Goodding EA

Environmental Assessment
Goodding Research Natural Area (Extension)

Coronado National Forest
Nogales Ranger District
Santa Cruz County, Arizona

Proposed Action

The proposed action is to extend the existing Goodding RNA. The extension was identified as a "proposed" Research Natural Area (RNA) in the Land and Resource Management Plan (Forest Plan) for the Coronado National Forest. It will be managed according to the direction provided in the Forest Plan (Management Areas 8 and 8A). The proposed action, formal designation of the extension as an RNA by the Chief of the Forest Service, will amend the Forest Plan.

Purpose and Need for Action

The purpose of extending the Goodding RNA is to contribute to a series of RNA's designated to "illustrate adequately or typify for research or education purposes, the important forest and range types in each forest region, as well as other plant communities that have special or unique characteristics of scientific interest and importance" (36 CFR 251.23). Goodding RNA was established in 1970 to protect an area that has a very high level of biological diversity. An evaluation by the Regional RNA Committee, pursuant to direction in Forest Service Manual (FSM) 4063.04b, identified that establishment of the RNA was needed to protect the rare plants and animals that occur in this unique canyon. Extending the Goodding RNA provides long-term protection for these species, including Dalea tentaculoides, a USFWS Category 1 plant that occurs only in this canyon, as well as other species such as Phaseolus supinus also Category 1, and the threatened Sonoran chub, Gilia ditaenia.

The extension of the Goodding RNA was identified in the Forest Plan as a "proposed" RNA based on the location of several rare plant and animal populations that are found only in Goodding RNA/Sycamore Canyon. Comments received from interested and affected members of the public supported extending the existing RNA. Site conditions and public concerns have been reviewed; no important changes have occurred.

Conditions and environmental effects of designation are the same as described in the EIS for the Forest Plan. Site specific conditions and effects are as follows:

-The majority of the Goodding RNA is within the Pajarito Wilderness and grazing has been eliminated in the area since 1986. There will be no change to this mangement.

-The Goodding Research Natural Area is in the process of being withdrawn from mineral entry.

-Recreation use is light and limited to existing trails.

Designation of alternate RNA's for protection of this type was considered during Forest Plan development. The extension of the Goodding/Sycamore Canyon RNA was determined at that time to provide the most appropriate site for inclusion in the national network for protection of the biological diversity that occurs in the area.

Alternatives and Environmental Consequences

Alternative A, Proposed Action

Alternative A would extend the Goodding RNA, comprising 1670 acres (676 hectares). This alternative will provide long-term protection for the area. Management of the area will limit recreation use to non-motorized dispersed recreation at a low intensity and reduced service level, and no harvest of forest products (including fuelwood) will be allowed. Wildfires outside the area that endanger the area will be extinguished in an appropriate manner, as will person-caused fires within the area. Unplanned ignitions within the area will receive appropriate suppression action. Use restrictions will be imposed as necessary to keep areas in their natural or unmodified condition (Forest Plan). Goodding RNA is in the process of being withdrawn from mineral entry.

The environmental consequences of Alternative A are described in the EIS for the Coronado Forest Plan. There are no adverse or irreversible environmental effects. Irretrievable effects result from resource outputs either reduced or lost as a result of special area designation. There are no significant cumulative effects of establishing the RNA.

Alternative B, No Action

This alternative continues management according to direction in the Forest Plan for the "proposed" extension. Only short-term protection of the area, dependent on the life of the Forest Plan, will be provided. Management of the area will be the same as in Alternative A. Management emphasis is to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep the area in an unmodified or natural condition.

The environmental consequences of Alternative B, the "No Action" alternative are as described in the EIS for the Coronado Forest Plan. No adverse or irreversible environmental effects are anticipated. Irretrievable effects result from resource outputs either reduced or lost as a result of special area designation.

Agencies and Persons Consulted

In the process of updating information to determine whether or not conditions had changed since adoption of the Forest Plan, several groups and individuals who may have additional information regarding the extension of Goodding RNA were contacted. Representatives from the national office of The Nature Conservancy, the Arizona Chapter of The Nature Conservancy, Arizona Heritage Program, Arizona Game and Fish Department, and Arizona Cattle Growers groups. Documentation of the contacts made and summaries of the comments are attached to this Environmental Assessment.

Supplemental Public Contacts

During the months of August-September 1993, the following groups, agencies, and individuals were contacted, by phone, regarding the establishment of the Canelo Research Natural Area. No negative comments regarding the establishment of this RNA were received. Phone contacts were made by Emilia Parra, Forest Botanist on the Coronado National Forest.

Arizona Chapter of Nature Conservancy - Andy Laurenzi, Peter Warren
Tucson Audubon Society - Doug Koppinger
Arizona State Parks, Natural Areas Association Committee - Jean Tripiano

MESSAGE SCAN FOR REGGIE A. FLETCHER

To RNA

From: REGGIE A. FLETCHER
Postmark: Apr 01,93 8:41 AM Delivered: Apr 01,93 8:41 AM
Status: Certified Confidential Previously read Urgent
Subject: Forwarded:

Comments:
From: REGGIE A. FLETCHER:R03A
Date: Apr 01,93 8:41 AM
Enclosed is a summary of contacts Gerald Henke made with the livestock industry on our submitting the draft RNA establishment reports to the Chief for his signature. While it is not spelled out in the summary, Gerald informs me that none of the persons contacted voiced objections to proceeding with those RNA's in the Forest Plans in either state. For new RNA's we will need to contact these individuals once again and if boundaries are changed to any degree we will need to do likewise. Please consider these contacts as adequate for public involvement for these individuals and the organizations they represent. This should be placed in the project file for all of the draft ER's covered by Forest Plans as of this date and for which we are doing public involvement.
Reggie Fletcher, Regional Ecologist April, 1, 1993

Previous comments:
From: GERALD HENKE
Date: Mar 31,93 2:48 PM
names added

----------X----------

RESEARCH NATURAL AREAS'S

Discussions have occured within the past two months with the Arizona Cattle Growers' Association (C.B. Lane) and individuals that attended the annual meeting of the New Mexico Range Improvement Task Force concerning those identified Research Natural Areas in Forest Land and Resource Management Plans in Region 3. Discussions focused around the present National Forest public involvement process and that those identified Research Natural Areas in Forest Plans would be forwarded to the Chief's for inclusion into the National Research Natural Areas system. One such discussion with the Arizona Cattle Growers occured by phone on March 30, 1993 while the conversation with the New Mexico Range Improvement Task Force (John Fowler, Jim Knight, Kirk McDaniel, Karl Wood, Dean John Owens) and attendees (David Kincade, Bill Ball, Stearling Carter, Ray Margo, Linden Parker) of that meeting occured on February 18, 1993.

MESSAGE SCAN FOR REGGIE A. FLETCHER

To RNA

From: REGGIE A. FLETCHER
Postmark: Apr 02,93 11:29 AM Delivered: Apr 02,93 11:31 AM
Status: Confidential
Subject: supplemental public input

Comments:
The enclosed is provided for those conducting public involvement on the RNA's for the NEPA step to use if needed. If used, please place in the project file. Thanks. Reggie

-------========X========-------

As supplementary material to public involvement on formalizing the proposed Research Natural Areas which are contained in current Forest Land and Resource Management Plans through signature of the Chief of the Forest Service, the following record is provided. On August 13-14, 1992, John Humke, representing the national office of The Nature Conservancy; Dan Campbell, Peter Warren and Mark Heitlinger, representing the Arizona Chapter of The Nature Conservancy; Fenton Kay representing the Arizona Heritage Program, Arizona Game and Fish Department; Rick Johnson and Bill Waldman representing the New Mexico chapter of The Nature Conservancy and the New Mexico Natural Heritage Program met with Larry Henson, Regional Forester, Forrest Carpenter, Deputy Regional Forester, Teresa Prendusi, Regional Botanist, Art Briggs, Director Land Management Planning and Reggie Fletcher, Regional Ecologist.

Among the topics discussed was the pursuit of the formalization of the Region's proposed Research Natural Areas. The Nature Conservancy and Heritage Program officials urged the Region's representatives to pursue whatever means necessary to satisfy the new RNA establishment report requirements in order to obtain the Chief's signature. The representatives also encouraged continued investigation into the possibility of locating additional suitable RNA's and securing their establishment.

Reggie Fletcher
Regional Ecologist

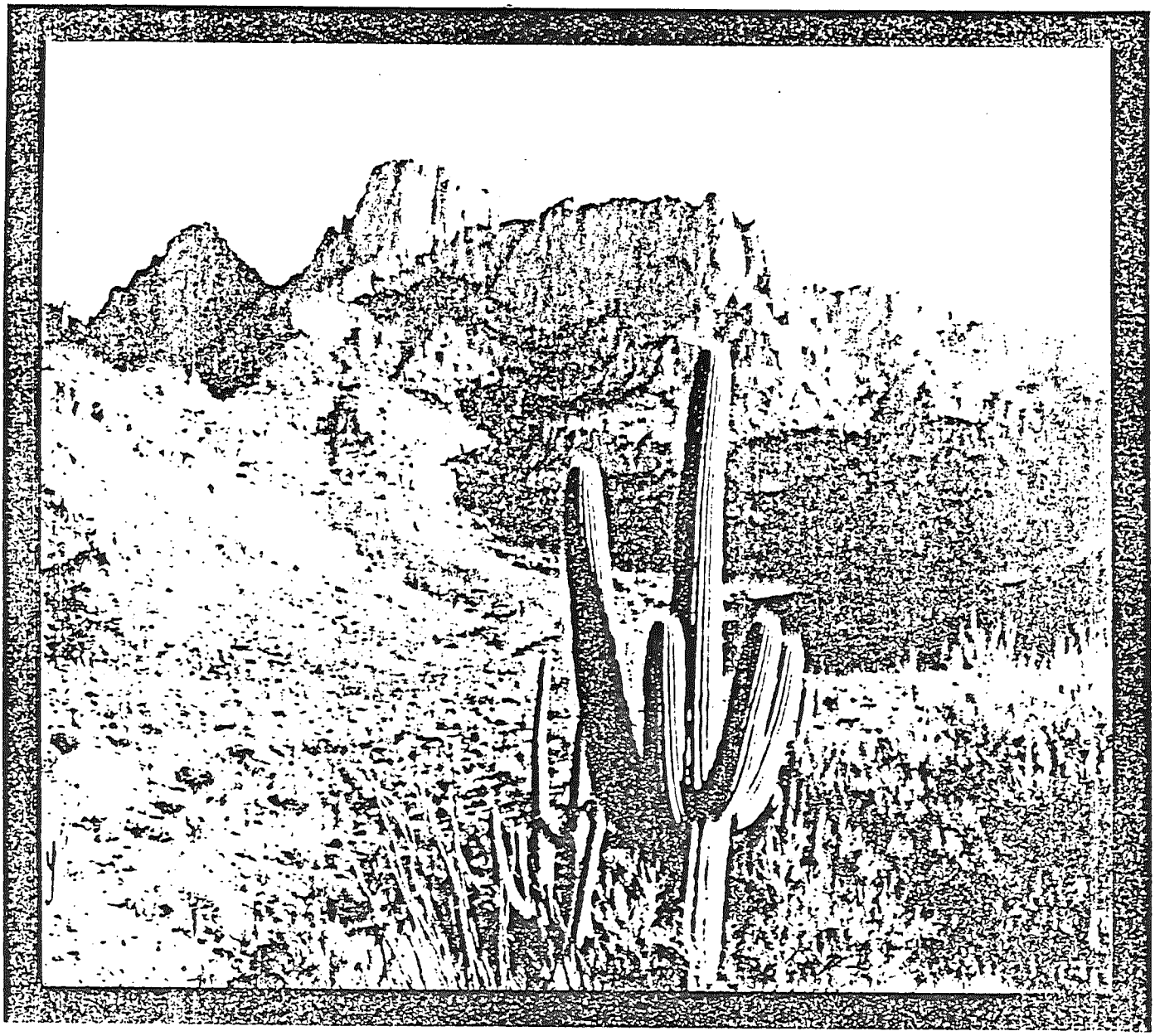
United States
Department of
Agriculture

**Forest
Service**

Southwestern
Region

July 1986

Coronado National Forest Plan



MANAGEMENT AREA 8

Management Emphasis and Intensity: Manage to provide opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their climax state. There will be no harvest of forest products including fuelwood.

Management Area Description: Includes those lands that have been determined to be suitable for designation as research natural areas. Includes the following areas:

Existing RNA	Acres
Butterfly	1000
Goudy Canyon*	370
Elgin	290
Goodding (North End)*	7

New RNA Proposal	Acres
Canelo	350
Goodding (North Extension)*	153

Other	Acres
Research Ranch	1635

* Remainder in Wilderness (MA8A)

The Research Ranch will not be designated as an official research natural area but will be managed under a memorandum of understanding to meet similar objectives except some vegetative manipulation will be allowed for research projects.

Capability Area Types: 6P, 6P/H, 6H/M, 6M, 9CH/M, and 11AR.
Total acres = 3805.

Specific Standards and Guidelines

Timber Suitability: All Acres Unsuitable.

Management Practices	Activities	Standards and Guidelines
Dispersed Recreation O&M (DU 1)	A14, A15 L23	1. Maintain 50% of trails at level 2 and 50% at level 3. See Appendix E for a definition of levels. 2. Motor vehicles are not permitted in research natural areas. Within the Research Ranch, use of motorized vehicles is permitted only on designated roads and trails. Some trails may be closed to use by motor vehicles for safety reasons, to eliminate conflicting uses or to further protect resources. 3. Attempt to maintain semiprimitive nonmotorized opportunities that exist within the Research Ranch. If any existing roads are determined to be unneeded, close them to create more opportunities for primitive or semiprimitive nonmotorized experience. 4. Manage dispersed use at less than standard.
Visual Resource Management (DU 2)	A03	Manage the following acres at the indicated Visual Quality Objectives: 2,170 Acres Retention 57% (RNAs) 1,635 Acres Partial Retention 43% (Research Ranch)
Wildlife & Fish O&M (DU 10)	C01, C02 C12	Specific standards and guidelines for management of wildlife are shown in the Forest-wide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives:

MANAGEMENT AREA 8 (Continued)

Management Practices	Activities	Standards and Guidelines
		1. Maintain or improve occupied habitat for federally and state listed animals.
		2. Maintain or improve current populations of endangered and threatened plants.
T&E Plant Habitat Improvement (DU 12) Fish Habitat Improvement (DU 13) Game Habitat Improvement (DU 14) Nongame Habitat Improvement (DU 15)	C03, C04 C05	Nonstructural habitat improvement projects will be based on guidelines in the Forest-wide prescription. They are intended to meet the following objectives: 1. Delist threatened and endangered species following guidelines of approved recovery plans and memorandums of understanding.
Range Management O&M (DU 16)	D02	1. Manage rangeland at level A (no livestock). Management excludes livestock grazing to protect other values or eliminate conflicts with other uses.
Watershed Maintenance & Improvement (DU 33, 34)	F03, F05	1. Watershed treatment is a low priority in this management area. If treatment is appropriate, activities are described in Appendix D.
		2. These areas will be monitored for watershed condition trends as relic areas.
Minerals Management (DU 36)	G07	1. There will be no removal of mineral materials.
		2. Maintain withdrawals from mineral entry for all areas.
		3. Recommend withdrawals from mineral entry for new areas.
		4. No surface occupancy for leasable minerals.
Road Maintenance (DU 48)	L19	1. Bring existing roads that are to be retained on the system to a maintenance standard which is suitable for the planned use and provides for safety and resource protection. Maintain roads to maintenance level 2. See Appendix E for a definition of levels.
		2. Close, drain, and revegetate roads that are determined to be unneeded for further use.
Fire Management (DU 56)	P08, P09	1. The management area is divided into fire suppression zones 1 and 2 based on objectives for resource protection and cost of suppression. See Section 5 for definition of zones.
		2. Use prescribed fire to reduce risk and to permit lightning to more nearly play its natural role.
Insect & Disease Management		1. Outbreaks of insects or disease will not be controlled, except where there is a clear and imminent danger to timber of other values outside the research natural area.

MANAGEMENT AREA 8A

Management Emphasis and Intensity: Manage for wilderness values and uses while providing opportunities for nondisruptive research and education. Use restrictions will be imposed as necessary to keep areas in their climax state. There will be no harvest of forest products including fuelwood.

Management Area Description: Includes those lands that have been determined to be suitable for both wilderness designation and designation as research natural areas. Includes the following areas:

Existing RNA	Acres
Pole Bridge	460
Santa Catalina (reduced)	890
Goodding*	538
Goudy Canyon*	190

New RNA Proposal	Acres
Goodding extension: South	1470
North*	47
Pole Bridge extension	90

* Remainder is outside Wilderness (MA8)

The Santa Catalina RNA will be reduced from 4131 acres to 890 acres. This will give a more manageable size while maintaining viable populations of targeted species.

Pole Bridge RNA is enlarged to include a more representative example of Chihuahua pine. The Goodding RNA is enlarged to include additional examples of Southwestern vegetative types as well as rare and threatened or endangered species.

Capability Area Types: 6H/M, 6M, 9AH/M, and 11AR.
Total acres = 3685

Specific Management Prescription

Timber Suitability: All Acres Unsuitable

Management Practices	Activities	Standards and Guidelines
Visual Resource Management (DU 2)	A03	Manage the following acres at the indicated Visual Quality Objectives: 3,685 Acres Preservation 100%
Wilderness Recreation O&M (DU 8)	B02, B03	1. Maintain trails to level 1 and level 3. See Appendix E for a definition of levels. 2. Use of motorized vehicles is prohibited except as approved for emergency or other special needs. 3. Manage wilderness use at less than standard. 4. Maintain existing ROS class composition.
Wildlife & Fish O&M (DU 10)	C01, C02 C12	Specific standards and guidelines for management of wildlife are shown in the Forest-wide prescription for activities appropriate to this Management Area. They are intended to meet the following objectives: 1. Maintain or improve occupied habitat for federally and state listed animals. 2. Maintain or improve current populations of endangered and threatened plants.

MANAGEMENT AREA 8A (Continued)

Management Practices	Activities	Standards and Guidelines
T&E Plant Habitat Improvement (DU 12)	C03, C04 C05	Nonstructural habitat improvement projects will be based on guidelines in the Forest-wide prescription. They are intended to meet the following objective:
Fish Habitat Improvement (DU 13)		1. Delist threatened and endangered species following guidelines of approved recovery plans and memorandums of understanding.
Game Habitat Improvement (DU 14)		
Nongame Habitat Improvement		
Range Management O&M (DU 16)	D02	1. Manage rangeland at level A (no livestock). Management excludes livestock grazing to protect other values or eliminate conflicts with other uses.
Watershed Maintenance & Improvement (DU 33, 34)	F03, F05 K04	1. Watershed treatment is a low priority in this management area. If treatment is appropriate, activity selection criteria is described in Appendix D.
		2. Monitor these areas for watershed condition trends as relic areas.
Minerals Management (DU 36)	G07	1. There will be no removal of mineral materials. Mineral withdrawals will be unnecessary because the segregative effect of wilderness designation exceeds that of a withdrawal.
Fire Management (DU 56)	P08, P09	1. The management area is in fire suppression zones one and two based on objectives for resource protection. See Section 5 for definition of zones.
		2. Use prescribed fire to reduce risk and to permit lightning to more nearly play its natural role.
Insect & Disease Management		1. Outbreaks of insects or disease will not be controlled, except where there is a clear and imminent danger to timber or other values outside the research natural area.

Natural Areas Report

Vol. 5, No. 1 Winter 1993

Northwest Natural Areas News and Information Exchange

Washington DNR Breaks New Ground in Prairie Restoration

THE BISQUIT-AND-SWALE topography at the Mima Mounds Natural Area Preserve was once covered by a native prairie environment maintained by periodic fire. The Washington Department of Natural Resources (DNR) acquired the 445-acre preserve in western Washington in the mid-1970s, but even then the mima prairie was changing rapidly.

For nearly a century, the Mima Mounds have been part of a landscape where wildfires were systematically extinguished. Fire suppression has forced the conversion of parts of the open prairie into closed, coniferous forest dominated by Douglas-fir. Scotch broom, a weedy shrub, has invaded all parts of the prairie. The combined effects of forest encroachment and weed invasion have resulted in a preserve-wide deterioration of historic ecological conditions. In September, 1992, DNR scientists and managers began an ambitious ten-year program to restore the Mima prairie.

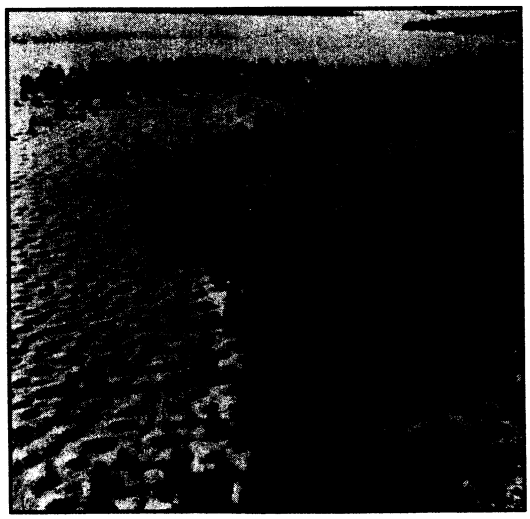
Research preceded restoration, and provided the project with measurable, ecological objectives. From studies of fire history, vegetation, and soils, the location and extent of the historic prairie was established. Three hundred acres that had been dominated by grasses and prairie herbs at the turn of the century were selected for restoration.

A five year pilot research project was begun in 1985 to determine the most effective method to control Scotch broom while minimizing impacts to native vegetation and soils. Another pilot project compared fire effects and vegetation response to summer and fall burning, at two- and three- year intervals.

The restoration plan was guided by a state-and-transition model developed to illustrate the management steps required to convert the current, degraded plant communities to desired conditions compatible with the stated ecological objectives for the preserve.

Recognizing that natural area management always takes place in the context of a larger social landscape, the DNR actively solicited participation in planning from neighbors, special interest groups, the academic community, and other agencies. This extra effort yielded a much greater general understanding and support for the prairie restoration, and specifically for the importance of using prescribed burning as an ecological management tool.

Very generally, the objectives of the ten-year restoration project are to significantly reduce the dominance of Scotch broom and to remove Douglas-fir from the former prairie environment. The first phase of this project, begun in September with a 200-acre prescribed burn, achieved a 98% top kill of Scotch broom.



Early forest encroachment at Mima Mounds

Preliminary studies had shown fall burning inflicted less damage to native grasses and lichens. Subsequent reburns are planned at two-year intervals to reduce the Scotch broom population. Once the woody species are dramatically reduced in abundance, a fire plan will be developed which will vary fire return intervals and locations of burns. It is expected that this fire regime will maintain the prairie, and also may more closely mimic the burning employed by native Americans prior to European settlement.

Restoration will continue this winter with removal of all Douglas-fir by helicopter. Some of these trees are 125 feet tall and three feet in diameter. Helicopter logging was found to be the least environmentally damaging technique for removal.

Seeds of native grasses and herbs will be collected and propogated in a nursery for transplanting in the newly cleared meadow.

If the Mima prairie restoration succeeds, it is due in large measure to good planning. This restoration project has been guided from the start by measurable ecological objectives and by a model used to reach those goals. Public support was solicited before field work began. We expect that all future natural area management actions of this magnitude will continue to benefit from this level of planning.

If you would like to discuss this project further, contact Reid Schuller, Natural Area Preserve Program, Department of Natural Resources, PO Box 47046, Olympia, WA 98504-7046; or call (206) 902-1679.

Reid Schuller
Natural Area Scientist
Washington DNR

Field Notes

For two days in December amid holiday hoopla, **Washington DNR 's Natural Area Preserve Program** gathered a group of staff and representatives from a variety of agencies, academia, and volunteer groups to assist with the program's long-term strategic planning. The effort was prompted by recent enormous growth in the program's land base coupled with less than commensurate growth in the program's budget. Approximately 35 participants reviewed the program's strengths, weaknesses, opportunities, and threats in order to refine its goals and objectives and to write a meaningful plan. The NAP program is now left to word-smith all the ideas into a document of mission and planning. For more information, contact Michael Perez-Gibson, Natural Areas Section Manager, (206) 902-1653.

South Slough National Estuarine Research Reserve completed its tidelands inventory this fall. This inventory includes mudflats, estuarine channels, salt marshes, subtidal and intertidal eelgrass, and shorebirds. The inventory located three occurances of saltmarsh bird's-beak (*Cordylanthus maritimus*), a state listed endangered plant; the site will be designated as a state Natural Heritage Conservation Area.

The second phase of the inventory at South Slough will involve freshwater riparian areas, streams, and wetlands. A riparian summit was held this past summer to assess the proposed inventory protocol. The summit gave its blessing, and the 70-page document is now available from Steve Rumrill, South Slough NERR, PO Box 5417, Charleston, OR 97420.

The Washington Natural Heritage Program has hired its first ever staff zoologist. Sandy Andelman comes from the University of Washington where she was teaching at the Institute for Environmental Studies and researching western pond turtles. Sandy looks forward to working closely with the Washington Department of Wildlife, getting more Heritage information into their database and designing more preserves to protect wildlife. She also will be providing inventory and management recommendations for wildlife protection related to the DNR's Natural Resource Conservation Areas program.

Gene conservation is the focus of a new group of agency and private geneticists from around the Forest Service Region 6. The group is investigating ways in which all types of natural areas and set-aside lands can be used to protect genetic populations of trees. (Other kinds of plants will be added to the investigation in the future.) In particular, they are interested in protecting the ability of a set of target species to adapt and evolve over a long period. The genetics group is interested in working on lands within the Pacific Northwest Natural Area program, and the Natural Area committee, in turn, is interested in criteria the group might develop for directing future aquisition and establishment of natural areas.

For more information, contact Sheila Martinson, Forest Service geneticist for Region 6, (503) 326-2988.

Forest Service RNA Coordinators Gather in Tucson

THE FOREST SERVICE National RNA coordinators recently met in sunny Tucson, Arizona to complete their strategic plan for RNAs. Most of the time was spent far from the sun (see Peter Warren's article describing our joyful escape to the great outdoors!) hammering out new directions and activities for the RNA program nationally. We spent the usual amount of time agonizing over the correct vision/mission statements, and then made progress on six strategic imperatives and set goals to meet these imperatives. They are:

- integration of natural area programs (RNAs, SIAs, Wildernesses, Wild and Scenic Rivers, etc.);
- ecosystem management;
- RNA administrative efficiency;
- RNA management, research, and monitoring;
- education and publicity;
- expand research in RNAs while maintaining their ecological integrity

The plan is currently in review throughout the Forest Service. We hope to publish it in an upcoming issue of the *Natural Areas Report*.

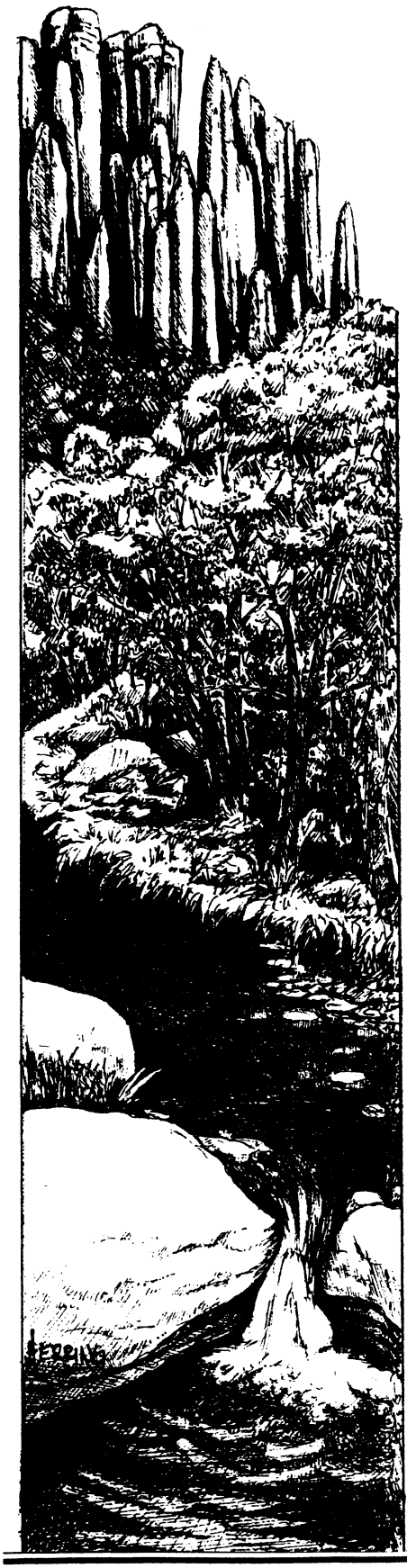
Other issues discussed at the meeting included NEPA regulations, mining and withdrawl of mineral entry, standardizing data gathering and management, placement of RNA boundaries on maps, and revision of the Forest Service manual direction for RNAs. Adoption of the strategic plan will give direction to many of these issues.

The group plans to meet at least once a year. We are excited about the heightened awareness of the RNA program and its potential to play a more visible role in good land stewardship.

Sarah Greene
Forest Service RNA Scientist
PNW and Region 6

National RNA coordinators, *in situ*

Frogs and Drugs: RNA Management in Southern Arizona



IN CONJUNCTION with their December meeting, the national Forest Service Research Natural Area coordinators took a field trip to the Goodding RNA in Sycamore Canyon on the Coronado National Forest. This southern Arizona site provided an excellent setting in which to discuss the values and management needs of RNAs across the nation.

Sycamore Canyon has both scenic and natural resource values that make it one of the treasures of the Coronado. The largest watershed within the Atascosa Mountains, Sycamore Creek flows perennially from near the upper boundary of the RNA and ends near the Mexican border where the canyon widens and water sinks into deep alluvial soil. Rhyolite forms the canyon walls in totem pole spires towering above the harder slick-rock chutes and terraces that form the stream bed. The RNA encompasses 2,215 acres of the watershed's inner canyon along the international boundary, 25 miles west of Nogales.

The stream and its riparian habitat support a diversity of rare and sensitive species unmatched within the national forest and perhaps throughout the southwest. Sycamore Canyon is the only U.S. locality for the Sonoran chub, a fish listed as threatened. The canyon was one of the last known sites for the Tarahumara frog, now extirpated within the U.S., and remains one of the few sites in the southwest where two leopard frog species—Chiricahua and lowland—are found together. Sycamore Canyon harbors the largest of only two populations of Chiricahua frogs verified last year from 36 population sites surveyed on the Coronado.

Sycamore Canyon supports a good population of the giant spotted whiptail lizard, a variety found only in southeast Arizona along the Mexican border. Other peripheral Mexican species give the canyon's herptofauna a distinctly subtropical composition. Several migratory Mexican birds nest in Sycamore Canyon. Birders from across the country come here to catch a glimpse of the five-striped sparrow, elegant trogon, northern beardless tyrannulet, and others.

Leslie Goodding was the first botanist to thoroughly explore Sycamore Canyon; one of its rare plants, Goodding ash, as well as the RNA, bear his name. Today, at least ten sensitive plants within the canyon are candidates for federal listing. *Dalea tentaculoides* is currently known only from Sycamore Canyon, in spite of numerous surveys throughout its historic range. *Phaseolus supinus*, a wild bean with unusual underground flowers, is known from only about 15 sites, of which the Sycamore Canyon population is the largest. *Coryphantha recurvata* and *Agave parviflora* are succulents found on rocky slopes and ridgetops; the largest populations of each are found in Sycamore Canyon. And two ferns, *Asplenium exiquum* and *Psilotum nudum*, whose distribution is centered in the Himalaya Mountains in Asia with scattered populations through eastern North America, have small disjunct populations in Sycamore Canyon.

The natural values of Goodding RNA present management challenges similar to those faced by many RNAs. Its natural beauty and diversity attract increasing numbers of visitors who may contribute to the deterioration of features they come to enjoy. Forest Service roads currently cross the creekbed in two places, exacerbating erosion in the stream channel just above the RNA. Ready access invites day hiking and uncontrolled camping. The presence of an international border at its boundary increases the problem of trespass on the RNA. Fences are regularly cut to make way for drug smuggling pack trains. Some scientists will not visit the canyon without a gun for fear of encountering smugglers.

The condition of the entire watershed affects the fate of the canyon. Currently, the Sycamore drainage is contained in one single grazing allotment. Goodding RNA is the riparian core of the watershed, and the site of the most reliable water for stock. Working with the rancher, managers have developed livestock water sources away from the canyon and reduced pressure on RNA fences. This level of cooperation with surrounding land use is not always the case for RNAs and should not be taken for granted. The question arises: To what extent should special values and the management needs of a natural area influence the management of surrounding buffer areas?

For example, California Gulch is directly adjacent to Sycamore Canyon and

Field Notes

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- RNA management, research, and monitoring;
- education and publicity;
- expand research in RNAs while maintaining their ecological integrity

The plan is currently in review throughout the Forest Service. We hope to publish it in an upcoming issue of the *Natural Areas Report*.

Other issues discussed at the meeting included NEPA regulations, mining and withdrawl of mineral entry, standardizing data gathering and management, placement of RNA boundaries on maps, and revision of the Forest Service manual direction for RNAs. Adoption of the strategic plan will give direction to many of these issues.

The group plans to meet at least once a year. We are excited about the heightened awareness of the RNA program and its potential to play a more visible role in good land stewardship.

Sarah Greene
Forest Service RNA Scientist
PNW and Region 6

National RNA coordinators, *in situ*

continued from page 3

shares many of the same natural features. However, California Gulch has been extensively impacted by past and present mine development, including cyanide heap leach operations to extract ore. Examining the two watersheds side by side, one wonders what active mining in the upper watershed Sycamore Canyon could do to the RNA. Or a change in the grazing allotment to a less responsible rancher. Or several years of drought. The challenge of natural area management is to identify potential problems *before* there is a crisis and to be prepared to modify management to avoid problems *before* resource deterioration occurs.

One strategy to meet this proactive challenge is a management plan that identifies the natural area and its buffers, and provides guidelines for monitoring site conditions. A management plan which is proposed for the Sycamore Canyon watershed in the near future will not necessarily create new activity or change old activity, but it will provide documentation on file of benchmark conditions and identify key monitoring needs, including sensitive species populations and habitat conditions. Such a document can also stimulate research interest in the natural area by opening communication with the academic community.

All of these factors must be considered for good management of an RNA. The Coronado has already directed substantial management effort to Sycamore Canyon: the frog populations and half of the sensitive plant species are now regularly monitored; habitat requirements have been determined for the Sonoran chub; and three exclosures have been constructed that can provide a baseline for watershed condition analysis. These activities promote good ecological management; many have been accomplished through interagency cooperation with US Fish and Wildlife Service, The Nature Conservancy, and Arizona Game and Fish Department. Yet, in spite of this care, Tarahumara frogs disappeared from the canyon for as yet unknown reasons. It is clear that one of the greatest needs for RNA management is simply to stimulate greater research interest in order to better understand the natural processes affecting the RNA.

For more information, contact Mima Parra-Szijj, Forest Botanist, Coronado National Forest, (602) 670-4550.

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THE FLORA OF SYCAMORE CANYON, PAJARITO MOUNTAINS, SANTA CRUZ COUNTY, ARIZONA.

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INTRODUCTION. — Sycamore Canyon, in the Pajarito Mountains of Santa Cruz County, Arizona, has long been considered as an area in the Southwest with an exceptional biota. Leslie N. Goodding was the first biologist to recognize the scenic and biological values of the canyon. He made extensive plant collections in the area from 1935 into the 1950's. These collections added many species to the flora of Arizona, and several to the flora of the United States (L.N. Goodding, 1946, 1961).

Botanical work in Sycamore Canyon has been continued to the present by many people. Robert A. Darrow first collected in the canyon in 1936, continuing into the 1950's. Darrow and H.S. Haskell made major collections on September 30 and October 13, 1944. Jack M. Kaiser first collected in Sycamore Canyon as a student of Darrow in 1941, and has collected and observed the plant life of the canyon to the present. Other botanists who have worked in the Sycamore area include T.H. Kearney and R.H. Peebles, F.W. Gould, C.G. and J.R. Reeder, C.T. Mason Jr., W.A. Niering and R.H. Whittaker, E.L. Little, Jr., D. Zimmerman, and W.Y. Wright. In many of the early collections the Sycamore Canyon area was referred to as Bear Valley.

In this report, we present a flora for Sycamore Canyon developed from collections and observations by the authors, and from an intensive survey of the material in the University of Arizona Herbarium (ARIZ), where most of the Sycamore Canyon collections by the aforementioned botanists have been deposited (Table 1). All the plant species listed are represented by specimens in the University of Arizona Herbarium, except those in the personal herbarium of J.M. Kaiser. Nomenclature follows Lehr (1978) and Lehr and Pinkava (in press). We follow Benson (1969) for the Cactaceae and Gentry (1972) for the Agavaceae. *Phaseolus supinus* (R. Buhrow, 1979, pers. comm.) is a new addition to the flora of Arizona. Names of lichens and mosses were taken directly from the University of Arizona Herbarium labels (Table 2).

Acknowledgements. — Tony Burgess strove mightily to sustain the spirit of the senior author during the long, grim, sunless days spent in reviewing the material in the University of Arizona Herbarium. Charles T. Mason Jr., Curator of the Herbarium, and his staff put up with both of us. Our good friend Janice Bowers helped with field work and specimen identification. Others who helped in the field are: M.H. Ames, D.E. Goldberg, N.F. McCarten, R.L. Bittman, and M.R. Van Devender. N.R. Curran, former Head Ranger of the Nogales District, Coronado National Forest, his family, and the staff of the Nogales Ranger District all gave aid and comfort, as did Vida Kaiser.

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LOCATION AND DESCRIPTION. — Sycamore Canyon is located in the Pajarito Mountains, Santa Cruz County, Arizona, 40 km west of Nogales via the Ruby Road (State Route 289), and 8 km east of the abandoned mining town of Ruby. The canyon begins just north of Ruby Road and ends just below the United States/Mexico International Boundary. This distance is about 7 km airline and about 11 km along the sinuous canyon bottom. The entire area is within the Nogales Ranger District of the Coronado National Forest. The canyon begins in an oak woodland-oak grassland community at an elevation of about 1220 meters. At the International Boundary the canyon bottom lies at about 1035 meters elevation, where the vegetation is a mesquite grassland-Sonoran desertscrub ecotone. In the upper part of the canyon, an area of 0.85 ha has been designated as the Goodding Research Natural Area (named in honor of L.N. Goodding) by the United States Forest Service.

The stream that flows through the canyon, with both intermittent and permanent stretches, provides rich riparian and aquatic habitats. Over most of its length the canyon's sides consist of steep slopes and cliffs, with rugged rock formations including spires approaching 25 meters in height. The twisting canyon offers slopes oriented to nearly all compass points, and the narrow, steep-sided nature of the canyon gives shady microhabitats in addition to those under tree and shrub cover. Most of the rocks in the area are rhyolitic. The thin soils are classified as Lampshire (sandy/gravelly loam). Sycamore Canyon has an annual precipitation of 440 mm (18 inches; Sellers and Hill, 1974). The annual mean temperature is about 24.7 °C, ranging from a summer high of 41 °C to a winter low of -13 °C.

The area covered in this study consists of Sycamore Canyon's floor and lower slopes from Ruby Road to the Boundary, and includes portions of the tributary Atascosa/Peñasco Canyon drainages. The area covers about 9 km^2 (2300 acres).

DISCUSSION. — The flora of Sycamore Canyon consists of 624 species, 349 genera, and 96 families of vascular plants (Table 1). In addition, 20 species of lichens and 40 species of mosses have been collected within the area (Table 2).

Twelve species have been collected in the United States only from Sycamore Canyon. They are: *Henrya brevifolia*, *Lobelia laxiflora*, *Dichondra repens* var. *sericea*, *Croton ciliatoglanduliferum*, *Paspalum virletii*, *Aeschynomene villosa*, *Desmanthus bicornutus*, *Lotus alamosanus*, *Phaseolus supinus*, *Rhynchosia edulis*, *Sida rhombifolia*, *Passiflora bryonioides*. Some of these species have been observed elsewhere in Santa Cruz County, but voucher specimens are not available for localities other than Sycamore Canyon. Sycamore Canyon is the type locality for *Dalea tentaculoides* (Gentry, 1950), *Fraxinus gooddingii* (Little, 1952), and *Muhlenbergia xerophila* (C. O. Goodding, 1940).

Several species in the study area have disjunct distributions. *Asplenium exiguum*, described on Asian specimens from the Himalayan Mountains, also occurs in Mexico. It is known in Arizona from a collection in Garden Canyon in the Huachuca Mountains and a few specimens from Sycamore Canyon. *Clitoria mariana* occurs on the east coast of the United States from New Jersey to Florida, west to central Texas, then again in the Sierra-Madrean Mountains of southeastern Arizona. The family Psilotaceae is represented in Arizona by a colony of *Psilotum nudum* growing in a rock crevice in the canyon. The nearest populations are in southern Sonora, Mexico, some 480 km to the southeast, and in Hardin County, Texas, 2000 km to the east (Mason, 1968). Interestingly, *P. nudum* has maintained itself for at least twenty years in the same colony but has not been found in other suitable spots within the canyon. *Aloysia gratissima* ranges from western Texas and Mexico to Argentina, but is reported only from the Sycamore Canyon-Peña Blanca area within Arizona. *Rhynchosia edulis* occurs in Sycamore, with the nearest population located in Chihuahua, Mexico. *Tillandsia recurvata* grows on *Quercus* spp. and *Juniperus erythrocarpa* in Sycamore Canyon, and other spots in Santa Cruz County, including Pine Canyon (Atascosa Mountains), Pena Blanca and Alamo Canyons (Pajarito Mountains), Flux Canyon (Patagonia Mountains), and Sonoita Creek (Santa Rita Mountains). Other populations are to the south in Sonora but the nearest population to the east-southeast is 830 km in the Chisos Mountains of Texas.

Many of the plants in Sycamore Canyon are essentially species of Mexican distribution. The genus *Henrya* is represented in the United States by our collection of *H. brevifolia* from the lower end of the canyon (Urry, 1979); it occurs to the south in Sonora, Mexico. Other species with Mexican population centers include several legumes: *Desmanthus bicornutus*, *Lotus alamosanus*, and *Psoralea pentaphylla*. *Psoralea pentaphylla* was added to the flora of the United States in September 1976 with a collection in Peck Canyon, Atascosa Mountains, Santa Cruz County by J.M. Kaiser (McLaughlin and Mason, 1977). Among the Mexican grasses are *Paspalum virletii* and *Tripsacum lanceolatum*. Other Mexican forms include: *Ambrosia cordifolia*, *Cnidoscolus angustidens*, *Croton ciliatoglanduliferum*, and *Tithonia thurberi*. An interesting vining ascelpiad, *Cynanchum wigginsii*, enters the United States only within the study area. *Acacia smallii*, a tropical species of Mexico, reaches the United States in Sycamore Canyon and the Baboquivari Mountains (Pima County). The important Mexican component of the Sycamore Canyon flora is not surprising, considering the geographic location of the canyon. With its lower end lying on the International Boundary, the canyon forms a natural corridor.

While Sycamore Canyon is the northern terminus for several Mexican plant species, it is also the southern limit in the range of some northern/montane species. *Amelanchier utahensis*, *Aquilegia triternata*, *Berberis wilcoxii*, *Parthenocissus inserta*, and *Philadelphus microphyllus* are all species which have their southern outposts within the study area. Further, some of these species and others including *Pinus discolor*, *Quercus hypoleucoides*, *Q. rugosa*, and *Robinia neomexicana* grow in Sycamore Canyon at their lowest-known elevations. These woodland species are able to establish and maintain populations within an otherwise inhospitable environment by taking advantage of the local, cool, shady habitats in the canyon. Cold air drainage from the higher elevations surrounding the canyon contributes to lower temperatures along the canyon bottom and shaded cul-de-sacs and side drainages. The presence of permanent water provides the relatively mesic condition required by these species.

The distributional patterns evident in the flora of Sycamore Canyon are also observable in some of the fauna of the study area. Some Mexican birds, including *Trogon elegans* (coppery-tailed trogon), *Platypsaris aglaiae* (rose-throated becard), and *Aimophila quinquestriata* (five-striped sparrow; Mills, 1977) have breeding populations in the canyon. Similar reptile distribution patterns include some mountain species as *Eumeces callicephalus* (mountain skink), *Phrynosoma douglassi* (short-horned horned lizard), and *Lampropeltis pyromelana* (Arizona mountain kingsnake). Mexican forms that enter the canyon include *Oxybelis aeneus* (vine snake), *Gyalopion quadrangularis* (Mexican hooknosed snake), *Rana tarahumarae* (Tarahumara frog), and *Hylactophryne augusti* (barking frog). *Gila ditaenia* (Sonoran chub) occurs in the United States only in the stream in Sycamore Canyon.

In Sycamore Canyon, species with widely-divergent geographical and ecological affinities grow close together. *Amelanchier utahensis*, a woodland and forest species, grows within a 2.5 km distance and 60 m elevation of *Croton ciliatoglanduliferum*, a subtropical form. *Pinus discolor*, a Sierra-Madrean pine-oak woodland species is separated from individuals of *Cereus giganteus* and *Jatropha cardiophylla* by similar distances and elevations. *Philadelphus microphyllus*, *Aquilegia triternata* and *Rubus arizonicus* grow within sight of *Lotus alamosanus*.

SUMMARY. — The flora of Sycamore Canyon, Pajarito Mountains, Santa Cruz County, Arizona, is summarized. A total of 624 species of vascular plants, 20 species of lichens and 40 species of mosses in 9 square kilometers gives Sycamore Canyon a very rich local flora.

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Table 1. Vascular plants of Sycamore Canyon. All species listed have been collected in Sycamore Canyon and specimens are located in the University of Arizona Herbarium, except those coded as follows: * = collection within 3 km of Sycamore Canyon proper; ? = reported from or near Sycamore Canyon not verified; ** = observation by authors; # = specimen in JMK herbarium, not in ARIZ; x = species known only from Sycamore Canyon in United States.

ACANTHACEAE
Anisacanthus thurberi (Torr.) Gray
Carlowrightia arizonica Gray
Dyschoriste decumbens (Gray) Kuntz *
Elytraria imbricata (Vahl.) Pers.
Henrya brevifolia Happ. x
Ruellia nudiflora (Engelm. & Gray) Urban *
Tetramerium hispidum Nees.

AGAVACEAE
Agave palmeri Engel.
A. parviflora Torr. *
A. schottii Engelm.
Dasylirion wheeleri Wats.
Nolina microcarpa Wats.
N. texana Wats.
Yucca arizonica McKelvey *
Y. schottii Engelm. **

AMARANTHACEAE
Alternanthera repens (L.) Kuntz
Amaranthus powellii Wats.
A. torreyi (Gray) Benth.
Brayulinea densa (Humb. & Bonpl.) Small
Froelichia arizonica Thornber ?
Gomphrena caespitosa Torr.
G. nitida Rothr.
G. sonorae Torr.
Iresine heterophylla Standl.

ANACARDIACEAE
Rhus choriophylla Woot. & Standl.
R. trilobata Nutt.
Toxicodendron radicans (L.) Kuntze

APOCYNACEAE
Amsonia grandiflora Alexander
Haplophyton crooksii L. Benson
Macrosiphonia brachysiphon (Torr.) Gray

ARALIACEAE
Aralia humilis Cav.

ARISTOLOCHIACEAE
Aristolochia watsoni Woot. & Standl. *

ASCLEPIADACEAE
Asclepias angustifolia Schweig.
A. asperula (Decne.) Woodson
A. elata Benth.
A. linaria Cav.
A. nummularia Torr.
A. nyctaginifolia Gray
A. tuberosa L.
Cynanchum arizonicum (Gray) Shinners
C. wigginsii Shinners x
Matelea arizonicum (Gray) Shinners
Sarcostemma heterophyllum (Engelm.) Standl.

BERBERIDACEAE
Berberis haematocarpa Wooton
B. wilcoxii Kearney

BIGNONIACEAE
Chilopsis linearis (Cav.) Sweet
Tecoma stans H.B.K. **

BORAGINACEAE
Cryptantha barbigera (Gray) Sweet
C. pusilla (Torr. & Gray) Greene #
Heliotropum phyllostachyum Torr. **

BROMELIACEAE
Tillandsia recurvata L.

CACTACEAE
Cereus giganteus Engelm. **
Coryphantha recurvata (Engelm.) Britt. & Rose **
C. vivipara (Nutt.) Britt. & Rose **
Echinocereus fendleri (Engelm.) L. Benson **
E. pectinatus (Scheidw.) Engelm. **
E. triglochidiatus Engelm. **
Mammillaria grahamii Engelm. **
M. gummifera Engelm. **
M. microcarpa Engelm. *
Opuntia chlorotica Engelm. & Bigel. **
O. phaeacantha Engelm. **
O. spinosior (Engelm.) Toumey **
O. versicolor Engelm. **
O. violacea Engelm. **

CAMPANULACEAE
Lobelia cardinalis L.
L. laxiflora H.B.K. x
Triodanus biflora (Ruiz & Pavon) Greene
T. perfoliata (L.) Lieuwl.

CAPPARIDACEAE
Polanisia dodecandra (L.) DC.

CAPRIFOLIACEAE
Lonicera albiflora Torr. & Gray

CARYOPHYLLACEAE
Cerastium texanum Britt.
Drymaria mollugina (Lag.) Didr.
Silene antirrhina L.

CHENOPODIACEAE
Chenopodium palmeri Standl.
C. fremontii Wats.
C. watsoni A. Nels.

COCHLOSPERMACEAE
Amoreuxia palmatifida Moc. & Sesse

COMMELINACEAE
Commelina dianthifolia Delile
C. erecta L.

COMPOSITAE
Acourtia thurberi Gray
A. wrightii Gray *
Ambrosia confertifolia DC.
A. cordifolia (Gray) Payne
Artemisia dracunculus L.
A. ludoviciana Nutt.

Aster subulatus Michx.
Baccharus salicifolia (R. & P.) Pers.
B. sarothroides Gray ••
B. thesioides H.B.K.
Bahia dissecta (Gray) Britt.
Bidens bipinnata L.
B. leptocephala Sherff.
B. pilosa L.
Brickellia californica (Torr. & Gray) Gray
B. floribunda Gray
B. chlorolepis (Woot. & Standl.) Shinners
B. venosa (Woot. & Standl.) Robins
Carphochaete bigelovii Gray
Carminatia tenuiflora DC.
Cirsium arizonicum (Gray) Petrak.
C. neomexicanum Gray
Conyza canadensis (L.) Cronq.
C. sophiaefolia H.B.K.
Coreocarpus arizonicus (Gray) Blake
Ericameria cuneata (Gray) McClatchie
Erigeron divergens Torr. & Gray
E. neomexicanus Gray
E. modestus A. Gray
Eupatorium pauperculum Gray
E. pycnocephalum Less.
Gnaphalium chilense Spreng.
G. wrightii Gray
Guardiola platyphylla Gray
Gutierrezia microcephala (DC.) Gray
G. sarothrae (Pursch.) Britt. & Rusbg.
Gymnosperma glutinosum (Spren.) Less.
Haplopappus gracilis (Nutt.) Gray
H. laricifolius Gray
H. spinulosus (Pursh.) DC. •
H. tenuisectus (Greene) Blake
Heliopsis parvifolia Gray •
Heterosperma pinnatum Cav.
Hieracium fendleri Schultz Bip.
Hymenoclea monogyra Torr. & Gray
Hymenothrix wislizenii Gray
H. wrightii Gray
Lactuca serriola L.
Melampodium longicorne Gray
M. strigosum Steussy
Microseris linearifolia (DC.) Schultz Bip.
Parthenice mollis Gray
Pectis felipes Harv. & Gray •
P. imberbis Gray •
P. longipes Gray
P. prostrata Cav.
Perityle coronopifolia Gray
Porophyllum ruderale (Jacq.) Cass.
Sanvitalia abertii Gray
Schkuhria wislizenii Gray •
Senecio douglasii DC.
S. neomexicanus Gray
S. seemannii Schultz Bip.
Solidago altissima L.
S. sparsiflora Gray
Stephanomeria pauciflora (Torr.) A. Nels.
S. thurberi Gray
Stevia lemmoni Gray
Tagetes lemmoni Gray
T. micrantha Cav.
Tithonia thurberi Gray
Trixis californica Kellog.
Verbesina enceloides (Cav.) Benth. & Hook. •
Viguiera annua (Jones) Blake
V. cordifolia Gray
V. dentata (Cav.) Spreng.
V. multiflora (Nutt.) Blake
Zexmenia podocephala Gray
Zinnia grandiflora Nutt. ••
Z. peruviana (L.) L.

CONVOLVULACEAE
Cuscuta applanata Engelm.
Dichondra brachypoda Woot. & Standl.
D. repens Forst. x
Evolvulus alsinoides L.
E. arizonicus Gray
Ipomoea hederifolia L.
I. longifolia Benth.
I. pubescens Lam.
I. purpurea (L.) Roth
I. thurberi Gray

CRASSULACEAE
Graptopetalum bartramii (Rose) K. & P. ••
G. rusbyi (Greene) Rose ?
Sedum griffithsii Rose

CRUCIFERAE
Arabis perennans Wats. ••
Descurainia pinnata (Walt.) Britt.
D. sophia (L.) Webb.
Draba petrophila Greene
Dryopetalon runcinatum Gray
Erysimum capitatum (Dougl.) Greene •
Lepidium lasiocarpum Nutt.
Lesquerella fendleri (Gray) Wats.
Pennellia micrantha (Gray) Nievw.
Rorippa nasturtium-aquaticum (L.) Schinz. & Thell.
Sisymbrium irio L.
Thelypodiopsis linearifolia (Gray) Al-Shebaz
Thlaspi montanum L.
Thysanocarpus curvipes Hook.

CYPERACEAE
Bulbostylis capillaris (L.) C.B. Clarke
Carex agrostoides Mackenz.
C. thurberi Dewey
C. ultra Bailey
Cyperus albomarginatus Mart. & Scrad.
C. aristatus Rottb.
C. fendlerianus Boeckl.
C. mutisii Grieb.
C. niger Ruiz & Pavon
C. pringlei Britt.
C. rusbyi Britt.
C. uniflorus Torr. & Hook.
C. wrightii Britt.
Fimbristylus annua (All.) R. & S.
Hemicarpa micrantha (Vahl.) Pax. •

CUCURBITACEAE
Apodanthera undulata Gray
Echinopepon wrightii Britt.
Sicyosperma gracile Gray

CUPRESSACEAE
Juniperus deppeana Steud. ••
J. erythrocarpa Cory. ••

ERICACEAE
Arctostaphylos pungens H.B.K. **

EQUISETACEAE
Equisetum laevigatum A. Braun

EUPHORBIACEAE
Acalypha lindheimeri Muell. Arg.
A. neomexicana Muell. Arg.
A. ostryaefolia Riddell
Cnidoscolus angustidens Torr.
Croton ciliatoglanduliferum Ortega x
Euphorbia bilobata Engelm.
E. capitellata Engelm.
E. exstipulata Engelm.
E. florida Engelm. *
E. heterophylla L. #
E. hirta L.
E. hyssopifolia L.
E. indivisa (Engelm.) Tidestrom
E. revoluta Engelm. #
Jatropha cardiophylla (Torr.) Muell. Arg.
J. macrorhiza Benth.
Manihot angustiloba (Torr.) Muell. Arg.
Tragia laciniata Torr.
T. nepetaefolia Cav.

FAGACEAE
Quercus arizonica Sarg.
Q. emoryi Torr. **
Q. hypoleucoides Camus
Q. oblongifolia Torr.
Q. rugosa Nee
Q. toumeyi Sarg.

FOUQUIERIACEAE
Fouquieria splendens Engelm.

FUMARICACEAE
Corydalis aurea Willd.

GARRYACEAE
Garrya wrightii Torr.

GERANIACEAE
Erodium cicutarium (L.) L'Her.
E. texanum Gray
Geranium wislizeni Wats.

GRAMINEAE
Agropyron arizonicum Scribn. & Smith
A. spicatum (Pursh.) Scribn. & Smith
A. trachycaulum (Link) Malte.
Agrostis scabra Willd.
A. semiverticillata (Forsk.) C. Chr.
Aristida adscensionis L.
A. hamulosa Henr.
A. orcuttiana Vasey
A. ternipes Cav.
Bothriochloa barbinodis (Lag.) Herter
Bouteloua chondrosioides (H.B.K.) Benth.
B. curtipendula (Michx.) Torr.
B. eludens Griffiths
B. eriopoda Torr.
B. glandulosa (Cerv.) Swallen
B. hirsuta Lag.
B. repens (H.B.L.) Scribn. & Merr.
rothrockii Vasey
nus anomalus Rupr. ex Fourn.
sonicus (Shear) Stebbins
B. carinatus Hook. & Arn.
B. frondosus (Shear) Woot. & Standl.
Cenchrus insertus M.A. Curtis
Chloris virgata Swartz.
Dichanthelium oligozanthes (Schult.) Gould
Digitaria sanguinalis (L.) Wartz.
Diplachne dubia (H.B.K.) Scribn.
Echinochloa colonum (L.) Link.
E. crusgalli (L.) Beauv.
Elyonurus barbiculmis Hack
Eragrostis arida Hitchc.
E. chloromelas Steud.
E. pectinacea (Michx.) Nutt.
Eriochloa contracta Hitchc.
E. lemmoni Vasey & Scribn.
Hackelochloa granularis (L.) Kuntze.
Heteropogon contortus (L.) Beauv.
H. melanocarpus (Ell.) Benth.
Hilaria berlangeri (Steud.) Nash
Leptoloma cognatum (Schultz.) Chase
Lycurus phleioides H.B.K.
Muhlenbergia arenacea (Buckl.) Hitchc.
M. arizonica Scribn.
M. dumosa Scribn.
M. emersleyi Vasey
M. glauca (Nees) Mez.
M. gooddingii Solderstrom
M. longiligula Hitchc.
M. microsperma (DC.) Kunth.
M. minutissima (Steud.) Swallen
M. monticola Buckl.
M. pauciflora Buckl.
M. pectinata C.O. Goodding
M. polycaulis Scribn.
M. rigens (Benth.) Hitchc.
M. xerophila C.O. Goodding
Panicum arizonicum Scribn. & Merr ?
P. plenum Hitchc. & Chase
Paspalum dilatatum Poir.
P. distichum L. *
P. setaceum Michx.
P. virletii Fourn. x
Piptochaetium fimbriatum (H.B.K.) Hitchc.
Poa bigelovii Vasey & Scribn.
P. fendleriana (Steud.) Vasey ?
Polypogon monspeliensis (L.) Desf.
Schizachyrium cirratum (Hack.) Woot. & Standl.
S. hirtiflorum (Nees) Kunth.
S. scoparium (Michx.) Nash
Setaria geniculata (Lam.) Beauv.
S. grisebachii Fourn.
S. macrostachya H.B.K.
Sitanion hystrix (Nutt.) J.G. Smith
Sorghum halapense (L.) Pers.
Sphenopholis obtusata (Michx.) Scribn.
Trichachne californica (Benth.) Chase
Tridens muticus (Torr.) Nash
Tripsacum lanceolatum Rupr.
Vulpia octoflora Walt.

HYDROPHYLLACEAE
Eucrypta micrantha (Torr.) Heller
Nama hispidum Gray *
Phacelia affinis Gray
P. coerulea Greene #

P. crenulata Torr. •
P. distans Benth.

IRIDACEAE
Sisyrinchium cernuum (Bickn.) Kearney

JUGLANDACEAE
Juglans major (Torr.) Heller ••

JUNCACEAE
Juncus acuminatus Michx.
J. bufonius L.
J. marginatus Rostk.
J. saximontanus A. Nels.
J. tenuis Willd.

KRAMERIACEAE
Krameria lanceolata Torr. •
K. grayi Rose & Painter •
K. parvifolia Benth.

LABIATAE
Agastache wrightii (Greenm.) Woot. & Standl.
A. rupestris (Greene) Standl. x
A. wrightii (Greenm.) Woot. & Standl.
Hedeoma dentatum Torr.
H. nanum Torr.
H. oblongifolium (Gray) Heller
Marrubium vulgare L. #
Monarda austromontana Epling.
Salvia parryi Gray
S. pinquifolia Fern. ?
S. reflexa Hornem.
S. subincisa Benth.
Scutellaria potosina T.S. Brandeg.
S. tessellata Epling.
Stachys coccinea Jacq.
Trichostema arizonicum Gray ••

LEGUMINOSAE
Acacia angustissima (Mill.) Kuntze
A. constricta Benth.
A. greggii Gray ••
A. smallii Isely
Aeschynomene villosa Poir. x
Amorpha fruticosa L.
Astragalus arizonicus Gray
A. mollissimus Torr.
A. nothoxys Gray
A. nuttalianus DC.
Calliandra eriophylla Benth.
C. humilis Benth.
Cassia absus L.
C. leptadenia Greenm.
C. leptocarpa Benth.
C. wrightii Gray
Clitoria mariana L.
Cologania angustifolia Gray
Coursetia microphylla Gray
Cracca edwardsi Gray
Crotalaria pumila Ortega
C. sagittalis L.
Dalea albiflora Gray
D. grayi (Vail) L.O. Williams
D. leporina (Ait.) Bullock
D. lumholtzii Robins. & Fern.
D. pringlei Gray
D. pulchra Gentry
D. tentaculoides Gentry
D. versicolor Zucc.
Desmanthus bicornutus Wats. x
D. cooleyi (Eaton) Trel.
Desmodium angustifolium (H.B.K.) DC.
D. batocaulon Gray
D. cinerascens Gray
D. neomexicanum Gray
D. procumbens (Mill.) A.S. Hitch.
Erythrina flabelliformis Kearney
Eysenhartia polystachya (Ortega) Sarg. ••
Galactia wrightii Gray
Indigofera sphaerocarpa Gray
Lathyrus graminifolius (Wats.) White
Lotus alamosanus (Rose) Gentry x
L. greenei (Woot. & Standl.) Ottley
L. humistratus Greene
L. oroboides (H.B.K.) Ottley
L. rigidus (Benth.) Greene
Lupinus concinnus Agardh.
L. sparsiflorus Benth.
Macroptilium heterophyllum (Willd.) Marechel & Baudet
Melilotus indicus (L.) All. #
Mimosa biuncifera Benth.
M. dysocarpa Benth.
M. grahamii Gray
Nissolia schottii (Torr.) Gray
Phaseolus acutifolius Gray
P. ritensis Jones
P. supinus Wiggins & Rollins x
Prosopis velutina Woot.
Psoralea pentaphylla L.
P. tenuiflora Pursh. •
Rynchosia edulis Griseb. x
R. pyramidalis (Lam.) Urb. x
R. senna Gill.
Robinia neomexicana Gray #
Tephrosia leiocarpa Gray
T. tenella Gray
Vicia ludoviciana Nutt.
Zornia diphylla (L.) Pursh.

LEMNACEAE
Lemna minima Phil. ?
L. minor L.
L. purpusilla Torr. •
L. valdiviana Phil.

LILIACEAE
Calochortis kennedyi Porter
Dichelostemma pulchellum (Salisb.) Heller
Milla biflora Cav.

LINACEAE
Linum puberulum (Engelm.) Heller •

LOASACEAE
Mentzelia albicaulis Dougl.
M. asperula Woot. & Standl.
M. pumila (Nutt.) Torr. & Gray •

LYTHRACEAE
Cuphea wrightii Gray
Lythrum californicum Torr. & Gray

MALPIGHIACEAE
Aspicarpa hirtella Rich.
Janusia gracilis Gray

ALVACEAE
Abutilon californicum Benth.
A. palmeri Gray
A. sonorae Gray
Anoda abutiloides Gray
A. cristata (L.) Schleckr.
A. reticulata Wats. #
Gossypium thurberi Todaro
Hibiscus biseptus Wats.
H. coulteri Harv. #
Malvastrum bicuspidatum (Wats.) Rose
Sida neomexicana Gray
S. filicaulis Torr. & Gray #
S. rhombifolia L. x
S. spinosa L. •
S. tragiaefolia Gray
Sphaeralcea fendleri Gray

ARTYNIACEAE
Proboscidia parviflora (Woot.) Woot. & Standl.

ENISPERMACEAE
Cocculus diversifolius DC. ••

ORACEAE
Morus microphylla Buckl.

YCTAGINACEAE
Allionia incarnata L.
Boerhaavia coccinea Mill.
B. erecta L.
B. intermedia Gray
B. purpurascens Gray
Mirabilis longiflora L.
M. coccineus (Torr.) B. & H.
M. linearis (Pursh.) Heimerl.
M. oblongifolia (Gray) Heimerl.

LEACEAE
Forestiera shrevei Standley
Fraxinus gooddingii Little
F. pennsylvanica Marsh

NAGRACEAE
Epilobium canum (Greene) Raven
Gaura hexandra Ortega
Oenothera caespitosa Nutt. #
O. hookeri Torr. & Gray #
O. rosea Ait.

XALIDACEAE
Oxalis albicans H.B.L.
O. alpina (Rose) Knuth.
O. amplifolia (Trel.) Knuth.
O. stricta L.

APAVERACEAE
Argemone intermedia Sweet ?
Eschscholtzia mexicana Greene ••

ASSIFLORACEAE
Passiflora bryonioides H.B.K. x

INACEAE
Pinus discolor Bailey & Hawksworth

HYTOLACCACEAE
Rivina humilis L.

LANTAGINACEAE
Plantago major L. ?
P. purshii Roem. & Schutt. #
P. virginica L. #

PLATANACEAE
Platanus wrightii Wats. ••

PLUMBAGINACEAE
Plumbago scandens L. #

POLEMONIACEAE
Ipomopsis macombii (Torr.) V. Grant •
I. thurberi (Torr.) V. Grant
Linanthus aureus (Nutt.) Greene •
Loeselia glandulosa (Cav.) G. Don
Microsteris gracilis (Hook.) Greene

POLYGALACEAE
Polygala alba Nutt.
P. hemipterocarpa Gray
P. barbeyana Chodat
P. obscura Benth.
P. reducta Blake

POLYGONACEAE
Eriogonum abertianum Torr.
E. polycladon Benth.
E. thurberi Torr.
E. wrightii Torr.
Polygonum aviculare L.
P. coccineum Muhl.
P. lapathifolium L.
P. pensylvanicum L.
P. punctatum Ell.
Rumex crispus L.
R. hymenosepalus Torr.

POLYPODIACEAE
Adiantum capillis-veneris L.
Asplenium exiguum Bedd.
A. palmeri Maxon
A. resiliens Kunze.
Bommeria hispida (Mett.) Underw.
Cheilanthes eatoni Baker
C. fendleri Hook. •
C. lindheimeri Hook.
C. tomentosa Link
C. wootoni Maxon
Cyrtomium auriculatum (Klotzch) Morton
Notholaena aurea (Poir.) Desv.
N. grayi Davenp. •
N. sinuata (Lag.) Kaulf.
Pellea intermedia Mett.
P. truncata Goodding
Polypodium thyssanolepis Klotzch
Woodsia plummerae Lemmon

PONTEDERIACEAE
Heteranthera limosa (Swartz.) Willd. ?

PORTULACACEAE
Calandrina ciliata (Ruiz & Pavon) DC.
Claytonia perfoliata Donn.
Portulaca mundula Johnst.
P. oleracea L.
P. suffrutescens Engelm.
P. umbraticola H.B.K.
Talinum aurantiacum Engelm.
T. paniculatum (Jacq.) Gaertn.

PRIMULACEAE
Androsace occidentalis Pursh.
Centunculus minimum L.
Samolus parviflorus Raf.
S. vagans Greene

PSILOTACEAE
Psilotum nudum (L.) Palisot-Beauvois

RANUNCULACEAE
Aquilegia chrysantha Gray
A. triternata Payson
Clematis ligusticifolia Nutt.
Delphinium scaposum Greene **
Myosurus cupulatus Wats.
Thalictrum fendleri Engelm.

RHAMNACEAE
Condalia correllii M.C. Johnston
C. spathulata Gray *
Rhamnus californica Esch.
Sageretia wrightii Wats.

ROSACEAE
Amelanchier utahensis Koehne
Prunus serotina Ehrh.
Pyracantha koidzummi (Hayata) Rehd.
Rubus arizonensis Focke

RUBIACEAE
Bouvardia glaberrima Engelm.
Crusea wrightii Gray
Diodia teres Walt.
Galium aperine L.
G. mexicanum H.B.K.
G. microphyllum Gray
G. wrightii Gray
Mitracarpus breviflorus Gray

RUTACEAE
Choisya arizonica Standl.
Ptelea trifoliata L.

SALICACEAE
Populus fremontii Wats. **
Salix bonplandiana H.B.K.
S. exigua Nutt.
S. taxifolia H.B.K.

SANTALACEAE
Comandra pallida A. DC. *

SAPINDACEAE
Dodonaea viscosa Jacq.
Sapindus saponaria L. **

SAXIFRAGACEAE
Fendlera rupicola Gray
Heuchera sanguinea Engelm.
Philadelphus microphyllus Gray
Ribes aureum Pursh.

SELAGINELLACEAE
Selaginella rupincola Underw.
S. underwoodii Hieron.

SCROPHULARIACEAE
Brachystigma wrightii (Gray) Pennell
Castilleja minor Gray #
Linaria texana Scheele
Maurandya antirrhiniflora Humbl. & Bonpland
Mecardonia vandellioides (H.B.K.) Pennell
Mimulus guttatus DC.
M. nasutus Greene
M. rubellus Gray
Penstemon barbatus (Cav.) Roth.
P. parryi Gray
Schistophragma intermedia (Gray) Small
Stemodia durantifolia (L.) Swartz. #
Veronica peregrina L. **

SOLANACEAE
Datura meteloides DC.
Jaltomata procumbens (Cav.) J.L. Gentry
Margaranthus solanaceus Schlect.
Nicotiana trigonophylla Dunal.
Physalis hederaefolia Gray
P. pubescens L.
Solanum deflexum Greenm.
S. douglasii Dunal
S. eleagnifolium Cav.
S. nodiflorum Jacq.

STERCULIACEAE
Ayenia compacta L.
Waltheria americana L.

TAMARICACEAE
Tamarix pentandra Pall. #

TYPHACEAE
Typha sp. **

ULMACEAE
Celtis pallida Torr. **
C. reticulata Torr. **

UMBELLIFERAE
Bowlesia incana Ruiz & Pavon
Caucalis microcarpa Hook. & Arn.
Daucus pusillus Michx. **
Eryngium heterophyllum Engelm.

URTICACEAE
Parietaria hespera Hinton
Urtica gracilenta Greene

VERBENACEAE
Aloysia gratissima (Gill. & Hook.) Troncoso
Bouchea prismatica (L.) Kuntz.
Glandularia bipinnatifida (Nutt.) Nutt.
G. gooddingii (Briq.) Solbrig
Tetraclea coulteri Gray *
Verbena gracilis Desf.
V. neomexicana (Gray) Small

VIOLACEAE
Hybanthus attenuatus Humbl. & Bonpland #

VISCACEAE
Phoradendron bolleanum (Seem.) Eichler
P. juniperinum Engelm.
P. villosum Nutt.

VITACEAE
Parthenocissus vitacea (Kerner) Hitchc.
Vitis arizonica Engelm. #

ZYGOPHYLLACEAE
Kallstroemia grandiflora Torr.

le 2. Lichens and mosses from Sycamore Canyon in the University of Arizona Herbarium. • = within 3 km of Sycamore Canyon.

CHENS
caraspora scheicheri (Ach.) Mass.
naptychia speciosa Mass.
aloplaca cinnabarina (Ach.) Zalhbr.
. flavovirescens (Wulf.) Dalla, Torr. & Smith.
andelariella cf. *fibrosa* (Fr.) Muell. Arg.
)ermatocarpon lachneum (Ach.) A.L. Sm.
). miniatum (L.) Mann.
leppia sp.
ecidea sp.
eptogium hildebrandi (Garov.) Nyl.
armelia caperata (L.) Ach.
. isidiata
. novomexicana Gyeln.
. olivaceae (L.) Ach.
. reticulata Tayl.
. subtinctoria Zalhr.
Physcia setosa (Ach.) Nyl.
Rinodina sp.
Staurothele cf. *catalepta* (Ach.) Blombg.
Xanthoria fallax (Hepp.) DR

OSSES

MBLYSTEGIACEAE
Amblystegium juratzkanum Schimp.
A. serpens (Hedw.) Bry. Eur.
Drepanocladus aduncus (Hedw.) Warnst. •
Hygroamblystegium fluviatile (Hedw.) Loeste.
H. irriguum (Wils.) Loeske.
Leptodictyum riparium (Hedw.) Warnst.
L. trichopodium (Schultz.) Warnst.

ARTRAMIACEAE
Philonotus marchica (Willd.) Baid.
P. fontana (Hedw.) Brid.
P. muhlenbergi (Schwegr.) Brid.

RACHYTHECIACEAE
Eurynchium hians (Hedw.) J&S
E. rusciforme (Neck.) Milde.
Rhynchostegiella compacta (Hedw.) J&S
Schleropodium tourettei Brid.

RYACEAE
Brachymenium mexicanum Mont.
B. systilium (C.M.) Jaegr.
Bryum argenteum L.
B. bimum L.
B. gemmiparum DeNot.
B. truncorum Brid.
B. turbinatum (Hedw.) Schraegr.
Pohlia drummondi (C.M.) Andrews
P. wahlenbergi (W.&M.) Andrews •

ABRONIACEAE
Fabronia ciliaris Brid.
F. pusilla Raddii •
F. ravenelli Sull.
F. wrightii Sull.

FUNARIACEAE
Entosthodon bolanderi Lesq. •
Funaria hygrometrica Hedw.

GRIMMACIAE
Grimmia pulvinata (H.) Smith
G. wrightii Aust.

HEDWIGIACEAE
Braunia secunda (Hook.) Bry. Eur.
Hedwigia ciliata Hedw.

LEUCODONTACEAE
Leucodon brachypus Brid.

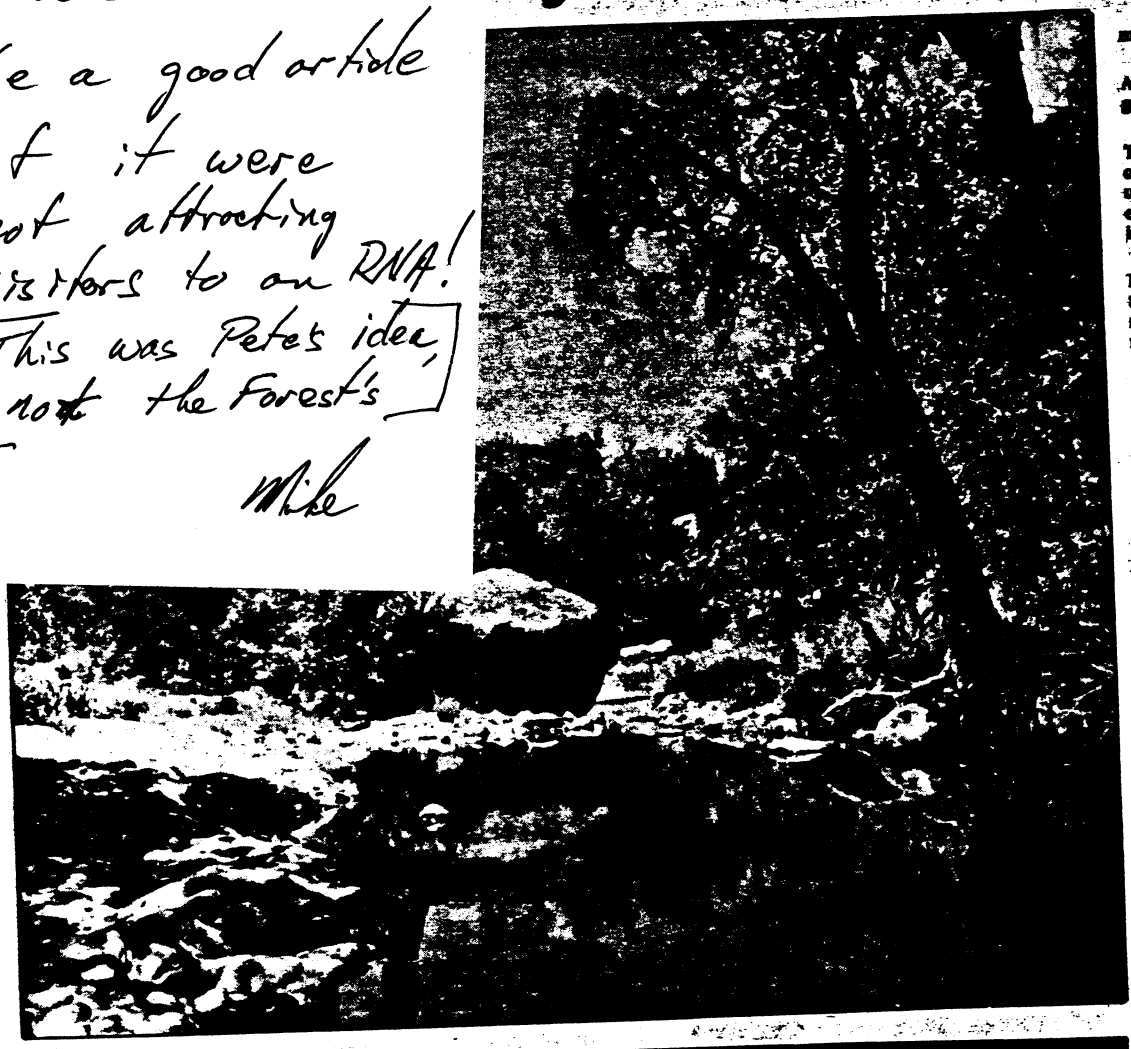
PTYCHOMITRIACEAE
Ptychomitrium legibergi Best.

THUIDIACEAE
Anomodon rostratus (Hedw.) Schimp.
Herpetineurium toccoae (Sull. & Lesq.) Card.
Thiudium microphyllum (Hedw.) Best.

Larry Schmidt
RO- S&W

Guess this would be a good article if it were not attracting visitors to our RNA!
[This was Pete's idea, not the Forest's]
Mike

nyon a wet, botanical gem



Water and desert don't go together in many places. But where they do, it's magic.

Such a place is Sycamore Canyon in the Atascosa Mountains, 20 miles west of Nogales.

The water provides a rich riparian life. The U.S. Forest Service set aside a portion of this canyon 21 years ago to preserve its unique botanical species. A fence was erected to keep livestock out, but the fence is no longer there.

There's a small fern known only from the Himalayan Mountains. There's an acacia tree, a native of France; a pigeon pea from southern Mexico, a Texas lippia; and a ball moss from the Deep South.

What are they doing in Sycamore Canyon? If Les Goodding were alive, he might be able to say. Goodding, a former botanist, died 16 years ago and many of the secrets he discovered in the canyon went with him.

The casual hiker doesn't really care. He wouldn't know a pigeon pea from a lippia. All he knows is the canyon is a delightful place to spend a day in the shade of tall trees.

The elevation is 4,000 feet where Ruby Road crosses the canyon. The first half mile or so downstream from the road turnaround is undistinguished. It looks pretty much like any other desert canyon with a gravel bottom. The first few stagnant pools don't hint at what's to come.

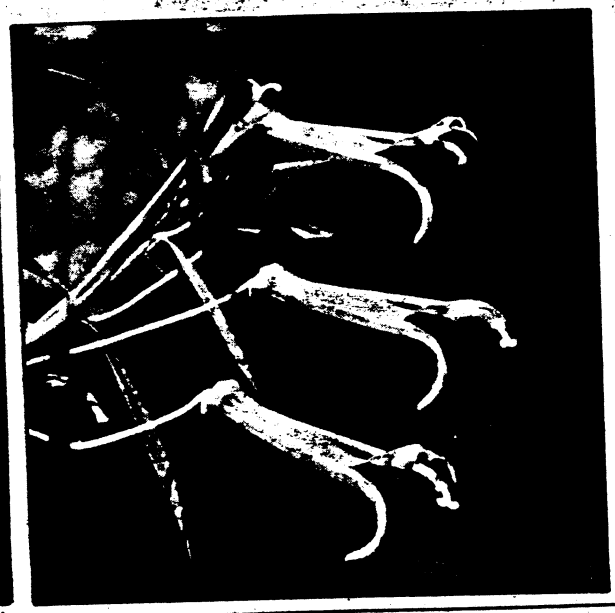
There are more pools, and then a trickle. The water feeds huge walnut trees, great oaks, willows and ashes. Penstamen and verbena give a splash of color.

For a mile or so, much of the canyon bottom is solid rock, worn slick by water. At low flow, the water and rock form a crazy-quilt pattern of wet and dry.

Along the sides of the canyon are cliffs and spires of volcanic rock, the home of green and yellow lichens.

It's about two miles to Peñasco (big rock) Canyon. For a lazy summer day, this is about as far as a hiker would want to go. But the energetic can boulder-hop another three-plus miles to the Mexican border. There may, or may not, be an old, barbed-wire fence to mark the boundary.

Sycamore Canyon drains south into Rio Altar.

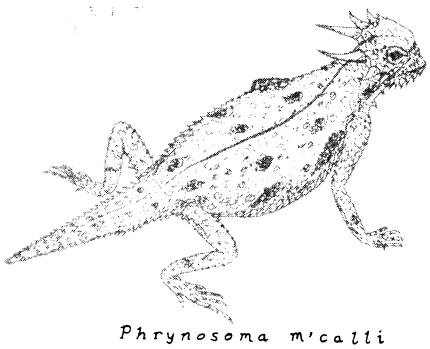


Pools, rocks and trees, above, help make Sycamore Canyon extraordinary. At left, a rare Gregg ash and penstamon flowers add brightness to an area near Nogales.

Story and photos by Pete Cowgill

1st 2 pgs. xd in G.C. '83, "RNAs: Doc. Protect, Outstanding Groups...", "San Francisco Peaks RNA" (also see below)

Arizona Natural Heritage Program



Phrynosoma m'calli

THE STATE OF ARIZONA
in cooperation with
THE NATURE CONSERVANCY

March 31, 1983

30 NORTH TUCSON BLVD.
TUCSON, ARIZONA 85716
(602) 323-1857
323-0867

Larry Schmidt
U.S. Forest Service
517 Gold Avenue, SW
Albuquerque, NM 87102

Dear Larry:

I have finally had an opportunity to compile the information on plants and animals that have limited distribution in Arizona which we have identified on Research Natural Areas. We promised it to you during our February meeting in Tucson. Enclosed is a list of species found on the RNA with a notation on any state or federal protection status they have received (see enclosed list of protection statuses).

see file "Sycamore Canyon RNA" (parts of the list which refer to other other RNAs may be found in the respective files) see pg. 3 of attachment.

The most notable site from our perspective is Goodding RNA in Sycamore Canyon. As we have progressed with our mapping of rare elements and habitats, a cluster exceeding anything else in at least the western United States has developed in the canyon centered in the existing RNA and trailing down-canyon within the proposed extension acreage. To give some indication of the significance of the RNA, five of the plants which occur here have been recently recommended for USFWS Threatened status and one for Endangered status. I have enclosed a bid copy on the flora of Sycamore Canyon co-authored by Tom Van Devender of our office, in case you needed one.

There have been several recommendations, including Greg Goodwin's and ours made a couple of years ago, to enlarge San Francisco Peaks RNA. We certainly would like to see these proposals enacted and provide the alpine tundra and the exceptional flora, in particular Senecio franciscanus, the RNA protection it deserves and requires, considering the mounting pressure on the long term viability of the Peaks. If an increase in acreage is a problem, perhaps the boundaries can be shifted to include much of the alpine tundra in sections 29 and 32 and retain only the best bristlecone pine stand of the existing RNA and adjacent areas identified by Greg Goodwin.

You mentioned to us the need for public input as to the practical values of RNAs. Certainly from the standpoint of the preservation of species diversity, which is becoming more pervasive in land management throughout the United States, the value of RNAs is beyond question. Even though research on some established RNAs has been minimal to non-existent, this doesn't lessen the value of the site as a future research resource. Also, it just makes good

sense from a long-term management standpoint to leave as many options available as possible for future needs, and a comprehensive RNA system is one of those options.

I hope this input is useful, and we hope to continue working with the Forest Service on RNAs. In addition we look forward to receiving your refinement of the guidelines on Zoological and Botanical Areas.

Sincerely,

Douglas Koppinger

Douglas G. Koppinger

DGK/mp

cc: Mike Borens

Enclosure

List of plants and animals with limited distribution in Arizona occurring on Forest Service Research Natural Areas

SYCAMORE CANYON

Species	Common Name	Status
Birds		
Aimophila quinquestriata	Five-striped Sparrow	S/T
Buteo albonotatus	Zone-tailed Hawk	(near RNA)
Camptostoma imberbe	Beardless Flycatcher	S/T
Myiodynastes luteiventris	Sulphur-bellied Flycatcher	
Platypsaris aglaiae	Rose-throated Becard	S/T
Trogon elegans	Coppery-tailed Trogon	S/C
Tyrannus crassirostris	Thick-billed Kingbird	S/T
Reptiles		
Elaphe triaspis	Green Rat Snake	
Eumeces callicephalus	Mountain Skink	S/C
Gyalopion canum	Western Hook-nosed Snake	
Oxybelis aeneus	Vine Sanke	S/C
Tantilla yaquia	Yaqui Black-headed Snake	
Amphibians		
Gastrophryne olivacea	Plains Narrow-mouthed Toad	S/C
Hylactrophryne augusti	Western Barking Frog	(near NRA)
Rana tarahumarae	Tarahumara Frog	S/E
Fish		
Gila ditaenia	Sonora Chub	S/T
Plants		
Abutilon reventum	Yellow Indian Mallow	SB
Acacia smallii	Huisache	
Aeschynomene villosa	Sensitive Joint Vetch	
Agastache rupestris	Baboquivari Giant Hyssop	
Agave parviflora	Santa Cruz Striped Agave	(near RNA) S/C, C1, SE
Aloysia gratissima	Common Bee Brush	
Amsonia grandiflora	Bigflower Blue Star	SE
Anoda abutiloides	False Indian Mallow	C2, DL, SC
Asplenium exiguum	Sonoran Spleenwort	
Basistelma angustifolium	Wiggins Milkweed Vine	C1, SE
Bouchea prismatica	Prism Bouchea	

Species	Common Name	Status
Coryphantha recurvata	Golden-chested Barrel Cactus	S/C, C1, PT, SE
Croton ciliato-glanduliferum	Tropical Glandular Croton	
Dalea tentaculoides	Gentry's Indigo Bush	C1, PT, SE, SC
Desmanthus bicornutus	Ruby Bundleflower	C1, PT
Dichondra repens sericea	Silky Pony Foot	
Erigeron eriophyllus	Woolly Fleabane	C1, PT, SE
Fraxinus gooddingii	Goodding Ash	C2, SE
Graptopetalum bartramii	Bartram Echeveria	S/C, C1, PT, SE, SC
Henrya brevifolia	Henrya	
Lachnostoma arizonicum	Rincon Milkweed Vine	
Lagascea decipiens	Beguiling Mexican Daisy	
Lobelia laxiflora	Mexican Lobelia	
Loeselia glandulosa	Tropical Spiny Phlox	
Lotus alamosanus	Alamos Deer Vetch	
Malvastrum bicuspidatum	Mexican Shrub Mallow	SB
Microchloa kunthii	Kunth Grass	(near RNA)
Muhlenbergia xerophila	Sycamore Canyon Muhly	
Notholaena incana	Hoary Cloak Fern	
Paspalum virlettii	Virlet Paspalum	
Passiflora bryonioides	Mexican Passionflower	
Passiflora foetida	Foetid Passionflower	(near RNA)
Pectis imberbis	Beardless Chinch Weed	(near RNA)
Phaseolus supinus	Supine Bean	C1, SE, PT
Polygala glochidiata	Spiny Milkwort	SB
Psilotum nudum	Whisk Fern	
Psoralea pentaphylla	Mexican Scurf Pea	
Rhynchosia edulis	Pan-American Snoutbean	
Rhynchosia precatoria	Mexican Rosary Bean	(near RNA)
Senecio hartwegii	Hartweg Groundsel	
Sisyrinchium cernuum	Nodding Blue-eyed Grass	S/C
Tephrosia thurberi	Thurber Hoary Pea	
Tillandsia recurvata	Ball Moss	
Tithonia thurberi	Thurber's Tithonia	(near RNA) C2, DL, SC
Tripsacum lanceolatum	Mexican Gamagrass	

Species	Common Name	Status
Animals		
Cleithrionomys gapperi	Red-backed Vole	
Mustela frenata	Long-tailed Weasel	
Zapus princeps	Jumping Mouse	S/T
Plants		
Allium gooddingii	Goodding Onion	S/C, C1, PT, SE
Calypso bulbosa	Western Fairy Slipper	S/C
Epilobium oregonense	Oregon Willow Herb	
Gentiana fremontii	Moss Gentian	
Goodyera repens	Lesser Rattlesnake Plantain	S/C
Habenaria stricta	Slender Bog Orchid	S/C
Oxypolis fendleri	Hog Fennel	
Salix arizonica	Arizona Willow	C1, DL, SE
WEST FORK OF OAK CREEK		
Animals		
Thamnophis rufipunctatus	Narrow-headed Garter Snake	S/T
Plants		
Adiantum pedatum	American Maidenhair	
Agrimonia gryposepala	Hook-nosed Agrimony	
Aletes macdougali	Vagabond Parsnip	
Cimicifuga arizonica	Arizona Bugbane	C1, PT, SE
Cystopteris bulbifera	Bulblet Fern	
Heuchera eastwoodiae	Eastwood Alum Root	
Ostrya knowltoni	Knowlton Hop Hornbeam	
Parnassia parviflora	Grass of Parnassus	
Polystichum lonchitis	Mountain Holly Fern	
GOUDY CANYON		
Plants		
Danthonia californica	Oat Grass	
SANTA CATALINA		
Plants		
Spiranthes parasitica	Fallen Ladys Tresses	

Agency Protection Status Codes

State--Animals

- S/X - Extinct (Group I, AGFD)
- S/E - Endangered (Group II, AGFD)
- S/T - Threatened (Group III, AGFD)
- S/C - Special Concern (Group IV, AGFD)

State--Plants

- S/B - Arizona Native Plant Law, Sec. 3-901.B
- S/C - Arizona Native Plant Law, Sec. 3-901.C

Federal--Plants and Animals

- LE - Listed Endangered (USFWS)
- LT - Listed Threatened (USFWS)
- PE - Proposed Endangered (USFWS)
- PT - Proposed Threatened (USFWS)
- C1 - Category 1--Appears to be a good candidate (USFWS)
- C2 - Category 2--Probably a good candidate; needs more study (USFWS)
- C3C - Category 3C--More abundant and/or widespread than originally thought; no recognizable threat (USFWS)

- SE - Sensitive (USFS)

- SC - Sensitive Candidate (BLM)
- SB - Sensitive Bureau (BLM)

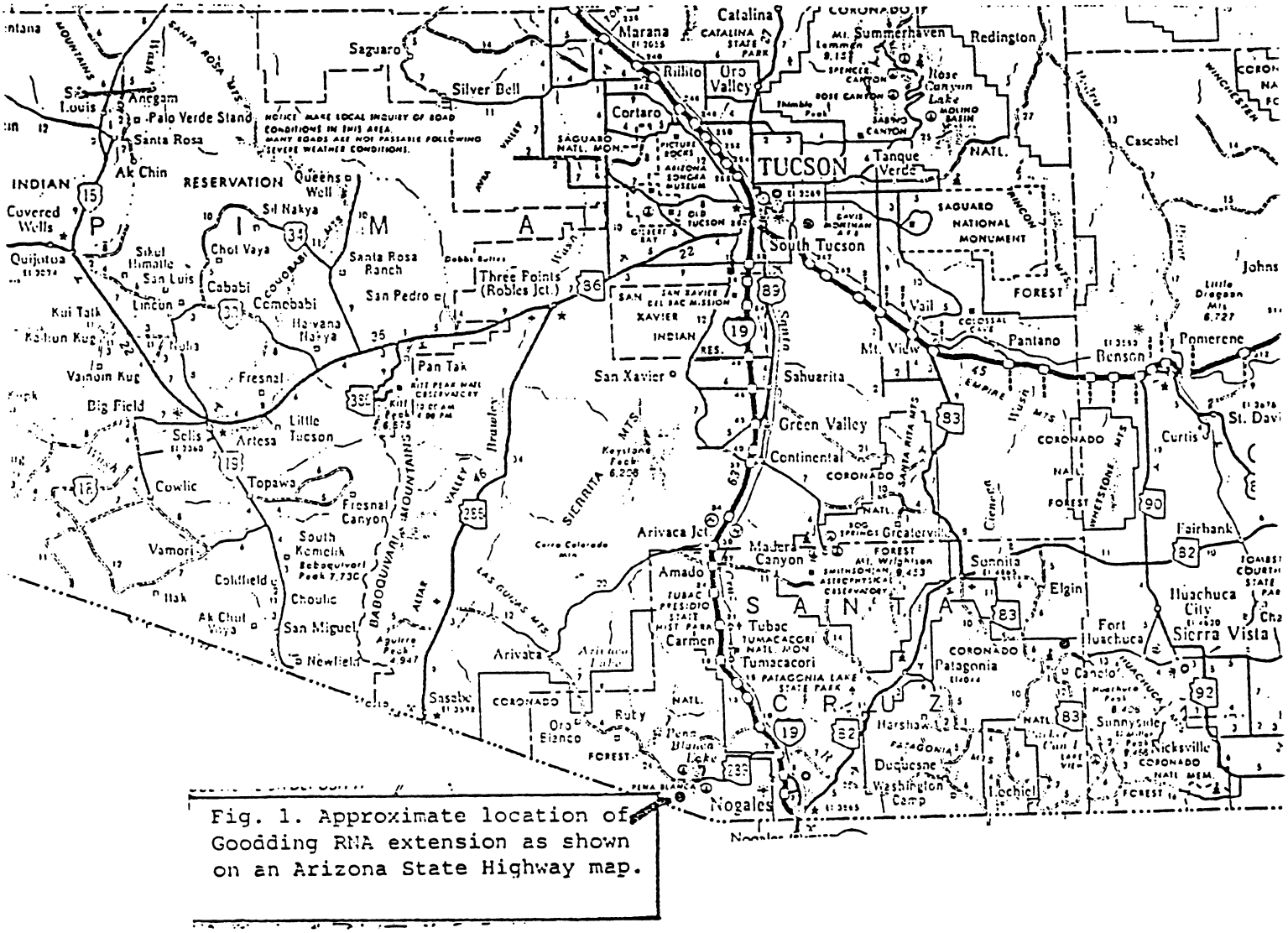


Fig. 1. Approximate location of Goodding RNA extension as shown on an Arizona State Highway map.

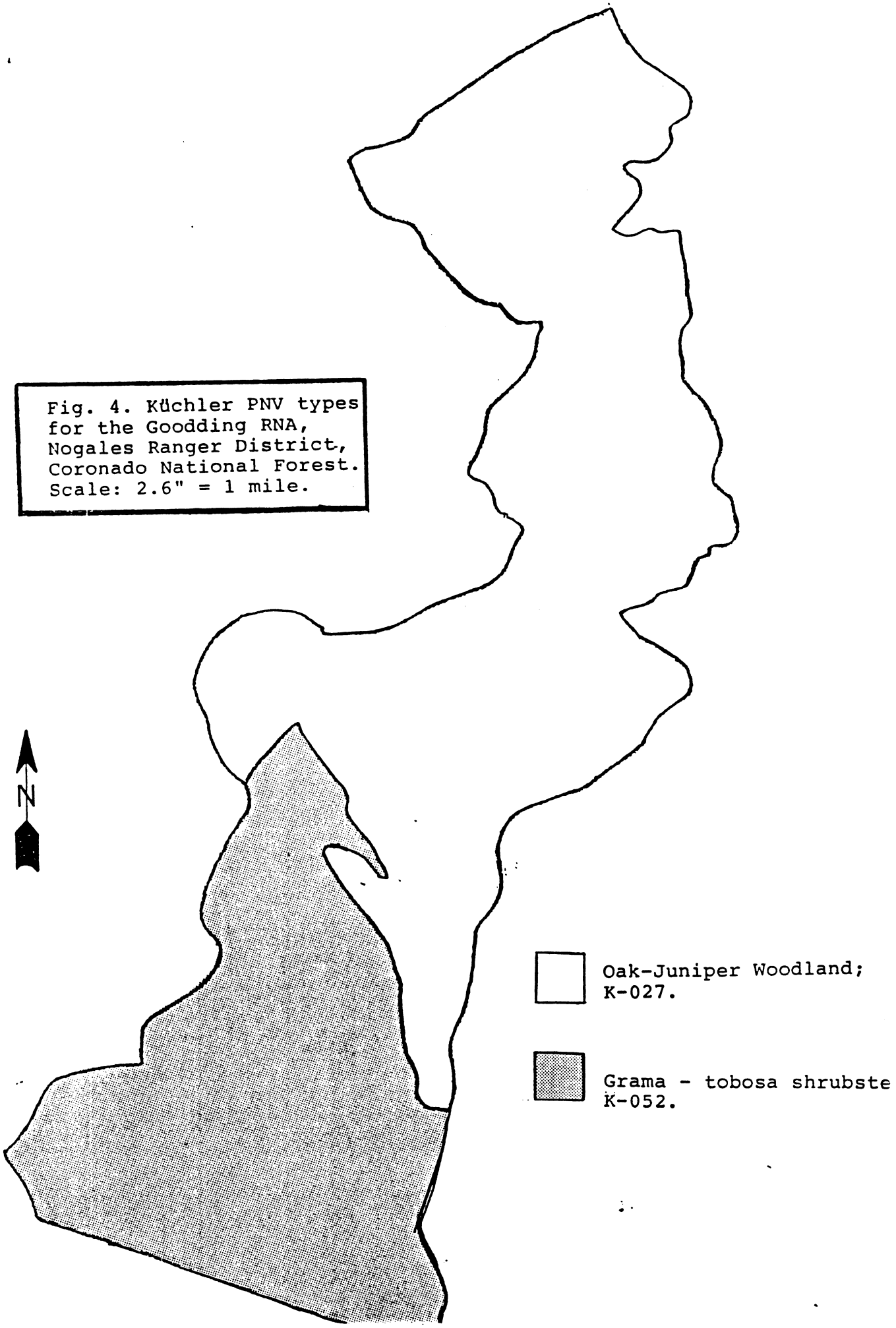


Fig. 4. Küchler PNV types for the Goodding RNA, Nogales Ranger District, Coronado National Forest. Scale: 2.6" = 1 mile.

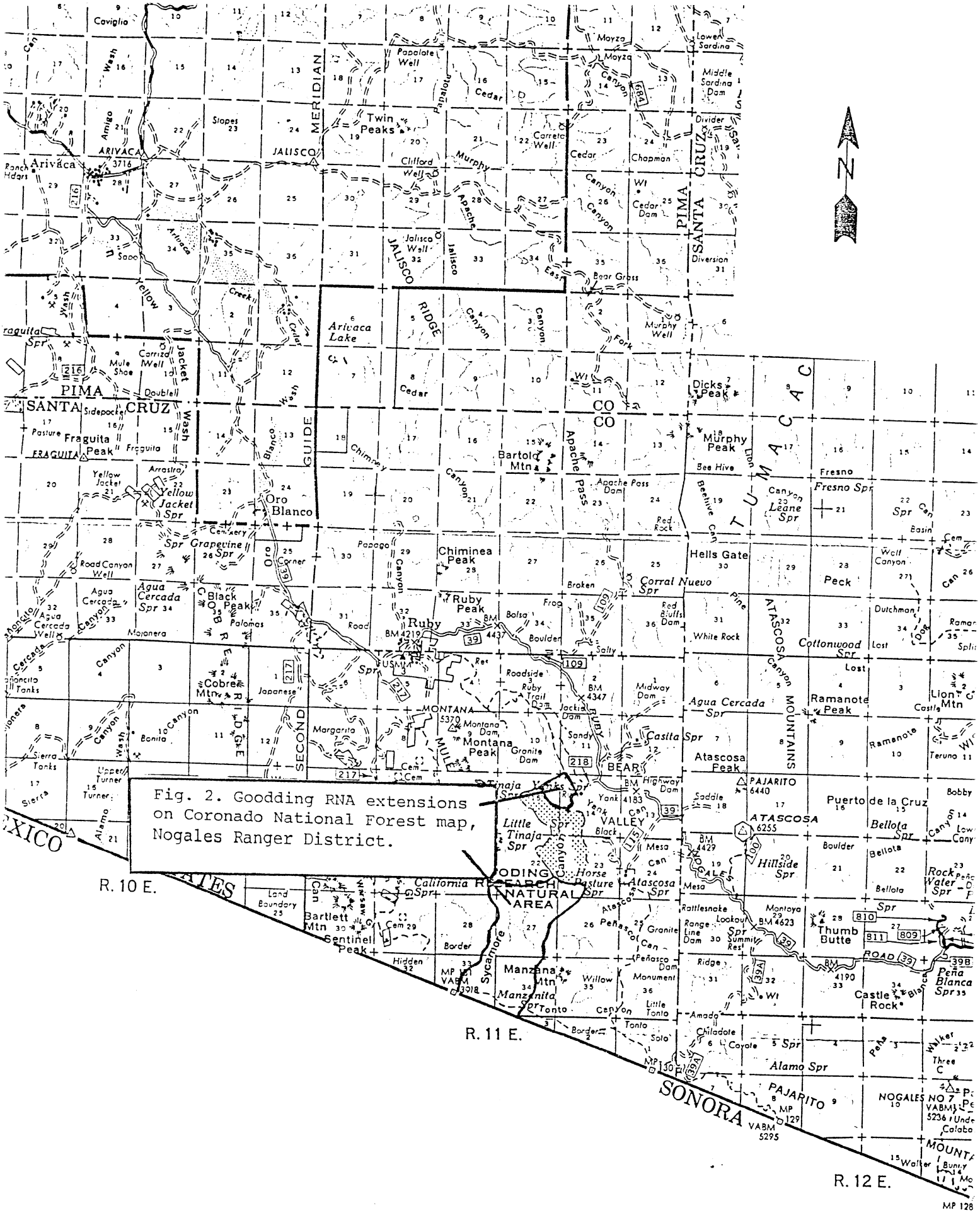


Fig. 2. Goodding RNA extensions on Coronado National Forest map, Nogales Ranger District.

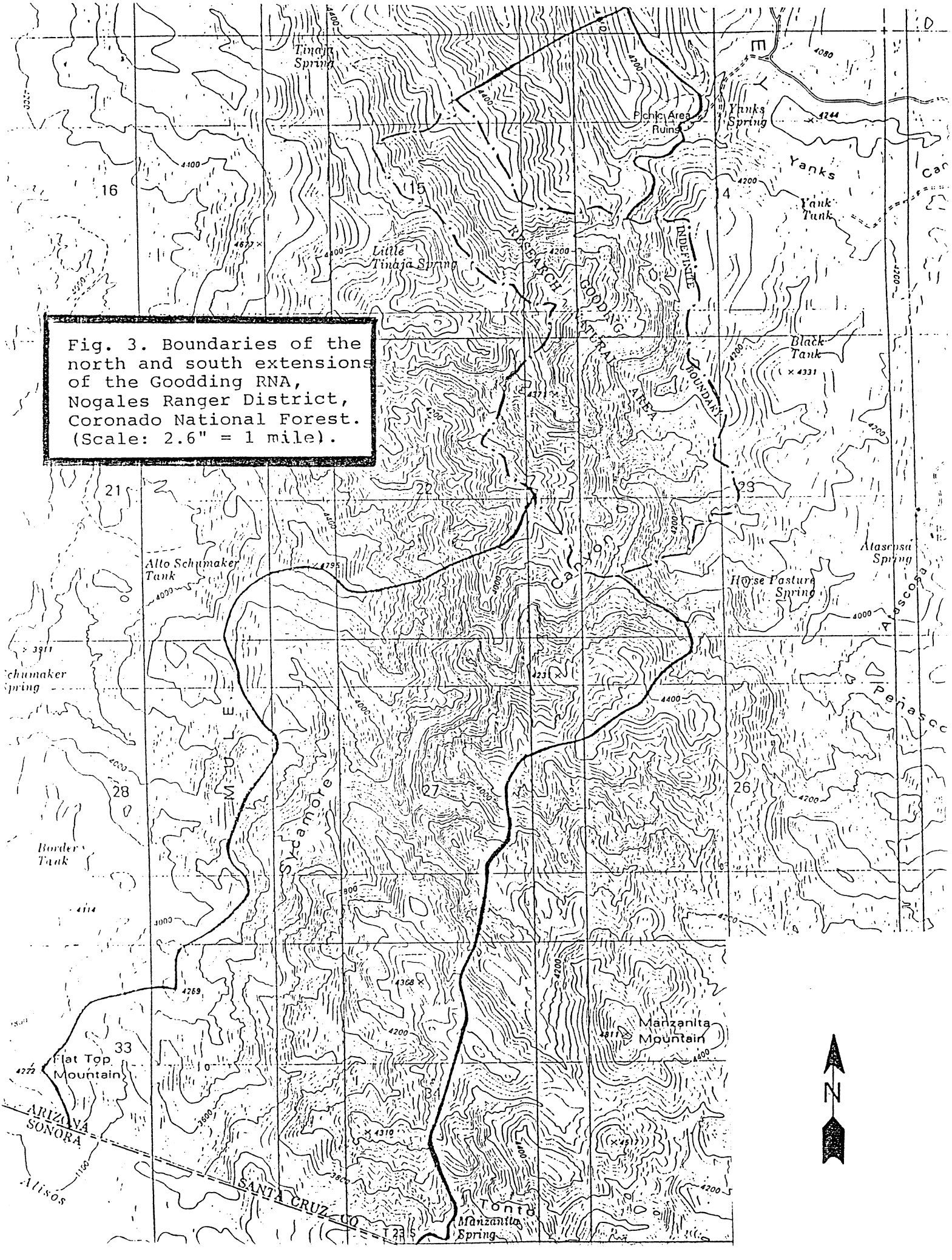


Fig. 3. Boundaries of the north and south extensions of the Goodding RNA, Nogales Ranger District, Coronado National Forest. (Scale: 2.6" = 1 mile).

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

PHOTOGRAPHER: Mark Severson

DATE SUBMITTED: 12/22/92

HEADQUARTERS UNIT:

LOCATION:

INITIAL DISTRIBUTION OF PRINTS AND FORM 1600-11

☐ WO ☐ RO ☐ DIV. ☐ FOREST ☐ DISTRICT ☐ PHOTOGRAPHER Date _____

INSTRUCTIONS: Submit to Washington Office in quadruplicate. Permanent numbers will be assigned and the forms will be distributed as follows: (1) Washington Office, (2) RO or Station, (3) Forest or Center and (4) Photographer.

PHOTOGRAPH NUMBER		SELECTED FOR W.O. PHOTO LIBRARY	DATE OF EXPOSURE	LOCATION (State, Forest, District and County)	CONCISE DESCRIPTION OF VIEW	NEGATIVE (Show size and BW for black and white or C for color)
TEMP. (1)	PERMANENT (To be filled in by the WO) (2)	(3)	(4)	(5)	(6)	(7)
			10/25/92	ALL Arizona, Coronado NF, Nogales District Santa Cruz County	Goodding RNA	All 24 x 36mm color slides
1.					Open oak woodland in northern extension, Blue oak (Quercus oblongifolia)/ mixed grama (Bouteloua spp.) habitat type.	
2.					Open oak woodland in northern extension, Blue oak (Quercus oblongifolia)/ mixed grama (Bouteloua spp.) habitat type.	
3.					Steep north-facing hillsides above Sycamore Canyon, Emory oak (Quercus emoryi)/ pointleaf manzanita (Arctostaphylos pungens) habitat type.	
4.					Narrow riparian corridor of Sycamore Canyon, mixed-decidous broadleaf riparian forest dominated by Arizona Sycamore (Platanus wrightii), Bonpland willow (Salix bonplandiana) and Arizona ash (Fraxinus pennsylvanica var velutina).	
5.					Narrow riparian corridor of Sycamore Canyon, mixed-decidous broadleaf riparian forest dominated by Arizona Sycamore (Platanus wrightii), Bonpland willow (Salix bonplandiana) and Arizona ash (Fraxinus pennsylvanica var velutina).	
6.					Scrub-grassland type on south-facing slopes in southern extension. Saguaro cactus (Cereus giganteus) occur sporadically.	
7.					Scrub-grassland type on south-facing slopes in southern extension. Saguaro cactus (Cereus giganteus) occur sporadically.	

USDA-FOREST SERVICE

PHOTOGRAPHIC RECORD

(See FSM 1643.52)

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Mark Severson	12/22/92
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TEMP. (1)	PERMANENT (To be filled in by the WO) (2)	(3)	(4)	(5)	(6)	(7)
8.					Open oak woodland and scrub-grassland ecotone, southern extension.	
9.					Corypantha recurvata, rare cactus within Goodding RNA	