparian –dependent resources, channel morphology, or streambank stability. (p. 90)
52	Limit use of herbicides, insecticides, rodenticides, or other chemical agents as part of management activities to times and places where possible transport to or by surface or groundwater has a low probability of occurrence. Limit the use of certain facilities in floodplains to non-flood seasons or daylight hours only. (p. 83)
53	Maintain water resource improvement projects where improvement and downstream values will be jeopardized if work is not accomplished.

	Accomplish/maintain soil resource improvement projects to prevent loss of soil productivity. (p. 85)
54	Avoid placement of roads in meadows whenever feasible and obliterate or relocate roads in key meadows presenting conflicts (page 73).
55	Recommend unlimited surface use stipulations for oil and gas leasing for areas having slopes in excess of 41 percent and riparian areas. Surface occupancy may be allowed but will be limited to specific sites jointly agreed upon by Forest Service & Leasee. Area in which surface occupancy will be limited or prohibited will include those that are highly visible, that have erosive or unstable soils, critical wildlife habitat, managed community watersheds, etc. (p. 87)
56	No surface occupancy of slopes greater than 40 percent or in Areas where the Visual Quality Objective is Retention (p. 88)
57	Requests for transmission corridors are evaluated based on public Need, economics, and environmental impacts of the alternatives. Emphasis is to use existing corridors to their capacity with Compatible utilities, including upgrade power lines, before evaluating new routes. New corridors through avoidance areas in the ponderosa pine and mixed conifer vegetative types will be minimized and always avoided when feasible (p 91).
58	Only one access road is approved to a parcel of private property Whether there are one or many owners. (p 96)
59	Certain private lands within or adjacent to the boundary of the Forest have been classified as desirable for acquisition, if they meet one or more of the following criteria: 2. Lands that contain vital species habitat or vital wildlife habitat; 4. Wetlands, riparian areas, and other water oriented lands (p 100 - 101)
60	Acquisition of non-Forest lands under the Land and Water Conservation Fund Act include lands providing habitat for threatened and endangered species. (p. 102)
61	Road Maintenance and Management - Erosion control measures will be included in road plans. Construct roads to keep sediment out of riparian and aquatic habitats. Minimize clearing widths and vegetative clearing. Allow roads within crucial wildlife habitat areas that have specific big game winter range objectives are needed to meet priority goals of the forest. (Amendment 1 – Replacement Pages 104, 105)
62	Seasonally or permanently close existing roads, prohibit off-road vehicle use or manage use when conflicts occur with wildlife and soil resource objectives. Generally limit closures to local roads in erosive soil areas, riparian areas, or wildlife areas that require specific management practices. (p. 106).
63	Total road density should average 3.5 miles/sq. mile or less. Open road densities should average 2.0 miles/sq. mile or less. (p. 106)
64	Remove infected overstories (Dwarf mistletoe) as soon as regeneration is accomplished. Thin understories to densities which will maximize fiber production over the length of the rotation, using yield simulation

	models as guides. Control mistletoe by clearcutting (in conformance with Regional Standards for clearcut size) and regenerating artificially when yield simulation models indicate that stands will not reach maturity because of dwarf mistletoe. (p. 117)
65	Snag densities: In at least 55 percent of a diversity unit, provide 180 snags/100 acres. In high priority areas provide 280 snags/100 acres. Only ponderosa pine and mixed-conifer species count toward snag requirements. (p. 122-3)
66	Provide minimum of 2 down logs per acre or untreated slash piles over 55 percent of diversity unit. (p. 123)
67	Manage aspen stands to provide a variety of sizes, shapes, crown closure, age structure, etc. Manage for interspersed conifer groups (1 ac per 10 ac aspen) (p. 123)
68	Within diversity units where no conflicts occur with TES species needs, as a guideline manage for forage to cover ratios between 40:60 and 70:30. (p. 124)
69	Manage for at least 30 percent cover in each diversity unit, of this at least 1/3 should be in thermal cover, 1/3 in hiding cover, and 1/3 in either hiding or thermal cover. (Amendment 1, Replacement p 124)
70	Thermal cover for elk is a stand of coniferous forest tall and wide enough to allow animal movement and bedding with a high degree of crown closure. Emphasize maintaining thermal cover in known travelways and bedding areas. (Amendment 1, Replacement p 124)
71	Hiding cover is vegetation and topographical features capable of hiding 90 percent of a standing deer or elk from human view at a distance of 200 feet or less. Emphasize maintaining hiding cover adjacent to dependable water and key openings, along known travelways, and in pine stringers. (Amendment 1, Replacement p 124)
72	Evaluation of existing and potential cover considers open road densities, topography, and tree, shrub, and herbaceous species to determine effective cover. The presence of species, such as Gambel oak, New Mexico locust, juniper, aspen and bigtooth maple, or topographic features, will require less BA/GSL to meet cover requirements. (Amendment 1, Replacement p 124)
73	Protect and manage to include hiding and thermal cover and defer logging activities from May 15 to June 30 in known fawning and calving areas. This restriction may be lifted if on-the-ground inspection indicates the area is not being used for fawning/calving and other areas adjacent to the sale area are available for wildlife needs. (Amendment 1, Replacement p 124)
74	Hiding and thermal cover levels in ponderosa pine and mixed conifer table. (Amendment 1; Replacement p. 124-1)
75	Maintain turkey habitat. (p 125)
76	Defer slash treatment activities in turkey nesting areas from April 15 through June 30. (p 125)
77	Manage for turkey nesting cover through modified slash treatment.

	Leave scattered patches, at least ¼ acre in size, of untreated slash within ½ mile of dependable water in actual or potential turkey nesting areas. At least 10 percent and not more than 20 percent of the area treated within the nesting areas shall be left untreated for at least 5 years, longer if it is determined that nesting is still occurring in the area. These guidelines will be evaluated and adjustments made, if necessary after two year of implementation. (p 125)
78	3. Gambel oak is important for cover, and patches of oak near nesting areas are an important consideration when selecting areas for retaining slash. Other species such as New Mexico locust and current also can provide cover. Oak stands in the nesting areas should be evaluated for opportunities to manage for cover. (p 126)
79	4. High value areas for leaving slash are adjacent to a deferred stand or Within the edge of a deferred stand. (p 126)
80	5. If large areas, as opposed to scattered patches, of untreated slash are left, retain strips of slash on the contour of the slope. (p 126)
81	6. The untreated slash may be prescribe burned after the needles have dropped off and the area is determined to not be used for nesting. (p 126)
82	7. Brood areas are also important near the nest. These areas are small openings 50 to 100 feet in diameter with little canopy coverage that produces herbaceous vegetation that can be used for forage. Grass species used for forage are generally those that produce abundant large seeds. (p 126 - 127)
83	Protect active raptor nest tree groups and advise Wildlife Biologist of location. Manage raptor nest tree groups as stands, if possible. Nest group consists of nest tree and adjacent trees and is maintained as follows: (p 127)
84	On aquatic sites – Utilize linear buffer or streams/rivers using a 1200 foot restricted timber harvest (retain dominant trees and snags along the water’s edge a distance of 300 feet back from the lake or stream edge. (p 127)
85	Protect bald eagle winter roosts with a 300-foot uncut buffer zone around the roost. Prohibit road development in the roost and buffer zone. (p 127)
86	As needed to meet habitat capability, protect red squirrel primary caches at a density of one cache per 2 acres. Retain all trees within a 26-foot radius from the cache to maintain nest tree groupings (1/20th acre) (spruce-fir and mixed conifer). Do not use in final removal and regeneration cuts. (p 128)
87	As needed to meet habitat capability, retain at least 20 Abert Squirrel nest tree groups per 100 acres. Not applicable to final removal and seed cuts. (p 128)
88	l) WFRP-S&GS to protect red squirrel caches and retention of Abert’s squirrel nest trees. (p 128)
89	m) Timber-All reforestation projects will include rodent control where

	needed. (p131)
90	Reduce loss of timber production through the control of root rots. 1) In root rot centers, salvage dead and dying trees during scheduled harvests. 2) Remove susceptible trees within 1 to 2 chains of the border of the center. (p 140)
91	Reduce susceptibility of Englemann Spruce stands to Englemann bark beetle. 1) Schedule overmature stands for harvest first, subject to other resource objectives. (p 140)
92	Reduce susceptibility of Englemann Spruce stands to Englemann bark beetle. 2) Remove defective, unsound, unhealthy trees during regeneration harvests. (p 140)
93	Reduce susceptibility of Englemann Spruce stands to Englemann bark beetle. 3) Salvage windthrown trees as soon as possible. (p 140)
94	Reduce loss of timber production to dwarf mistletoes through silvicultural controls. 1) No live trees will be left as potential snags if they are infected with dwarf mistletoe unless they are girdled or poisoned. 2) No live dwarf mistletoe infected overstory trees, including those used as seed sources will be left in areas with established regeneration (p 140).
95	Reduce mixed conifer stands' susceptibility to attack by Douglas-fir beetle. 1) Harvest overmature stands first consistent with other resource objectives. 2) Remove harvested logs within 1 year of falling. 3) Thin stands periodically to maintain vigor (p 141)
96	Reduce the amount of wood volume lost to stem decays. 1) Remove infected, unsound and defective trees at the first opportunity (p 142).
97	Road densities should be planned to economically balance road costs and skidding costs. Permanent road densities should average 3.5 miles/square mile or less, unless topography dictates higher densities to economically remove the timber. Also, open road densities after Timber sale activities cease should average 2.0 mi/sq mi. or less. (p 142)
98	Seasonally or permanently close existing roads, prohibit off road vehicle use or manage use when conflicts occur with wildlife and soil resource objectives, Generally limit closures to local roads in erosive soil areas, riparian areas, or wildlife areas that require specific management practices. (p. 143)
99	Enhance watershed condition by obliterating roads causing resource damage that are unneeded for forest management. (p 143)
100	Defer firewood activities from May 15 to June 30 in known fawning and calving areas. (p 148)
101	Manage for at least 20 percent of each diversity unit in hiding and thermal cover. Emphasize cover management in travelways, bedding areas, reproductive areas, and adjacent to key openings. Cover is managed to provide at least 60 percent crown cover and at least 500' wide. (p 148)
102	In treated stands manage for small game and non-game by leaving an

	average of one slash pile per 3 acres in the woodland type or leave lopped and scattered slash on 30 percent of area. (p 148)
103	Cover corridors are laid out to connect treated areas, or breaks in terrain to provide interconnecting cover corridors. Known or suspected routes of game travel are used to lay out cover corridors. (p 148)
104	Roads will be located away from stream bottoms to minimize sediment delivery to the streamcourse whenever possible. (p. 153)
105	Plan/accomplish erosion reduction projects on areas disturbed by project activities where the site is not expected to stabilize within 2 years or when water quality degradation will occur. (p. 153)
106	Maintain suitable filter/buffer strips between stream courses and disturbed areas and/or location to: a. Maintain suitable stream temperature, and b. Maintain water quality standards. (p. 153)
107	Give preferential consideration to riparian area dependent resources in cases of unsolvable conflicts. Manage to maintain or improve riparian areas to satisfactory riparian condition. Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian dependent resources. (Amendment 1; Replacement Page 155)
108	Management emphasis will be directed at areas with riparian dependent resources in the following order of priority: 1. Threatened and endangered species; 2. Cold water fisheries; 3. Warm water fisheries; and 4. All other riparian areas. (A list of priority streams is presented) (Amendment 1; Replacement Page 155)
109	Forage utilization standards for riparian areas will be determined for each allotment at levels permitting timely achievement of fisheries and T&E objectives. Areas in unsatisfactory riparian condition 0-45 percent utilization; Areas in satisfactory riparian condition 0-55 percent utilization. (p. 155-2)
110	Recovery activities such as fencing, vegetation projects, and special management prescriptions will be maintained until the affected areas are in satisfactory condition and as long thereafter as needed to maintain the area(s) in satisfactory condition, or until they are replaced by more effective techniques. (p. 156)
111	Acquire riparian area when funding becomes available or through exchange authorities (p 156)
112	Identify capacity for recreation in each riparian area. The objective for each riparian area should be maximum possible recreation use while protecting or enhancing the riparian characteristics of each site. (p. 157)
113	Recreation use, including off road vehicle use, will be prohibited or restricted and sites rehabilitated in areas in unsatisfactory condition, when recreation was a significant causative factor in affecting the condition. (p. 157)
114	Manage for or maintain at least 60 percent of potential habitat capability for Apache trout, rainbow trout, brook trout, brown trout, loach minnow, and Little Colorado spinedace. (p. 158)

115	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 1) Manage for and maintain at least 80 percent of near natural shade over water surfaces. (Amendment 1 - Replacement Page 158)
116	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 2) Manage for and maintain a least 80 percent of streambank total linear distance in stable condition. (Amendment 1 - Replacement Page 158)
117	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 3) Prevent siltation not to exceed 20 percent fines (<855mm) in riffle areas. (Amendment 1 - Replacement Page 158)
118	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 4) Maintain 80 percent of the spawning gravel surface free of inorganic sediment. (Amendment 1 - Replacement Page 158)
119	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 5) Manage for stream temperatures not o exceed 68 degrees F. unless not technically feasible. (Amendment 1 - Replacement Page 158)
120	For Priority 1 and 2 Riparian Areas: a) Aquatic resources: 6) Manage for and maintain at least a 80 Biotic Condition Index on all perennial streams. (Amendment 1 - Replacement Page 158)
121	For Priority 1 and 2 Riparian Areas: b) Vegetation resource (where the site is capable of supporting woody plants): 1) Manage for and maintain at least 60 percent of woody plant composition in three or more riparian species. (Amendment 1 - Replacement Page 158)
122	For Priority 1 and 2 Riparian Areas: b) Vegetation resource (where the site is capable of supporting woody plants): 2) Manage for and maintain at least three age classes of riparian wood plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings. (Amendment 1 - Replacement Page 158)
123	For Priority 1 and 2 Riparian Areas: b) Vegetation resource (where the site is capable of supporting woody plants): 3) Manage for and maintain at least 60 percent near natural shrub and tree crown cover. (Amendment 1 - Replacement Page 158)
124	For Wetlands: a) Improve wetlands in accordance with the Forest Wetlands Management Plan where consistent with private water rights. (p 159)
125	For Wetlands: b) Potential emergent vegetation cover in key wetlands as identified in the Wetland Project Implementation Plan will be maintained at optimum density from late spring (May 1) to July 15. (p 159)
126	For Wetlands: c) Improve wintering water fowl habitat, including loafing island construction. (p 159)
127	For Wetlands: d) Maintain or improve nesting cover in conjunction with construction of waterfowl islands by seeding herbaceous species unpalatable to large herbivores. (p 159)
128	For Wetlands: e) Determine the need, and then maintain and improve wetland habitat by planting waterfowl forage species along the shorelines. (p 159)

129	For Wetlands: f) Maintain or improve nesting cover and waterfowl forage on existing waterfowl island and shorelines and in conjunction with construction of waterfowl islands. (p 159)
130	Maintain riparian and meadow communities by providing water for wildlife and livestock away from sensitive riparian areas. (p. 159)
131	Wildlife use will be controlled in areas of unsatisfactory condition where wildlife use is a significant causative factor affecting conditions. (p. 159)
132	Review and as necessary revise allotment management plans using the Integrated Resource Management process to maintain or improve riparian and/or fish stream habitat objectives. (p. 160)
133	Grazing strategies should be directed toward recovery of both biological systems (vegetation diversity and structure) and physical systems (channel characteristics and hydrology) (p. 160)
134	Determine grazing capability for livestock in each riparian area. The objectives for each riparian area should include livestock use when consistent with other resource objectives and riparian recovery goals. (p. 160)
135	In areas of unsatisfactory riparian condition where grazing has been determined to be a significant causative factor, revised AMPs will: a) Implement intensive management systems that limit grazing and provide adequate rest for riparian areas; b) Reduce stocking to a level that will allow degraded areas to recover, or c) Use site-specific exclusion fencing. (p. 160)
136	Salting in or within ¼ mile of riparian areas for livestock management is prohibited. (p. 160)
137	Limit pasture-to-pasture moving of livestock along riparian areas except on approved routes as specified in AOP. Approval will be granted only where there is no alternative route and when riparian areas will not be damaged. (p. 161)
138	Use vegetation manipulation only where needed to enhance riparian objectives. (p. 161)
139	Enhance watershed condition by obliterating roads causing resource damage, that are unneeded for Forest management (see plan page 106). (p.161)
140	Implement BMPs to prevent water quality degradation. Implement improvement action where water quality degradation does occur. (p. 161)
141	Emphasize wildlife habitat and visual quality, especially big game winter range. (p. 165)
142	Evaluate need and construct fences where necessary to protect key meadows from grazing. (p. 166)
143	When springs are developed in meadow communities, riparian areas, or other sensitive areas, protect these areas by piping the water to water developments in adjacent, less sensitive areas. (p. 166)

144	Control grazing by management and fencing to allow adequate regeneration of grasses and forbs. (p. 167)
145	Maintain existing mountain meadows by removing invading conifers and shrub overstories by cutting or other methods, gully stabilization to raise the water table, soil scarification, and seeding with appropriate grass and forage species. (p. 167)
146	A seral grassland or savanna woodlands site is maintained. On pinyon-juniper lands where overstory modifications have occurred in the past (50,219 acres), a retreatment schedule of approximately 25 years is initiated. Retreatments are accomplished through one or all of the following methods: - individual tree removal, - chemical treatment, - prescribed burning. (p. 167)
147	Enhance watershed condition by closing/obliterating roads causing resource damage that are unneeded for forest management. (p 168)
148	Manage aspen regeneration stands to limit aspen sprout consumption by grazing to one out of 3 years. 20 percent or less of current year's growth. Where water facilities are provided inside aspen stands, pipe water to areas outside the stand to maintain distribution of livestock and wildlife. (p. 192)
149	Emphasis the production of fish and wildlife including waterfowl. (p. 205)
150	Manage waters to perpetuate Apache Trout in order that this species can be delisted from the endangered category (p 206).
150a	Manage waters capable of supporting fish to maintain a fishery (pg 206)
151	Maintain and improve wetlands for waterfowl by planting, constructing islands, potholes. Coordinate with other resource functions to pursue instream flow rights to protect aquatic ecosystems, fish and wildlife. Review existing and potential water impoundments and water impoundment sites, and obtain water rights for developing and maintaining fishing and/or wetland conditions in lakes and streams. (p. 207)
152	Manage for or maintain habitat capability for Arizona trout, rainbow trout, brook trout, brown trout, loach minnow, and spinedace at least 60 percent of potential. (p 207)
153	Cooperate with the Arizona Game and Fish Department in the management of the Threatened Apache Trout (p. 210).
154	Close designated areas to public entry to protect T&E species during critical use periods. (p. 210)
155	Improvements such as wildlife spring developments, fish barriers, erosion-control structures, trails, etc., can be authorized if they do not conflict with the management emphasis. (p. 218)
156	Improvements such as wildlife spring developments, fish barriers, can be authorized if they do not conflict with management emphasis (semi-primitive, highly scenic). (p. 222)

157	Except where permitted by outstanding rights: dams, diversions, or other water resource developments are prohibited. (p. 223)
158	Improvements such as wildlife spring developments, fish barriers, erosion control structures, trails, etc., can be authorized as long as they do not conflict with the management emphasis. (p. 226)
159	Access will be strictly managed within the Chevelon Creek as follows: -Trails are closed to motorized use; -Off –road travel by motorized vehicles is prohibited; - Motorized use within the corridor is restricted to the 504 road. The road to Durfee Crossing will remain closed. Any vehicular access within the corridor other than the 504 road must be authorized by the District Ranger (p. 226-277).
160	Avoid any encouragement of recreation activities within unique willow stands. (p. 230)
161	Improvements such as wildlife spring developments, fish barriers, erosion control structures, trails, etc., can be authorized if they do not conflict with the management emphasis (semi-primitive, highly scenic). (p. 230)
162	Insure there is no effect on the unique willow stands caused by grazing. (p. 230)
163	Emphasize the recovery of this critical watershed. In addition, emphasize the management of the loach minnow and the Black Hawk. (p.233)
164	Cooperate with Arizona Game and Fish Department and the U.S. Fish and Wildlife Service in the management of the Loach Minnow. (p. 234)
165	Defer from grazing until critical watershed and riparian areas are satisfactorily restored. (p. 234)
166	Maintain habitat capability through direct treatments of vegetation, soil, and water. a) Reseed wildfire areas that are not expected to stabilize within 2 years with a mixture of grass forbs and browse species appropriate for the site. Manage livestock to ensure establishment; d) Avoid placement of roads in meadows whenever feasible and obliterate or relocate roads in key meadows present conflicts. (p 73)
167	Water lots are left open to wildlife for free access except when controlling livestock distribution through water accessibility and soil moisture conditions adversely effect fence stability. Provide fence modifications as needed for wildlife access. (Page 76)
168	When needed during summer months, leave water in livestock troughs for wildlife use after domestic animals have been removed from the grazing unit. In winter months in key wildlife winter ranges, provide water where freezing will not damage existing facilities. Freezing can be prevented by using bubblers. (Page 76)
169	Survey proposed earthen stock tank sites for location accuracy, soil suitability, and legal requirements. Design structures built in drainages to meet appropriate flood occurrence intervals. Assure that on new stock tanks appropriate documents for construction and water rights application are filed in a timely manger and according to state law.

	(Amendment 1 – Replacement Page 79)
170	Maximize use of road pit tanks to meet livestock water needs. (Amendment 1 – Replacement Page 79)
171	Conserve soil and water resources; avoid permanent impairment of site productivity and ensure conservation of soil and water resources. The minimum soil and resource management requirement is to control surface water runoff and erosion at not less than tolerance conditions. 36 CRF 218.23 and 27. (Page 81)
172	Plan/accomplish erosion reduction projects on areas disturbed by project activities where the site is not expected to stabilize within 2 years or when water quality degradation will occur. (Page 82)
173	Carry out the appropriate management activities outlined in the Rocky Mountain Southwest Peregrine Falcon and Apache Trout Recovery Plans. (Amendment 6 – Replacement Page 69)
174	Continue to identify existing and potential habitat for peregrine falcons and Apache Trout as outlined in the Species Recovery Plans. (Amendment 6– Replacement Page 70)
175	The Forest Wildlife Biologist will be consulted on all proposed activities, modifications, and other commitments of lands within known habitat of peregrine, bald eagle, spotted owl, loach minnow, Little Colorado Spinedace, and Apache Trout, threatened, endangered or sensitive plants. (Page 71)
176	Monitor management practices within occupied and potential peregrine falcon, Apache Trout, bald eagle, loach minnow, and Little Colorado River spinedace habitat, and evaluate impacts. (Amendment 6 – Replacement Page 70)
177	Maintain suitable filter/buffer strips between stream courses and disturbed areas and/or road locations to: a. Maintain Suitable Stream Temperature b. Maintain Water Quality Standards (Page 83)
178	No streambed alteration or removal of material is allowed if it significantly affects on riparian-dependent resources, channel morphology, or streambank stability. (Page 90)
179	To improve management and benefit the administration of the National Forest, certain private lands within or adjacent to the boundary of the Forest (hereinafter referred to as Public Land) have been classified as desirable for acquisition. Because local and physical conditions may change during the life of this plan, the lands classified in this plan and others that may be considered, will meet one or more of the following criteria: 2. Lands that contain vital species habitats, or vital wildlife habitat (i.e.. calving areas or critical winter range); 4. Wetlands, riparian areas, and other water oriented lands (p 100)
180	The Purchase Program centers about the Land and Water Conservation Fund Act that designates that lands within the following categories are eligible for acquisition with L&WCFA funds: 3. Threatened and endangered species habitat. (p 102)
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181	For proposed oil and gas leases, include additional stipulations for the protection of surface resources in the following categories: slopes over 40 percent (507.1M acres), to riparian areas (33.6M acres), critical wildlife habitats, and developed and proposed recreation sites (9.3M acres). When possible, classify these areas as available for leasing but with "limited surface occupancy". Develop site specific "limits" if needed. These should describe such requirements as restrictions on periods of permissible activity, access control, etc. If necessary, classify as "no surface occupancy." Use the same categories to develop appropriate mitigation measures or restrictions for all other mineral development proposals.
182	Initiate validity contests on mining claims where there is unwarranted occupancy, detrimental surface disturbance, or the lands are needed for another National Forest program. (C. Forest-wide Prescriptions, Minerals – page 2)
183	Require operating plans for mining claims when significant surface disturbance or occupancy is proposed. (C. Forest-wide Prescriptions, Minerals – page 2)
184	Exchange for lands that meet one or more of the following criteria: Lands that contain vital threatened and endangered species habitat, or vital wildlife habitat (i.e. calving areas). Wetlands, riparian areas, and other water oriented lands. (C. Forest-wide Prescriptions, Lands – page 2)
185	Purchase available lands as funding permits within the following categories: -Land containing threatened and endangered species habitat and critical wildlife habitats (lands page 2)
186	[semi-primitive non motorized (SPN)] The areas, other than Management area 20, resource modification and utilization practices should emphasize recreation and wildlife concerns. (C. Forest-wide Prescriptions, Recreation – page 3)
187	Maintain the numerous natural processes, genetic and biological diversity, and soil productivity, which equates to ecological diversity (Sustainable forest page 2)
188	First priority for allocation will be stands meeting old-growth conditions, then potential old growth, then stands with characteristics close to old growth/potential old growth undisturbed. No stands allocated to old growth will be harvested this planning period. In the future, stands allocated to old growth should not be planned for harvest until similar replacement stands are allocated (sustainable forest page 6)
189	The biological value of stands is highest when they are positioned on the landscape so that there is plant and animal genetic interchange among stands. It is likely that stream courses and stringers of vegetation are key avenues for genetic interchange. Management of these areas and adjacent upland stands should be considered key to prevent fragmentation. (C. Forest-wide Prescriptions, Sustainable

	Forest – page 8)
190	Timber harvest activities are limited to slopes less than 40 percent gradient with very minor exceptions. (C. Forest-wide Prescriptions, Timber – page 13)
191	Arterial and collector road grades will not normally exceed 10 percent unless justified from the standpoint of savings and user costs or to protect the investment and adjacent resources. Likewise, local road grades normally will not exceed 12 percent (Best Management Practices) (C. Forest-wide Prescriptions, Travel – page 4)
192	Reseed road cut and fill slopes with grasses and forbs which are adapted to the area and provide effective erosion control (Best Management Practices) (C. Forest-wide Prescriptions, Travel – page 4)
193	Evaluate potential resource impacts on T&E and sensitive species habitat on projects and activities through a biological evaluation and conduct appropriate consultation when necessary. (C. Forest-wide Prescriptions, Wildlife and Fish - page 2)
194	Improve T&E and sensitive species habitat. Improvement projects give priority to recovery of T&E species and conform to approved recovery plans. (C. Forest-wide Prescriptions, Wildlife and Fish - page 2)
195	Identify forest portions of recovery objectives in conjunction with the N.M. Dept. of Game and Fish (NMGF) and U.S. Fish and Wildlife Service (FWS) for federally listed threatened and endangered species. Refine habitat requirements and identify specific habitat projects needed to achieve recovery objectives for individual species habitats. (C. Forest-wide Prescriptions, Wildlife and Fish – page 3)
196	Manage sensitive species not already on federal lists, to sustain viability and prevent the need for listing as threatened or endangered. Recovery activities will be pursued where pertinent. If a species is proposed for listing, monitor actions to determine effect of management practices on habitat and the need for conference with U.S. Fish and Wildlife Service. Identify areas where sensitive species occur and manage to maintain or enhance habitat in occupied territory. (wildlife and fish, page 3)
197	Accomplish recovery projects included in approved recovery plans. Projects will be coordinated through integrated resource management practices. (C. Forest-wide Prescriptions, Wildlife and Fish – page 3)
198	Manage T, E & S animal, fish and plant habitats to achieve delisting in a manner consistent with the goals established with the FWS and the NMGF in compliance with approved recovery plans. (C. Forest-wide Prescriptions, Wildlife and Fish – page 3)
199	Consultation will be initiated for situations where federally listed or proposed listed species may be affected. Review all planned, funded, executed, or permitted programs and activities to determine needs for consultation or conference with the Fish and Wildlife Service and the New Mexico Department of Game and Fish. (C. Forest-wide Prescriptions, Wildlife and Fish – page 3)

200	Develop habitat management plans for wintering bald eagle habitats as specified in approved recovery plans. Maintain bald eagle winter roost and perch trees. Accomplish riparian and fishery improvements to maintain and enhance prey base for wintering bald eagles. (C. Forest-wide Prescriptions, Wildlife and Fish – page 3)
201	Proposed control and other activities which may disturb the integrity of prairie dog towns must be fully evaluated and managed to perpetuate the species. All such activities will be preceded by approved inventory procedures to determine the occurrence of the black-footed ferret. (C. Forest-wide Prescriptions, Wildlife and Fish – page 4)
202	Identify MSO areas according to standardized survey methods, where spotted owl occur and protect occupied nesting territory. (C. Forest-wide Prescriptions, Wildlife and Fish – page 4)
203	Wildlife habitat objectives for each diversity unit are evaluated on an individual stand basis. This means that in designing timber sales and other projects the size, shape, juxtaposition, age, and crown closure of each stand will be evaluated against the wildlife habitat objectives established for the diversity unit. (C. Forest-wide Prescriptions, Wildlife and Fish – page 4)
204	Snags will not be felled on major sales as a fire protection measure. Manage for at least 300 snags/100 acres on 60 percent of suitable timberlands. (C. Forest-wide Prescriptions, Wildlife and Fish – page 8)
205	Retain sufficient size and length per 100 acres of down logs (where biologically feasible) on 75 percent of suitable timberlands not determined to be highly vulnerable to fuelwood collection. (C. Forest-wide Prescriptions, Wildlife and Fish – page 9)
206	Minimizing the displacement of big game and other sensitive wildlife, and providing sufficient security areas will be emphasized in the planning and implementation of the Forestwide timber sale program. (C. Forest-wide Prescriptions, Wildlife and Fish – page 9)
207	Adequate perch and roost trees for raptors will be managed adjacent to cliffs, major ridges, and openings. Trees should be open-crowned, either living or dead, and be maintained over time. (C. Forest-wide Prescriptions, Wildlife and Fish – page 10)
208	Permanent roads will be designed to avoid saddles, meadows, ridge tops, and riparian areas whenever economically and physically possible. (C. Forest-wide Prescriptions, Wildlife and Fish - page 11)
209	The following wildlife-related criteria will be used to evaluate the need for future travel closures and restrictions including over-the-snow vehicles. - Habitat for threatened, endangered, or sensitive species is threatened. -Meadows and other forage areas likely to be, or being damage. -Riparian areas which are being threatened or damaged. (C. Forest-wide Prescription, Wildlife and Fish – page 11)
210	Livestock salt shall not be placed in or adjacent to any riparian area or other identified key wildlife area where degradation of wildlife habitat would be likely to occur. (C. Forest-wide Prescriptions, Wildlife and

	Fish – page 11)
211	On wet meadows and other riparian areas, favor the establishment of woody riparian vegetation as defined in FSH 2509.23. Control livestock and wildlife grazing through management and/or fencing to allow for adequate establishment of vegetation and the elimination of overuse. (C. Forest-wide Prescriptions, Wildlife and Fish – page 12)
212	Integrate the seasonal and yearlong habitat needs of fish and wildlife into the planning and implementation of other resource activities and uses. Minimize or eliminate adverse impacts and cumulative effects, and determine opportunities to improve habitat conditions through the management of these other activities. Some examples include: - Build campgrounds and other developed recreation sites in areas not identified as important habitat. - Locate recreational trails outside of important habitats. -Coordinate with, and use watershed improvement funds, to close and obliterate roads in important wildlife habitats, and in the restoration and protection of riparian areas. (C. Forest-wide Prescriptions, Wildlife and Fish – page 12)
213	Consult and cooperate with the NMGF to achieve goals and objectives specified in the New Mexico Wildlife, Fisheries and Endangered Species Comprehensive Plan. Cooperate with the U.S.FWS and other agencies and organizations as necessary. Cooperate with NMGF in evaluating proposals for reintroducing extirpated species into suitable habitat and on fish stocking and public access for fishing. (C. Forest-wide Prescriptions, Wildlife and Fish – page 12 & 13.
214	Manage in cooperation with NMGF for indigenous fauna. Exotic species will not be introduced. Unapproved exotics which become established on national Forest System Lands will be managed toward the goal of elimination. (C. Forest-wide Prescriptions, Wildlife and Fish – page 13)
215	Inventory riparian vegetation conditions and manage to achieve acceptable riparian standards. Direct habitat improvements may include planting, seeding, fencing, and rejuvenation of woody vegetation through selective cutting and burning. (C. Forest-wide Prescriptions, Wildlife and Fish – page 13)
216	Construct roads for timber sales utilizing Best Management Practices. Guidelines are 2.0 miles per square mile for construction first entry; 2.0 miles per square mile for reconstruction first entry; 4.0 miles per square mile for reconstruction 167 second entry (Management Area 4, page 2)
217	Improve drainage and surfacing on existing roads that will not be closed to improve riparian areas and reduce stream sedimentation with a guideline of 3.0 miles annually (Management Area 4, page 2)
218	On allotments designated for level D management, and big game winter ranges treat sagebrush to reduce density and create a seral grassland community. Reseed if ground cover prior to treatment is less than 30 percent. Do not treat black sagebrush (<i>Artemesia nova</i>). Treatment methods: <i>Burn</i> : When sagebrush cover is at least 20 percent density

	(herbaceous fuel is at least 600 lbs. per acre). <i>Herbicides</i> : When conditions aren't suitable for burning. <i>Mechanical</i> : When neither burning nor herbicides are feasible (Management Area 12 Sagebrush - range, page 2).
219	Manage to achieve acceptable riparian standards. (D. Management Area Prescriptions, 14. Riparian - page 1): - 80 percent of natural shade over water surfaces. - 80 percent of natural bank protection. -85 percent of stream substrate free of inorganic sediment. -60 percent of natural shade over land surfaces, for wildlife species. -60 percent of woody plant composition in three or more riparian species. -Three or more age classes of woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings and saplings. -A mosaic of tree diversity to include all stand conditions and basal area levels (up to the maximum possible for the site condition). -Have large diameter trees with ages up to 240 years. -Wildflowers will be along the roadways.
220	New borrow pits or long-term road material storage areas will not be permitted. (D. Management Area Prescriptions, 14. Riparian – page 3)
221	Locate new roads outside of the riparian type. If new roads are to be built, then erosion control measures utilizing Best Management Practices will be included. (D. Management Area Prescriptions, 14. Riparian - page 3)
222	If feasible, relocate or remove existing roads and trails or manage them with seasonal closures to minimize disturbance to wildlife. (D. Management Area Prescriptions, 14. Riparian – page 3)
223	Align crossings so that the minimum possible area is affected. Do not align roads to pass through the long axis of narrow riparian strips. Schedule construction activities during low water periods. Minimize road-clearing widths. (D. Management Area Prescriptions, 14. Riparian - page 3)
224	When essential habitat for threatened and endangered species is identified, coordinate activities for species concerned. (D. Management Area Prescriptions, 17. Wilderness - page 4)
225	Prohibit livestock grazing in the Arellano Canyon Proposed Research Natural Area. (D. Management Area Prescriptions, Management Area – 19, page 2.)
226	Prohibit all off road vehicle travel for the study for the Arellano Canyon Proposed Research Natural Area. (D. Management Area Prescriptions, Management Area – 19, page 2.)
227	When essential habitat for threatened and endangered species is identified, coordinate activities for species concerned. (D. Management Area Prescriptions, Management Area – 17, page4)
Cibola National Forest	
228	Manage for a diverse, well-distributed pattern of habitats for viable populations of wildlife and fish species in cooperation with states and other agencies. Apply technology and manage habitat to help recover threatened and endangered species and increase the productivity for

	existing native and desired non-native, vertebrate species consistent with other resource considerations. Resist introduction of exotics. (Page 33)
228a	Conduct production/utilization studies on all allotments twice per period on National Forest allotments. Make annual extensive allotment inspections. Prevent excess and unauthorized use (pg 56).
228b	Utilization levels of available forage production may vary by soil type, season of use, and type of management being applied. The following guidelines will be used to determine if management is appropriate to protect and/or enhance the resource (pg 56-1)
228c	The following guidelines will be used when scheduling implementation of new, revised, or updated Allotment Management Plans in the Forest Plan Implementation Schedule. Emphasis will be placed on the first guideline. Flexibility in rescheduling to take advantage of opportunities and changing conditions is needed and recognized: Problem allotments where unsatisfactory management, unsatisfactory range condition, or overstocking is occurring (pg 56-1)
228d	The following guidelines will be used when scheduling implementation of new, revised, or updated Allotment Management Plans in the Forest Plan Implementation Schedule. Emphasis will be placed on the first guideline. Flexibility in rescheduling to take advantage of opportunities and changing conditions is needed and recognized: Allotments properly stocked where range condition, trend and management are satisfactory but resource information and data need to be updated to accomplish planned monitoring (pg 56-1).
228e	The following guidelines will be used when scheduling implementation of new, revised, or updated Allotment Management Plans in the Forest Plan Implementation Schedule. Emphasis will be placed on the first guideline. Flexibility in rescheduling to take advantage of opportunities and changing conditions is needed and recognized: Properly stocked allotments where investments in range development are required to maintain an upward trend in range condition and obtain or continue an intensive management level (pg 56-1).
228f	Adjust permitted use to range capacity by Period 3. Capacity and permitted use are summarized below for Periods 1-5 (pg 57).
228g	Improve 50 percent of suitable range to its maximum potential condition class by the end of Period 3 (pg 58)
228h	Pinyon-juniper overstory removal will be accomplished through firewood harvest. Where public demand for firewood is not sufficient to permit the desired treatment scheduled to be met, firewood harvest does not achieve the desired management objectives, the stand does not provide suitable firewood or factors which are necessary to accomplish harvest are not available, other measures will be used. These measures will involve mechanical, fire or chemical treatment. However, no more than 20 percent of the acres identified for pinyon-juniper removal in each period will be treated by mechanical or chemical means (pg 58)

228i	New livestock water developments will provide for wildlife escape (pg 58).
228j	Fence new spring developments where needed to enhance cover for wildlife (pg 58).
228k	Require permittee maintenance of all Range improvements assigned in the grazing permit (pg 58).
229	ORV closures or restrictions will be implemented to protect resources from unpredictable damage. (Page 59)
230	Guideline. Establish buffers or other mitigation measures to protect and maintain riparian and wetland habitat. (Page 61-1)
231	Guideline. 1.i.(a). Maximum road density of 1.9 miles of road per square mile. (Page 61-1)
232	Guideline. 1.i.(c). Control sediment, particularly resulting from soil movement caused by roads. (Page 61-1)
233	Guideline. Protect habitat for T&E species of plants and animals. (Page 61-2)
234	Through the use of best management practices, the adverse effect of planned activities will be mitigated and site productivity maintained. These practices are determined (after problem assessment, examination of alternatives and appropriate review by local or state agencies and public participation) to be the most effective practicable means of preventing or reducing the amount of pollutants generated by non point sources to levels compatible with water quality goals. (Page 67-2)
235	1. Install water control structures and/or intercede on poor and very poor condition ranges where revegetation potential is moderately high to high on slopes less than 40 percent. (Page 67-2)
236	6. Construct or reconstruct roads to specifications that allow outsloping or water control structures at appropriate distances. Obliterate all temporary roads following activities. (Page 67-2)
237	7. Stream courses will be designated within timber sales to protect watershed values. The protection will include controls on skidding within riparian areas and along or across designated stream courses. (Page 67-2)
238	8. Skid trails and landings will be water barred, seeded, and closed following activities. (Page 67-2)
239	Rehabilitation will be applied when needed to minimize loss of site productivity following activities or wildfire. (Page 67-2) These measures include seeding with appropriate species to establish adequate effective ground cover and the construction of control structures where needed to control runoff. (Page 68)
240	Give preferential consideration to resources dependent on riparian areas over other resources when conflicts among uses arise. (Page 68)
241	Riparian areas should be managed toward meeting the following standards: Aquatic Resource: Shade. Maintain or provide shading over perennial and intermittent water surfaces that is at least 80 percent of

	natural levels (p 68).
242	Riparian areas should be managed toward meeting the following standards: Aquatic Resource: Bank Cover. Maintain or provide natural bank protection to at least 80 percent of natural levels. Give emphasis to the protection of stream bank stability provided by woody plant roots, particularly on outside bends of stream channel meanders (p 68).
243	Riparian areas should be managed toward meeting the following standards: Aquatic Resource: Streambed Sedimentation. Composition of sand, silt, and clays within streambeds should not exceed 20 percent of natural levels.
244	Riparian areas should be managed toward meeting the following standards: Vegetation Resource: Plant Composition. Maintain or provide 60 percent of woody plant composition in three or more riparian species or as appropriate for the site.
245	Riparian areas should be managed toward meeting the following standards: Vegetative Resource: Plant Structure. Maintain or provide at least three age class of riparian woody plants with at least 10 percent of the woody plant cover in the sprout seedling and sapling stages and 10 percent in the mature and overmature (p 68).
246	Riparian areas should be managed toward meeting the following standards: Aquatic Resources: Crown Cover. Maintain or provide crown cover of both trees and shrubs that is at least 60 percent of natural levels considering unit reaches of about 2 miles
247	Riparian areas should be managed toward meeting the following standards: Aquatic Resources: Ground Cover. Maintain or provide ground cover and litter as appropriate for site and overstory conditions.
248	Require Rural Electrification Administration (REA) specifications for raptor protection on permitted power lines during construction and reconstruction. (Page 68-3)
249	Conduct special wildlife habitat studies for specific species, 32 studies/decade. Initial studies will concentrate on habitat requirements for Federally and State listed flora and fauna. After these species are completed, data will be compiled for lesser known nongame species on the Forest and National Grasslands. (Page 69)
250	Manage threatened and endangered species habitat to achieve delisting consistent with recovery plans and goals established by the US Fish and Wildlife Service. Manage sensitive species habitat to maintain population viability within the National Forest. (Page 69)
251	Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species. (Page 70)
252	All vegetation manipulations will be coordinated with T&E species requirements. (Page 70)
253	Studies by appropriate, qualified personnel will be conducted to

	ascertain suitability of reintroduction of endangered, threatened, proposed, and state listed native species to suitable habitat where not presently occupied.
254	Consult with appropriate agencies and specialists on all proposed activities, modifications, and other commitment of lands within known habitat of peregrine, bald eagle, Zuni Bluehead sucker, and threatened, endangered or sensitive plants, and historical range of black footed ferrets. (Page 70)
255	When management practices are proposed in listed or proposed species habitat, evaluate the need for consultation or conference with the Fish and Wildlife Service and appropriate State Agency. (Page 70)
256	Forage improvement activities and population control projects will not be permitted on areas with prairie dog towns larger than 15 acres without prior evaluation by the Forest Wildlife Biologist to protect potential black-footed ferret habitat. (Page 70)
257	In consultation with the Fish and Wildlife Service, develop site-specific forage utilization levels (Page 63-7).
258	Monitor management practices within occupied and potential habitat of plants listed as threatened, endangered, or on the Regional Forester's Sensitive Plant List. Manage sensitive species to sustain viability and prevent the need for listing as threatened or endangered. (Page 71-9)
259	Mineral Leasing Category. Control surface uses in mineral operations through plans of operation and permits which provide for: protection of water quality and watershed values; monitoring of pertinent water quality constituents when water quality is adversely affected by mining activities; reclamation to use surface resource opportunities afforded by mine contours, roads and facilities, or reclamation to original or characteristic contours (when practicable); and reforestation or revegetation with appropriate species to attain soil stability and protect threatened, endangered and sensitive species. (Page 73)
259a	Act on plans of operation for locatable minerals within 30 days (pg 72).
259b	Mining operations shall be conducted as to minimize adverse environmental impacts. Operations will be controlled by means of FS approval of plans of operations and by periodic inspection of the operation (pg 72).
260	The following waters are closed to recreational prospecting that involves mechanized suction dredging and mechanized sluicing as per Permit Number NM OYT 0315A dated October 27, 1983, issued by Albuquerque District of the Corps of Engineers. This permit expires on October 26, 1988. 1. Zuni River All perennial reaches of the main stem and its tributaries in McKinley and Cibola Counties. (Page 74)
261	Classify private lands as desirable for acquisition in period 1 according to the following priorities: 1. Lands in Wilderness, 2. Lands for T&E species, 3. Lands containing cultural resources, 4. High recreation potential, 5. Productive lands, 6. Consolidate ownership to improve management. (Page 75)

262	Manage area to Level A. No livestock will be allowed except for recreation pack and saddle stock. (Page 81)
263	Close designated areas to public entry to protect T and E species during key use period (March 15 - August 15), (page 83)
264	Wildlife diversity and population viability will be maintained or improved through habitat management using such tools as prescribed fire, timber or fuelwood harvest, or structural improvements to attain identified goals and objectives for the management area. Page 84.
265	Manage area at Level A. No commercial livestock will be allowed except for recreation pack and saddle stock. (Page 85)
266	Leave existing snags and create additional, if needed, to average three snags/acre. Within two chains of water leave or create an average of five snags/acre. Snags will be created by girdling damaged, poorly formed, cull or dying trees. (Page 88-1)
267	Apply uneven age management where appropriate to achieve site specific resource needs. (Page 89)
268	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. Page 90.
269	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway obliteration. Roads will be obliterated at the following rates in Period 1. 35.8 miles of local roads. (Page 92).
270	Manage Cedro Canyon, between Otero Canyon and Big Block Trailheads, as a special area featuring riparian ecosystems and heritage resources. The emphasis on trail use shall be as an environmental discovery experience. Restore meadows in David Canyon where tree encroachment is occurring and create openings where meadows historically existed. (Page 92).
270a	Manage range lands at or above the following intensity levels: Period 1 --Level A: 3,324 acres; Level B: 41,448 acres; Level X: 55,235 acres (pg 95)
270b	Adjustments will occur during periods 2 through 4 so that by period 5 management or rangelands will be at or above the following intensity level: Level A 3,324 acres; Level B 96,683 acres (pg 95).
270c	Through development of improved allotment management plans, the full capacity rangelands in unsatisfactory condition will be treated. The treatments will include, but may not be limited to: 1. Structural range improvements; and 2. correction of stocking problems which include

	reduction in permitted use in those instances where management will not correct the unsatisfactory condition (pg 95).
270d	Construction, replacement and maintenance of structural range improvements will be to standards identified in the R-3 Range Structural Handbook. These will be directed toward improvements that correct management problems. Replacement of structural improvements is planned on a recurring basis of 20-30 years for waters and 40 years for fences. Maintenance of structural improvements will be scheduled on a planned basis that is defined in the allotment management plan or annual operation plan. Maintenance will continue until replacement is scheduled (pg 96).
270e	Improvements should, to the extent possible, blend into the wilderness character (pg 96).
270f	Structural Range improvements will be constructed and/or replaced at the following rate: 3 miles of fence per period in periods 1 through 4; 2 waters per period in periods 1 through 4; 3 storage-drinkers per period in periods 1 through 4; and 1 mile of pipeline per period in periods 1 through 4 (pg 96).
270g	Oil and gas leasing is prohibited within the designated wilderness (pg 98).
271	Maintain 100,007 acres of wilderness closed to ORV use as required by wilderness designation. (Page 98).
272	Management Emphasis: Wildlife value are an important management concern. Range activities will be compatible with wildlife habitat needs. Wildlife habitat carrying capacity will increase through structural and nonstructural habitat improvements. (Page 99)
273	All units of the Black Kettle National Grasslands are closed to motor vehicle entry except for roads signed open. (Page 101)
274	All mature and over-mature trees within 20 feet of the shoreline of Lake Marvin and McClellan will be retained for bald eagle roosts except those determined to be a hazard to human safety or dam structural stability. Consideration will be given to reestablishing or preserving younger trees to replace roost trees that will eventually die out and be removed. Page 103. Amendment No. 4, May 29, 1990
275	Monitor management practices within occupied and potential bald eagle habitat and evaluate impacts. Page 103. Amendment No. 4, May 29, 1990
276	Monitor watershed Improvements where necessary repair or protect structures. Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway obliteration. Roads will be obliterated at the following rates In Period 1. 50.8 miles of local roads. (Page 103)
277	Manage Canadian River Canyon to preserve its wild, scenic or recreation river potential . As the opportunity becomes available, acquire private lands within the Canadian River Canyon area to

	preserve the unique qualities of the river. (Page 107)
278	Recommend leasing oil and gas for Canadian River Canyon with no surface occupancy stipulations. (Page 108)
279	Management Emphasis: Wildlife habitat and species diversity will be maintained within the management area, particularly for Federal and State listed species. (Page 109)
280	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. (Page 113)
281	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway obliteration. (Page 115)
282	Manage the road system for an average road density of 0.3 miles of road per square mile in active timber harvest areas. (Page 115)
283	For proposed recreational developments: g. Protect endangered plants, animals and critical habitat, in consultation with the State Natural Resources Department, Department of Game and Fish, and U.S. Fish and Wildlife Service. Page 120-2 and 120-3
284	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. (Page 123)
285	Road management will be applied to obliterate poorly located or constructed roadways. This treatments being applied to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration and use of gates for seasonal and temporary closures. (Page 124)
286	Management Emphasis: Primary emphasis is on wildlife, especially those species favoring late successional stage vegetation. (Page 127)
287	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests.

	(Page 123)
288	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. (Page 131/132)
289	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. (Page 137)
290	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 8.7 miles of local roads in Period 1. (Page 139)
290a	Manage rangelands at or above the following intensity levels -- Period 1: Level A--8,311 ac; Level B--33,294 ac; Level X--30,788 ac (pg 141).
290b	Adjustments will occur during periods 2 through 4 so that by period 5 management or rangelands will be at or above the following intensity level: Level A 8,311 acres; Level B 64,082 acres (pg 141).
291	Management Emphasis: Provide and maintain wildlife habitat diversity and old growth. (Page 141)
291a	Full capacity rangelands in unsatisfactory condition will be treated through development of improved allotment management plans. The treatment identified will include, but may not be limited to: 1) structural range improvements, and 2) correction of stocking problems, which includes reduction in permitted use where necessary (pg 142).
291b	Condition class of full capacity rangelands may decline during period 1 but will not decline further throughout the remainder of the planning horizon (pg 142).
291c	Construction, replacement and maintenance of structural range improvements will be to standards identified in the R-3 Range Structural Handbook. These will be directed toward improvements that correct management problems. Replacement of structural improvements is planned on a recurring basis of 20-30 years for waters and 40 years for fences (pg 142).
291d	Maintenance of structural improvements will be scheduled on a planned basis that is defined in the allotment management plan or annual operating plan. Maintenance will continue until replacement is scheduled (pg 142).
292	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are

	no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. (Page 146)
293	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 94.7 miles of local roads in Period 1. (Page 146)
293a	Manage the following average road densities: 1.9 miles of road per square mile (analysis area 14); 1.2 miles of road per square mile (analysis area 15); two to three miles of road per square mile in active timber harvest areas (temporary - in analysis areas 14 and 15) (pg 147).
294	Management Emphasis: Provide and maintain wildlife habitat diversity and old growth. (Page 149)
294a	Manage rangelands at or above the following intensity levels -- Period 1: Level A--1,776 ac; Level B--1,542 ac; Level C--639 ac; Level X--3,030 ac (pg 149). Adjustments will occur during Periods 2-4 so that by Period 5 rangeland will be at or above the following levels: Level A -- 1,776 ac; Level B -- 2,890 ac; Level C -- 639 ac; Level X -- 1,682 ac (pg 150)
294b	Full capacity rangelands in unsatisfactory condition will be treated through development of improved allotment management plans. The treatment identified will include, but may not be limited to: 1) structural range improvements, and 2) correction of stocking problems, which includes reduction in permitted use where necessary (pg 150).
294c	Condition class of full capacity rangelands may decline during period 1 but will not decline further throughout the remainder of the planning horizon (pg 150).
294d	Construction, replacement and maintenance of structural range improvements will be to standards identified in the R-3 Range Structural Handbook. These will be directed toward improvements that correct management problems. Replacement of structural improvements that correct management problems. Replacements are planned on a recurring basis of 20 to 30 years for waters and 40 years for fences (pg 150).
294e	Maintenance of structural improvements will be scheduled on a planned basis that is defined in the allotment management plan or annual operating plan. Maintenance will continue until replacement is scheduled (pg 150).
294f	Structural Range improvements will be constructed and/or replaced at the following rate: 2.5 miles of fence per period in periods 1 through 4; 1 water per period in periods 1 through 4; 1 storage-drinker per period in periods 1 through 4; and 0.5 mile of pipeline per period in Periods 1

	through 4 (pg 151).
295	Habitat requirements for threatened, endangered, and sensitive species will take precedence over insect and disease control. Where there are no conflicts with TES species habitat requirements, all silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe infected trees during intermediate and regeneration harvests. (Page 154)
296	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 17.4 miles of local roads in Period 1. (Page 155/156)
296a	Manage the average road densities indicated below: 1.7mile of road per square mile (analysis area 16); 1.2 mile of road per square mile (analysis area 17); 2-3 miles of road per square mile (temporary) in active timber harvest areas (analysis areas 16 and 17) (pg 156-157).
297	Management Emphasis: The primary emphasis is on wildlife management activities. (Page 158)
297a	Construction of new and replacement of structural range improvements will be to standards identified in the Range Structural Handbook. They will be directed toward improvements that correct management problems. Replacement of structural improvements is planned on a recurring basis of 20-30 years for waters and 40 years for fences (pg 158).
298	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 115.3 miles of local roads in Period 1. (Page 160)
299	Management Emphasis: Wildlife habitat will be enhanced through structural and nonstructural improvements and from integrating range and firewood management activities with wildlife habitat needs. Zuni Bluehead Sucker habitat will be protected. (Page 163)
300	The use of direct investment and management changes will be used in watershed projects. Direct watershed treatments will be applied on lands suitable for revegetation with slopes less than 40 percent where current range condition is poor or very poor. This treatment is being applied to improve watershed condition and reduce soil loss. It may consist of water spreading, shaping, and/or seeding and will conform to accepted methods. Indirect methods will also be applied to watersheds to improve effective ground cover. These may consist of controlling impacts through management by allocating grazing capacity to only moderately high or high condition range. 32,232 acres will be treated per period in Periods 1 and 2 on Mt/. Taylor. (Page 170)

301	Riparian treatments will be applied to areas of low to moderately low condition. This treatment may consist of protection or management fencing with seeding and/or plantings. These treatments are applied to improve watershed condition and water quality by reducing direct sedimentation. Treatments will conform to accepted methods such as seeding, planting and protection fencing. (Page 170)
302	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration and use of gates for seasonal and temporary closure.. Obliterate roads at the following rates: 354.9 miles of local roads in Period 1. (Page 170)
303	Complete protection fencing of habitat occupied by Zuni Bluehead Sucker in Radosevich Creek. Stream having potential to provide habitat for Zuni Bluehead sucker (e.g., Tampico Draw, Dean Creek, Grasshopper Creek and others) may also be fenced to restore riparian vegetation and perennial water. Fencing will be built in accordance with standards established in the range handbook. Fencing will be coordinated with watershed and range riparian restoration work. Fence three acres with wildlife funds and 70 acres with range and watershed funds. Work will be completed within first three years following plan implementation. Maintain fencing annually. Activities having a detrimental effect on sucker habitat will be modified so as not to impact the species. The existing livestock may be permitted to graze within the fenced areas if this is determined not to have a detrimental impact on the Zuni Bluehead sucker habitat. Page 172
304	Efforts will be made to acquire private lands containing existing or potential Zuni Bluehead sucker habitat. Actions identified in the Zuni Bluehead sucker Habitat Management Plan will be carried out. The Zuni Bluehead sucker Habitat Management Plan will be updated by 1985 to incorporate new knowledge regarding the species and its habitat. Determine limiting factors of Zuni Bluehead Sucker habitat and prescribe actions to reduce their effects. Assist New Mexico Department of Game and Fish in carrying out transplant operations to establish or supplement Zuni Bluehead Sucker populations. Page 172
305	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration and use of gates for seasonal and temporary closure.. Obliterate roads at the following rates: 219.5 miles of local roads in Period 1. (Page 180)
305a	Full capacity rangelands in unsatisfactory condition will be treated through development of improved allotment management plans that intensity livestock management. The treatment identified will include,

	but may not be limited to: 1) structural range improvements, 2) non-structural range improvements, and 3) correction of stocking problems, which includes reduction in permitted use where necessary (pg 183).
305b	Condition class of full capability rangelands will not decline below existing levels during Period 1. During Periods 2 through 5 vegetation condition class will improve as stocking and management corrections are made (pg 183).
305c	Construction of new and replacement of structural range improvements will be to standards identified in the Range Structural Handbook. They will be directed toward improvements that correct management problems. Replacement of structural improvements is planned on a recurring basis of 20-30 years for waters and 40 years for fences (pg 183).
305d	Non-structural range improvements will be accomplished on slopes less than 15 percent with moderate to high productivity potential. Overstory removal of pinyon/juniper, rabbitbrush control, and shinnery oak control will occur where an increase in the forage base for livestock and wildlife can be achieved. Seeding where necessary will be included. Non-structural range improvements will be accomplished in Periods 1 & 2. Retreatment of sites treated in Periods 1 & 2 will be accomplished as necessary. where applicable, pinyon/juniper treatments occurring in Periods 1 & 2 will be scheduled for retreatment every two decades after the initial treatment (pg 184).
305e	Tools available are prescribed burning, mechanical and chemical treatments, forest product harvesting, and livestock management or a combination of these. Tool selection will be based on cost effectiveness and soil conditions.
305f	Retreatment of pinyon/juniper overstory removal which occurs in Periods 1&2 or which occurred in 1950-1970 decades will be done where: 1. The objective for the area is to maintain an open savanna grassland to provide a continual forage base for livestock and wildlife and improve watershed condition. 2. Retreatment can be scheduled 5 years prior to losing the original investment. When a decision is reached not to retreat areas of pinyon/juniper overstory removal, the site will be allowed to return to a stocked stand. 3. Diversity of the pinyon/juniper vegetation type is maintained on the allotment (pg 184-1).
305g	Structural range improvements will be constructed/replaced at the following rate: 38 water per period in Periods 1 through 4; 38 storage-drinkers per period in Periods 1 through 4 (pg 184-1).
305h	Nonstructural range improvements will be accomplished at the following rate: 2,304 acres of pinyon-juniper overstory removal in Periods 1 and 2; 7,000 acres of brush control and/or reseeding per period in Periods 1 and 2; Approximately 2,230 acres of rabbit brush will be treated per period (pg 184-1)
305i	Structural range improvements will be constructed/replaced at the

	following rate: 19 miles of fence per period in Periods 1 through 4; 10 waters per period in Periods 1 through 4; 11 storage-drinkers per period in Periods 1 through 4; and 6.5 miles of pipeline per period in periods 1 through 4 (pg 184-1).
305j	Nonstructural range improvements will be accomplished at the following rate: 915 acres of pinyon-juniper overstory removal in Periods 1 and 2; 2,475 acres of brush control and/or reseeding per period in Periods 1 and 2; Approximately 825 acres of rabbit brush will be treated per period (pg 185).
305k	Manage rangelands at or above the following intensity levels in Period 1: Level B--163,273 ac; Level C -- 102,558 ac; Level D -- 18,799 ac; Level E --30,690 ac; Level X -- 141, 759ac (pg 182)
305l	Adjustments will occur during Periods 1 through 4 so that by period 5 management of suitable rangelands will be at or above the following intensity levels: Level B --163,236 ac; Level C -- 9,622 ac; Level D-- 82,246; Level E -- 160,240; Level X -- 41,735 ac. (pg 183)
306	The use of direct investment and management changes will be used in watershed projects. Direct watershed treatments will be applied on lands suitable for revegetation with slopes less than 40 percent where current range condition is poor or very poor. This treatment is being applied to improve watershed condition and reduce soil loss. It may consist of water spreading, shaping, and/or seeding and will conform to accepted methods. Indirect methods will also be applied to watersheds to improve effective ground cover. These may consist of controlling impacts through management by allocating grazing capacity to only moderately high or high condition range. Periods 1, 2 - treat 909 acres per period. (Page 189/190)
307	Riparian treatments will be applied to areas of low to moderately low condition. This treatment may consist of protection or management fencing with seeding and/or plantings. These treatments are applied to improve watershed condition and water quality by reducing direct sedimentation. Treatments will conform to accepted methods such as seeding, planting and protection fencing. (Page 190)
308	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 299.0 miles of local roads in Period 1 (pg 190).
308a	Manage the average road densities indicated below: 0.3 mile of road per square mile (analysis area 25); 1.0 mile of road per square mile (analysis area 26); 1.4 mile of road per square mile (analysis area 27); 1.0 mile of road per square mile (analysis area 28); 1.0 mile of road per square mile (analysis area 29); 1.3 miles of road per square mile (analysis area 30) (pg 192)
309	Management emphasis will be to improve wildlife habitat diversity and decrease the threat of escaped wildfire..... (Page 193)

310	Road management will be applied to obliterate poorly located or constructed roadways to improve watershed condition and reduce soil loss. Management will take the form of standard roadway prescriptions for obliteration. Obliterate roads at the following rates: 38.0 miles of local roads in Period 1. (Page 197)
Coconino National Forest	
311	S&G Pursue instream flow rights when existing rights are lacking or inadequate in order to protect recreation interests. Page 52-3
312	S&G Coordinate trail management, use, and development with other resource management considerations. Page 55
313	S&G Manage areas for public safety, resource protection, compliance checks, and capacity monitoring. Dispersed areas are kept clean for aesthetics, health, and safety. Areas damaged due to use are closed and restored as necessary. Page 57
314	S&G Initiate Code-A-Site inventory system Forest-wide to track and prevent potential resource damage due to overuse of dispersed areas. Page 58
315	S&G Annually review and update the Off-road Driving Implementation Schedule; amend the implementation schedule as needed to prevent resource damage and/or user conflicts. Areas are closed to off-road driving when adverse resource impacts occur, when conflicts with the minimum management requirements occur, or if areas are too sensitive to withstand driving. The annual implementation schedule will provide for removal of forest products on administered sales. Page 58
316	S&G Monitor motor vehicle use to determine the effectiveness of the Off-road Driving Implementation Schedule. Repair damage where cost effective and unacceptable environmental damage is occurring. Implement appropriate measures to prevent or minimize damage. Page 58
317	S&G Areas closed to off-road driving at the beginning of the planning period are identified on the Off-road Driving Management Plan Map. Restrictions may be year-round or seasonal. There may be other restricted areas in the future that are not yet identified. Opportunities for recreational off-road driving will be considered in the road closure planning process. For example, existing roads which have eroded to a rock surface and are not likely to continue to erode may be left open and managed as motorized trails to provide a challenging driving experience when determined appropriate through an environmental analysis. These trails are signed for off-road vehicles and are not part of the regular road system. They are not included when calculating the average road density per mile, but should be considered in evaluating wildlife habitat. Page 58-59.
318	The following criteria are used to evaluate the need for future closures or restrictions: - Soils that are receiving, or are expected to receive, damage to the extent that soil productivity will be significantly

	impaired; - slopes exceeding 40 percent where high probability for damage exists; - Riparian areas being threatened or damaged; - Meadows likely to be or being damaged; - Areas adjacent to stream courses where potential for sedimentation is high; - areas within watercourses or wetlands (permanently or intermittently wet); - habitat for threatened, endangered, or sensitive species that is threatened; - Key wildlife areas being threatened or damaged; - Areas important to wildlife reproduction, such as, fawning or nesting areas, where disturbance is causing, or likely to cause, significant stress and reduction of reproductive success; - dispersed recreation areas where conflicts exist. Page 58-59.
319	S&G Implement off-road driving restrictions in areas where roads are closed or obliterated and restrictions are necessary to prevent reopening of the roads by motor vehicle users. Page 60
320	S&G Trailheads are located to screen and protect water sources and to prevent harassment to wildlife that use the waters. Page 61
321	<u>Standard</u> Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species. Follow approved recovery plans. Page 64
322	S&G Inventory and evaluate wildlife and fish habitat. Use the best available and resource data and technical expertise to identify habitat objectives and prepare implementation schedules for key habitats. Page 64
323	S&G The riparian standards apply to areas meeting the riparian definition even though the sites may not have been large enough to be mapped as a discrete unit. Page 64
324	S&G Inventory, evaluate, and prepare recovery schedules for proposed, T&E, and sensitive plant and animal species in the first decade or as species are proposed. Monitor approved schedules, reproductive success, and effects of management activities at occupied threatened, endangered, and sensitive species sites. Reintroduce T&E species in accordance with recovery plans. Page 64
325	S&G Evaluate potential resource impacts on T&E and sensitive species habitat by projects and activities through a biological assessment (FSM 2670) and conduct appropriate consultation (FSM 2670) when necessary. Provide appropriate protection or enhancement. Page 64-1
326	S&G <u>Hedeoma diffusum</u> and <u>Senecio franciscanus</u> are managed by the direction presented in the management plans prepared for each species. <u>Hedeoma diffusum</u> is covered by the <u>Hedeoma diffusum</u> Management Plan and <u>Senecio franciscanus</u> by the San Francisco Peaks Alpine Tundra Management Plan, which are both adopted by the Forest Plan. Page 65
327	S&G Provide appropriate law enforcement to protect habitat for listed

	species. Page 65
328	S&G Give priority to maintaining structures for threatened and endangered species. Page 65-12
329	S&G Determine whether structural improvements are needed. Maintain structural improvements in operable condition or replace. Page 65-12
330	S&G Protect occupied <u>Cimicifuga arizonica</u> habitat. Restrict ground disturbing activities within the habitat and provide shade needed for perpetuation of the species. Fence and/or relocate trails where necessary to protect occupied habitat. Page 65-12
331	S&G Consult and cooperate with Arizona Game and Fish Department (AGFD) to at least achieve habitat management goals and objectives specified in the Arizona Wildlife and Fisheries Comprehensive Plans and strategic plans. Work with AGFD to fully consider opportunities for increasing habitat capacity above the objectives specified in the Comprehensive Plans and strategic plans. Where habitat capacity can reasonably be increased above the objectives specified in the Comprehensive Plan without adversely affecting other resources and uses, work with AGFD to fully consider these opportunities. Implement where determined appropriate through the environmental analysis process. Cooperate with the Fish and Wildlife Service and other agencies and organizations as the need arises. Cooperate with AGFD in evaluating proposals for reintroducing extirpated species into suitable habitat and on fish stocking and public access for fishing. Cooperate with the AGFD to prevent and/or remove <u>unapproved</u> introduced species. Page 65-12
332	S&G Improve vegetation conditions through seeding a mixture of species of grass, forbs, forage, and browse species desirable to wildlife. Page 66
333	S&G Improve forage conditions by using prescribed fire where environmental analysis shows beneficial effects and in line with approved burning plans. Page 66
334	S&G Manage forage to increase threatened and endangered species and management indicator species where it is determined appropriate through the IRM and NEPA process. Page 66
335	S&G Install structures, such as gates or barriers, necessary to manage roads to limit or restrict access into key big game winter range and bald eagle nesting and wintering areas. Follow with appropriate administration and enforcement. Page 66
336	S&G Permitted use and capacities are maintained in balance for the allotments by increasing or decreasing numbers of livestock, by changing the management intensity levels, and by initiating changes in livestock class, season of use, and rotation patterns. Page 67
337	S&G Revise and update AMP'S at least every 10 years to the Regional standards in FSH 2209.21. Management systems are designed to provide multiple-use management. The integrated resource

	management (IRM) approach is used during the environmental analysis of AMP's. The scoping portion of IRM will include an interdisciplinary analysis with input from potentially affected and interested parties. Issues that are significant and need to be included in further analysis will be identified. As a minimum the following areas will be considered to determine whether they contain significant issues: range condition, riparian condition, watershed condition, economic feasibility, practicality of implementation, wildlife habitat, recreation opportunity spectrum, timber management, and resource access and travel management. Page 67
338	S&G Manage grazing use to maintain or enhance condition classes of full capacity rangelands. Page 68
339	S&G Full capacity rangeland in unsatisfactory condition that has potential for improvement is treated through appropriate structural and nonstructural range improvements and pasture stocking rate adjustments as described in the AMP'S. Page 68
340	S&G Inventory transitory range resulting from timber harvest and firewood cutting during the allotment planning process, and assign capacity where appropriate. Page 68
341	S&G Salt is used to help achieve proper livestock grazing distribution. Permanent salt is not placed within 1/4 of a mile of the edge of any riparian area or tree plantation. Temporary salting may be approved if it will help to achieve a specific management objective for enhancement of riparian areas. Page 68
342	S&G Analyze range structural improvements to determine whether they are needed during the preparation of the AMP'S. Reconstruct only those improvements that are needed. Remove improvements no longer needed and restore the area as appropriate, e.g., old fence is picked up and removed, discontinued fences are completely removed, and ineffective stock tanks returned to production following transfer of water rights. Page 68
343	S&G Establish woody riparian vegetation as defined in FSH 2509.23 in wet meadows and other riparian areas. Control livestock grazing through management and/or fencing to establish vegetation and eliminate overuse. Page 69
344	S&G Manage all seeding projects to avoid concentrating livestock use in riparian and other sensitive areas. Page 69
345	S&G Habitat requirements for threatened, endangered, and sensitive species take precedence over insect and disease control. Page 70
346	S&G Cuts are designed to eliminate or reduce dwarf mistletoe infections to manageable levels. Page 70
347	S&G Use pesticides when they are legally available, environmentally acceptable, and are the most cost-efficient means of preventing or suppressing damaging pest outbreaks. Page 70
348	S&G Establish and maintain stand diversity through ISM to provide suitable habitat for wildlife in lands suitable for timber production,

	while maintaining or enhancing timber resource production and timber age class distribution (regulation). See specific management areas for Standards and Guidelines. Page 70
349	S&G Standards and Guidelines are applied on a 10K Block basis rather than on an individual timber sale or project basis. Page 70
350	S&G Minimum Management Requirements are exceeded where it is good multiple-use management to do so, such as greater density of snags adjacent to meadows, riparian areas, and key water sources. Page 70-3
351	S&G Wildlife habitat objectives for each 10K Block are evaluated on an individual stand basis as well as for the entire block. Page 71
352	S&G Evaluate the need for wildlife forage in the 10K Blocks using the Habitat Capability Index, other available data and professional judgment and, where needed, adjust prescriptions to obtain it. These areas are stands of up to 10 acres with reduced GSL. Page 71
353	S&G Ensure compliance with PL 92-500 "Federal Water Pollution Control Act" and Arizona Water Quality Standards through the implementation of Best Management Practices (BMP) to prevent water quality degradation. Page 71
354	S&G Use project monitoring information to evaluate BMP'S currently used to reduce nonpoint pollution from activities on the Forest. BMP'S include project planning as well as on the ground measures. By 1995, develop guidelines for implementation of BMP'S on the Forest. In the interim period, a general list of BMP'S has been included below. Apply these practices, depending on individual project and site requirements, to reduce nonpoint source pollution and protect riparian areas. Page 71
355	S&G Plan for appropriate filter strips adjacent to streamcourses and/or riparian areas, as determined through the IRM process. A filter strip is an area of vegetation and forest litter located adjacent to streamcourse and/or riparian areas for the purpose of filtering sediment, providing bank stability, and in tree/shrub ecosystems providing shade for fisheries habitat. The ability of the strip to trap and filter sediments is a function of the amount and type of material on the ground, and width and slope of the strip. The ability of the strip to provide shade over perennial streams is dependent on the height of the vegetation and orientation of the stream with respect to the sun. Significant topographic changes, such as abrupt canyon edges may be used as boundaries for filter strips, as long as ground disturbing activities beyond the canyon walls do not influence water quality (p 71).
356	S&G FILTER STRIP TABLE - NON RIPARIAN STREAMCOURSES: Erosion hazard is defined as the risk of erosion and sedimentation that is based on slope, soil type, and the amount and type of material on the ground that is able to trap eroded material (pg 71). Severe - 1.5 chains on each side of stream course; moderate - 1.0 chains on each side of streamcourse; slight - 0.5 chains on each side of

	streamcourse; limited skidding may occur within the filter strip of nonriparian streamcourses as long as the ability to function as a filter strip is maintained; landings, decking areas, machine piling, skid trails, and roads (except at designated crossings) are planned outside of the filter strip of non riparian streamcourses. Page 72
357	S&G FILTER STRIP TABLE - RIPARIAN STREAMCOURSES: severe - 2.0 chains on each side of streamcourse; moderate - 1.5 chains on each side of streamcourse; slight - 1.0 chains on each side of streamcourse; Directional falling and end-lining of logs out of the filter strip without crossing the streamcourse may occur; Landings, decking areas, machine piling, limited skidding, skid trails, and roads (except at designated crossings) are planned outside of the filter strip of riparian streamcourses. Page 72
358	S&G Streamcourses: Designate stream courses and riparian areas to receive protection during projects such as timber sales and road work. As a minimum, those streams shown on 7 1/2 minute quads as stream courses are evaluated for the need to be designated stream courses. Page 72
359	S&G Streamcourses: Existing wood debris in stream channels is not disturbed unless designated for removal as a special project to improve channel conditions (p 72).
360	S&G Streamcourses: Logging and other debris that gets into stream channels is removed to above the high water mark before winter rains and snows begin except when an environmental analysis shows that debris can be effectively used to improve fisheries habitat (p 72).
361	S&G Streamcourses: Locate new roads out of stream courses and water-collecting features such as swales. Relocate roads out of bottom positions and obliterate poorly located segments as they are identified (p 72).
362	S&G Streamcourses: Provide adequate road drainage to prevent concentrated flow and sedimentation (p 72).
363	S&G Streamcourses: Maintain at least 80 percent of the potential crown cover in the riparian area (p 72).
364	S&G Streamcourses: Plan projects, parts of projects, and/or management practices for soil and water resources improvement where watershed condition is unsatisfactory. Incorporate plans for soil and water improvements into project planning for other resources (p 72).
365	S&G Use the following BMP techniques to minimize sedimentation from road construction and reconstruction: - Outslope road surface; - Leadout ditches and relief culverts; - Energy dissipators on culverts; - Vegetating cut and fill slopes; - Riprap installation; - Rolling grade. Page 72-A
366	S&G Inventory riparian communities and areas capable of supporting riparian species by the end of the first decade. Channel condition and aquatic habitat condition will be included in the survey. Plan and design projects in areas of unsatisfactory or degraded condition to

	<p>promote channel and streambank stability and to improve flow and timing of water. Meet or exceed eighty percent of Regional requirements above the Rim and ninety percent below the Rim by 2030. Manage to achieve at least 25 percent of the currently unsatisfactory riparian areas will be in satisfactory condition by 2000. Page 73</p>
367	<p>S&G Assure compliance with Executive Order 11990, protection of wetlands: - Locate roads out of wetlands; Locate skid trails and decks out of wetlands. Page 73</p>
368	<p>S&G Assure compliance with Executive Order 11988, floodplain management: - Conduct flood hazard evaluations (100 year flood plain) on all potential land exchanges; - Design structures built in drainages to meet appropriate flood occurrence intervals. Page 73</p>
369	<p>S&G Inspect areas proposed to be treated with chemical agents such as pesticides and herbicides to ensure that surface or ground water contamination does not occur. Page 73</p>
370	<p>S&G Evaluate the need to monitor water quality from areas disturbed by management and use activities. Conduct monitoring where needed to assure compliance with the Arizona State Water Quality Standards and P.L. 92-500. Page 73</p>
371	<p>S&G Conduct water quality monitoring of primary contact recreation sites to standards of FSM 2540 and Arizona Water Quality Standards for full body contact waters (swimming and wading). Conduct monitoring as necessary to assure compliance with standards for aquatic life and wildlife where known problems are occurring. Page 73</p>
372	<p>Take action to legally protect Forest uses of needed waters. Page 74</p>
373	<p>S&G File for water rights on appropriable waters following State procedures. Complete all documentation required for the adjudication process by dates specified by the courts. Page 74</p>
374	<p>S&G Take action to obtain instream flow water rights for fish, wildlife, recreation, and channel maintenance purposes: - For nonappropriable water uses, check for compliance with Arizona Revised Statutes and R-3 guidelines; - Participate in State water right adjudications; - Secure water rights through purchase or severance-and-transfer when additional sources are needed; - Maintain and update annually an inventory of all water uses on the Forest (WURR). Page 74</p>
375	<p>S&G Maintain current satisfactory watershed conditions and improve any unsatisfactory conditions to satisfactory by 2020. Page 74</p>
376	<p>S&G Implement resource improvement projects that are cost-effective and/or are beneficial for maintaining and improving water quality, quantity, and soil productivity. Priority is given to vegetative versus structural measures. On those areas where grazing occurs, projects are only done where there is an approved AMP. Treated areas are protected by grazing management, fencing, and/or other methods, until recovery is satisfactory. On those areas where grazing occurs, management will be evaluated and modified if necessary to be</p>

	consistent with the objectives of the improvement project. In project planning evaluate the need for planting nonpalatable herbaceous and woody vegetation to discourage concentration of elk and livestock. Page 74
377	S&G Implement emergency fire rehabilitation measures where necessary to protect soil and water resources from intolerable losses or to prevent unacceptable downstream damage. Page 75
378	S&G Enhance watershed condition by obliterating roads causing resource damage. A total of 400 miles of roads will be obliterated by the end of the first decade (average of 40 miles annually). Page 75
379	S&G Evaluate the need for maintenance and, where appropriate, do maintenance to protect investments in water resource improvement projects as needs are identified. Page 75
380	S&G Recommend to the Department of Interior the mineral withdrawals, retentions, revocations, and modifications identified under activity J04 by 1988. These withdrawals are all the Forest special areas currently identified as justifying a mineral withdrawal. Page 76
381	S&G Notices of Intent, Operating Plans, and EA's/EIS's are used to manage the beneficial and adverse effects from mining activities. Page 76
382	S&G Conduct environmental analysis for mineral projects. Apply Standards and Guidelines recognizing the distinction between temporary or short-term impacts usually associated with exploration activities and the long-term impacts usually associated with mineral development. Emphasize planning to avoid or repair adverse effects on riparian-dependent resources, channel morphology, and/or streambank stability. Page 76
383	S&G Mineral projects meet NEPA requirements. Future EA'S/ EIS'S from other resource areas receive appropriate input from minerals resource. Surface resource projects and plans which have potential for conflict with the development of the minerals resource, such as wildlife implementation schedules, T&E recovery schedules, viewshed corridor plans, and ROS plans will receive input from a Forest Service mineral resource specialist regarding potential impacts on mineral exploration and development and on ways to avoid unnecessary conflicts between surface and mineral resources. Input will also be solicited from the interested and affected publics including, as appropriate, mining claimants, Arizona Department of Mines and Mineral Resources, Arizona mining and prospecting associations, and leasable energy companies. Page 76
384	S&G There will be no surface occupancy where listed endangered species exist, on slopes greater than 40 percent, on areas where the VQO is foreground Retention, on the Montezuma Castle Backdrop Area, or the portion of Deadman Wash basin adjacent to Wupatki National Monument. On a case-by-case basis, minor exceptions, such as a buried pipeline, may be considered provided the overall foreground

	Retention VQO is met. Page 76
385	S&G Review and recommend stipulations to BLM for oil and gas lease applications. Page 77
386	S&G Cooperate with Department of Interior in oil and gas leasing operations, including surface reclamation efforts. Page 77
387	S&G In sensitive areas, in conformance with R-3 standards and guidelines for oil and gas leasing, request inclusion of R-3 Supplement C, Limited Surface Use Stipulation. Page 77
388	S&G Manage the adverse effects of leasing in areas of high resource sensitivity. Use same criteria as detailed under Mining Law Compliance and Administration. Page 77
389	S&G In-service projects requiring mineral materials will consider environmental concerns, multiple-use objectives, economic costs, and savings opportunities. Project-level environmental analysis will consider environmental potential of new sources as well as existing sources. Project-level environmental analysis will identify the most cost efficient material sites (whether existing or potential sites), based on geologic/geotechnical suitability, excavation/processing costs, and haul costs. Resource considerations will be evaluated at the same time. If other sources are considered, the extra economic costs, environmental concerns, and multiple-use objectives are identified and considered in the decision to select a material source. Page 77
390	S&G Evaluate and respond within 60 days or less after receipt of a complete operating plan for surface occupancy unless there is a specific reason to extend the time. Work cooperatively with proposed operations of private mineral rights to reduce impacts on National Forest resources. In sensitive resource areas, protect resources by investigating mineral rights using methods such as title searches, BLM record searches, and Zone Geologist involvement. Page 78
391	S&G Prepare a mined area, reclamation implementation schedule in the first decade. Implement 20 percent of the top priority work in the second decade. Page 78
392	S&G Urban expansion needs are evaluated and appropriate action taken to meet community needs on public lands where environmentally acceptable and logical to do so. Page 79
393	S&G Evaluate requests for transmission corridors based on public need, economics, and environmental impacts of the alternatives. Use existing corridors to capacity with compatible utilities where additions are environmentally and visually acceptable before evaluating new routes. Overbuilding and underbuilding are considered for additions. Page 79
394	S&G New corridors will avoid wildernesses, RNA's, geological and botanical areas, Elden Environmental Study Area, and the ponderosa pine and mixed conifer vegetation types. New corridors will be evaluated for their potential impacts on T&E habitats. Page 79
395	S&G New corridors are managed to maintain current resource

	protection and outputs to the degree possible. Page 80
396	S&G Powerlines and towers are built (construction or reconstruction) to specifications compatible with raptor use. Page 80
397	S&G New proposals for electronic sites are evaluated on a case-by-case basis for compatibility with other uses and are limited to the existing developed sites (see Forest Electronic Sites Inventory, Appendix C). Nontraditional uses are evaluated and, where appropriate, approved to consolidate users at existing sites, or if necessary, at new sites selected to reduce resource impacts. They are identified and documented through the NEPA process. Page 80
398	S&G Right-of-way grants are processed by priority, first priority being the public interest and National Forest needs. Generally, only one access road is approved to a parcel of private property whether there are one or many owners. Where there are multiple landowners to be served by the access, issue right-of-way to either local government, an improvement district, or a homeowners association with authority to collect funds for road maintenance. In evaluating requests for access to private land across National Forest fully use the NEPA process including evaluation of all reasonable alternatives (from an engineering and environmental standpoint) regardless of the applicant's stated preference, including those across non-National Forest land. Grant rights-of-way and authorization for road construction only on locations and to plans and specifications that effectively protect National Forest, and other affected ownerships, lands and resources. Page 81
399	S&G The land purchase program is authorized by the Land and Water Conservation Fund Act (L&WCFA). The following lands are eligible for acquisition with L&WCFA funds: - Congressionally designated areas; - Threatened and endangered species habitat; - Recreation acquisition composites and inholdings. Page 87
400	S&G Operate and maintain roads in accordance with objectives as specified in road prescriptions. Roads not needed for industry, public, and/or administrative use are closed and put to bed or returned to resource production through obliteration. Obliteration includes restoring the original land contour to the degree practical, scarifying, providing proper drainage, and revegetating with appropriate species. Page 88
401	S&G Maintain access roads to the lowest standard necessary for two-wheel drive pick-ups for removal of green firewood. Page 88
402	S&G Seasonally close roads using gates or barriers where the road structural support is inadequate when the ground is wet, and for resource protection or management. Page 88
403	S&G New timber sale roads designated for closure have gates, barriers and signs planned as a cost of the project. Roads planned for closure or obliteration will be signed to inform users of the temporary existence of the road. Turn-arounds are planned and developed at the point of closure. Page 89

404	S&G Manage road densities to achieve an average of 1.1 mile of open road per section in the woodland zone, such as pinyon-juniper, desert, and grassland vegetation types and an average of 2 miles of open road per section in the ponderosa pine/mixed conifer zone. These densities reflect all system roads in maintenance categories 2 through 5, but do not include Federal, State, and County systems. Temporary roads that are only for short-term use and will then be fully <u>obliterated</u> and long term closure roads are not a part of the calculated density. In calculating densities by vegetative type do not include areas having legal or administrative restrictions on roads, e.g., wilderness and research natural areas. Page 89
405	S&G Horse and pack stock are not allowed on these trails: - Elden Lookout Trail; - Oldham Trail, the portion between Buffalo Park and the El Paso natural gas pipeline - Mount Humphrey's Trail and the Weatherford Trail above Doyle Saddle; - Fay, Wilson Mountain, West Fork of Oak Creek, Devil's Bridge, and Boynton Canyon Trails within the Red Rock-Secret Mountain Wilderness. Page90
406	S&G In the transportation plan, road densities, construction/reconstruction standards, location, maintenance structures, types of roads, and closure or obliteration are planned to meet the project objectives, minimize resource impacts, ground disturbance, and provide for user safety. Page 91
407	S&G Construct/reconstruct access roads to lowest standard and density necessary for removing firewood to minimize resource impacts and ground disturbance and provide for user safety. Use road maintenance fund deposits from firewood permits to help achieve needed maintenance. Page 91
408	S&G Locate new roads out of riparian areas and water collecting features such as swales. However, in wet meadows existing roads may also be reconstructed and maintained in accordance with Best Management Practices as defined in the Standards and Guidelines. Relocate or eliminate roads that are presently in these locations. Obliterate the poorly located segments. Cross streamcourses perpendicular to the flow to minimize bank disturbance and sediment production. Page 91
409	S&G Manage smoke from prescribed fires to meet legal standards and to provide for public safety. Page 92
410	S&G The objectives by suppression zone are as follows: <u>Wilderness</u> : Fires that are not a threat to areas outside the wilderness are allowed to burn naturally provided that prescribed conditions are met. Prescribed conditions to be met are found in Standards and Guidelines specific to wildernesses (Management Area 1) (p 94).
411	S&G Plan fuel treatments that have the least impact on the site, meet resource management needs, are cost effective, and meet fuel treatment objectives. Page 95
412	S&G Snags and downed logs that are necessary to meet wildlife

	management objectives for the area are identified and fire lined to protect them. They are also monitored during burning to protect them. T&E and sensitive species are also protected by lining and monitoring. Any unburned islands inside the perimeter of the fire of one-quarter to 2 acres are left unless they are a threat to the management of the fire or prevent achievement of the fuel treatment objectives. Page 95
413	S&G Suppress fires that threaten habitat of threatened and endangered, or sensitive species. Page 95
414	S&G Limit the treatment of natural fuels to areas where fuel buildups are a threat to life, property, adjacent to old-growth areas, or specifically identified high resource values. Page 95
415	Management Emphasis - Emphasize wilderness recreation and watershed condition while maintaining wilderness resource values. In order to accomplish this, some additional trail and trailhead development will be done, particularly in the Kachina Peaks, Red Rock-Secret Mountain, West Clear Creek, and Munds Mountain Wildernesses. Page 105
416	Manage grazing under Congressional guidelines for grazing in wilderness. Livestock grazing presently occurs in portions of all the wildernesses except Strawberry Crater (p 105).
417	S&G Implement corrective measures such as a wilderness permit system if overuse causes unacceptable resource damage. Overuse is determined from: - Limits of Acceptable Change (LAC) studies; - Range analyses; - Code-a-site inventories; - Professional judgment Page 107
418	S&G <u>Kachina Peaks</u> : ...No overnight camping above timberline; - Use in the City of Flagstaff watershed (draining into Inner Basin) is limited to day-use foot traffic. The area may be closed if unacceptable damage occurs as determined by a degradation of water quality; - Protect <i>Senecio franciscanus</i> by an area closure; - Prepare establishment report for San Francisco Peaks RNA addition in the first decade. In the interim, manage the area to preserve the suitability for designation; - Declassify C. Hart Merriam Scenic Area in the first decade (p 108).
419	O 8. Designate camp areas in West Fork consistent with protection of threatened, endangered and sensitive species. Page 108-2
420	S 1. Camping and recreation fires are prohibited in Boynton Canyon. Page 108-3
421	S 3. Camping is prohibited throughout the West Fork of Oak Creek, except in designated campsites. Recreation fires in the West Fork of Oak Creek are prohibited. Page 108-3
422	G 2. For the West Fork of Oak Creek Canyon establish a reservation only permit system for overnight camping. This system should include the following: no camping within 2.5 miles of the confluence, no more than 5 camping areas, each camping are to accommodate 2-4 camping parties, camping party size to be generally 4 persons, camp areas to be located outside of spotted owl protected activity centers where possible,

	and total annual overnight use to be maintained at or less than 1997 use (approximately 1,300 persons). Page 108-3
423	S&G Protect 325 acres of alpine areas on the San Francisco Mountains to improve habitat for <i>Senecio franciscanus</i> by closing the area during snow-free periods. Access is limited to designated trails. Page 110
424	S&G Wildernesses are open to grazing. Strawberry Crater Wilderness has no grazing capacity assigned to it and is managed at Level A. The tundra and upper mixed conifer/spruce-fir slopes within the Kachina Peaks Wilderness are closed to grazing and are not part of any grazing allotment. Other wildernesses have a total of 77,426 acres of full capacity lands. Of the total acres, 2,710 acres are in less than satisfactory condition. Less than satisfactory range conditions are improved by completion of the development program contained in the AMP. Page 110
425	S&G Any adjustments in the numbers of livestock permitted to graze in wildernesses will be made as a result of revisions in the normal grazing and land management planning and policy setting process, giving consideration to legal mandates, range condition, and protection of the range resource from deterioration. It is anticipated that the numbers of livestock permitted to graze in wilderness would remain at the approximate levels existing at the time an area enters the wilderness system. If studies reveal conclusively that increased livestock numbers or animal unit months (AUM's) could be made available with no adverse impact on wilderness values, such as plant communities, primitive recreation, and wildlife populations or habitat, some increase in AUM's may be permissible (Conference Report S.2009 (H.R. No. 96-1126)). By the same token, if it is discovered that present livestock numbers have an adverse impact on wilderness values, some decrease in AUM's may be necessary. Page 110
426	Management Emphasis - Emphasize maintaining the Wild & Scenic River characteristics and watershed condition. The Verde River in the Mazatzal Wilderness is classed as wild and will be managed as wilderness. Highlights include: - Prepare the Verde Wild and Scenic River implementation schedule in the first decade that describes in detail how the River is managed; - - Maintain watershed conditions at satisfactory levels; - Protect and improve habitat for T&E species. Page 113-114
427	S&G Sign and prohibit boat landing and camping within one-half mile of active bald eagle nests. Page 114
428	S&G Preserve the free-flowing condition of the River. Free-flowing is defined by law as existing or flowing in a natural condition without impoundment, diversion, straightening, riprapping, or other modifications of the waterway except as allowed in the Arizona Wilderness Act. Maintenance of minor structures that existed at the time of designation is permitted. Page 114 S&G Recreation development may occur so long as the Scenic River characteristics are

	not adversely affected. Page 115
429	S&G Access is prohibited in the vicinity of nesting bald eagles between December 1 and June 15 (Closure Order 16-52, October 23, 1984). Should eagles occupy a nest territory earlier or later, the closure period will be adjusted. Page 115
430	S&G Seed and plant woody species in riparian areas. Priority is given to riparian areas that do not meet Regional standards, see the Regional Guide. Page 115
431	S&G No grazing capacity is assigned, however, existing watering gaps along the River are maintained or the River may be used in emergency conditions. Page 115
432	S&G Protect instream flow water rights in conjunction with the Prescott and Tonto National Forests. Page 115
433	Management Emphasis - Emphasize a combination of multiple-uses including a sustained-yield of timber and firewood production, wildlife habitat, livestock grazing, high quality water, and dispersed recreation. Highlights include: - Manage for timber production using Integrated Stand Management (ISM) to achieve diverse and healthy stands. Manage to reduce or eliminate dwarf mistletoe. Protect stands from unacceptable losses due to insects or diseases; - Manage habitat for the following indicator species through ISM: - Turkey, Goshawk, Pygmy nuthatch, Elk, Abert squirrel, Red squirrel, Hairy woodpecker, Spotted owl... (p 117)
434	Management Emphasis - Highlights include: Manage at least 61,154 acres in the tentatively suitable timber lands for old-growth on a sustained basis to achieve at least 30,577 acres meeting old-growth conditions at all times. Manage to make firewood available from major species within this Management Area. Manage to make miscellaneous forest products available in a cost-effective manner, including Christmas trees, poles, posts, and wildings. Manage the approximately 12,100 acres identified as the pine-aspen capability area for aspen, on a regulated, sustained-yield basis to maintain aspen as a component of the Forest. Feature a rotation to enhance firewood production and wildlife habitat. Use firewood sales to achieve regeneration by sprouting. Manage livestock grazing generally at Level C and D. Closely coordinate range management with wildlife habitat management to achieve compliance with the State Comprehensive Plan. Coordinate with timber management to take advantage of transitional range created behind intermediate timber harvests (p 118).
435	S&G Silvicultural prescriptions emphasize treating dwarf mistletoe infections to bring them down to acceptable levels, unless threatened, endangered, or sensitive species habitat requirements take precedence. Page 122-1.
436	S&G Where determined through environmental analyses, management of old-growth and snags will be above the levels specified in the following sections. Page 123

437	S&G The following standards and guidelines will apply in areas where threatened, endangered, or sensitive habitat requirements do not conflict. Habitat requirements for threatened, endangered, or sensitive species take precedence over requirements for other species. The headings included are: Raptors, Wildlife Cover, Squirrel Habitat, Spotted Owl and Bear Habitat, Turkey Nesting and Roosting, and Snag Management. Page 123
438	S&G Raptors - Maintain a current inventory of nest locations. A nest group consists of nest tree and adjacent trees and is maintained at least as follows unless environmental analysis indicates either more or less is needed: - Bald eagle winter roosts -- Protect with a 300-foot radius uncut zone around the roost. Road development should avoid the roost and uncut zone (p 123).
439	S&G Ospreys: Provide a 20-acre nest site of uncut area around each existing (occupied or unoccupied) nest; Provide at least 3 potential nest sites in preferred nesting habitat within Designated Bald Eagle/Osprey Emphasis Area(s). This potential nest site should be at least 5 acres of mature and overmature trees with at least 2 snags per acre greater than or equal to 20 inches. Use of uneven-age stands is optimal; Forest-wide, during 10K Block planning, give high priority to managing for snags within potential osprey habitat. Snags and old-growth managed for osprey habitat contribute to the 10K Block requirements... (p 124).
440	S&G Ospreys: ... Manage for at least 2 snags per acre of 20" or greater. Snags should be the height of the canopy or taller, on at least percent of the acres along the shorelines. Where necessary to provide sufficient perches and nest sites, take actions to create snags; Road construction or reconstruction should avoid osprey nest sites. New roads should not be constructed within 660 feet of nests; In cooperation with the Arizona Game and Fish Department, develop an implement an osprey and wintering bald eagle public education program (p 124).
441	S&G Within 10K Blocks at least 50 percent of the forested land meets the following criteria for snags: - At a minimum, snags are maintained at an average of 200 snags per 100 acres; - Snag species will represent the tree species composition of the stand; - In high priority areas as determined by environmental analysis, including both edge habitats adjacent to meadows or water and interior stands, manage for an average of 280 snags per 100 acres; - Snags are not available for firewood unless designated because of being surplus to wildlife needs, for example, after wildfires; - Snag acres in old-growth can be used to count toward the snag requirement within a 10K Block; - Snags and potential snags will be identified and tallied for each stand. Markers will paint mark each tree with a yellow "w"... (p 126-127)
442	S&G Within 10K Blocks at least 50 percent of the forested land meets the following criteria for snags: - Leave potential snags where needed to meet snag requirements. The following are priorities for leaving trees for future snags: - obvious culls with conks and cavities present; -

	less than one-third merchantable tree including wolfy and crooked trees; - spiketops less than one-half merchantable; - any tree expected to die before expected harvest of the sale being marked, and - mistletoe and genetically poor trees will not be left unless they are planned to be killed. Carefully plan salvage sales to meet snag standards where snag numbers are less than desired levels. Delay salvage sales if numbers are too low to allow salvage; - Nonharvest areas, such as wilderness or unsuitable timber lands, can be credited toward meeting management direction for snag management. Use of nonharvest areas from adjacent 10K Blocks does not exceed one-third of the 10K Block management objectives for snags (p 127).
443	S&G In 10K Blocks seriously deficient in snags, environmental analysis will be done to evaluate the marking of merchantable green trees to meet snag numbers and ISM objectives. Page 127
444	S&G Stand size, except managed old-growth stands, foreground Retention areas, or stands resulting from catastrophic events, such as wildfires or epidemic insect infestation, is between 10 and 100 acres unless larger or smaller stands are approved by the Forest Supervisor. Exceptions are stands managed for conversion to aspen and those managed as Gambel Oak nonindustrial wood, which can be as small as 5 acres and 1 acre, respectively and have maximum sizes of 10 and 40 acres, respectively. Also stands having a VQO of foreground Retention can be 2.5 acres. Page 129
445	S&G Stands managed for old-growth are 100 to 300 acres in size. Page 129
446	S&G Management will generally use uneven-aged systems. When stands are managed under even-aged systems, the shelterwood method is the preferred method in accordance with the following guidelines (FSM 2471, FSH 2409.26d, Regional Guide). Page 130
447	S&G Harvest recent dead and poor risk trees in excess of planned snag densities. Snags without red needles are retained for wildlife purposes, except wildfire-killed trees. Page 130
448	S&G Manage oak to improve wildlife habitat and provide firewood. Silvicultural prescriptions provide a balance of age classes within a 10K Block and provide a sustained-yield of sprouts, mast, cavities, and foliage volume. Maintain oak components wherever they occur. Salvaging of dead, down oak is encouraged. Oak showing obvious wildlife use will be retained. Page 131
449	S&G Oak management is considered in all activities, including harvest of other species. Page 131
450	S&G Gambel oak occurs on both suitable and unsuitable timber lands and is managed differently depending on suitability. There are two oak prescriptions, one for nonindustrial wood (Timber's Stand Data Base Component 265 = code 951) and one for oak in association with suitable ponderosa pine stands (Timber's Stand Data Base Component 265 = codes 500's or 600's). When oak comprises 50 percent of more

	of the stand's BA, the stand will be managed for oak (Timber's Stand Data Base Component 265 = code 951). Page 131
451	S&G Gambel Oak Non-industrial Wood ... Standing dead trees greater than 10 inches d.b.h. and greater than 10 feet tall and live trees containing one or more cavities are retained regardless of vigor at a density of at least two cavity bearing trees per acre. In 10K Blocks where the snag density objectives are exceeded, areas containing excessive mortality may be harvested under the following criteria: - Retain at least two snags per acre greater than 15 inches d.b.h. without signs of wildlife use; - Retain trees showing signs of wildlife use or rot; - Retain trees with some live crown and less than 75 percent trunk girdling unless removal is necessary to meet overall objectives (p 131-132).
452	S&G Gambel Oak on Tentatively Suitable Lands --Oak component within a stand will not fall below 20 percent of the total stand basal area when average oak d.b.h. >5 inches; - Rotation age for the oak component will be 240 to 360 years; - Rotations for conifer and oak will be about 60 years out of phase to avoid competitive interaction during seedling establishment.; - Oak component will not fall below one sprout cluster per acre when average d.b.h. ≤5 inches; - Use an irregular shelterwood system for the oak component. Seed trees are left standing to die from natural causes. Page 132
453	S&G Bigtooth maple areas are managed to maintain coniferous overstory that provides shading for existing and the regenerated maple areas and a BA of at least 120 in 10 to 16-inch overstory trees. Manage for 280 snags/100 acres greater than 12 inches d.b.h. and greater than 15 feet high. Snags are to be randomly dispersed. White fir over 20 inches d.b.h. is not cut, nor is any white fir showing signs of rot. Page 132
454	S&G Pine stringers are noncontiguous, narrow communities of predominantly ponderosa pine that extend into the pinyon-juniper woodland below the normal elevational distribution of ponderosa pine. Manage pine stringers to emphasize wildlife habitat needs by maintaining turkey roosts and big game cover except where environmental analysis indicates otherwise. Page 133
455	S&G Mixed conifer stringers, primarily Douglas-fir, are noncontiguous, narrow communities that extend into the ponderosa pine. Manage the mixed conifer stringers to emphasize wildlife habitat needs by maintaining big game cover except where environmental analysis indicates otherwise. Page 133
456	S&G An average 300 feet on each side of the road will be managed as foreground Retention (nearly 20,000 acres) total from all Management Area's. Determine the exact width of the foreground Retention area after on-the-ground review. Page 134
457	S&G Foreground Partial Retention (VQO) Silvicultural Objectives are: - To maintain or create a mosaic of stands of various sizes and age

	classes throughout the rotation with a mature tree component (± 18 inches d.b.h.) on at least 10 percent of the area; - Created slash will be treated. Page 134
458	S&G Evaluate K-V soil and water and wildlife resource improvement opportunities on sale areas. Plan projects to improve areas in unsatisfactory condition and to maintain those in satisfactory or better condition. Priorities for use of K-V funds will be: 1. Regenerate stands. 2. Correct serious problems that have been identified such as erosion that needs to be stopped to preserve soils, needed T&E habitat improvement, and treatment of dwarf mistletoe infected stands. 3. TSI where needed to manage stocking levels and where the site justifies the costs. 4. Restoring riparian areas and closing roads by revegetation, channel restoration, blocking, providing drainage, obliteration, or combination of these types of activities. 5. Seeding to improve forage in areas where additional forage is needed. 6. All other work. Exceptions below priority 2 may be made by the Forest Supervisor based on documented results of an environmental analysis. Page 136
459	S&G Construct landings and decking areas outside of riparian areas. Page 136
460	S&G Locate or relocate roads out of riparian areas, except at designated crossings. Obliterate unnecessary roads in riparian areas. Page 136
461	S&G Avoid or designate stream course crossings for skid trails. Limit to the minimum needed. Choose crossings with stable conditions or stable bed and bank material such as cobble or rock. Page 136
462	S&G Restrict skidding and hauling to soil moisture conditions that do not cause excessive soil compaction, displacement, or puddling. Restrict timber sale activities to slopes of 25 percent or less on cinder cones under conventional skidding. Page 136
463	S&G Annual average wildfire acreage burned should not exceed 750 acres per year on the average over a 10-year period. Page 137
464	Management Emphasis - Emphasize wildlife habitat, watershed condition, and dispersed recreation. Management intensity is low. Highlights include: - Manage with emphasis on wildlife habitat and dispersed recreation. Total acres of any Recreation Opportunity Spectrum (ROS) class may change no more than +15 percent in Decade 1 due to road or trail building and other activities. - - Manage for the following indicator species: Turkey, Goshawk, Pygmy nuthatch, Elk, Abert squirrel, Red squirrel, Hairy woodpecker, Spotted owl. Manage the Dry Lake Hills-Mount Elden area for dispersed recreation and wildlife habitat and a semi-primitive nonmotorized ROS class. Manage at least 640 acres of the tentatively suitable timber lands for old-growth on a sustained basis to achieve at least 320 acres meeting old-growth conditions at all times. Page 139
465	S&G Standards and Guidelines for fire management planning and analysis are the same as for Management Area 3. Page 140

466	Management Emphasis - Emphasize a combination of wildlife habitat, visual quality, firewood production, watershed condition, and dispersed recreation with other resources and uses managed to be compatible. Page 141
467	S&G Protect regenerated areas and assign no grazing capacity until seedlings are established. Protect areas or a group of areas by excluding grazing through fencing, or other means where appropriate. If funding is not available for needed protection, do not harvest the area(s). Page 143
468	S&G Retain snags greater than 12 inches d.b.h. and nest trees. Follow snag Standards and Guidelines as shown in Management Area 3. Page 143
469	Management Emphasis - Emphasize a combination of wildlife habitat, watershed condition, and livestock grazing. Other resources are managed in harmony with the emphasized resources. Highlights include: - Use prescribed fire as a tool to help meet desired resource objectives. Page 145
470	S&G Where an open meadow is maintained, as determined in an environmental analysis, eliminate invading overstory vegetation, stabilize gullies to raise the water table, and seed with appropriate grass and forage species. Control livestock grazing through management and/or fencing to allow for adequate revegetation. Page 146
471	S&G Maintain diversity of tree species so that ponderosa pine, Gambel oak, and alligator juniper are maintained as a component of the vegetation where they are now present. Page 147
472	Management Emphasis - Emphasize firewood production, watershed condition, wildlife habitat, and livestock grazing. Other resources are managed in harmony with the emphasized resources. Highlights include: -Wildlife habitat management emphasizes forage production on 0 to 15 percent slopes, in conjunction with firewood harvest using Integrated Stand Management (ISM). Old-growth, cover, and snags are generally provided on slopes greater than 15 percent. However, exceptions will occur if dispersion requirements for habitat components are not met on these steep slopes. Where necessary to meet 10K Block requirements or specific habitat needs, one or more of these components can be obtained through management emphasis on the gentler slopes; - Palatable grass and forb species may be seeded. Page 148
473	S&G Where seral grasslands are maintained in the pinyon-juniper woodland, eliminate invading vegetation through mechanical, chemical, or planned fire treatments on a maintenance schedule averaging once every 25 years. Consider firewood harvesting and Christmas tree harvesting as tree removal methods. Stabilize gullies, scarify the soil, and seed disturbed soils with a mix tailored for the site, emphasizing high production, shade tolerant, and multi-growing season species. Seed suitable areas in all range condition classes if needed.

	Control livestock grazing through management and/or fencing to allow for adequate revegetation. Page 150-151
474	Management Emphasis - Emphasize livestock grazing, visual quality, and wildlife habitat. Other resources are managed in harmony with emphasized resources. The smaller mountain meadows in remote areas are managed mostly for wildlife habitat, especially for elk summer range. Page 158
475	S&G When springs are developed in meadow communities, riparian areas, or other sensitive areas, protect these areas by piping the water to water developments in adjacent, less sensitive areas. Page 159
476	Management Emphasis - Emphasize range management, watershed condition, and wildlife habitat. Other resources are managed to improve outputs and quality. Emphasis is on prescribed burning to achieve management objectives. Walnut Canyon National Monument entrance road is within this Management Area. The management and use of the 1000 foot right-of-way along the entrance road is directed toward the protection and maintenance of the cultural and natural resources of the area. Page 162
477	S&G Maintain a seral grassland state on pinyon-juniper lands where type conversions have occurred in the past, with the exception that corridors of cover for wildlife habitat, determined through environmental analysis, may be allowed to develop through regrowth of pinyon-juniper. Initiate a retreatment schedule of approximately 25 years. Retreatments are accomplished through one or all of the following methods (see Table 12): Individual tree pushing or cutting; Prescribed burning; Chemical treatments. Page 164
478	S&G Depending upon plant composition and diversity, seed treated sites with a mix tailored to the site, emphasizing high production, multi-growing season species to achieve a balance between warm and cool season plants. The goal of retreatment is to maintain the seral grasslands in a savannah-like state that emphasizes a diversity of habitats to enhance forage for livestock and wildlife. Page 164
479	Management Emphasis - Emphasize watershed condition, range management, wildlife habitat for upland game birds, and dispersed recreation. Page 166
479	Coordinate with Dead Horse State Park for connecting trails and access roads adjacent to the park (pg 167)
480	S&G Verde Valley is managed for dispersed recreation along the upper Verde River outside the Wild and Scenic section and along lower Oak Creek. Page 166
481	S&G Manage the segment of West Clear Creek downstream from the wilderness to Clear Creek Campground and the segment of Wet Beaver Creek downstream from the wilderness to the private land boundary at the section line between sections 22 and 23, T. 15N., R. 6E. to maintain their free flowing status and their scenic and recreational values. Manage to avoid impacts that would disqualify them from future study

	and possible designation as scenic, recreational, or other equivalent classification. Evaluate activities and proposed developments that are visible from or that could affect the physical character or ROS class through the environmental analysis process. Proposed developments evaluated in this manner include, but are not limited to, impoundments and new water diversions (unless directed otherwise by legislation), developed recreation sites, and road building. Manage livestock grazing and vehicular access to maintain ROS class and recreation/scenic values. Page 166
482	S&G Access likely to cause disturbance is prohibited in the vicinity of Wildlife nesting bald eagles between December 1 and June 15 (Closure Order 16-52, October 23, 1984). If eagles occupy a nest territory earlier or later, the closure period may be lengthened or shortened. Page 166 Nonstructural Wildlife Habitat Improvement
483	S&G Where seral grasslands are maintained as pinyon-juniper woodland, eliminate invading vegetation through mechanical, chemical, and prescribed fire treatments on a maintenance schedule averaging once every 25 years. Page 168
484	S&G Stabilize gullies, scarify the soil, and seed disturbed soils species mix tailored for the site, emphasizing high production, shade tolerant, and multi-growing season species. Control livestock grazing through management and/or fencing to allow for adequate revegetation. Page 169
485	S&G Where watershed condition is unsatisfactory plan, design, and implement projects by the end of the second decade following watershed condition inventory and subsequent prioritization. Evaluate soils to determine suitable species that would provide maximum soil stabilizing benefits on each of the various soil parent materials. Establish a cost effective monitoring program to determine trends in watershed condition. Page 169
486	Management Emphasis: Emphasize wildlife habitat, visual quality, fish habitat, and watershed condition on the wetlands, riparian forest, and riparian scrub. Emphasize dispersed recreation, including wildlife and fish recreation, on the open water portion (p 172)
487	Management Emphasis: An interdisciplinary team approach will be used on management activities such as timber sales, allotment management plans, and other management activities to prescribe specific management practices to meet the goal of riparian area recovery by 2030. Manage riparian areas based on the potential to support riparian vegetation. Potential is determined through a consensus of an interdisciplinary review. In order to achieve certain aspects of recovery, such as establishing three age classes of woody riparian vegetation, implementing riparian Standards and Guidelines occurs in the first decade. Riparian areas provide a filter strip of vegetation, important for filtering sediments generated from upslope soil erosion. Eighty percent of the riparian recovery is expected by

	2030. The remaining 20 percent will be significantly improved, but will not have all of the characteristics of a fully recovered riparian area. The goals and objectives for elk populations and for livestock grazing affect achievement of the full recovery (p 172).
488	Management Emphasis: Highlights include: Improve riparian areas through a combination of improvement projects and management activities; - Manage for the following indicator species: cinnamon teal, Lincoln's sparrow, Yellow breasted chat, Lucy's warbler, macroinvertebrates (p 172).
489	S&G The following applies to riparian areas, whether they are large enough to be mapped out or not. Wetlands and open water containing emergent vegetation which provide nesting habitat are protected from disturbing uses that will harass nesting birds, such as activities that are noisy or would damage nests or nesting habitat from May 1 to July 15. Page 173
490	S&G Meet the following Riparian Standards in the Regional Guide for 80 percent of riparian areas above the Rim and 90 percent below the Rim by the year 2030: Maintain at least 80 percent of the potential overstory crown coverage; - Maintain at least three age classes of woody riparian species, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings; - Maintain at least 80 percent of the potential stream shading from June to September along perennial cold and cool water streams; - Maintain at least 80 percent of the potential shrub cover in high elevation areas; - Maintain at least 80 percent of the potential emergent vegetation cover from May 1 to July 15 in key wetlands; - Maintain at least 80 percent of the spawning gravel surface free of inorganic sediment; - Maintain at least 80 percent of streambank total linear distance in stable condition; - Retain snags in riparian areas that are not a safety hazard. Page 174
491	S&G Measures such as fencing to exclude livestock, vegetation projects, and special management prescriptions will be undertaken until the affected areas are brought into satisfactory riparian condition. Page 174
492	S&G In addition, the remainder of the Forest's riparian areas will have some of these characteristics, but not all of them by 2030. Page 174
493	S&G Coordinate with other resource functions to pursue instream flow rights to protect aquatic ecosystems, fish, and wildlife. Page 174
494	S&G Determine the need to rehabilitate riparian areas through seeding and planting woody species in areas that are in unsatisfactory condition, including those areas not mapped as discrete riparian areas, and then proceed to rehabilitate areas as determined. Attempt using unpalatable species where necessary to avoid wildlife browsing. Page 174
495	S&G Construct 10 miles of fences per decade for the first two decades where necessary to protect key wet meadows, wetlands, and riparian regeneration from grazing. Page 175
496	S&G Maintain riparian and meadow communities by providing waters

	for wildlife and livestock away from these sensitive areas. Page 175
497	S&G Establish administrative exclosures the first decade to determine riparian vegetation potential on representative streams. Page 175
498	S&G Manage lakes and streams to improve fisheries habitat by constructing structures and barriers as appropriate based on environmental analysis and on professional judgment of the responsible official and resource specialist: Install 10 stream improvement projects on perennial streams in first decade; Improve fish habitat through placement of 200 cover structures on lake bottoms during the first decade; Create spawning habitat of 10 acres per year in lakes in the first decade. Page 175
499	S&G Salt is used to help achieve proper livestock grazing distribution. Permanent salt is not placed within 1/4 mile of the edge of any riparian area. Temporary salting may be approved if it will help to achieve a specific management objective for enhancement of riparian areas. Page 175
500	S&G Proper allowable use within Management Area 12 is not to exceed 20 percent on the woody vegetation. Page 175
501	S&G Favor the establishment of woody riparian vegetation, where potential natural vegetation has been determined through an interdisciplinary process to include woody riparian species. Control livestock grazing through management and/or fencing to allow for adequate establishment of vegetation and the elimination of overuse. Page 176
502	S&G Evaluate seeding projects for effects on concentrating livestock use in riparian and other sensitive areas. Page 176
503	S&G No precommercial thinning or piling thinning slash in riparian areas or areas that have riparian characteristics. Page 176
504	S&G Plan for suitable filter strips between streamcourses and disturbed areas and/or road locations. See Filter Strip Table in Forest-wide Standards and Guidelines under Watershed/Soil/Air, F2. Plan for suitable filter strips between stream courses and ground disturbing activities including roads. Page 176
505	S&G Mineral material excavation with the riparian zone may be allowed after environmental analysis. Authorized mineral activities will maintain or improve riparian conditions. Page 176
506	S&G New special-uses are normally not allowed in riparian areas unless they benefit riparian management. Exceptions which cannot be avoided, such as utility lines or roads crossing stream courses, are designed to minimize the amount of riparian affected and the degree of effects. Page 176
507	S&G Acquiring riparian areas through land exchange has a high priority. Page 176
508	Management Area NAGEMENT EMPHASIS - Wildlife habitat, healthy stream conditions and clean air and water are protected. Fire hazards and risk are carefully managed within this streamside corridor.

509	O 6. Ensure adequate instream flow to maintain aquatic communities and water sources for wildlife. Page 184
510	O 8. Support research efforts that further define the habitat requirements of native fish and bat populations. Protect and/or restore habitat conditions that may be limiting these populations. Page 185
511	O 9. Ensure that there is an appropriate range of spawning, rearing and overwintering habitat to support the native fish community in Oak Creek. Page 185
512	O 10. Ensure that woody materials, such as logs, tree limbs and snags, are present in riparian communities for prey base habitat, aquatic nutrient cycling and soil retention consistent with public safety. Page 185
513	O 11. Acquire undeveloped private property needed to protect critical riparian habitats. Page 185
514	G 1. Discourage facility investments within the Oak Creek 100-year floodplain. Page 185
515	O 3. Increase day-use opportunities emphasizing nature-based activities such as hiking, picnicking, bird watching, photography, fishing and interpretation. Increase opportunities for people to access the water and enjoy the creek. Page 187
516	O 17. Reduce impacts on water quality by such methods as: placing toilets in strategic locations; - providing information about proper sanitation practices; - limiting equestrian use, and installing shower and hand-washing facilities and more gray-water disposal sites. Page 187-1
517	S 2. Prohibit camping and recreation fires except in designated sites. Page 187-2
518	S 1. Withdraw Oak Creek Canyon Management Area from locatable and leasable mineral entry. Page 187-2
519	S 2. Minerals materials operations are discouraged, though some activities may be appropriate for ADOT and Forest Service administration needs if they are minor and consistent with Management Area objectives and goals. Page 187-2
520	S&G In designing new facilities and in evaluating developed sites that are amortized or in need of reconstruction, give special consideration to riparian habitat, especially riparian scrub, wetlands, and riparian forest. Utilize opportunities to relocate existing facilities out of these areas where it can be done cost-effectively and still provide adequate opportunities for National Forest recreation. Page 189
521	S&G The Snow Bowl special-use authorization area will be fenced to physically exclude grazing. Page 190
522	S&G The area is closed to grazing and is not part of a grazing allotment. Unfenced areas are fenced as needed. Page 192
523	S&G Limit vehicle access to City and Federal vehicles necessary to administer the area. The area is closed to livestock use and recreational livestock use such as horses, mules, or llamas. The area is closed to

	off-road driving use. Page192
524	Description- Verde Valley Botanical Area, a 1,140-acre desert scrub community, represents a unique desert community which has been greatly reduced by human activities. <u>Cowania subintegra</u> , a T&E species, is located here. Page 193
525	Management Emphasis: Emphasize and protect watershed condition and maintain natural ecological conditions on the Research Natural Areas (RNA's) so that they are available for research and education that does not disturb the areas' natural condition. Use restrictions are imposed as necessary to keep areas in their natural or unmodified condition. There is no harvest of timber products, including firewood. RNA's are closed to off-road driving (p 194).
526	Management Emphasis: The botanical areas and the geological area are managed to maintain, as nearly as possible, existing conditions and natural processes for public enjoyment, demonstration, and study. Interpretative and educational demonstration opportunities are emphasized and enhanced through selective facility development. Natural events are not rehabilitated. Off-road driving is prohibited (p 194).
527	Management Emphasis: Highlights include: - Prepare establishment reports for the Rocky Gulch and West Clear Creek proposed Research Natural Areas; - Prepare implementation schedules for the botanical areas and the geological area; - Include management that provides for later interpretation; - Manage for VQO's of Preservation in the research natural areas and Retention or Partial Retention in the geological and botanical areas (p 194).
528	S&G As needed, assess carrying capacity in special areas and limit visitors to meet carrying capacity. Page195
529	S&G Prohibit off road-driving. Page 195
530	S&G RNA's and botanical areas are managed to protect and maintain their uniqueness and ecological condition. Page 195
531	S&G Timber harvest and firewood cutting is prohibited. Page 195
532	S&G Seek withdrawal of RNA's and the other special areas from locatable mineral entry in the first decade. Page 196
533	S&G Do not allow special-use authorizations that would or could adversely affect or change the character of the areas. Page 196
534	S&G Manage roads adjacent to botanical areas and the Red Mountain Geological Area to prevent vehicular intrusion. Block and obliterate existing roads entering the area in the first decade. Page 196
535	S 1. Non-commercial group size should be limited to 25 persons or fewer in Casner RNA and to 12 persons or fewer without a permit in the West Fork of Oak Creek. Page 196-1
536	S 2. Prohibit livestock grazing. Page 196-1
537	S 2. Restrict camping and prohibit recreation fires in Oak Creek RNA. Page 196-1

538	Management Emphasis: Emphasize dispersed and developed recreation, visual quality, and wildlife travel corridors across the Rim, generally the heads of major canyons running to the northeast. Dwarf mistletoe is aggressively treated through ISM (p 200).
539	Management Emphasis: Highlights include: Manage at least 1,281 acres in the tentatively suitable for old-growth on a sustained basis to achieve at least 640 acres meeting old-growth conditions at all times; - Restrict off-road driving use along and south of the Rim Road and the Crook Trail to enhance solitude and reduce distractions to other recreational users; - Protect and maintain the General George Crook Trail. Reconstruction of the Rim road protects the major undisturbed portions of the trail; - Natural and created fuels are treated to manage large fire potential and to protect visual resource and wildlife habitat; - Wildlife corridors are provided for animals to move across the Rim; - Develop informational trail guides jointly with the Tonto National Forest; - Construct trails/trailheads for access from Crook Trail to Highline Trail on the Tonto; - Construct a new developed campground; - Expand existing developed campgrounds; - Manage riparian inclusions according to Management Area 12 Standards and Guidelines (p 200-201).
540	S&G Manage for VQO of Partial Retention on other roads within Management Area 19. Close Management Area 19 to off-road driving, except for vehicles traveling over-the-snow such as snowmobiles or in the vicinity of Knoll Lake, please refer to Off-road Driving Map. Page 202
541	S&G Sites are closed to off-road driving, unless specific management needs are identified for such things as administration, construction, or maintenance. Sites are closed to vehicles and operators not licensed for highway use in the State of Arizona. Page 202
542	S&G Evaluate forage improvements and maintain forage improvement acres in satisfactory or better condition. Except during the timber regeneration period, revegetate suitable sites. Forage emphasis is to attain a balanced composition of cool and warm season forage species. Page 203
543	S&G Where open meadows in the pine/mixed conifer type are to be maintained, eliminate invading overstory vegetation, stabilize gullies to raise the water table, scarify the soil, and seed with appropriate grass and forage species. Control livestock grazing through management and/or fencing to establish the revegetation. Page 203
544	S&G Management for the ponderosa pine/mixed conifer stands and the big tooth maple stands is the same as Management Area 3, foreground Retention and for areas adjacent to foreground Retention lands. See Management Area 5 for direction for the aspen stands. Page 203
545	O 1. Improve and protect water quality and long-term soil productivity and restore critical soil functions through such methods as: -improving the rate of water infiltration, thereby reducing on-site soil loss and

	<p>minimizing surface runoff and sedimentation;- enhancing soil organic matter content to improve physical condition and increase nutrient cycling; -reducing flood potential and securing favorable conditions of water flow; -increasing and improving the distribution of vegetative ground cover and coarse woody debris; -setting livestock capacities to levels that maintain and/or improve soil stability, soil productivity and water quality; -locating new trails away from riparian communities, steep grades and sensitive soils; -hardening trail and road surfaces and providing sanitation facilities at key places; and -improving road and trail maintenance. Page 206-10</p>
546	<p>O 3. Engage in activities that will maintain or enhance southwestern willow flycatcher habitat. Page 206-10</p>
547	<p>O 4. Eliminate unneeded roads and redesign or relocate poorly located roads and trails to lessen impacts on such resources as cultural sites, soil, water and wildlife and to reduce user conflicts. Restore areas heavily damaged by vehicle or foot traffic using such methods as obliteration, barriers, closures and visitor information. Page 206-10</p>
548	<p>O 9. Maintain adequate plant cover/security for wildlife habitat needs. Retain dead and down woody materials, such as logs, limbs and flood debris, in riparian communities for prey base habitat. Page 206-11</p>
549	<p>S 2.Restrict aircraft activities related to commercial filming to protect threatened, endangered and sensitive species. Page 206-11</p>
550	<p>S 5. For the southwestern willow flycatcher: -conduct site visits to identify suitable and potential habitat; -inventory suitable habitat to locate nesting flycatchers; -monitor sites currently and previously occupied; -maintain and enhance suitable and occupied habitat; -ensure that potential habitat progresses toward suitable habitat; and -minimize disturbance to nesting birds. Page 206-12</p>
551	<p>G 1.In general, the following guidelines (1 through 8) should be applied to threatened, endangered and sensitive species. If analysis or new information suggests a modification of these guidelines is needed, consultation with the US Fish and Wildlife Service (U.S. Fish and Wildlife Service) must occur. Page 206-12</p>
552	<p>G 3.Maintain riparian pasture and riparian exclosure fences to prevent livestock trespass, which can result in the degradation of threatened, endangered and sensitive species habitat. Page 206-12</p>
553	<p>G 8.Southwestern willow flycatcher: Activities in occupied or suitable habitat must not reduce the suitability of the habitat nor disturb nesting birds during the breeding season (p 206-13).</p>
554	<p>G 8. Southwestern willow flycatcher: Coordinate with the U.S. Fish and Wildlife Service, AG&FD and any other agency or organization involved in ongoing research to determine monitoring needs for occupied southwestern willow flycatcher sites. Information needs and site-specific considerations are important to determine the monitoring intensity/frequency and implementation strategy for monitoring occupied sites (p 206-13).</p>

555	G 8. Southwestern willow flycatcher: Exclude livestock grazing in occupied southwestern willow flycatcher habitat to avoid direct impacts to flycatchers and their habitat. Allow grazing in occupied southwestern willow flycatcher habitat outside of its critical season only where flycatcher research is occurring under a research plan approved by U.S. Fish and Wildlife Service and other project cooperators (p 206-13).
556	G 8. Southwestern willow flycatcher: Implement brown-headed cowbird control programs based on U.S. Fish and Wildlife Service consultation requirements and site-specific determination of need (p 206-14).
557	G 8. Southwestern willow flycatcher: Occupied and suitable habitats should be inventoried annually to determine the presence of southwestern willow flycatchers. If inventory does not occur, the guidelines for occupied habitat apply (p 206-14).
558	G 8. Southwestern willow flycatcher: Site visits to potential habitat should be conducted every few years in order to document the area's progression toward suitable habitat characteristics (p 206-14).
559	G 8. Southwestern willow flycatcher: Activities in southwestern willow flycatcher potential habitat should not slow or prevent potential habitat from progression toward suitable habitat conditions (p 206-14).
560	G 8. Southwestern willow flycatcher: Coordinate with fire management personnel to develop a strategy for responding to wildfires that could threaten occupied, suitable or potential southwestern willow flycatcher habitat (p 206-14).
561	G 10. The following riparian standards are repeated here for clarity but have not changed from the existing Forest Plan direction: -maintain at least three age classes of woody riparian species, with at least 10 percent of the woody plant cover in sprout, seedlings and saplings; - retain snags in riparian communities if they are not a safety hazard. Page 206-14
562	G 13. Restrict National Forest visitor activities from any area as needed to support soil and plant restoration efforts. Page 206-14
563	G 2. Discourage new utility corridors on National Forest System lands. When no other alternative exists, combine new utilities with existing utility corridors or road/trail corridors. Page 206-21
564	O 7. Eliminate, redesign or relocate unneeded or poorly located roads and trails to lessen impacts on such resources as cultural sites, soil, water and wildlife and to minimize user conflicts. Page 206-23
565	O 10. Protect sensitive archaeological and biological sites by reducing public access and informing visitors more thoroughly.
566	S 2. Off-road driving is prohibited within most of the Sedona/Oak Creek Ecosystem, except under rare circumstances by permit. Page 206-24
567	G 5. Close trails and roads where impacts on cultural and biological resources are unacceptable. Page 206-25

568	S 1.Prohibit helicopter landings and takeoffs on National Forest System lands except for emergencies and rare maintenance support activities. Page 206-27
569	G 3.Commercial tour activities must not allow livestock to access unsuitable range. Page 206-28
570	Management Emphasis - Wildlife habitat, water quality and a healthy stream environment are protected. Page 206-38
571	O 2.A native fish community exists and functions naturally within the lower reaches of Oak Creek. There is an appropriate range of spawning, rearing and overwintering habitat to support native fish. Increase angler awareness of and demand for native fish. Page 206-38
572	O 6.Implement such measures as vehicle barriers to restrict vehicles from driving in Oak Creek. Maintain National Forest road access to Elmersville. Page 206-39
573	O 7.Provide for dispersed camping that is consistent with protection of riparian values. Page 206-39
574	O 5.Create a network of roads and trails to serve OHV, mountain bike and equestrian use. Provide loops and connections with trails outside the area. Expand spring and fall trail recreation opportunities using existing roadways as much as feasible. Page 206-52
575	O 10. Provide a system of OHV recreation routes through the area that offer scenic and wildlife viewing, moderately rugged road conditions and dispersed camping. Provide route markers, road signs and maps as needed to guide people along the routes. Page 206-53
576	G 2. Use only native surfacing and do not use road prism development for lateral roads (off of main access roads) unless increased use and development of private property require improvement for resource protection. Page 206-53
577	G Use-level allocations will range from no allocation within some Primitive and Semi-primitive Non-motorized ROS areas to relatively high use allocations within some Roded Natural areas. Other more site-specific resource concerns, such as the presence of significant archeological sites, threatened, endangered, or sensitive wildlife habitat, and areas with sensitive soils, will also influence outfitter/guide allocations. Page 206-65
578	G Other more site-specific resource concerns, such as the presence of significant archeological sites, threatened, endangered, or sensitive wildlife habitat, and areas with sensitive soils, will also influence group use allocations. Page 206-66
579	GL/O Rock climbing opportunities are provided, while protecting sensitive resources from unacceptable impacts. Page 206-66
580	G The climbing plan will include, but is not limited to: - Existing and new climbing routes; - Climbing implementation schedule identifying funding priorities for climbing management; - Closure measures when needed for threatened, endangered, and sensitive (TE&S) plants and animals and cultural resources; - Schedules for Limits of Acceptable

	Change (LAC) or other management strategies when needed; - Monitoring 206-67
581	G Where social trails occur within Mexican spotted owl Protected Activity Centers (MSO PACs), delineate a system trail that provides for recreation use and lessens impacts to MSOs. Close and re-vegetate non-system trails in PACs not used for the designated trail. Page 206-68
582	GL/O Threatened, endangered, sensitive, and management indicator species are maintained or recovering in the majority of the habitat. Page 206-72
583	G Bald eagle winter roosts and perch habitat will be evaluated for long-term viability. Silvicultural methods that encourage regeneration and growth of desirable trees may be used near roost sites. Groves of trees may be maintained to provide screening for roost and perch areas. Silvicultural practices will result in the growth of large diameter trees with open crowns in multi-layered stands. Prescribed fires to improve and protect roost areas may be used with effective protection of large trees and snags. Page 206-73
584	G Human activities will be managed so that disturbance does not interfere with the eagles' ability to use the site. Page 206-73
585	G Distribute wildlife cover where needed within the FManagement AreaZ 1U without accruing unacceptable wildfire threat to nearby neighborhoods. Wherever possible, projects should retain cover conditions within wildlife travelways, MSO protected activity centers (PAC's), along canyon rims, and on steeper slopes. Projects within the FManagement AreaZ 1U, should attempt to retain 15 percent cover within a given section. Page 206-76.
586	G Dense stand conditions on steep slopes and within MSO PAC's contribute to the targeted 15 percent cover condition. Cover conditions might exceed 15 percent per section due to the presence of steeper slopes or MSO PAC's. In the absence of steep slopes or MSO PAC'S site-specific projects could retain a maximum of 15 percent cover condition to maintain a wildlife travelway through a section. Projects do not have to retain cover conditions of 15 percent, if a given section poses a high fire hazard to nearby neighborhoods. Page 206-76
587	GL/O Stream channels have adequate and appropriate plant cover to protect stream banks and dissipate energy during high flows. Page 206-78
588	GL/O Stream flow is adequate to maintain aquatic communities and water sources for wildlife. Page 206-78
589	G Emphasis is placed on rehabilitation of high elevation riparian communities. Rehabilitation may include: wildlife and livestock grazing management, fencing, stream channel stabilization, road relocation, recreation management, and physical protection of revegetation work. Page 206-78
590	Management Emphasis: In the entire Management Area, re-introduce

	<p>fire's natural role as much as possible, and ponderosa pine lands progress towards desired forest structure (goshawk and Mexican spotted owl habitat). In the lakes, maintain the variety of waterfowl, raptors, amphibians, and many different kinds of plants adapted to lake shore environments. Emphasize healthy shorelines adjacent to the water with ample ground cover, and less erosion or compaction. Turbidity is natural to these lakes. Minimize human disturbance to wildlife, where needed, during the critical times. Continue to provide general dispersed and water-based recreation opportunities. Improve wildlife viewing opportunities where wildlife viewing is compatible with wildlife habitat. Page 206-97 thru 98</p>
591	<p>Management Emphasis: Highlights include: -MIS should be referenced by vegetation and landform type. For example, in ponderosa pine lands less than 40 percent slope MIS are those listed for Management Area3; - Maintain existing recreation facilities and improve signing, parking, and sanitation. Balance recreation demands with sensitive resources such as species habitats, fragile riparian vegetation, and erosive soils where they occur. Continue to focus high levels of use on the Lake Mary Road side of the lakes; - Per the <i>Objectives for Recreation Opportunity Spectrum</i> map, expand Semi-primitive Motorized areas and maintain Roded Natural corridors along major roads. New Semi-primitive Non-motorized patches should be created on Mormon Mountain in sensitive species habitat. Page 206-97 thru 98</p>
592	<p>G Continue current seasonal motorized restrictions in the Pinegrove Seasonal Closure Area. Page 206-99</p>
593	<p>G Refer to more recent management guidelines and conservation assessments that exist for bald eagle winter habitat management. Page 206-100</p>
594	<p>G The designated bald eagle/osprey emphasis area should be expanded to include future perch and roost trees in key areas. Page 206-100</p>
595	<p>G Roads, trails, camping, and grazing will be managed to improve watershed condition particularly within mountain meadows, springs, and drainages. Page 206-100</p>
596	<p>Management Emphasis: A small portion of this Management Area is within the Urban/Rural Influence Zone. Reduce the risk of catastrophic wildfire, especially within the Urban/Rural Influence Zone. Reintroduce fire's natural role as much as possible. Emphasize daytime recreation activities, primarily non-motorized in the Urban/Rural Influence Zone and provide designated camping sites in the Dry Lake Hills. Balance recreation demands with protection of the soils, water, vegetation, and sensitive species. This includes defining limits on recreation individual, group or outfitter/guide use if analysis shows a need. Page 206-103 thru 104</p>
597	<p>Management Emphasis: Highlights include: -In the Mt. Elden/Dry Lake Hills area, people should be mostly on the trail system, leaving undisturbed patches of habitat in between. Wildlife habitat will be</p>

	<p>somewhat fragmented because of the extent of the trail system, but topography and dense mixed conifer vegetation reduce some of the effects; - Per the <i>Objectives for Recreation Opportunity Spectrum</i> map, maintain the Semi-primitive Non-motorized setting in the Dry Lake Hills and expand the Semi-primitive Non-motorized setting below the Waterline Road. Expand Semi-primitive Motorized settings in the remainder of the Management Area with Roaded Natural corridors along major roads; - Maintain the two Mexican spotted owl PACs. Page 206-103 thru 104</p>
598	<p>G Maintain the current trail system. Maintain and improve trailhead parking and identify designated parking spots. Relocate trailhead parking on the Elden Lookout Road to balance use with sensitive MSO habitat. Page 206-105</p>
599	<p>Management Emphasis: Provide Recreational Opportunities. Maintain the quality of the recreational experience throughout this Management Area. North and west of Walnut Canyon emphasize daytime recreation activities, primarily non-motorized. South and east of Walnut Canyon emphasize remote dispersed recreation (day and overnight) with motorized and non-motorized opportunities. Balance recreation demands with protection of the soils, water, vegetation, and sensitive species. Protect the community - A small portion of this Management Area is within the Urban/Rural Influence Zone. Reduce the risk of catastrophic wildfire, especially within the Urban/Rural Influence Zone. Reintroduce fire's natural role as much as possible. Opportunities for firewood or other forest products are rare north and west of the Canyon, however, firewood sales may be used as a tool for management. Maintain sensitive species habitat. Page 206-108 thru 109</p>
600	<p>Management Emphasis: Ponderosa pine lands progress towards desired forest structure (Mexican spotted owl and northern goshawk habitat). Emphasize the social values compatible with an urban interface that includes recognition of the area's opportunity for wildlife, recreational and scenic values. Provide forage and security for a variety of game and non-game species of wildlife, provide conservation and environmental education opportunities, provide an area for recreational uses for the Flagstaff public, and manage a portion of the area to give a quiet, almost primitive recreation experience. Page 206-108 thru 109</p>
601	<p>Management Emphasis: Highlights include: -Per the <i>Objectives for Recreation Opportunity Spectrum</i> map, expand Primitive (Non-motorized) settings in and around the steepest portions of Walnut Canyon. Expand Semi-primitive Non-motorized settings on Campbell Mesa, around Walnut Canyon, in the Skunk/Fay Canyon area and northwest of Fisher Point. The Skunk/Fay Canyon areas and lands north of Fisher Point are classified as SPNM ROS settings with one or two SPM road corridors located to protect important habitat characteristics and soil and water needs of the canyon rim. Roaded</p>

	<p>Natural settings continue in some portions of the Management Area along the Lake Mary Road corridor.; - Balance recreation demands with sensitive resources such as sensitive species habitats, fragile riparian vegetation, and erosive soils on steep slopes; - MIS should be referenced by vegetation and landform type. For example, in ponderosa pine lands less than 40 percent slope, MIS are those listed for Management Area3... Page 206-108 thru 109</p>
602	<p>Management Emphasis: Highlights include: ...Reduce the risk of catastrophic fire especially in the Urban/Rural Influence Zone. There is concern for wildfire losses to the National Monument from fires starting southwest of the park. Balance the need to reduce wildfire risk in these areas with desired conditions for Primitive and Semi-primitive ROS settings and disturbance sensitive species habitat. Reference FLEA area-wide direction and other the <i>Forest Plan</i> management direction related to vegetation and fire management. Per the area-wide FLEA direction: meet with specific communities, City and County officials and consider input for Forest road and trail management, discourage proliferation of unneeded trails, create a primary trail system that serves as a collector for trails that originate in neighborhoods, convert some roads that are not needed for the road system south and east of Walnut Canyon to motorized trails outside of SPNM areas. Page 206-108 thru 109</p>
603	<p>G Portions of this Management Area will be closed to camping as noted on the Camping Objectives Map. Page 206-110</p>
604	<p>Management Emphasis - In the remainder of the Management Area, reintroduce fire's natural role as much as possible, progress towards desired conditions described (MSO and goshawk guidelines), restore meadows, and promote healthy pine/oak forests. Minimize recreation impacts to disturbance sensitive species. Maintain wildlife travelways. Take actions to help protect and maintain high quality water in Oak Creek. Page 206-114 thru 115</p>
605	<p>Management Emphasis: Highlights include: -Along Woody Ridge there are large tracts of unfragmented habitat and remote recreation opportunities including Semi-primitive Motorized and Semi-primitive Non-motorized ROS settings with Roded Natural corridors. The challenge here will be to maintain remote characteristics as new residential development occurs on the west side of Flagstaff. Maintain Woody Ridge as a Semi-primitive Non-motorized ROS setting with walk-in hunting opportunities; - Reference the <i>Fort Valley Ecosystem Management Environmental Assessment</i> and the "A-1" <i>10K Ecosystem Management Environmental Assessment</i> for site-specific desired conditions and actions; - Per the <i>Objectives for Recreation Opportunity Spectrum</i> map, maintain Semi-primitive Non-motorized settings on portions of Woody Ridge, A-1 Mountain and west of A-1 Mountain. In the remainder of National Forest System lands, maintain patches of Semi-primitive Motorized habitat with Roded Natural corridors along</p>

	major roads or in smaller National Forest inholdings.... Page 206-114 thru 115
606	Management Emphasis: Highlights include:... In this Management Area, the Semi-primitive settings have higher numbers of people than occur in outlying Management Area's; - Per the area-wide FLEA direction: meet with specific communities and County officials and consider input for Forest road and trail management, discourage proliferation of unneeded trails, create a primary trail system that serves as a collector for trails that originate in neighborhoods, convert some roads that are not needed for the road system into motorized trails; - MIS should be referenced by vegetation and landform type. For example, in ponderosa pine less than 40 percent slope, MIS are those listed for Management Area3. Page 206-114 thru 115
607	G Per the <i>Objectives for Camping</i> map (Appendix M) there should be designated dispersed camping along the Highway 89A corridor and the Freidlein Prairie Road. Expand the area where camping and campfires are prohibited. General dispersed camping should continue in the remainder of the Management Area. Page 206-115
608	G Focus road and trail rehabilitation work in the steep drainages, such as Pumphouse Wash, that flow into Oak Creek Canyon and contain fragile plants and rare species. Locate trails and manage recreation use to reduce impacts of woody riparian vegetation and riparian habitat in Pumphouse Wash. Page 206-116
609	G Per the FLEA Area-wide direction, focus special use permits away from urban/residential areas. Generally, do not place additional outfitter/guide activities or group activities in Pumphouse Wash, any spring or perennial stream site, except in support of approved research and/or to improve safety or provide site rehabilitation. Page 206-116
610	G In the Oak Creek watershed, high priority is given to minimizing soil erosion and sedimentation from Forest system roads and trails. Proper maintenance and drainage will be emphasized as well as relocating roads from meadows and obliterating unnecessary roads. Page 206-116
611	G Where perennial stream flow is present, riparian communities should have adequate in-stream flows and adequate plant cover to protect stream banks and dissipate energy during high flows. Channel characteristics and water support natural biodiversity. Ensure adequate instream flow water rights to maintain aquatic communities and water sources for wildlife. Page 206-116
Coronado National Forest	
612	1. Develop operational plans for all areas that are receiving resource damage because of recreation activities.
613	2. Determine use capacities and manage to those capacities at less than standard or standard.
614	5. Caves will be evaluated under provisions of the Federal Cave Protection Act of 1988. Caves determined to be significant under the

	Act or those being evaluated are exempt from locational disclosure under the Freedom of Information Act.
615	6. The location and resources of caves will be kept confidential when needed to protect important archeological resources, habitat for endangered wildlife, sensitive cave biota, and unique geological features. This confidentiality also includes information provided by cooperators under signed agreements.
616	7. Specific management prescriptions will be prepared for caves with high resource, educational, or recreational values; hazardous conditions; or heavy use. These prescriptions will include guidelines for appropriate use, necessary restrictions, and monitoring requirements. Planning priority is for those caves currently under permit.
617	8. Inventory, map, and monitor caves Forestwide to determine visitor capacity, condition, and further management needs. Evaluation of this information will help identify priority caves that may require protection measures such as gating, entry permits, or education emphasis.
618	9. Surface-disturbing land management decisions will include consideration of potential impacts to delicate cave ecosystems.
619	10. Measures for protection of caves will be incorporated into project planning. These may include avoidance of the alteration of cave entrances, limitation of management activities within and area draining into a cave if they may affect the cave ecosystem, avoidance of diversion of surface drainage into caves, and limitation of public access if required to prevent damage to cave resources or if there are safety hazards.
620	11. Identified bat roosts will be managed as a sensitive resource and for the enhancement of populations. Protection measures may include seasonal closures, education, and gating. Management of roosts will include consultation with State and Federal wildlife agencies.
621	12. Access for exploration and development of locatable mineral resources will be analyzed in response to a proposed operating plan. Potential impacts to cave resources will be considered in reviewing proposed mining operating plans.
622	13. Withdraw from mineral entry those areas needed to protect caves from mining activities.
623	14. Excavation to locate caves will be analyzed and permitted on a case-by-case basis. Exploration inside caves, including excavation, will be commensurate with identified resource values and permitted on a case-by case basis.
624	16. All management direction will be accomplished with involvement of interested publics. Encourage management of specific caves through the use of a Memorandum of Understanding with caving organizations.
625	17. Entry permits will be required for caves, based upon specific resource considerations.
626	18. Transportation and recreation planning will consider existing and

	<p>future needs for both motorized (vehicular) and non-motorized recreation opportunities. Appropriate users will be contacted prior to closing roads or trails to existing uses. The following criteria will be applied to each area of the Forest when considering changes in motorized vehicle use: (a) The type of recreational uses to be accommodated and the appropriate maintenance levels for each road or trail. (b) Safety of both non-vehicle users and vehicle users. (c) Minimization of conflicts between vehicle users and non-vehicle users. (d) Protection of the natural resource base.</p>
627	<p>1. Maintain or improve occupied habitat of commonly hunted species, listed threatened and endangered species, and management indicator species through mitigation of Forest activities with cooperation of New Mexico Department of Game and Fish, Arizona Game and Fish Department, and US Fish and Wildlife Service. Where applicable, consult with other wildlife and plant oriented groups and affected agencies. (See Appendix H [attached as Table IV] for minimum desired habitat acres.)</p>
628	<p>3. Maintain or improve current vegetative diversity (numbers of plant associations and species occurrence) by mitigation of Forest activities. (See Appendix H [attached as Table IV] for desired acres.)</p>
629	<p>4. With cooperation of Federal, Arizona, and New Mexico wildlife agencies, develop overall direction for listed threatened and endangered species. (See Appendix G [attached as Table V] for species list). Delist Federally- and State-listed threatened and endangered species in accordance with species recovery plans. Reoccupy historical habitat Forestwide with other identified species.</p>
630	<p>5. Reintroduce extirpated native species into historical habitats in accordance with cooperative interagency plans.</p>
631	<p>6. Consult with the New Mexico Department of Game and Fish, New Mexico Department of Natural Resources, Arizona Game and Fish Department, and US Fish and Wildlife Service during the environmental analysis process on projects significantly affecting wildlife and threatened and endangered plant habitats. Specific agency responsibilities are described in FSM 2610 (Wildlife and Fish Cooperative Relations) and 2670 (Threatened and Endangered Plants and Animals) an in the Endangered Species Act. Where applicable consult with other wildlife and plant oriented groups (such as State Heritage Programs) and affected Federal agencies.</p>
632	<p>7. Determine presence of Federally and State listed threatened and endangered plant and animal species in project areas through on-site inventory and consultation with existing databases as part of environmental analysis completion. Recommendations for habitat needs will be made on a project-by-project basis.</p>
633	<p>8. In cooperation with the US Fish and Wildlife Service, Arizona Game and Fish Department, and New Mexico Department of Game and Fish, develop a general activity plan for State and Federally listed</p>

	<p>threatened and endangered species. This directional plan would guide habitat management on the Coronado National Forest by: (1) determining critical habitat for threatened and endangered species and prescribing measures to prevent the destruction or adverse modification of such habitat; (2) recommending appropriate conservation measures including the designation of special areas to meet the protection and management needs of such species; (3) prioritizing completion of recovery plans on Memorandums of Understanding by species; and (4) establishing a timeframe for (3) above. Habitat requirements, research needs, and transplant goals with completion dates would be outlined for each species within its recovery plan. (See Appendix G [attached as Table V] for species list.)</p>
634	<p>9. Develop management plans for designated endangered species critical habitat on site-by-site basis as species recovery plans are completed. Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species.</p>
635	<p>10. In cooperation with Arizona and New Mexico wildlife agencies develop an activity plan for transplanting other native species into historically occupied habitat. This directional plan would guide habitat management on the Coronado National Forest by: (1) prioritizing relocation sites Forestwide by species; (2) developing habitat management plans and Memoranda of Understanding for relocation sites; (3) establishing a schedule for completion of (1) and (2) above.</p>
636	<p>11. Evaluate through consultation with Arizona Game and Fish, New Mexico Departments of Game and Fish and Natural Resources, along with other wildlife and plant oriented groups where appropriate, population viability of management indicator species through determination of: (1) amount of suitable habitat; (2) distribution of suitable habitat; (3) number of individuals that support regional population goals; and (4) likelihood of continued existence.</p>
637	<p>12. Mitigate impacts on wildlife and plant diversity by applying the following standards and guidelines to the appropriate management activities. Wildlife species to be featured are shown for each individual management area.</p>
638	<p>a. Mineral entry and oil and gas exploration. (1) leave buffers around watering and feeding areas for escape and hiding cover. Buffer widths vary with the site but must be wide enough to screen affected wildlife from the project site. (2) Rehabilitate site after entry using mixture of forage and cover plant species. (3) Within occupied habitat of threatened and endangered species. (a) specific recommendations made on site by site basis. Recommendations vary from seasonal limitations to no construction permitted or mineral withdrawal.</p>
639	<p>b. Recreation. (1) Trails (a) New construction: 1. Leave one mile</p>

	buffer around peregrine falcon eyrie locations and other critical raptor nesting sites. 2. Route around rock talus slopes. (b) Maintenance of existing trails: 1. Minimum maintenance within one mile of peregrine falcon eyrie location. 2. limit maintenance to between October 1 and February 1 within one mile of peregrine falcon. (2) Recreation Use (a) Establish species tolerance levels on a project site by site basis.
640	c. Fuelwood Harvest. (1) Follow old growth standards and guidelines per the regional standards and guidelines depicted at the beginning of Chapter 4 (plan pages 22 to 23). Old growth characteristics have been placed in tabular form (plan page 24). (a) Retention areas will emphasize hiding, escape, bedding and thermal cover around feeding and watering areas, in drainages, and along roads. Leave strips vary in size from 50 to 200 feet depending on density by exiting vegetation. (b) Retention areas will emphasize leaving mast and berry producing trees in the same mixtures of mature and overmature species as in pre-treatment stand. (c)
641	c. Fuelwood Harvest. (2) In Mexican spotted owl and northern goshawk habitat, manage other tree age classes per region-wide guidelines depicted at the head of Chapter 4 (plan pages 15 to 22). In other areas manage other tree classes as follows: Poles: greater than or equal to 20 percent of the stand. Sapling and seedling: less than or equal to 60 percent of the stand.
642	c. Fuelwood Harvest. (3) Maintain 3 or more cavity bearing live trees and 3 or more snags or decadent trees per acre. Tree diameters at breast height will be at least 12 inches through rotation period, where feasible.
643	c. Fuelwood Harvest. (5) In fuelwood stands yielding less than 4 cords per acre at end of rotation, leave 50 percent of trees with diameter breast heights less than 4 inches for thermal, hiding and escape cover and as growing stock.
644	c. Fuelwood Harvest. (6) Retain all age classes of riparian species (defined in FSM 2526, Riparian Watershed Management) and madrone.
645	c. Fuelwood Harvest. (7) Control livestock and recreation use in stands for two growing seasons or more after harvest to establish vegetative regeneration.
646	c. Fuelwood Harvest. (9) Leave at least two slash piles as cover or nest sites within one half mile of water. In turkey and Mearn's quail habitats, lop and scatter the slash.
647	c. Fuelwood Harvest. (10) Retain 150 foot vegetation buffers around raptor nests and colonial turkey vulture and owl roost sites.
648	c. Fuelwood Harvest. (12) In identified threatened and endangered species habitat, the above standards and guidelines will be modified, if necessary, on a site by site basis.
649	d. Roads. (1) Limit density of existing and new road construction to one mile of road or less per square mile.

650	d. Roads. (2) Close and reseed temporary fuelwood roads after harvest.
651	d. Roads. (3) Establish tolerance levels for state and federally listed threatened and endangered species for new construction and maintenance of roads on project by project basis.
652	e. Range Management. (1) Provide wildlife input into allotment management plans in order to: (a) Maintain wildlife and livestock utilization of perennial vegetation at levels established in FSM 2209.21, R-3 (Range Analysis and management Handbook). (b) Provide for one water per section available to wildlife yearlong. (c) Provide for wildlife escape ramps in water developments. (d) Allow for wildlife passage through fences by: 1. Building fences with 4 wires or less with bottom wire 16 inches off ground, top wire 12 inches above second wire, and fence height less than or equal to 42 inches. 2. Providing crossings at established antelope travel routes.
653	f. Range and watershed rehabilitation projects. (1) Leave strips of existing vegetation in drainages and around waters. Width varies with density of existing vegetation but adequate hiding, escape, bedding and thermal cover is usually provided with strips of 50 to 150 feet wide.
654	f. Range and watershed rehabilitation projects. (3) Retain all non-targeted plant species, (such as cacti and agaves) within limits of treatment method.
655	g. Other forest products harvest. (2) Yucca, cactus, ocotillo, etc. (a) Harvest permitted on site by site basis.
656	h. Timber harvest. (1) Maintain basal area and age class distributions as shown in silvicultural guidelines for timber harvest in Management Area 2.
657	h. Timber harvest. (2) Retain current acres of meadows (a) Route timber haul roads around meadows. (b) Restrict off-road vehicle use to designated roads. (c) Leave 50 to 150 feet buffers around meadows to provide thermal, escape and hiding cover.
658	h. Timber harvest. (3) Leave 3 or more snags of at least 20 inches diameter breast height per acre through rotation period.
659	h. Timber harvest. (5) Retain all ages classes of riparian species (defined in FSM 2526. Riparian Watershed Management) and madrone.
660	h. Timber harvest. (6) Control livestock and recreation use in stands for 2 or more growing seasons after harvest to allow vegetative regeneration.
661	h. Timber harvest. (7) Leave 50 to 150 foot or more vegetation buffers around waters and along roads and drainages to provide thermal, escape, bedding and hiding cover. Width varies with density of existing vegetation.
662	h. Timber harvest. (8) Retain 150 foot buffers around raptor nests.
663	h. Timber harvest. (10) In harvest stands lop and scatter slash within one half mile of water.

664	h. Timber harvest. (11) Manage aspen as follows: (a) 40 percent of stand has aspen and conifer basal area greater than or equal to 161; 30 percent greater than or equal to 81 but less than 160; 30 percent less than or equal to 80. (b) 20 percent of canopy cover retained in overmature or mature age classes. (c) Leave 3 cavity bearing overmature and mature trees and 3 snags with diameter breast heights greater than 10 inches per acre during the 80 year rotation period. (d) Regeneration areas will be less than 6 acres.
665	h. Timber harvest. (12) Gambels oak. (a) Retain 40 percent of canopy cover (compared to total enclosure) as mature and overmature; less than or equal to 30 percent as poles; and less than or equal to 30 percent as seedlings/saplings.
666	1. Maintain wildlife structures to the following guidelines. They are intended to meet specific wildlife habitat objectives as shown for each Management Area. Structures may not exist in every Management Area. a. Maintain all water developments every 4 years. b. Maintain study plots once every 10 years. c. Maintain other structures once every 4 years.
667	The following structural and nonstructural improvement guidelines are intended to meet the specific wildlife habitat objectives as shown for each Management Area. They may not be applicable for every Management Area. Nonstructural Wildlife Improvements (a) Prescribe burn feasible areas on a 20-year cycle. (b) Seed suitable wildlife forage species as needed in fuelwood and timber areas. (c) Transplant listed threatened and endangered and other identified species into suitable habitat following guidelines of species recovery plans and Memoranda of Understanding. (d) Revegetate wildlife areas with wildlife forage, cover, and riparian species. Native species should be used when available. (e) Thin or patch cut an average of 10 acres of aspen, gambel oak, and timber species per year.
668	The following structural and nonstructural improvement guidelines are intended to meet the specific wildlife habitat objectives as shown for each Management Area. They may not be applicable for every Management Area. Structural Wildlife Improvements a. Construct water developments or potholes to accomplish 1 per section within 4 decades. b. Consider structural improvements and maintenance for threatened and endangered species as technology develops. c. Construct fish habitat improvement structures as needed for threatened and endangered species. d. Fence riparian areas where prescribed by approved allotment management plans. Miles of fence constructed will vary with management plan.
669	1. Priority for allotment management planning will be given to areas with opportunity to reverse range deterioration or to increase permitted numbers.
670	4. Discontinue livestock grazing in Redfield Allotment (Galiuro Mountains) due to economic and ecological reasons.

671	3. Timber management priorities are to enhance wildlife and recreational resources.
672	2. First priority for watershed improvement projects goes to unsatisfactory watershed condition.
673	5. Through management services, provide information to minimize disturbance and improve already-disturbed areas. Best management practices will be used to minimize the time of recovery to a satisfactory erosion level, minimize soil productivity loss, improve water quality, and minimize channel damage.
674	7. Restrict equipment use to terrain and climatic conditions where soil damage will be minimal.
675	9. Manage riparian areas to protect the productivity and diversity of riparian-dependent resources by requiring actions within or affecting riparian areas to protect and, where applicable, improve dependent resources (FSM 2526). Emphasize protection of soil, water, vegetation, and wildlife and fish resources prior to implementing projects (FSM 2526).
676	10. Give preferential consideration to resources dependent on riparian areas over other resources. Other resource uses and activities may occur to the extent that they support or do not adversely affect riparian-dependent resources.
677	11. By the end of the first time period, complete classifications and inventories of all riparian areas, and complete action plans to improve all unsatisfactory riparian areas. Improve all riparian areas to satisfactory or better condition by the end of Period 5. Such satisfactory conditions are specified below, expressed as a percentage of "natural" conditions (that is, what each site can produce if not further disturbed by man). Twenty-five percent of all riparian areas must be in satisfactory condition by Period 2.
678	a. Aquatic resource: (1) Maintain at least 80 percent of natural shade over water surfaces in fish bearing streams. (2) Maintain at least 80 percent of natural bank protection. (3) Maintain the composition of sand, silt, and clay within 20 percent of natural levels in fish bearing streams.
679	b. Vegetative resources (where the site is capable of supporting woody plants): (1) Maintain at least 60 percent of the woody plant composition in three or more riparian species. (2) Maintain at least three age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian species. (3) maintain at least 60 percent of natural shrub and tree crown cover.
680	c. Wildlife resources: Maintain at least 60 percent of natural shade over land surfaces.
681	12. On a site-specific basis, identify riparian-dependent resources and develop action plans and progress to bring about conditions essential to supporting those dependent resources.

682	1. To the extent possible, avoid construction of roads across sensitive soils and scenic lands. Prohibit the construction of roads across mountain meadows.
683	5. The powerline serving the Mt. Graham International Observatory will be buried. The astronomical observatory permittee will provide electric power capability to Columbine Administrative Site.
684	Maintain existing electronic and astrophysical sites and complete site management plans for all sites with cooperation of user groups. Continue to establish user groups or organizations for each site. Consolidation of existing and new facilities and uses shall be given high priority over opening new sites. Group uses according to compatibility.
685	9. Within the Pinaleno Mountains, High Peak (Mt. Graham) will no longer be considered for electronic site development. Any development of the West Peak electronic site will be deferred until further analysis is completed as part of the recovery for the Mt. Graham red squirrel.
686	10. Electronic sites will be managed to the following standards: a. Maximize joint use of existing buildings.
687	10. Electronic sites will be managed to the following standards: b. Lot plans as presently established will be eliminated. Sites allocated on a total required facility basis.
688	10. Electronic sites will be managed to the following standards: d. Clearing of vegetation will be limited to that which poses a hazard to facilities and operational efficiency.
689	10. Electronic sites will be managed to the following standards: f. VHF transmitters will be permitted if frequencies are compatible with those of previous users. (Authorize only specified frequencies and not wide range bands on 2700-10 Technical Data Sheets.)
690	10. Electronic sites will be managed to the following standards: g. All new and replacement towers must be self-supporting.
691	10. Electronic sites will be managed to the following standards: i. All utility lines will be placed underground.
692	9. Emphasize acquisition of water-oriented property inside the National Forest boundary. This property provides much needed high quality public recreation use, as well as high value wildlife and fish habitat.
693	2. Develop the minimum transportation system to adequately meet management, protection, and utilization needs, but in locations that will minimize damage and maximize the values of all resources.
694	4. Road maintenance activities will be conducted primarily for protection of our road investment, resource protection, user safety, and user economy. Funding will continue to be the primary constraint on the intensity of road maintenance efforts. When roads in need of maintenance cannot be serviced because of budget constraints, they will be closed if unacceptable resource damage is occurring.

	Maintenance agreements with local government and private organizations will be sought to supplement Forest Service funding.
695	3. Conduct fire suppression activities in a way to protect watershed and visual resource values.
696	2. Conform to Department of Agriculture standards in the use of all pesticides and promote development of acceptable alternatives for the use of pesticides.
696	1. Safeguard water, people, animals, pets, and property in connection with use of pesticides and fire retardants (pg 45)
697	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: a. Insecticides and rodenticides in recreation areas and administrative sites (pg 45).
698	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: b. Herbicides for aquatic weed control in fishing lakes. Requests normally come for State Game and Fish Departments (pg 45).
699	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: c. Insect and disease control on timber and rangelands. Proposals for insect control on rangelands (i.e. grasshoppers, etc.) normally come from outside agencies (45).
700	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: d. Small research studies from universities or governmental research agencies.
701	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: e. Herbicides to control brush and herbaceous plants along State and Federal highways. Requests normally come from State highway Departments as part of annual highway maintenance.
702	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: g. Cyanide leaching as part of mining operations.
703	3. Chemicals may be used within guidelines approved by other agencies for the following purposes: h. Herbicides to control invading plants that reduce herbaceous forage production on rangelands. Not all of the control would be done by use of herbicides. Depending on individual site circumstances, the control might be by mechanical means, prescribed fire, fuelwood harvest, herbicides, or some combination.
704	1. Threatened, endangered, and sensitive species habitat requirements will take precedence over vegetation manipulation to control insects and disease. All silvicultural examinations will integrate insect and disease considerations in the final stand prescriptions to maintain stand vigor and composition in resistant conditions. Special attention will be given to removal of mistletoe-infected trees during intermediate harvests and regeneration harvests.
705	2. Use of motorized vehicles is restricted to existing trails and roads.

	Some trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons. All trails on the Santa Catalina Ranger District are closed to motorized vehicles.
706	3. Emphasize semi-primitive motorized and semi-primitive nonmotorized recreation opportunities. When roads are no longer needed, close them in order to create more opportunities for semi-primitive nonmotorized or primitive experiences.
707	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain and improve current habitat for Federally listed plant and animal species and work toward delisting. 2. Maintain current levels of occupied habitat for: mule deer, white-tailed deer, javelina, bighorn sheep, pronghorn, cottontail, white-sided jackrabbit, black bear, raptors, Merriam's turkey, Gould's turkey, scaled quail, Mearn's quail, Gambel's quail, waterfowl, Baird's sparrow, Five-striped sparrow, Arizona ridge-nosed rattlesnake, Twin-spotted rattlesnake, Western massassauga, Gila topminnow.
708	1. Maintain wildlife structures based on guidelines shown in Forestwide prescription. The objective is to maintain current levels of occupied habitat for: mule deer, white-tailed deer, javelina, bighorn sheep, pronghorn, cottontail, black bear, Merriam's turkey, scaled quail, waterfowl, Gila topminnow
709	Structural and nonstructural habitat improvement projects will be based on guidelines shown in the Forestwide prescription. They are intended to meet the following objectives: 1. Improve quality and availability of forage and availability of water for commonly hunted species: mule deer, white-tailed deer, javelina, bighorn sheep, pronghorn. 2. Maintain horizontal and vertical plant diversity at current level. 3. Delist threatened and endangered species and reoccupy historic habitat with other identified species following guidelines in approved species recovery plans and Memoranda of Understanding. 4. Maintain and improve current nesting habitat for endangered species as directed by approved recovery plans.
710	1. Manage rangeland at level A (no assigned permitted use for livestock).
711	1. Restore to satisfactory watershed condition, on an emergency basis, watersheds or portions of watersheds when damaged. Watershed treatment is a low priority in this Management Area. Water and soil resources improvements may consist of channel stabilization and revegetation using native or non-native species. See Appendix D for appropriate activities.
712	2. Close, drain, and revegetate existing roads that are determined to be unneeded for further use. This should be a cost of the initiating resource element.
713	3. Prescribed fire will be used to reduce fuel hazards, enhance wildlife

	values, and enhance visual resources.
714	1. Maintain surveillance for insect and disease outbreaks. Where opportunities exist, attempts will be made to reduce or prevent damage from insects and diseases. Use integrated pest management techniques which are compatible, economical, and environmentally acceptable.
715	2. Use of motorized vehicles is restricted to existing trails and roads. Some roads and trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons. All trails on the Santa Catalina Ranger District are closed to motorized vehicles.
716	3. Road 507 will be closed to public motorized vehicles at the junction with Swift Trail. Nonmotorized activities will be permitted along the first 1.8 miles to the red squirrel refugium boundary.
717	4. Within the Pinaleno Mountains, snowmobiles are restricted to roads and trails designated (signed) for their use.
718	5. Facilities for snow play activity (tubing/sledding) could be developed outside suitable habitat for the Mt. Graham red squirrel. Consider as part of other recreational sites development in Management Area 3A/3B.
719	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain and improve current habitat for Federally listed threatened and endangered plants and animals and work toward delisting.
720	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 2. Maintain 80 percent or more of primary and secondary cavity nester habitat in timber, aspen, and Gambel's oak stands.
721	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 3. Maintain or improve current levels of occupied habitat for: white-tailed deer, black bear, Mt. Graham red squirrel, Other squirrel species, Merriam's turkey, buff-breasted flycatcher, raptors, Arizona ridge-nosed rattlesnake, Twin-spotted rattlesnake, rock rattlesnake, Arizona trout, Mexican spotted owl, Northern goshawk.
722	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 4. Studies to define the life history and ecology of the red squirrel and the spruce-fir and mixed conifer forest will be conducted for at least a 10-year period. Studies will also include human/wildlife encounters and potential impacts. Specific studies to be conducted will be determined by appropriate agencies and the University of Arizona. Funding responsibilities will be part of the final study determination..
723	Specific standards and guidelines for management of wildlife are

	shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 5. Monitor squirrel population and habitat annually through inventory and analysis. Red squirrel habitat needs will supercede the needs of all other species.
724	Maintenance of structural and nonstructural habitat improvements will be based on guidelines shown in the Forestwide prescription. They are intended to meet the following objectives: 1. Maintain and improve occupied habitat for: Mt. Graham red squirrel, white-tailed deer, black bear, Merriam's turkey, buff-breasted flycatcher, Arizona trout, Mexican spotted owl, Northern goshawk. 2. Maintain horizontal and vertical plant diversity. 3. Delist threatened and endangered species and reoccupy historical habitat with other identified species following guidelines of approved recovery plans and Memoranda of Understanding. 4. Improve old growth spruce-fir and mixed conifer forest habitat conditions for the Mt. Graham red squirrel. 5. Reforest existing fuelbreaks, clearcuts, and roadbeds as needed to increase habitat for Mt. Graham red squirrel.
725	1. Silviculturally manage the tree resource under uneven or even-age management, as appropriate, with emphasis upon recreation, visual quality, wildlife, and watershed. Complete stand examinations of all suitable acres.
726	2. The removal of timber is based on a 240-year rotation using group selection and small-patch shelterwood cuts to feature four age classes, plus wildlife openings. The desired age class structure is as follows: seedling-sapling, 0-60, 40 percent; poles-sawtimber, 61-120, 20 percent; Mature sawtimber, 121-180, 20 percent; Old growth sawtimber, 181-240, 20 percent. Within the 0 to 60 and 61 to 121 year old stands, maximum basal areas should be maintained for thermal cover. Stocking should not be so high as to cause stand stagnation and decreased tree vigor (less than 120 BA). In the two older age classes, basal area should vary so that 25 to 50 percent of the stands are opened up (40 BA) and the other 50 to 75 percent are dense (up to 120 BA). Existing meadows in the mixed conifer and spruce-fir types are not included in the suitable timber landbase. They will be maintained as open meadows. Additional wildlife openings will be created through timber harvest practices. These will normally rotate as part of the harvest cycle.
727	3. Reduce slash from wood harvest by offering logging residue as fuelwood. Residual slash will be treated within two years. Within suitable habitat for the Mt. Graham red squirrel (Pinaleno Mountains), dead and down material will not be removed for fuelwood, except for on-site recreational use.
728	4. Within suitable habitat for the Mt. Graham red squirrel (Pinaleno Mountains), Christmas trees will not be harvested.
729	3. Between approximately November 15 and April 15 each year, Swift

	Trail (State Road 366), beginning at its intersection with Forest Road 507 to its terminus, will be closed to all motorized vehicles except those officially authorized.
730	All access roads leading off Swift Trail above Forest Road 507 and including Road 352 (Heliograph Peak Road) will be closed to all motorized vehicles except those officially authorized. This does not include access roads into developed public recreation sites.
731	5. Prescribed fire will be used to reduce fuel hazard and enhance wildlife habitat.
732	1. Trails and trailheads will be closed and not maintained for public use within the red squirrel refugium. Those that provide access to trails outside the refugium will be relocated.
733	2. Hiking will be allowed along the observatory access road and in other areas outside the refugium. Trails will be maintained to level 2 (near primitive). See Glossary, Trail Maintenance.
734	3. Use of motorized vehicles is allowed only on the new observatory access road. No public or private vehicles will be allowed except by permit. Workers will be shuttled to the observatory. Road 669 will be gated closed to all but official vehicles beyond the observatory boundary.
735	4. Road 507 will be closed to public motorized vehicles at the junction with Swift Trail. Nonmotorized activities will be permitted along the first 1.8 miles to the red squirrel refugium boundary.
736	5. No snowmobiles are permitted except for approved administrative activities. Facilities for snow play activity (tubing/sledding) will not be provided.
737	6. Manage dispersed use at the following service levels: 1,750 acres at less than standard (red squirrel refugium). No public use permitted except as part of shuttle tour. 863 acres at less than standard. Nonmotorized public uses permitted.
738	9. The following applies to the 16 -acre astrophysical permitted use area: Prohibit all hunting, camping, hiking, and campfires. Limited daylight public access. Roadway closed at night. Radio transmissions controlled. Fencing may be used to limit access to the area. Pets are required to be kept on a leash within all areas of the refugium where there is public access.
739	1. Within the red squirrel refugium (1,750 acres) the general objective is to reduce human/wildlife conflicts and improve the habitat of the red squirrel. Red squirrel habitat needs will supercede the needs of all other species.
740	2. Studies to define the life history and ecology of the red squirrel and the spruce-fir and mixed conifer forests will be conducted for at least a 10-year period. Studies will also include human/wildlife encounters and potential impacts. Specific studies to be conducted will be determined by appropriate agencies and the University of Arizona. Funding responsibilities will be part of the final study determination.

741	3. Monitoring of red squirrels within and adjacent to the observatory and associated roads will be done during the life of the operation. This will be the responsibility of the observatory permittee with guidance from appropriate agencies.
742	4. Specific standards and guidelines for management of wildlife are shown in the Coronado National Forest Plan under the Forestwide prescription for activities appropriate to the Management Area. These are intended to meet the following objectives: (a) Improve current habitat for the endangered Mt. Graham red squirrel and work toward delisting. Emphasize establishment and maintenance of old growth forests within the entire Management Area. (b) Assist in the establishment and implementation of recovery plans for all Federally listed threatened or endangered species. (c) Inventory and analyze population levels and habitat quality for all appropriate management indicator species in order to monitor plan objectives. (d) In spruce-fir, mixed conifer, and aspen stands maintain at least 80 percent of the existing primary and secondary cavity nesting habitat during any activity.
743	5. Construction activities will utilize methods to minimize windthrow or blowdown in spruce-fir and mixed conifer forests. Small trees that would be destroyed by construction activities will be salvaged for use in reforestation efforts.
744	6. Implement an effective environmental education program (See Dispersed Recreation Management guidelines) to lessen the impacts of recreation uses on the area.
745	7. Monitor squirrel population and habitat annually through inventory and analysis.
746	1. Maintenance and improvement of structural and nonstructural improvement activities will be commensurate with the Wilderness Act and guidelines shown in the Coronado National Forest Plan Forestwide prescription. They are intended to meet the following objectives: (1) Improve habitat for the endangered Mt. Graham red squirrel. Develop a recovery plan to identify specific habitat improvement measures. (2) Improve old growth spruce-fir and mixed conifer forest habitat conditions. (3) Reforest existing fuelbreaks, clearcuts, and roadbeds to increase habitat for old growth dependent species including the Mt. Graham red squirrel. Reforestation efforts in red squirrel habitat will be initiated immediately with the objective of completing initial efforts in 5 years. The University of Arizona will share in the cost of this effort.
747	1. Manage rangeland at level A (no livestock). Exclude livestock grazing including recreational animals to protect wildlife values.
748	2. Use of down woody material for firewood is restricted to on-site recreational use within areas open to public use (863 acres).
749	1. Maintain satisfactory watershed condition.
750	4. Manage all programs to eliminate or minimize on-site and

	<p>downstream water pollution. Wastewater (sewage and gray water) will be handled with approved septic tank/drain field systems. During construction phases, areas will be cleared only for construction planned for in that year. All toxic waste chemicals and materials will be hauled off the Forest to a suitable treatment or disposal facility. Garbage and trash will be hauled off Forest to a suitable disposal site. Topsoil will be stockpiled and redistributed to provide a fertile base, and slopes will be revegetated with native species. Cut material (soil and rock) from construction not used as fill or for revegetation will be hauled off the Forest to a suitable disposal site. Significant construction and operation activities will not be allowed within the cienega watersheds.</p>
751	<p>6. The character of the cienegas will be maintained naturally (including annual free water fluctuations, channel characteristics, water quality, and composition and density of riparian vegetation). Surface water flows will not be diverted or impounded within the cienegas.</p>
752	<p>2. Recommend withdrawal from mineral entry and mineral leasing on 2,629 acres to protect essential habitat for Federal and State listed threatened and endangered species and astronomical research operations. Mineral withdrawal is automatic with wilderness designation for the remaining 442 acres.</p>
753	<p>5. A management plan for the construction and operation of the observatory and associated road systems will be developed in a way to least likely have adverse effects on the red squirrel. The plan will include standards and guidelines for human activities on the site and adjacent areas. If additional facilities are approved after the 10-year study period, the management plan will be revised to include the additions.</p>
754	<p>3. Close, drain, and revegetate all unneeded roads as they are identified. Funding will be provided by the observatory permittee to the extent closures provide additional habitat for the red squirrel.</p>
755	<p>2. Utilized prescribed fire to reduce risk from wildfire and enhance wildlife values with emphasis on red squirrel habitat. Allow fire to assume its natural role in wilderness.</p>
756	<p>2. Within other areas, outbreaks of insects or disease will be controlled using integrated pest management concepts when there is a significant danger to the vegetation needed to sustain habitat for the Mt. Graham red squirrel and astronomical research activities.</p>
757	<p>Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain and improve current habitat for Federally listed threatened and endangered plants and animals and work toward delisting.</p>
758	<p>Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 2. In fuelwood stands, maintain 80 percent or more of occupied habitat</p>

	(compared to untreated stands) for primary and secondary cavity nesters. In other areas, maintain 100 percent of occupied habitat for these species.																
759	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 3. As part of allotment management planning, complete riparian management plans by the second period.																
760	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 4. Maintain or improve current levels of occupied habitat for: Apache fox squirrel, white-tailed deer, mule deer, javelina, pronghorn, cottontail, raptors, Mearn's quail, Merriam's turkey, coppery-tailed trogon, sulphur-bellied flycatcher, beardless flycatcher, thick-billed kingbird, Bell's vireo, blue-throated hummingbird, Arizona ridge-nosed rattlesnake, Mexican stoneroller, Gila topminnow, Sonora chub, Gila chub, Arizona trout.																
761	Maintain wildlife structures based on guidelines as shown in the Forestwide prescription. The objective is to maintain current levels of occupied habitat for species listed above. Structural and nonstructural habitat improvements will be based on guidelines as shown in the Forestwide prescription. They are intended to meet the following objectives: 1. Improve quality of forage for: white-tailed deer, mule deer, pronghorn, Merriam's turkey, Gould's turkey. 2. Delist threatened and endangered species and reoccupy historical habitat with other identified species following approved species recovery plans and Memoranda of Understanding. Also improve Federally endangered species habitat following these same guidelines.																
762	1. Manage suitable rangeland at Level A (no livestock), Level B (some livestock), Level C, and Level D. See Appendix C for definitions of range management levels. <u>Range Management Levels</u> <table border="1"> <thead> <tr> <th><u>Level</u></th> <th><u>Acres</u></th> </tr> </thead> <tbody> <tr> <td>A</td> <td>716</td> </tr> <tr> <td>B</td> <td>4,840</td> </tr> <tr> <td>C</td> <td>2,395</td> </tr> <tr> <td>D</td> <td>6,821</td> </tr> </tbody> </table> Manage controls livestock numbers so that livestock use is within present grazing capacity. Improvements are constructed to the extent needed to protect and maintain the other resources in presence of grazing. Riparian areas in Cave Creek are grazed only during period November 1 to June 30. No grazing in Madera Canyon and Carr Canyon Reef Area. <u>Projected Range Condition</u> <table border="1"> <thead> <tr> <th><u>Condition</u></th> <th><u>Period 1</u></th> <th><u>Period 5</u></th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	<u>Level</u>	<u>Acres</u>	A	716	B	4,840	C	2,395	D	6,821	<u>Condition</u>	<u>Period 1</u>	<u>Period 5</u>			
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	Satisfactory	14,181	14,181
	Unsatisfactory	591	592
763	3. Restrict removal of other vegetation, including beargrass, ocotillo, and cactus to salvage operations.		
764	1. Restore damaged watersheds to a satisfactory watershed condition. Watershed treatment is a high priority in this Management Area. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. See Appendix D for appropriate activities.		
765	2. Manage all programs to eliminate or minimize onsite and downstream water pollution.		
766	3. Remove slash and clearing debris from drainages, as needed, whether perennial or ephemeral, so that it is above the high water line.		
767	4. Provide, to the extent possible, conservation pools and minimum streamflows in authorizing or developing water storage impoundments and diversion projects.		
767a	2. Use of motorized vehicles is restricted to existing trails and roads. Some trails may be closed to motorized vehicles for safety, resource protection, and user conflict reasons. All trails on the Santa Catalina Ranger District are closed to motorized vehicles (pg 55)		
767b	5. Initiate or continue environmental education programs in Sabino, Madera, and Cave Creek Canyons (pg 55)		
767c	3. Prescribed fire will be used to reduce fuel hazard and to maintain or improve wildlife habitat and watershed conditions (pg 58)		
768	14. Specific standards and guidelines for the Sabino Canyon Recreation Area are: a. Prohibit hunting, fishing, and trapping in, and the removal of, native animals and plants for the Sabino Canyon Recreation Area. b. Refrain from the introduction of non-native animals or plants into the Sabino Canyon Recreation Area. Through information and education, discourage the public from releasing non-native species in the area. c. Study the feasibility of eliminating all species of non-native fishes from the portion of Sabino Creek within the Sabino Canyon Recreation Area and reintroducing the native longfin dace (<i>Agosia chrysogaster</i>). d. Encourage research to increase available information concerning the flora and fauna of the Sabino Canyon Recreation Area. Emphasis should be on inventory of species present and evaluation of their status. e. Continue to prohibit camping, pets, and glass containers in the Sabino Canyon Recreation Area.		
769	1. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to maintain and improve current levels of occupied habitat for appropriate indicator species groups and threatened and endangered species (61).		
770	Nonstructural habitat improvement will be based on guidelines shown in the Forestwide prescription. The objective is to: (1) Delist		

	threatened and endangered species following guidelines of approved recovery plans and Memoranda of Understanding.
771	1. Manage suitable rangeland at Level A (no assigned capacity for livestock). Some livestock grazing is permitted for the purpose of reducing the fire hazard from grasses. Some sites may be closed to grazing to meet recreation objectives (pg 61).
772	1. Manage all programs to eliminate or minimize on-site and downstream water pollution (pg 61).
773	2. Manage all programs to maintain satisfactory watershed conditions. Watershed treatment is a high priority in this Management Area. See Appendix D for appropriate activities (pg 61).
773a	1. Maintain surveillance for insect and disease outbreaks. Where opportunities exist, attempts will be made to reduce or prevent damage from insects and diseases. Use integrated pest management techniques which are compatible, economical, and environmentally acceptable (pg 61)
774	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain and improve current habitat for Federally listed plant and animal species and work toward delisting.
775	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 2. In fuelwood stands (as compared to an unharvested stand) maintain 80 percent or more of the occupied high density habitat and 60 to 80 percent of the low density habitat for Mearn's quail. Maintain 80 percent or more of the occupied habitat for cavity nesters.
776	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 3. Outside fuelwood areas, maintain 100 percent of occupied habitat for quail and cavity nester species.
777	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 4. Maintain or improve current levels of occupied habitat for: mule deer, white-tailed deer, javelina, desert bighorn sheep, pronghorn, cottontail, white-sided jackrabbit, black bear, raptors, Merriam's turkey, Gould's turkey, scaled quail, Gambel's quail, waterfowl, Baird's sparrow, Arizona ridge-nosed rattlesnake, Twin-spotted rattlesnake, Western massassauga, Gila topminnow.
778	1. Maintain wildlife structures based on guidelines shown in Forestwide prescription. The objective is to maintain current levels of occupied habitat for: mule deer, white-tailed deer, javelina, desert bighorn sheep, pronghorn, cottontail, black bear, Merriam's turkey,

	scaled quail, Gambel's quail, waterfowl, Gila topminnow.
779	1. Structural and nonstructural habitat improvements projects will be based on guidelines in the Forestwide prescription. They are intended to meet the following objectives: (1) Improve quality and availability of forage and availability of water for commonly hunted species: mule deer, white-tailed deer, javelina, desert bighorn sheep, pronghorn. (2) Maintain horizontal and vertical plant diversity at current levels. (3) Delist threatened and endangered species and reoccupy historical habitat with other identified species following guidelines in approved species recovery plans and Memoranda of Understanding. (4) Maintain and improve current nesting habitat for endangered species as directed by approved recovery plans.
780	2. Develop proper grazing systems to insure renewal of desired vegetative species for livestock forage, big and small game habitat, and to improve soil and water resources (pg 64).
780a	4. Structural and nonstructural improvements should receive high priority in these areas as needed for the desired level of management (pg 64)
780b	5. Vegetation manipulation will be used for range forage improvement and may consist of such activities as prescribed burning, mechanical removal, wood harvest use of approved herbicides, livestock grazing and reseedling of native or non-native species (pg 64).
781	4. Prohibit the removal of saguaro cactus, agave, yucca, and ironwood wildings unless it becomes necessary to remove these in order to accommodate a use of higher priority. The harvest of beargrass, ocotillo, and most cactus species will be permitted as long as there is no significant impact on other resources or uses.
781a	1. Silviculturally manage the woodland resource under uneven age management. Fuelwood harvest will be limited to those lands which contain fuelwood species having a crown cover of 10 percent or more. Manage to sustain an average 40 to 50 year cutting cycle (pg 64)
781b	2. The removal of dead or green trees for wood products or Christmas trees will be by individual tree selection or group selection limited to maximum clearing size of two acres. Harvest will be restricted to removal of over-mature, mature, poor form, low vigor or over-crowded trees for the purpose of maintaining vigorous stands and desired wildlife habitat (pg 64).
782	1. Restore damaged watersheds to a satisfactory watershed condition. Watershed treatment is a high priority in this Management Area. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. See Appendix D for appropriate activities (pg 65).
783	2. Manage all programs to eliminate or minimize onsite and downstream water pollution (pg 65).
784	3. Provide, to the extent possible, conservation pools and minimum

	streamflows in authorizing or developing water storage impoundments and diversion projects (pg 65).
785	2. Close, drain, and revegetate roads and trails that are determined to be unneeded for further use. This should be a cost of the initiating resource element (PG 65).
785a	1. Bring existing roads and trails that are to be retained on the system to a maintainable standard which is suitable for the planned use and provides for safety and resource protection (pg 65)
786	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain and improve current habitat for Federally listed plant and animal species and work toward delisting.
787	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 2. In fuelwood stands maintain 90 percent or more of occupied habitat (compared to untreated stands) for primary and secondary cavity nesters. In other areas, maintain 100 percent of occupied habitat for these species.
788	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 3. As part of allotment management planning, complete riparian management plans by the second period.
789	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 4. Maintain or improve current levels of occupied habitat for: Apache fox squirrel, white-tailed deer, mule deer, pronghorn, cottontail, raptors, Mearn's quail, Gould's turkey, Merriam's turkey, coppery-tailed trogon, sulphur-billed flycatcher, beardless flycatcher, thick-billed kingbird, Bell's vireo, blue-throated hummingbird, Arizona ridge-nosed rattlesnake, Mexican stoneroller, Gila topminnow, Sonora chub, Gila chub, Arizona trout.
790	1. Maintain wildlife structures based on guidelines shown in Forestwide prescription. They are intended to maintain current levels of occupied habitat for species listed above.
791	Structural and nonstructural habitat improvements projects will be based on guidelines as shown in the Forestwide prescription. They are intended to meet the following objectives: (1) Improve quality and availability of forage and water for: white-tailed deer, mule deer, pronghorn, Merriam's turkey, Gould's turkey. (2) Delist threatened and endangered species and reoccupy historical habitat with other identified species following approved species recovery plans and Memoranda of Understanding. Also improve habitat for Federally

	listed plants and animals following these same guidelines.
792	1. Manage suitable rangeland at Level D. If level D is not achievable, manage at Level A (no livestock). See Appendix C for definition of range management levels.
792a	2. The following criteria will be considered when determining whether livestock should be excluded from riparian areas. Exclusion may be temporary or permanent; seasonal or yearlong. (a) Satisfactory riparian conditions as described in the Forest-wide prescription can not be achieved or maintained. (b) There is a need to protect natural or artificial regeneration of riparian species. (c) There is a need to protect Threatened and Endangered species habitat (pg 69)
792b	1. Structural improvements are minimal and constructed only to the extent needed to protect and maintain the unique resources in presence of grazing (69)
793	1. Restrict removal of vegetation, such as beargrass, agave, yucca, ocotillo, and cactus to salvage operations and to remove invading species (pg 69).
794	1. Restore damaged watersheds to satisfactory watershed condition. Watershed treatment is a high priority in this Management Area. Watershed maintenance and improvement may consist of channel stabilization and revegetation using native or non-native species. See Appendix D for appropriate activities (pg 69).
795	2. Manage all programs to eliminate or minimize onsite and downstream water pollution (pg 69).
796	1. Consider mineral withdrawals as needed to protect essential habitats for threatened and endangered species (pg 69).
797	3. Close, drain, and revegetate existing roads that are determined to be unneeded for further use. This should be a cost of the initiating resource element.
798	5. The prescribed use of fire will be used to reduce fuel hazard and enhance wildlife habitat.
799	1. Maintain surveillance for insect and disease outbreaks. Where opportunities exist, attempts will be made to reduce or prevent damages from insects and diseases. Use integrated pest management techniques which are compatible, economical, and environmentally acceptable.
800	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (1) Maintain and improve current habitat for Federally listed plant and animal species and work toward delisting.
801	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (2) In fuelwood stands (as compared to unharvested stands) maintain 80 percent or more of the occupied high density habitat and 60 to 80 percent of the low density habitat for Mearn's quail. Maintain 80

	percent or more of the occupied habitat for cavity nesters. In other areas, maintain 100 percent of occupied habitat for quail and cavity nester species.									
802	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (3) Maintain or improve current occupied levels of habitat for: white-tailed deer, mule deer, javelina, pronghorn, cottontail, raptors, Merriam's turkey, Gould's turkey, coppery-tailed trogon, sulphur-billed flycatcher, beardless flycatcher, thick-billed kingbird, Bell's vireo, blue-throated hummingbird, Arizona ridge-nosed rattlesnake, Mexican stoneroller, Gila topminnow, Sonora chub, Gila chub.									
803	1. Maintain wildlife structures based on guidelines shown in Forestwide prescription. They are intended to maintain current levels of occupied habitat for species listed above.									
804	Structural and nonstructural habitat improvements projects will be based on guidelines as shown in the Forestwide prescription. They are intended to meet the following objectives: (1) Improve quality and availability of forage and water for: white-tailed deer, mule deer, pronghorn, Merriam's turkey, Gould's turkey. (2) Delist threatened and endangered species and reoccupy historical habitat with other identified species following approved species recovery plans and Memoranda of Understanding. Also improve habitat for Federally listed plants and animals following these same guidelines.									
805	<p>1. Manage suitable rangeland at Level D. If level D is not achievable, manage at Level A (no livestock). See Appendix C for definition of range management levels. Management seeks full utilization of forage allocated to livestock. Cost-effective management systems and techniques, including fencing and water development, are designed and applied to obtain relatively uniform livestock distribution and use of forage and to maintain plant vigor.</p> <p><u>Projected Range Conditions</u></p> <table border="1"> <thead> <tr> <th><u>Condition</u></th> <th><u>Period 1 Acres</u></th> <th><u>Period 5 Acres</u></th> </tr> </thead> <tbody> <tr> <td>Satisfactory</td> <td>15,412</td> <td>15,412</td> </tr> <tr> <td>Unsatisfactory</td> <td>1,712</td> <td>1,712</td> </tr> </tbody> </table>	<u>Condition</u>	<u>Period 1 Acres</u>	<u>Period 5 Acres</u>	Satisfactory	15,412	15,412	Unsatisfactory	1,712	1,712
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Satisfactory	15,412	15,412								
Unsatisfactory	1,712	1,712								
806	3. Prohibit the removal of saguaro cactus, agave, yucca, and ironwood wildings unless it because necessary to remove them in order to accommodate a use of higher priority. The harvest of beargrass, ocotillo, and most cactus species will be permitted as long as there is no significant impact of other resources or uses.									
807	1. Watershed treatment is a high priority in this Management Area. Watershed maintenance and improvement may consist of channel stabilization, activities to increase water infiltration, and revegetation using native or non-native species. See Appendix D for activity selection criteria.									

808	2. Manage all programs to eliminate or minimize onsite and downstream water pollution.
809	1. Consider mineral withdrawals as needed to protect essential habitats for Federally threatened and endangered species.
810	1. Attempt to avoid these areas with new road development.
811	3. Close, drain, and revegetate existing roads that are determined to be unneeded for further use. This should be a cost of the initiating resource element.
812	4. Prescribed fire will be used to reduce fuel hazard and maintain or improve wildlife habitat, livestock forage, and watershed condition.
813	1. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (1) Maintain and improve occupied habitat for Federally and State listed animals. (2) Maintain or improve current populations of endangered and threatened plants.
814	1. Nonstructural habitat improvement projects will be based on guidelines in the Forestwide prescription. They are intended to meet the following objectives: (1) Delist threatened and endangered species following guidelines of approved recovery plans and Memoranda of Understanding.
815	1. Manage rangeland at Level A (no livestock). Management excludes livestock grazing to protect other values or eliminate conflicts with other uses.
816	1. There will no removal of mineral materials.
817	2. Maintain withdrawals from mineral entry for all areas.
818	2. Close, drain, and revegetate roads that are determined to be unneeded for further use.
819	1. Outbreaks of insects and disease will not be controlled, except where there is a clear and imminent danger to timber or other values outside the research natural area.
820	1. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (1) Maintain and improve occupied habitat for Federally and State listed animals. (2) Maintain or improve current populations of endangered and threatened plants.
821	1. Nonstructural habitat improvement projects will be based on guidelines in the Forestwide prescription. They are intended to meet the following objectives: (1) Delist threatened and endangered species following guidelines of approved recovery plans and Memoranda of Understanding.
822	1. Manage rangeland at Level A (no livestock). Management excludes livestock grazing to protect other values or eliminate conflicts with other uses.

823	1. There will no removal of mineral materials. Mineral withdrawals will be unnecessary because the segregative effect of wilderness designation exceeds that of a withdrawal.
824	1. Outbreaks of insects and disease will not be controlled, except where there is a clear and imminent danger to timber or other values outside the research natural area.
824a	3. Use of motorized vehicles is prohibited except as approved for emergency or other special needs (pg 80)
824b	7. Permit lightning caused fires to play, as nearly as possible, their natural ecological role within wilderness (pg 80)
825	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (1) Maintain and improve current habitat for endangered and threatened plants and animals and work toward delisting.
826	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (2) As part of livestock grazing allotment and recreation management planning, complete riparian management plans by second period (pg 80).
827	Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (3) Maintain current levels of occupied habitat for: mule deer, white-tailed deer, javelina, bighorn sheep, pronghorn, cottontail, black bear, Mt. Graham spruce squirrel, Apache fox squirrel, Arizona gray squirrel, raptors, Merriam's turkey, Mearn's quail, Gambel's quail, buff-breasted flycatcher, coppery-tailed trogon, sulphur-bellied flycatcher, N. tyrannulet flycatcher, thick-billed kingbird, Bell's vireo, blue-throated hummingbird, twin-spotted rattlesnake, Arizona ridge-nosed rattlesnake, rock rattlesnake, Gila topminnow, Arizona trout, Mexican stoneroller, Sonora chub, Gila chub (pg 80).
828	Maintenance and improvement activities will be commensurate with the Wilderness Act and guidelines shown in the Forestwide prescription. They are intended to meet the following objectives: (1) Maintain habitat for: mule deer, white-tailed deer, javelina, pronghorn, black bear, Merriam's turkey, Gould's turkey. (2) Improve habitat for: desert bighorn sheep, Gila topminnow, Sonora chub, Arizona trout, peregrine falcon and other species following guidelines of approved species recovery plans and Memorandums of Understanding. (3) Consider and implement as appropriate, structural improvement for native and game fish habitats (pg 81).
829	3. Riparian areas will be managed to achieve and maintain satisfactory riparian conditions as described in the Forestwide prescription. This may be accomplished through the use of structural improvements,

	movement of livestock, of the exclusion of livestock (pg 82).
829a	1. Act on all land exchange offers involving acquisition of private land (pg 82).
829b	1. Utilize prescribed fire to reduce to an acceptable level, the risks and consequences of wildfire within the wilderness or escaping from wilderness (pg 82).
830	1. Outbreaks of insects and disease will not be controlled, except where there is a clear and imminent danger to timber or other values outside the wilderness, and then only by approval of the Regional Forester.
831	6. Recommend the designation of the South Fork of Cave Creek (outside the wilderness area) as a zoological-botanical area and portions of Guadalupe Canyon as a zoological area. A ten-foot wide strip along each side of the South Fork Road, around South Fork Picnic Area, and around the existing recreation residences will be excluded from this designation. They will be part of Management Area 3A.
832	9. A Forest Service permit will be required for plant collection and for research activities that involve placing anything on the National Forest. Collection permits will be locally available in the Cave Creek area within availability of personnel and volunteers to issue them. Permits will be used as a tool to monitor resource use and potential impacts.
833	Under this prescription, the general objective is to emphasize non-consumptive wildlife recreation activity. Management plans for designated national zoological areas will be completed in cooperation with State and Federal wildlife agencies and other wildlife and plant oriented groups and agencies. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (1) Maintain and improve current habitat for Federally listed plant and animal species and work toward delisting.
834	Under this prescription, the general objective is to emphasize non-consumptive wildlife recreation activity. Management plans for designated national zoological areas will be completed in cooperation with State and Federal wildlife agencies and other wildlife and plant oriented groups and agencies. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (2) Maintain or improve current levels of occupied habitat for: Apache fox squirrel, white-tailed deer, mule deer, javelina, pronghorn, cottontail, raptors, Mearn's quail, Gould's turkey, Merriam's turkey, coppery-tailed trogon, sulphur-bellied flycatcher, beardless flycatcher, thick-billed kingbird, Bell's vireo, blue-throated hummingbird, Arizona ridge-nosed rattlesnake, Arizona trout.
835	Under this prescription, the general objective is to emphasize non-

	consumptive wildlife recreation activity. Management plans for designated national zoological areas will be completed in cooperation with State and Federal wildlife agencies and other wildlife and plant oriented groups and agencies. Specific standards and guidelines for management of wildlife are shown in the Forestwide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: (3) Allow nongame recreation use demand to occur while maintaining occupied habitat for species listed above. Future limits on nongame use may be avoided by implementation of an effective environmental education program (See Dispersed Recreation Management guidelines.)
836	Maintenance of existing structures and development of new structural and nonstructural improvements will be based on guidelines shown in the Forestwide prescription. They are intended to meet the following objectives: (1) Maintain quality of forage for: white-tailed deer, mule deer, Merriam's turkey, Gould's turkey. (2) Delist threatened and endangered species and reoccupy historical habitat with other identified species following approved species recovery plans and Memoranda of Understanding. Also improve habitat for Federally listed plants and animals following these same guidelines.
837	1. Recommend withdrawals from mineral entry to protect essential habitats for threatened and endangered species and recreational opportunities and facilities investments.
838	2. There will be no removal of mineral materials.
839	8. Outbreaks of insects and disease will be controlled if there is a significant danger to the recreation uses or the unique vegetation or wildlife species, or if poses a threat to other uses outside the zoological area.
	Gila National Forest
840	In existing and potential Gila trout habitat pH of the water shall not be below 6.5. No limits recommended for biological indicators, but collection of information is recommended to protect the food base of trout.
841	No decrease in riparian-dependent vegetative diversity in riparian areas that have a management objective of attaining late seral vegetation.
842	Road construction will be avoided in riparian areas
843	Continue recovery efforts with the objectives of delisting the species. Develop species into native game fisheries within selected areas identified in conjunction with the NMFG.
844	Prescribed fire implementation plans (unplanned and planned ignition) will be initiated on vegetative types where the natural role of fire has been identified.
845	A decision to use prescribed fire in wilderness shall not be based on benefits to wildlife, maintenance of vegetation types, improvements [to] forage production, or enhancement of other resource values. These can be additional benefits which may result from a decision to use

	prescribed fire but are not objectives for managing fire in wilderness.
846	On a site specific basis, identify riparian dependent resources & develop action plans & programs to bring about conditions essential to supporting those dependent resources.
847	Manage riparian areas to protect the productivity & diversity of riparian dependent resources by requiring actions within or affecting riparian areas to protect & where applicable, improve dependent resources. Emphasize protection of soil, water, vegetation, and wildlife and fish resources prior to implementing projects.
848	Within the first decade, complete classification & inventories of all riparian areas, & complete action plans to improve all unsatisfactory riparian areas. Improve all riparian areas to satisfactory or better condition by 2030. Such satisfactory conditions are specified [below], expressed as a percentage of "natural" conditions. Twenty-five percent of all riparian areas must be in satisfactory condition by 2000. Aquatic Resources: 1) Maintain at least 80 percent natural shade over water; 2) Maintain at least 80 percent bank protection; 3) Maintain sand, silt, clay composition within 20 percent of natural levels. Vegetation Resources: 1) Maintain at least 60 percent woody plant composition in 3 or riparian species; 2) Maintain at least 3 age classes of riparian woody plants, with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings of riparian 'species. 3) Maintain at least 60 percent of natural shrub and tree crown cover. Wildlife Resource: Maintain at least 60 percent natural shade over land surface.
849	Manage riparian in accordance with legal requirements regarding floodplains, wetlands, wild & scenic rivers, and cultural and other resources
850	Wildlife coordination and improvement efforts will include emphasis on riparian and aquatic area management.
851	Give preferential consideration to resources dependent on riparian areas over other resources. Other resource uses & activities may occur to the extent that they support or do not adversely affect riparian-dependent resources.
852	Provide snag recruitment for cavity nesting species. Maintain 3 snags/acre adjacent to waters & openings within woodland and coniferous habitats. Maintain at least 100 snags per 100 acres over the remaining coniferous & woodland areas.
853	Plan and administer disturbance activities in known elk calving, turkey nesting, and raptor nesting areas so as not to disrupt calving and nesting success.
854	Acquisitions of fee lands by purchase will be limited to lands within classified wilderness and lands involved with threatened and endangered wildlife species and high value recreation lands.
855	Require Rural Electric Administration specifications for raptor protection on permitted power lines during construction and reconstruction.

856	Mineral leasing category: Control surface uses in mineral operations through lease information notices, stipulations, Plans of Operations and permits which provide for reasonable protection of resource values.
857	Off road vehicle use prohibited.
858	Grazing in riparian zones will be managed to provide for the maintenance and improvement of riparian areas.
859	Recreation use of riparian zones will be managed to avoid damage to riparian resources.
860	Improve all riparian areas to satisfactory or better conditions
861	Protect and improve soil resource
862	Restore lands in unsatisfactory watersheds.
863	Provide long term quality water flow
864	Through the use of best management practices, the adverse effect of planned activities will be mitigated and site productivity maintained. Soil loss due to management will not exceed soil loss tolerances.
865	Analyze all wildfires for soil rehabilitation needs.
866	Establish current baseline for TES indicator species habitats and monitor trends at 10-yr intervals. Cooperate with FWS & NMGF in monitoring indicator species populations.
867	When management practices are proposed in or likely to affect listed species habitat, a Biological Assessment/Evaluation will be conducted to assess impacts and determine needs for consultation or conference with the FWS or NMDGF. Consultation will be initiated for situations where listed or proposed listed species may or is likely to be affected.
868	TES species habitats found during project or management planning phases will be evaluated on the basis of best information available. Management requirements needed to maintain or enhance habitats for these species will be incorporated into implementation plans for individual areas. Habitat requirements for TES will take precedence over requirements for other species.
869	Manage T&E animal, fish & plant habitat to achieve delisting in a manner consistent with the goals established with the U.S. Fish and Wildlife Service & NMGF in compliance with approved recovery plans.
870	Studies will be conducted to ascertain suitability of reintroduction of TEP, & state listed native species into suitable habitats. This will be accomplished in conjunction with development & approval of recovery plans
871	Habitat management for Federally listed species take precedence over unlisted species. Habitat management for endangered will take precedence over threatened species. Habitat management for sensitive species will take precedence over nonsensitive species
872	Accomplish recovery projects included in approved recovery plans. Projects will be coordinated through integrated resource management plans.

873	Maintain or improve watershed conditions to a satisfactory condition on 70 - 90 percent of the unsatisfactory watersheds by the end of the fifth decade. This should be accomplished through a combination of resource management and watershed structures.
874	Plan fire rehabilitation where necessary to protect water resources from intolerable losses or to prevent unacceptable downstream damage.
875	Implement watershed restoration projects where emergency fire rehabilitation and watershed condition analyses have identified needs.
876	Provide for management of sensitive soils in all surface disturbing activities to minimize or control erosion. Recognizing increased cost associated with the management of sensitive soils.
877	Stabilize and restore native Gila trout fauna of the Gila and Aldo Leopold Wilderness according to the Gila trout recovery plan
878	Manage for indigenous species. Exotic species capable of reproducing in native habitats will not be introduced or allowed to invade National Forest System lands.
879	Cooperate with state & other agencies to maintain population levels within habitat capability objectives in stated in management area emphasis direction.
880	Manage for a diverse, well-distributed pattern of habitats for wildlife populations and fish species in cooperation with states and other agencies.
881	Maintain and/or improve habitat for T&E species & work toward the eventual recovery/delisting of species through recovery plans.
882	Animal damage control activities will be accomplished in the Gila National Forest in accordance with the Interagency Animal Damage Control Guidelines.
883	Primary wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved
884	Non-wilderness: Riparian treatments will be applied to areas of low conditions as needed to stabilize habitat levels. This treatment may consist of protection fencing, seeding, and/or planting.
885	Habitat improvement emphasis is placed on game fish
886	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
887	Provide maintenance of habitat improvements to sustain existing habitats. Maintenance priority is as follows: 1) T&E species, 2) Game species, and 3) other species.
888	Provide for the protection of sensitive soils in all surface disturbing activities.
889	Primary wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved

890	Non-wilderness: Riparian treatments will be applied to areas of low conditions. This treatment may consist of protection fencing, seeding, and/or planting.
891	Habitat improvement emphasis is placed on game fish
892	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis. T&E and sensitive species within this area include the Bald Eagle, the roundtail Chub, and the Mountain Silverspot Butterfly.
893	Provide maintenance of habitat improvements to sustain existing habitats. Maintenance priority is as follows: 1) T&E species, 2) Game species, and 3) other species.
894	Provide for protection of sensitive soils in all surface disturbing activities
894a	Priority for expenditure of funds includes New Construction: springs - 10 each
895	Primary wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved
896	Riparian treatments will be applied to areas of low conditions as needed to stabilize habitat levels. This treatment may consist of protection fencing, seeding, and/or planting.
897	Provide maintenance of habitat improvements to sustain existing habitats. Maintenance priority is as follows: 1) T&E species, 2) Game species, and 3) other species.
898	Provide protection of sensitive soils in all surface disturbing activities
899	Planning emphasis is placed on big game, small game, and threatened and endangered species
900	Riparian treatments (planting, seeding, protection fencing, etc.) is applied to areas of low condition to improve to levels meeting Regional riparian standards
901	Maintenance of habitat improvements to sustain existing and improved habitats. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
902	Provide protection to sensitive soils in all surface disturbing activities
903	Primary wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved
904	Non-wilderness. Riparian treatments will be applied to areas of low conditions as needed to stabilize habitat levels. This treatment may consist of protection fencing, seeding, and/or planting
905	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
906	Provide maintenance of habitat improvements to sustain projected

	habitat levels. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
907	Within wilderness - Continue to maintain natural and recovered habitats for T&E species
908	Provide for the protection of sensitive soils in all surface disturbing activities.
909	Identify and implement channel and land treatment structures on 120 acres within the first decade in conjunction with other resource activities
910	Riparian treatments (planting, seeding, protection fencing, etc.) are applied to areas of low condition to improve to levels meeting Regional riparian goals
911	Habitat improvement emphasis is placed on game fish while maintaining populations of all other native fish species present
912	Special emphasis should be placed on any management decision to provide protection for fragile soils during the evaluation and implementation processes.
913	Identify and implement channel and land treatment structures on 1,640 acres within the first decade in conjunction with other resource activities
914	Riparian treatments will be applied to areas of low conditions as needed to stabilize habitat levels.
915	Accomplish threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
916	Special emphasis will be placed on any management decision effecting fragile soils during the evaluation and implementation processes
917	Identify and implement channel restoration and stabilization structures on 7,000 acres within the first decade.
918	Planning emphasis is placed on big game, small game, and threatened and endangered species. T&E species will receive priority over other species where needs are identified through approved recovery plans
919	Riparian treatments (planting, seeding, fencing, etc.) are applied to areas of low condition to meet Regional riparian goals
920	Accomplish threatened and endangered species habitat improvements as identified through approved management and recovery plans.
921	Planning emphasis is placed on game species and T&E species. Management plans for T&E species will be address as recovery plans are completed and approved
922	Riparian treatments will be applied to areas of low conditions to meet Regional riparian goals. This treatment may consist of fencing, seeding, and/or planting.
923	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain

	T&E habitats and address recovery needs on a case by case basis
924	Provide maintenance of habitat improvements to sustain projected habitat levels. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
925	Wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved.
926	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
927	Provide maintenance of habitat improvements to sustain projected habitat levels. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species. Habitat maintenance is projected at the following levels: Water developments (trick tanks, rockheaders, spring developments, etc.) - 1 structure; Wetland developments - 1 structures; Protection fencing - 1 mile; Control of habitat access - 1 mile; Opening Maintenance - 25 acres.
928	During transportation planning, road and trail densities will be evaluated, maintaining emphasized carrying capacity within these key habitat areas.
929	This management area has no grazing allotments
930	Wildlife planning emphasis is on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved.
931	Integrate habitats to provide the following levels of primary components: Old Growth - 17, 368 acres; Cover Habitat - 8, 041 acres; Squirrel Habitat - 2 acres; Turkey Habitat - 227 acres; Herbaceous WL Forage/Cover - 2,166 acres.
932	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
933	Non-wilderness - Provide maintenance of habitat improvements to sustain existing habitats. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
934	Wilderness - Continue to improve Gila trout habitats within designated drainage according to the Gila trout recovery plan. Utilize methods that reduce the appearance of man's impact on the environment until recover is complete. Restore to sport fisheries population levels. Designated areas include portions of Dry Creek and Spruce Creek
935	Wilderness - Continue to maintain natural and recovered habitats for threatened and endangered species
936	Planning emphasis is on big game, small game, game fish and threatened and endangered species. T&E species will receive priority over other species where needs are identified through approved recovery plans.

937	Integrate habitats to provide the following levels of primary components: Old Growth - 3,472 acres; Cover Habitat - 6,294 acres; Squirrel Habitat -717 acres; Turkey Habitat - 580 acres; Herbaceous WL Forage/Cover - 4,174 acres.
938	Riparian treatments (planting, seeding, fencing, etc.) are applied to areas of low condition to meet Regional riparian goals
939	Habitat improvement emphasis is placed on game fish while maintaining existing populations of all other native fish species present. Habitat areas and primary species emphasized include: 1) Taylor Creek - Trout; 2) Gila River - both trout and warm water species; 3) Indian Creek - Trout; 4) Beaver Creek - Warm Water Species. Fish habitat improvements will include the following wildlife activity levels: Stream Improvement Structures - 10 structures, Planting Riparian etc - 20 acres, and Stream Cover Structures - 2 structures.
940	Accomplish maintenance of habitat improvements to sustain existing and improved habitats. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
940a	Known T&E and sensitive species within this area include: Wildlife: Bald Eagle, Black Hawk, Narrowhead Gartersnake, Roundtail Chub, Sonora Mtn. Kingsnake, Spike Dace, and Mountain Silverspot Butterfly.
940b	Reconstruct range improvements needed to manage at Level C on a 40 year cycle. If a more cost effective alternative to replacement is available, it may be implemented. Priority for expenditure of funds is as follows:...Water Developments, Springs - 5.
940c	Game species are emphasized along with maintenance of existing populations of all other wildlife species present.
940d	Habitat improvement emphasis is placed on game and fish. Areas and species emphasized include: 1. Tularosa Creek - trout and warm water game species; 2. Apache Creek - Trout and warm water game species
940e	T&E and sensitive species within this area include: wildlife - bald eagle, narrowhead gartersnake. Montane vole, sonoran mountain kingsnake, and loach minnow.
940f	Threatened and endangered species habitat developments are projected as follows for the first decade: Protection fencing - 1 mile; Planting - 20 acre
940g	Grazing allotments generally will be managed to a level of D or above. Lands classified as full capacity rangelands equal 94,464 acres of which 14,170 acres are currently unsatisfactory. The unsatisfactory acres are estimated to be 11,412 by the end of the fifth decade.
940h	Maintain ORV closure on the Gila River Bird Management Area
940i	Implementation plans and inventories will be conducted to meet the objectives indicated in the management emphasis. Wildlife planning emphasis is on game species and T&E species. Projects involving T&E species will be addressed as recovery plans are completed and approved.

940j	Within Gila River Bird Management Area, manage toward quality riparian and associated habitats to maintain unique wildlife species present
940k	Habitat improvement emphasis is placed on game fish with maintenance of native fish species. Areas and species emphasized include: 1. Gila River - warm water game species.
940l	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case-by case basis. T&E and sensitive species within this area include: Wildlife - Albert's towhee, Bald eagle, Black hawk, Bell's vireo, Coatimundi, Costa's hummingbird, Gila monster, Gila woodpecker, Grey vireo, Loach minnow, McCown's longspur, Narrowhead gartersnake, Roundtail chub, Sonora mountain kingsnake, and Spikedace.
940m	Grazing allotments generally will be managed to a level of C or above
940n	Lands classified as full capacity rangelands equal 93,387 acres of which 27, acres are currently unsatisfactory. Approximately 24, 847 acres are estimated to be unsatisfactory by the fifth decade
940o	Plans will specifically identify game and T&E species habitat improvement and maintenance needs
940p	Accomplish fish habitat improvement projects needed to improve existing habitat levels. Areas and species emphasized include: 1. Sapillo Creek - warm water species and trout; 2. Mogollon Creek - trout; 3. Lower Gila River - warm water species; 4. Trout Creek - trout.
940q	Accomplish threatened and endangered species habitat improvements as identified through approved management and recovery plans. Known T&E and sensitive species within this area include: Wildlife - Bald eagle, Bell's vireo, Black hawk, Coatimundi, Gila trout, Gila woodpecker, Grey Vireo, Loach minnow, Narrowhead gartersnake, Roundtail chub, Spikedace, Aberts Towhee, and Sonoran mountain kingsnake.
940r	The wildlife habitat increase will result from implementation of the Gila prescribed fire program.
940s	Grazing allotments generally will be managed to a level of B or above. Lands classified as full capacity rangelands equal 64,358 acres, of which 50,843 acres are unsatisfactory. About 47,295 acres are estimated to be unsatisfactory by the fifth decade
941	Wildlife planning emphasis is on game species and T&E species while maintaining populations for all other species present. Management plans for T&E species will be addressed as recovery plans are completed and approved. Management plans for T&E species will be addressed as recovery plans are completed and approved.
942	Integrate habitats to provide the following levels of primary components: Old Growth - 17,387 acres; Cover Habitat - 17,662 acres; Squirrel Habitat - 376 acres; Turkey Habitat - 1,267 acres; Herbaceous WL Forage/Cover - 4,918 acres.

943	Riparian treatments will be applied to areas of low conditions as needed to stabilize habitat levels. This treatment may consist of protection fencing, seeding, and/or planting.
944	Habitat improvement emphasis is placed on game fish while maintaining existing populations of all other native fish species present. Areas and species to be emphasized include: 1) Black Canyon - Trout; 2) South Diamond - Gila Trout; 3) E. Fork Gila - Trout; 4) Aspen Canyon - Trout.
945	Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis
946	Provide maintenance of habitat improvements to sustain existing habitats. Maintenance priority is: 1) T&E species, 2) Game species, and 3) other species.
947	Wilderness - Continue to improve Gila trout habitat within designated drainage according to the Gila trout recovery plan until recovery is complete and the species is restored to fishable populations.
948	Primary wildlife planning emphasis is on big game and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved. Plans and inventories will be conducted to meet the objectives indicated in the management emphasis
949	Integrate habitats to provide the following levels of primary components: Old Growth - 15,308 acres; Cover Habitat - 16,474 acres; Squirrel Habitat - 677 acres; Turkey Habitat - 1,101 acres; Herbaceous WL Forage/Cover - 5,298 acres.
950	Riparian treatments will be applied to areas of low conditions to meet Regional riparian goals. This treatment may consist of fencing, seeding, and/or planting.
951	Habitat improvement emphasis is placed on game fish while maintaining existing populations of native fish species present. Areas and species emphasized include: 1) Mibres River - Trout; 2) McKnight - Gila Trout.
952	Non-wilderness: Continue threatened and endangered species habitat improvements as identified through approved recovery plans. Objectives are to maintain T&E habitats and address recovery needs on a case by case basis.
953	Provide maintenance of habitat improvements to sustain projected levels of wildlife populations. Maintenance priority is 1) T&E species, 2) game species, and 3) other species.
954	Limit forage utilization in the upper Mibres and McKnight drainage bottoms to 10 percent for improved watershed condition
954a	Riparian treatments (planting, seeding, protection fencing, etc.) are applied to areas of low condition to stabilize habitats
954b	Habitat improvement emphasis is placed on game fish with maintenance of native fish species. Habitat areas and primary species emphasized include: 1. Negrito Creek - Trout; 2. Tularosa Creek -

	Trout and warm water game species; 3. San Francisco River - Trout and warm water game species; 4. Cienega Creek - Trout
954c	Implement threatened and endangered species habitat improvements as identified through approved management and recovery plans. T&E and sensitive species within this area include: Wildlife: Bald Eagle, Black Hawk, Loach Minnow, Narrow Headed, Garter Snake, and Sonoran Mountain King Snake
954d	Lands classified as full capacity rangelands equal 108,012 acres, of which 68,048 acres are currently unsatisfactory. About 56,723 acres are estimated to be unsatisfactory by the fifth decade. Unsatisfactory condition rangelands will be treated through development of approved allotment management plans.
954e	Grazing allotments generally will be managed to a level of B or above.
954f	Identify and implement channel and land treatment structures on 5,500 acres within the first decade
954g	Habitat improvement emphasis is placed on game fish while maintaining populations of all native fish species. Habitat areas and primary species emphasized include: 1. San Francisco - warm water species; 2. Tularosa Creek - warm water species; 3. Negrito Creek - Trout and Warm water species
954h	Accomplish threatened and endangered species habitat improvements as identified through approved recovery plans. T&E and sensitive species within this area include: Wildlife - bald eagle, black hawk, narrowhead gartersnake, and sonoran mountain kingsnake.
954i	Provide maintenance of habitat improvements to sustain existing and improved habitats. Maintenance priority is 1) T&E species, 2) game species, and 3) other species
954j	Lands classified as full capacity rangelands equal 63,290 acres, of which 42,404 acres are currently unsatisfactory. About 35,437 acres are estimated to be unsatisfactory by the fifth decade.
954k	Identify and implement channel and land treatment structures on 1,000 acres within the first decade
955	Wildlife planning will be on game species and T&E species. Management plans for T&E species will be addressed as recovery plans are completed and approved.
956	Habitat inventories will be keyed to project areas as identified by other resource uses. Integrate habitats to provide the following levels of primary components: Old Growth - 6,139 acres; Cover Habitat - 5,796 acres; Squirrel Habitat - 381 acres; Turkey Habitat - 158 acres; Herbaceous WL Forage/Cover -1,577 acres.
957	Riparian treatments will be applied to areas of low conditions to meet Regional riparian goals. This treatment may consist of protection fencing, seeding, and/or planting.
957a	Projects will be designed to maintain or improve wildlife habitat to the extent possible, provided other resource management objectives can be met.

957b	Implement threatened and endangered species habitat improvements as identified through approved management and recovery plans. T&E and sensitive species within this area include: Wildlife: Bald Eagle, Black Hawk, Bells Vireo, Gila Springs Snail, Loach Minnow, Mountain Silverspot Butterfly, Narrowhead Gartersnake, New Mexico Hot Springs Snail, Roundtail Chub, Sonoran Mt. Kingsnake, and Spike Dace.
957c	Relocation of the transportation system is authorized for health and safety, visitor use dispersement, resource protection, and to avoid rights-of-way acquisition across fee land. The system contains proposed and approved helispots and the following: Trail - 23.3 miles; Road - 5.0 miles.
957d	Reconstruct range improvements needed to manage at Level B on a 40 year cycle. Priority for expenditure of funds for existing improvements is as follows:....Water Developments, Springs -8.
957e	Emphasis is placed on big game, small game, game fish and threatened and endangered species. T&E species will receive priority over other species where needs are identified through approved recovery plans.
957f	Include wildlife habitat improvement projects in fuelwood Sale Areas Improvement (SAI) plans.
957g	Construct threatened and endangered species habitat improvements as identified through approved management and recovery plans.
957h	Accomplish maintenance of habitat improvements to sustain projected population levels. Maintenance priority is 1) T&E species, 2) game species, and 3) other species.
957i	Grazing allotments generally will be managed to a level of B or above. Based on existing data, this is projected to result in a long term capacity of approximately 6,025 AUMs. Any additional forage capacity that becomes available after Management Area emphasized levels for livestock and wildlife have been attained will generally be allocated according to the land term management emphasis ratio.
957j	Lands classified as full capacity rangelands equal 56,937 acres, of which 41,452 acres are currently unsatisfactory/ Approximately 38,985 acres are estimated to be unsatisfactory by the fifth decade. Unsatisfactory condition rangelands will be treated through implementation of approved allotment management plans. Treatment will include: 1) Structural or non-structural range improvements necessary to implement or maintain the prescribed intensity level. 2) Adjust stocking levels as necessary to maintain the management emphasis.
957k	Reconstruct range improvements needed to manage at Level B on a 40 year cycle. Priority for expenditure of funds is the reconstruction on allotment boundary fences, water developments, interior fences, and all other improvements.
957l	Total existing improvements in the Management Area are: Allotment Boundary Fence - 97.6 miles; Earthen Stock Tanks - 26; Wells - 10;

	Springs - 10; Allotment Interior Fences - 53.5 miles; Corrals - 11, Cattleguards - 19.
957m	PJ Fuelwood harvest will not exceed 1,400 acres in the first decade. Volume control for fuelwood will be on the per acre basis.
957n	Grazing allotments generally will be managed to a level of B or above. Lands classified as full capacity rangelands equal 12,009 acres. Of the full capacity acres, approximately 3,149 acres are currently unsatisfactory. About 2,963 acres are estimated to be unsatisfactory by the fifth decade
957o	By the end of the first decade, recommend for withdrawal from mineral entry all lands not currently withdrawn within the highway 15 corridor (2,500) acres. The corridor extends from the District boundary to the Gila Cliff Dwellings National Monument and includes the national Forest System lands outside the Wilderness boundary.
957p	Implement threatened and endangered species habitat improvements as identified through approved management and recovery plans. T&E and sensitive species within this area include: wildlife -Gila trout, Black hawk, Bald eagle, Sonoran mountain kingsnake, Loach minnow, Roundtail chub, Spikedace, Narrowhead gartersnake, Mountain silverspot butterfly.
957q	Relocation of the transportation system is authorized for health and safety, visitor use dispersement, resource protection, and to avoid rights-of-way acquisition across fee land.
	Kaibab National Forest
958	"Establish off-road vehicle [ORV] closures as needed to maintain other resource objectives. Manage ORV use to provide ORV opportunities while protecting resources and minimizing conflicts with other users."
959	"Improve wildlife habitats through expanding knowledge of species requirements, development of habitat quality and diversity, and the identification and protection of key habitats."
960	"Improve habitats for listed threatened, endangered, or sensitive species of plants and animals and other species as they become threatened or endangered. Work toward recovery and de-listing of species."
961	"Identify and protect areas that contain threatened, endangered, and sensitive species of plants and animals. Consult with the U.S. Fish and Wildlife Service when activities have the potential to impact protected species."
962	"Inventory all riparian areas. Woody riparian communities and riparian communities dominated by shrub and herbaceous species shall be in satisfactory or better condition."
963	"Produce the maximum amount of forage, consistent with other resource values, for use by wildlife and livestock on a sustained yield basis. Benefits are improved watershed condition, range forage, wildlife habitat, and enhanced visual quality. "
964	"Maintain soil productivity and watershed condition. Rehabilitate non-productive lands on a planned basis to eliminate unsatisfactory

	watershed condition by 2020. Maintain a high quality sustained water yield for Forest users and others. Identify and protect wetlands and floodplains."
965	"Minimize the number of electronic sites and utility corridors consistent with appropriate public services that require the use of Forest lands."
966	In reference to the table on pg. 89 of the ROD, text was clarified as follows - "MC BR-E RU1 1 Does not apply to the Kaibab NF." and "MC OTHER RU2 2 Applies to the Kaibab NF." and "PINE-OAK3 3 Applies to the Williams RD, Kaibab NF."
967	"Provide off-road vehicle area closures to maintain recreation, visual, heritage, soil, water, wildlife, and other resource values."
968	"Provide for intensive management of wildlife and fish habitats. Make habitat surveys, analyses, and formulate plans in concert with the Arizona Game and Fish Department to ensure moderate level of habitat diversity and capability. Provide wildlife and fish resource integration and coordination in land and resource management planning. Formulate and execute habitat investments to improve habitat components and diversity through vegetative manipulations. Improved habitat diversity and capability accrue through the coordinated interaction of other planned resource practices with planned habitat vegetative manipulations. Develop resource habitat management plans for all threatened and endangered and sensitive plant and animal species. Maintain habitat inventory and management record system."
969	"Provide for extensive management of livestock use of the range resource. Make periodic inventory of range resource components on all National Forest System lands. Provide range resource integration and coordination in land and resource management planning. Structural improvements and physical movement are utilized in concert to control livestock use of range resources; provide for the periodic maintenance and replacement of structural improvements. Improved forage generally accrues through other resource investments, such as timber stand thinning, habitat improvement, soil improvements, or catastrophic agents. Long-term grazing use and capacity is kept in balance through the removal or addition of permitted livestock use. Maintain range resource inventory and information systems."
970	"Provide for intensive management of soil and watershed resources. Make soil and watershed resource inventories and analyses to ensure the conservation of soil and water resources and to avoid significant and permanent impairment of site productivity. Provide soil and water resource integration and coordination in land and resource management planning. Changes in site productivity generally result from the interaction of other resource practices or catastrophic agents with the hydrologic condition present in the watershed. Formulate and execute land treatment measures to (1) close, revegetate, and thereby obliterate, system roads not needed for resource actions and (2) establish ground-

	cover improvements in degraded, unsatisfactory watersheds to return them to satisfactory condition. Provide for the long-term maintenance of vegetative ground-cover improvements. Maintain soil and water inventory and information systems."
971	"Restrict or prohibit surface use in areas with habitat of threatened and endangered and sensitive plant and animal species." [The preceding does not apply to EManagement Area 12, which is almost entirely withdrawn from mineral entry.] "Impose operating and occupancy restrictions on exploration, development, and operation activities associated with locatable and leasable mineral entry to protect visually sensitive road corridors and important wildlife habitat. Evaluate the need for creation or development of areas with substitute or surrogate habitats, facilities, structures etc., to replace areas of substantial loss or destruction from mineral activities. ... Allow development of new mineral material sources in accordance with the management direction for recreation, wildlife, and soil and water resources...."
972	"... Maintain local terminal roads that support intermittent and short-term resource actions in a closed-to-traffic mode except during said periods of intermittent use. ... Identify and obliterate unneeded system roads and facilities in accordance with the Management Direction for Soil and Water Resources."
973	"Provide fire protection to restrict wildfire size to 200 acres. ... Long term average annual burned area should not exceed [2 percent of the EManagement Area] acres. Fires from natural ignitions may exceed these size limits when burning within an approved area and declared a wildland fire use action...."
974	"... Minimize the amount of land allocated to electronic sites and utility corridors consistent with appropriate accommodation for these public services that can be met only on National Forest System lands. ... Identify property corners and boundaries to protect National Forest landownership by detecting and resolving unauthorized land occupancy and trespass. Administer the Small Tracts Act to resolve trespass and improve and consolidate National Forest landownership."
975	"Operate and maintain heavily used dispersed areas and facilities to standard service management by providing regular scheduled patrols throughout the recreation season. Provide control measures for areas where the following resource damage occurs: (1) soil compaction, (2) loss of vegetative cover, (3) tree damage and mortality, and (4) deterioration of water quality."
976	"Prohibit off-road competitive events."
977	"Implement permanent, temporary or seasonal closures of areas to off-road vehicle traffic to protect soil, vegetation, visual, wildlife, wildlife habitat and cultural and historic resources."
978	"Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for

	sensitive species will take precedence over non-sensitive species."
979	"Survey, inventory, monitor, and evaluate habitat diversity; species composition; impact of management activities; and the distribution and density of management indicator species, threatened and endangered species, and sensitive species. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
980	"Monitor management practices and evaluate their impact within occupied and potential habitats of Apache trout, bald eagle, and peregrine falcon. Determine need for consultation with USDI Fish and Wildlife Service. Implement recovery plans for threatened and endangered species. Prepare and implement an area management plan to conserve and protect the peregrine falcon in a manner consistent with recovery goals."
981	"Take all reasonable precautions, consistent with policies regarding jeopardy to human life and property, during fire suppression, search and rescue, or other emergency operations to conserve and protect threatened and endangered species, candidate species, sensitive species and their habitats."
982	"1. Forage. a. Provide forage cover ratios of 40:60 to 60:40. in areas where TES species habitat requirements do not conflict."
983	" 1. Forage. c. Increase efforts to resolve conflict with livestock grazing in all critical wildlife habitats to achieve resource management objectives. In areas of conflict, new winter grazing use by livestock will be allowed when such use does not adversely affect wildlife objectives. Allocate forage to (a) maximize habitat capability for threatened and endangered species and (b) provide habitat capability for indicator and harvest species in the range specified in the State Comprehensive Wildlife Plan."
984	"2. Cover. a. Provide for at least 40 percent cover where TES species habitat requirements do not conflict."
985	"3. Snags and cavity, cull, and damaged trees. a.) Provide for the following snag and other tree objectives. (1) Regionally consistent Standards and Guidelines apply for snag management in ponderosa pine, mixed conifer and spruce-fir cover types. (2) Pinyon-juniper type: not less than 100 snags et al., 9 inches and larger DRC and 12 feet in height, per 100 acres over 65 percent of the forested area."
986	"3. Snags and cavity, cull, and damaged trees. b.) Select larger trees for retention from the following categories in sequence: (1) Existing snags and dying trees. (2) Living trees with cavities. (3) Trees with dead tops, spike tops, and damaged tops. (4) Living cull and damaged trees. (5) Living diseased trees, excepting mistletoe infected trees, not accounted for in 1 through 4 above. (6) Living healthy trees."
987	"3. Snags and cavity, cull, and damaged trees. c.) Intensively manage emphasis areas (forest opening edges, water sources) to meet snag et al. objectives. "
988	"4. Personal -use fuelwood standards. a.) Ponderosa pine, Douglas fir,

	and spruce: (2) Any standing dead tree less than 12 inches DBH. (3) Any standing dead tree less than 15 feet in total height"
989	"4. Personal-use fuelwood standards. b.) Juniper: (2) Any standing dead tree without green foliage."
990	"4. Personal-use fuelwood standards. c.) Pinyon pine: (2) Any standing dead tree less than 12 inches DRC (10"DBH). (3) Any standing dead tree less than 12 feet in height."
991	"4. Personal-use fuelwood standards. d.) Gambel oak: (2) Any standing dead tree less than 8 inches in DBH."
992	"4. Personal-use fuelwood standards. e.) Quaking aspen: (2) Any standing dead tree less than 12 inches in DBH."
993	"7. Raptor habitat except northern goshawk and Mexican spotted owl. a.) Retain raptor nest tree-groups and a non-activity buffer around raptor nest sites as follows: (3) Bald eagle: (a) Provide a 10-chain uncut buffer zone around existing and potential bald eagle winter roosts, (b) Identify and protect foraging perches and potential roost sites. (4) Osprey: (a) Provide an 8-chain uncut buffer area around existing (occupied or unoccupied) nests, (b) Restrict logging activities within 20 chains of active nest sites between April 1 and August 15, (c) Provide, for every ten surface acres of water, not less than five acres of mature and overmature trees with not less than four snags, with heights, equal to, or no greater than, the surrounding trees, and not less than 20 inches in DBH, per acre, for potential osprey nesting sites, (d) Provide uneven-aged and, or irregular-aged stand conditions within a 10-chain zone around aquatic areas with five or more surface-acres of water, (f) Prohibit road construction in roost areas and buffer zones.
994	"10. Pronghorn antelope habitat. a.) In key antelope ranges, maintain existing openings and create additional openings as provided for in Wildlife Non-structural Habitat Improvement. Provide for high forb composition (25 percent)."
995	"11. Riparian Vegetation. Riparian areas are geographically delineable areas with distinctive resource values and characteristics that are comprised of aquatic and riparian ecosystems. Riparian ecosystem is a transition between aquatic ecosystems and adjacent terrestrial ecosystem identified by soil characteristics or distinctive vegetation communities that require free or unbound water; terrestrial ecosystems characterized by hydric soils and plant species that are dependent on the water table (saturated zone) and, or its capillary zone. a.) Inventory all riparian areas; collect data regarding location, size, classification and condition of the riparian, b.) Maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings, c.) Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover, d.) Maintain not less than 90 percent of the potential shrub cover in riparian areas,

996	"11. Riparian Vegetation Continued: e.) Maintain not less than 90 percent of total linear streambank in stable condition, f.) Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are to rate in satisfactory or better condition, g.) Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment"
997	"Do non-structural wildlife habitat improvement as specified in project level analysis and the following guidelines using special cutting, burning, seeding, and planting."
998	"1. Created openings in pinyon-juniper woodland. a.) Opening is not larger than 40 acres, b.) The maximum width of the opening is 10 chains, c.) The maximum sight distance within the opening is 15 chains, d.) The minimum distance between any two openings is 10 chains, e.) Retreat these areas by burning and seeding at 20 to 40 year intervals, f.) Coordinate identification and planning of treatment areas with the Arizona Game and Fish Department, h.) Exclude livestock from seeded areas for not less than two of three growing seasons immediately following treatment."
999	"2. Gambel oak. a.) Manage Gambel oak for increased hard mast production, cavities, and deciduous foliage volume to promote and enhance wildlife habitat, b.) Retain all standing oak trees eight inches and larger at DBH, c.) Personal and commercial cutting of oak will be done in designated areas only from May 15 to October 15 inclusive, d.) Consider age class distribution in project planning."
1000	"Do structural habitat improvement as specified in project level analysis and the following guidelines: 4. Install structures to promote recharge of wet meadows and riparian areas, 5. Construct, improve, and, or stabilize lakes to improve aquatic habitat for desirable fish species, 6. Maintain or improve nesting cover and waterfowl forage on existing waterfowl islands and shorelines and in conjunction with construction of waterfowl islands."
1001	"1. Manage grazing allotments at the range management level determined on a project basis. Less than satisfactory range conditions are corrected through implementation of the range management program in the allotment management plan. Revise existing allotment management plans during first plan period. to bring permitted grazing use in line with grazing capacity on all grazing allotments by the end of the Forest Plan period."
1002	"2. Manage livestock use in riparian areas to meet riparian area objectives. This normally will be by providing adequate rest. Fence to exclude livestock from riparian areas when alternative means are not feasible. In sheep allotments, sheep will be herded and may use riparian areas on a once through lightly basis (less than 20 percent of available forage) unless the permittee is instructed to not use an area; riparian areas will not be grazed more than one time during the grazing season."

1003	"4. Increase efforts to resolve grazing conflicts in all critical wildlife habitats to achieve resource management objectives. Consider season of use, forage improvements, deferred entry, and reductions in livestock and/or wildlife use to insure proper forage management. In areas of conflict, new winter grazing use by livestock will be allowed when such use does not adversely affect wildlife objectives. Allocate forage to (a) maximize habitat capability for threatened and endangered species and (b) provide habitat capability for indicator and harvest species in the range specified in the State Comprehensive Wildlife Plan. When determined that wildlife populations are damaging the range resource, the Forest Supervisor will advise the Arizona Game and Fish Department to address Wildlife population numbers and, or wildlife management to correct the problem."
1004	"Administer all grazing permits annually. Make inspections on all allotments annually. Based on range studies and revised allotment management plans, adjust livestock numbers and grazing seasons to reflect actual capacity of the range. Bring permitted grazing in line with grazing capacity on overstocked for each allotment by the end of first planning the Forest Plan period."
1005	"5. Do not cut any tree larger than 40 inches at DBH."
1006	"7. To provide for future snags requirements as specified in Wildlife Surveys, Planning, Prescriptions, Monitoring, Coop, and Administration, 3. a. (1) and (2), retain at least at least 400 live trees, 14 inches DBH and larger, per 100 acres, on 65 percent of the treatment acres in ponderosa pine stands; and at least 600 live trees, 14 inches DBH and larger, per 100 acres, on 65 percent of the treatment acres in mixed conifer stands. Select larger trees for retention from the following categories in sequence: a.) Living trees with cavities, b.) Trees with dead tops, spike tops, and damaged tops, c.) Living cull and damaged trees, d.) Living diseased trees, excepting mistletoe infected trees, not accounted for in a through c above, e.) Living healthy trees."
1007	"2. Designate stream courses in timber sale planning to protect watershed values. Include in this protection control on skidding in riparian areas and along or across designated stream courses."
1008	"5. Formulate resource management practices involving the application of pesticides using Integrated Resource Management. This formulation and review will take into account: c.) On-site and adjacent land uses and resource conditions such as wetlands, riparian areas, wildlife habitats, dispersed recreation uses etc."
1009	"7. Establish non-treatment buffer areas to separate treatment areas from wetlands and riparian habitats. The size, location, and other characteristics of these non-treatment areas are contingent on the specifics of the application and must be identified and evaluated in Integrated Resource Management."
1010	"2. Restrict use and occupancy within one-quarter mile of raptor nest sites and permanent waters from April 1 to August 15."

1011	"5. Restrict use and occupancy yearlong in areas supporting populations of Threatened and Endangered and sensitive plants."
1012	"6. Restrict use and occupancy within one mile of Threatened and Endangered raptor nest sites from March 1 to August 15.'"
1013	"9. Prohibit use and occupancy within one-quarter mile of turkey and raptor nest sites from March 1 to July 30."
1013a	2. Identify habitat management territories for threatened, endangered, or sensitive plant or animal species that are consistent with the conservation strategy and the recovery plan established for the species through on-the-ground surveys or record searches.
1013b	5. Formulate and portray, describe, or quantify management objectives and desired conditions for the landscape. In landscapes that involve habitat for threatened, endangered, or sensitive plant or animal species, formulate management objectives and desired conditions for each designated management territory. Formulate, design, and implement resource operations or improvements that contribute to the achievement or maintenance of these management objectives and desired conditions.
1013c	7. Formulate, design, and proposed resource operations or improvements that contribute, over time, to the achievement or maintenance of desired resource or ecological conditions in landscapes. Consult when applicable: a.) Survey and inventory protocols for TE&S species; b.) Recovery plans and conservation strategies for TE&S species; c.) Formal Consultation Reports; d.) Guidelines for resource operations and improvements; e.) Intergovernmental agreements and memoranda of understanding; f.) Forest Service Manuals and Handbooks; g.) Management review and resource monitoring evaluation reports; h.) Technical reports and bulletins, research papers, handbooks, monographs, and other documents in the literature; i.) Tribal, state, and local government input; j.) Public input.
1013d	9. Prepare a biological assessment and evaluation (BA&E) to document the effect of the selected action on the habitat and on each individual in the population of threatened or endangered species.
1013e	1. Identify, describe, and geographically locate existing conditions in the implementation land area, regarding: . . . t.) Management territories for threatened, endangered, or sensitive species.
1013f	Guidelines for Recreation Resource Operations and Improvements: . . . 3. Monitor off-road vehicle (ORV) use; prevent resource damage and user conflicts; 7. Formulate and implement control measures where and when the following damage occurs: a.) Soil Compaction; b.) Loss of vegetative cover; c.) Tree damage and mortality; d.) Deterioration of water quality; 8. Prohibit competitive ORV events; 9. Maintain trails to maintenance level 3 or better.
1013g	Guidelines for Rangeland Resource Operations and improvements: 1. Inventory noxious weeds. Coordinate noxious weed control activities with other agencies and adjoining land owners; 2. Favor native species in all revegetation activities; 3. Restrict livestock access to 30 percent

	of the shoreline of the stock tanks that have stable water levels with the capacity to grow emergent aquatic vegetation.
1013h	Guidelines for Air and Watershed Resource Operations and Improvements: 1. Define, geographically identifying and locate best management practices for the landscape during landscape planning and analysis. Apply best management practices to mitigate adverse effects of activities and maintain site soil productivity. These practices include: a.) installation of water control structures or seeding lands in poor and very poor condition where the revegetation potential is moderately high to high and the slope is less than 40 percent; b.) Designate stream courses during landscape planning and analysis process; c.) Rehabilitate areas impacted by wildfire; d.) Apply pesticides that are registered or otherwise permitted in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act, as amended; e.) Evaluate all applications of pesticides in terms of site response, social and environmental impacts, including public health and safety, and monitoring and evaluation requirements; determine and identify the extent, severity, and probable duration of any associated hazard;
1013i	Guidelines for Air and Watershed Resource Operations and Improvements: 1. Define, geographically identifying and locate best management practices for the landscape during landscape planning and analysis. Apply best management practices to mitigate adverse effects of activities and maintain site soil productivity. These practices include: f.) Establish non-treatment buffer areas to separate treatment areas from wetlands and riparian habitats; g.) Incorporate pesticide spill contingency direction in resource management practices that involve the application of pesticides.
1013j	Guidelines for Air and Watershed Resource Operations and Improvements: 2. Exclude domestic livestock from treated areas for not less than two growing seasons; 3. Maintain not less than three age classes of woody riparian species with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings; 4. Maintain not less than 90 percent of the potential stream shading from May to September along all perennial cold or cool water streams. Provide shade with tree and other vegetational cover; 5. Maintain not less than 90 percent of the potential shrub cover in riparian areas; 6. Maintain not less than 90 percent of total linear streambank in stable condition; 7. Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are rated in satisfactory or better condition; 8. Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment.
1013k	Guidelines for Geologic and Mineral Resource Operations:... 4. Incorporate the following limited surface use stipulations in oil and gas leases: ...b.) Restrict use and occupancy yearlong on slopes of 15 percent or greater to prevent loss of soil productivity and vegetative

	cover. 8. Incorporate the following limited surface use stipulations in locatable mineral plans of operations for exploration: ...b.) Restrict use and occupancy yearlong on slopes of 15 percent or greater to prevent loss of soil productivity and vegetative cover.
1013l	Guidelines for Realty Operations and Improvements: 7. Attempt to acquire the Bull Basin private land tract adjacent to Kendrick Mountain Wilderness, the Sunflower Flat, and the Tule private land tracts by purchase or exchange to reduce the potential for encroachment of nonconforming uses. Acquire key wildlife areas such as riparian areas through acquisition authorities/
1013m	Guidelines for Facility Operations and Improvements:...2. Close local roads and skid trails to vehicular travel with signing and physical obstructions such as gates or barriers; 3. Obliterate all temporary roads and skid trails; restrict ORV use until revegetated; 4. Maintain commensurate share roads for intended commercial use;...6. Replacing surfacing at the rate of five percent per year; 7. Reestablish drainage and subgrade stabilization at the rate of two percent per year.
1013n	Guidelines for Activity and Natural Fuel Operations and Improvements:...3. In northern goshawk PFAs, preferred method for treating woody debris is, in order, fire use, lopping and scattering, hand piling, machine grapple piling, and lastly, crawler tractor piling; 4. In other forested areas, preferred method for treating woody debris is, in order, fire use, lopping and scattering, hand piling, machine grapple piling, and lastly, crawler tractor piling.
1013o	Guidelines for Fire Protection Operations and Improvements:...3. Provide fire protection to restrict wildfire size to 20 acres; 4. Minimize acreage burned by high intensity fires (200+BTU/FT/SEC);...7. Fire which exceed, or are expected to exceed, the size objective for the ecosystem management area are considered escaped and appropriate management response is determined by a wildland Fire Situation Analysis (WFSA). The WFSA will consider at least the following: a.) The resource management emphasis of threatened ecosystem management areas; ...c.) Effects on air quality, aesthetics, soil, and watershed
1014	"Survey habitat diversity, species composition, distribution and density of management indicator species, threatened and endangered species, and sensitive species. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
1015	"Survey and monitor activities of bald eagle and peregrine falcon use and habitat annually to determine need for consultation with USDI Fish and Wildlife Service. Evaluate impacts of management activities."
1016	"Where sensitive wildlife or plant habitats are present, make decisions on trails and trailheads, utilizing an interdisciplinary resource access travel management process. Encourage public involvement and consider public concerns."

1017	"Survey habitat diversity, species composition, distribution and density of management indicator species, threatened and endangered species, and sensitive species. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
1018	"Use pesticides only after it has been determined, in conjunction with other Federal and State wildlife management agencies, that such use will not adversely affect either Threatened or Endangered Species or their critical habitat."
1019	"Exclude livestock grazing. Do not assign grazing capacity to the area."
1020	"Processing of Mineral Exploration Proposals. Impose the following operating constraint on leaseable mineral prospecting and exploration activities to protect sensitive plant habitat: 1. Prohibit surface use and occupancy yearlong."
1021	"Processing of Oil and Gas Lease Applications. Incorporate the following limited surface use stipulation in oil and gas leases: 1. Prohibit surface use and occupancy yearlong to protect sensitive plant habitat."
1022	"Processing of Site Specific Mineral Development Proposals. Prohibit the construction of oil and gas well surface facilities."
1023	"Withdraw this area to locatable mineral entry."
1024	"Direct attack and control all fires."
1025	"Processing of Mineral Exploration Proposals. Impose the following operating constraint on leaseable mineral prospecting and exploration activities: 1. Prohibit surface use and occupancy yearlong."
1026	"Processing of Oil and Gas Lease Application. Incorporate the following limited surface use stipulation in oil and gas leases: 1. Prohibit surface use and occupancy yearlong to prevent disturbance of vegetation."
1027	"Processing of Site Specific Mineral Development Proposals, Prohibit the construction of oil and gas well surface facilities"
1028	"Withdraw this area to locatable mineral entry."
1029	"1. Do not construct fire line or apply chemical retardant in the area."
1030	"Survey, inventory, monitor and evaluate habitat diversity; species composition; impact of management activities; and the distribution and density of management indicator species, threatened and endangered species, and sensitive species to determine the need for consultation with USDI, Fish and Wildlife Service. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
1031	"2. Riparian Vegetation. b.) Maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings, c.) Maintain not less than 90 percent of the potential shrub cover in riparian areas, d.) Maintain not less than 90 percent of total linear streambank in stable condition, e.) Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are to rate in

	satisfactory or better condition by the end of decade one."
1032	"Impose the following operating constraints on locatable mineral prospecting and exploration activities to maintain wildlife habitat components and wilderness characteristics: 1. Prohibit surface use and occupancy within one mile of Threatened and Endangered raptor nest sites from March 1 to August 15; 2. Prohibit the construction of access roads to exploration sites; 3. Minimize the area of disturbance of exploration sites."
1033	"Prohibit the construction of mine surface facilities within the wilderness area."
1034	"Survey, inventory, monitor and evaluate habitat diversity; species composition; impact of management activities; and the distribution and density of management indicator species, threatened and endangered species, and sensitive species to determine the need for consultation with USDI, Fish and Wildlife Service. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
1035	"Survey and evaluate assessment areas during project design and plan projects to achieve the following habitat standards: 1. Apache Trout. a.) Re-distribute Apache trout upstream in North Canyon Creek when appropriate, b.) Monitor aquatic macroinvertebrates biannually. Maintain a minimum Biotic Condition Index of 80, c.) Consider the establishment of other populations of this species at suitable introduction sites to promote and secure the genetic integrity and viability of this species."
1036	"3. Riparian Vegetation. a.) Inventory all riparian areas; collect data regarding location, size, classification and condition of the riparian, b.) Maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings, c.) Maintain not less than 90 percent of the potential shrub cover in riparian areas, d.) Maintain not less than 90 percent of total linear streambank in stable condition, e.) Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are to rate in satisfactory or better condition by the end of decade one, f.) Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment."
1037	"Structural Habitat Improvement. Construct 20 single log structures, using primitive means, to improve and stabilize Apache trout habitat in North Canyon Creek."
1038	"Fire Management Planning and Analysis. 2. Protect the aquatic habitat in North Canyon."
1039	"Management Direction for Franks Lake: Management is directed at preserving the natural features and perpetuating the natural ecologic processes affecting the area. Activities are designed to minimize the effects of human intervention. The area is closed to off-road vehicle use."

1040	"Survey, inventory, monitor and evaluate habitat diversity; species composition; impact of management activities; and the distribution and density of management indicator species, threatened and endangered species, and sensitive species to determine the need for consultation with USDI, Fish and Wildlife Service. Evaluate habitat for those species in Threatened Native Wildlife in Arizona."
1041	"Survey and evaluate assessment areas during project design and plan projects to achieve the following habitat standards: 1. Riparian Vegetation. a.) Inventory all riparian areas; collect data regarding location, size, classification and condition of the riparian, b.) Maintain not less than three age classes of woody riparian species, with ten percent of the woody plant cover in sprouts, suckers, seedlings, and saplings, c.) Maintain not less than 90 percent of the potential shrub cover in riparian areas, d.) Maintain not less than 90 percent of total linear streambank in stable condition, e.) Woody riparian communities in addition to riparian communities which are dominated by shrub and herbaceous species are to rate in satisfactory or better condition by the end of decade one, f.) Select riparian areas for treatment based on relative scorecard condition rating with the lowest rating assigned to first treatment."
1042	"Exclude livestock grazing."
1043	"Processing of Exploration Proposals. Impose the following operating constraint on leasable mineral prospecting and exploration activities to protect sensitive plant and wildlife habitat: 1. Prohibit surface use and occupancy yearlong."
1044	"Processing of Lease Applications. Incorporate the following limited surface use stipulation in oil and gas leases: 1. Prohibit surface use and occupancy yearlong to protect sensitive plant and wildlife habitat."
1045	"Prohibit the construction of oil and gas well surface facilities."
1045a	Most of the fishing use in the Forest occurs in this management area. All fish are stocked by Arizona Game and Fish Department. Lakes are treated periodically for algae and undesirable fish species.
1045b	Inspect and maintain Cataract Lake, Dogtown Lake, Kaibab Lake and White Horse Lake dams annually
1045c	None of the proposed sites are associated with an existing water impoundment. Construction of the Cougar Lake campground is predicated on the development of Cougar Lake.
1045d	Cougar Dam will provide fishing opportunities and waterfowl and bald eagle habitat.
Lincoln National Forest	
1046	Provide for a diversity of plant and animal species through improved habitat management. (Page 11) Mgt. Dir.
1047	Provide for the improvement of habitat for threatened and endangered species to meet the goals and intent of the Endangered Species Act of 1973. (Page 11) Mgt. Dir.
1048	Protect and enhance riparian habitat consistent with riparian area

	management policy set forth in the Regional guidelines. (Page 32) (All Areas)
1049	Retain two trees with obvious wildlife cavities, live culls, or lightning scars per 5 acres, consistent with integrated resource management concepts. (Replacement Page 32) (All Areas)
1050	Retain all snags 18" or greater within the spruce-fir, mixed-conifer, or ponderosa pine habitat types unless removal is necessary for safety. (Replacement Page 32) (All Areas)
1051	Use indigenous species in revegetation of riparian areas. (Page 34)
1052	Incorporate state-of-the-art specifications on powerlines and towers to prevent electrocution of wildlife species. (Page 34)
1053	Meet T&E species requirements in all range or grazing activities. (Page 35b)
1054	Suitable and/or occupied T&E habitat on private lands within Forest boundary will be recommended for acquisition or easement. (Page 45)
1055	Use pesticides only when they are the most economical, biologically sound and environmentally acceptable means of preventing or suppressing pest outbreaks which threaten the attainment of objectives. (Page 55)
1056	When pesticides are used for pest control, project plans will contain appropriate and necessary monitoring procedures and mitigation measures. (Page 55)
1057	The principles of integrated pest management (IPM) will be utilized to treat areas that are, or become, infested by insects or diseases, and to reduce susceptibility of host-types to future infestations. The IPM process will be used to evaluate the trade-offs between treatment versus TES habitat manipulation. TES habitat considerations are a higher priority than insect and disease considerations. (Replacement Page 55)
1057a	Evaluate all prescribed burns for coordination with other resource activity needs (pg 48).
1058	Protect and manage essential and critical habitats of threatened, endangered, and sensitive species through ensuring that legal and biological requirements of designated plant and animal species are met; further identify data needs for threatened, endangered and sensitive species. (Page 205)
1059	Identify, protect and enhance existing and potential habitat of all T&E and sensitive species. (Page 205)
1060	Activities likely to cause disturbance, including public use, will be prohibited in the vicinity of an essential habitat for T&E species. (Page 205)
1061	Evaluate the need for consultation with the U.S. Fish and Wildlife Service when management practices are proposed which are likely to cause disturbance to T&E species and/or their habitat. (Page 205)
1062	Manage T&E habitats in a manner consistent with all Interim Management, Recovery Plans and Action Plans. (Page 205)

1063	Manage T&E species to attain total recovery levels over time. Existing and proposed T&E and Sensitive species that are known or suspected to occur on the Forest are continually identified by the Forest Biologist based on lists prepared by the U.S. Fish Wildlife Service and the Regional Forester. Evaluation will be made to ascertain desirability of re-introduction of endangered native species to suitable habitat not presently occupied. (Page 205 and Replacement Page 205)
1064	Habitat management for Federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species. (Replacement Page 205)
1065	Protect and improve riparian and wetland areas to provide suitable aquatic environment for threatened and endangered species using measures such as log dams, rock fence structures, trees, shrubs, and hydrophyte plantings, etc. (Page 206)
1066	Determine sources of water quality degradation when water quality may affect threatened and endangered species habitat. Remedy the situation where needed. (Page 206)
1067	Prohibit the use of pesticides, herbicides or other contaminants harmful to any T&E species present on the project area or areas affecting prey base. (Page 206)
1068	In the event new species or new populations of known species are identified to occur in the planning area, the Forest Plan will be modified to accommodate protection or enhancement of such species and/or their habitats. (Page 206)
1069	Avoid new road development within essential bald eagle habitat which would increase public access and use from November 1 to March 31, whenever possible. Restrict public access and use on existing roads within each habitat during this period should adverse impacts on eagles occur. (Page 47)
1070	Provide for bald eagle winter roost requirements in known eagle habitat by retaining or recruiting snags in those areas. (Page 205)
1071	In general, select for treatment 10 percent of the [Mexican spotted owl] protected activity centers (PAC) where nest sites are known or where a 100 acre “no treatment” area has been delineated (based on Ward and Salas, 2001) in each recovery unit having high fire risk conditions. Also select another 10 percent of the PACs where nest sites are known as a paired sample to serve as control areas. For the Rio Peñasco/La Luz Watershed, 38 PACs will have vegetative treatment and will be monitored as described in the Rio Peñasco II EA, Appendix C, August 2002. (Replacement Page 206C)
1072	Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire to abate fire risk in the remainder of the selected protected activity center outside the 100-acre “no treatment” area (1996 amendment). The nine-inch diameter limit is

	exempted in the Rio Penasco/La Luz Watershed where scientific studies are designed to test fuel management prescriptions in MSO protected activity centers. (Replacement Page 206C)
1073	All vehicles will be restricted to system roads and trails signed as open, except they are allowed up to 300 feet from roads and trails for dispersed camping. (Page 4)
1074	Manage and enhance the vegetation resource and bring permitted grazing use in balance with the forage allocated for use by domestic livestock. Place all allotments under appropriate levels of management. (Page 12)
1075	Manage for a favorable flow of water for users by improving or maintaining all watersheds to a satisfactory or higher condition (Page 13)
1076	Manage riparian areas to provide optimum vegetation and ecological diversity (Page 13).
1077	A permit for competitive events shall be issued only when supported by an environmental analysis and appropriate documentation which determines the potential impacts of the event. The analysis must also determine whether the specific event is appropriate or inappropriate in the National Forest setting (pg 30a).
1078	Maintain and enhance fish habitat. Avoid causing disturbances to existing habitats (Page 34)
1079	Meet T&E species requirements in all range or grazing activities. (Page 35b)
1080	Manage areas of unsatisfactory watershed condition to bring condition to the satisfactory level by the fourth period. (Page 40)
1081	b. <u>Chemical</u> treatments may be applied: 3. on areas that would benefit from selective control of plant species (Page 40)
1082	e. <u>Hand</u> treatment should be used on areas where the other methods: 2. would cause other unacceptable impacts. (Page 41)
1083	b. Stream courses will be designated within timber sales to protect watershed values. This protection will include controls on skidding within riparian areas and along or across designated stream courses. (Page 41)
1084	Mineral Leasing Category. Control surface uses in mineral operations through plans of operation and permits which provide for: preservation of water quality, protection of watershed values, monitoring of pertinent water quality constituents when water quality is adversely affected by mining activities, reclamation to original or characteristic contours (when practical), or provide opportunities for new landforms that are beneficial for both human and animal populations, reforestation or revegetation with appropriate species to attain soil stability and protect Threatened, Endangered and Sensitive species (pg 42).
1085	Suitable and/or occupied T&E habitat on private lands within Forest boundary will be recommended for acquisition or easement. (Page 45)

1086	Unsatisfactory condition range will be treated by implementing improved management and range improvements (pg 64).
1087	Unsatisfactory range condition will be treated by implementing improved management (pg 67).
1088	Unsatisfactory range condition will be treated through improved allotment management including range improvements. (Page 57, 82, 87, 97, 133, 150, 153)
1088a	Develop and replace structural improvements needed to attain levels C and D management (pg 57, 64, 82, 125, 151, 153)
1088b	Retreat 290 acres of pinyon-juniper plant control project areas to retain forage production (pg 57).
1088c	Treat 1200 acres of pinyon-juniper by fire and chemical treatments. Treatment will only occur on areas of 0-15 percent slope, which have a soil productivity rating of moderate or higher (pg 125).
1088d	Develop or replace 8.3 miles of pipeline needed for Level C and D management (pg 128).
1089	Maintain level A management on La Luz watershed and Laborcita allotment. (Page 84)
1089a	That portion of the management area that is part of the La Luz watershed is Zone D with a suppression objective of 10 acres or less. The remainder of the area is Zone C - suppression objective of 1000 acres or less (pg 85)
1089b	Use prescribed fire with planned and unplanned ignitions to accomplish resource management objectives (pg 85).
1089c	Manage unplanned ignitions which occur during the period from April 1 to July 15 as wildfires (pg 85)
1090	Unsatisfactory range condition will be treated through improved allotment management and range improvements. (Page 87)
1091	Maintain level A management on Alamogordo watershed. (Page 87)
1092	Protect and enhance T&E species habitat. Collect and plant seed. Protect riparian habitat. (Page 87)
1093	A T&E plant will be protected. (Page 91/107)
1094	Manage dispersed sites along the Sacramento River to prevent degradation of riparian habitat in conjunction with other resources. (Page91)
1095	Achieve management level A on wetlands in Sacramento River drainage by first period. (Page 92)
1096	Habitat for a T&E plant will be improved and maintained. (Page 95/104/150)
1097	Manage Bluff Springs for dispersed recreation while providing for T&E species management and maintenance of water quality. (Page 96)
1098	Develop the following nonstructural T&E improvements: Plant and seed (Ac.) 4 (Includes collection and planting of all T&E species.) (Page 97)
1099	Construct one mile of fence to protect and enhance T&E species

	habitat. (Page 97)
1100	Unsatisfactory condition range will be treated through improved allotment management along with both structural and non-structural range improvements. (Page 64, 97, 128, 150, 153)
1100a	Use prescribed fire with planned ignitions throughout the management area to accomplish resource management objectives (pg 83).
1101	Develop and replace structural improvements needed for C and D management levels: Fence reconst. (Mi.) 30, Corrals (Ea.) 5, Drinkers (Ea.) 5, Earthen Stock Dam (Ea.) 6. (Page 97)
1102	Maintain six watershed structural improvements, primarily channel stabilization, annually (pg 98)
1103	Develop and replace structural improvements needed for Level C and D management: Stock Tanks (Ea.) – 2 (Page 100)
1104	Maintain six watershed structural improvements, primarily channel stabilization (Page 101)
1105	Seed and plant four acres of <i>Cirsium vinaceum</i> . (page 105)
1106	Develop and replace structural improvements needed for Level C and D management. Fence reconst. (Mi.) – 10; Stock Tanks (Ea.) - 5 (Page 105)
1107	Maintain two watershed structural improvements per year, primarily channel stabilization. (Page 106)
1108	Build two miles of fence to protect and enhance T&E species habitat. (Page 108)
1109	Develop and replace structural improvements as needed for (C) and (D) level management. Fence reconst. (Mi.) – 11; Earthen Stock Tank (Ea.) - 1 (Page 87, 92, 97, 105, 109)
1110	Maintain watershed structural improvements, primarily channel stabilization (pg 109)
1111	Unsatisfactory range condition will be treated through improved allotment management including structural and non-structural improvements. (Page 128/148)
1112	Develop waters needed to provide a maximum travel distance of one mile. Fence (Mi.) - .25; Road Closure (Mi.) - 15.0; Trick tank (Ea) – 1; (Page 130)
1113	Develop and replace structural improvements needed for (C) and (D) level management. Fence (Mi.) – 3; Storage Tanks (Ea.) – 3; Pipelines (Mi.)- 4; Spring (Ea.) - 1 (Page 130)
1114	Unsatisfactory range condition will be treated through development of improved allotment management including approximately 150 acres of non-structural range improvement. (Page 67)
Prescott National Forest	
1115	Threatened and endangered species habitat enhancement will increase over the current levels and recovery of species will be accomplished at a higher rate. The Arizona Wildlife and Fisheries Comprehensive Plan goals will be met at a high level. (Page 7)

1116	The Forest is managed with a primary emphasis on healthy, robust environments with productive soils, clean air and water, and diverse populations of flora and fauna. (Page 11)
1117	Cooperate with other agencies and private range landowners to reduce impacts of livestock grazing. (Page 11)
1118	Manage for a diverse, well-distributed pattern of habitats for wildlife populations and fish species in cooperation with states and other agencies. (Page 12-1)
1119	Maintain and/or improve habitat for threatened or endangered species and work toward the eventual recovery and delisting of species through recovery plan implementation. (Page 12-1)
1120	Support the goals and objectives of the Arizona Wildlife and Fisheries Comprehensive Plan as approved by the Southwestern Regional Forester and the Director of the Arizona Game and Fish Department. (Page 12-1)
1121	Avoid adverse impacts to the public, Government facilities and all uses in floodplains and wetlands. (Page 13)
1122	Restore all lands to satisfactory watershed condition. (Page 13)
1123	Riparian-dependent resources have preference over other resources. (Page13)
1124	Improve all riparian areas and maintain in satisfactory condition. (Page 13)
1125	Implement access restrictions to prevent unauthorized reopening of closed or obliterated roads. (Page 27)
1126	Implement appropriate measures to ensure that significant long-term resource damage does not occur. (Page 27)
1127	Whenever conflicts between wildlife species exist, prioritization for structural and non-structural design will be threatened and endangered species, sensitive species, emphasis species and comprehensive plan goals. (Page 34)
1128	Habitat management for federally listed species will take precedence over unlisted species. Habitat management for endangered species will take precedence over threatened species. Habitat management for sensitive species will take precedence over non-sensitive species. (Page 35)
1129	Formal and informal consultation with the U.S. Fish and Wildlife Service will be implemented whenever the need is identified. (Page 36)
1130	All recovery plans will be implemented. (Page 36)
1131	The overall effect of the Forest Plan will be an improvement of wildlife habitat from current action. Species requiring early to mid-successional stages will gradually decrease over time but at a significantly slower rate than current projections. Increases in late successional species would correspondingly increase. Threatened and endangered species habitat enhancement will increase over the current

	levels and recovery of special will be accomplished at a higher rate. The Arizona Wildlife and Fisheries Comprehensive Plan goals will be met at a high level. (Page 7)
1132	Structural maintenance on existing wildlife structures will be prioritized in the following manner: Threatened and Endangered Species, Sensitive Species, Emphasis species and comprehensive plan goals. (Page 34)
1133	Continue to survey for threatened and endangered species. (Page 36)
1134	All Forest projects will be reviewed for Threatened and Endangered Species (Page 36)
1135	Motor vehicles are allowed only on forest roads indicated on the Forest visitor map and where signed on the ground. Where discrepancies occur, on-the-ground signing will prevail. (Page 26)
1136	Trail access is restricted to non-motorized use except where indicated on the Forest visitor maps and signed on the ground. Where discrepancies occur, on the ground signing will prevail. (Page 26)
1137	Access restrictions for roads, trails, or cross country travel may be year long or temporary to reduce erosion potential, protect roads, to protect cultural sites, and to provide for recreation settings without vehicle disturbance. (Page 27)
1138	The following criteria are used to evaluate the need for future access restrictions: (Page 27) High erosion hazard areas likely to be or being damaged by off highway vehicle use. Habitat for threatened, endangered, or sensitive species is jeopardized. Areas important to wildlife reproduction e.g., fawning or nesting areas, where the disturbance is causing or is likely to cause significant stress and reduction of reproductive success. Riparian areas, which are jeopardized or damaged.
1139	The following areas are designated essential habitat for spike dace (<i>Meda fulgida</i>): 1103Y050 1104Y026 1103Y075 1J04Y000 1G03Y075 1H03Y050 1H03Y000 (less the Hell Canyon portion) (Page 36)
1140	The following capability area is designated essential habitat for bald eagle (<i>Haliaeetus leucocephalus</i>): 5L07Y025 (Page 36)
1141	No harvest activity will take place within 150 feet of any undifferentiated raptor nest. - Mexican spotted owl - refer to Appendix G. - Bald eagle - winter roost will be protected by a 300-foot unharvested buffer zone around the roost. - Roosts and active nest sites will be protected by prohibiting any road development within close proximity (100 feet) of any unharvested or buffer zone. (Page 36)
1142	Management projects within riparian areas will be in accordance with legal requirements regarding floodplains, wetlands, wild and scenic rivers, cultural and other resources and will be in accordance with

	standards and guidelines identified in the Southwestern Regional Guide. (Page 39)
1143	Projects impacting riparian areas will be designed to protect the productivity and diversity of riparian-dependent resources. Emphasize protection of soil, water, vegetation, wildlife and fish resources. (Page 39)
1144	Riparian dependent resources will have a preference over other resources. Other resource uses and activities may occur to the extent that they support the objective of riparian enhancement. (Page 39)
1145	No discretionary vegetation manipulation will occur within 200 feet of identified riparian capability area boundaries except the objective is to enhance downstream productivity. (Page 39)
1146	Riparian projects will be developed on a site-specific basis and in accordance with the Southwestern Regional Guidelines and Riparian Handbook. (Page 39)
1147	Meet the following riparian Standards in the Regional Guide for 80 percent of riparian areas by 2030: (Page 40) Maintain at least 80 percent to the potential overstory crown closure of obligate riparian species. Manage resources to create or maintain at least three age classes of woody riparian species with at least 10 percent of the woody plant cover in sprouts, seedlings, and saplings where site potential exists. Maintain at least 80 percent of the potential stream shading along perennial cold-water streams. Maintain adequate emergent vegetation to ensure compliance with the goals of the strategic plan. Maintain 80 percent of spawning gravel surface free of occlusive inorganic sediment. Maintain at least 80 percent of stream bank linear distance in stable condition. Retain snags in riparian areas that are not a safety hazard.
1148	Rehabilitate areas in poor condition where natural processes are ineffective within the planning horizon. (Page 40)
1149	Cooperate with Arizona Game and Fish Department on population control of aquatic plants and undesirable fish species. Permit fish stocking to meet State fisheries goals. (Page 40)
1150	Construct adequate exclosures to protect key riparian areas from livestock grazing where rest rotation or time control grazing fails to provide adequate protection to the riparian areas. (Page 40)
1151	Maintain riparian communities by providing water for wildlife and livestock away from sensitive areas. (Page 40)
1152	The following cover standards and guidelines will apply in areas where threatened and endangered habitat requirements do not conflict. Habitat requirements for threatened and endangered species will take precedence over cover requirements for other species. (Page 40)
1153	Manage livestock grazing to achieve soil and water protection objectives. Make use of cost effective range improvements and management techniques. (Page 42)
1154	Manage to bring all grazing allotments to satisfactory management by

	the end of the first decade. Satisfactory management occurs on allotments where management actions are proceeding according to a schedule (Allotment Management Plan), which lead to fair or better range condition with upward trend. Acres of satisfactory management are the total full capacity acres for a complete allotment within a management area being operated satisfactorily. Acres of unsatisfactory managed range are the total full capacity acres for complete allotments within a management area being operated unsatisfactorily. (Page 42)
1155	Control livestock grazing through management and/or fencing to allow and favor: 1) adequate establishment of riparian vegetation, 2) elimination of overuse. (Page 42)
1156	No adjustment to grazing numbers will be undertaken that will allow for prolonged maintenance of unsatisfactory watershed conditions or degradation of wildlife habitat. (Page 42)
1157	Eliminate yearlong grazing in riparian areas. (Page 45)
1158	Implement grazing systems and/or methods that: (a) will advance the ecological objectives for riparian dependent resources. (b) require sufficient recovery rest to meet the physiological of the plants and plant associations. (Page 45)
1159	Proper allowable use within riparian areas will not exceed 20 percent on woody species. (Page 45)
1160	Salting within one-quarter mile of riparian areas for the purpose of management of livestock is prohibited; this includes the use of salt to gather livestock. (Page 45)
1161	Meet T&E species requirements in all range or grazing activities. (Page 45)
1162	When using pesticides, avoid direct application to water. Do not mix or load chemicals near streams or wet areas. (Page 45-1)
1163	Plan, design and construct or reconstruct a road system that optimizes safety, economical access and resource protection. (Page 47)
1164	Detect and monitor insect and disease activities. Control if necessary to protect resources or uses. The method of control utilized will be determined through the NEPA process and cost analysis. (Page 48)
1165	Implement watershed condition improvement plans to stabilize soils and improve stream flow characteristics. (Page 49)
1166	Minimize impacts to the soil and water resources in all ground disturbing activities. Where disturbance cannot be avoided, provide stabilization and revegetation as part of the project. (Page 49)
1167	Designate stream courses within timber sales to protect watershed values. This protection will include controls on skidding within riparian and along or across designated stream courses. (Page 51)
1168	Require Rural Electrification Administration (REA) specifications for raptor protection and permitted power lines during construction and reconstruction. (Page 53)
1169	Roads needed for private land access, special uses or mineral activities

	will be built and maintained by the permittee on permanent locations, to the minimum standards for the intended use, and will be closed, drained and revegetated after use. (Page 55)
1170	Allow only one access road for subdivision access unless natural features dictate otherwise and where there is no suitable private land alternative or where additional access is needed for public safety. (Page 55)
1171	Respond to land exchange proposals as presented. Seek to acquire all private holdings meeting one or more of the following criteria: 2. Lands that contain vital threatened and endangered species habitat or vital wildlife habitat (i.e. eagle nesting sites) 4. Wetlands, riparian areas and other water-oriented lands. (Page 56)
1172	The acquisition programs will be achieved through purchases, exchanges, and donation authorities. The purchase program centers around the Land and Water Conservation Fund Act that designates lands within the following categories which are eligible for acquisition utilizing L&WCF funds: Threatened and endangered species habitat. (Page 57)
1173	Emphasize relocating roads out of canyon bottoms during construction and reconstruction activities. (Page 58)
1174	Prohibit road construction on unstable soils and slopes greater than 40 percent if it cannot be done in a manner that maintains or enhances water quality (sediment or chemical) and quantity objectives. (Page 58)
1175	Woodland Management Emphasis - Improve all riparian areas and maintain in satisfactory condition. (Page 66)
1176	Chaparral Management Emphasis - Improve all riparian areas and maintain in satisfactory condition. (Page 70)
1177	Pine Management Emphasis - ...timber management will produce commercial wood products using treatments that compliment the emphasis on wildlife and dispersed recreation management. (Page 74)
1178	Pine Management Emphasis - Improve all riparian areas and maintain in satisfactory (condition). (Page 74)
1179	Desert Grasslands Management Emphasis - Improve all riparian areas and maintain in satisfactory condition. (Page 78)
1180	Improve all riparian areas and maintain in satisfactory condition. Emphasis Manage the wilderness resource to ensure its character and values are dominant and enduring. Refer to Appendix F for direction specific to an individual wilderness. (Page 82)
1181	Management Area 7 . Recreation Management Emphasis - Improve all riparian areas and maintain in satisfactory condition. (Page 91)
1182	Management Area 7. Recreation: The Verde wild and scenic portion will be managed for the maintenance and enhancement of the Bald Eagle habitat. This will be accomplished by implementing the recommendations identified in the Action Program for Resolution of Livestock and Riparian Conflicts in Salt and Verde Rivers and The Bald Eagle Recovery Plan. (Page 91)

Santa Fe National Forest	
1183	Manage habitat to maintain viable populations of wildlife and fish species and improve habitat for selected species. Coordinate habitat management with other resource activities. (p. 19)
1184	Identify, protect and enhance habitat that contains threatened, endangered, and sensitive species of plants and animals to contribute toward the goal of species recovery. (p.19)
1185	Provide direction and support to all resource management activities with emphasis on maintaining the soil resource, water quality and water quantity. (p.20)
1186	Manage for a favorable flow of water for users by improving or maintaining all watersheds to a satisfactory condition. (p.20)
1187	Identify and protect wetlands and floodplains. (p. 20)
1188	Achieve satisfactory condition in riparian ecosystems. Maintain areas that are currently in good condition. (p.20)
1189	Minimize disturbance due to resource activities and other uses in the riparian zone. (p.20)
1190	When developed recreation facilities are proposed in threatened and endangered species (T&E) habitat, a biological assessment will be obtained and a no adverse effect determination made before project authorization. Existing facilities located in T&E habitat will be managed to protect that habitat. (p.51)
1191	ORV closure and restrictions are indicated by management area... Criteria for restricted use or closure of an area may include: 1. Loss of vegetative cover; 2. Degradation of important wildlife habitat or wildlife harassment.; 3. Identifiable impacts on soils riparian ecosystems, or water quality... (p.52)
1192	TES habitat needs will take precedence over visual resource management. (p.56)
1193	Continue to emphasize threatened, endangered, and sensitive species for studies. (p.61)
1194	In cooperation with the New Mexico Department of Game and Fish and the U.S. Fish and Wildlife Service, jointly review the threatened, endangered, and sensitive species program to identify species priority, direction, and joint opportunities. (p.61)
1195	Manage at least 5 logs per acre in various stages of decomposition where consistent with visual quality and fuel loading objectives. Wildlife logs should be the largest diameter available and at least 15 feet in length. (p. 62)
1196	Inventory, evaluate, and improve areas of streams, lakes, and wetlands for cold-water fisheries, especially the Rio Grande cutthroat trout, water fowl and other water-related habitats. (p. 62)
1197	Adjust riparian plant composition or structure through coordination with other uses or direct manipulation in order to achieve riparian standards. (p.62)

1198	Consult and cooperate with New Mexico Natural Resources Department (Resource Survey Section) to achieve management objectives for threatened, endangered, and sensitive flora. (p.63)
1199	In the construction or reconstruction of campgrounds adjacent to fishing streams and lakes, keep the habitation improvements away from the streambanks and lakeshores. (p.62)
1200	Monitor management practices within occupied and potential threatened or endangered species habitat and evaluate impacts. (p.63)
1201	Proposed activities which may disturb the integrity of prairie dog towns must be fully evaluated and managed to perpetuate the species. (p.64)
1202	Manage for indigenous fauna in cooperation with the New Mexico Department of Game and Fish. Generally, exotic species will not be introduced. Exotics determined to be undesirable on National Forest System lands will be managed to obtain the goal of elimination in cooperation with appropriate State or Federal agencies. (p.64)
1203	Cooperate with New Mexico Department of Game and Fish in monitoring indicator species populations. (p.64)
1204	Accomplish recovery projects included in approved recovery plans. (p.64)
1205	Manage threatened and endangered animal, fish and plant habitats to achieve delisting in a manner consistent with the goals established with the U.S. Fish and Wildlife Service and the New Mexico Department of Game and Fish in compliance with approved recovery plans. (p.64)
1206	Habitat requirement for TES species will take precedence over requirements for other species and habitat requirements for sensitive species will take precedence over nonsensitive species. Habitat requirements for endangered species take precedence over threatened species. (p.64)
1207	Develop management plans for wintering bald eagle habitats as specified in approved recovery plans. Maintain bald eagle winter roost and perch trees. Accomplish riparian and fisheries improvements to maintain and enhance prey base for wintering bald eagles. (p.64)
1208	Studies will be conducted to ascertain suitability for reintroduction of endangered, threatened, proposed and state listed native species into suitable habitats. This will be accomplished in conjunction with development and approval of recovery plans. (p.65)
1209	Monitor management practices within occupied and potential habitat for plants listed as threatened, endangered, or on the Southwestern Region sensitive list. Manage sensitive species to sustain viability and prevent the need for listing as threatened or endangered. Recovery activities will be pursued where pertinent. ... (p.65)
1210	Review all planned or permitted programs and activities to develop biological evaluations and determine needs for consultation or conference with the Fish and Wildlife Service and the New Mexico Department of Game and Fish. Consultation will be initiated for situations where listed or proposed listed species may be affected. This

	process will be completed prior to project approval. (p.65)
1211	Plan and administer activities in known turkey and raptor nesting areas so as not to disrupt nesting success in a manner which significantly effects the population. (p. 65)
1212	Include game and non-game habitat improvement projects in sale area improvement plans for timber sale areas, to benefit wildlife and fish. (p.66)
1213	Adequate perch and roost trees for raptors will be managed within a 2000-foot wide stand along cliffs, major ridges, and openings. Trees should be open crowned, both living and dead, and maintained over time. (p.66)
1214	Jointly develop annual permittee plans of work, including a salting plan that minimizes impacts to riparian zones, meadow ecosystems, and other Forest resources. (p.68)
1215	Maintenance of range improvement projects will be evaluated and executed to have no adverse effect on T&E species. (p.68)
1216	Review classification of forest and woodland inventories as part of project planning. (p.68)
1217	Site specific identification of old growth will occur during ecosystem area analysis or project planning. Stands managed for old growth should be at least 40 acres in size, with a preference for larger stands. (p.68)
1218	Thinning is permitted in stands being managed for old growth when the result will enhance attainment of the old growth characteristics. No treatments should occur in a stand managed for old growth once the stand has achieved minimum structural characteristics of old growth. (p.69)
1219	Timber producing areas deforested by catastrophic events will be reforested to Regional standards or as prescribed by silviculturist as soon as practical. (p.70)
1220	Reforestation projects will not be planned in areas which exhibit characteristics of a self perpetuating meadow ecosystem. (p.70)
1221	Uneven-aged management is the preferred system for managing timber resources. (p.72)
1222	Silvicultural treatments will leave sound snags (10"+ DBH). Manage for 220 natural snags per 100 acres on a minimum of 40 percent of the ecosystem area with emphasis on peripheral edges of openings. Areas unavailable for harvest are considered as part of the 40 percent as long as good spatial distribution is maintained. Additional criteria for snags are: 1. Unmerchantable trees selected for snag recruitment will be due to dead or broken tops, heart rot and lightning strikes and not primarily due to poor genetics. 2. Leave dwarf mistletoe-free unmerchantable trees for snag recruitment and all existing snags 10"+ DBH and above except those to be removed for public safety or fire management. 3. If unmerchantable trees are not available, then merchantable trees may be considered for snag recruitment. (p.72)

1223	Stands within 200 ft. of canyon rims in peregrine falcon feeding zones will receive uneven age, deferral, or other silvicultural treatment which enhances this key habitat and its features. (p.73)
1224	Log landing areas will be located outside of designated sensitive land areas to the extent practical. These sensitive areas include: riparian areas, wetlands and natural meadows, archaeological sites, threatened and endangered or sensitive species habitat and along Level 1 roads requiring viewshed corridor plans. When landings must be located in these areas they will be coordinated to the sensitive resource. (p.73)
1225	Use road management to restrict use periods as needed for resource protection. (p.73)
1226	Openings created through harvest of timber or firewood will not exceed 40 acres in size, except with regional approval to meet resource objectives. (p.73)
1227	All firewood removal will be administered through a permit or sale system. Free use firewood for personal use will be restricted to dead and down material in designated areas to accomplish management objectives. (p.74)
1228	Manage to perpetuate or maintain aspen stands along stream course reaches with less than a 6 percent gradient. (p.74)
1229	Plan and design activities and management strategies specifically for soil and water resources improvement where watershed condition is unsatisfactory. (p.75)
1230	Plan watershed rehabilitation where necessary to protect water resources and soil productivity after wildfire. (p.75)
1231	Select treatment methods for plant control or revegetation projects according to the NEPA process and the following criteria: 1. Large equipment may be used: a. on slopes less than 40 percent, b. on soils with moderate or high revegetation potential, and c. when they will not adversely affect stream channels. 2. Prescribed fire may be used: a. on areas with suitable fuel types. b. on areas where the proper vegetative response can be expected, c. where the fire will not pose a threat to human safety or surrounding property, d. on slopes greater than 40 percent, with careful resource consideration, e. on soils with moderate or high revegetation potential, f. soils with low revegetation potential, as long as 40 percent of the vegetative cover remains. (p.75)
1232	Work toward improving unsatisfactory watershed condition to a satisfactory state on those acres that can be cost effectively improved. This should be accomplished through a combination of structural methods and management strategies, such as road closures, satisfactory allotment plans or ORV restrictions. (p.76)
1233	Accomplish 100 acres (approximately 66 miles) of road obliteration each year for the first two decades. Priorities for road obliteration will be based on the following criteria: 1. damage to the riparian ecosystem. 2. unacceptable resource damage. 3. management area emphasis of low optimum open road density or protection of sensitive

	soils. (p.76)
1234	Minimize the impacts to soil and water resources in all ground disturbing activities. (p.77)
1235	Insure that the Best Management Practices (BMP) recommended by the State of New Mexico, the EPA and the Forest Service are utilized in all projects where water quality may be affected by non-point source pollution to insure compliance with the New Mexico water quality standards. (p.77)
1236	BMPs for Road Design, Construction, and Management: 1. Locate roads away from watercourses. Determine the minimum distance between roads and watercourses after considering the following factors:... a-e. (p.77)
1237	2. Use brush mulches or filter fences when necessary to mitigate impacts of roads near water courses. (p.77)
1238	3. Locate necessary stream crossings at points where the stream channel is stable. Approach stream crossings at right angles. (p. 77)
1239	4. Provide for storm flows across the road prism when through-fills across water courses have been constructed. (p.77)
1240	5. Design roads so grades are less than 10 percent. If grades must exceed 10 percent, reduce the distance between drainage dips so water concentrations cannot erode the road surface or fill slopes. (p.77)
1241	6. Drain springs and seeps across roads with inslope road surfaces, ditches, and culverts. (p.77)
1242	7. Minimize construction of midslope roads where side slopes exceed 60 percent. When this construction is deemed necessary, full bench the roads and dispose of excavated material at a suitable location. (p.77)
1243	8. Provide road surface drainage by frequent rolling of the road grade, construction of drainage dips, or construction of lateral ditches. (p.78)
1244	9. Evaluate the need for aggregate surfacing for roads located on soils with low bearing strength or high plasticity. (p.78)
1245	10. Minimize the period that disturbed areas are not vegetated by revegetating and/or mulching cuts and fill slopes. (p.78)
1246	11. Maintain all roads to ensure proper function of drainage structures. (p.78)
1247	12. Avoid location of temporary roads on unstable or sensitive soils, steep slopes, and watercourses. Revegetation should be accomplished as soon as temporary use is completed, using site adapted seed mixtures and planting during moist seasons. (p.78)
1248	BMP'S for Timber Sale Preparation and Administration: 1. Protected stream courses will be designated on the sale area map. Stream courses include the designated area on each side of the stream which is given special management consideration. This area will be marked on the ground and will vary in width depending on the physical characteristics and management objectives.
1249	a. Protected stream course crossings will be approved and designated

	by the Forest Service. (p.78)
1250	b. Endlining will be used within protected stream courses unless the stream courses can be protected by other means. (p.78)
1251	2. Restrict skidding in areas having wet or highly erodible soil conditions. (p.78)
1252	3. In the harvest units designated for skyline logging, yarding will be upslope or fully suspended if cross slope yarding is necessary. Skyline corridor widths will be limited to 15 feet. Require on end suspension during in-haul for all skyline operations. (p.78)
1253	4. All landings and skid trails will be properly drained using waterbars at proper spacing, and will be ripped and revegetated appropriately. (p.78)
1254	5. Use appropriate erosion control techniques when disking for site preparation. (p.79)
1255	After riparian condition inventories are initiated, prioritize riparian improvement projects according to the following criteria: 1. Effect on T&E habitat. 2. Degradation of fisheries habitat. 5. Significant variance from Southwestern Regional riparian guidelines.
1256	Manage riparian areas in accordance with legal requirements regarding floodplains, wetlands, wild and scenic rivers, and cultural and other resources. Protect the productivity and diversity of riparian-dependent resources and emphasize the protection of soil, water, vegetation, wildlife and fish resources prior to implementing projects. Give preferential consideration to resources dependent on riparian areas over other resources when conflicts among uses arise. (p.79)
1257	Riparian areas should be managed toward meeting the following guidelines: Ground cover- Provide average ground cover of plant and litter at 80 percent of natural levels. Shade- Provide shading over perennial and intermittent water surfaces that is 80 percent of natural levels considering unit reaches of about 2 miles in length. Bank cover- Provide shrub and tree cover along bank lengths that is 80 percent of natural levels. Give emphasis to the protection of streambank stability provided by woody plant roots, particularly on outside bends of stream channel meanders. Streambed Sedimentation- Composition of sand, silt, and clays within streambeds should not exceed 20 percent of natural levels. Plant Composition- Provide at least 60 percent of the woody plant composition in 3 or more riparian species. Plant Structure- Provide at least 3 age classes of riparian trees and shrubs, with at least 10 percent of the cover in the seedling sapling stages and 10 percent in the mature and overmature. Crown Cover- Provide crown cover of both trees and shrubs that is 80 percent of natural levels considering unit reaches of about 2 miles in length (p.79-80).
1258	Control surface uses in mineral operations through plans of operation and permits which provide for: - preservation of water quality; - protecting watershed values; - T & E species and other wildlife habitats (p.81)

1259	Ensure reclamation of mineral areas to restore resource damage and remove public safety hazards as needed. (p.82)
1260	Specifications for raptor protection on permitted power lines during construction and reconstruction will follow “Suggested Practices for Raptor Protection on Powerlines”, Report #4, by the Raptor Research Foundation. (p.86)
1261	Permits will not be issued until archaeological clearance and compliance with the Endangered Species Act is obtained. (p.86)
1262	Because conditions may change over time, classify lands that are desirable for acquisition according to the following criteria: 2. Contain essential or critical habitat for threatened, endangered, sensitive, or other key wildlife species. 4. Wetlands or riparian areas. 8. Need rehabilitation or stabilization to restore their productivity. (p.87)
1263	The purchase program centers around the Land and Water Conservation Fund Act (LWCF) that designates that lands within the following categories are eligible for acquisition with LWCF funds: 3. T & E species habitat. (p.88)
1264	Roads needed only for private land access, special uses, or mineral activities will be built and maintained by the permittee to minimum standards for the intended use. They will be closed, drained and revegetated after final use. (p.90)
1265	Avoid development of new roads within essential bald eagle and peregrine falcon habitat which would increase public access and use. Restrict public access and use on existing roads as necessary to protect these habitats. (p.90)
1266	Consider fisheries management objectives in the design of stream crossings. (p.90)
1267	Construct new roads and trails at least ¼ mile from prairie dog towns where practical. (p.90)
1268	Minimize the area of impact of new and existing roads and trails on riparian zones and wet meadows. Locate construction equipment service areas outside the riparian areas. (p.90)
1269	Pursue an aggressive program for closure of unneeded roads. (p.91)
1270	Threatened and endangered species needs will be coordinated with the District Ranger to avoid negative impacts as safety and emergency conditions permit. (pp.93, 94)
1271	Air traffic will be coordinated to minimize impacts on peregrine falcon and bald eagle. (p.93)
1272	Fires which exceed the suppression objectives are considered escape fires and appropriate response will be determined by an escape fire situation analysis. The analysis will consider at least the following: 7. Impacts on T & E species. (p.93)
1273	Fuels treatment will be coordinated with wildlife habitat needs. Prescribed fire will be utilized to minimize high intensity fire risk in essential T&E habitat. Existing and potential snags needed for wildlife

	habitat will be protected. (p. 94)
1274	Habitat requirements for TES species will take precedence over disease/insect treatment needs and cover requirements for non-TES species. (p.95)
1275	When pesticides are used for pest control, project plans will contain appropriate and necessary monitoring procedures and mitigation measures. Depending on the situation, monitoring procedures might include some or all of the following: 3. Determine effects on water quality. (p.97)
1276	Wildlife emphasis is on providing even distribution of age classes in forested communities and improved fisheries. Stands providing forage and cover will be spatially designed to enhance wildlife values. (p.100, Management Area A)
1277	This management area consists of those Forest lands that provide key deer and elk winter range, some of the essential habitat for threatened and endangered species, or other areas important to game and non-game wildlife... The emphasis in this area is on wildlife habitat improvement and key species habitat protection. Grazing and timber harvest activities occur where compatible with the primary emphasis of this area. (p.102, Management Area B)
1278	Manage 75 percent of the forested acreage to have a minimum of 220 snags per 100 acres. (p.104, Management Area B)
1279	Firewood should be managed to retain snags and on-the-ground large diameter logs. (pp.104, 168)
1280	Roads will be constructed, reconstructed, maintained or closed to enhance wildlife habitat effectiveness and support timber harvest activities. (p. 104 Management Area B)
1281	Road use will be managed with the objective of limiting open road density to 0.3 to 1.5 miles per square mile. (pp. 104, 123, 173)
1282	Air traffic will be coordinated to minimize impacts on T&E species. (pp.105, 111, 154, 169)
1283	These are transportation corridors and areas which provide essential habitat for T&E species along with ... Emphasis is on enhancement of visual quality and developed recreation opportunities while protecting essential wildlife habitat and riparian zones. Grazing and timber activities occur where consistent with the primary emphasis of this area. (p.106 Management Area C)
1284	When developed recreation facilities are proposed in T&E habitat, a biological assessment will be obtained and a no adverse effect determination made before the project proceeds. Existing facilities located in T&E habitat will be managed to protect that habitat. (p.107 Management Area C)
1285	In addition to those criteria for ORV restriction or closure listed in Forestwide standards, the following priority criteria will apply: 2. Degradation of T&E or sensitive species habitat. 3. Degradation of the riparian ecosystem. (pp. 107-108, 113)

1286	Retain and encourage existing groupings of gambel oak, and other understory vegetation to promote visual diversity. Allow planting/seeding of indigenous understory species. (pp. 108, 114)
1287	Dispose of activity-generated slash in the immediate foreground zone within one year of project completion, with the exception of a maximum of five logs per acre of minimum 12” diameter and 15’ length of wildlife. (pp.109,114)
1288	Wildlife emphasis is to enhance T&E habitat, riparian habitat, and fisheries. (pp. 109, 114)
1289	Coordinate with recreation development and viewshed corridor planning to reduce impacts on T&E and sensitive species. (p.109 Management Area C)
1290	T&E species habitat management will emphasize reducing human disturbance and enhancement of riparian communities. (p. 109 Management Area C)
1291	Plant cottonwoods where appropriate to enhance bald eagle winter habitat effectiveness. (p.109 Management Area C)
1292	Vertical diversity will be emphasized over horizontal diversity. (pp. 109, 114)
1293	Within approved allotment management plans, emphasis will be given to proper utilization of the riparian zone. (p.109, 115)
1294	Reforestation activities will be designed to eliminate adverse effects on T&E species. (p.110 Management Area C)
1295	TSI activity levels will be coordinated to eliminate adverse effects on T&E species. (p.110 Management Area C)
1296	Manage 75 percent of the forested acres to have 300 snags per 100 acres. (p. 110 Management Area C)
1297	Roads will be constructed, reconstructed, maintained or closed to support the objectives of high quality recreation access for a variety of vehicles, protection of riparian zones and protection of T&E habitat. (p. 111, 116)
1298	Manage timber stands under uneven-aged or extended rotation even-aged systems to provide or retain visual diversity and benefit non-game species. (p.115 Management Area D)
1299	Evaluate these lands and identify opportunities to contribute to T&E species recovery objectives. (pp. 122, 151, 172)
1300	Manage for perches distributed throughout the area to meet songbird and raptor needs. (pp. 122, 144, 172)
1301	In the Caja, manage prairie dogs to maintain viable populations. (p. 122 Management Area G)
1302	Protection will be provided to T&E plant inclusions from both wildfire and suppression efforts. (pp.124, 145)
1303	These combinations provide important habitat for a wide array of T&E and other wildlife species. Management emphasis in these areas is to preserve wilderness character. Primitive recreation opportunities,

	wildlife habitat management, grazing, and fire management will occur only when consistent with these values and where historically established. (p.125 Management Area H)
1304	Control measures may include closing areas, lake shores and lake basins to overnight camping, use by reservation, permit systems, etc. (p. 125 Management Area H)
1305	Use trail system design to disperse recreationists away from wet meadows, riparian areas, and areas of concentrated use. (p. 126 Management Area H)
1306	Manage wilderness use to maintain or enhance T&E species habitat. (p. 127 Management Area H)
1307	Manage for native plant and animal species and allow for re-introduction of native species. (p. 127 Management Area H)
1308	Avoid management practices which tend to concentrate grazing livestock in sensitive areas such as riparian zones and wet meadows. (p. 127 Management Area H)
1309	Utility corridors are prohibited except in accord with Section 4(d)(4)(1) of the Wilderness Act. (p. 128 Management Area H)
1310	Protect bald eagle winter roost areas from wildfire. (p. 128 Management Area H)
1311	Allotment management plans will be consistent with wilderness and T&E objectives. (p. 130 Management Area H)
1312	Campfires and overnight camping are prohibited within the posted areas at Pecos Falls, Beatty's Flat, and within the lake basins of all lakes, due to loss of vegetative cover and soil. (p. 132 Management Area H)
1313	The Santa Fe Watershed portion of the wilderness is closed to recreation use. (p. 132,
1314	Cienega Gregorio is closed to campfires and overnight camping due to loss of vegetative cover and soils and use levels inconsistent with wilderness values. (p. 134 Management Area H)
1315	Extraction of mineral materials will not be permitted. (p. 137 Management Area I)
1316	Roads will not be constructed except where necessary for permitted special uses, mineral activities, private land access, to access adjacent management areas where other reasonable access is not available or to support cultural resource management. Road management will be implemented with the objective of closing all unnecessary roads where they currently exist. (pp. 137, 142, 145, 154)
1317	Timber harvest activities will be planned to limit the potential of catastrophic fire, and promote long term forest ad watershed health. (p. 141 Management Area J)
1318	The primary emphasis in this area is on protection of sensitive species, ecosystems and fragile soils. Consistent with this theme, ORV travel will be prohibited, and recreation, grazing, and firewood activities will

	occur only when compatible with the primary emphasis. (p. 143 Management Area K)
1319	Wildlife management in the Erosion Pasture will feature the following: Riparian management and improvement of the Rio del Oso; Birds of prey nesting and feeding habitat; Increased non-game habitat values. (p. 144 Management Area K)
1320	Manage to enhance suitable cover for ground nesting birds and rodents in deficient areas. (p. 144 Management Area K)
1321	As a forestwide average for this management area, road use will be managed with the objective of limiting open road density to 0 to 1.0 miles per square mile. Road management priorities will be based on minimizing resource damage, eliminating unsafe conditions, or closing unneeded roads. (p. 145 Management Area K)
1322	These areas are closed to motorized travel. (p. 147 Management Area L)
1323	In White Rock Canyon, wildlife management should emphasize maintenance or enhancement of birds of prey habitat T&E species migration corridors, riparian areas, and mule deer habitat. (p. 147 Management Area L)
1324	The riparian zone will be evaluated for enhancement opportunities with specific consideration of possible contribution to T&E species recovery. (p. 147 Management Area L)
1325	In the East Fork of the Jemez River, wildlife management should emphasize late forest seral stage habitat, T&E species, and fisheries. (p. 147 Management Area L)
1326	T&E habitat needs will be evaluated in determining size constraints for individual low intensity (less than 4' flame length) wildfires. (p. 148 Management Area L)
1327	Prohibit introduction of non-native plant or animal species. (p. 151 Management Area M)
1328	Low intensity wildfires will have no size limitations. (p. 151 Management Area M)
1329	These areas of land contain essential habitat for T&E species. The emphasis here will be on management that protects and enhances essential wildlife habitat. This land area will not be included in the suitable timber base. However, certain timber management activities as well as grazing, firewood, and fire management may occur when consistent with the protection emphasis of this area. (p. 152 Management Area N)
1330	Vegetation management will favor old growth forest conditions and vertical diversity for non-game after T&E species habitat needs are met. (p. 153 Management Area N)
1331	Timber management may be used in these areas only to accomplish T&E habitat improvement objectives. (p. 153 Management Area N)
1332	All vegetation management must be executed in a manner and time of

	year which is consistent with T&E species needs. (p. 153 Management Area N)
1333	All powerlines 69Kv or less must utilize location, design, and construction practices to meet T&E habitat requirements and the appropriate VQO. (p. 154 Management Area N)
1334	Prescribed fire and fuelbreak design will be used to minimize the effects of wildfire on T&E or sensitive species habitat. (p. 154 Management Area N)
1335	Management emphasis is on quality water production. This area will remain closed to all entry according to the original closure order. (p. 155 Management Area O)
1336	Utility corridors will be excluded. (p. 156 Management Area O)
1337	Roads will not be constructed in this management area except as necessary to control wildfire which threatens life, property, or water quality. Any constructed roads will be closed or obliterated after use. (p. 156 Management Area O)
1338	Wildlife management will emphasize T&E species habitat enhancement, access management, riparian enhancement and even distribution of seral habitats. (p. 167 Management Area R)
1339	Evaluate these lands and identify opportunities to contribute to T&E species recovery objectives. (pp. 122, 151, 172)
	Tonto National Forest
1340	<u>Standard</u> Locate and survey all potential Gila Topminnow sites. Where feasible stock sites, monitor for success, and restock if necessary.
1341	<u>Standard</u> Identify, survey, map, and analyze habitat for all Federally-listed species. Identify management conflicts and enhancement opportunities. Correct any management conflicts or problems.
1342	<u>Standard</u> Continue to clear all projects for threatened, endangered, proposed, and candidate plant and animal species. Clearances will be done by Wildlife Biologist and reviewed by Forest Biologist.
1343	<u>Standard</u> New additions of listed, proposed, or candidate species by the US Fish and Wildlife Service will be protected.
1344	<u>Standard</u> Maintain a minimum of 30 percent effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30 percent exists, it will be the management goal to obtain a minimum of 30 percent effective ground cover.
1345	<u>Standard</u> Habitat requirements for endangered species will have precedence over threatened species. Habitat requirements for threatened, endangered, and sensitive species will take precedence over requirements for other species and habitat requirements for sensitive species will take precedence over nonsensitive species.
1346	The northern goshawk standards and guidelines apply to the forest wood-land communities described below that are outside of Mexican

	spotted owl protected and restricted areas. Within Mexican spotted owl protected and restricted areas, the Mexican spotted owl standards and guidelines take precedence over the northern goshawk standards and guidelines. One or the other set of standards and guidelines apply to all forest and woodland communities but the Mexican spotted owl standards always take precedence in areas of overlap.
1347	Where VSS 6 is deficit within the ecosystem management area, all VSS 6 will be maintained regardless of location. However, over time, the intent is to sustain a relatively even distribution (again based on site quality) of VSS 6 across the ecosystem management area.
1348	<u>Standard</u> Coordinate with range to achieve utilization in the riparian areas that will not exceed 20 percent of the current annual growth by volume of woody species.
1349	<u>Standard</u> Coordinate with range to achieve at least 50 percent of the cottonwood-willow and mixed broadleaf acres in structural Type 1 by 2030.
1350	<u>Standard</u> Rehabilitate at least 80 percent of the potential shrub cover in riparian areas through the use of appropriate grazing systems and methods.
1351	<u>Standard</u> Identify and delineate the home range of all Bald Eagle breeding areas. Document and correct any resource conflicts and disturbances to Bald Eagles and their habitat. During portions of any year that a Bald Eagle's nest site is active, an appropriate area of land surrounding the nest will be closed to public entry if such closure is necessary.
1352	<u>Standard</u> Manage the warm water non-game type streams to support Gila sucker and Longfin dace.
1353	Any surface or vegetation disturbing projects in riparian areas will be coordinated and will specify protection or rehabilitation of riparian-dependent resources. For example, the required planting of large cottonwood poles in 7 Mile Wash by Arizona Department of Transportation (ADOT).
1354	<u>Guideline</u> Conduct surveys and write reports on allotments scheduled for re-analysis and possible stocking adjustments. Allow for forage to maximize Threatened and Endangered (T&E) species, management indicator species, and emphasis harvest species.
1355	All Riparian Areas- Rehabilitate and maintain, through improved management practices, mixed broadleaf riparian to achieve 80 percent of the potential overstory crown coverage. Natural regeneration is anticipated to achieve most of this goal. Artificial regeneration may be necessary in some areas.
1356	<u>Standard</u> Re-establish riparian vegetation in severely degraded but potentially productive riparian areas. Natural regeneration is anticipated to achieve this goal, but artificial regeneration may be necessary in some areas.
1357	<u>Standard</u> Rehabilitate cottonwood willow Type 11 to achieve

	conversion to Type 1 by the year 2030. Natural regeneration is anticipated to achieve most of this goal, but artificial regeneration may be necessary in some areas.
1358	<u>Standard</u> Bat roosts and other sensitive biological resources within cave will be managed using all appropriate means identified in the Cave Implementation Plan.
1359	<u>Standard</u> Initiate informal or formal consultation, as required by the Endangered Species Act, with the U.S. Fish and Wildlife Service on all actions that effect T&E plant and animal species
1360	<u>Standard</u> Survey, study and assess the status of candidate species on a priority basis. Identify document and correct any management conflicts to the species or their habitats.
1361	<u>Guideline</u> Manage riparian areas to the level needed to provide protection and improvement.
1362	<u>Guideline</u> Where possible, locate roads on natural benches, ridges, flat slopes near ridges J02, L04, F01 or valley bottoms, and away from stream channels.
1363	<u>Guideline</u> Roads should be located on well-drained and stable ground, avoiding seeps and other unstable areas
1364	<u>Guideline</u> Stream crossing approaches should avoid steep pitches and grades in order to prevent sedimentation.
1365	<u>Guideline</u> Where channel crossings are necessary, select an area where the channel is straight and cross the channel at right angles.
1366	<u>Guideline</u> In streams inhabited by fish, structures need to provide for fish passage. In addition, structures containing natural stream bottoms are preferred over culverts.
1367	<u>Guideline</u> Reduce road dimensions to that which will adequately fulfill anticipated needs and avoid large road cuts and fills.
1368	<u>Guideline</u> Avoid channel changes or disturbance of stream channels and minimize impacts to riparian vegetation.
1369	<u>Standard</u> All surface-disturbing activities planned near or within a known cave area will be examined to potential impacts to the cave(s) and the area around each cave entrance(s), (plus feeder drainages and surface areas immediately over cave passages). The cave area will be evaluated to determine protection measures needed.
1370	<u>Standard</u> Protection measures for caves will be incorporated into project planning, and may include (but not be limited to) education, seasonal closures, and installation of entrance gates.
1370a	Specific allotment goals and objectives, utilization guidelines, grazing systems or methods, structural and non-structural improvement needs, and specific monitoring methods will be documented in allotment management plans for each allotment. Specific objectives documented

	in allotment management plans will be attainable within a period of 5 to 10 years. Allotment management plans will be updated, revised, or amended on 5 to 10 year increments to ensure they accurately reflect allotment goals and objectives and the method of grazing management being employed on the allotments. Prescribed monitoring will be sufficient to determine if allotment management objectives are being met at a reasonable level. If it is determined through allotment monitoring that objectives are not being achieved, necessary changes in permitted numbers and/or management will then be made. In extreme cases, exclusion of livestock by fencing may be necessary (pg 43).
1370b	Pesticide proposals will be handled through additional environmental analysis and documentation to ensure project objectivity and public safety (pg 43).
1370c	Assure permittee maintenance of existing structural improvements on an annual basis to assure full life of project (pg 43).
1370d	Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species (pg 42).
1371	Rehabilitate Bald Eagle nesting habitat by planting large cottonwood poles on alluvial benches.
1371a	Preserve the free-flowing condition of this river (free-flowing is defined by law as: existing or flowing in a natural condition without impoundment, diversion, straightening, rip-rapping, or other modifications of waterway). Retention of minor structures which existed at the time of designation may be permitted (pg 56, 59)
1371b	Coordinate with Arizona Game & Fish Department on maintenance of viable populations of Razorback suckers and River otters. Study to identify and correct any management conflicts (pg 57).
1371c	Manage suitable rangelands at Level B. Rangeland in less than satisfactory condition will be treated with improved grazing management. Projected changes in range condition acreages: Satisfactory range condition - 0 acres (current) to 615 acres (decade 1); Unsatisfactory - 6,148 acres (current) to 5,533 acres (decade 1) (pg 57).
1371d	Cooperate fully with the State Department of Health Services (Division of Environmental Health), and with the Arizona Water Quality Control Council to reduce or eliminate pollution of the river (pg 57, 60)
1371e	Administer the withdrawal from appropriation under mining laws and from leasing under the mineral leasing laws of all public lands constituting the bed, bank, and also the acreage within one-quarter mile of the bank of this wild river (Verde River) (pg 57)
1371f	No roads will be built in this area (pg 58)
1371g	Construct or reconstruct trails in either former or new locations to prevent resource degradation and provide public safety (pg 58, 60)
1371h	Planning and work for administration and operation of existing trails to prevent resource degradation and provide for public safety and utilization (pg 58)

1371i	Coordinate with Arizona Game & Fish Department on reintroduction of Razorback suckers and River otters. Study to identify and correct any management conflicts (pg 60).
1371j	Manage suitable rangelands at Level B. Rangeland in less than satisfactory condition will be treated with improved grazing management. Projected changes in range condition acreages: Satisfactory range condition - 0 acres (current) to 28 acres (decade 1); unsatisfactory range condition - 544 acres (current) to 526 acres (decade 1) (pg 60).
1372	River-running outfitter/guide activities are restricted to no more than two groups entering this Management Area per day.
1373	No non-indigenous species of animal not now found in this wilderness will be introduced or utilized within it.
1374	Soaps and detergents may not be introduced into sidecreeks.
1375	Minimal range improvements, i.e., boundary and essential interior division fences deemed necessary for Level B management. Rangeland in less than satisfactory condition will be treated with improved grazing management.
1376	Manage suitable rangelands at Level C. Rangeland in less than satisfactory condition will be treated with improved grazing management.
1376a	Integrate habitat needs through prescribed fires within fire suppression objectives (pg 68-1, 140-1, 166)
1376b	Projected changes in range condition acreages: satisfactory range condition - 65,047 (current) to 87,744 acres (decade 1); unsatisfactory range condition - 226,864 acres (current) to 204,167 acres (decade 1) (pg 69)
1376c	O&M of entire trail system to provide for a variety of user experience levels, resource protection, and public safety. Includes trail condition surveys and maintenance plans (pg 70, 121, 126, 136, 143, 148, 159, 168, 170, 197).
1376d	Use prescribed fire to treat vegetation for water yield, forage, and wildlife habitat improvement (pg 71, 136, 143)
1377	Protect and enhance Yuma Clapper Rail habitat. Identify, document, and correct management conflicts with, or other disturbances to, Yuma Clapper Rail or their habitat.
1378	Rehabilitate Bald Eagle nesting habitat by planting large cottonwood poles on alluvial benches.
1379	Assess and study the effects of grazing on the endangered Hedgehog cactus by fencing plots.
1379a	Study and assess the effects of grazing on the endangered hedgehog cactus by fencing plots. Correct management conflicts in hedgehog cactus range (pg 87)
1380	Manage suitable rangelands at Level B, except Goldfield allotment manage at Level A. Rangeland in less than satisfactory condition will

	be treated with improved grazing management.
1381	ORV use prohibited (pg 119, 124, 137, 147, 169, 178).
1382	Manage suitable rangeland at Level A. Level A to be established through fencing. Fencing responsibility to be established in memorandum of understanding with Desert Botanical Garden. Little change in range condition is expected.
1383	Protect and enhance Yuma Clapper Rail habitat. Identify document, and correct management conflicts with or other disturbances to Yuma Clapper Tail or their habitat.
1384	Manage suitable rangeland at Level A for Blue Point Cottonwood Natural Area and Level B for Sycamore Creek Natural Area. Little change in range condition is expected.
1384a	Closely monitor all mineral activity and ensure that notices of intent and Plans of Operation are filed. Determine validity on all claims on which surface disturbing activities are planned. If validity is sustained on claims filed prior to January 1, 1984 or August 28, 1984, as applicable, complete the NEPA process on the plan, ensuring appropriate mitigation and reclamation measures are employed. Closely monitor activities of the approved Plan of Operations, utilizing wilderness ranger and technical assistance (as required) (pg 74).
1384b	Minimal range improvements necessary for Level B management and protection of the forage and soil resources commensurate with wilderness values. Maintain utilization at acceptable levels within key forage producing and wilderness use areas (pg 74).
1385	Process withdrawals for locatable and leasable minerals by 1988. Issue no surface occupancy stipulations for leasing activities.
1385a	Process notices of intent and operation plans as needed (pg 45)
1385b	Protect Forest Service surface rights as needed, including preparation of EA/EIS, title searches, litigation, etc. (pg 45)
1386	Manage the pinyon-juniper type in a sustained yield evenflow basis. Horizontal diversity will be provided by a mix of successional stages within 5,000 acre wildlife management units. Ten percent of the type will be maintained as permanent openings with suitable ground cover for specific site conditions. Powerlines, natural openings or meadows count toward the standard. Where natural openings or powerlines do not meet this standard openings will be created. The scheduling of fuelwood harvest will produce a distribution of successional stages as follows: 1 Permanent openings (2-40 acres) 10 percent 2 Fresh cut areas (0-20 years) 10 percent 3 Immature (20-100 years and 3-6" dbh) 40 percent 4 Mature (100-175+ years and 6-11" dbh) 40 percent
1387	The following cover standard and guidelines will apply in areas where threatened, endangered, and sensitive species habitat requirements do not conflict. Provide a ratio of 60:40 percent forage to cover in pinon-juniper for

	mule deer. Permanent openings, fresh cut areas, and immature stands qualify as forage producing areas (pg 69, 115, 142, 167, 196)
1388	Maintain a minimum of 100 snags per 100 acres. A preferred snag is 12" dbh and 20 feet tall over at least 50 percent of the pinyon-juniper type.
1388a	Manage suitable rangeland at Level B to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management. Satisfactory range condition - 4,382 acres (current) to 6,133 acres (decade 1); unsatisfactory range condition - 35,020 acres (current) to 33,269 acres (decade 1) (pg 120)
1388b	Manage suitable rangeland at Level B to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management. Satisfactory range condition - 943 acres (current) to 1,367 acres (decade 1); unsatisfactory range condition - 8,486 acres (current) to 8,062 acres (decade 1) (pg 125)
1388c	ORV use allowed (except as noted above) unless posted as closed (pg 129)
1388d	Wildlife habitat improvement needs will be integrated into range forage improvement projects identified in approved AMPs. Habitat improvement opportunities will also be integrated with timber management activities (pg 130, 154).
1388e	Manage suitable rangelands at Level D. Rangeland in less than satisfactory condition will be treated with improved grazing management. Projected changes in range condition acreages: satisfactory range condition - 20,886 acres (current) to 33,418 acres (decade 1); unsatisfactory range condition - 83,544 acres (current) to 71,012 acres (decade 1) (pg 131).
1388f	Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production. Methods could include prescribed fire, chemical and/or mechanical means (pg 131)
1389	The oak component of the conifer types and the encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40 percent of the stand. When thinning stands retain large trees contributing the bulk of the mast crop. Manage oak to enhance Band-tailed pigeon and whitetail deer habitat, especially within 1/2 mile of water.
1390	Retain all raptor nest tree groups.
1391	Habitat requirements for threatened, endangered, and sensitive species will take precedence over requirements for other species (131, 155).
1392	The timber harvest schedule will produce a mix of vertical and horizontal structural diversity. Within management units (averaging 5,000 acres) vertical diversity will be provided by: (1) Twenty percent of each unit will have old growth characteristic (age classes 121-240

	years). (2) The twenty percent will be in at least 50 acre stands averaging 12 trees per acre that are more than 20" dbh. (3) The stands will have at least two canopy levels with at least 60 gsl in the lower canopy and an overall basal area of 80 in trees 10" dbh and larger. (4) Within the stands, an average of 10 tons per acre of down woody material in logs greater than 12" in diameter is desirable.
1393	Existing stand conditions will not allow full implementation of this prescription until the first rotation in the regenerated stand. Ten percent of the existing pole stands will be set aside to provide horizontal diversity requirements and will be allowed to develop into the old growth component of the regenerated stand.
1394	Provide a minimum of 180 snags per 100 acres in the Ponderosa pine/mixed conifer type. A preferred snag is at least 15" dbh and 35 feet tall.
1395	Where snags are not present, they will be provided by leaving 2-3 trees from re-generation cuts to become potential snags.
1396	Integrate dwarf mistletoe surveys into stand examinations. Remove infected overstories as soon as regeneration is accomplished. Thin understories to densities which will maximize fiber production, and therefore stand vigor, using yield simulation models as guides. Eradicate infected stands by clear-cutting and regenerate artificially when yield simulation models indicate that they will not reach maturity because of mistletoe
1397	Manage noncommercial species within the pine type to maintain their representation in the vegetative diversity.
1398	Timber sale road systems should be designed to minimize impacts on stream channels and water quality. Roads should be located on slopes less than 60 percent, and should have sustained gradients of less than 8 percent. Roads should not be located on unstable slopes where mass movement is likely to occur (pg 134, 158).
1399	An Interdisciplinary (I.D.) team will evaluate the need for buffer strips adjacent to water bodies within proposed commercial sawtimber sale areas. Where a buffer strip is deemed necessary, the I.D. team will recommend the width of strip needed to achieve adequate protection of aquatic and riparian resources. The width of the buffer strip will depend upon such factors as channel stability, side-slope steepness, erodibility of soils, existing ground cover conditions, and existing aquatic conditions. Logging vehicles will not be allowed to operate within any such designated buffer strips, except at designated crossings (pg 135, 158).
1400	Restrict tractor skidding to those areas that have sustained slopes of 40 percent or less (pg 135).
1401	Skidding and hauling should be restricted to soil moisture conditions which do not cause excessive soil compaction, displacement, or puddling (pg 135, 158).
1402	Slash and debris should be kept out of protected stream channels (pg

	135, 159).
1403	Raise lead end of logs when skidding to minimize gouging. Restrict skidding during wet weather if necessary to prevent watershed damage. Rehabilitate skid trails and landings when logging is completed (provide drainage, repair ruts and gullies, and seed if necessary) (pg 135).
1404	Manage suitable rangeland at Level A. Little change in Range condition will occur during the first decade (PG 137).
1404a	Manage dispersed recreation at low intensity, reduced service level (pg 137)
1404b	Post all boundaries and close road at Fossil Springs (pg 137).
1404c	Manage the East Verde River and Tonto Creek to assure that their river recreation attributes are maintained (pg 139)
1404d	ORV use allowed unless posted as closed (pg 140, 153)
1404e	Projected changes in range condition acreages: satisfactory range condition - 35,859 (current) to 48,874 acres (decade 1); unsatisfactory range condition - 130,154 acres (current) to 117,139 acres (decade 1) (pg 141)
1404f	Manage suitable rangeland at Level B to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management. Projected changes in range condition acreages: satisfactory range condition - 2, 863 acres (current) to 2,969 acres (decade 1); unsatisfactory range condition - 2,124 acres (current) to 2,018 acres (decade 1) (pg 148)
1404g	Manage suitable rangelands at Level D. Rangeland in less than satisfactory condition will be treated with improve grazing management along with the installation of structural and non-structural improvements. Projected changes in range condition acreages: satisfactory range condition - 5,215 acres (current) to 20, 018 acres (decade 1); unsatisfactory range condition - 98,689 acres (current) to 83,886 acres (decade 1) (pg 154)
1405	The oak component of the conifer types and the encinal oak type will be maintained. Oak may be cut to improve spacing and sprouting. Thickets can be cut to thin but retain at least 40 percent of the stand. When thinning stands retain large trees contributing the bulk of the mast crop. Manage oak to enhance Band-tailed pigeon and whitetail deer habitat, especially within 1/2 mile of water.
1406	Retain all raptor nest tree groups.
1407	Where necessary for restocking of Arizona trout, pesticides will be used to remove or control undesirable or competing fish species.
1408	Evaluate need for additional planting of large cottonwood poles to aid in rehabilitating Bald Eagle nesting habitat.
1409	Coordinate with Arizona Game & Fish Department on maintenance of viable populations of Razorback suckers and River otters. Study to identify and correct any management conflicts.

1410	Habitat requirements for threatened, endangered, and sensitive species will take precedence over requirements for other species.
1411	The timber harvest schedule will produce a mix of vertical and horizontal structural diversity. Within management units (averaging 5,000 acres) vertical diversity will be provided by: (1) Twenty percent of each unit will have old growth characteristic (age classes 121-240 years). (2) The twenty percent will be in at least 50 acre stands averaging 12 trees per acre that are more than 20" dbh. (3) The stands will have at least two canopy levels with at least 60 GSL in the lower canopy and an overall Basal area of 80 in trees 10" dbh and larger. (4) Within the stands an average of 10 tons per acre of down woody material in logs greater than 12 inches in diameter is desirable.
1412	Exclude cable logging along the face of the Mogollon Rim (pg 132).
1413	Provide a minimum of 180 snags per 100 acres in the Ponderosa pine/mixed conifer type. A preferred snag is at least 15" dbh and 35 feet tall.
1414	Integrate dwarf mistletoe surveys into stand examinations. Remove infected overstories as soon as regeneration is accomplished. Thin understories to densities which will maximize fiber production, and therefore stand vigor, using yield simulation models as guides. Eradicate infected stands by clearcutting and regenerate artificially when yield simulation models indicate that they will not reach maturity because of mistletoe.
1415	Manage noncommercial species within the pine type to maintain their representation in the vegetative diversity.
1416	Slash and debris should be kept out of protected stream channels.
1417	Raise lead end of logs when skidding to minimize gouging. Restrict skidding during wet weather if necessary to prevent watershed damage. Rehabilitate skid trails and landings when logging is completed (provide drainage, repair ruts and gullies, and seed if necessary).
1418	Manage suitable rangelands at Level A. Little change in range condition is expected during the first decade.
1418a	Manage suitable rangeland at Level D. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements. Projected changes in range condition acreages: satisfactory range condition - 24,593 acres (current) to 27,249 acres (decade 1); unsatisfactory range condition - 146,194 acres (current) to 131,575 acres (decade 1) (pg 166).
1418b	Manage suitable rangeland at Level B to maintain permitted use within forage capacity. Rangeland in less than satisfactory condition will be treated with improved grazing management. Projected changes in range condition acreages: satisfactory range condition - 237 acres (current) to 237 acres (decade 1); unsatisfactory range condition - 0 acres (current) to 0 acres (decade 1) (pg 170)

1418c	Manage suitable rangeland at Level A. Little change is expected in range condition during the first decade (pg 178)
1419	Rehabilitate Bald Eagle nesting habitat by planting large cottonwood poles on alluvial benches.
1420	Manage suitable rangelands at Level C except: Three-Bar Wildlife/Watershed Area Windy Hill Recreation Area Burnt Corral Campgrounds Apache Lake Watershed bounded by Apache Lake on the north, the Tonto Basin District Boundary and SR 88 on the south, and the Roosevelt Allotment Boundary fence on the east side of Davis Wash. That portion of Roosevelt Wildlife Area bounded by Roosevelt Lake on the east, Theodore Roosevelt Dam on the south, SR 188 on the west, and Bumblebee Creek on the north. Manage these at Level A.
1421	A group size limitation of not more than 15 people will be enforced.
1422	Soaps and detergents may not be introduced into sidecreeks.
1422a	ORV use is prohibited unless posted as open (pg 194)
1423	Manage Suitable rangelands at Level D, except South Thompson Mesa manage at Level A unit the area returns to satisfactory productivity. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and non-structural improvements. Projected changes in range condition acreages: satisfactory range condition - 44,664 acres (current) to 67,599 acres (decade 1); unsatisfactory range condition - 229,350 acres (current) to 206,415 acres (decade 1) (pg 195).
1423a	Manage suitable rangelands at Level D. Rangeland in less than satisfactory condition will be treated with improved grazing management along with the installation of structural and nonstructural improvements (pg 68-1, 140-1).
1423b	Manage the chaparral type on a 30 year prescribed fire rotation on those sites managed intensively for forage production and water yield (pg 69, 88, 195).
1423c	Use of approved herbicides on a selective basis where brush encroachment is clearly inhibiting forage production for wildlife and domestic livestock. Possible treatment areas will be identified in Allotment Management Plans and will involve areas of limited size and extent where other management practices (i.e. prescribed burning) cannot be effectively or economically utilized to achieve management objectives or economically utilized to achieve management objectives. Projects of this nature will be subject to environmental assessment and public involvement to insure project objectivity and public safety (pg 69, 88, 141, 166, 195).
1423d	Develop structural improvements in association with Allotment Management Plans (AMP) to maintain utilization at levels appropriate with management intensity and AMP objectives (pg 69, 88, 141, 196).
1423e	Maintenance performed on revegetation acres as determined in Allotment Management Plans to retain optimum forage production. Methods will be appropriate to vegetation and terrain of treatment areas

	and could include prescribed fire, chemical and/or mechanical means (pg 69, 88).
1424	Maintain a minimum of 100 snags per 100 acres. A preferred snag is 12' dbh and 20 feet tall over at least 50 percent of the Pinyon-juniper type.
	1996 Regional Amendment
1425	Provide three levels of habitat management—protected, restricted, and other forest and woodland types to achieve a diversity of habitat conditions across the landscape.
1426	Protected areas include delineated protected activity centers; mixed conifer and pine-oak forests with slopes greater than 40 percent where timber harvest has not occurred in the last 20 years; and reserved lands which include wilderness, research natural areas, wild and scenic rivers, and congressionally recognized wilderness study areas.
1427	Restricted areas include all mixed-conifer, pine-oak, and riparian forests outside of protected areas.
1428	Other forest and woodland types include all ponderosa pine, spruce-fir, woodland, and aspen forests outside protected and restricted areas.
1429	Survey all potential spotted owl areas including protected, restricted, and other forest and woodland types within an analysis area plus the area 1/2 mile beyond the perimeter of the proposed treatment area.
1430	Establish a protected activity center at all Mexican spotted owl sites located during surveys and all management territories established since 1989.
1431	Allow no timber harvest except for fuelwood and fire risk abatement in established protected activity centers. For protected activity centers destroyed by fire, windstorm, or other natural disaster, salvage timber harvest or declassification may be allowed after evaluation on a case-by-case basis in consultation with the US Fish and Wildlife Service.
1432	Allow no timber harvest except for fire risk abatement in mixed conifer and pine-oak forests on slopes greater than 40 percent where timber harvest has not occurred in the last 20 years.
1433	Limit human activity in protected activity centers during the breeding season. Breeding season is March 1 to August 31..
1434	In protected and restricted areas, when activities conducted in conformance with these standards and guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with the US Fish and Wildlife Service to resolve the conflict.
1435	Monitor changes in owl populations and habitat needed for delisting.
1436	Conduct surveys following Region 3 survey protocol.
1437	Road or trail building in protected activity centers should be avoided but may be permitted on a case-by-case basis for pressing management reasons.
1438	Generally allow continuation of the level of recreation activities that

	was occurring prior to listing.
1439	Require bird guides to apply for and obtain a special use permit. A condition of the permit shall be that they obtain a subpermit under the U.S. Fish and Wildlife Service Master endangered species permit. The permit should stipulate the sites, dates, number of visits and maximum group size permissible.
1440	Harvest fuelwood when it can be done in such a way that effects on the owl are minimized. Manage within the following limitations to minimize effects on the owl: *Retain key forest species such as oak; *Retain key habitat components such as snags and large downed logs; *Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below.
1441	Harvest fuelwood when it can be done in such a way that effects on the owl are minimized. Manage within the following limitations to minimize effects on the owl:
1442	Retain key forest species such as oak.
1443	Retain key habitat components such as snags and large downed logs.
1444	Harvest conifers less than 9 inches in diameter only within those protected activity centers treated to abate fire risk as described below.
1445	Treat fuel accumulations to abate fire risk:
1446	Select for treatment 10 percent of the protected activity centers where nest sites are known in each recovery unit having high fire risk conditions. Also select another 10 percent of the protected activity centers where nest sites are known as a paired sample to serve as control areas.
1447	Designate a 100-acre "no treatment" area around the known nest site of each selected protected activity center. Habitat in the no treatment area should be as similar as possible in structure and composition as that found in the activity center.
1448	Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel treatment and prescribed fire to abate fire risk in the remainder of the selected protected activity center outside the 100-acre "no treatment" area.
1449	Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar.
1450	Select and treat additional protected activity centers in 10 percent increments if monitoring of the initial sample shows there were no negative impacts or there were negative impacts which can be mitigated by modifying treatment methods.
1451	Use light prescribed burns in nonselected protected activity centers on a case-by-case basis. Burning should avoid a 100-acre "no treatment" area around the activity center. Large woody debris, snags, clumps of broad-leafed woody vegetation should be retained and hardwood trees larger than 10 inches diameter at the root collar.

1452	Pre- and post-treatment monitoring should be conducted in all protected activity centers treated for fire risk abatement (See monitoring guidelines).
1453	Steep Slopes (Mixed conifer and pine-oak forests outside protected activity centers with slopes greater than 40 percent that have not been logged within the past 20 years): No seasonal restrictions apply.
1454	Treat fuel accumulations to abate fire risk:
1455	Use combinations of thinning trees less than 9 inches in diameter, mechanical fuel removal, and prescribed fire.
1456	Retain woody debris larger than 12 inches in diameter, snags, clumps of broad-leafed woody vegetation, and hardwood trees larger than 10 inches in diameter at the root collar.
1457	Pre- and post-treatment monitoring should occur within all steep slopes treated for fire risk abatement (See monitoring guidelines).
1458	Reserved Lands (Wilderness, Research Natural Areas, Wild and Scenic Rivers, and Congressionally Recognized Wilderness Study Areas): Allow prescribed fire where appropriate.
1459	Mixed Conifer and Pine-oak Forests (See glossary definition): Manage to ensure a sustained level of owl nest/roost habitat well distributed across the landscape. Create replacement owl nest/roost habitat where appropriate while providing a diversity of stand conditions across the landscape to ensure habitat for a diversity of prey species.
1460	The following table displays the minimum percentage of restricted area which should be managed to have nest/roost characteristics. The minimum mixed conifer restricted area includes 10 percent at 170 basal area and an additional amount of area at 150 basal area. The additional area of 150 basal area is +10 percent in BR-E and +15 percent in all other recovery units. The variables are for stand averages and are minimum threshold values and must be met simultaneously. In project design, no stands simultaneously meeting or exceeding the minimum threshold values should be reduced below the threshold values unless a district-wide or larger landscape analysis of restricted areas shows that there is a surplus of restricted area acres simultaneously meeting the threshold values. Management should be designed to create minimum threshold conditions on project areas where there is a deficit of stands simultaneously meeting minimum threshold conditions unless the district-wide or larger landscape analysis shows there is a surplus.
1461	Attempt to mimic natural disturbance patterns by incorporating natural variation, such as irregular tree spacing and various patch sizes, into management prescriptions.
1462	Maintain all species of native trees in the landscape including early seral species.
1463	Allow natural canopy gap processes to occur, thus producing horizontal variation in stand structure.
1464	Emphasize uneven-aged management systems. However, both even-

	aged and uneven-aged systems may be used where appropriate to provide variation in existing stand structure and species diversity. Existing stand conditions will determine which system is appropriate.
1465	Extend rotation ages for even-aged stands to greater than 200 years. Silvicultural prescriptions should explicitly state when vegetative manipulation will cease until rotation age is reached.
1466	Save all trees greater than 24 inches dbh.
1467	In pine-oak forests, retain existing large oaks and promote growth of additional large oaks.
1468	Encourage prescribed and prescribed natural fire to reduce hazardous fuel accumulation. Thinning from below may be desirable or necessary before burning to reduce ladder fuels and the risk of crown fire.
1469	Retain substantive amounts of key habitat components:
1470	Snags 18 inches in diameter and larger.
1471	Down logs over 12 inches midpoint diameter.
1472	Hardwoods for retention, recruitment, and replacement of large hardwoods.
1473	Riparian Areas: Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.
1474	Domestic Livestock Grazing: Implement forest plan forage utilization standards and guidelines to maintain owl prey availability, maintain potential for beneficial fire while inhibiting potential destructive fire, maintain and restore riparian ecosystems, and promote development of owl habitat. Strive to attain good to excellent range conditions.
1475	Old Growth: Except where otherwise noted, implement forest plan old growth standards and guidelines to maintain and promote development of owl habitat.
1476	Apply ecosystem approaches to manage for landscape diversity mimicking natural disturbance patterns, incorporating natural variation in stand conditions and retaining special features such as snags and large trees, utilizing appropriate fires, and retention of existing old growth in accordance with forest plan old growth standards and guidelines.
1477	Basin and Range - West: Emphasize restoration of lowland riparian habitats.
1478	Management activities necessary to implement the Mt. Graham red squirrel recovery plan, which may conflict with standards and guidelines for Mexican spotted owl, will take precedence and will be exempt from the conflicting Mexican spotted owl standards and guidelines.
1479	Basin and Range - East: Emphasize restoration of lowland riparian

	habitats.
1480	Management activities necessary to implement the Sacramento Mountain thistle recovery plan, which may conflict with standards and guidelines for Mexican spotted owl, will take precedence and will be exempt from the conflicting Mexican spotted owl standards and guidelines.
1481	Monitoring and evaluation should be collaboratively planned and coordinated with involvement from each national forest, U.S. Fish and Wildlife Service Ecological Services Field Office, U.S. Fish and Wildlife Service Regional Office, USDA Forest Service Regional Office, Rocky Mountain Research Station, recovery team, and recovery unit working groups.
1482	Population monitoring should be a collaborative effort with participation of all appropriate resource agencies.
1483	Habitat monitoring of gross habitat changes should be a collaborative effort of all appropriate resource agencies.
1484	Habitat monitoring of treatment effects (pre- and post-treatment) should be done by the agency conducting the treatment.
1485	Rangewide: Track gross changes in acres of owl habitat resulting from natural and human caused disturbances. Acreage changes in vegetation composition, structure, and density should be tracked, evaluated, and reported. Remote sensing techniques should provide an adequate level of accuracy.
1486	In protected and restricted areas where silvicultural or fire abatement treatments are planned, monitor treated stands pre- and post-treatment to determine changes and trajectories in fuel levels; snag basal areas; live tree basal areas; volume of down logs over 12 inches in diameter; and basal area of hardwood trees over 10 inches in diameter at the root crown.
1487	Establish, and delineate on a map, a post-fledgling family area that includes 6 nesting areas per pair of nesting goshawks for known nest sites, old nest sites, areas where historical data indicates goshawks have nested there in the past, and where goshawks have been repeatedly sighted over a 2 year or greater time period but no nest sites have been located. Manage for uneven-age stand conditions for live trees and retain live reserve trees, snags, downed logs, and woody debris levels through out woodland, ponderosa pine, mixed conifer and spruce-fir forest cover types. Manage for old age trees such that as much old forest structure as possible is sustained over time across the landscape. Sustain a mosaic of vegetation densities (overstory and understory), age classes and species composition across the landscape. Provide foods and cover for goshawk prey.
1488	Manage the ground surface layer to maintain satisfactory soil conditions i.e., to minimize soil compaction; and to maintain hydrologic and nutrient cycles.
1489	When activities conducted in conformance with these standards and

	guidelines may adversely affect other threatened, endangered, or sensitive species or may conflict with other established recovery plans or conservation agreements; consult with US Fish and Wildlife Service to resolve the conflict.
1490	Emphasize maintenance and restoration of healthy riparian ecosystems through conformance with forest plan riparian standards and guidelines. Management strategies should restore degraded riparian areas to good condition as soon as possible. Damage to riparian vegetation, stream banks, and channels should be prevented.
1491	General: The distribution of vegetation structural stages for ponderosa pine, mixed conifer and spruce-fir forests is 10 percent grass/forb/shrub (VSS 1), 10 percent seedling-sapling (VSS 2), 20 percent young forest (VSS 3), 20 percent mid-aged forest (VSS 4), 20 percent mature forest (VSS 5), 20 percent old forest (VSS 6). NOTE: The specified percentages are a guide and actual percentages are expected to vary + or - up to 3 percent.
1492	The distribution of VSS, tree density, and tree age are a product of site quality in the ecosystem management area. Use site quality to guide in the distribution of VSS, tree density and tree ages. Use site quality to identify and manage dispersal PFA and nest habitat at 2 to 2.5 mile spacing across the landscape.
1493	Snags are 18" or larger dbh and 30 feet or larger in height, downed logs are 12 inches in diameter and at least 8 feet long, woody debris is 3 inches or larger on the forest floor, canopy cover is measured with vertical crown projection on average across the landscape.
1494	The order of preferred treatment for woody debris is: 1) prescribed burning, 2) lopping & scattering, 3) hand piling or machine grapple piling, and 4) dozer piling.
1495	Canopy Cover: Canopy cover guidelines apply only to mid-aged to old forest structural stages (VSS 4, VSS 5, and VSS 6) and not to grass/forb/shrub to young forest structural stages (VSS 1, VSS 2, and VSS 3).
1496	Spruce-Fir: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60 percent and 2/3 40 percent, mature forest (VSS 5) should average 60+ percent, and old forest (VSS 6) should average 60+ percent. Maximum opening size is 1 acre with a maximum width of 125 feet. Provide two groups of reserve trees per acre with 6 trees per group when opening size exceeds 0.5. Leave at least 3 snags, 5 downed logs, and 10-15 tons of woody debris per acre.
1497	Mixed Conifer: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60+ percent and 2/3 40+ percent, mature forest
1498	(VSS 5) should average 50+ percent, and old forest (VSS 6) should average 60+ percent. Maximum opening size is up to 4 acres with a maximum width of up to 200 feet. Retain one group of reserve trees per acre of 3-5 trees per group for openings greater than 1 acre in size. Leave at least 3 snags, 5 downed logs, and 10-15 tons of woody debris

	per acre.
1499	Ponderosa Pine: Canopy cover for mid-aged forest (VSS 4) should average 40+ percent, mature forest (VSS 5) should average 40+ percent, and old forest (VSS 6) should average 40+ percent. Opening size is up to 4 acres with a maximum width of up to 200 feet. One group of reserve trees, 3-5 trees per group, will be left if the opening is greater than an acre in size. Leave at least 2 snags per acre, 3 downed logs per acre, and 5-7 tons of woody debris per acre.
1500	Woodland: Manage for uneven age conditions to sustain a mosaic of vegetation densities (overstory and understory), age classes, and species composition well distributed across the landscape. Provide for reserve trees, snags, and down woody debris.
1501	General: Provide for a healthy sustainable forest environment for the post-fledgling family needs of goshawks. The principle difference between “within the post-fledgling family area” and “outside the post-fledgling family area” is the higher canopy cover within the post-fledgling family area and smaller opening size within the post-fledgling family area. Vegetative structural stage distribution and structural conditions are the same within and outside the post-fledgling family area.
1502	Spruce-Fir: Canopy cover for mid-aged forest (VSS 4) should average 60+ percent and for mature (VSS 5) and old forest (VSS 6) should average 70+ percent.
1503	Mixed Conifer: Canopy cover for mid-aged (VSS 4) to old forest (VSS 6) should average 60+ percent.
1504	Ponderosa Pine: Canopy cover for mid-aged forest (VSS 4) should average 1/3 60+ percent and 2/3 50+ percent. Mature (VSS 5) and old forest (VSS 6) should average 50+ percent.
1505	Woodland: Maintain existing canopy cover levels.
1506	Spruce-fir, Mixed Conifer and Ponderosa Pine Cover Types: The nesting area contains only mature to old forest (VSS 5 & 6) having a canopy cover (measured vertically) between 50-70 percent with mid-aged VSS 6 trees 200-300 years old. Non-uniform spacing of trees and clumpiness is desirable.
1507	Woodland: Maintain existing canopy cover levels.
1508	Low intensity ground fires are allowed at any time in all forested cover types, but high intensity crown fires are not acceptable in the post-fledgling family area or nest areas. Avoid burning the entire home range of a goshawk pair in a single year. For fires planned in the occupied nest area, a fire management plan should be prepared. The fire management plan should minimize the risk of goshawk abandonment while low intensity ground fire burns in the nesting area. Prescribed fire within nesting areas should be planned to move with prevailing winds away from the nest tree to minimize smoke and risk of crown fire developing and driving the adults off or consuming the nest tree.

1509	Manage road densities at the lowest level possible. Where timber harvesting has been prescribed to achieve desired forest condition, use small skid trails in lieu of roads.
1510	Forage use by grazing ungulates will be maintained at or above a condition which assures recovery and continued existence of threatened and endangered species
1511	Identify key ungulate forage monitoring areas. These key areas will normally be 1/4 to 1 mile from water, located on productive soils on level to intermediate slopes, and be readily accessible for grazing. Size of the key forage monitoring areas could be 20 to 500 acres. In some situations such as high mountain meadows with perennial streams, key areas may be closer than 1/4 mile from water and less than 20 acres. Within key forage monitoring areas, select appropriate key species to monitor average allowable use.
1512	In consultation with the US Fish and Wildlife Service, develop site-specific forage use levels. In the event that site-specific information is not available, average key species forage utilization in key forage monitoring areas by domestic livestock and wildlife should not exceed levels in the above table during the forage growing season.
1513	The above table is based on composition and climatic conditions typical of sites below the Mogollon Rim. On sites with higher precipitation and vegetation similar to sites above the Mogollon Rim, allowable use for ranges in poor to excellent condition under deferment or rest strategies may be increased by 5 percent. The guidelines established in the above table are applicable only during the growing season for the identified key species within key areas. Allowable use for key forage species during the dormant season is not covered in the above table. These guidelines are to be applied in the absence of more specific guidelines currently established through site specific NEPA analysis for individual allotments.
1514	Guidelines for allowable use for specific allotment(s) management or for grazing strategies not covered in the above table will vary on a site-specific basis when determined through the Integrated Resource Management (IRM) process.
1515	Allowable use guidelines may be adjusted through the land management planning revision or amendment process. Guidelines established through this process to meet specific ecosystem objectives, will also employ the key species and key area concept and will be monitored in this manner.
1516	Until the forest plan is revised, allocate no less than 20 percent of each forested ecosystem management area to old growth as depicted in the table on page 96.
1517	Forested sites should meet or exceed the structural attributes to be considered old growth in the five primary forest cover types in the southwest as depicted in the table on page 96

Appendix D (see attached CD)

**U.S. Fish and Wildlife Service Rankings of
U.S. Forest Service LRMP Standards and Guidelines**