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Status of Federally Listed Threatened and Endangered Species at Los Alamos National Laboratory

Prepared by: Charles D. Hathcock, David C. Keller, Brent E. Thompson, and
Marjorie A. Wright
Environmental Protection Division, Resources Management Team at
Los Alamos National Laboratory.

Prepared for: U.S. Department of Energy, National Nuclear Security Administration,
Los Alamos Field Office

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ACRONYMS

AEI	Area of Environmental Interest
Bd	Batrachochytrium dendrobatidis
DOE	U.S. Department of Energy
ESA	Endangered Species Act
GPS	Global Positioning System
HMP	Threatened and Endangered Species Habitat Management Plan
JMS	Jemez Mountains Salamander
LANL	Los Alamos National Laboratory
LANS	Los Alamos National Security, LLC
NMDGF	New Mexico Department of Game and Fish
NNSA	National Nuclear Security Administration
USFWS	U.S. Fish and Wildlife Service

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INTRODUCTION

Los Alamos National Security, LLC (LANS) biologists at Los Alamos National Laboratory (LANL) completed surveys in 2015 for three species protected under the Endangered Species Act (ESA). These surveys follow the required survey protocols for each species and were performed by permitted biologists.

HABITAT MANAGEMENT PLAN

ESA compliance at LANL is achieved through the implementation of the LANL Threatened and Endangered Species Habitat Management Plan (HMP; LANL 2014). This plan is a formal agreement between the U.S. Department of Energy (DOE)/National Nuclear Security Administration (NNSA) and the U.S. Fish and Wildlife Service (USFWS) for the management of endangered species and their habitats at LANL. Actions and activities approved in the HMP were reviewed by the USFWS and do not require further consultations. Projects that cannot follow the HMP requirements must go through separate section 7 consultations. The controls for ESA compliance are incorporated into an internal project review process through which all LANL projects are reviewed for environmental compliance.

COMPLIANCE ACTIONS

Three biological assessments were completed in 2015 for actions not covered in the HMP. DOE/NNSA consulted with the USFWS to incorporate two newly-listed species into the HMP (LANL 2015a; Consultation # 02ENNM00-2015-I-0538). The USFWS determined the addition of the species and their associated work controls may affect, but were not likely to adversely affect, either species. DOE/NNSA also consulted with the USFWS on the development of a bike path/trail through the length of Los Alamos Canyon and opening up the canyon for year-round public access (LANL 2015b; Consultation # 02NNM00-2015-I-0281). USFWS determined the proposed activity may effect, but was not likely to adversely affect, the two newly-listed species. The final consultation considered the decommissioning and removal of infrastructure at the Fenton Hill facility (LANL 2015c). As of November 2015 this consultation is not yet complete.

SPECIES INTRODUCTION

The LANL HMP includes federally protected species under the ESA that occur on or near LANL property. The HMP requires surveys to be conducted either annually or as needed depending on the species.

Mexican Spotted Owl

General Biology

Mexican Spotted Owls (*Strix occidentalis lucida*) are one of only a few owls in the United States with dark eyes. Features include a pale gray-chestnut brown color with white and brown spots on the abdomen, back, and head, the tails are brown with thin white bands, and the ears lack tufts. Young owls less than five months old have a downy appearance. Females are larger than males (USFWS 2012a).

The Mexican Spotted Owl is found in northern Arizona, southeastern Utah, southwestern Colorado, New Mexico, west Texas, and into Mexico. It is the only subspecies of Spotted Owl recognized in New Mexico (USFWS 2012a). The Mexican Spotted Owl generally inhabits mixed conifer and ponderosa pine-gambel oak forests in mountains and canyons. Characteristics of Mexican Spotted Owl habitat include high canopy closure, high stand diversity, multi-layered canopy resulting from an uneven-aged stand, large mature trees, downed logs, snags, and stand decadence, as indicated by the presence of mistletoe (*Phoradendron* Nutt.). Some Spotted Owls have been found in second-growth forests, i.e., younger forests that have been logged; however, these areas were found to contain characteristics typical of old-growth forests. No Spotted Owls were found in forests less than 36 years of age (USFWS 2012a). Mexican Spotted Owls in the Jemez Mountains seem to prefer cliff faces in canyons for their nest sites (Johnson and Johnson 1985). The young leave the nest at 32 to 36 days old to perch on surrounding branches, and can fly short distances at 40 to 45 days. Survival rate for the young is low. The recovery plan for the Mexican Spotted Owl recommends that mixed conifer and pine-oak woodland types on slopes greater than 40 percent be protected for the conservation of this owl (USFWS 2012a). Although seasonal movements vary among owls, adults commonly remain within their summer home ranges throughout the year.

Under the HMP, Mexican Spotted Owl habitat was modeled at LANL based on a combination of topographical features and macro-level vegetation classifications. Areas defined as suitable Mexican Spotted Owl habitat were delineated into Areas of Environmental Interest (AEIs) during the development of the HMP in 1998. However, personnel at LANL developed a Mexican Spotted Owl habitat model that incorporates a finer scale of vegetation characteristics into the current model (Hathcock and Haarmann 2008). A version of this model was used to redelineate the AEIs at LANL and the proposed changes received concurrence from the USFWS in 2005 (LANL 2005). The current Mexican Spotted Owl AEI inventory consists of five AEIs spanning seven canyons at LANL.

Conservation History and Current Status

On December 30, 1982, a USFWS status review of vertebrate taxa led to the consideration of adding the Mexican or “Southern” Spotted Owl to the ESA list of threatened or endangered species (USFWS 1982). On November 3, 1991, the USFWS proposed listing the Mexican Spotted Owl as a threatened species under the ESA (USFWS 1991). The Mexican Spotted Owl was listed as a threatened species under the ESA on March 16, 1993 (USFWS 1993). Critical habitat was

established on August 31, 2004 (USFWS 2004). The first recovery plan for the Mexican Spotted Owl was approved in 1995 (USFWS 1995a). The plan was updated in 2012 (USFWS 2012a).

Survey Methods

There are three primary calling techniques that can be used to survey for the Mexican Spotted Owl. The choice of calling technique is based on the best way to cover all suitable habitats. The three calling methods are point, continuous, and leapfrog technique. LANS biologists use the point method survey technique.

In the point method survey technique, an electronic recording of an owl call is played using a FOXPRO Game Caller at a fixed point. The observer spends at least 15 minutes at a point and alternates between playing the recording of the owl and listening for a response. In canyon habitat, surveyors spend a minimum of 20 minutes at each station. The primary four-note location call of the Mexican Spotted Owl is the major call played during surveys. Points are approximately 0.5 mi (0.8 km) apart and cover all suitable habitats.

Surveys are conducted annually in all Mexican Spotted Owl AEI core areas on LANL property. Four surveys are conducted in each AEI between April 1 and August 31 of any given year unless a Mexican Spotted Owl is found. No more than one survey is conducted in March of any given year. A minimum of two surveys are completed before July 1 of any given year. Surveys are at least five days apart. Surveys are initiated either before sunrise or the two hours after sunset. Field surveys are not conducted during existing or predicted wind >15 mph (>24.1 km) or during stormy weather. Surveys are not conducted when there are access problems due to snow or poor road conditions.

History of Results

Surveys for Mexican Spotted Owls have been conducted on LANL property since 1994. In 1995 a pair of Mexican Spotted Owls and their nest was located in Cañon de Valle. The nesting territory was occupied from 1995 through 2011, and young have fledged in multiple years. In 2004, 2005, and 2006, a territory in Mortandad Canyon was occupied by at least one Mexican Spotted Owl. This area was re-occupied in 2013 and continues to be occupied to date with a pair of owls. In 2007, LANS biologists located a pair of Mexican Spotted Owls and their nest in Three-mile Canyon. This site has been occupied each year since and young have fledged in multiple years. A history of the Mexican Spotted Owl survey results since surveys began in 1994 is detailed in Table 1.

Table 1. Mexican Spotted Owl Survey Results at LANL

Year	Cañon de Valle	Water Canyon	Three-mile Canyon	Pajarito Canyon	Mortandad Canyon	Sandia Canyon	Los Alamos Canyon
1993	—	—	—	N	—	—	—
1994	—	—	—	—	—	—	N
1995	P+(2)	N	N	N	—	—	N
1996	P+(2)	N	N	N	—	—	N

Year	Cañon de Valle	Water Canyon	Three-mile Canyon	Pajarito Canyon	Mortandad Canyon	Sandia Canyon	Los Alamos Canyon
1997	P	N	—	—	—	—	N
1998	P+(2)	N	—	—	N	N	N
1999	P+(2)	N	N	N	N	N	N
2000	P	N	N	N	N	N	N
2001	P	N	N	N	N	N	N
2002	P	N	N	N	N	N	N
2003	P	N	N	N	N	N	N
2004	P	N	N	N	P*	N	N
2005	P+(3)	N	N	N	P*	N	N
2006	P	N	N	N	P*	N	N
2007	P	N	P+(3)	N	N	N	N
2008	P	N	P	N	N	N	N
2009	P+(2)	N	P+(1)	N	N	N	N
2010	P	N	P	N	N	N	N
2011	P	N	P	N	N	N	N
2012	N	N	P+(1)	N	N	N	N
2013	N	N	P+	N	P+	N	N
2014	N	N	P	N	P	N	N
2015	N	N	P+(4)	N	P+(3)	N	N

— = No data; N = Negative survey; P = Positive survey; + = Breeding confirmed (# of young seen); * = A single owl;

Jemez Mountains Salamander

General Biology

The Jemez Mountains salamander (JMS; *Plethodon neomexicanus*) is one of two species of plethodontid (lungless) salamanders endemic to New Mexico. The JMS can be found in the Jemez Mountains in north-central New Mexico in Los Alamos, Rio Arriba, and Sandoval counties (Stebbins and Riemer 1950). The JMS occurs predominantly at elevations between 6,988 to 11,254 ft (2,130 to 3,430 m) in mixed-conifer forest, consisting primarily of Douglas fir (*Pseudotsuga menziesii* Mirb.), blue spruce (*Picea pungens* Engelm.), Engelmann spruce (*Picea Engelmannii* Parry), white fir (*Abies concolor* Gord.), limber pine (*Pinus flexilis* E. James), ponderosa pine (*Pinus ponderosa* Douglas), Rocky Mountain maple (*Acer glabrum* Torr.), and aspen (*Populus tremuloides* Michx.) (Degenhardt et al. 1996). Although pure stands of ponderosa pine may not be considered ideal habitat, the species has occasionally been found in this habitat. The species has also occasionally been found in spruce-fir and aspen stands, and high-elevation meadows.

The JMS spends most of its life underground but can be found at the surface when conditions are warm and wet, typically from July through September; but occasional salamander observations have been made in May, June, and October (USFWS 2013a). When on the surface, the species usually is found under decaying logs, rocks, bark or moss mats, or inside decaying logs or stumps. The salamander is strictly terrestrial and does not use standing surface water for any life stage. Respiration occurs through the skin, which requires a moist microclimate for gas exchange. The JMS is uniformly grayish dark brown above (dorsally), with occasional gold stippling and sooty gray below (ventrally). The salamander is slender and elongate, and it possesses foot webbing and a reduced fifth toe. The average JMS is approximately 3.2 in. (82 mm) total length. The JMS eats invertebrates including ants, mites, and beetles and is thought to lay its eggs underground (USFWS 2013b).

Conservation History and Current Status

The JMS was listed in New Mexico as endangered under the Wildlife Conservation Act of New Mexico in 2006 (NMDGF 2006). In September 2012, the USFWS proposed the JMS as endangered under the ESA (USFWS 2012b). The final listing of the JMS as endangered under the ESA was issued September 10, 2013 (USFWS 2013c). On November 20, 2013, the USFWS issued the designation of critical habitat for the Jemez Mountains salamander (USFWS 2013b).

Survey Methods

The survey techniques for the JMS were developed jointly between the New Mexico Department of Game and Fish (NMDGF) and the USFWS. Federal and state permits are required prior to conducting surveys. The JMS Visual Encounter Surveys consist of three-person hour surveys or until first detection of the species. A moisture assessment of the survey area is required prior to all surveys in order to determine if conditions are suitable for salamander surface activity. Current weather, soil moisture, soil pH, and soil temperature data is collected before the salamander survey begins. Once conditions are determined to be suitable for a salamander survey, the three-person hour survey begins. One individual is the center point and lead for the survey and responsible for tracking time; the remaining surveyors are spaced approximately 30 ft apart in a line. Global Positioning System (GPS) coordinates for the initial survey point, midpoint, and conclusion of the area surveyed are collected. While surveying within a new area for salamanders, the surveyors always leave one log intact for each log destroyed and only destroy 50 percent of any log in order to minimize habitat disturbance. If a salamander is found, it is immediately placed into a plastic bag with a small amount of water. Morphological measurements and microhabitat data (cover object type and size, soil temperature, soil pH, and current weather conditions) are recorded. All salamanders are swabbed on their ventral side for disease sampling. GPS coordinates are collected at the salamander location and the survey is complete. The NMDGF and USFWS recommend repeat salamander surveys should be conducted at least twice within a survey season. During repeat salamander surveys, the surveyors leave two logs intact for each log destroyed and only destroy 50 percent of any log in order to minimize habitat disturbance. To prevent inadvertent movement of disease or parasitic organisms among sites, field equipment and boots are cleaned and disinfected following the disinfection protocols provided by the USFWS.

History of Results

Prior to being listed as endangered under the ESA in 2013, there were two documented JMS locations at LANL. Surveys were conducted in 1985 and began again in 2007. The salamander was documented in Los Alamos Canyon, east of the Omega Bridge by Romotnik (1986) and west of the bridge by Hathcock (LANL 2008). In 2014, JMS surveys were conducted in Los Alamos Canyon, Cañon de Valle, and Fenton Hill; no salamanders were detected. In 2015, JMS surveys were conducted in Los Alamos Canyon, Two-mile Canyon, and near the Fenton Hill facility; two salamanders were found in Los Alamos Canyon. A history of JMS survey results are detailed in Table 2.

Table 2. Jemez Mountains Salamander Survey Results at LANL

Year	Los Alamos Canyon	Pajarito Canyon	Two-mile Canyon	Canon de Valle	Fenton Hill
1985	P	—	N	N	N
2008	P	—	—	—	—
2009	—	—	—	—	—
2010	—	—	N	—	—
2011	—	—	—	—	—
2012	—	—	—	—	N
2013	—	—	—	—	N
2014	N	—	—	N	—
2015	P	N	N	—	N

P = Positive survey; — = No survey; N = Negative survey

Disease

One of the factors in the federal listing (USFWS 2013a) was risk to the JMS from disease. The amphibian pathogenic fungus *Batrachochytrium dendrobatidis* (Bd) was found in a JMS in 2003 (Cummer et al. 2005) on the east side of the species' range and again in another JMS in 2010 on the west side of the species' range (USFWS 2013a). LANS biologists have proactively been monitoring for Bd since 2007. In 2008, 2010, and 2015 a total of five JMS were swabbed for Bd and test results from Pisces Molecular, LLC laboratory were negative. An additional 40 amphibians have been swabbed since 2007 and all were negative for Bd. In a separate study in 2015, 10 larval stage (neotenic adult and juvenile) Tiger Salamanders (*Ambystoma tigrinum*) were collected. They were anesthetized and euthanized. Swab samples were taken on the outer dermis and also on all mouth parts to examine whether larval stage Tiger Salamanders had enough keratin in their outer dermis to be able to detect Bd compared to keratinized mouth parts. All 20 swabs were negative for Bd, more study is needed. Tissue samples were also collected from all 10 Tiger Salamanders and were tested for ranavirus, another amphibian pathogen; these were also negative.

Southwestern Willow Flycatcher

General Biology

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is a small migratory bird about 6 in. (15 cm) long with gray-green back and wings, white throat, gray-olive breast, and pale-yellow belly. It also has two obvious pale wing-bars, but lacks the conspicuous pale eye-ring of many similar *Empidonax* species. While perched, the Southwestern Willow Flycatcher characteristically flicks its tail slightly upward. It is best identified by vocalizations. The primary song, consisting of *fitz-bew*, can be interspersed with *britt* notes (USFWS 2002). The Southwestern Willow Flycatcher is found in close association with dense stands of willows (*Salix* L.), arrowweed (*Pluchea* spp.), buttonbush (*Cephalanthus occidentalis* L.), tamarisk, Russian olive (*Elaeagnus angustifolia* L.), and other riparian vegetation, often with a scattered overstory of cottonwood (USFWS 2002). The size of vegetation patches or habitat mosaics used by Southwestern Willow Flycatchers varies considerably and ranges from as small as 2 ac (0.8 ha) to several hundred acres. The Southwestern Willow Flycatcher nests in thickets of trees and shrubs approximately 6.5 to 50 ft (2 to 15 m) tall, with a high percentage of canopy cover and dense foliage from 0 to 13 ft (0 to 4 m) above ground. Regardless of the plant species composition or height, occupied sites always have dense vegetation in the patch interior (Sogge et al. 2010).

Conservation History and Current Status

The Southwestern Willow Flycatcher was given a status review and possible listing as an endangered or threatened species on September 1, 1992 (USFWS 1992). It was proposed due to serious population declines, historical and present habitat destruction, and inadequate regulatory protections. It was given full protection under the ESA as endangered on February 27, 1995 (USFWS 1995b). It also received revisions to critical habitat on January 3, 2013 (USFWS 2013c). The Southwestern Willow Flycatcher is known to have breeding territories in all states of its historical range, except Texas. However, its continued existence is in jeopardy due to continued riparian habitat reduction, degradation, and elimination caused by land and water management actions associated with agricultural and urban development. Other threats include predation, cowbird brood parasitism, and naturally occurring fires and floods that have become more frequent and intense as a result of the proliferation of exotic vegetation and degraded watersheds (USFWS 2002).

Survey Methods

The survey methods for documenting the presence/absence of Southwestern Willow Flycatchers rely on broadcast call-playback technique. An electronic recording of a Willow Flycatcher is played to elicit a response from a territorial bird, thereby increasing the detectability of a resident bird. Surveys should be initiated in the pre-dawn hours and continue until all suitable habitat has been covered, or until environmental factors or adverse anthropogenic sources hinder a full and adequate survey being conducted. There are a differing number of visits for general surveys versus project-related surveys, with a minimum of one survey within each of the three survey periods for general surveys. For project-related surveys, one survey within the first survey period must be conducted and the second and third survey periods must have two surveys conducted. Surveys must

be conducted with at least five days between surveys. Survey periods are as follows: Survey Period 1 occurs May 15–31, Survey Period 2 occurs June 1–24, and Survey Period 3 occurs June 25–July 17.

History of Results

In 2015 LANS biologists conducted surveys within Sandia Wetlands and the Pajarito Wetlands following a linear transect, due to each of these wetland complexes being in early successional stages. However, a breeding season Monitoring Avian Productivity and Survivorship-banding station operated in the Sandia Wetlands captured multiple Willow Flycatchers (subspecies unknown) during the spring migration period. All subsequent presence/absence surveys were negative in 2015. In 2016, biologists plan to survey the stretch of potential habitat along the Rio Grande that lies on LANL’s eastern boundary. A history of Southwestern Willow Flycatcher survey results are detailed in Table 3.

Table 3. Southwestern Willow Flycatcher Survey Results at LANL

Year	Pajarito Canyon	Sandia Canyon	Buckman Crossing
1995	N	—	N
1996	N	—	—
1997	P	—	P
1998	P	—	P
1999	N	—	N
2000	N	—	—
2001	N	—	—
2002	N	—	—
2003	N	—	—
2004	N	—	—
2005	P	—	—
2006	N	—	—
2007	N	—	—
2008	N	—	—
2009	N	—	—
2010	P	—	—
2011	P	—	—
2012	N*	—	—
2013	N	—	—
2014	N	—	—
2015	N	N*	—

N = Negative survey; — = No data; P = Positive survey; * = Caught but not detected during formal survey

Yellow-billed Cuckoo

General Biology

The Yellow-billed Cuckoo (*Coccyzus americanus*) is a neo-tropical migrant bird with a mostly yellow bill, brownish back, rufous wings, and all white underneath. In flight and when perched, large white spots and edging to tail feathers are prominent. The Yellow-billed Cuckoo is a riparian obligate species; therefore, they nest almost exclusively in low-mid elevation riparian/riverine habitat dominated by a cottonwood-willow matrix (Halterman et al. 2015). They are a late spring migrant, and therefore have one of the shortest nesting phases of any bird species. The cuckoo tends to time breeding with locally abundant food supplies (Hughes 2015).

Conservation History and Current Status

The Yellow-billed Cuckoo was noted as declining in California as early as 1944 (Grinnell and Miller 1944). The Yellow-billed Cuckoo was first posted to the Federal Register for review of possible listing as an endangered or threatened species on December 30, 1982 (USFWS 1982). On October 3, 2013, the USFWS proposed listing the Western Distinct Population Segment of the Yellow-billed Cuckoo as threatened. Following multiple public comment periods and a proposal to designate critical habitat for the Yellow-billed Cuckoo, the USFWS designated it as a threatened species within the western United States, Canada, and Mexico (USFWS 2014a). The species is no longer thought to breed in western Canada or the northwestern continental United States areas of Washington, Oregon, and Montana (USFWS 2014a).

Survey Methods

Surveys are conducted by permitted biologists along the Rio Grande on LANL's eastern boundary, following a continuous linear transect with a broadcast call-playback technique. A minimum of one survey per survey period must be conducted with no fewer than 12 days and no more than 15 days between surveys in survey periods 1 and 3: Survey Period 1 occurs June 15–July 1 and Survey Period 3 occurs July 31–August 15. A minimum of two surveys must be conducted in survey period #2 (July 1–July 31). The surveys start at first light and continue until all points or suitable habitat have been covered. Special attention should be made to complete the survey route before 11:00 in the morning, since activity levels decrease significantly after this time (Halterman et al. 2015). The survey protocol should consist of five contact calls, (e.g., kowlp) spaced one minute apart with an initial minute of listening for calls when arriving at survey points. Survey points should be approximately 328 ft (100 m) apart. However, if a cuckoo is identified at a survey point, the researcher should move at least 984 ft (300 m) away so an individual is not recounted.

History of Results

To date there have been no surveys completed within LANL-boundaries. There is only one account of a Yellow-billed Cuckoo within the section of the Rio Grande within the LANL boundary (BISON-M 2015).

New Mexico Meadow Jumping Mouse

General Biology

The New Mexico Meadow Jumping Mouse (*Zapus hudsonius luteus*) is endemic to the states of New Mexico, Arizona, and portions of southern Colorado (Hafner et al. 1981). The jumping mouse is grayish-brown on the back, yellowish-brown on the sides, and white underneath. The species is about 7 to 10 in. (187 to 255 mm) in total length with elongated feet and an extremely long, bicolored tail. It nests in dry soils, but uses moist, streamside, and dense riparian/wetland vegetation up to elevations of about 8,000 ft (2,438 m) (Frey 2006). The meadow jumping mouse appears to only utilize riparian community types that consist of persistent, emergent herbaceous wetlands (i.e., beaked sedge and reed canarygrass alliances) and scrub-shrub wetlands (i.e., riparian areas along perennial streams composed of willows and alders) (Frey 2005). The jumping mouse is generally nocturnal, but occasionally diurnal. It is active only during the growing season of the grasses and forbs on which it depends. During the growing season, the jumping mouse accumulates fat reserves by consuming seeds and insects to sustain it through hibernation.

Conservation History and Current Status

The USFWS first proposed adding the jumping mouse as a threatened or endangered animal on September 18, 1985 (USFWS 1985). The meadow jumping mouse was given protection under the ESA as an endangered species on July 10, 2014, with a final determination of critical habitat forthcoming (USFWS 2014b).

Survey Methods

There are no formal survey methods approved by the USFWS at the time of this report.

History of Results

There are no records of the meadow jumping mouse from within the LANL boundary or Los Alamos County (BISON-M 2015, LANL 2009).

Black Footed Ferret

Basic Biology

The Black-footed ferret (*Mustela nigripes*) is a medium-sized *mustelid* (a member of the weasel family) typically weighing 1.4 to 2.5 lbs and measuring 19 to 24 in. (48 to 60 cm) in total length, including a 5- to 6-in. tail. It has a black face mask and a black-tipped tail. Its short, sleek fur is a beige-buff color, lighter on the belly and nearly white on the forehead, muzzle, and throat. Black-footed ferrets have short legs with large front paws and claws developed for digging. The ferret's large ears and eyes suggest it has acute hearing and sight, but smell may be its most important sense for hunting prey underground in the dark. Its large skull and strong jaw and teeth are adapted for eating meat (USFWS 2013d). Black-footed ferrets are highly specialized predators dependent upon prairie dogs (*Cynomys* spp.) for survival. Prairie dogs make up more than 90 percent of the diet (USFWS 2013d). Prairie dog burrows provide suitable dens to raise young as

well as escape predators and harsh weather. The mating season is March through April. Gestation time is 41 to 43 days and kits are born May through June. Litter sizes are typically three to five kits.

Conservation History and Current Status

The species was listed as endangered on March 11, 1967 (USFWS 1967), across its entire range. The species was thought twice to be extinct; a remnant population in Wyoming was found and the remaining 18 individuals were captured and used to establish a captive-breeding and reintroduction program. A recovery plan was first established for the species in 1978 and revised most recently in 2013 (USFWS 2013d). Reintroduction efforts have been initiated in 24 locations within Arizona, Colorado, Kansas, Montana, New Mexico, South Dakota, Utah, Wyoming, Canada, and Mexico. However, the USFWS completed a five-year review of Black-footed ferret recovery efforts in November 2008 and found that the species remains one of the most endangered mammals in the United States and continues to warrant endangered status.

Survey Methods

A Black-tailed Prairie Dog (*Cynomys ludovicianus*) town or complex of less than 80 ac (32 ha) with no neighboring prairie dog towns may be developed or treated without a ferret survey. A neighboring prairie dog town is defined as less than 7 km (4.34 mi) distance from the nearest edge of the town being affected by a project. Black-tailed prairie dog towns or complexes greater than 80 ac (32 ha) but less than 1,000 ac (404 ha) may be cleared after a survey for Black-footed ferrets is completed provided that no ferrets or ferret sign are found. A White-tailed Prairie Dog (*Cynomys leucurus*) town or complex of less than 200 ac (81 ha) with no neighboring prairie dog towns may be cleared without a ferret survey. White-tailed prairie dog towns or complexes greater than 200 ac (81 ha) but less than 1,000 ac (404 ha) may be cleared after completion of a survey for Black-footed ferrets provided that no ferrets or ferret sign are found during the survey. The USFWS recommends that surveys for Black-footed ferrets be conducted as close to the initiation of a project construction date as possible but not more than one year before the start of a proposed action. Two methods to survey for Black-footed ferrets or ferret sign are approved and either method can be used. These methods are based upon the most recent survey research data, and both involve specific time periods. Research has shown a marked decrease in ferret activity and/or sign in November, April, May, and June. For this reason, surveys for ferrets during these months are not recommended since no acceptable confidence can be placed on the results of surveys conducted during this period. Diurnal (daylight) surveys for ferrets are recommended if surveys are conducted between December 1 and March 31. This type of survey is used to locate signs left by ferrets. During winter months, ferret scats, prairie dog skulls, and diggings are more abundant because prairie dogs are less active and less likely to disturb or destroy ferret sign. When there is snow cover, both ferret tracks and fresh diggings are more obvious and detectable.

Daylight searches for ferret sign should meet the following criteria to fulfill the minimum standards of these guidelines.

- Three searches must be made on each prairie dog town. Each search should be done when fresh snow has been present for at least 24 hours and after 10 or more days have passed between each search period.
- Vehicles driven at less than 5 mph may be used to search for tracks or ferret diggings, but complete visual inspections of each part of the prairie dog town being surveyed is required (i.e., visually overlapping transects).
- If ferret sign is observed, photograph the sign and make drawings and measurements of diggings before contacting the USFWS office.

Nighttime surveys involve the use of spotlighting techniques for locating ferrets. This survey method is designed to locate ferrets when the maximum population and the longest periods of ferret activity are expected to occur. Listed below are the minimum standards to conduct nighttime surveys.

- Surveys should be conducted between July 1 and October 31.
- The prairie dog town should be continuously surveyed using spotlights. Surveys should begin at dusk and continue until dawn on each of at least three consecutive nights. Large prairie dog colonies should be divided into tracts of 320 ac (129 ha) and each tract systematically searched throughout three consecutive nights. Rough uneven terrain and tall dense vegetation may require smaller tracts for effective coverage of a town.
- Observations on each prairie dog town or tract searched should begin at a different starting point on each successive night to maximize the chance of overlapping the Black-footed ferrets' nighttime activity period(s).
- A survey crew consists of one vehicle and two observers equipped with two 200,000 to 300,000 candle power spotlights. If the terrain is not suitable for vehicles, a crew will consist of two individuals working on foot with battery-powered 200,000 to 300,000 candle power spotlights. To estimate the number of crew nights for a survey, divide the total area (acres) of prairie dog town to be surveyed by 320 ac (129 ha) and multiply by three. One or both of the observers in each survey crew should be a biologist trained in ferret search techniques.

History of Results

There have been no reported sightings of Black-footed ferrets in the Los Alamos County area since at least 1934 (Frey and Yates 1996), when the last known ferret was documented in New Mexico. Between 1909 and 1934 there were reported sightings in the Los Alamos area (Hubbard et al. 1979). No large prairie dog towns have been observed on LANL property.

FUTURE RECOMMENDATIONS

This report will become an annual series and updated with survey results and important information regarding federally listed threatened or endangered species at LANL. In 2016, LANS biologists will initiate Yellow-billed Cuckoo surveys along the Rio Grande on LANL's eastern border.

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