ESTABLISHMENT RECORD

for

SAN FRANCISCO PEAKS RESEARCH NATURAL AREA AND EXTENSIONS

within

Coconino National Forest

Coconino County, Arizona

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

San Francisco Peaks Research Natural Area and Extensions

Coconino National Forest

Coconino County, Arizona

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INTRODUCTION

The San Francisco Peaks Research Natural Area (SFPRNA) is located on the west slope of Humphreys Peak about 15 miles (24 km) north of Flagstaff, Arizona. The area is within the Flagstaff Ranger District of the Coconino National Forest, in Coconino County, and is reserved, public domain National Forest land. The original RNA boundary area and two extensions are within the Kachina Peaks Wilderness designated by Congress in 1984.

The two extensions were put forward by the Regional RNA Task Force (USDA Forest Service, 1984). This document provides information on the expanded RNA of 1,289 acres (521.7 hectares) with special emphasis on the two extensions.

LAND MANAGEMENT PLANNING

The current Coconino National Forest planning documents, the Environmental Impact Statement and Forest Plan (USDA Forest Service, 1987a/1987b), include the San Francisco Peaks RNA extensions. The environmental analysis conducted as part of the planning process supports the recommendation to extend the original RNA boundary.

JUSTIFICATION STATEMENT FOR ESTABLISHMENT OF AREA

The need for representation of bristlecone pine (Pinus aristata) / (Pinus flexilis) limber pine forest and Rocky Mountain alpine tundra was identified in the Southwestern Regional Guide (USDA Forest Service, 1983). The SFPRNA was established in 1935 to protect representative alpine and subalpine communities in northern Arizona. The objectives for augmenting the original boundary area are:

1). To provide greater representation of bristecone pine and alpine tundra communities in the Southwest RNA system.

2). To provide opportunities for monitoring long-term ecological changes in alpine and subalpine environments in Arizona.

3). To maintain genetic diversity in Arizona's only true, alpine tundra ecosystem.

PRINCIPAL DISTINGUISHING FEATURES

The two extensions expand the acreage of alpine tundra and bristlecone pine communities in the RNA. Both bristlecone pine and alpine tundra communities occur nowhere else in the State of Arizona except on the San Francisco Peaks. These communities also provide habitat for 45 species of plants, which are largely

restricted in their Arizona distribution to the San Francisco Peaks. Especially noteworthy are two endemics, the San Francisco Peaks groundsel (Senecio franciscanus), a Federally listed threatened species (USDI Fish and Wildlife Service, 1985), and a buttercup, Ranunculus inamoenus var affinis. Both plants are associated with the alpine tundra in the original boundary area and the eastern extension.

LOCATION

The SFPRNA is located within the Flagstaff Ranger District of the Coconino National Forest in Coconino County, Arizona (Figs. 1 & 2). The area is located at latitude 35°21′ north and longitude 111°41′ west. The western extension is located in section 24 of T23N R6E, and the eastern extension is located in sections 20 and 29 of T23M R7E. Both extensions are included on the USGS Humphreys Peak 7.5′ topographic quadrangle (Fig. 3). The boundary of the eastern extension follows the 12,000 foot contour northeast from the southeast corner of the original boundary and then follows a ridgeline to the northeast corner of the original boundary. This eastern extension encompasses 165 acres (67 hectares) and includes the entire upper west slope below HUmphrey's Peak. The western extension adds 100 acres (42 hectares) to the northwest corner of the original RNA. Elevation ranges from about 10,600 to 12,000 feet (3,233 to 3,660 m) in the eastern extension to about 8,900 to 9,700 feet (2,715 to 2,959 m) in the western extension.

To reach the RNA, one must travel north from Flagstaff on U.S. Highway 180 to the Arizona Snow Bowl turnoff. The latter is 7.5 miles (12.1 km) northwest of Flagstaff. The road to the Snow Bowl is a winding dirt road, 7.7 miles (12.4 km) long. The elevation changes from 7,340 feet (2239 m) at the Snow Bowl turnoff to 9,520 feet (2904 m) at the end of the road, however the road is not steep or difficult to negotiate. To reach the RNA site from the Snow Bowl requires a hike of about one mile through heavy timber. To reach the eastern boundaries of the area requires about a two-hour hike up a very steep grade through dense forest that is laced with deadfall timber and boulders, (reproduced from Smith, 1974). The western boundary of the western extension can be reached by traveling to the end of FS Road 267.

AREA BY COVER TYPES

Information on cover types was obtained from the Flagstaff Ranger District, Rominger and Paulik (1983) and the Region 3 RNA Progress Report (USDA Forest Service, 1984).

Küchler

Eastern Extension: The Küchler types found in this extension are Alpine Meadows and Barren, K-045, and Southwestern Spruce--Fir Forest, K-020.

Western Extension: The Küchler type found in this extension is Southwestern Spruce-Fir Forest, K-020.

Society of American Foresters

Eastern Extension: Engelmann spruce (Picea engelmanni)-Subalpine fir (Abies lasiocarpa var arizonica), SAF 206, is the SAF cover type present (Fig. 4).

Western Extension: Engelmann spruce - Subalpine fir, SAF 206, and Bristlecone pine, SAF 209, are the SAF cover types present.

Habitat Types or Plant Associations

Eastern extension: Includes several habitat types or plant associations described by Rominger and Paulik (1983). These are Pinus aristata, Geum rossii/Carex bella, and Primula parryi communities.

Western extension: Includes several habitat types or plant associations described by Rominger and Paulik, (1983). These are Abies lasiocarpa/Lathyrus arizonica, and Abies lasiocarpa/Erigeron superbus habitat types and Pinus aristata and Populus tremuloides communities.

Table 1. Estimated areas of vegetative cover types in the SFPRNA Extensions.

Type	Society of American Foresters Type[1]	Küchler Type[2]	Surface Area Acres	Hectares
EASTERN EXTENSION				
Alpine Tundra	Non-forest	K-045	136.8	55.4
Engelmann Spruce/ Subalpine Fir	SAF 206	K-014	27.9	11.3
WESTERN EXTENSION				
Engelmann Spruce/ Subalpine Fir	SAF 210	K-011	86.0	34.8
Bristlecone Pine	SAF 209		14.1	5.7
		TOTAL	264.8	107.2

[1] Society of American Foresters Cover Type, Eyre (1980).
[2] Küchler Natural Vegetation Type, Küchler (1964).

PHYSICAL AND CLIMATIC CONDITIONS

The San Francisco Peaks are a large, composite volcano which include Humphreys Peak, the highest point in Arizona. Both extensions are located on the west slope of this peak. The area is an outstanding example of past volcanic activity and preserves the best example of Ice Age glaciation in Arizona in lateral and medial moraines and former stream beds.

The elevation of the extended SFPRNA varies from about 8,900 to 12,000 feet (2715 to 3660 m). Topographically, the area is very steep with elevational changes of 2,200 feet (671 m) occurring over one mile (1.7 km) between the southwest and southeast corners of the site. The site is best characterized by steep, mountainous terrain, including several parallel canyons and talus slopes which drain westward.

There is marked seasonal climatic variation at the RNA. Temperatures range from - 50° in winter to the 70's in the summer. Freezing temperatures may occur during any month of the year and winters are normally characterized by moderated to heavy deposition of snow. Average annual precipitation is about 35 inches, of which about 12 inches falls during the summer months in the form of rain. The majority of the remaining 23 inches falls during the autumn and winter months in the form of snow (reproduced from Smith,1974).

DESCRIPTION OF VALUES

Flora

The major portion of the original RNA is covered by heavily vegetated, subalpine forest dominated by Engelman spruce and corkbark fir with smaller stands of bristlecone pine, quaking aspen (Populus tremuloides) and alpine tundra. The extensions serve to increase the acreage of bristlecone pine forest and alpine tundra in the SFPRNA. The plant associations in the original area have received detailed study by Rominger and Paulik (1983). Several of the plant communities described in this study occur in the extensions, and we refer the reader to this study for a complete description of plant communities.

There are 45 plant species that are largely restricted in their Arizona deistribution to the San Francisco Peaks, and most of these are known to occur in the SFPRNA. Two endemics are especially noteworthy, San Francisco Peak groundsel, (listed as threatened by the USFWS), occurs on the gravelly talus slopes of the alpine and subalpine environments of the RNA and a buttercup, Ranunculus inamoenus var affinis occurs commonly in the moist meadows of the alpine tundra in the original RNA and eastern extension.

For a complete list of plants known from the original RNA refer to Rominger and Paulik (1983). A detailed survey of the extensions has not been undertaken but in addition to the aforementioned flora, two additional floras (Schaack, 1983; Paulik, 1979) have been compiled for the alpine and subalpine

environments. Together these three studies provide a good working list of plants to be expected in the extensions.

Fauna

The following animal list was derived from the RUN WILD III computer-stored data base (Lehmkuhl and Patton, 1982) for Alpine Tundra biome (111.000) and Subalpine Conifer Forest and Woodland biome, Bristlecone Pine - Limber Pine series (211.100). No threatened or endangered animals are known from the area.

An Abbreviated Animal List For SFPRNA

BIRDS:

Bluebird, Mountain	*Sialia currucoides*
Common Bushtit	*Psaltriparus minimus*
Chickadee, Mountain	*Parus gambeli*
Brown Creeper	*Certhia americana*
Crossbill, Red	*Loxia curvirostra*
Eagle, Golden	*Aquila chrysaetos*
Falcon, Prairie	*Falco mexicanus*
Finch, Cassin's	*Carpodacus cassinii*
Finch, Rosy	*Leucosticte arctoa*
Flicker, Northern	*Colaptes auratus*
Flycatcher, Western	*Empidonax difficilis*
Goshawk, Northern	*Accipiter gentilis*
Hummingbird, Broad-tailed	*Selasphorus platycercus*
Jay, Steller's	*Cyanocitta stelleri*
Junco, Dark-eyed	*Junco hyemalis*
Kestrel, American	*Falco sparverius*
Kinglet, Ruby-crowned	*Regulus calendula*
Lark, Horned	*Eremophila alpestris*
Nutcracker, Clark's	*Nucifraga columbiana*
Nuthatch, Pygmy	*Sitta pygmaea*
Nuthatch, Red-breasted	*Sitta canadensis*
Owl, Great-horned	*Bubo virginianus*
Owl, Long-eared	*Asio otus*
Pipit, Water	*Anthus spindletta*
Poorwill, Common	*Phalaenoptilus nuttallii*
Raven, Common	*Corvus corax*
Robin, American	*Turdus migratorius*
Sapsucker, Williamson's	*Sphyrapicus thyroideus*
Siskin, Pine	*Carduelis pinus*
Solitaire, Townsend's	*Myadestes townsendi*
Sparrow, Lincoln's	*Melospiza lincolnii*
Sparrow, White-crowned	*Zonotrichia leucophrys*
Swallow, Violet-green	*Tachycineta thalassina*
Tanager, Western	*Piranga ludoviciana*
Thrush, Hermit	*Catharus guttatus*
Vireo, Solitary	*Vireo solitarius*
Vulture, Turkey	*Cathartes aura*
Warbler, Grace's	*Dendroica graciae*

Waxwing, Cedar	Bombycilla cedrorum
Woodpecker, Three-toed	Picoides tridactylus
Wren, House	Troglodytes aedon
Wren, Rock	Salpinctes obsoletus

MAMMALS:

Bat, Hoary	Lasiurus cinereus
Bat, Silver-haired	Lasionycteris noctivatgans
Chipmunk, Cliff	Tamius dorsalis
Chipmunk, Colorado	Tamius quadrivittatus
Chipmunk, Least	Tamius minimus
Cottontail, Eastern	Sylvilagus floridanus
Gopher, Northern Pocket	Thomomys talpoides
Mouse, Deer	Peromyscus maniculatus
Myotis, Long-legged	Myotis volans
Shrew, Dwarf	Sorex nanus
Shrew, Vagrant	Sorex vagrans
Squirrel, Golden-mantled	Spermophilus lateralis
Red Squirrel	Tamiasciurus hudsonicus
Vole, Long-tailed	Microtus longicaudus
Weasel, Long-tailed	Mustela frenata
Woodrat, Bushy-tailed	Neotoma cinerea

Geology

Entire area is underlain by Quaternary and Tertiary age volcanics: rhyolitic to andesitic flows, cinders, ash and tuff (Arizona Department of Transportation, 1975).

Soils

Soils vary significantly with the underlying geologic material. Soils associated with Rhyolite are classified as Dystric Cryochrepts, loamy-skeletal, mixed while the soils associated with Andesite are mainly Typic Cryoboralfs, loamy-skeletal, mixed (USDA Forest Service, 1986).

Cultural Resources

The two areas to be added to the SFPRNA have never been surveyed for cultural resources. Although one prehistoric site has been recorded near Bismarck Lake, west of the western addition, the potential for cultural resources in the proposed additions is very low. However, the additions are in areas sacred to many Native American groups and pertinent tribes will be consulted for their comments.

Since the extended boundaries of the San Francisco Peaks RNA will cause no change to the character of the area, there will be no effect upon cultural resources by inclusion of the western and eastern extensions. In fact, there will be a beneficial effect to cultural resources since designation as a RNA prohibits project developments.

IMPACTS AND POSSIBLE CONFLICTS

Mineral Resources

Both areas lie within the Kachina Peaks Wilderness and are withdrawn from mineral entry. Also, there are no existing claims that were made prior to the wilderness designation.

Grazing

No impacts and/or possible conflicts on the grazing resource exists in relation to the RNA's annexation of two additional areas. The existing and extended boundaries of the RNA are not fenced. The area within these boundaries is generally classified a non-suitable rangeland: not grazable due to the dense timber and moderate to steep slopes. Although wildlife and livestock graze these areas to a light degree, the use occurs mainly at lower elevations and the small intermittent meadows and openings which occur within the boundaries. Construction of a boundary fence is possible, but not feasible for the area. The rocky soil, steep slopes, dense tree cover, heavy winter snow cover and heavy winter snow cover and heavy elk use prohibit the construction and intensive maintenance of a fence to exclude livestock.

If in the future, livestock concentrations and grazing use intensifies to a point that a fence is required to restrict grazing use from the RNA, it is recommended that three miles of fence be constructed on the west boundary, at a total estimated cost of $10,000.

The RNA and the extension areas lie within the Hart Prairie Unit of the Peaks Grazing Allotment. Because the RNA's existing and extended area are non-suitable to livestock grazing, (with excess forage available within other areas of the allotment), and the location is not restrictive to general livestock movements, or other range management needs, no issues or concerns are present for livestock and/or wildlife grazing requirements.

Timber

Both additions are within the existing Kachina Peaks Wilderness where timber values were previously withdrawn from the timber producing base.

Watershed

The annexation of two extension areas onto the San Francisco Peaks RNA has no conflicts or irretrievable impacts on the watershed resource.

The RNA and it's extension areas are split by two major watersheds, the Little Colorado River and the Sycamore watersheds. Watershed conditions for these areas are in excellent condition.

No issues or concerns have been identified in relation to the RNA and extension area's watershed conditions or the two major watersheds in which they flow.

Recreation Values

The areas are not accessible or near roads. There are no major trails through the areas and consequently receive very little general recreation use.

Wildlife and Plant Values

Senecio franciscanus, the San Francisco Peaks groundsel, is a Federally listed threatened species (USDI Fish and Wildlife Service, 1985) which occurs within the alpine habitat of the RNA. Senecio franciscanus is endemic to the San Francisco Peaks. Some of the other plant species found in the alpine habitat are limited in distribution in the Southwest.

Wilderness, Wild and Scenic River, National Recreation Area Values

Both areas are within the congressionally designated Kachina Peaks Wilderness.

Transportation

None due to wilderness designation.

MANAGEMENT PLANNING

Land Management Planning

The SFPRNA is recommended in the Coconino National Forest Plan Management Area 17 (see Appendix). Management emphasis is protect watershed condition and maintain natural ecological conditions so that the RNMA is available for research and education that does not disturb the area's natural conditions. Use restrictions are imposed as necessary to keep areas in their natural or unmodified condition. The RNA is closed to ORV use.

Vegetation Management

There is no harvest of timber products, including firewood. The RNA is assigned no grazing capacity and will be fenced as necessary to protect. Prescribed fire, using planned ignitions, will be used as a management tool provided its use is compatible with the resources being managed. Suppression tactics will be used that minimize damage to the character of the RNA. Fires in the area will be allowed to burn undisturbed unless they threaten persons or property outside of the area, or they threaten the uniqueness of the area.

ADMINISTRATIVE RECORDS AND PROTECTION

Administration and protection of the SFPRNA and extensions will be the responsibility of the Coconino National Forest. The District Ranger, Flagstaff Ranger District, Flagstaff, AZ has direct responsibility.

The Director of the Rocky Mountain Forest and Range Experiment Station, or his designee, will be responsible for any

studies or research conducted in the area, and request to conduct research in the area should be referred to him. He, or his designee, will evaluate research proposals and coordinate all studies and research in the area with the District Ranger and RNA research coordinator. All plant and animal specimens collected in the course of research conducted in the area will be properly preserved and maintained within university or federal agency herbaria and museums, approved by the Rocky Mountain Station Director.

Records for the San Francisco Peaks (Extensions) RNA will be maintained in the following offices:

Regional Forester, Southwestern Region, Albuquerque, NM
Rocky Mountain Station, Fort Collins, CO
Coconino National Forest, Flagstaff, AZ
District Ranger, Flagstaff Ranger District, Flagstaff, AZ

REFERENCES

Arizona Department of Transportation. 1975. A Materials Inventory of Coconino County: Arizona Highway Division, Phoenix, Arizona.

Billings, W.D. and H.A. Mooney. 1968. The Ecology of Arctic and Alpine Plants. Biol. Rev., 43:481-530.

Carothers, S.W., J.R. Halderman and R.P. Balda. 1973. Breeding birds of the San Francisco area and the White Mountains, Arizona. Museum of Northern Arizona Technical Series No. 12.

Eyre, F.H., ed. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, D.C. 148 pp.

Goodwin, Greg. 1978. An assessment of impacts created by past and present development on the alpine tundra zone of the San Francisco Peaks. Unpubl. USDA Forest Service Report.

Küchler, A.W. 1964. Potential natural vegetation of the coterminous United States. American Geographical Society, Special Publication 36, 119 pp.

Lehmkuhl, John F. and David R. Patton. 1984. Run Wild, Wildlife/Habitat relationships: user's manual for the Run Wild III data storage and retrieval system. USDA Forest Service, Southwestern Region, Wildlife Unit Technical Report, 68 pp.

Little, Elbert L., Jr. 1941. Alpine flora of the San Francisco Mountain, Arizona. Madrono 6:65-81.

Marr, J.W. and B.E. Willard. 1970. Persisting Vegetation in an Alpine Recreation Area in the Southern Rocky Mountains, Colorado. Biol. Cons., 2 (2): 97-104.

Mathiasen, Robert L., and Frank G. Hawksworth. 1980. Taxonomy and Effects of Dwarf Mistletoe on Bristlecone Pine on the San Francisco Peaks, Arizona. USDA Forest Service Research Paper RM-224, 9 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Merriam, C.H. 1980. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado in Arizona. North American Fauna 3. 136 p., 13 plates, 5 maps. USDA, Division of Ornithology and Mammalogy, Washington, D.C.

Moir, William H., and John A. Ludwig. 1979. A classification of spruce-fir and mixed conifer forest habitat types in Arizona

and New Mexico. USDA Forest Service Research Paper RM-207, 47 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Moore, Thomas C. 1965. Origin and disjunction of the alpine tundra flora on San Francisco Mountain, Arizona, Ecology 46:860-864.

Pase, Charles P. 1982. 111.5 Alpine Tundra. Pp. 27-33. IN: D.E. Brown (Ed.) Biotic Communities of the American Southwest-United States and Mexico. Desert Plants Vol. 4(Nos.1-4) Special Issue. 324 pp.

Pase, Charles P. and David E. Brown. 1982. 121.3 Rocky Mountain (Petran) Subalpine Conifer Forest. Pp. 36-39. IN: D.E. Brown (Ed.) Biotic Communities of the American Southwest-United States and Mexico. Desert Plants Vol. 4(Nos.1-4) Special Issue. 324 pp.

Paulik, Laurie A. 1979. A vascular flora of the sub-alpine spruce-fir forest of the San Francisco Peaks, Arizona. 94 pp. M.S. thesis, Northern Arizona University, Flagstaff, AZ.

Pominger, James M. and Laurie A. Paulik. 1983. A floristic inventory of plant communities of the San Francisco Peaks Research Natural Area. USDA Forest Service General Technical Report. RM-96, 9 pp.

Schaack, C.C. 1983. The alpine vascular flora of Arizona. Madrono 30 (4) Suppl.: 79-88.

Smith, E.L. 1974. Established Natural Areas in Arizona-A Guide Book for Scientists and Educators. Arizona Academy of Sciences, for Office of Economic Planning and Development, State of Arizona. Phoenix. 300 pp.

Thilenius, J.F. 1975. Alpine Range Management in the Western United States. Principles, Practices, and Problems. USDA Forest Service, Res. Paper RM-157.

USDA Forest Service. 1983. Regional guide for the Southwestern Region. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDA Forest Service. 1984. Progress report, Research Natural Areas: recommended representations for important ecosystems on National Forest System Land in the Southwestern Region. USDA Forest Service, Southwestern Region, Albuquerque, NM 90 pp.

USDA Forest Service. 1986. Terrestrial Ecosystem Handbook, Appendix B. USDA Forest Service, Region 3, Albuquerque, NM.

SDA Forest Service. 1987a. Environmental Impact Statement for the Coconino National Forest Plan. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDA Forest Service. 1987b. Coconino National Forest Plan. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDI Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; review of plant taxa for listing a endangered of threatened species; notice of review. Federal Register Vol.50 No.188:39526-39527.

Willard, B. and S. Marr. 1970. Effects of Human Activities on Alpine tundra ecosystems in Rocky Mountain National Park, Colo. Biol. Cons. 2 (4): 257-265.

Willard, B. and S. Marr. 1971. Recovery of alpine tundra under protection after damage by human activities in the Rocky Mountain of Colorado. Biol. Cons. 3 (3): 181-190.

APPENDIX

The following pages have been reproduced from the Coconino National Forest Plan.

Research Natural Areas

USDA Forest Service, Rocky Mountain, Intermountain, Southwestern and Great Plains States

SEARCH RNAs BY

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Northern Region,
Rocky Mountain Region,
Southwestern Region,
Intermountain Region,
Rocky Mountain Research
Station,
and the
Montana Natural Heritage
Program

SAN FRANCISCO PEAKS

General Information S.USNAHP*84

- Created: 1931
- Size: 1024 (acres)
- Elevation Range: 9300 - 12100ft
- Location: *San Francisco Peaks RNA is situated on the west slope of Mt. Humphreys about 15 miles north of Flagstaff. The RNA lies within the San Francisco Mountain Wilderness.*

Site Description

San Francisco Peaks RNA features bristlecone pine (Pinus longaeva) and spruce-fir forests and alpine vegetation. This location is one of only two places in Arizona which is above treeline. The dwarf shrub and alpine turf communities support a number of rare (disjunct) plant species including the Peaks groundsel (Senecio franciscanus).

Climate and Enviromental Information

Data not Available

Vegetation - San Francisco Peaks

Bristlecone Pine (SAF 209) Engelmann Spruce-Subalpine Fir (SAF 206)

SAN FRANCISCO PEAKS RESEARCH NATURAL AREA

ABSTRACT

This natural area consists of 1,024 acres (414 ha) composed principally of a dense stand of mixed cork-bark fir and Engelmann spruce. Bristlecone pine is found at higher elevations on the site.

The site is characterized by steep mountainous terrain with an elevational range of 9,300 feet to 12,100 feet above sea level. The area is located at 35° 21' N. Lat., 111° 41' W. Long. in the Coconino National Forest, Arizona and is administered by the U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station.

Location

The San Francisco Peaks Research Natural Area (SFPRNA) is situated on the west slope of Mt. Humphreys, an extinct volcano, about 15 miles (24.2 km) north of Flagstaff, Coconino County, Arizona. The site, covering 1,024 acres, includes all of Section 30 and part of Section 19 of T. 23N., R. 7E. The southern edge of the natural area is 0.8 miles north and 0.2 miles east of the Arizona Snow Bowl (See Map, Figure 1).

Access and Accommodations

To reach SFPRNA, one must travel north from Flagstaff on U.S. Highway 180 to the Arizona Snow Bowl turnoff. The latter is 7.5 miles (12.1 km) northwest of Flagstaff. The road to the Snow Bowl is a winding dirt road, 7.7 miles (12.4 km) long. The elevation changes from 7,340 feet at the Snow Bowl turnoff to 9,520 feet at the end of the road, however the road is not steep or difficult to negotiate.

To reach the natural area site from the Snow Bowl requires a hike of about one mile through heavy timber. To reach the eastern boundaries of the area requires about a two-hour hike up a very steep grade through dense forest that is laced with deadfall timber and boulders. There are no hiking trails into the area.

The nearest indoor accommodations are on U.S. 180 at the Snow Bowl turnoff. The city of Flagstaff also has numerous motels and other accommodations. There are no developed campgrounds or trailer facilities in the immediate vicinity of the natural area.

Climate

There is marked seasonal climatic variation at the SFPRNA. Temperatures range from -50° in winter to the 70's in the summer. Freezing temperatures may occur during any month of the year and winters are normally characterized by moderate to heavy deposition of snow. Average annual precipitation is about 35 inches, of which about 12 inches falls during the summer months in the form of rain. The majority of the remaining 23 inches falls during the autumn and winter months in the form of snow.

Topography and Landform

The elevation of SFPRNA varies from about 9,300 feet to 12,100 feet. Topographically, the area is very steep with elevational changes of 2,200 feet occurring over one mile between the southwest and southeast corners of the site. The site has a western exposure (is west facing) and is drained by several canyons that originate near timberline on Humphreys Peak. The largest canyon,

Whitehorse Canyon, is the northernmost canyon in the natural area. Canyons are boulder-strewn and difficult to walk through.

Geologically, the area is composed of volcanic rock including basalt, andesite, latite, dacite and rhyolite. As one approcahes timberline, the steep slopes are strewn with boulders which makes hiking a little difficult. The larger canyons are also strewn with loose volcanic rock and cinders. Some distance above timberline, the boulder fields give way to areas of soft, ankle-deep cinders interspersed between rock outcroppings.

Soils are poorly developed on the higher portions of the natural area and quite shallow on the forested slopes. There are areas of deeper alluvial soils upon which occur open alpine meadows and stands of aspen. Such areas are, however, restricted almost entirely to the lower elevations within, and adjacent to the natural area.

Biota

The dominant forest type that occurs on the SFPRNA is an association of Engelmann spruce (*Picea engelmannii*) and subalpine or cork-bark fir (*Abies lasiocarpa* var. *arizonica*). At lower elevations the above intermingles with aspen (*Populus tremuloides*), Douglas fir (*Pseudotsuga menziesii*) and scattered ponderosa pine (*Pinus ponderosa*). At higher elevations (ca. 11,400 feet), the cork-bark fir drops out and the dominant vegetation just below timberline consists of weather-stunted Engelmann spruce and bristlecone pine (*Pinus aristata*). The site consists of 953 acres of spruce-fir forest and 71 acres of bristlecone-spruce woods.

Understory vegetation is rather poorly developed except in open areas where sunlight easily reaches ground level. Lush open pockets of peavine (*Lathyrus leucanthus*), Lupine (*Lupinus argenteus*), cinquefoil (*Potentilla herpiana*) and Rocky Mountain iris (*Iris missouriensis*) are scattered over the lower slopes. At higher elevations, open areas have a similar floral composition with the addition of a tiny buttercup (*Ranunculus inamoenus*), purple gentian (*Gentiana barbellata*), primrose (*Primula parryi*) and Jacob's ladder (*Polemonium delicatum*).

Within the dense spruce-fir forest there is little understory growth. The shrubby understory consists mostly of rose (*Rosa arizonica*), gooseberry (*Ribes montigenum*), orange currant (*Ribes pinetorum*) and scattered elderberry (*Sambucus microbothrys*) plants. Below the shrub layer, in somewhat open areas and along small gullies, occur small stands of bluebells (*Mertensia franciscana*), violet (*Viola canadensis*), bisquit-root (*Lomatium nevadense*), golden columbine (*Aquilegia chrysantha*) and false Solomen's seal (*Smilacena stellata*). Other plant species that occur in the area are listed in Table 1.

The vertebrate faunas of SFPRNA are doubtless similar to these in comparable nearby areas that have been studied by Carothers, Haldeman and Balda (1973) and Hoffmeister and Carothers (1969). Table 2 lists vertebrate species that are known to occur in the area.

Research History

To our knowledge there have been no research projects conducted that have been specifically restricted to this site. However, Carothers and others (see above) have conducted and are conducting research projects in similar habitats in the San Francisco Peaks area and the classic studies of Merriam (1890) were conducted, in part, in the San Francisco Mountains.

Maps and Aerial Photographs

SFPNA may be located on the Humphreys Peak, Arizona, Topographic Quadrangle published (1966) by the U.S. Geological Survey. The Director of the Rocky Mountain Forest and Experiment

Station can provide information relative to other maps and recent aerial photographic coverage. Additional information may be obtained from the Coconino National Forest offices in Flagstaff, Arizona.

TABLE 1. A list of plant species known to occur on the San Francisco Peaks Research Natural Areas site. Voucher specimens are located in the herbarium at the Museum of Northern Arizona. Identifications were made by Michael Theroux of the Museum of Northern Arizona.

POLYPODIACEAE - Fern Family
- *Cystopteris fragilis* ..... bladder fern
- *Pteridium aquilinum* ..... braken fern

PINACEAE - Pine Family
- *Pinus aristata* ..... bristle-cone pine
- *Pinus ponderosa* ..... ponderosa pine
- *Picea engelmanni* ..... Engelmann spruce
- *Pseudotsuga menziesii* var. *glauca* ..... Douglas fir
- *Aibes lasiocarpa* var. *arizonica* ..... corkbark fir

GRAMINEAE - Grass Family
- *Festuca ovina* ..... fescue
- *Poa pratensis* ..... Kentucky blue grass
- *Poa fendleriana* ..... mutton grass
- *Dactylis glomerata* ..... orchard grass

CYPERACEAE - Sedge Family
- *Carex occidentalis* ..... sedge
- *Carex subfusca* ..... sedge
- *Carex geophila* ..... sedge

JUNCACEAE - Rush Family
- *Lazula parviflora* ..... wood-rush

LILIACEAE - Lily Family
- *Smilacina stellata* ..... starflower

IRIDACEAE - Iris Family
- *Iris missouriensis* ..... Rocky Mountain iris

ORCHIDACEAE - Orchis Family
- *Corallorhiza maculata* ..... coral-root

SALICACEAE - Willow Family
- *Populus tremuloides* ..... quaking aspen

CARYOPHYLLACEAE - Pink Family
- *Arenaria lanuginosa* ..... sandwort

RANUNCULACEAE - Crowfoot Family
- *Aquilegia chrysantha* ..... golden columbine
- *Ranunculus inamoenus* ..... buttercup
- *Thalictrum fendleri* ..... meadow-rue

BERBERIDACEAE - Barberry Family
- *Berberis repens* ..... creeping mahonia

CRUCIFERAE - Mustard Family
- *Thlaspi fendleri* ..... wild-candytuft
- *Draba aurea* ..... yellow draba

CRASSULACEAE - Orpine Family
- *Sedum rhodanthum* ..... stonecrop

SAXIFRAGACEAE - Saxifrage Family
- *Saxifraga rhomboidea* ..... saxifrage
- *Ribes montigenum* ..... gooseberry currant
- *Ribes pinetorum* ..... orange gooseberry

ROSACEAE - Rose Family
- *Fragaria ovalis* ..... strawberry
- *Potentilla Hippiana* ..... cinquefoil
- *Rosa arizonica* ..... wild rose

TABLE 1 (Continued)

LEGUMINOSAE - Pea Family
- *Lupinus argenteus* ..... lupine
- *Vicia americana* ..... vetch
- *Lathyrus leucanthus* ..... peavine

GERANIACEAE - Geranium Family
- *Geranium richardsonii* ..... cranesbill
- *Geranium caespitosum* ..... cranesbill

VIOLACEAE - Violet Family
- *Viola canadensis* ..... violet

UMBELLIFERAE - Parsley Family
- *Osmorhiza depauperata* ..... sweet-root
- *Lomatium nevadense* ..... biscuit-root

ERICACEAE - Heather Family
- *Moneses uniflora* ..... moneses

PRIMULACEAE - Primrose Family
- *Primula parryi* ..... primrose
- *Androsace septentrionalis* ..... rock jasmine

GENTIANACEAE - Gentian Family
- *Gentian barbellata* ..... blue gentian
- *Swertia radiata* ..... deers ears

POLEMONIACEAE - Phlox Family
- *Polemonium delicatum* ..... skunk-leaf

BORAGINACEAE - Borage Family
- *Mertensia franciscana* ..... bluebells

SCROPHULARIACEAE - Figwort Family
- *Besseya arizonica* ..... besseya
- *Castilleja linariaefolia* ..... paint-brush

CAPRIFOLIACEAE - Honeysuckle Family
- *Sambucus microbothrys* ..... elderberry

COMPOSITAE - Sunflower Family
- *Antennaria parvifolia* ..... pussy-toes
- *Helenium hoopesii* ..... orange sneeze-weed
- *Achillea lanulosa* ..... western yarrow
- *Taraxacum officinale* ..... dandelion
- *Agoseris arizonica* ..... mountain dandelion

TABLE 2. A partial listing of vertebrate species that occur on the San Francisco Peaks Research Natural Area site. Data relative to breeding birds are from Haldeman et. al. (1973) and mammal data from Hoffmeister and Carothers (1969). Bird species marked with an asterisk are known to breed in the area. Mammal species marked with an asterisk are known primarily from high boreal habitats in the Flagstaff area. Other mammals (no asterisk) may occur at SFPRNA but are more common in other habitats.

I. Birds
- * Coopers Hawk ..... *Accipiter cooperi*
- * Mourning Dove ..... *Zenaida macroura*
- * Broad-tailed Hummingbird ..... *Selasphorus platycercus*
- * Red-shafted Flicker ..... *Colaptes auratus*
- * Yellow-bellied Sapsucker ..... *Sphyrapicus varius*

TABLE 2 (Continued)

I. Birds (Continued)

* Williamson's Sapsucker	*Sphyrapicus thyroideus*
* Hairy Woodpecker	*Dendrocopos villosus*
* Western Flycatcher	*Empidonax dificilis*
* Western Wood Pewee	*Contopus sordidulus*
* Violet-green Swallow	*Tachycineta thalassina*
* Steller's Jay	*Cyanocitta stelleri*
* Clark's Nutcracker	*Nucifraga columbiana*
* Mountain Chickadee	*Parus gambeli*
* White-breasted Nuthatch	*Sitta carolinensis*
Red-breasted Nuthatch	*Sitta canadensis*
* Pygmy Nuthatch	*Sitta pygmaea*
* Brown Creeper	*Certhia familiaris*
* House Wren	*Troglodytes aedon*
* Robin	*Turdus migratorius*
* Hermit Thrush	*Catharus guttatus*
Mountain Bluebird	*Sialia currucoides*
* Townsend's Solitaire	*Myadestes townsendi*
* Warbling Vireo	*Vireo gilvus*
* Audubon's Warbler	*Dendroica auduboni*
* Grace's Warbler	*Dendroica graciae*
* Western Tanager	*Piranga ludoviciana*
* Black-headed Grosbeak	*Pheucticus melanocephalus*
* Pine Siskin	*Spinus pinus*
* Gray-headed Junco	*Junco caniceps*

II. Mammals

* Vagrant Shrew	*Sorex vagrans*
* Little Brown Myotis	*Myotis lucifragus*
Long-eared Myotis	*Myotis evotis*
Fringed Myotis	*Myotis thysanodes*
Long-legged Myotis	*Myotis volans*
* Small-footed Myotis	*Myotis subulatus*
Silvery-haired Bat	*Lasionycteris noctivagans*
Big-eared Bat	*Plecotus townsendii*
Golden-manteled Ground Squirrel	*Spermophilus lateralis*
Gray-collared chipmunk	*Eutamias cinereicollis*
* Red Squirrel	*Tamiasciurus hudsonicus*
Common Pocket Gopher	*Thomomys bottae*
Deer Mouse	*Peromyscus maniculatus*
Mexican Wood Rat	*Neotoma mexicana*
* Long-tailed Vole	*Microtus longicaudus*
Porcupine	*Erethizon dorsatum*
Black Bear	*Euarctos americanus*
Long-tailed Weasel	*Mustela frenata*
Striped skunk	*Mephitis mephitis*
Bobcat	*Lynx rufus*
Elk	*Cervus canadensis*
Mule Deer	*Odocoileus hemionus*

Formerly present, now extinct in area

Timber Wolf	*Canis lupis*
Grizzly Bear	*Ursus horribilis*
Mountain Sheep	*Ovis canadensis*

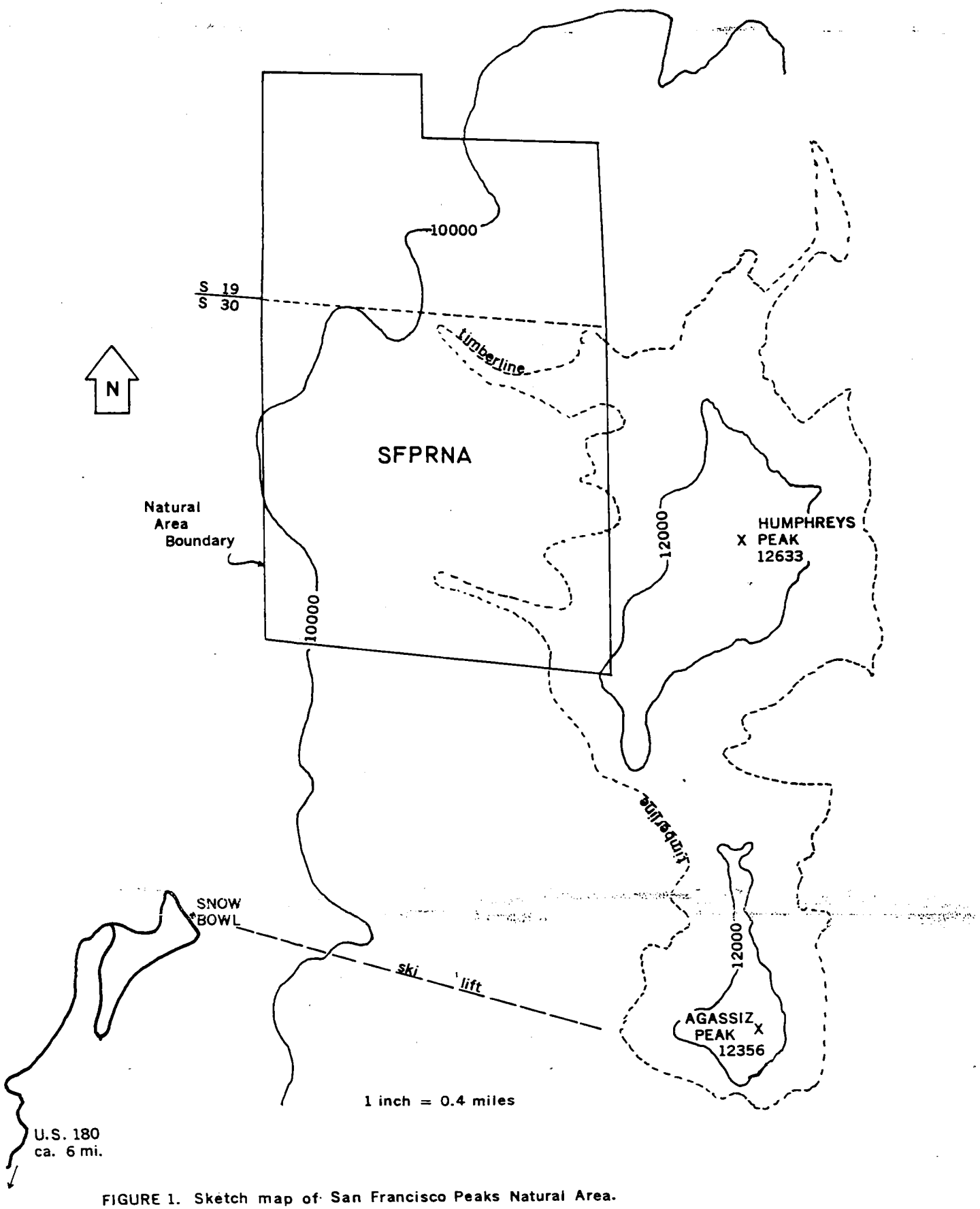

FIGURE 1. Sketch map of San Francisco Peaks Natural Area.

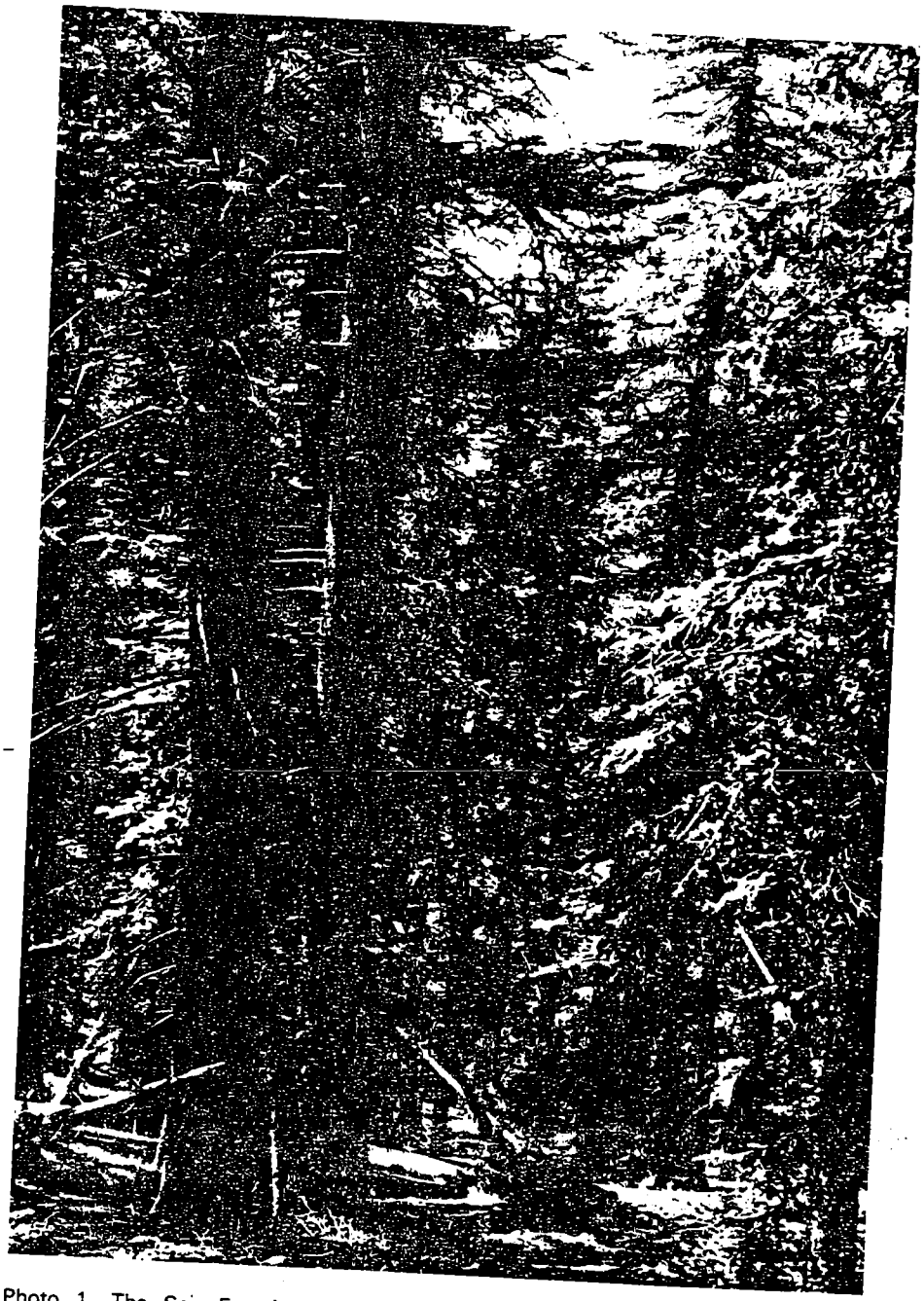

Photo 1. The San Francisco Peaks Research Natural Area showing dominant Engelmann spruce and subalpine fir.

Photo 2. Bristlecone pine growing just below timberline on Mt. Humphreys in the San Francisco Peaks Research Natural Area. Smaller trees in the background are Engelmann spruce.

LITERATURE CITED

Carothers, S. W., J. R. Haldeman and R. P. Balda
1973. Breeding birds of the San Francisco Mountain area and the White Mountains, Arizona. Museum of Northern Arizona Technical Series No. 12.

Hoffmeister, D. F. and S. W. Carothers
1969. Mammals of Flagstaff, Arizona. Plateau, 41:184-188.

LEGAL DESCRIPTION FOR THE EASTERN AND WESTERN EXTENSIONS
OF THE SAN FRANCISCO PEAKS RESEARCH NATURAL AREA

Coconino National Forest, Arizona

The Eastern Extension is located in sections 20 and 29, T.23N., R.7E., and the Western Extension is located in section 24, T.23N., R.6E., G&SRM, Coconino County, Arizona.

Two tracts of land within the Administrative Boundary of the Coconino National Forest, being the Eastern and Western Extensions of the San Francisco Peaks Research Natural Area, and more particularly described as follows:

> Beginning at the section corner of sections 29, 30, 31 and 32, T.23N., R.7E. which is identical with the southeast corner of the Research Natural Area, run east along the south boundary of section 29 approximately 400 feet to a point on the summit between Agassiz Peak and Humprhreys Peak; thence northeasterly and turning northerly along the summit for approximately 2700 feet, to the top of Humprhreys Peak; thence northwesterly along the top of a predominate ridge for approximately 6300 feet, to the northeast corner of the Research Natural Area.

The above legal description is of the Eastern Extension of the San Francisco Peaks Research Natural Area. Following is the legal description of the Western Extension of the San Francisco Peaks Research Natural Area:

> Beginning at the northwest corner of the San Francisco Peaks Research Natural Area, being on the east boundary of section 24; thence, west 2000 feet; thence, south for approximately 2000 feet, to the 9400 foot contour; thence, southerly and southwesterly along the 9400 foot contour for approximately 2100 feet; thence, east 1500 feet, more or less, to a point on the east boundary of section 24 which is also the west boundary of the Research Natural Area.

The area of the Eastern Extension of the San Francisco Peaks Research Natural Area is 165 acres, more or less, and the area of the Western Extension is 100 acres, more or less.

DECISION NOTICE/DESIGNATION ORDER

Decision Notice
Finding of No Significant Impact
Designation Order

By virtue of the authority vested in me by the Secretary of Agriculture under regulations 7 CFR 2.42 and 36 CFR 251.23, I hereby establish the San Francisco Peaks Research Natural Area Extensions. The San Francisco Peaks Research Natural Area Extensions shall be comprised of lands described in the section of the Establishment Record entitled "Location."

The Regional Forester, Larry Henson, recommended the establishment of the San Francisco Peaks Research Natural Area Extensions in the Coconino National Forest Land and Resource Plan. That recommendation was the result of an analysis of the factors listed in 36 CFR 219.25 and Forest Service Manual 4063.41. Results of the Regional Forester's analysis are documented in the Coconino National Forest Land and Resource Management Plan and Final Environmental Impact Statement which are available to the public.

The San Francisco Peaks Research Natural Area and Extensions will be managed in compliance with all relevant laws, regulations, and Forest Service Manual direction regarding Research Natural Areas. It will be administered in accordance with the management direction/prescription identified in the Establishment Record.

I have reviewed the Coconino National Forest Land and Resource Management Plan (LRMP) direction for this RNA and find that the management direction cited in the previous paragraph is consistent with the LRMP and that a Plan amendment is not required.

The Forest Supervisor of the Coconino National Forest shall notify the public of this decision and will mail a copy of the Decision Notice/Designation Order and amended direction to all persons on the Coconino Land and Resource Management Plan mailing list.

Based on the Environmental Analysis, I find that the designation of the San Francisco Peaks Research Natural Area Extensions is not a major federal action significantly affecting the quality of the human environment.

This decision is subject to appeal pursuant to 36 CFR Part 217. A Notice of Appeal must be in writing and submitted to:

The Secretary of Agriculture
14th & Independence Ave., S.W.
Washington, D.C. 20250

and simultaneously to the Deciding Officer:

Chief (1570)
USDA, Forest Service
P.O. Box 96090
Washington, D.C. 20090-6090

The Notice of Appeal prepared pursuant to 36 CFR 217.9(b) must be submitted within 45 days from the date of legal notice of this decision. Review by the Secretary is wholly discretionary. If the Secretary has not decided within 15 days of receiving the Notice of Appeal to review the Chief's decision, appellants will be notified that the Chief's decision is the final administrative decision of the U.S. Department of Agriculture (36 CFR 217.17(d)).

_____ _____

Chief Date

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

San Francisco Peaks Research Natural Area and Extensions

Coconino National Forest

Coconino County, Arizona

Prepared by Andrew W. Laurenzi Date 11/3/87
Mark H. Cochran, The Arizona Nature Conservancy
Andrew W. Laurenzi, The Arizona Nature Conservancy

Recommended by _____ Date 5/9/88
Max C. Reid, District Ranger,
Flagstaff Ranger District

Recommended by _____ Date 5/18/88
Neil Paulsen, Forest Supervisor,
Coconino National Forests

Recommended by John W Russell Date 5-26-88
John W. Russell, Chairman,
Southwestern Research Natural
Area Committee

Recommended by _____ Date 6/16/88
for Sotero Muniz, Regional Forester
Southwestern Region

Recommended by Charles M. Loveless Date Sept. 28, 1988
Charles M. Loveless, Station Director
Rocky Mountain Forest and Range
Experiment Station

A. INTRODUCTION

The San Francisco Peaks Research Natural Area (SFPRNA) is located on the west slope of Humphreys Peak about 15 miles (24 km) north of Flagstaff, Arizona. The area is within the Peaks Ranger District of the Coconino National Forest, in Coconino County, and is reserved, public domain National Forest land. The original RNA boundary area and two extensions are within the Kachina Peaks Wilderness designated by Congress in 1984.

The two extensions were put forward by the Regional RNA Task Force (USDA Forest Service, 1984). This document provides information on the expanded RNA of 1,289 acres (521.7 ha) with special emphasis on the two extensions.

(1) Land Management Planning

The current Coconino National Forest planning documents, the Environmental Impact Statement and Forest Plan (USDA Forest Service, 1987a/1987b), include the San Francisco Peaks RNA extensions. The environmental analysis conducted as part of the planning process supports the recommendation to extend the original RNA boundary.

B. OBJECTIVES

The objectives of placing this area within the RNA system are:

1. To provide greater representation of bristlecone pine and alpine tundra communities in the Southwest RNA system.
2. To provide opportunities for monitoring long-term ecological changes in alpine and subalpine environments in Arizona.
3. To maintain genetic diversity in Arizona's only true alpine tundra ecosystem.

C. JUSTIFICATION STATEMENT FOR ESTABLISHMENT OF AREA

The need for representation of bristlecone pine/limber pine (Pinus aristata[1]/Pinus flexilis) forest and Rocky Mountain alpine tundra was identified in the Southwestern Regional Guide (USDA Forest Service, 1983). The SFPRNA was established in 1935 to protect representative alpine and subalpine communities in northern Arizona.

D. PRINCIPAL DISTINGUISHING FEATURES

The two extensions expand the acreage of alpine tundra and bristlecone pine communities in the RNA. Both bristlecone pine and alpine tundra communities occur nowhere else in the State of Arizona except on the San Francisco Peaks. These

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[1]In this Establishment Record all trees are named following Little, E.L.Jr. 1979. Checklist of United States trees (native and naturalized). Agricultural Handbook No. 541. USDA. Washington, DC. All other plants are named following Lehr, J.H. 1978. A Catalog of the flora of Arizona. Northland Press. Flagstaff, AZ.

communities also provide habitat for 45 species of plants, which are largely restricted in their Arizona distribution to the San Francisco Peaks. Especially noteworthy are two endemics, the San Francisco Peaks groundsel (Senecio franciscanus), a federally listed threatened species (USDI Fish and Wildlife Service, 1985), and a buttercup, Ranunculus inamoenus var affinis. Both plants are associated with the alpine tundra in the original boundary area and the eastern extension.

E. LOCATION

The SFPRNA is located within the Peaks Ranger District of the Coconino National Forest in Coconino County, Arizona (Figs. 1 & 2). The area is located at latitude 35°21′ north and longitude 111°41′ west. The western extension is located in section 24 of T23N R6E, and the eastern extension is located in sections 20 and 29 of T23M R7E. Both extensions are included on the USGS Humphreys Peak 7.5′ topographic quadrangle (Fig. 3).

The boundary of the eastern extension follows the 12,000 foot contour northeast from the southeast corner of the original boundary and then follows a ridgeline to the northeast corner of the original boundary. This eastern extension encompasses 165 acres (67 ha) and includes the entire upper west slope below Humphreys Peak. The western extension adds 100 acres (42 ha) to the northwest corner of the original RNA. Elevation ranges from about 10,600 to 12,000 feet (3,233 to 3,660 m) in the eastern extension to about 8,900 to 9,700 feet (2,715 to 2,959 m) in the western extension.

To reach the RNA, one must travel north from Flagstaff on U.S. Highway 180 to the Arizona Snow Bowl turnoff. The latter is 7.5 miles (12.1 km) northwest of Flagstaff. The road to the Snow Bowl is a winding dirt road, 7.7 miles (12.4 km) long. The elevation changes from 7,340 feet (2239 m) at the Snow Bowl turnoff to 9,520 feet (2904 m) at the end of the road, however the road is not steep or difficult to negotiate. To reach the RNA site from the Snow Bowl requires a hike of about one mile through heavy timber. To reach the eastern boundaries of the area requires about a two-hour hike up a very steep grade through dense forest that is laced with deadfall timber and boulders, (reproduced from Smith, 1974). The western boundary of the western extension can be reached by traveling to the end of FS Road 267.

F. AREA BY COVER TYPES

Information on cover types was obtained from the Peaks Ranger District, Rominger and Paulik (1983) and the Region 3 RNA Progress Report (USDA Forest Service, 1984).

Küchler

Eastern Extension: The Küchler types found in this extension are Alpine Meadows and Barren, K-045, and Southwestern Spruce--Fir Forest, K-020 (Küchler, 1966).

Western Extension: The Küchler type found in this extension is Southwestern Spruce-Fir Forest, K-020 (Küchler, 1966).

Society of American Foresters

Eastern Extension: Engelmann spruce (Picea engelmanni)-Subalpine fir (Abies lasiocarpa var arizonica), SAF 206, is the SAF cover type present (Fig. 4) (Eyre, 1980).

Western Extension: Engelmann spruce-Subalpine fir, SAF 206, and Bristlecone pine, SAF 209, are the SAF cover types present (Eyre, 1980).

Habitat Types or Plant Associations

Eastern extension: Includes several habitat types or plant associations described by Rominger and Paulik (1983). These are Pinus aristata, Geum rossii/Carex bella, and Primula parryi communities.

Western extension: Includes several habitat types or plant associations described by Rominger and Paulik, (1983). These are Abies lasiocarpa/Lathyrus arizonica, and Abies lasiocarpa/Erigeron superbus habitat types and Pinus aristata and Populus tremuloides communities.

Table 1. Estimated areas of vegetative cover types in the SFPRNA Extensions.

Type	Society of American Foresters Type[1]	Küchler Type[2]	Surface Area Acres	Hectares
EASTERN EXTENSION				
Alpine Tundra	Non-forest	K-045	136.8	55.4
Engelmann Spruce/ Subalpine Fir	SAF 206	K-014	27.9	11.3
WESTERN EXTENSION				
Engelmann Spruce/ Subalpine Fir	SAF 210	K-011	86.0	34.8
Bristlecone Pine	SAF 209		14.1	5.7
		TOTAL	264.8	107.2

1 Society of American Foresters Cover Type, Eyre (1980).
2 Küchler Natural Vegetation Type, Küchler (1966).

G. PHYSICAL AND CLIMATIC CONDITIONS

The San Francisco Peaks area is a large, composite volcano that includes Humphreys Peak, the highest point in Arizona. Both extensions to the SFPRNA are located on the west slope of this peak. The area is an outstanding example of past volcanic activity and preserves the best example of Ice Age glaciation in Arizona in lateral and medial moraines and former stream beds.

The elevation of the extended SFPRNA varies from about 8,900 to 12,000 feet (2715 to 3660 m). Topographically, the area is very steep with elevational changes of 2,200 feet (671 m) occurring over one mile (1.7 km) between the southwest and southeast corners of the site. The site is best characterized by steep, mountainous terrain, including several parallel canyons and talus slopes which drain westward.

There is marked seasonal climatic variation at the RNA. Temperatures range from -50° F (-45.5° C) in winter to the 70's F (21° to 26° C) in the summer. Freezing temperatures may occur during any month of the year and winters are normally characterized by moderated to heavy deposition of snow. Average annual precipitation is about 35 inches (88.9 cm), of which about 12 inches (30 cm) falls during the summer months in the form of rain. The majority of the remaining 23 inches (58 cm) falls during the autumn and winter months in the form of snow (reproduced from Smith, 1974).

H. DESCRIPTION OF VALUES

(1) Flora

The major portion of the original RNA is covered by heavily vegetated, subalpine forest dominated by Engelmann spruce and corkbark fir with smaller stands of bristlecone pine, quaking aspen (Populus tremuloides) and alpine tundra. The extensions serve to increase the acreage of bristlecone pine forest and alpine tundra in the SFPRNA. The plant associations in the original area have received detailed study by Rominger and Paulik (1983). Several of the plant communities described in this study occur in the extensions, and we refer the reader to this study for a complete description of plant communities.

There are 45 plant species that are largely restricted in their Arizona distribution to the San Francisco Peaks, and most of these are known to occur in the SFPRNA. Two endemics are especially noteworthy, San Francisco Peak groundsel, (listed as threatened by the USFWS), occurs on the gravelly talus slopes of the alpine and subalpine environments of the RNA and a buttercup, Ranunculus inamoenus var affinis occurs commonly in the moist meadows of the alpine tundra in the original RNA and eastern extension.

For a complete list of plants known from the original RNA refer to Rominger and Paulik (1983). A detailed survey of the extensions has not been undertaken but in addition to the aforementioned flora, two additional floras (Schaack, 1983; Paulik, 1979) have been compiled for the alpine and subalpine environments. Together these three studies provide a good working list of plants to be expected in the extensions.

(2) Fauna

The following animal list was derived from the RUN WILD III computer-stored data base (Lehmkuhl and Patton, 1982) for Alpine Tundra biome (111.000) and Subalpine

Conifer Forest and Woodland biome, Bristlecone Pine - Limber Pine series (211.100). No threatened or endangered animals are known from the area.

An Abbreviated Animal List For SFPRNA

BIRDS:

Bluebird, Mountain	Sialia currucoides
Common Bushtit	Psaltriparus minimus
Chickadee, Mountain	Parus gambeli
Brown Creeper	Certhia americana
Crossbill, Red	Loxia curvirostra
Eagle, Golden	Aquila chrysaetos
Falcon, Prairie	Falco mexicanus
Finch, Cassin's	Carpodacus cassinii
Finch, Rosy	Leucosticte arctoa
Flicker, Northern	Colaptes auratus
Flycatcher, Western	Empidonax difficilis
Goshawk, Northern	Accipiter gentilis
Hummingbird, Broad-tailed	Selasphorus platycercus
Jay, Steller's	Cyanocitta stelleri
Junco, Dark-eyed	Junco hyemalis
Kestrel, American	Falco sparverius
Kinglet, Ruby-crowned	Regulus calendula
Lark, Horned	Eremophila alpestris
Nutcracker, Clark's	Nucifraga columbiana
Nuthatch, Pygmy	Sitta pygmaea
Nuthatch, Red-breasted	Sitta canadensis
Owl, Great-horned	Bubo virginianus
Owl, Long-eared	Asio otus
Pipit, Water	Anthus spindletta
Poorwill, Common	Phalaenoptilus nuttallii
Raven, Common	Corvus corax
Robin, American	Turdus migratorius
Sapsucker, Williamson's	Sphyrapicus thyroideus
Siskin, Pine	Carduelis pinus
Solitaire, Townsend's	Myadestes townsendi
Sparrow, Lincoln's	Melospiza linclonii
Sparrow, White-crowned	Zonotrichia leucophrys
Swallow, Violet-green	Tachycineta thalassina
Tanager, Western	Piranga ludoviciana
Thrush, Hermit	Catharus guttatus
Vireo, Solitary	Vireo solitarius
Vulture, Turkey	Cathartes aura
Warbler, Grace's	Dendroica graciae
Waxwing, Cedar	Bombycilla cedrorum
Woodpecker, Three-toed	Picoides tridactylus
Wren, House	Troglodytes aedon

Wren, Rock	Salpinctes obsoletus

MAMMALS:

Bat, Hoary	Lasiurus cinereus
Bat, Silver-haired	Lasionycteris noctivatgans
Chipmunk, Cliff	Tamius dorsalis
Chipmunk, Colorado	Tamius quadrivittatus
Chipmunk, Least	Tamius minimus
Cottontail, Eastern	Sylvilagus floridanus
Gopher, Northern Pocket	Thomomys talpoides
Mouse, Deer	Peromyscus maniculatus
Myotis, Long-legged	Myotis volans
Shrew, Dwarf	Sorex nanus
Shrew, Vagrant	Sorex vagrans
Squirrel, Golden-mantled ground	Spermophilus lateralis
Squirrel, Red	Tamiasciurus hudsonicus
Vole, Long-tailed	Microtus longicaudus
Weasel, Long-tailed	Mustela frenata
Woodrat, Bushy-tailed	Neotoma cinerea

(3) Geology

Entire area is underlain by Quaternary and Tertiary age volcanics: rhyolitic to andesitic flows, cinders, ash and tuff (Arizona Department of Transportation, 1975).

(4) Soils

Soils vary significantly with the underlying geologic material. Soils associated with Rhyolite are classified as Dystric Cryochrepts, loamy-skeletal, mixed while the soils associated with Andesite are mainly Typic Cryoboralfs, loamy-skeletal, mixed (USDA Forest Service, 1986).

(5) Lands

(6) Cultural

The two areas to be added to the SFPRNA have never been surveyed for cultural resources. Although one prehistoric site has been recorded near Bismarck Lake, west of the western addition, the potential for cultural resources in the proposed additions is very low. However, the additions are in areas sacred to many Native American groups and pertinent tribes will be consulted for their comments.

Since the extended boundaries of the San Francisco Peaks RNA will cause no change to the character of the area, there will be no effect upon cultural resources by inclusion of the western and eastern extensions. In fact, there will be a beneficial effect to cultural resources since designation as a RNA prohibits project developments.

(7) Other

No other significant natural values which have not already been discussed occur in the SFPRNA.

I. IMPACTS AND POSSIBLE CONFLICTS

(1) Mineral Resources

Both areas lie within the Kachina Peaks Wilderness and are withdrawn from mineral entry. Also, there are no existing claims that were made prior to the wilderness designation.

(2) Grazing

No impacts and/or possible conflicts on the grazing resource exists in relation to the RNA's annexation of two additional areas. The existing and extended boundaries of the RNA are not fenced. The area within these boundaries is generally classified a non-suitable rangeland: not grazable due to the dense timber and moderate to steep slopes. Although wildlife and livestock graze these areas to a light degree, the use occurs mainly at lower elevations and the small intermittent meadows and openings which occur within the boundaries. Construction of a boundary fence is possible, but not feasible for the area. The rocky soil, steep slopes, dense tree cover, heavy winter snow cover and heavy winter snow cover and heavy elk use prohibit the construction and intensive maintenance of a fence to exclude livestock.

If in the future, livestock concentrations and grazing use intensifies to a point that a fence is required to restrict grazing use from the RNA, it is recommended that three miles of fence be constructed on the west boundary, at a total estimated cost of $10,000.

The RNA and the extension areas lie within the Hart Prairie Unit of the Peaks Grazing Allotment. Because the RNA's existing and extended area are non-suitable to livestock grazing (with excess forage available within other areas of the allotment), and the location is not restrictive to general livestock movements, or other range management needs, no issues or concerns are present for livestock and/or wildlife grazing requirements.

(3) Timber

Both additions are within the existing Kachina Peaks Wilderness where timber values were previously withdrawn from the timber producing base.

(4) Watershed Values

The annexation of two extension areas onto the San Francisco Peaks RNA has no conflicts or irretrievable impacts on the watershed resource.

The RNA and its extension areas are split by two major watersheds, the Little Colorado River and the Sycamore watersheds. Watershed conditions for these areas are in excellent condition.

No issues or concerns have been identified in relation to the RNA and extension area's watershed conditions or the two major watersheds in which they flow.

(5) Recreation Values

The areas are not accessible or near roads. There are no major trails through the areas and they consequently receive very little general recreation use.

(6) Wildlife and Plant Values

Senecio franciscanus, the San Francisco Peaks groundsel, is a Federally listed threatened species (USDI Fish and Wildlife Service, 1985) which occurs within the alpine

habitat of the RNA. Senecio franciscanus is endemic to the San Francisco Peaks. Some of the other plant species found in the alpine habitat are limited in distribution in the Southwest.

(7) Special Management Area Values

Both areas are within the Congressionally designated Kachina Peaks Wilderness.

(8) Transportation Plans

None due to wilderness designation.

J. MANAGEMENT PRESCRIPTION

The SFPRNA is recommended in the Coconino National Forest Plan Management Area 17 (see Appendix). Management emphasis is protect watershed condition and maintain natural ecological conditions so that the RNA is available for research and education that does not disturb the area's natural conditions. Use restrictions are imposed as necessary to keep areas in their natural or unmodified condition. The RNA is closed to off-road vehicle use.

(1) Vegetation Management

There is no harvest of timber products, including firewood. The RNA is assigned no grazing capacity and will be fenced as necessary to protect. Prescribed fire, using planned ignitions, will be used as a management tool provided its use is compatible with the resources being managed. Suppression tactics will be used that minimize damage to the character of the RNA. Fires in the area will be allowed to burn undisturbed unless they threaten persons or property outside of the area, or they threaten the uniqueness of the area.

K. ADMINISTRATION RECORDS AND PROTECTION

Administration and protection of the SFPRNA and extensions will be the responsibility of the Coconino National Forest. The District Ranger, Peaks Ranger District (5075 N. Highway 89, Flagstaff, Arizona 86004) has direct responsibility.

Records for the San Francisco Peaks RNA and extensions will be maintained in the following offices:

Regional Forester, Southwestern Region, Albuquerque, NM
Rocky Mountain Station, Fort Collins, CO
Coconino National Forest, Flagstaff, AZ
District Ranger, Peaks Ranger District, Flagstaff, AZ

L. ARCHIVING

The Director of the Rocky Mountain Forest and Range Experiment Station, or his designee, will be responsible for any studies or research conducted in the area. Requests

to conduct research in the area should be referred to him at 240 W. Prospect Rd., Ft. Collins, CO 80526-2098. He, or his designee, will evaluate research proposals and coordinate all studies and research in the area with the District Ranger and the RNA research coordinator. Plant specimens collected in the course of research in the area will be maintained at the University of Arizona, College of Agriculture herbaria in Tucson, Arizona, or at the Forest Supervisor's office. Animal specimens will be maintained at the Arizona State University, Department of Zoology vertebrate museum in Tempe, Arizona.

M. REFERENCES

Arizona Department of Transportation. 1975. A Materials Inventory of Coconino County: Arizona Highway Division, Phoenix, Arizona.

Billings, W.D. and H.A. Mooney. 1968. The Ecology of Arctic and Alpine Plants. Biol. Rev., 43:481-530.

Carothers, S.W., J.R. Halderman and R.P. Balda. 1973. Breeding birds of the San Francisco area and the White Mountains, Arizona. Museum of Northern Arizona Technical Series No. 12.

Eyre, F.H., ed. 1980. Forest cover types of the United States and Canada. Society of American Foresters, Washington, D.C. 148 pp.

Goodwin, G. 1978. An assessment of impacts created by past and present development on the alpine tundra zone of the San Francisco Peaks. Unpubl. USDA Forest Service Report.

Küchler, A.W. 1966. Potential natural vegetation. USDI Geol. Survey. 1969. Washington, DC.

Lehmkuhl, J.F. and D.R. Patton. 1984. Run Wild, Wildlife/Habitat relationships: user's manual for the Run Wild III data storage and retrieval system. USDA Forest Service, Southwestern Region, Wildlife Unit Technical Report, 68 pp.

Little, E.L., Jr. 1941. Alpine flora of the San Francisco Mountain, Arizona. Madrono 6:65-81.

Marr, J.W. and B.E. Willard. 1970. Persisting Vegetation in an Alpine Recreation Area in the Southern Rocky Mountains, Colorado. Biol. Cons., 2 (2): 97-104.

Mathiasen, R.L., and F.G. Hawksworth. 1980. Taxonomy and Effects of Dwarf Mistletoe on Bristlecone Pine on the San Francisco Peaks, Arizona. USDA Forest Service Research Paper RM-224, 9 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Merriam, C.H. 1980. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado in Arizona. North American Fauna 3. 136 p., 13 plates, 5 maps. USDA, Division of Ornithology and Mammalogy, Washington, D.C.

Moir, W.H., and J.A. Ludwig. 1979. A classification of spruce-fir and mixed conifer forest habitat types in Arizona and New Mexico. USDA Forest Service Research Paper RM-207, 47 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO.

Moore, T.C. 1965. Origin and disjunction of the alpine tundra flora on San Francisco Mountain, Arizona, Ecology 46:860-864.

Pase, C.P. 1982. 111.5 Alpine Tundra. Pp. 27-33. IN: D.E. Brown (Ed.) Biotic Communities of the American Southwest-United States and Mexico. Desert Plants Vol. 4(Nos.1-4) Special Issue. 324 pp.

Pase, C.P. and D.E. Brown. 1982. 121.3 Rocky Mountain (Petran) Subalpine Conifer Forest. Pp. 36-39. IN: D.E. Brown (Ed.) Biotic Communities of the American Southwest- United States and Mexico. Desert Plants Vol. 4(Nos.1-4) Special Issue. 324 pp.

Paulik, L.A. 1979. A vascular flora of the sub-alpine spruce-fir forest of the San Francisco Peaks, Arizona. 94 pp. M.S. thesis, Northern Arizona University, Flagstaff, AZ.

Pominger, J.M. and L.A. Paulik. 1983. A floristic inventory of plant communities of the San Francisco Peaks Research Natural Area. USDA Forest Service General Technical Report. RM-96, 9 pp.

Schaack, C.C. 1983. The alpine vascular flora of Arizona. Madrono 30 (4) Suppl.: 79-88.

Smith, E.L. 1974. Established Natural Areas in Arizona; A Guide Book for Scientists and Educators. Arizona Academy of Sciences, for Office of Economic Planning and Development, State of Arizona. Phoenix. 300 pp.

Thilenius, J.F. 1975. Alpine Range Management in the Western United States. Principles, Practices, and Problems. USDA Forest Service, Res. Paper RM-157.

USDA Forest Service. 1983. Regional guide for the Southwestern Region. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDA Forest Service. 1984. Progress report, Research Natural Areas: recommended representations for important ecosystems on National Forest System Land in the Southwestern Region. USDA Forest Service, Southwestern Region, Albuquerque, NM 90 pp.

USDA Forest Service. 1986. Terrestrial Ecosystem Handbook, Appendix B. USDA Forest Service, Region 3, Albuquerque, NM. SDA Forest Service. 1987a. Environmental Impact Statement for the Coconino National Forest Plan. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDA Forest Service. 1987b. Coconino National Forest Plan. USDA Forest Service, Southwestern Region, Albuquerque, NM.

USDI Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; review of plant taxa for listing a endangered of threatened species; notice of review. Federal Register Vol.50 No.188:39526-39527.

Willard, B. and S. Marr. 1970. Effects of Human Activities on Alpine tundra ecosystems in Rocky Mountain National Park, Colo. Biol. Cons. 2 (4): 257-265.

Willard, B. and S. Marr. 1971. Recovery of alpine tundra under protection after damage by human activities in the Rocky Mountain of Colorado. Biol. Cons. 3 (3): 181-190.

R (L)
Natural Areas
Coconino

SAN FRANCISCO PEAKS NATURAL AREA

Purpose

To preserve permanently in a natural state a representative area of the best Engelmann spruce- corkbark fir forest in northern Arizona. This is one of the few patches of spruce-fir forest in the San Francisco Mountains that have not been burned ever. It is especially valuable for research because of its close proximity to the Fort Valley Ranch of the Southwestern Forest and Range Experiment Station.

Description

Location

West side of San Francisco mountains, above Hart Prairie. The proposed area comprises about 880 acres and is described by legal subdivision as follows:

All of Sec. 31. T. 23 N., R. 7 E.; SE ¼ SE ¼ sec. 36, T. 23 N., R. 6 E.; lot 1, Sec. 1, T. 22 N., R. 6 E. ; and lots 1, 2, 3, and 4, Sec 6, T. 22 N., R.7 E., G. & S. R. H.

All is national forest land, but the state of Arizona has an equity in the SE ¼ SE ¼ of Sec. 36, T. 23 N., R. 6 E., by virtue of its being in a school section

Acreage by Dominant Cover Types

The species at the lower boundary are Douglas fir, cork-bark fir, limber pine and aspen. Higher up the stand on north slopes is nearly pure cork-bark fir, and still higher, cork-bark fir and Engelmann spruce are found in mixture. Above 10,800 feet Engelmann spruce predominates, and from 11,000 to 11,500 feet it forms nearly purse stands. Bristle-cone pine occurs on ridges and south slopes up to 11,500 feet. Above 11,500 feet all tree species becoming bushy or trailing and still higher they disappear entirely.

A canyon extends through the south half of Sec. 31 in nearly due east and west direction. It is on the north slopes and benches of this drainage that the heavy stands of spruce and fir occur, the south slopes being more open. The acreage by forest types is about 400 acres each Douglas fir and Engelmann spruce types, the remaining 80 acres being in the alpine scene at or above timber line.

Physiography and Climate

The altitudinal range is from about 9,000 to 11,500 feet. It has the characteristic fir-spruce climate. Above 10.00 feet on the north slopes, snow lies will into the month of June, and temperatures rarely exceed 70° F. The annual precipitation is between 30 and 35 inches, most of which comes in the form of snow.

Forest Values

Timber stands are excellent, yielding as high as 40,00 board feet per acre; but they are classed inaccessible.

Agricultural Values

None

Grazing Values

Probably one-fourth of the area is grazed by sheep as they pass back and forth between ranges to the north and south. They do not enter the dense stands of timber to any appreciable extent because there is little for them to eat. It is almost necessary to permit the passage of sheep along the lower border. By fencing they can be confined to a strip about 10 rods wide. This lower border is not typical virgin forest anyway, and is regarded as a buffer strip rather than a part of the natural area.

Mineral Value

None is known to exist.

Value for Other Public Use

Probably the time will come when the Forest service will be requested to set aside the San Francisco Mountains for recreational and scientific purposes. The proposed natural area would fit in with the latter object and need not interfere with the former.

Transport Facilities

By following the Veit Ranch-Hart Prairie road and taking off on one of the open glades to the north, it is possible to drive a car within about a mile of the middle section of the area.

Public Sentiment

It is believed that public sentiment is in favor of any movement to preserve the scenic beauty of the San Francisco Mountains, and while there may be no active expression in favor of this particular area, its dedication to sciences is undoubtedly in accord with public sentiment.

Plan of Management

Natural conditions should be preserved to the fullest extent possible. All cutting and other forms of commercial use should be prohibited, except grazing which can not be excluded with out fencing. Grazing is very light, however, because of dense timber. It may become necessary in time to fence the lower border, on the west side, to prevent excessive drifting of stock. In that case a passage way about 10 rods wide should be left. Roads and trails should be kept out. It is unlikely that any roads or trails will need to pass through the area, and, moreover, the route through the heavy stands of timber on the north slopes is not feasible one because the snow lies late into the summer. Fires should be kept under control as far as possible.

Approved:

Forest Supervisor

Director, Southwestern Forest & Range Exp. Station

Regional Forester

Forester

RELOCATION REPORT FOR SAN FRANCISCO PEAKS NATURAL AREA

This is a proposal to revise the boundaries of the San Francisco Peaks Natural Area by deleting Lots 3, 4, 5, 6, E½ E¼, and E½ NW¼, section 31, and adding Lots 2, 3, 4, SE¼ NW¼, E½ SW¼, and SE¼ section 19, and all in T. 23 N., R. 7 E, GSSRBSM, within the Coconino National Forest.

Both areas were examined on the ground by Gil Schubert of the Rocky Mountain Forest and Range Experiment Station, and John Hart, Flagstaff District Ranger, on July 22, 1965. The area was traversed on foot, from the area which is proposed to be opened for administrative purposes to the area that would be included in the relocation.

The San Francisco Peaks Natural Area is located on the west slope of the San Francisco Peaks. The elevation ranges from approximately 9,500 feet to over 12,000 feet. Vegetation types traversed vary from mixed conifer and aspen at the lower elevations through purse stands of Engelmann spruce to the sub-alpine type.

The primary distinguishing feature of this natural area is the stands of bristlecone pine (Pinus aristats), and the pure stands of Engelmann spruce (Picea engelmannii) which are prevalent within the natural area. Topography within the natural area is steep: slopes to 60% are not uncommon, but no shear escarpments are present. Soils are quite uniform over the entire area, composed of immature volcanic cinder types. Small areas of deeper alluvial soils are present and generally identified by open meadows or aspen stands.

Temperature ranges in the area very from 80° + in the summer to lows of minus 50° in the winter season. Precipitation is of nearly equal amounts split between summer and winter seasons; estimated annual precipitation is approximately 30 inches. Snow depths in the wintertime rarely exceed 5 feet.

The present area is located immediately adjacent to the Arizona Snow Bowl winter sports area. Due to the proximity of the winter sports area and the increasingly summer use by people riding the chair lift, a few people are currently using the natural area for recreational purposes. Since no scientific studies are currently being conducted within the natural area, recreation use is not materially affecting the natural area at present.

The long range development plan for the winter sports area calls for two chair lifts which have impact on the present natural area. The lift for novice skiers would be located outside the natural area, but skiers would ski over a portion of the natural area. The second proposed lift as shown on the attached map would be well within the natural area, thus resulting in clearing for the lift, trails, etc.

Relocation of the natural area will not result in any appreciable change in geology, flora or fauna represented in the present area.

The area would be located sufficiently distant from proposed and present recreation developments to prevent heavy future use of the natural area by recreationists.

The area will not be as accessible as the present location, but this is and advantage rather than a disadvantage from the standpoint of protection of scientific values.

In order to proceed with the planned commercial developments at the Arizona Snow Bowl, yet still reserve a representative area of the best Engelmann spruce and bristlecone pine in northern Arizona, a change in the boundaries of the natural area is considered necessary. The change, if approved, would result in the following:

ALL GSSRBSM

	Acres
ELIMINATE: Lots, 3, 4, 5, 6, E½ NE¼, E½ NW¼ section 31, T. 22 N., R. 7 E.	330.20
RETAIN: Lots 1 through 12, E½ W½ section 30, T. 22 N., R. 7 E.	633.07
RECOMMENED ADDITION: Lots 2, 3, 4, SE ¼NW¼, E½SW¼, SE¼ section 19, T. 22 N., R. 7 E.	390.86
NEW AREA ACERAGE	1023.93

(Net increase in area - - - - 69.56)

In general, following is a summary of advantages and disadvantages of relocation of the natural areas:

Advantages

1. Permit expansion of adjacent winter sport area, which is a popular year-long recreation area. An estimated 200,000 people will visit this development in CY 1965.

2. Administration on adjacent National Forest Land will be simplified with the relocation because the chance disturbance by domestic livestock, recreationalists, and individuals harvesting forest products will be virtually eliminated.

Disadvantages

The area will not be accessible for scientific studies.

No changes in the plan of management as outlined in the original classification report of the San Francisco Peaks Natural Area are necessary. Upon approval of this report, immediate steps will be taken to withdraw the additional area in Section 19 for mineral entry.

The primary public concern for this area is that bristlecone pine areas will still be within the natural area. This was physically determined by Mr. Schubert and myself.

Approval of the proposed relocation of the San Francisco Peaks Natural Area is recommended since the area will be no change in the basic values the area was originally established to preserve.

APPROVED:

Director, R.M.F.R.E.S.

Date

Regional Forester

Date

Associate

Chief, Forest Service

Date

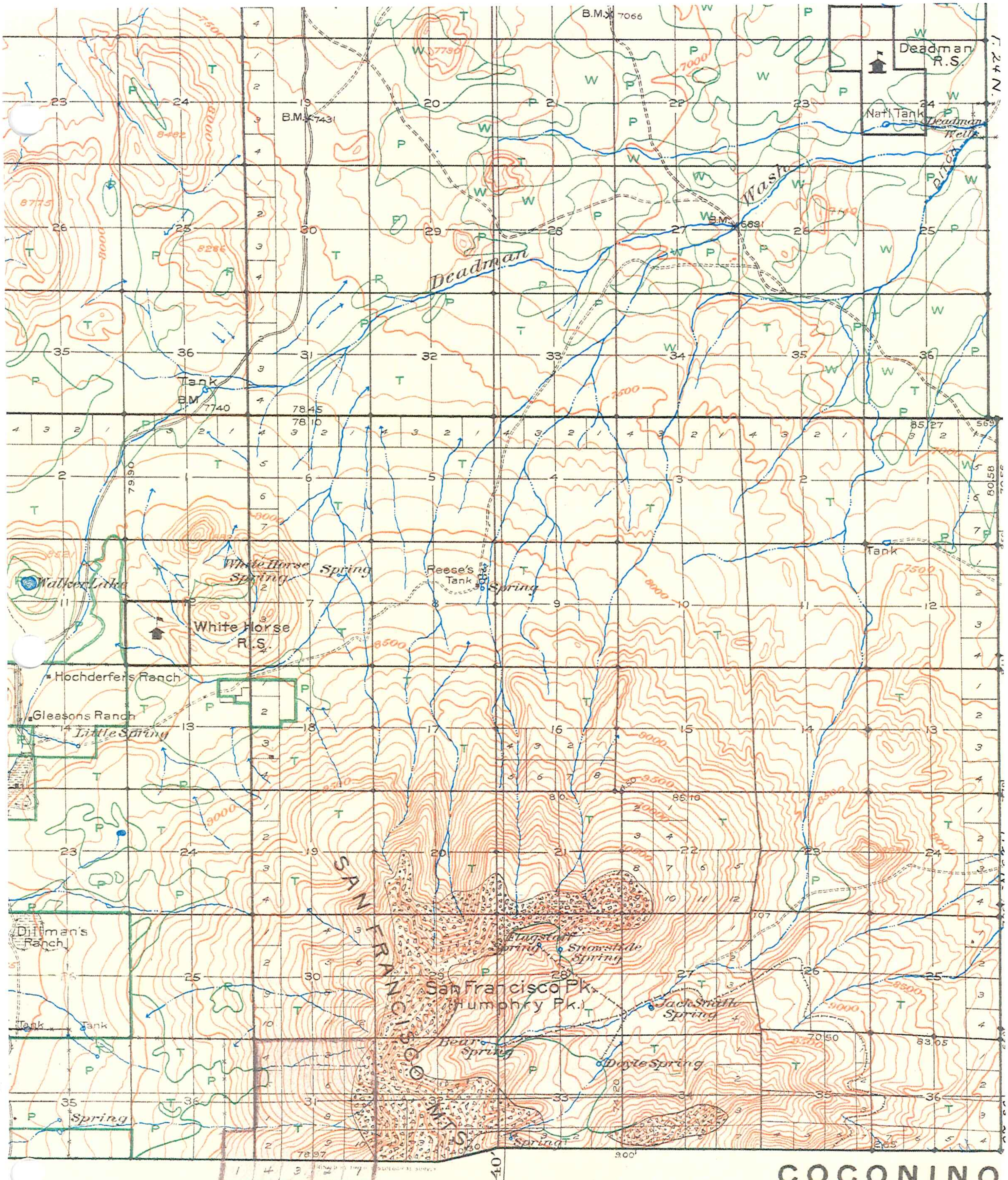
RECOMMENED:

District Forest Ranger

Date

Forest Supervisor

Date



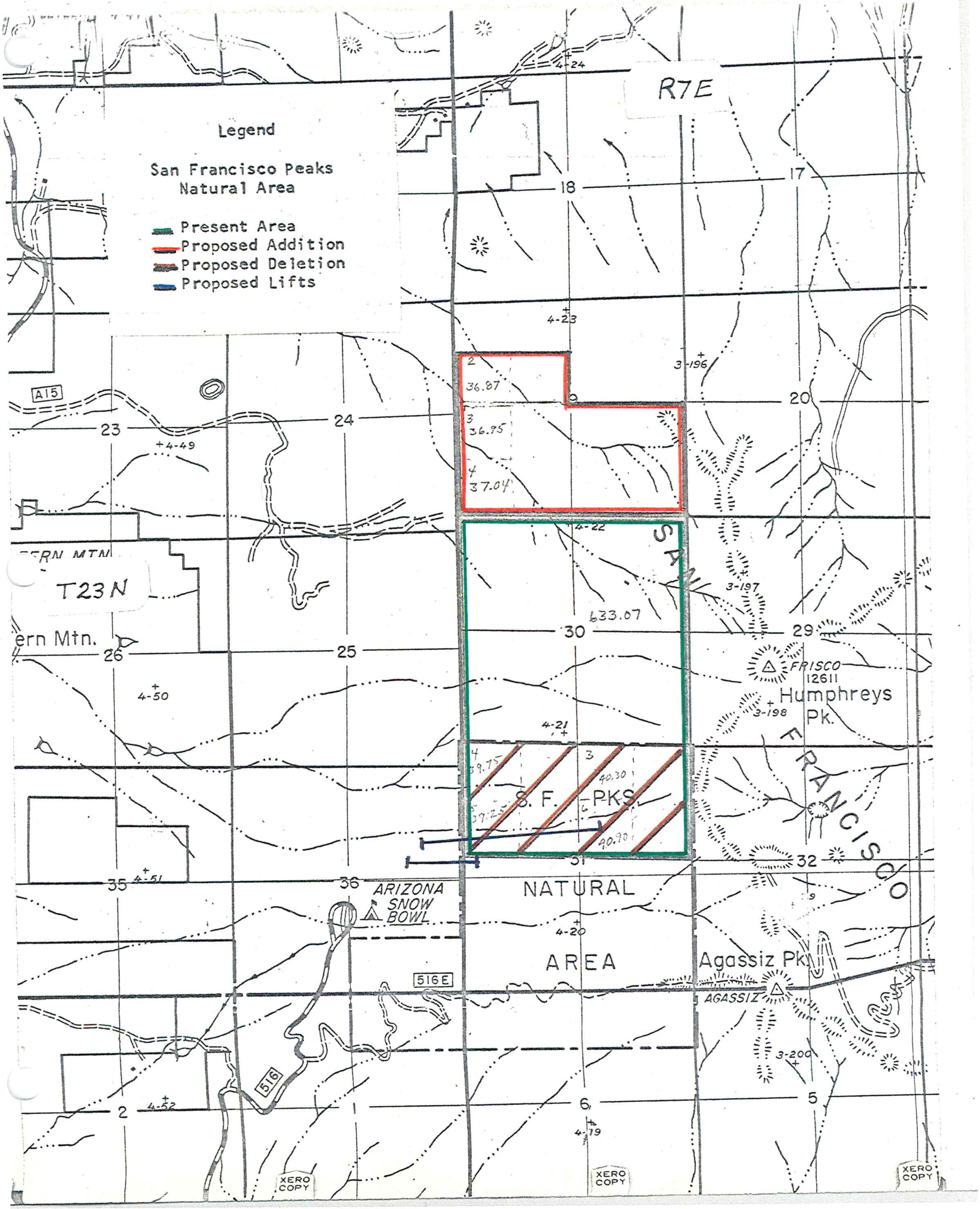
COCONINO

GILA & SALT RIVER MERIDIA

SAN FRANCISCO PEAKS
NATURAL AREA

R 7 E.

Base Map by R. R. Hill, 1912
Compiled by H. S. Meekham, 1912


Legend
San Francisco Peaks Natural Area
Present Area
Proposed Addition
Proposed Deletion
Proposed Lifts
R7E
T23N
18
17
4-24
4-23
3-196
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United States
Department of
Agriculture

Forest Service

**Rocky Mountain
Forest and Range
Experiment Station**

Fort Collins,
Colorado 80526

**General Technical Report
RM-96**

A Floristic Inventory of the Plant Communities of the San Francisco Peaks Research Natural Area

James M. Rominger and Laurie A. Paulik

Abstract

In this study area, covering 1,024 acres of alpine and subalpine vegetation on the west slopes of Humphreys Peak in Coconino County, Arizona, 129 species of vascular plants were found within nine plant communities or habitat types, as classified by Moir and Ludwig.

USDA Forest Service
General Technical Report RM-96

March 1983

A Floristic Inventory of the Plant Communities of the San Francisco Peaks Research Natural Area[1]

James M. Rominger, Professor of Botany and Curator of the Deaver Herbarium
and
Laurie A. Paulik, University Library Staff
Northern Arizona University[2]

[1]Research reported here was funded by the Rocky Mountain Forest and Range Experiment Station and Northern Arizona University, Flagstaff, under contract 53-82FT-8-19 between U.S. Department of Agriculture Forest Service and the authors. The Station's headquarters is in Fort Collins, in cooperation with Colorado State University. Supervision was provided by Robert C. Szaro, project scientist in RM-1710, at the Station's Research Work Unit at Tempe, in cooperation with Arizona State University.

[2]Flagstaff. Paulik was formerly a Technician at the Deaver Herbarium.

Contents

A Floristic Inventory of the Plant Communities of the San Francisco Peaks Research Natural Area

James M. Rominger and Laurie A. Paulik

INTRODUCTION

The San Francisco Peaks Research Natural Area (hereafter referred to as the SFPRNA or the Natural Area) was established in 1935. It reserves, for future study, representative alpine and subalpine communities in northern Arizona. One of the original criteria for selecting the present location of the SFPRNA was to protect a representative sample of bristlecone pines (*Pinus aristata*). These trees occur nowhere else in the state of Arizona except on the San Francisco Peaks. Within the Natural Area are nearly pure stands of Engelmann spruce (*Picea engelmannii*) and bristlecone pine, and a small portion of the only alpine tundra in Arizona. This study defines the plant communities within the Natural Area and includes a checklist of the vascular plants growing within its boundaries (appendix A). This will provide baseline information for all future research done on the San Francisco Peaks Research Natural Area.

The first biological survey party to traverse the Natural Area was headed by C. Hart Merriam (1890), who collected the biota of the San Francisco Peaks during the summer of 1889. His base camp was at Little Springs, which lies about 1.5 miles northwest of the SFPRNA. Between 1937–39, E. L. Little (1941) collected extensively in the alpine tundra of the San Francisco Peaks reporting 49 alpine species. Moore (1965) added two species to the known alpine flora, and Schaack (1970) expanded the number of known species of the alpine tundra to a total of 82. Paulik (1979) reported 189 species of vascular plants for the subalpine spruce-fir forest complex of the San Francisco Peaks. And, the San Francisco Peaks were included by Moir and Ludwig (1979) in their classification of habitat types of the spruce-fir and mixed coniferous forests.

STUDY AREA

The SFPRNA is on the west slope of Humphreys Peak about 15 miles (24 km) north of Flagstaff, Arizona. The site (fig. 1), which includes one whole section and nearly two-thirds of another, covers 1,024 acres.[3] The southern edge of the Natural Area is 0.8 miles north and 0.2 miles east of the Arizona Snow Bowl. It replaces an earlier Natural Area that was adjacent to the Arizona Snow Bowl. In 1966, that portion of the Natural Area located in Section 31, was deleted and a portion in Section 19 was added. Section 30 has remained intact since 1935.

[3]*SFPRNA covers section 30 and two-thirds of section 19 in Township 23N, Range 7E.*

Elevation ranges from 9,100 feet (2,800 m) at the northwest corner to about 12,100 feet (3,700 m) at the southeast corner. The site is characterized by steep, mountainous terrain, including several parallel canyons and talus slopes which drain westward toward the Bismarck Lake area (fig. 2). Two unmarked but well-worn foot trails traverse the SFPRNA, each leading towards Humphreys Peak in a meandering southeasterly direction. Two abandoned 4-inch pipelines are still intact in lower White Horse Canyon and in the two adjacent canyons to the south. These pipelines, which were installed in the late 1940's to carry water to livestock on private lands northwest of the SFPRNA, connect with springs in the alpine tundra below Humphreys Peak (fig. 3). Their removal would be impractical and would cause unnecessary damage to the terrain.

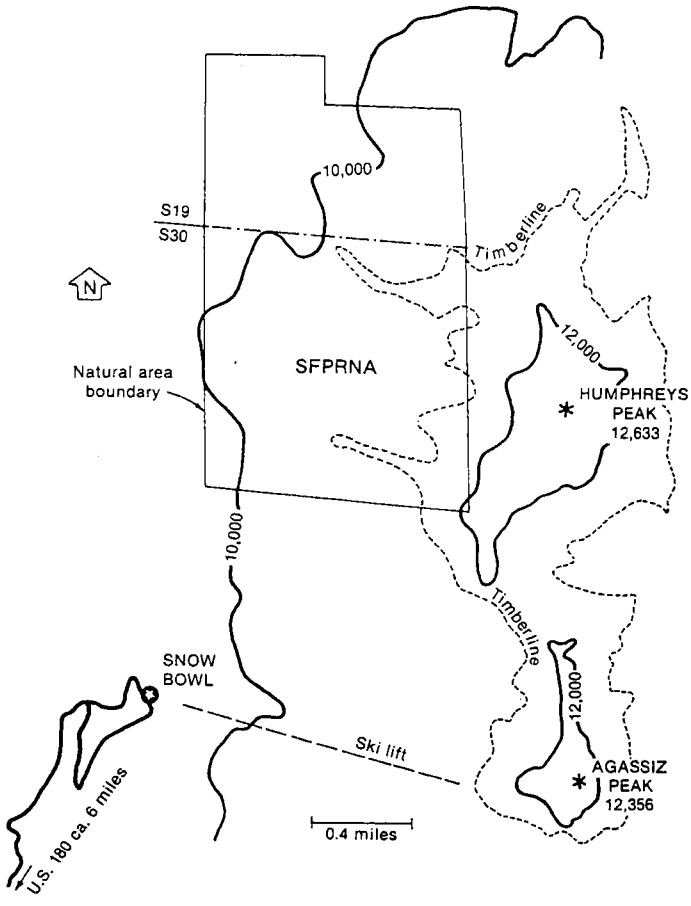


Figure 1.—Sketch map of the San Francisco Peaks Research Natural Area.

Figure 2.—View of the SFPRNA from Forest Service Road 418 in the fall.

Figure 3.—Closeup of four-inch pipeline in the White Horse Canyon.

METHODS

Eleven collecting trips were made into the SFPRNA during the growing season of 1980.[4] These included one trip in June, four in July, four in August, and two in September. Snow covered much of the area above 11,000 feet until after mid-July.[4] Field notes were recorded for each trip, and voucher specimens were filed at the Deaver Herbarium, Northern Arizona University, Flagstaff. Attempts were made to correlate field observations with habitat type (HT) descriptions of Moir and Ludwig (1979) for the San Francisco Peaks. Visual stem counts were made in mixed conifer and spruce-fir communities at elevational intervals of about 200 feet (60 m) to determine dominance. Notes were kept to indicate approximate elevation and slope exposure where one dominant species was replaced by another.

[4]*Equipment carried on each trip included compass, altimeter, Humphreys Peak Topographical Quadrangle map, aerial photos of the area, camera, trowel, and plant collecting bags.*

Aerial photographs taken of the area in 1967 were enlarged (to the scale of 8 inches = 1 mile) and used in the preparation of the vegetation map. The boundaries of both aspen and alpine tundra communities were determined from these.

RESULTS AND DISCUSSION

The major portion of the SFPRNA is covered by a mixture of Engelmann spruce and corkbark fir (*Abies lasiocarpa* var. *arizonica*), but there are also significant stands of bristlecone pine and aspen (*Populus tremuloides*), as well as a small area of alpine tundra.

Field studies in this area resulted in the collection of 129 species from 89 genera and 43 families of vascular plants. In her thesis study of the previous year, Paulik (1979) reported 189 species for the subalpine as a whole. There are several reasons for the smaller number of species found in the Natural Area: (a) the area is much smaller, with some habitats greatly reduced; (b) no part of the Inner Basin, which has several species unique to it, is within the Natural Area; and (c) of the 189 species previously collected, 17% or 33 species were considered weedy or introduced and were found primarily around the Arizona Snow Bowl lodge or along hiking trails. Disturbances of this kind occur much less frequently in the Natural Area, and thus few weedy species were recorded.

The plant collections also produced four previously unreported records for the San Francisco Peaks. Timber oatgrass (*Danthonia intermedia*) was formerly reported only from the White Mountains and the Mogollon Rim in wet meadows and pine forests (McDougall 1973). Mountain trisetum (*Trisetum montanum*) was known only from Apache County. Whortleberry (*Vaccinium oreophilum*) was known only from the White Mountains. Now, all three can be included in the San Francisco Peaks flora. Over's goosefoot (*Chenopodium overi*) appears to be an introduced species not previously reported for the subalpine zone of the Peaks.

The presence or absence of the proposed endangered species reported for the area was also noted. The subalpine buttercup (*Ranunculus inamoenus* var. *subaffinis*) is fairly common in moist to mesic meadows throughout the Natural Area. The alpine groundsel (*Senecio franciscanus*) though not as common as the buttercup, was not difficult to find on the gravelly talus slopes of the alpine and upper subalpine area.

Based on plant collections, field observations, and literature studied, nine plant communities are recognized within the boundaries of the SFPRNA. These are described in some detail below and are outlined on a vegetation map in appendix II. The communities are named for the dominant plants in each and are based on Moir and Ludwig's (1979) habitat type studies, indicated by HT, and the vegetation classification system of Brown et al. (1979).

In the description of the plant communities, common names and/or acronyms are sometimes used for con-

venience. The major trees and dominant herbs for which the plant communities are named are listed in table 1.

Table 1.—Scientific name, acronym, and common name of the major trees and dominant herbs of the nine plant communities of the SFPRNA

Scientific name	Acronym	Common name
Picea engelmannii	PIEN	Engelmann spruce
Abies lasiocarpa var. *arizonica*	ABLA	Corkbark fir
Populus tremuloides	POTR	Aspen
Pinus aristata	PIAR	Bristlecone pine
Geum rossii var. *turbinatum*	GERO	Mountain avens
Primula parryi	PRPA	Parry's primrose
Carex bella	CABE	Beautiful sedge
Muhlenbergia montana	MUMO	Mountain muhly
Lathyrus arizonicus	LAAR	Arizona peavine
Erigeron superbus	ERSU	Showy fleabane

Plant Communities

1. *Picea engelmannii*/Moss (PIEN/MOSS) HT

This HT, covering over 400 acres, ranges from 10,000 to 11,000 feet and dominates the west-facing slopes at the upper middle elevations (fig. 4). Engelmann spruce are largest in diameter (d.b.h.) and outnumber corkbark fir by at least three to one. The understory varies according to available light, with Arizona peavine (*Lathyrus arizonicus*) prevailing in forest openings. Under a closed canopy, which typifies this HT, herbaceous vegetation is sparse, with mosses and lichens providing most cover (fig. 5). The herbs seen most frequently are wild strawberry (*Fragaria ovalis*), fireweed (*Epilobium angustifolium*), mountain parsley (*Pseudocymopterus montanus*), orange sneezeweed (*Helenium hoopesii*), and green gentian (*Swertia radiata*). Predominant shrubs are gooseberry current (*Ribes montigenum*), orange gooseberry (*Ribes pinetorum*), and bearberry honeysuckle (*Lonicera involucrata*). Below 10,000 feet, Engelmann spruce begins to give way to corkbark fir, the codominant tree which is present throughout the HT. On higher and wetter sites, the PIEN/GERO HT replaces it. Below, it merges into the ABLA/LAAR HT. Occasionally limber pine (*Pinus flexilis*) is encountered on exposed ridges.

2. *Picea engelmannii/Geum rossii* (PIEN/GERO) HT

On wetter, north-facing slopes, this HT dominates. Its elevation is generally higher than PIEN/MOSS HT, ranging from 10,500 to 11,500 feet. This HT contains nearly pure stands of Engelmann spruce with occasional corkbark fir. The soil is moist and snow covered until early July. The herbaceous cover is dominated by mountain avens (Geum rossii)[5] in association with a variety of species also found in the adjacent alpine tundra, including Jacob's ladder (*Polemonium delicatum*), franciscan bluebells (*Mertensia franciscana*), golden columbine (*Aquilegia chrysantha*), and alpine fescue (*Festuca ovina* var. *brachyphylla*).

[5]*Mountain avens is correctly named* Geum rossii *(R. Br.) Ser. var.* turbinatum *(Rydb.) C. L. Hitchc., (Lehr and Pinkava 1980), and is the equivalent of* Geum turbinatum *Rydb. as treated by McDougall (1973), Kearney and Peebles (1960) and Lehr (1978).*

Figure 4.—*Picea engelmannii*/Moss HT at about 10,500 feet.

Figure 5.—Closeup of *Picea engelmannii*/Moss HT.

3. *Abies lasiocarpa/Lathyrus arizonicus* (ABLA/LAAR) HT

On west-facing slopes at lower elevations, this HT dominates. Ranging from 9,500 to 10,000 feet, it is the dominant HT where the road from Bismarck Lake enters the forest. In the SFPRNA, perhaps one-third of this HT is in a seral stage dominated by aspen, particularly in Section 19. Corkbark fir outnumbers Engelmann spruce by about five to one, but a few large, mature spruce are present. The understory is dominated by Arizona peavine in the openings, with a sparse scattering of the following herbs: Richardson's geranium (*Geranium richardsonii*), starflower (*Smilacina stellata*), wintergreen (*Pyrola* spp.), spotted coral root (*Corallorhiza maculata*), meadow rue (*Thalictrum fendleri*), creeping barberry (*Berberis repens*), and fringed brome (*Bromus richardsonii*).

4. *Abies lasiocarpa/Erigeron suberbus* (ABLA/ERSU) HT

In the northwest corner, the terrain is interspersed with several shallow canyons paralleling White Horse Canyon, all of which slope abruptly to the northwest. In this area, Douglas-fir (*Pseudotsuga menziesii*) makes its only appearance in the SFPRNA. It is the largest tree in this community, but corkbark fir is greatest in density. Douglas-fir may represent a seral stage that is gradually being replaced by corkbark fir. Douglas-fir is most abundant on south-facing slopes at elevations below 9,400 feet. Limber pine and corkbark fir are present on west-facing slopes, and Engelmann spruce becomes a major component on north-facing slopes. White fir (*Abies concolor*), which is a frequent inhabitant of such a mixed coniferous forest in Arizona, is notably absent. Understory vegetation is a mixture of showy fleabane (*Erigeron superbus*), wintergreen, starflower, creeping barberry, Richardson's geranium, Canadian violet (*Viola canadensis*), sweet cicely (*Osmorhiza depauperata*), and fairybells (*Disporum trachycarpum*). Several interesting shrubs are found on the north side of White Horse Canyon; these include Scouler's willow (*Salix scouleri*), service berry (*Amelanchier utahensis*), mountain ash (*Sorbus dumosa*), and rock spiraea (*Holodiscus dumosus*). The only collection of whortleberry was made at 9,500 feet in White Horse Canyon.

5. *Pinus aristata* community

This bristlecone pine community is found on south-facing ridges and talus slope edges at elevations between 10,500 and 11,500 feet (fig. 6). Occasionally Engelmann spruce and limber pine are intermixed. Except for sporadic shrub cover of common juniper (*Juniperus communis*) and gooseberry currant, there is a very sparse understory. The few herbs present are wild candytuft (*Thlaspi fendleri*), yellow draba (*Draba aurea*), Whipple's beardtongue (*Penstemon whippleanus*), and alpine fescue. The bristlecone pines are widely spaced and stunted at higher elevations. This community repeatedly appears on the north edges of talus slopes, which are the warmer and drier sites.

6. *Populus tremuloides* subclimax community

Extensive stands of aspen are found within the ABLA/LAAR HT, and a few arms extend upward into the PIEN/MOSS HT (fig. 7). These are seral stages, presumably following fire. Herbaceous cover varies greatly in response to the percentage of canopy cover. Under a relatively open canopy, Arizona peavine forms a luxuriant growth with a mixture of silvery lupine (*Lupinus argenteus*), American vetch (*Vicia americana*), Parry goldenweed (*Haplopappus parryi*), squirreltail (*Sitanion longifolium*), and fringed brome. Under a more closed canopy, such mesic species as starflower, creeping barberry, wintergreen, and baneberry (*Actaea arguta*) are found. Comparison of 1980 field observations of the aspen stands (taken from both Kendrick Park and Kendrick Mountain) with 1967 aerial photographs showed a decline in size of the aspen communities. Direct observation, on the ground, indicated very good regeneration of corkbark fir and Engelmann spruce beneath the aspen. Assuming no new fire damage occurs, these aspen communities may be replaced within the next 50 years. Depending on altitude and slope exposure, the true climax will be either Engelmann spruce or corkbark fir.

7. *Geum rossii/ Carex bella* community

True alpine tundra is found in the southeast corner and extends downward on the exposed talus slopes in Section 30 (fig. 8). A small patch of tundra is also found on the exposed talus slope in the southeastern part of Section 19. This community is found mostly above 11,000 feet. It is dominated by mountain avens with a mixture of sedges, the most prevalent being the beautiful sedge (*Carex bella*). Other components of this community are sticky Jacob's ladder (*Polemonium viscosum*), moss campion (*Silene acaulis*), mountain sorrel (*Oxyria digyna*), painted alumroot (*Heuchera versicolor*), alpine groundsel, queen's crown (*Sedum rhodanthum*), spike trisetum (*Trisetum spicatum*), and spreading wheatgrass (*Agropyron scribneri*). At the lower extremes of the talus slopes in Section 30, a more dense shrub cover appears. This shrubby cover includes common juniper, gooseberry currant, red elderberry (*Sambucus microbotrys*), and bearberry honeysuckle.

8. *Primula parryi* community

This Parry's primrose community (fig. 9), recognized by Paulik (1979), covers less than 0.1% of the Natural Area and is restricted to high altitude regions which have additional moisture from seeps or springs. Parry's primrose dominates in abundance, size, and aroma. One such area is found at the eastern edge of Section 19 in a narrow vertical strip of about 200 feet. Associated with this community are such rare species as nodding bluegrass (*Poa reflexa*) and pygmy saxifrage (*Saxifraga debilis*). Other more ubiquitous herbs are mountain avens, Franciscan bluebells, subalpine buttercup, and several sedges (*Carex* spp.). An abundant nurse crop of Engelmann spruce thrives here.

9. *Muhlenbergia montana*/forb meadow community

In the southwest corner at the lower end of the talus slope, there are a few grassy openings on southwest-facing slopes adjacent to an aspen stand. These meadows are dominated by mountain muhly (*Muhlenbergia montana*) mixed with forbs and grasses typically found in the Douglas-fir and ponderosa pine communities of lower elevation. Associated grasses include Arizona fescue (*Festuca arizonica*), pine dropseed (*Blepharoneuron tricholepis*), and squirreltail. Common forbs are American vetch and silvery lupine. This is the

Figure 6.—*Pinus aristata* community at about 11,500 feet.

Figure 8.—*Geum rossii/Carex bella* community, with pipeline running through it.

Figure 7.—View of White Horse Canyon and *Populus tremuloides* subclimax community.

Figure 9.— *Primula parryi* community.

Table 2.—Plant communities of the SFPRNA, their equivalent association designation by Brown et al. (1979), and area (acres) covered

Map number	Plant community	Equivalent from Brown et al. (1979)		Total area covered	Percent of total
1.	*Picea engelmanniil*Moss HT	121.311	*Picea engelmannii-Abies lasiocarpa* association	412	40.2
2.	*Picea engelmanniil/Geum rossii* HT	121.312	*Picea engelmannii* assoc.	173	16.9
3.	*Abies lasiocarpa/Lathyrus arizonicus* HT	121.314	*Abies lasiocarpa arizonica* association	164	16.0
4.	*Abies lasiocarpa/Erigeron superbus* HT	121.314	*Abies lasiocarpa* 51 *arizonica* association		5.0
5.	*Pinus aristata* community	121.322	*Pinus aristata* assoc.	56	5.5
6.	*Populus tremuloides* subclimax community	121.316	*Populus tremuloides* subclimax association	82	8.0
7.	*Geum rossii/Carex bella* community	111.532	*Geum turbinatum-Carex bella* association	74	7.2
8.	*Primula parryi* community	111.052	Mixed Herb Series of Rocky Mt. Alpine Tundra	1	0.1
9.	*Muhlenbergia montana* forb meadow community	142.411	Mixed forb-grass assoc. of Rocky Mt. Montane grassland	1	.1
	Bare rock			10	1.0

only place in the SFPRNA that showed evidence of domestic livestock intrusion. A spring here is responsible for attracting cattle to this lush, grassy meadow at about 10,000 feet.

SUMMATION

Table 2 matches the plant community name used above with the corresponding association designation used by Brown et al. (1979); it also shows the amount of land area covered by the nine plant communities recognized.

Of the nine plant communities represented in the SFPRNA, the PIEN/MOSS HT is by far the most extensive. Second in size and sharing nearly equal acreage are the PIEN/GERO HT and the ABLA/LAAR HT. A casual visit to the SFPRNA gives the impression that the ABLA/LAAR HT is much more extensive than it actually is, as it lies along most of the western edge and must be passed through to reach other communities. The two smallest communities are the *Primula parryi* community and the *Muhlenbergia montana*/forb meadow community. Two communities which are particularly unique in Arizona are the *Pinus aristata* community (bristlecone pine) and the *Geum rossii/Carex bella* community (alpine tundra). These two communities are found nowhere else in the state of Arizona except on the San Francisco Peaks.

LITERATURE CITED

Brown, D. E., C. H. Lowe, and C. P. Pase. 1979. A digitized classification system for the biotic communities of North America with community (series) and association examples for the Southwest. Journal of Arizona-Nevada Academy of Science. 14(1):1-16.

Kearney, Thomas H., and Robert H. Peebles. 1960. Arizona flora. 1085 p. University of California Press, Berkeley and Los Angeles.

Lehr, J. H. 1978. A catalogue of the flora of Arizona. 203 p. Desert Botanical Garden, Phoenix.

Lehr, J. H., and D. J. Pinkava. 1980. A catalogue of the flora of Arizona, Supplement I. Journal of Arizona-Nevada Academy of Science. 15(1):17-32.

Little, Elbert L., Jr. 1941. Alpine flora of the San Francisco Mountain, Arizona. Madrono 6:65-81.

McDougall, W. B. 1973. Seed plants of northern Arizona. 594 p. Museum of Northern Arizona, Flagstaff.

Merriam, C. H. 1890. Results of a biological survey of the San Francisco Mountain region and desert of the Little Colorado in Arizona. North American Fauna 3. 136 p., 13 plates, 5 maps. U.S. Department of Agriculture, Division of Ornithology and Mammalogy, Washington, D.C.

Moir, William H., and John A. Ludwig. 1979. A classification of spruce-fir and mixed conifer forest habitat types in Arizona and New Mexico. USDA Forest Service Research Paper RM-207, 47 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

Moore, Thomas C. 1965. Origin and disjunction of the alpine tundra flora on San Francisco Mountain, Arizona. Ecology 46:860-864.

Paulik, Laurie A. 1979. A vascular flora of the subalpine spruce-fir forest of the San Francisco Peaks, Arizona. 94 p. M.S. thesis, Northern Arizona University, Flagstaff.

Schaack, C. G. 1970. A flora of the arctic-alpine vascular plants of the San Francisco Mountain, Arizona. 107 p. M.S. thesis, Northern Arizona University, Flagstaff.

Smith, E. Linwood. 1974. Established natural areas in Arizona: A guidebook for scientists and educators. 300 p. Planning Division, Office of Economic Planning and Development, Office of the Governor, Phoenix, Ariz.

APPENDIX A

Checklist of the Vascular Plants of the San Francisco Peaks Research Natural Area[6]

7. POLYPODIACEAE
   - *Cystopteris fragilis* (L.) Bernh. var. *tenuifolia* (Clute) Brown
8. PINACEAE
   - *Abies lasiocarpa* (Hook.) Nutt. var. *arizonica* (Merriam) Lemmon
   - *Picea engelmannii* Parry
   - *Pinus aristata* Engelm.
   - *Pinus flexilis* James
   - *Pseudotsuga menziesii* (Mirb.) Franco var. *glauca* (Beissn.) Franco
9. CUPRESSACEAE
   - *Juniperus communis* L. var. *saxatilis* Pall. = (var. *depressa* Pursh)
18. POACEAE
   - *Agropyron scribneri* Vasey
   - *A. trachycaulum* (Link) Malte var. *glaucum* (Pease and Moore) Malte
   - *A. trachycaulum* (Link) Malte var. *latiglume* (Scribn. & Smith) Beetle
   - *Agrostis exarata* Trin.
   - *Blepharoneuron tricholepis* (Torr.) Nash
   - *Bromus frondosus* (Shear.) Woot. & Standl.
   - *B. richardsonii* Link
   - *Danthonia intermedia* Vasey
   - *Festuca arizonica* Vasey
   - *F. ovina* L.
   - *F. ovina* L. var. *brachyphylla* (Schult.) Piper
   - *F. sororia* Piper
   - *Koeleria cristata* (L.) Pers. = (*K. pyramidata* (Lam.) Beauv.)
   - *Muhlenbergia montana* (Nutt.) Hitchc.
   - *Phleum alpinum* L.
   - *Poa fendleriana* (Steud.) Vasey
   - *P. interior* Rydb.
   - *P. pratensis* L.
   - *P. reflexa* Vasey & Scribn.
   - P. rupicola Nash
   - *Sitanion longifolium* J. G. Smith
   - *Trisetum montanum* Vasey
   - *T. spicatum* (L.) Richt.
19. CYPERACEAE
   - *Carex albonigra* MacKenzie
   - *C. bella* Bailey
   - *C. chalciolepis* Holm
   - *C. ebenea* Rydb.
   - *C. occidentalis* Bailey
   - *C. rossii* Boott
   - *C. siccata* Dewey
   - *C. wootonii* MacKenzie
26. JUNCACEAE
   - *Luzula parviflora* Desv.
   - *L. spicata* (L.) DC.
27. LILIACEAE
   - *Disporum trachycarpum* (Wats.) Benth. & Hook.
   - *Smilacina stellata* (L.) Desf.
   - *Zigadenus elegans* Pursh
30. ORCHIDACEAE
   - *Corallorhiza maculata* Raf.
   - *Goodyera oblongifolia* Raf.
32. SALICACEAE
   - *Populus tremuloides* Michx.
   - *Salix scouleriana* Barratt
43. POLYGONACEAE
   - *Oxyria digyna* (L.) Hill
44. CHENOPODIACEAE
   - *Chenopodium berlandieri* Moq.
   - *C. overi* Aellen
50. CARYOPHYLLACEAE
   - *Arenaria lanuginosa* (Michx.) Rohrb. ssp. *saxosa* (Gray) Mag.
   - *A. obtusiloba* (Rydb.) Fern.
   - *A. rubella* (Wahlenb.) J. E. Smith
   - *Cerastium beeringianum* Cham. & Schlecht.
   - *Silene acaulis* L. ssp. *subcaulescens* (F. N. Williams) Hitchc. & Maguire
   - *S. scouleri* Hook. ssp. *pringlei* (Wats.) Hitchc. & Maguire
   - *Stellaria umbellata* Turcz.
52. RANUNCULACEAE
   - *Actaea arguta* Nutt.
   - *Anemone globosa* Nutt.
   - *Aquilegia chrysantha* Gray
   - *Ranunculus inamoenus* Greene var. *subaffinis* (Gray) L. Benson
53. BERBERIDACEAE
   - *Berberis repens* Lindl.
56. CRUCIFERAE
   - *Draba aurea* Vahl
   - *D. crassifolia* Graham
   - *Thlaspi fendleri* Gray
59. CRASSULACEAE
   - *Sedum rhodanthum* Gray
60. SAXIFRAGACEAE
   - *Heuchera versicolor* Greene forma *pumila* Rosendahl et al.
   - *Ribes montigenum* McClatchie
   - *R. pinetorum* Greene
   - *Saxifraga debilis* Engelm.
   - *S. rhomboidea* Greene var. *franciscana* (Small) K. & P.

[6] *Numbering and sequence of plant families follows McDougall (1973) and Kearney and Peebles (1960).*

63. ROSACEAE
Amelanchier utahensis Koehne
Fragaria ovalis (Lehm.) Rydb.
Geum rossii (R. Br.) Ser. var. *turbinatum* (Rydb.) C. L. Hitchc.
Holodiscus dumosus (Nutt.) Heller
Potentilla diversifolia Lehm.
P. hippiana Lehm.
P. sibbaldii Hall. f.
Rubus strigosus Michx.
Sorbus dumosa Greene

64. LEGUMINOSAE
Lathyrus arizonicus Britton
Lupinus argenteus Pursh
Vicia americana Muhl.

65. GERANIACEAE
Geranium richardsonii Fisch. & Trautv.

74. EUPHORBIACEAE
Euphorbia lurida Engelm.

91. VIOLACEAE
Viola canadensis L.

97. ONAGRACEAE
Epilobium angustifolium L.

100. UMBELLIFERAE
Osmorhiza depauperata Phil.
Pseudocymopterus montanus (Gray) Coult. & Rose

103. ERICACEAE
Moneses uniflora (L.) Gray
Pyrola secunda L.
P. virens Schweigg.
Vaccinium oreophilum Rydb.

104. PRIMULACEAE
Androsace septentrionalis L.
Primula parryi Gray

110. GENTIANACEAE
Gentianella amarella (L.) Börner
G. barbellata (Engelm.) J. M. Gillett
Swertia radiata (Kellogg) Kuntze

114. POLEMONIACEAE
Polemonium delicatum Rydb.
P. viscosum Nutt.

116. BORAGINACEAE
Mertensia franciscana Heller

118. LABIATAE
Agastache pallidiflora (Heller) Rydb.
Monardella odoratissima Benth.

120. SCROPHULARIACEAE
Castilleja austromontana Standl. & Blumer
Pedicularis parryi Gray
Penstemon barbatus (Cav.) Roth
P. whippleanus Gray
Veronica wormskjoldii Roem. & Schult.

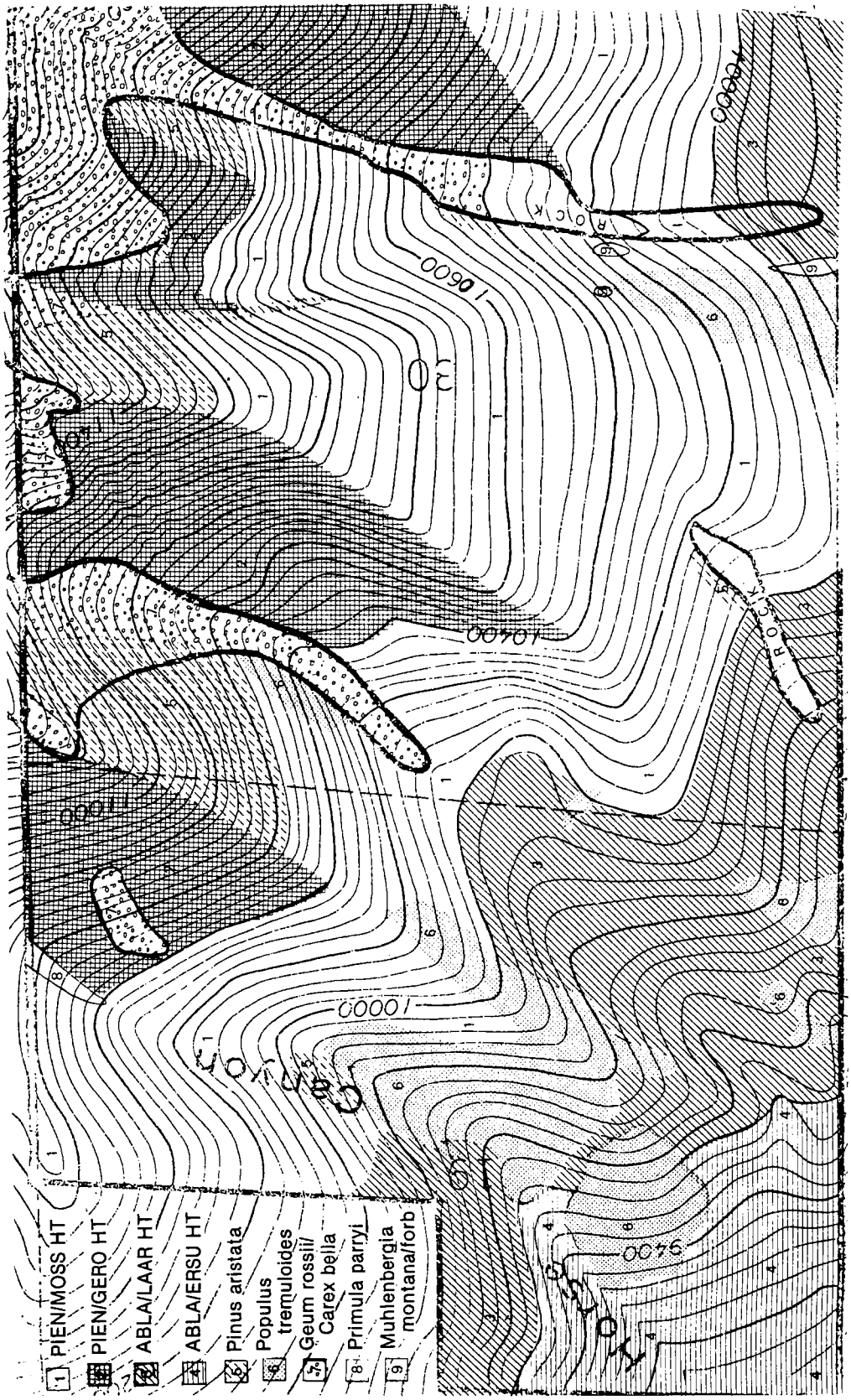
128. CAPRIFOLIACEAE
Lonicera arizonica Rehder
L. involucrata (Richards) Banks
Sambucus microbotrys Rydb.
Symphoricarpos parishii Rydb.

129. VALERIANACEAE
Valeriana acutiloba Rydb.

132. COMPOSITAE
Achillea lanulosa Nutt.
Agoseris arizonica Greene
A. aurantiaca (Hook.) Greene
Antennaria parvifolia Nutt.
A. umbrinella Rydb.
Erigeron flagellaris Gray
E. formosissimus Greene
E. simplex Greene
E. superbus Greene
Haplopappus parryi Gray
Helenium hoopesii Gray
Helianthella quinquenervis (Hook.) Gray
Senecio bigelovii Gray
S. franciscanus Greene
S. macdougalii Heller
Solidago decumbens Greene
S. multiradiata Ait.
Taraxacum officinale Weber

APPENDIX B

Vegetation Map of the San Francisco Peaks Research Natural Area



Rominger, James M., and Laurie A. Paulik. 1983. A floristic inventory of the plant communities of the San Francisco Peaks Research Natural Area. USDA Forest Service General Technical Report RM-96, 9 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

In this study area, covering 1,024 acres of alpine and subalpine vegetation on the west slopes of Humphreys Peak in Coconino County, Arizona, 129 species of vascular plants were found within nine plant communities or habitat types, as classified by Moir and Ludwig.

Keywords: Floristic inventory, research natural area, alpine vegetation, subalpine vegetation

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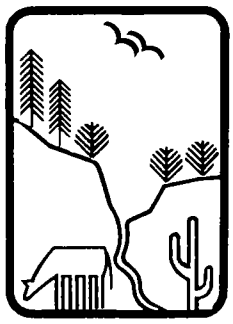
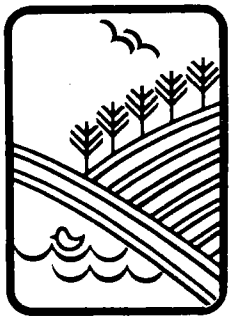
Rocky Mountains



Southwest



Great Plains

U.S. Department of Agriculture
Forest Service

Rocky Mountain Forest and Range Experiment Station

The Rocky Mountain Station is one of eight regional experiment stations, plus the Forest Products Laboratory and the Washington Office Staff, that make up the Forest Service research organization.

RESEARCH FOCUS

Research programs at the Rocky Mountain Station are coordinated with area universities and with other institutions. Many studies are conducted on a cooperative basis to accelerate solutions to problems involving range, water, wildlife and fish habitat, human and community development, timber, recreation, protection, and multiresource evaluation.

RESEARCH LOCATIONS

Research Work Units of the Rocky Mountain Station are operated in cooperation with universities in the following cities:

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Flagstaff, Arizona
Fort Collins, Colorado*
Laramie, Wyoming
Lincoln, Nebraska
Lubbock, Texas
Rapid City, South Dakota
Tempe, Arizona

*Station Headquarters: 240 W. Prospect St., Fort Collins, CO 80526

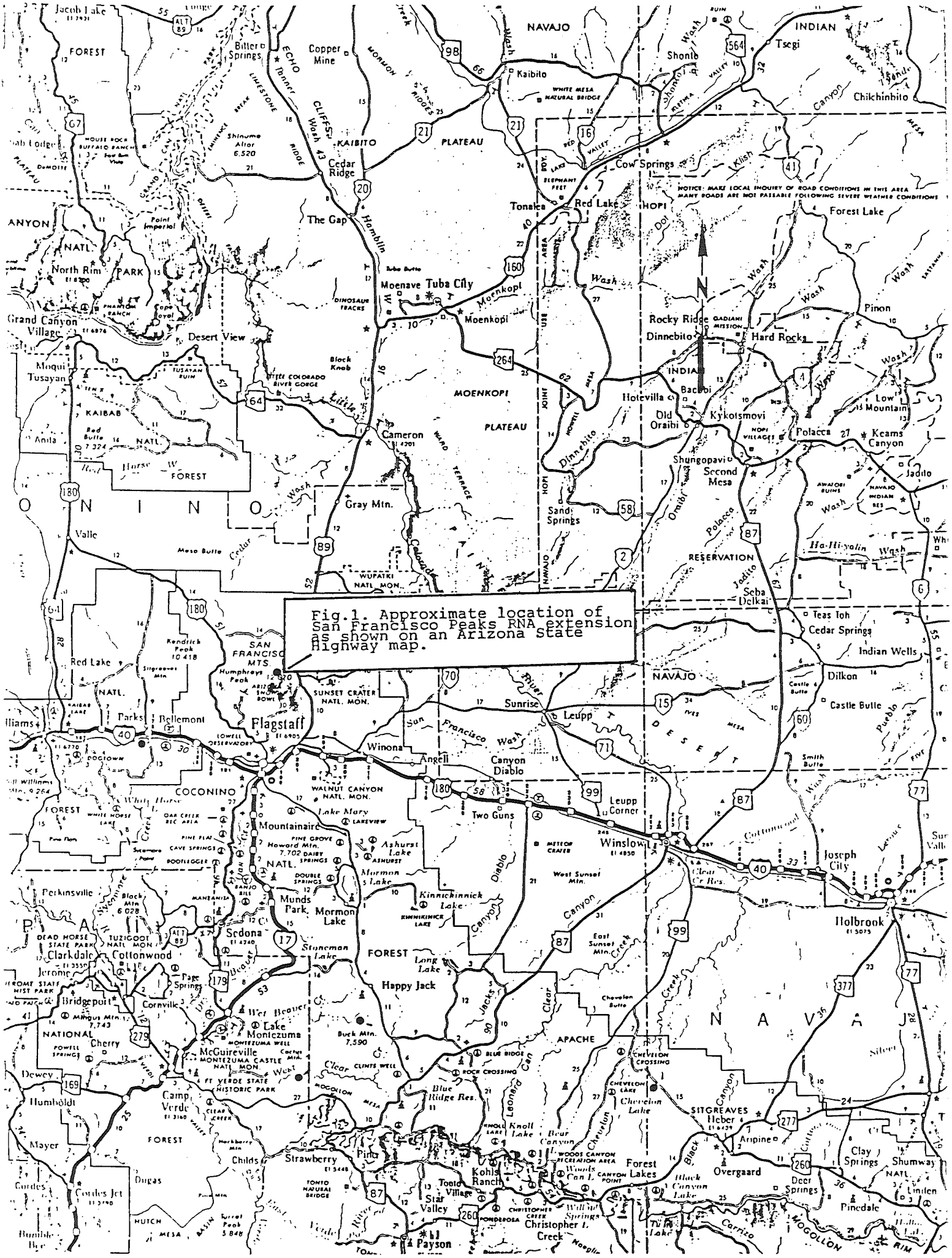


Fig.1. Approximate location of San Francisco Peaks RNA extension as shown on an Arizona State Highway map.

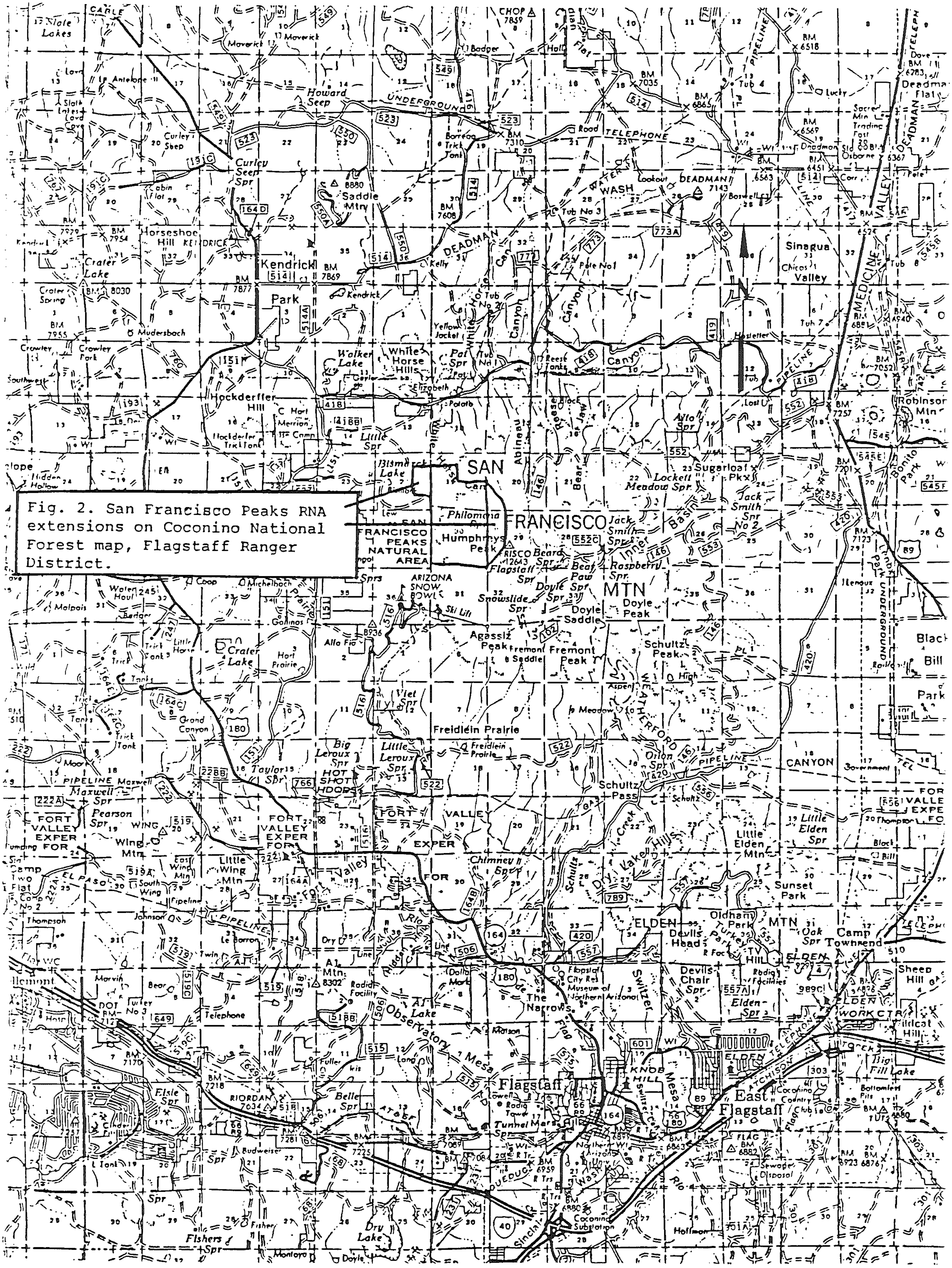


Fig. 2. San Francisco Peaks RNA extensions on Coconino National Forest map, Flagstaff Ranger District.

COCONINO NATIONAL FOREST
ELDEN AND FLAGSTAFF RANGER DISTRICTS

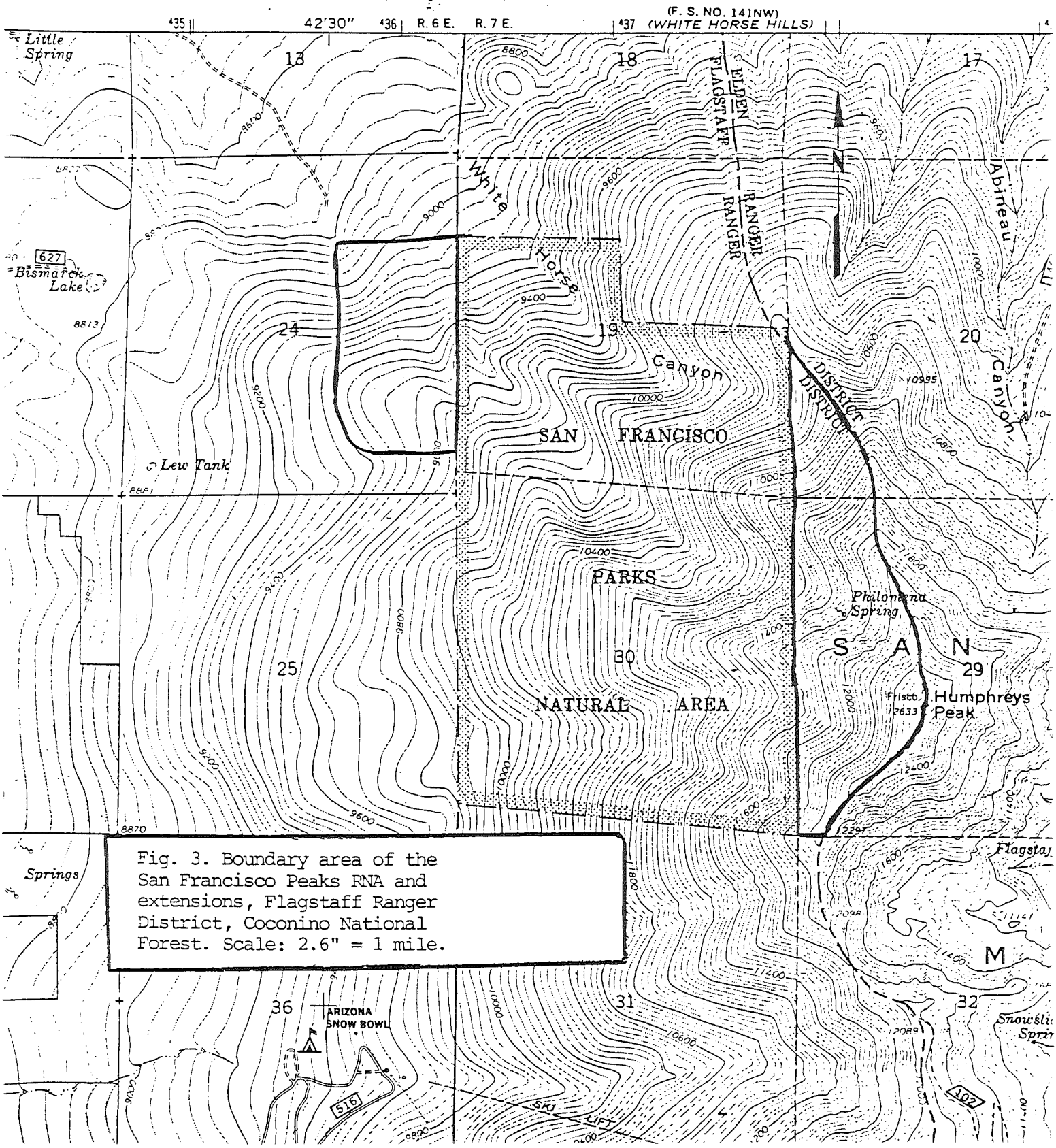


Fig. 3. Boundary area of the San Francisco Peaks RNA and extensions, Flagstaff Ranger District, Coconino National Forest. Scale: 2.6" = 1 mile.

COCONINO NATIONAL FOREST
ELDEN AND FLAGSTAFF RANGER DISTRICTS

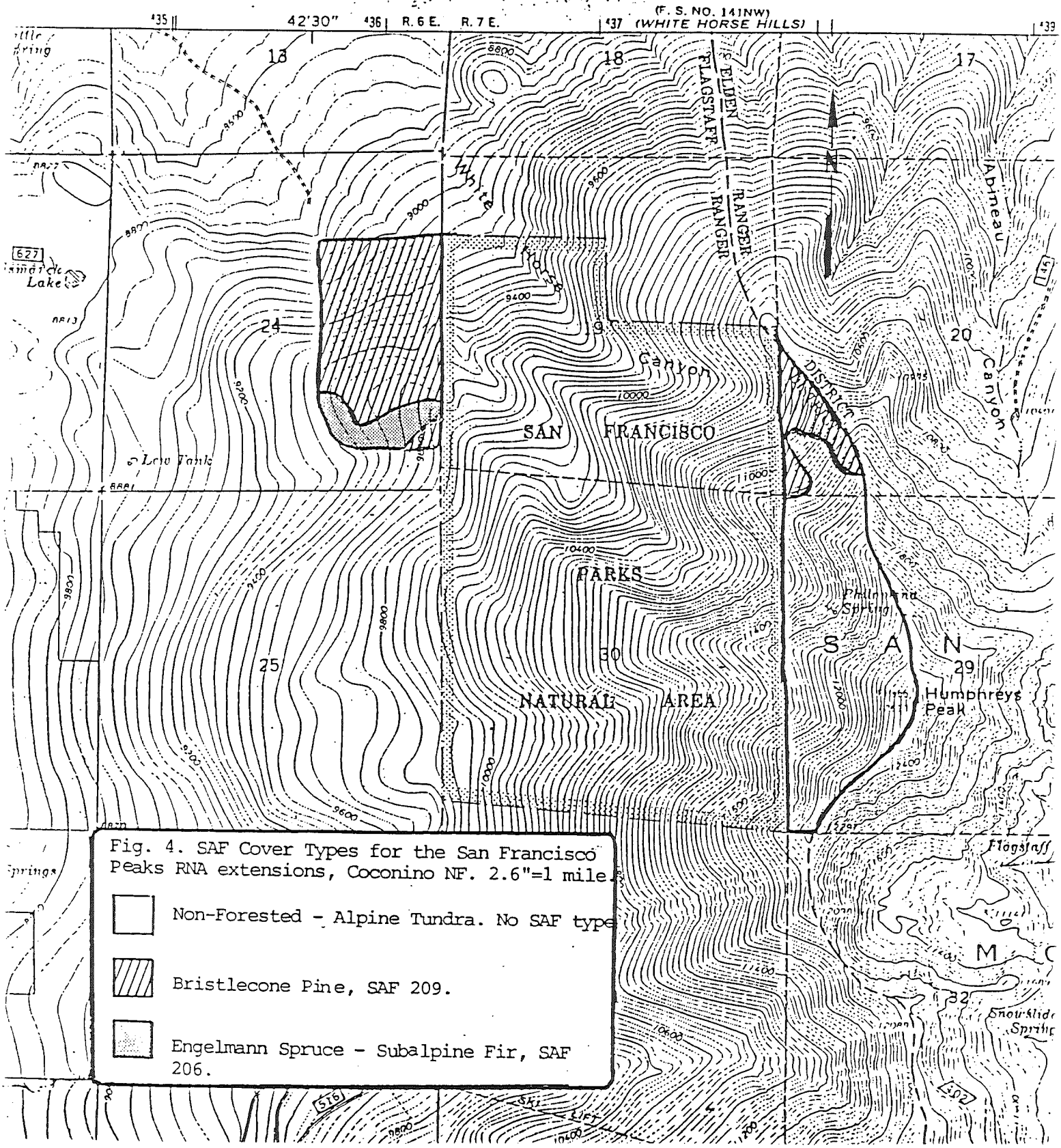


Fig. 4. SAF Cover Types for the San Francisco Peaks RNA extensions, Coconino NF. 2.6"=1 mile.

Non-Forested - Alpine Tundra. No SAF type

Bristlecone Pine, SAF 209.

Engelmann Spruce - Subalpine Fir, SAF 206.

APPENDIX

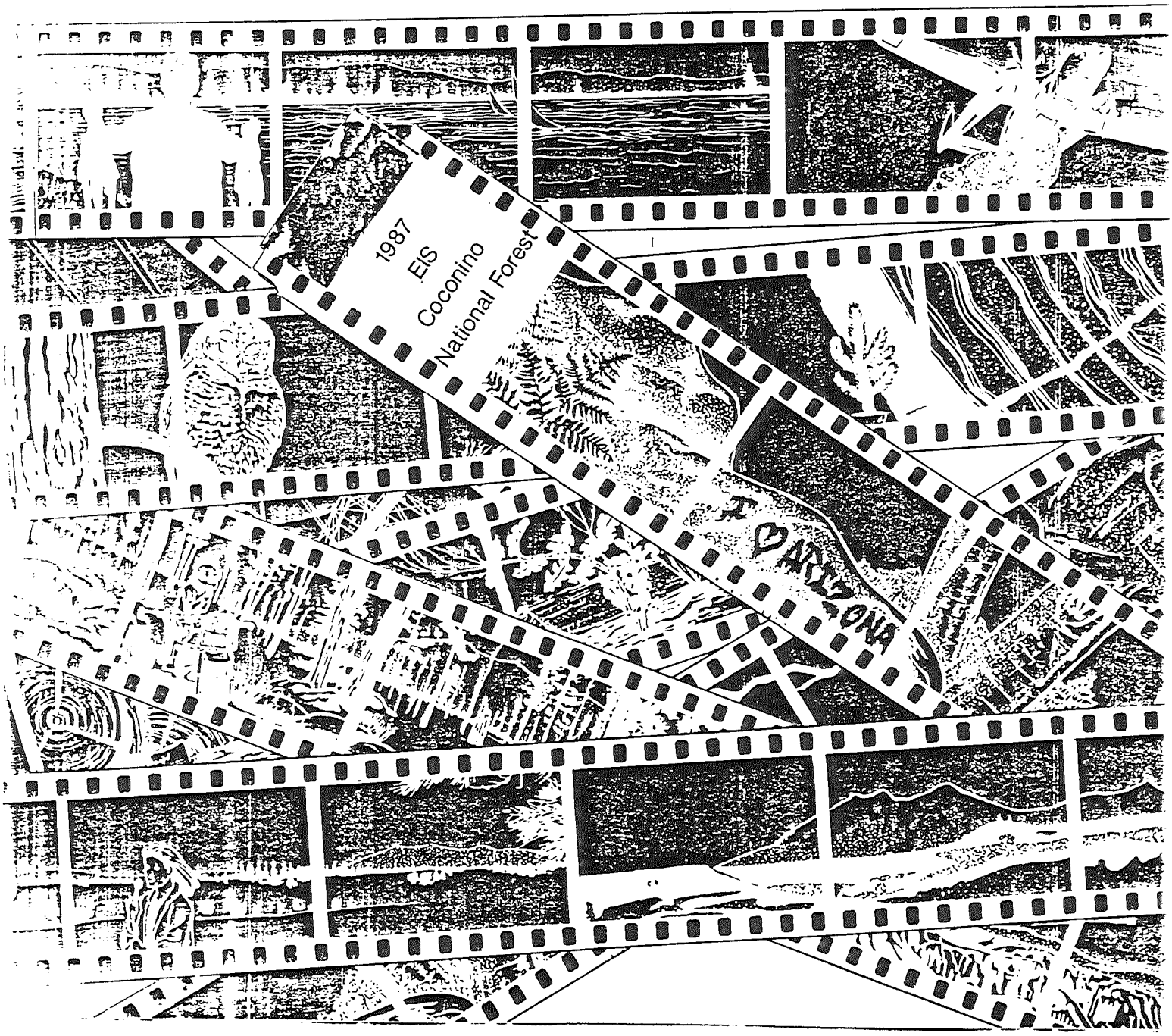
The following pages have been reproduced
from the Coconino National Forest Plan.

United States
Department of
Agriculture

Forest
Service

Southwestern
Region

Coconino National Forest Plan



MANAGEMENT AREA 17

Special Areas
Analysis Areas 48-51 Acres: 4,773

The Special Areas include one geological area, four botanical areas, one research natural area (RNA), Casner Canyon, and one proposed RNA, Rocky Gulch. There are two other RNA's, the San Francisco Peaks and West Fork of Oak Creek, included in the wildernesses that surround them, and G. A. Pearson RNA is included in the Fort Valley Experimental Forest. West Clear Creek proposed RNA is within the West Clear Creek Wilderness. By approval of this Forest Plan, the Red Mountain Geological Area, the Mogollon Rim Botanical Area, the Verde Valley Botanical Area, the Fern Mountain Botanical Area, and the Fossil Springs Botanical Area are officially designated (FSH 2372.2). The proposed Rocky Gulch and West Clear Creek RNA's require establishment reports and designation by the Chief.

- Casner Canyon RNA is located near Sedona and within Oak Creek Canyon. The area contains a pure stand of Arizona cypress along with some chaparral. This area was established in 1973 and contains 565 acres.

- Rocky Gulch proposed RNA is located in the Beaver Creek Watershed. The area contains 850 acres of old-growth ponderosa pine and was one of the control watersheds for research in the Beaver Creek Watershed.

- The 154-acre G. A. Pearson RNA was established in 1950 and is located just north of Flagstaff in a portion of Rocky Mountain Research Station Experimental Forest. The area represents a pure stand of old-growth ponderosa pine. Management decisions for the experimental forests are not made in this Forest Plan.

- The 1,223-acre Red Mountain Geological Area was first proposed in 1977 by the Forest but only had a withdrawal from mineral entry without formal designation. It contains a unique cinder cone within the San Francisco Peaks volcanic field.

- Mogollon Rim Botanical Area, a 360-acre white fir/bigtooth maple community, represents a unique vegetation type found in Arizona only at a few locations along the Mogollon Rim.

- Verde Valley Botanical Area, a 1,140-acre desert scrub community, represents a unique desert community which has been greatly reduced by human activities. Cowania subintegra, a T&E species, is located here.

- Fern Mountain Botanical Area, a 170-acre high elevation riparian scrub community dominated by Bebb's willow, represents a unique riparian community .

- Fossil Springs Botanical Area is a riparian deciduous forest associated with a large perennial spring and covers approximately 26 acres. It is immediately adjacent to the Fossil Springs Wilderness.

Management Emphasis

Emphasize and protect watershed condition and maintain natural ecological conditions on the Research Natural Areas (RNA's) so that they are available for research and education that does not disturb the areas' natural condition. Use restrictions are imposed as necessary to keep areas in their natural or unmodified condition. There is no harvest of timber products, including firewood. RNA's are closed to off-road driving.

The botanical areas and the geological area are managed to maintain, as nearly as possible, existing conditions and natural processes for public enjoyment, demonstration, and study. Interpretative and educational demonstration opportunities are emphasized and enhanced through selective facility development. Natural events are not rehabilitated. Off-road driving is prohibited.

Highlights include:

- Prepare establishment reports for the Rocky Gulch and West Clear Creek proposed Research Natural Areas.
- Prepare implementation schedules for the botanical areas and the geological area.
- Include management that provides for later interpretation.
- Manage for VQO's of Preservation in the research natural areas and Retention or Partial Retention in the geological and botanical areas.

Timber Land Use Classes:

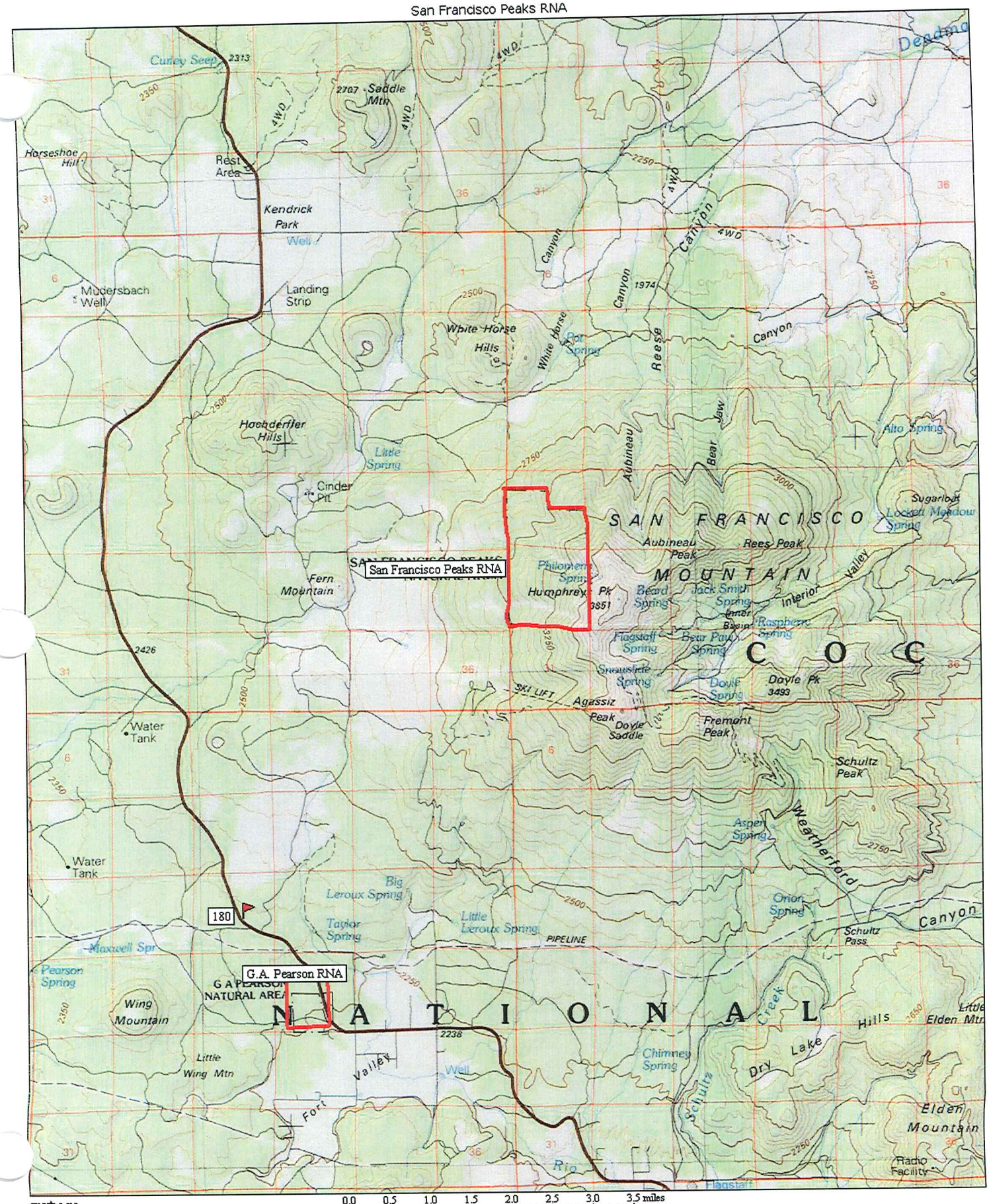
Nonforest	1,432 acres
Forested land withdrawn	
Ponderosa Pine/Mixed Conifer	1,628 acres
Pinyon-juniper	1,712 acres
Unsuitable (Pinyon-juniper)	0 acres
Unsuitable (physically unsuited or not capable)	0 acres
Forested lands not appropriate for timber harvest	0 acres
Suitable Timber lands	0 acres
TOTAL	4,773 acres

MA 17 - SPECIAL AREAS

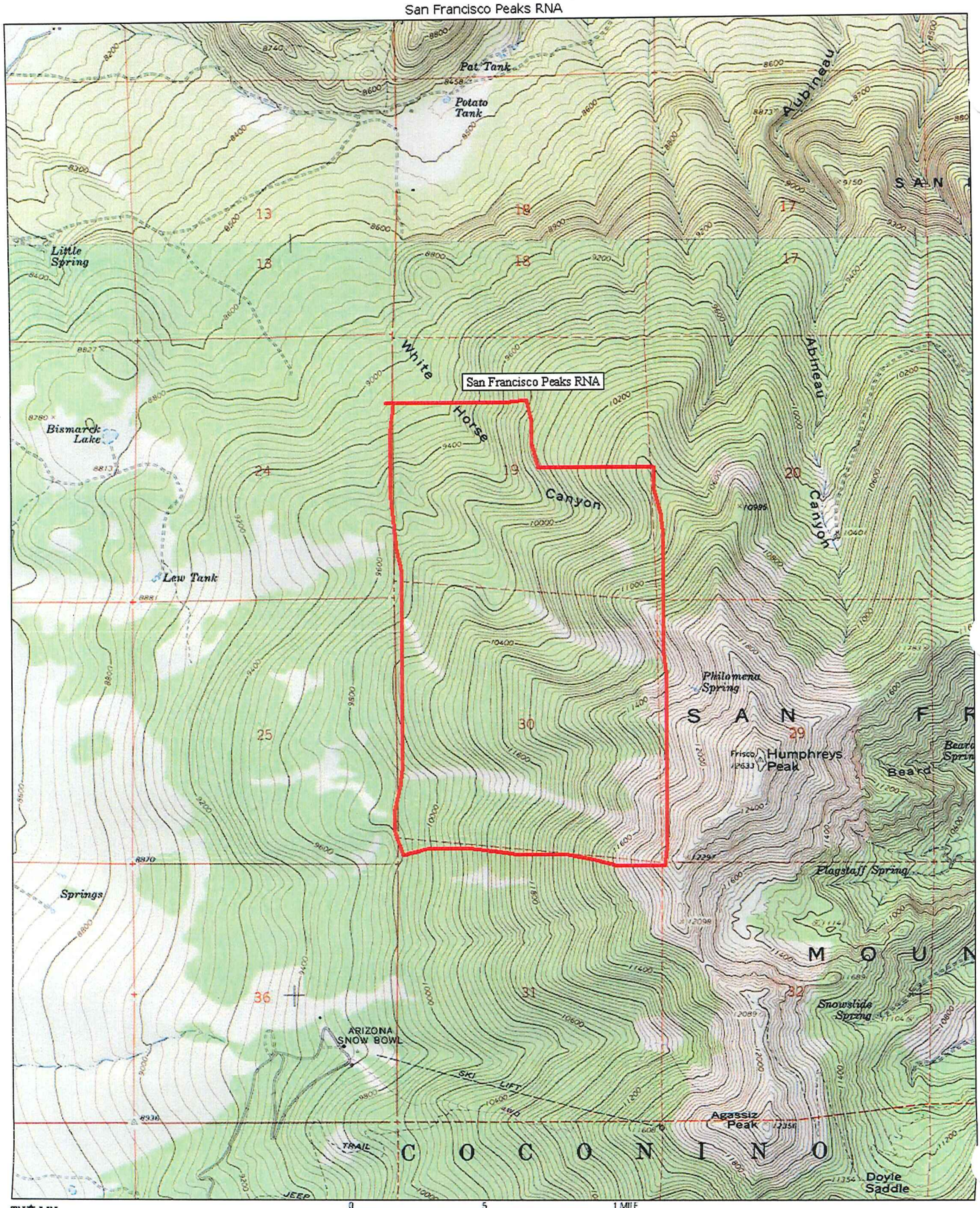
Program Components	Activities	Standards and Guidelines
		Recreation Planning and Inventory
A2 Recreation	A01, A02	Prepare an implementation schedule for the Red Mountain Geological Area and post the boundaries for it in the first decade.
		Prepare implementation schedules and post boundaries for Mogollon Rim, Verde Valley, Fern Mountain, and Fossil Springs botanical areas during the first decade.
		Eliminate mention of RNA's in news stories and general informational materials.
		Prepare establishment reports for the Rocky Gulch and West Clear Creek proposed RNA's during the first decade. In the interim, manage them to preserve their suitability for designation.
		As the Arizona Natural Areas Council recommends RNA's and botanical areas for inclusion in the State Natural Areas Program, the Forest will review the recommendations and may support the recommendations and develop VIS programs as needed.
		Dispersed Recreation--Standard Service Level
	A08	As needed, assess carrying capacity in special areas and limit visitors to meet carrying capacity.
		Prohibit off-road driving.
		Range Resources Planning and Inventory
D2 Range	D01, D02	RNA's are assigned no grazing capacity.
		There are 93 acres in the Red Mountain Geological Area open to grazing that are managed at the C level.
		RNA's and botanical areas are managed to protect and maintain their uniqueness and ecological condition.
		AMP's will have provisions to protect the uniqueness and/or ecological condition of the special areas. Approved AMP's are revised and if necessary amended by 1992.
		Timber Resource Management Planning and Inventory
E8 Timber	E08	Timber harvest and firewood cutting is prohibited.

Program Components	Activities	Standards and Guidelines
		Minerals
G1, G2 Minerals	G01	Seek withdrawal of RNA's and the other special areas from locatable mineral entry in the first decade.
		Lands
J3 LMP/Special-Uses/Lands	J01	Do not allow special-use authorizations that would or could adversely affect or change the character of the areas.
		Road Maintenance and Management
L2 Transportation	L19, F04	Manage roads adjacent to botanical areas and the Red Mountain Geological Area to prevent vehicular intrusion. Block and obliterate existing roads entering the area in the first decade.
		Fire Management Planning and Inventory
P2 Protection	P01	Use prescribed fire with planned ignitions as a management tool provided its use is compatible with the management of the specific area.
		Suppression tactics minimize damage to the the character of RNA's and all other special areas.
		Manage each special area as the adjacent lands until implementation schedules are developed.
		Implementation schedules will recognize each area's unique management objectives and the sensitivity of each area to different fire suppression techniques.

San Francisco Peaks RNA



San Francisco Peaks RNA



TN 12° MN

0 .5 1 MILE

0 1000 FEET 0 500 1000 METERS

Society of American Foresters
Committee on Natural Areas

Proposed Natural Area

Name of Proposed Natural Area San Francisco Peaks

Location: State Arizona County Coconino

Nearest Town Flagstaff

Nearest Federal, State or county highway N-U.S. 180

Permanence Afforded Through What Means Regulation
(law, regulation, will, endowment, Board of Directors, etc.)

Name of Administration Unit Coconino Natl Forest
(National Forest, national park, national wildlife refuge, State, university, etc.)

Listing of Timber Types on Area:

S.A.F. Type No.	Acres	Average Age
206	953	150
209	71	150
Barren, water, buffer zone, etc.		
Total:	1024	

Range in Elevation: Low 9,500 Feet High 11,500 Feet

Topography Steep
(Level, rolling steep, broken, etc.)

Geology Volcanic
(Volcanic, alluvial, moraine, etc.)

Average Height and Diameter of each major species:

Species	Average Height	Average Diameter
Corkbark fir	25'	15"
Engelmann Spruce	50'	22"

Submitted by _____ Title _____

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