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File Code: 4060-3 Date: February 28, 1996
Route To:

Subject: Establishment of Mt. Eddy Research Natural Area

To: Regional Forester, R5

I have reviewed the enclosed Establishment Record and I concur with the establishment of the Mt. Eddy Research Natural Area on the Shasta-Trinity National Forests. The land allocation and NEPA decision for this Research Natural Area were included in the Record of Decision for the Shasta-Trinity National Forests Land and Resource Management Plan.

It is my pleasure to support this establishment of a new RNA.

/s/ James C. Space

JAMES C. SPACE
Station Director

Enclosures

cc:
David Diaz, R5 RNA Coordinator, TM
Connie Millar, PSW RNA Coordinator
C.Phillips, RNA Ecologist

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Mt. Eddy Research Natural Area

Shasta-Trinity National Forests

Siskiyou County, California

The undersigned certify that all applicable land management planning and environmental analysis requirements have been met and that boundaries are clearly identified in accordance with FSM 4063.21, Mapping and Recordation and FSM 4063.41 5.e(3) in arriving at this recommendation.

Prepared by Sheauchi Cheng Date 2/5/96
SHEAUCHI CHENG, RESEARCH ASSISTANT
Pacific Southwest Forest and Range Experiment Station

Recommended by [signature] Date 2/9/96
CHARLEY FITCH, Wilderness and Dispersed Recreation Director
Shasta-Trinity National Forests

Recommended by Karyn L. Wood Date 2/10/96
for SHARON HEYWOOD, Forest Supervisor
Shasta-Trinity National Forests

Concurrence of [signature] Date 2/28/96
JAMES C. SPACE, Station Director
Pacific Southwest Forest and Range Experiment Station

Established by [signature] Date 3/13/96
For G. LYNN SPRAGUE, Regional Forester
Pacific Southwest Region

TITLE PAGE

Establishment Record for
Mt. Eddy Research Natural Area
within Shasta-Trinity National Forests
Siskiyou County, California.

A. Introduction

Mt. Eddy Research Natural Area (MERNA) is located on the Mt. Shasta Ranger District, Shasta-Trinity National Forests in Siskiyou County, California. It is about eight air miles (13 km) west of Mt. Shasta City.

In 1973, 50 acres of the Mt. Eddy area were nominated by the Shasta-Trinity National Forests to be established as a Research Natural Area (RNA). The target vegetation for the RNA was a pure stand of late seral foxtail pine (Pinus balfouriana[1]). Two years later the California Native Plant Society (CNPS) proposed that the Forest Service enlarge the Mt. Eddy RNA to include the surrounding areas which contain many rare and endangered plants. The candidate RNA was enlarged to 890 acres in 1976 supporting 6 sensitive plant species (Skinner and Pavlik 1994).

The RNA system is a national network of ecological areas designated in perpetuity for research and education, and to maintain biological diversity on the National Forest System lands. Only nonmanipulative research, observation, and study are allowed in the RNAs. Primary selection of RNAs is based on the identification of 'target element(s)' which are representative examples of common, or widespread vegetation types found in each vegetation province. Additional selections are made to obtain representation of unusual or unique vegetation and, or geologic types. In California, these target elements are mostly plant communities described in major ecological studies, such as Barbour and Major (1977), Eyre (1980), Kuchler (1966), and Holland (1986). Other unique ecosystems are selected on a case by case basis.

In December, 1976, following the completion of a Reconnaissance Report, Mt. Eddy was formally advanced to Candidate Research Natural Area status by the Pacific Southwest Research Station (PSW)/Region 5 (R5) RNA Committee. Whipple and Cope were contracted by the Committee to conduct an Ecological Survey which was completed in 1978.

The entire MERNA is on land managed by the Shasta-Trinity National Forests. It is within the Mt. Eddy Roadless Area in the Parks-Eddy Management Area (Management Area #5). The Mt. Eddy Roadless Area is currently placed in a "further planning" category. To the west of the MERNA is the Roadless Area called the Upper Trinity Management Area (Management Area #6) (Appendix A1).

Areas surrounding the MERNA are not entirely owned by the Forest Service. The Forest Products Company owns two large parcels of land north (sec. 7, T4ON, R5W and sec. 13, T4ON, R6W) and southwest (sec. 25, T4ON, R6W) of the MERNA (Map 1). Southern Pacific Company owns a 10 acre parcel in NE1/4, sec. 19, T4ON, R5W along the North Fork Sacramento River, which is approximately 0.3 mile (0.5 km) due south from the MERNA. Access to the north sections of Forest Products Company lands are via a private road approaching those

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[1]Nomenclature for plants follows Munz (1959), except tree species which follow Little (1979).

sections from the north. Access to the Forest Products Company and Southern Pacific Company lands southwest of the RNA is via Road 40N45. These private roads are not within or adjacent to the RNA.

Acquiring land on the north side of Mt. Eddy to expand the MERNA boundary is one of the management directions listed in the Shasta-Trinity National Forests Land and Resource Management Plan (FLRMP) (U.S.D.A. Forest Service 1995a) (Appendix A2).

(1) Land Management Planning:

The recommendation for establishment of the MERNA is included in the Shasta-Trinity FLRMP (U.S.D.A. Forest Service 1995a) (Appendix A2). The land allocation decision was made with the signing of the Record of Decision for the FLRMP by the Regional Forester (1995). The analysis for this decision was conducted in the Environmental Impact Statement for the FLRMP (U.S.D.A. Forest Service 1995b). Mt. Eddy is one of thirteen RNAs currently listed under Special Area Management (Management Prescription X) in the FLRMP (Appendix A3).

B. Objectives

The primary objective of establishing MERNA is to add to the Regional and National RNA systems an example of the foxtail pine forest in the Klamath Province. The foxtail pine vegetation type covers 240 acres (97 ha) of the RNA and is considered in good health. No other RNAs within this physiographic region contain significant populations of foxtail pine. This area is at the northern range limit for the species, which occurs in two disjunct regions in California (Griffin and Critchfield 1972, Appendix B). The MERNA is especially valuable for genetic and ecological studies.

Additional objectives are to include within the RNA vegetation types associated with foxtail pine and to maintain the ecological processes and interrelationships between them with minimal human disturbance. Associated vegetation types are: Ultramafic White Pine Forest (Holland 84160), Montane Meadows (Holland 45100), and Klamath-Cascade Fell-Field (Holland 91110).

Establishment of the MERNA also serves to maintain biological diversity since as many as six sensitive plant species occur within the RNA.

C. Justification

Foxtail pine is the primary target element for which the MERNA was selected. The need for this element is high, since no other current RNA proposals contain a significant population of foxtail pine in the northern portion of its range or in the Klamath Mountain Province. The Ecological Survey (ES), by Whipple and Cope (1979), estimated that the Foxtail Pine Forest (Holland 86300) covers 240 acres (97 ha) within the MERNA and so is adequately represented. The foxtail pine forests at Mt. Eddy are of exceptional quality and are described in the ES as "large, healthy," and "an

excellent example of the northern Pinus balfouriana forest". The foxtail pine forest has received very little recreational impact.

The MERNA also includes the Ultramafic White Pine (Pinus monticola) Forest (Holland 84160), Klamath-Cascade Fell-Field (Holland 91110), and Montane Meadow (Holland 45100) vegetation types. This provides excellent research opportunities for monitoring high elevation ecosystems, or the potential range fluctuations of the foxtail pine forest.

MERNA contains six CNPS listed sensitive species (Skinner and Pavlik 1994): golden draba - Draba aureola (List 1B), Campanula scabrella (List 4), Mt. Eddy draba - Draba howellii ssp. carnosula (List 1B), Eriogonum umbellatum var. humistratum (List 4), Eriogonum siskiyouense (List 4), and Trinity buckwheat - Eriogonum alpinum (List 1B), which is also State listed endangered. These species are endemic to serpentine soils in the MERNA.

D. Principal distinguishing features

The major feature in the MERNA is Mt. Eddy at the northern end of the RNA. Mt. Eddy at 9025 ft (2751 m) is the highest peak in the Klamath Province. The MERNA also includes three ridges extending southerly from the summit of Mt. Eddy, one lies in the middle portion of the RNA and the other two constitute the RNA's western and eastern borders. The lowest elevation is approximately 6320 ft (1926 m) located in the southeast corner of the RNA. South facing slopes, ranging from 20 to 50 percent (11-27 degree), are dominant in the area.

The vegetation is composed primarily of high elevation open pine forests with patchy shrub layers and sparse herbaceous layers. Western white pine (Pinus monticola) dominated forest occupies the lower elevations and the nearly pure foxtail pine forest occupies the higher elevations.

E. Location

1) National Forests Involved

Mt. Eddy RNA is located on the Mt. Shasta Ranger District, Shasta-Trinity National Forests, in Siskiyou County, California. No other Forest System lands are involved.

2) Latitude and Longitude

The approximate center of the RNA is at $41^{o}21'$N latitude and $122^{o}30'$W longitude.

3) Boundary Description

The center of Mt. Eddy RNA is 8.0 air miles (13 km) due west of Mount Shasta City. It lies on the south flank of Mt. Eddy, within portions of sec. 24 (T4ON, R6W) and sec. 18 (T4ON, R5W), Mount Diablo Base and Meridian (MDBM), USGS Mount Eddy and South China Mountain quad (Map 1). Some areas adjacent to the RNA, sec. 7, T4ON, R5W on the north and sec. 25, T4ON, R6W on the southwest, are private lands.

The boundary of Mt. Eddy RNA follows land ownership and topographical divisions. The following describes the boundaries of MERNA. For further clarification, please refer to Map 1.

Beginning at the Mt. Eddy Triangulation Station (VABM 9025) (Point a), elevation 9025 ft (2751 m) in NW1/4, sec. 18, T4ON, R5W, thence;

(a) southwestwardly ($S55^{o}W$), along the top of the ridge following the demarcation of Siskiyou and Trinity Counties for approximately 1.5 miles (2.4 km), to its junction with a northwest ($N60^{o}W$)-southeast ($S20^{o}E$) trending ridge (Point b), said point being approximately at 8000 ft (2438 m) elevation;

(b) thence southeastwardly ($S20^{o}E$), along the top of the ridge following the demarcation of Siskiyou and Trinity Counties for approximately 1500 ft (457 m), to its junction with the southern section line of sec. 24, T4ON, R6W (Point c), said point being approximately 2000 ft (610 m) due east from the found southwest section corner of sec. 24, T4ON, R6W;

(c) thence due east, in a direct line following the southern section line of sec. 24 for approximately 3300 ft (1006 m), to the southeast corner of sec. 24, T4ON, R6W (Point d);

(d) thence northwestwardly ($N5^{o}W$), in a direct line following the eastern section line of sec. 24, for approximately 200 ft (61 m), to the southwest corner of sec. 18, T4ON, R5W (Point e);

(e) thence due east, in a direct line following the southern section line of sec. 18, T4ON, R5W, for approximately 1.6 miles (2.6 km), to the found southeast section corner of sec. 18, T4ON, R5W (Point f);

(f) thence northwardly ($N2^{o}E$), in a direct line following the eastern section line of sec. 18, T4ON, R5W, for approximately 1000 ft (305 m), to its junction with a ridge (Point g);

(g) thence northwestwardly ($N35^{o}W$), along the top of the ridge, for approximately 5400 ft (1646 m), to a peak of 8881 ft (2707 m) elevation (Point h);

(h) thence northeastwardly ($N10^{o}E$), along the top of the ridge, for approximately 400 ft (122 m), to its junction with the northern section line of sec. 18 (T4ON, R5W) (Point i), said point being at approximately 8855 ft (2699 m) elevation;

(i) thence due west, in a direct line following the section line, for approximately 2600 ft (792 m), to its junction with a ridge (Point j);

(j) thence southeastwardly (S27°E), along the top of ridge, for approximately 700 ft (213 m), to the Mt. Eddy Triangulation Station (Point a), the point of beginning.

4) Acreage

The area in Mt. Eddy RNA totals 890 acres (360 ha).

5) Elevation

Elevations range from 6320 ft (1926 m) in the southeast corner of the RNA to 9025 ft (2,750 m) at the summit of Mt. Eddy.

6) Access

There is no vehicle access to the MERNA (Map 2). Access to Mt. Eddy is possible from the east (Mt. Shasta City and Lake Siskiyou area) via the Sisson-Callahan National Recreation Trail, which parallels the North Fork Sacramento River and runs through the western portion of the MERNA.

However, the most common access route from Mt. Shasta City is to drive north on Interstate 5 (I-5) to the Parks Creek Road, 6 miles (10 km) past Weed; turn off I-5 and continue south via Stewart Springs Road (Forest Route 17) for approximately 15 miles (24 km) to the Deadfall Creek Trailhead. This trail (6W05) connects with the Sisson-Callahan National Recreation Trail on the ridge at the western border of the RNA. At the junction point, a pass (6W25) running on the ridge top leads to the summit of Mt. Eddy. From the parking area at Deadfall Creek to the foxtail pine stand near the western border is about 3.5 miles (5.6 km) with a 2000 ft (609 m) vertical rise (Johnson 1977).

F. Area by cover type

Table 1: Areas by cover type

SAF Type (Eyre 1980)	Code	Acres	Hectares	Percent
California Mixed Subalpine	256	651	264	73
Whitebark Pine	208	169	68	20
Unclassified		70	28	7
Total		890	360	100
Holland Type (Holland 1986)				
Ultramafic White Pine Forest	84160	383	155	43
Montane Meadows	45100	49	20	5
Foxtail Pine Forest	86300	268	108	30
Klamath-Cascade Fell Field	91110	169	68	20
Rock		21	9	2
Total		890	360	100
Kuchler Type (Kuchler 1966)				
Lodgepole Pine Subalpine Forest	8	820	332	92
Unclassified		70	28	8
Total		890	360	100

G. Physical and climatic conditions

Mt. Eddy is the highest and most northerly peak in the Klamath Province. The parent material of Mt. Eddy area is mesozoic ultrabasic intrusive rock, predominantly serpentinized peridotite. The mountain has been glaciated on all sides.

MERNA includes the summit, most of the southern flank, and small portions of the upper northern flank of Mt. Eddy. It consists of three southerly trending ridges, two of them being the eastern and western boundaries of the RNA. The ridge on the western boundary of the RNA, located immediately south of Deadfall Lakes, is mesozoic granite (Johnson 1977). Soils in the MERNA are thin, gravelly, and unstable.

Most of the area is covered by open forest. Ridges and upper slopes are rocky with sparse herbaceous plants. Within the MERNA there are no lakes. Being the headwaters of the North Fork Sacramento River, several seeps and streams are found in the MERNA. Small meadows occur in these wet areas.

The climate is typical of the eastern Klamath Region. The bulk of the precipitation occurs in the winter months, but occasional summer thunderstorms contribute to the annual precipitation. The Mt. Shasta Weather Bureau Station at 3590 ft (1094 m), approximately 9 miles (14.5 km) east, has 78 years of temperature records and 104 years of precipitation records. The records show a mean annual precipitation of 37.05 inches (943 mm) and mean annual temperature of 49.6°F (9.8°C). The monthly normal temperatures and precipitations are shown in Table 2.

In Mt. Shasta City the mean daily temperatures range from 33.9°F (1.1°C) in January to 68.0°F (20.0°C) in July. Temperatures on Mt. Eddy, 3500 to 5500 ft (1067 to 1676 m) higher than Mt. Shasta City, would be correspondingly cooler.

On Mt. Eddy, the Deadfall Lakes Snow Course average April 1 depth of snow is 82.7 inches (2104 mm), with an average water content of 33 inches (840 mm). There is normally no permanent snow on Mt. Eddy despite its stature as the highest peak in the Klamath Mountains.

Table 2: Monthly normals of Mt. Shasta WSO

	Temperature (°f [°c]): Max.	Min.	Mean	Precipitation: (Inches [mm])
Jan.	42.1 (5.6)	25.5 (-3.6)	33.9 (1.1)	7.21 (183)
Feb.	47.3 (8.5)	28.6 (-1.9)	38.0 (3.3)	5.69 (145)
Mar.	50.9 (10.5)	29.6 (-1.3)	40.2 (4.6)	4.23 (108)
Apr.	57.9 (14.4)	33.2 (0.7)	45.6 (7.6)	2.75 (70)
May	67.0 (19.4)	39.6 (4.2)	53.3 (11.8)	1.55 (39)
June	75.4 (24.1)	46.2 (7.9)	60.9 (16.1)	0.80 (20)
July	85.1 (29.5)	50.7 (10.4)	68.0 (20.0)	0.25 (6)
Aug.	83.3 (28.5)	49.0 (9.4)	66.2 (19.0)	0.45 (11)
Sep.	77.5 (25.3)	44.3 (6.8)	60.9 (16.1)	0.85 (22)
Oct.	65.4 (18.6)	37.4 (3.0)	51.4 (10.8)	2.01 (51)
Nov.	50.9 (10.5)	30.8 (-0.7)	40.9 (4.9)	5.19 (132)
Dec.	43.9 (6.6)	26.7 (-2.9)	35.3 (1.8)	6.07 (154)
Ann.	62.2 (16.8)	36.8 (2.7)	49.6 (9.8)	37.05 (943)

from National Oceanic and Atmospheric Administration (1990)

H. Values

1) Flora

There are 289 identified taxa (Appendix C), in the MERNA and the neighboring Deadfall Lakes area (Whipple and Cope, 1979). All scientific names are in accordance with Munz (1959), except for trees which follow Little (1979). Many of the plants are endemic to the serpentine soils found in the area. The following plants are listed as threatened, endangered, or sensitive (TES) and occur in the MERNA:

Draba aureola - CNPS List 1B
Draba howellii ssp. carnosula - CNPS List 4
Eriogonum alpinum - CNPS List 1B, State-Listed endangered
Eriogonum umbellatum var. humistratum - CNPS List 4
Eriogonum siskiyouense - CNPS List 4
Campanula scabrella - CNPS List 4

Additional TES plants occurring in the vicinity of the RNA are:

Darlingtonia californica - CNPS List 4
Epilobium siskiyouense - CNPS List 2
Veronica copelandii - CNPS List 4
Lupinus lapidicola - CNPS List 4
Raillardella pringle - CNPS List 1B, State/Federal List C2
Phacelia dalesiana - CNPS List 1B, State/Federal List C2
Thelypodium brachycarpum - CNPS List 4

Mt. Eddy is the type locality for several taxa occurring in the area, including Carex gigas, Orthocarpus copelandii, Veronica copelandii, Astragalus whitneyi ssp. siskiyouensis, Mimulus primuloides ssp. linearifolius, and Rudbeckia californica var. intermedia. Since early citations were often quite poor, it is possible that Mt. Eddy is the type locality of several other species. For example, the location of the original collection of Pinus balfouriana is interpreted to be the Scott Mountains, which according to many authors includes Mt. Eddy.

Vegetation in the MERNA can be grouped into four major types in Holland's (1986) vegetation classification system: Ultramafic White Pine Forest (84160), Foxtail Pine Forest (86300), Klamath-Cascade Fell-Field (91110), and small areas of Montane Meadows (45100), which occur within the forested areas (Map 3).

The following descriptions of vegetation types are mainly based on the Ecological Survey (Whipple and Cope [W&C] 1979) and the Reconnaissance Report (Johnson 1977).

(1) Ultramafic White Pine Forest (Holland 84160)
SAF 256 - California Mixed Subalpine
Kuchler 8 - Lodgepole Pine Subalpine Forest
W&C - Pinus monticola/Angelica arguta

This type occupies elevations below 7600 ft (2316 m). This is an open forest, primarily composed of Pinus monticola with an average canopy total cover of 20 percent, average density of 44 trees per acre (110 trees per ha), and basal area of 138.7 square feet per acre (32.2 square meters per ha). White fir (Abies concolor) is an important component of the canopy (up to 20%) and is relatively abundant along streams throughout the type. Also common along streamsides are Pinus contorta ssp. murrayana in the overstory and Potentilla fruticosa in the understory. Pinus albicaulis is frequently an important canopy species particularly at the upper elevation limits for the type. Typically, the shrub understory covers no more than 15 percent, and consists of Arctostaphylos nevadensis and Quercus vaccinifolia. On more xeric and higher south-facing slopes the shrub layer reaches 65 percent cover.

(2) Foxtail Pine Forest (Holland 86300)
SAF 256 - California Mixed Subalpine
Kuchler 8 - Lodgepole Pine Subalpine Forest
W&C - Pinus balfouriana/Anemone drummondii

The Foxtail Pine Forest is confined mainly to the south and southwest slopes of Mt. Eddy between 7800 and 8000 ft (2377-2438 m). This is another open forest type with an average total canopy of 18 percent. The total basal area of this type was 184.7 square feet per acre (42.89 square meters per ha), and the tree density was 44 trees per acre (110 trees per ha). Shrub understory cover can reach 25 percent at lower elevations, but is typically absent. Pinus albicaulis is only occasional and is partially replaced by P. monticola at lower elevations. Anemone drummondii is nearly always present in the understory and typically exceeds 10 percent cover.

According to Johnson (1977) the largest pure foxtail pine stand is in a shallow cirque-like area 0.4 miles (0.6 km) southwest of the summit. Johnson also stated that the older trees in the stand are apparently healthy and have the characteristically flattened crowns of subalpine pines. Cones were observed on most foxtail pine trees over 10 ft (3 m) tall and from indications of the cones on the ground, many trees are excellent cone producers. Recruitment of young trees appears to be successful as indicated by the abundance of conical crowned trees also in the stand. In openings where there is bare mineral soil, there is often abundant foxtail pine reproduction.

Johnson also found indications that the range of the foxtail pines may be expanding. Saplings and pole-size trees were observed on the ridges at the southwestern borders of the RNA.

No indications of ground or forest fires were observed by Johnson. Ground cover is generally sparse, but in the most heavily forested areas there is sufficient ground vegetation and duff to support a ground fire.

(3) Klamath-Cascade Fell-Field (Holland 91110)
SAF 208 - Whitebark Pine
Kuchler 8 - Lodgepole Pine Subalpine Forest
W&C - Penstemon procerus/Potentilla glandulosa

This type occurs on the ridges and summit of Mt. Eddy at high elevations above the Foxtail Pine Forest. Perennial herbs or dwarf shrubs less than 1.6 ft (0.5 m) tall, including "cushion plants", form a low turf on favorable sites but more often are scattered among the rocks and gravel. The cushion plants are usually well developed at the bases of large rocks. Keeler-Wolf (1990) classified this type as Alpine Talus and Scree Slope (Holland 91200), which occupies a similar area. However, vegetation in the Alpine Talus and Scree Slope type is typically more spare than is found in the MERNA.

Potentilla fruticosa is the only shrub commonly found in this type. Eriogonum umbellatum and Sitanion hystrix are also important species in this vegetation type, which covers about 25 percent of the loose gravel substrate. Stunted whitebark pine (Pinus albicaulis) can be found throughout this area.

Whipple and Cope recognized two phases in this vegetation type, one characterized by Eriogonum siskiyouense and the other by Lesquerella occidentalis. At higher elevations, 8500-9000 ft (2591-2743 m), and on southwest slopes the Lesquerella occidentalis phase was observed. The Eriogonum siskiyouense phase was found at 7900-8100 ft (2409-2469 m) on the southern slopes of the ridge at the western border of the RNA. This phase contains more Crepis pleurocarpa (93 percent versus 25 percent presence), and Phlox diffusa (73 percent versus 29 percent presence) than the Lesquerella occidentalis phase. It also contains Sedum lanceolatum (80 percent presence), Arenaria congesta (67 percent presence), and Eriogonum siskiyouense (67 percent presence) which are absent from the other phase. The Lesquerella occidentalis phase contains more Poa pringlei (79 percent versus 33 percent presence) and Lesquerella occidentalis (67 percent versus 20 percent presence). It also includes Erigeron compositus, Hulsea nana, and Ivesia gordonii which are not present in the Eriogonum siskiyouense phase.

Several sensitive plants occur in this vegetation type. Eriogonum siskiyouense (CNPS List 4) and Draba howellii ssp. carnosula (CNPS List 1B) are present on rocky slopes at lower elevations within the RNA. Draba aureola (CNPS 1B) is rare on Mt. Eddy and was previously reported to occur in California only on Mt. Lassen. Campanula scabrella (CNPS List 4) and Eriogonum alpinum (CNPS List 1B, State-listed endangered) occur on the very loose soils of the upper slopes of Mt. Eddy. These loose soils make them particularly sensitive to disturbance by humans or cattle. Eriogonum umbellatum var. humistratum (CNPS List 4) can also be found in the MERNA.

(4) Montane Meadow (Holland 45100)
no SAF and Kuchler equivalents
W&C - Pinus monticola/Angelica arguta

Several seeps and streams in the forested areas support meadow type vegetation. Dodecatheon alpinum, Caltha howelli, Helenium bigelovii, and several Carex and Eleocharis species dominate the meadows.

2) Fauna

No threatened, endangered, or sensitive fauna species have been sighted within the MERNA (Dias 1994), but no field survey of fauna species has been conducted. However, lists of potential fauna species with various levels of association to the habitats in MERNA were created by using a modified Wildlife Habitat Relationship (WHR) Model for Shasta-Trinity National Forests (Crumpton and Dias 1994, Appendix D1). Parameters used to created the species lists are: WHR habitat types found in the RNA, elevation of the RNA, which watershed contains the RNA, and the habitat index. Habitat index value of '1' creates the 'strongly' associated list; index value '2', the 'moderately' associated list; and index value '3' and 'M', the 'generally' associated list. There are 6 species strongly associated (Appendix D2), 17 species moderately associated (Appendix D3), and 28 species generally associated (Appendix D4) with the MERNA. Of these species 4 are considered Forest Service sensitive: northern

goshawk (Accipiter gentilis)[2], marten (Martes americana), Pacific fisher (Martes pennanti), and Cascades frog (Rana cascadea). The latter two species are also Federally listed Category 2 (USDA Forest Service 1995c). According to the WHR model used, the Cascades frog is strongly associated with the habitats in MERNA and the other three are moderately associated.

3) Geology

Mt. Eddy RNA lies on the eastern portion of the Klamath Mountains Geologic Province, within the Trinity ultramafic sheet, a part of the Eastern Klamath Mountains Subprovince. Bedrock of the RNA consists of Paleozoic dunite and peridotite in varying degrees of serpentinization. Along the western boundary of the MERNA, there is a granite intrusion. There is extensive evidence of Pleistocene glaciation within the MERNA.

Because of the geology of the MERNA, most of the soil in MERNA is Ca/Mg imbalanced, therefore, "toxic to vegetation" (USDA Forest Service et al. 1980). Plant species in those area are limited and sparse.

The region containing MERNA has a history of mining, primarily chromite. One chromite mine (Johnson Mine) with past production occurs within the MERNA. It produced an unrecorded amount of chromium ore during World War II. The most recent Bureau of Land Management (B.L.M.) mining claim records dated October 5, 1989 show no mining claims in or adjacent to the MERNA.

One chromite prospect (Ratero prospect) and one gold prospect (Half Century prospect) were identified north of the MERNA in sec. 6 (T4ON, R5W). The chromite deposits occur in dunite or serpentinized peridotite. Several other chromite, nickel and asbestos prospects occur in peridotite, dunite and serpentine to the north, south, and west of the RNA (Teixeira 1990, Appendix E).

Detailed discussion of the mineral resources in the MERNA can be found in Section I, and a report on the mineral potential in the MERNA by Teixeira (1990) is included in Appendix E.

4) Soils

Soil map of this area is available from the Soil Survey of Shasta-Trinity Forest Area, California (USDA Forest Service et al. 1980). Soils in the MERNA are thin, gravelly, and unstable. Most of them lie on serpentinized ultramafic bedrock. They are classified into 8 mapping units (Fig. 1) at the Order 3 mapping level which has a minimum area of 10 acres (4 ha).

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[2]Nomenclature of fauna species follows Laudenslayer and Grenfell (1983)

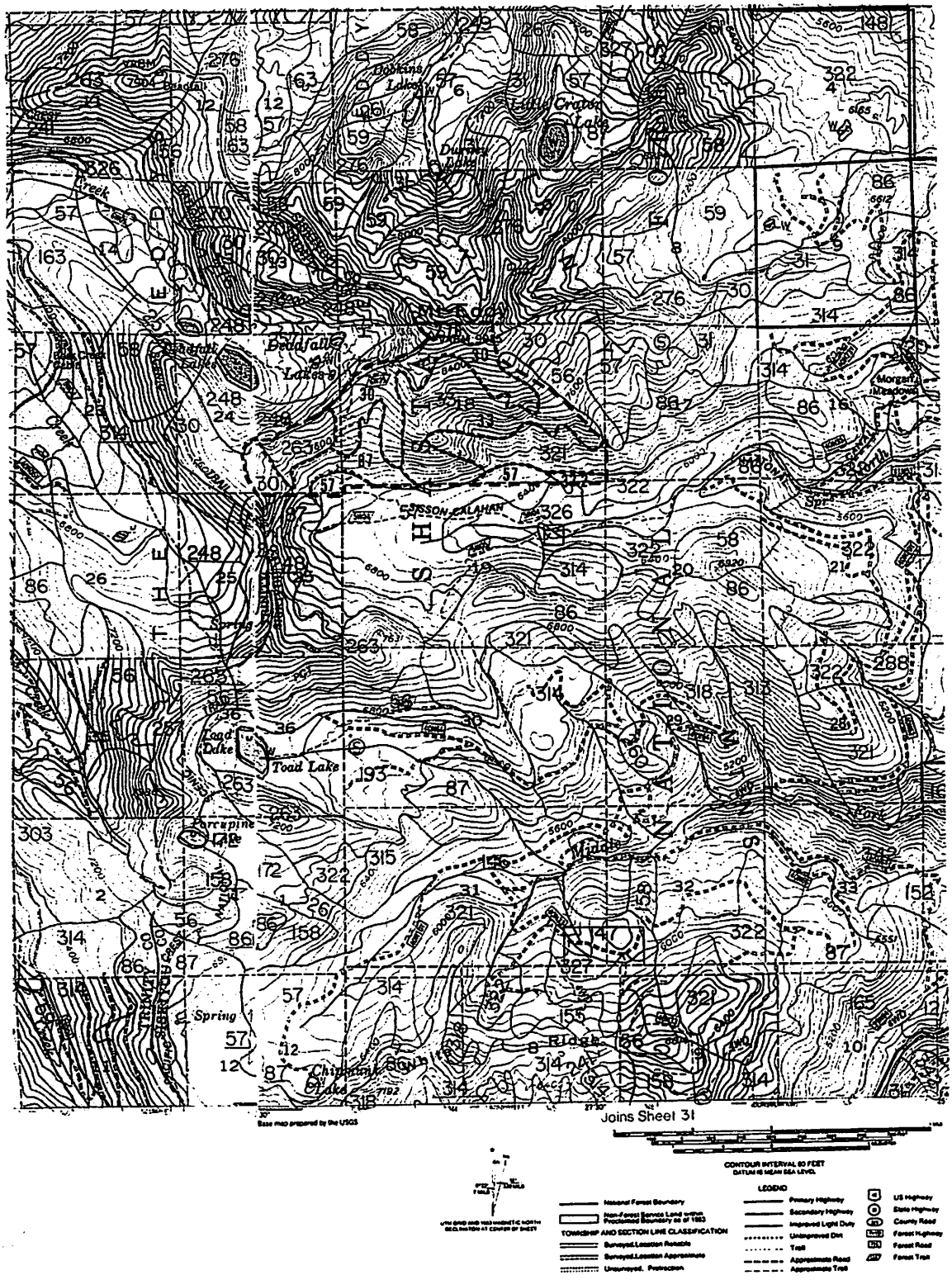


Figure 1. Soils in the Mt. Eddy Research Natural Area.
(from Soil Survey of Shasta-Trinity Forest Area, California)

The following briefly describes the eight soil types. Detailed descriptions are included in Appendix F.

(1) Mapping unit 276 - Rock outcrop, ultramafic-Rubble land association, 60 to 80 percent slopes

This serpentine rock rubble type is found in the northern extremes of the MERNA, on the north facing slopes near the summit of Mt. Eddy. Several rare plants occur in this soil type, due to the extreme Ca/Mg nutrient imbalance in the soil. They are Eriogonum umbellatum var. hummistratum, Draba aureola, and Eriogonum alpinum. Rock outcrop, ultramafic makes up 30 percent, and Rubble lands make up 60 percent of the association.

(2) Mapping unit 30 - Deadfall family-Lithic Cryochrepts Complex, 40 to 60 percent slopes

This soil complex is located on the ridge tops and at high elevations on south-facing slopes. It is an upper montane serpentine semi-barren area. The soil parent material is ultramafic rocks so the soils have an unbalanced Ca/Mg ratio and poor aeration. Vegetation is of the Klamath-Cascade Fell-Field (Holland 91110, Whipple and Cope: Penstemon procerus/Potentilla glandulosa) type. The soil complex is also associated with open foxtail pine forest in the upper elevations and white pine in the lower elevations of the RNA.

The surface soil of Deadfall family is about 14 inches (35.6 cm) deep, pale brown and yellowish brown, and has a very gravelly (35-45% gravel and cobbles) sandy loam texture. The subsoil extends to 24 inches (61.1 cm), is yellowish brown, and has an extremely gravelly (75% gravel and cobbles) sandy loam texture. The surface soil of the Lithic Cryochrepts is 7 inches (17.8 cm) deep, very pale brown, and of gravelly (40% gravel) sandy loam texture. The subsoil extends to 17 inches (43.3 cm), is pale brown, and has a very gravelly (50% gravel), sandy clay loam texture.

(3) Mapping unit 33 - Deadwood family, 60 to 80 percent slopes

This soil unit lies on sideslopes in the mid-elevations of the RNA. The surface soil is very shallow, only 3 inches (7.6 cm) deep, dark brown, and has a very gravelly (55% gravel) sandy loam texture. The subsoil extends to 15 inches (38.2 cm), and is very gravelly loam to extremely cobbly (55-65% gravel and cobbles) heavy loam textured. Its parent material is slightly weathered metamorphosed shale. Foxtail pine forest is found on this soil type.

(4) Mapping unit 263 - Rock outcrop-Lithic Cryochrepts-Deadfall family complex, 20 to 70 percent slopes

This soil type is confined to the two low ridges in the southwest portion of the RNA. It is a semi-barren area with rock outcrops. The Klamath-Cascade Fell-Field (Holland 91110, Whipple and Cope: Penstemon procerus/Potentilla glandulosa) vegetation type occupies this area. Rock outcrop makes up 40 percent, Lithic Cryochrepts make up 35 percent, and Deadfall family soils make up 15 percent of this soil complex. Soil characteristics are similar to the Mapping Unit 30.

(5) Mapping unit 87 - Gozem-Toadlake families association, 20 to 40 percent slopes

Below the ridges in the western portion of the MERNA, lay the soils of the Gozem-Toadlake families association. The surface soil of the Gozem family soils are very shallow, 4 inches (10.2 cm) deep, yellowish brown, very cobbly (35% gravel and cobbles) and of loam texture. The subsoil extends to 18 inches (45.8 cm), and has a very gravelly (45-55% gravel and cobbles) loam texture. The surface soil of the Toadlake family soil is 10 inches (25.4 cm) deep, grayish brown and light gray, and of very gravelly (35-45% gravel and cobbles) loam texture. The subsoil for the Toadlake family extends to 56 inches (142.5 cm) and is very gravelly (45-50% gravel and cobbles) with textures ranging from clay loam to sandy clay loam. Vegetation on this soil type is open Ultramafic Pine Forest with white pine dominant at lower elevations and foxtail pine at upper elevations.

(6) Mapping unit 321 - Toadlake-Tamflat families complex, 40 to 70 percent slopes

In the eastern lower elevations of the MERNA, open forest of white pine is found on this soil type. The soils of the Tamflat family are extremely shallow, and have surface soils about 1 inch (2.5 cm) deep. The surface soil is brown, and has a very cobbly (58% gravel and cobbles) loam texture. The subsoil extends to 19 inches (48.3 cm), is extremely gravelly (62-75% gravel and cobbles) and has textures ranging from clay to clay loam. Toadlake family soils have a 10 inch (25.4 cm) deep surface soil, which is grayish brown and light gray, and of very gravelly (35-45% gravel and cobbles) loam texture. The subsoil extends to 56 inches (142.5 cm), and is very gravelly (45-50% gravel and cobbles), with textures ranging from sandy clay loam to clay loam. The parent material for Tamflat family soils are peridotite rocks and the parent material for the Toadlake family soils are ultramafic. Both soils are Ca/Mg unbalanced.

(7) Mapping unit 57 - Endlich family-Rubble land complex, 15 to 40 percent slopes

This soil type occurs at the southern boundary of the RNA. Endlich family has a shallow surface soil, 5 inches (12.7 cm) deep. Color and

texture can be dark yellowish brown very fine sandy loam and yellowish brown very gravelly (10-45% gravel and cobbles) sandy loam. The subsoil extends to 16 inches (40.7 cm), and has a very gravelly (55% gravel and cobbles) very fine sandy loam texture. Open white pine forest is the dominant vegetation. Rubble lands make up 30 percent of this complex.

(8) Mapping unit 322 - Toadlake family, till substratum, 10 to 40 percent slopes

At the extreme southeastern border of the MERNA lies this soil type. The surface soil is 12 inches (30.5 cm) deep, yellowish brown and pale brown, extremely cobbly (45-65% gravel and cobbles) loams. Subsoil extends to 31 inches (78.9 cm) is very gravelly (35-50% gravel and cobbles) and has a texture ranging from loam to clay loam. Hard compacted glacial till is the substratum. White pine open forest is found on this soil type.

5) Lands

All lands within the MERNA are controlled by the Shasta-Trinity National Forests, no private inholdings are involved. However, the area immediately to the north (sec. 7, T40N, R5W and sec. 13, T40N, R6W) and southwest (sec. 25, T40N, R6W) are under private ownership by the Forest Products Company. In addition, Southern Pacific Company owns a 10 acre parcel in NE 1/4, sec. 19 (T40N, R5W) approximately 0.3 mile (0.5 km) due south from the MERNA (see map 1). These lands have high priority ratings for acquisition by the Shasta-Trinity National Forests.

6) Cultural sites

No formal archaeological surveys have been conducted in this area and there are no records of archaeological sites or Native American placenames. At the top of Mt. Eddy, there was a Forest Service lookout dated pre-1930s, but little or no evidence remains. The Deadfall Creek Trail (6W05) is a Forest Service trail and has probably been in use since the early 1900s. This trail connects to the more well known historic Sisson-Callahan National Recreation Trail to the south (Henn 1995) (Map 2).

I. Impacts/Conflicts

1) Mineral resources

The general vicinity of the MERNA has a history of mining. Chromite has been the principal metallic mineral. One chromite mine (Johnson Mine) with past production occurs within the MERNA. The Johnson Mine produced an unrecorded amount of chromium ore during World War II from a 35 foot (10.7 meter) decline in podiform chromite in dunite. A grab sample from

the remaining stockpile assayed 39.8% chromite. Reserve estimates were not possible due to limited surface exposures.

The most recent B.L.M. mining claim records, dated October 5, 1989, showed no mining claims in or adjacent to the MERNA. This area has not been classified by the B.L.M. as being "prospectively valuable" for any mineral commodities. There are no leases or lease applications on or adjacent to the MERNA. It has a low potential for hosting any energy or non-energy leasable mineral deposit.

The locatable minerals in the MERNA are considered to have nominal value only. The potential for their occurrence is low, based on the geologic setting, and the current mineral interest. A report on the mineral potential in the MERNA by Teixeira (1990) is included in Appendix E.

The area north of this RNA in sec. 6, T40N, R5W contains one chromite prospect (Ratero prospect) and one gold prospect (Half Century prospect). The chromite deposits occur in dunite or serpentinized peridotite. The gold prospect has been identified in iron-stained quartz lenses in hornblende diotite. Small amounts of chalcopyrite, bornite and malachite occur in the lenses. A grab sample reportedly assayed 0.271 ounces per ton.

Several other chromite, nickel and asbestos prospects occur in peridotite, dunite and serpentine to the north, south, and west of the RNA (Teixeira 1990).

Establishment of the MERNA will have no conflict with the mineral resources in the area.

2) Grazing

Mt. Eddy RNA is in an active grazing allotment. The Bear Creek allotment permits 160 head plus calves. The calves are close to 6 months old by fall, so stocking rates are in excess of 160 head. The cattle mainly graze near Deadfall Lakes in sec. 24 (T40N, R6W) and probably do not go up very far on Mt. Eddy within sec. 18 (T40N, R5W) (Selby, 1994). Grazing will have an adverse impact on some of the sensitive plant species occurring in the fell fields and meadows if trampled. To meet the objectives of this RNA, and to follow standards and guides in the FLRMP, grazing will be eliminated from the RNA. Since fencing is not effective in high country, other alternatives will need to be developed.

3) Timber

There is no tentatively suitable timber land within the area (USDA Forest Service 1995b). Establishment of the RNA will not have an impact on the timber value of the area.

4) Watershed values

This area is part of the headwaters of the North Fork Sacramento River. Several seeps and streams occur in the forested area. These wet areas support unique mountain meadows which provide important habitat for wildlife and play a valuable role on the biodiversity of the area. The Federally listed Cascade frog is strongly associated with Montane Meadow habitat in Siskiyou County. Establishment of the RNA will ensure the stability of these meadows.

North Fork Sacramento River drains into Lake Siskiyou, which is located approximately 25 miles (40 km) upstream from Shasta Lake. These lakes are used extensively for consumptive and nonconsumptive uses. Establishment of MERNA will secure water resource and enhance the water quality of North Fork Sacramento River.

5) Recreation values

Mt. Eddy, being the highest peak in the Klamath Mountains, attracts recreational users. The MERNA is located to the northeast of a network of trails.

The historic Sisson-Callahan National Recreation Trail, which is designated administratively for special management consideration, runs along the North Fork Sacramento River outside the RNA on the south, and through the western portion of the MERNA to the Deadfall Lakes area, where it connects the Pacific Crest National Scenic Trail and Trail 6W05 (Map 2). Trail 6W05, along the Deadfall Creek, provides the primary access to the RNA (Johnson 1977, Humpherys 1995).

Diverging from the Sisson-Callahan Trail, on the ridge top at the western border of MERNA, Trail 6W25 leads to the summit of Mt. Eddy (Map 2). Estimated use of this trial (6W25) is 200 visitors annually. Approximate annual use on Trail 6W05 is 400 visitors, and on the historic Sisson-Callahan National Recreation Trail, 150 (Humpherys 1995).

Hiking is the major recreation activity occurring in the MERNA. A small amount of snowmobile and ski use occurs in the area in the winter and early spring (Humpherys 1995).

Establishment of the RNA will have a minor conflict with the recreational use of the trails, especially the Sisson-Callahan National Recreation Trail, since recreation use is not encouraged within the RNAs. However, because the RNA lacks lakes, travel on these trails is typically enroute to other camping destinations and is not considered to compromise the value of the RNA. Recreation use will be discouraged by posting RNA boundary signs along the trails.

6) Wildlife & plant values

The high elevation areas and ridges where the rare plants concentrate are very sensitive to disturbance. Currently, they are under pressure from disturbances caused by grazing and recreation. Establishment of the MERNA will preserve the vegetation and associated wildlife values because after establishment, grazing will be eliminated and recreational use will be discouraged.

Establishment of the RNA will be compatible with the maintenance of habitat for species of special concern found in and adjacent to the RNA.

Fire is insignificant in the ecosystem of the area. Due to the low temperatures and short growing seasons, vegetation in the MERNA produces limited amounts of organic matter. The accumulation of fuels is slow, so fire is very infrequent and tends to be slow-burning surface fires of low intensity. The fire regime of the endemic ecosystems will not be effected by the establishment of the MCRNA.

7) Special management area

The MERNA occurs within the Mt. Eddy Roadless Area, which is not a congressionally designated area. Establishment of the RNA will not conflict with the values of the Roadless Area.

8) Transportation plans

Establishment of MERNA will have no effect on current or proposed transportation systems on the Shasta-Trinity National Forests. The only vehicle access to the northern vicinity area, Dobkins/Durney Lake area, is under private ownership; and the current owner (Forest Products Co.) may have plans to close the road (Huhtala 1994). This will not have any significant impact on the MERNA.

J. Management prescription

Appendix A3 contains the management prescription for the MERNA as stated in the Shasta-Trinity National Forests Land and Resource Management Plan (USDA Forest Service 1995a). Within it standards and guidelines are provided.

1) RNA Management Plan

The Shasta-Trinity National Forests will develop a specific management plan to maintain the target element and other resource values in the best possible condition after the establishment of MERNA.

K. Administration records and protection

The official responsibility for administration and protection of the RNA is with the Director of Wilderness and Dispersed Recreation, Star Route, Box 10, Big Bar, CA 96010, Tel: (916) 623-6106. Attention should be given to the management of recreational use on the trails and to grazing impacts within the RNA.

The research coordinator is the Director, Pacific Southwest Forest and Range Experiment Station, P.O. Box 245, Berkeley, CA 94701. This person is responsible for approving and coordinating observational or nonmanipulative applied research, and maintaining a research data file.

L. Archives

The Station Director shall establish and maintain a system for archiving data and reports from Research Natural Areas in a manner that will facilitate the exchange and transfer of information among Stations, Forests, and scientists.

M. Reference list

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Appendices

A. Excerpts from Shasta-Trinity National Forests Forest Land and Resource Management Plan (1995)

   A1. Location of Mt. Eddy RNA in the Management Areas

   A2. Management prescription for Parks-Eddy Management Area

   A3. Management prescription for Special Areas

B. Distribution of foxtail pine (Pinus balfouriana) in California (from Griffin and Critchfield 1972)

C. Plant list of Mt. Eddy Research Natural Area (from Whipple and Cope 1979)

D. List of fauna species generated by modified Wildlife Habitat Relationship (WHR) model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

   D1. Modified Wildlife Habitat Relationship (WHR) model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

   D2. Strongly associated list

   D3. Moderately associated list

   D4. Generally associated list

E. USDA Forest Service Mineral potential report for lands proposed for mineral withdrawal in the Mt. Eddy Research Natural Area (Richard W. Teixeira, 1990)

F. Descriptions of soil types in the Mt. Eddy Research Natural Area (from Soil Survey of Shasta-Trinity Forest Area, California 1980)

Appendix A. Excerpts from Shasta-Trinity National Forests Proposed Forest Land and Resource Management Plan (USDA Forest Service 1995)

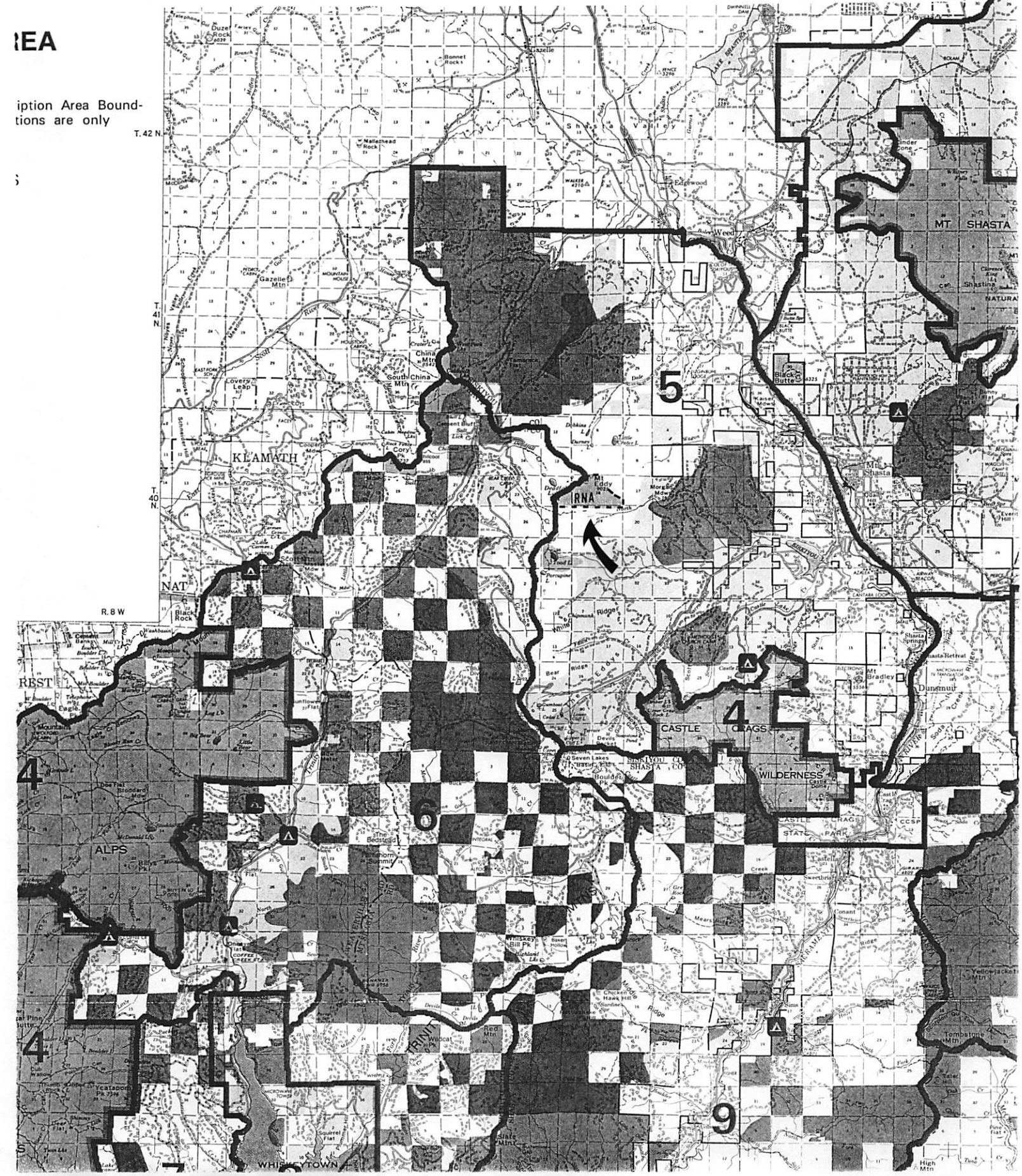
A1. Location of Mt. Eddy RNA in the Management Areas

A2. Management prescription for Parks-Eddy Management Area

A3. Management prescription for Special Areas

Appendix A1. Location of Mt. Eddy RNA in the Management Areas

STA NATIONAL FOREST
PLAN ALLOCATIONS (PRF)



Appendix A2. Management prescription for Parks-Eddy Management Area

5 - Parks-Eddy

Counties: Shasta/Siskiyou
Ranger District: Mt. Shasta
Elevation: 3,000 to 9,000 feet
National Forest Land: 70,010 acres

Description

A

Location:

The Parks-Eddy Management Area (MA) is located in the Klamath Mountains immediately west of Mt. Shasta City. The area is bordered on the northwest by the Klamath National Forest, the Trinity Divide, and the Pacific Crest Trail (PCT).

Physical Environment:

This mountainous MA includes the headwaters of the Sacramento River, Dale Creek, Eddy Creek, and Parks Creek. Dominant features are Mt. Eddy (9,025 feet), and the Upper Sacramento River (South, Middle, and North Forks). Many alpine lakes are present near the PCT and the Trinity Divide along the western boundary. Castle Lake is one of the largest and deepest alpine lakes in the area. Little Castle Creek provides water to the community of Cragview for domestic use. The area is within the Willows, Parks, South Fork Sacramento, and Upper Sacramento watersheds. Soils in the MA are usually mixed ultramafic basil intrusive and granitic types which have a high erodibility, low to non-plantable site and high landslide potential.

Biological Environment:

Vegetation is generally mixed-conifer and evergreen brushfields. The wide variety of conifer tree species includes: mountain hemlock, foxtail pine, whitebark pine, Port-Orford cedar, and Shasta red fir. Good habitat exists for deer, black bear, goshawks, and resident coldwater fisheries.

Sensitive Plants:

Mt. Eddy is one of the outstanding botanical attractions on the Forests. In addition to its high degree of diversity, it supports populations of eight sensitive plants, most of them serpentine endemic. Trinity buckwheat, listed by the State of California as endangered, is concentrated in this MA. Refer to Appendix P for additional information.

Management of the Area:

The MA offers a variety of resource opportunities. Much of the past use has centered on mining and logging. Timber harvesting occurs on both public and private lands. In addition, there are outstanding recreation opportunities. National Forest lands surrounding Toad Lake are closed to off-highway vehicles thus providing excellent back-country dispersed recreation activities. The Sisson-Callahan National Recreation Trail (NRT) follows the North Fork of the Sacramento River through this MA. The PCT traverses the Trinity Divide with several access points. A portion of the Sacramento River below the Box Canyon Dam is being recommended for inclusion in the State Wild and Scenic Rivers System. The West Parks, Eddy, and portions of the Bear Creek and South Fork grazing allotments are located in this area. There is a past history of locatable mineral activity. Mineral exploration is a continuing activity with the potential for development of active extraction of the resource. Habitat management for the Klamath deer herd, black bear, spotted owls, and resident coldwater fisheries is an important resource activity. Maintaining diversity is also important.

Special Areas:

Research Natural Areas (RNAs) are recommended for the Cedar Basin (1,160 acres) and the Mt. Eddy area (890 acres). China Mountain and Toad Lake are recommended for designation as botanical Special Interest Areas (SIA).

Public Use and Resource Attractions - Recreation is primarily dispersed and includes hunting, fishing, camping, hiking, mountain biking, photography, snowmobiling, skiing and sightseeing. Forest Road 17 over the Parks Creek summit has been designated as part of a scenic byway. The PCT and the historic Sisson-Callahan National Recreation Trail (NRT) traverse this area; visitor use on these trails is increasing. The trails are well maintained and signed, and interpretive material is available at the District Offices. This material discusses the trails, their development, and the scenic vistas and features along each. In addition, the many alpine lakes on the western half of the area have been linked through a series of roads and trails.

Dispersed campsites are monitored for resource impacts, and closures are used where needed to allow for revegetation. Developed camping facilities complement the developments on surrounding private lands, including Lake Siskiyou. Traditionally high visitor use of Castle and Gumboot lakes has been dispersed to other areas while these campgrounds have been improved to protect them from visitor impacts. Interpretive trails have been developed to highlight features unique to this management area.

Roads are evaluated on a regular basis to determine treatment needs based on recreation, wildlife, water quality and visual quality objectives.

Fire and Fuels - Fire danger and fuel loading have been managed and reduced along the urban interface with the towns of Mt. Shasta and Dunsmuir, as well as along Interstate 5 and the Southern Pacific railroad. This action is a cooperative effort with the cities and county.

Heritage Resource - Cultural features in this area have been identified and evaluated for significance. The history and importance of the area for transportation, logging and mining has been interpreted for visitors at developed recreation sites.

Lands - Properties surrounding the summit of Mt. Eddy have been acquired and now provide a high quality backcountry experience for hikers, campers and skiers. The Upper Sacramento River above Lake Siskiyou continues to receive high use but is managed to protect the soil and water quality for wildlife and domestic use.

Management Prescriptions

B

Table 4-8 depicts the acres of each management prescription within the management area. The boundaries are depicted on the PRF map.

Table 4-8
Management Prescriptions for Management Area 5

Number	Name	Acres
Late-Successional Reserves		
VII	Late-Successional Reserves and Threatened, Endangered and Selected Sensitive Species	23,588
	Total	**23,588**
Administratively Withdrawn Areas		
I	Unroaded Non-motorized Rec.	10,840
IV	Roaded, High Density Rec.	189
X	Special Area Management	1,613
XI	Heritage Resource Management	145
	Total	**12,787**
Riparian Reserves		
IX	Riparian Management	5,572
	Total	**5,572**
Matrix		
III	Roaded Recreation	23,284
VI	Wildlife Habitat Management	4,886
VIII	Commercial Wood Products Emphasis	893
	Total	**29,063**
	Grand Total	**71,010**

Desired Future Condition

C

Forty-one percent of the 71,010 acres in this management area are allocated to Matrix, 18% to Administratively Withdrawn Areas and 41% to Late-Successional Reserve and Riparian Reserve.

Suitable Matrix lands are managed on a sustained yield basis with stands ranging generally from 5 to 40 acres in size. Forest stands range from tree seedling to mature forests, while maintaining some structural diversity. Fifteen percent of each regenerated stand is retained and managed to maintain or provide dispersed pockets of late-successional forests across the landscape. Regenerated stands appear more natural than in the past due to the retention of larger trees and snags.

Forest stand densities are managed at levels to maintain and enhance growth and yield to improve and protect forest health and vigor recognizing the natural role of fire, insects and disease and other components that have a key role in the ecosystem. Stand understories appear more open with less ingrowth, particularly in stands on sites where wildfire plays a key role in stand development. The actual target stand densities depend upon stand species, site quality, stand age, and stand objectives (i.e., Stand densities are maintained at lower levels to grow larger old trees within Late-Successional Reserves).

A sustained level of forest products from suitable Matrix lands as a by product of ecosystem management is expected to provide approximately 20 million board feet per decade in wood products.

Dispersion habitat requirements for the northern spotted owl/late-successional dependent species are met by a combination of:

1. Riparian Reserves;
2. Fifteen percent Old-Growth over entire watershed and within units;
3. Half of all regenerated stands over time will be 50-60 years old, which on average or better sites results in stands of conifers that will provide for dispersion habitat; and
4. Over the life of the plan, a substantial portion of the untreated landscape meets dispersion requirements.

While 50-11-40 is no longer a requirement under the ROD, it will usually be met, due to the above.

Matrix lands are further disaggregated into three management prescriptions with more specific emphasis and direction. They are: Management Prescription III, Roaded Recreation about 80%; Management Prescription VI, Wildlife Habitat Management about 17%; and Management Prescription VIII, and Commercial Wood Products Emphasis about 3%.

Management Prescription III areas are often located around high use recreation areas and travel corridors. Management activities are evident but subordinate to the viewer within this area.

Management Prescription VI areas emphasize habitat management for early and mid-level seral stage dependent species. Forest stands in wildlife emphasis areas are managed to maintain lower tree stocking levels and greater amounts of understory cover/forage ratios. The landscape within this area is openings of early seral stage plants and trees to open mature stands often containing multiple understory layers of trees and shrubs. This prescription area includes many areas of hardwood types.

Management Prescription VIII areas emphasize timber growth and yield. Commercial Wood Products Emphasis provide the highest level of outputs of the Matrix lands. The forest is more even aged, with ingrowth and understory vegetation treatment to enhance timber stand growth and yield, improve forest stand health and forest protection from stand destroying wildfires.

Riparian Reserves are applied along both sides of rivers, streams, lakes and wetlands. Riparian Reserves appear as natural corridors throughout the Matrix.

Late-Successional Reserves and Managed Late-Successional Areas are located in the area west of Parks Creek to the Forest boundary, north of the Mount Eddy Roadless Area, adjacent to Management Prescription VIII, within the area east of Morgan Meadows and north of South Fork Sacramento River, and in a managed Late-Successional Reserve northwest of Castle Lake. The landscape of the Late-Successional Reserve appears natural with much of the area in late-successional forest vegetation. Late-successional forest stands are managed to maintain health and diversity components through the use of prescribed fire and thinning from below. Dead and dying trees and snags are at higher levels than within the Matrix. Patches of dead trees and snags are scattered across the landscape. Younger to mature forest stands are managed to replace older dead and dying stands as they no longer are suitable for Old-Growth ecosystem dependent organisms. Late-successional stands contain large numbers of "Old-Growth" trees with large branching, flattened or dead tops, and high levels of decadence. These older stands are structurally diverse often being multiple-storied.

Supplemental Management Direction

D

1. Develop and implement a management plan for standing historic structures including a supplemental management plan for Mt. Bradley lookout. Provide stabilization and protection where necessary.
2. Conduct additional inventories and evaluations to identify significant prehistoric sites. Develop a research design that will address important questions regarding prehistory on a local and regional level.
3. Emphasize alpine lakes fisheries management through increased trail access and habitat improvement projects.
4. Dispose of lands heavily encumbered by long-term use.
5. Acquire private lands around high value recreation areas.
6. Evaluate the potential to acquire private lands adjacent to Castle Crags in T39N., R4W Sections 29 and 33 and in T38N., R4W Section 3. Develop new access points and emphasize non-wilderness climbing opportunities on these lands if acquired.
7. Acquire inholdings on the north side of Mt. Eddy to allow expansion of the RNA boundary.
8. Develop an interpretive plan to provide historic information for recreational trail users.
9. Conduct inventories and site evaluations on historic mining sites to better understand the range of site types present and the potential for scientific research and public interpretation.
10. Develop public access points to the Sacramento River.
11. Consider impacts to traditional recreation uses of the Sisson-Callahan NRT when planning projects in the vicinity of the trail.
12. Maintain and improve access to dispersed recreation sites including access along the South Fork Sacramento River.
13. Maintain Dobkins/Durney Lake Basin in its current condition pending evaluation of its suitability as a SIA.
14. Search for RNA candidates for dry subalpine meadow, fen, and montane freshwater marsh targets.
15. Evaluate the effects of grazing on sensitive plants and botanical diversity. Implement plans to miti-

gate these effects. Consider reducing grazing allotments if necessary.

16. Perform a Port-Orford cedar risk analysis for any planned management activities in areas with that species. Implement appropriate mitigation measures to prevent the introduction of *Phytophthora lateralis* , the cause of Port-Orford cedar root disease.

17. Plan activities in the Little Castle Creek watershed so that water quality will be protected for domestic use.

18. Emphasize fishing and hunting over non-game aspects of fish and wildlife management.

19. Maintain and/or improve selected habitats for deer, bear, goshawks and spotted owls.

20. Assess the opportunity for reintroduction of Roosevelt elk in cooperation with the California Department of Fish and Game.

Appendix A3. Management prescription for Special Areas

9. In developed recreation areas keep conifer stocking at levels which will reduce mortality.
10. In developed recreation and other high value areas treat conifer stumps immediately after tree felling to prevent infection by *Heterobasidion annosum*
11. Areas within developed recreation sites will meet a VQO of modification. Management activities that are seen from developed recreation sites will meet a VQO of retention in the foreground and partial retention in the middleground.
12. Areas within developed site boundaries are not subject to snag, dead/down material, and hardwood standards due to safety considerations and recreation use.

X. SPECIAL AREA MANAGEMENT

A. Objective

This prescription provides for protection and management of special interest areas (SIAs) and research natural areas (RNAs). Protection and management of associated amenity values, including unique plant, animal, and aquatic systems, will be consistent with special area objectives. These standards apply to all special areas. If the special area is located in an allocation more restrictive than an Administrative Withdrawal the additional restrictions also apply.

B. Management Practices

Emphasized:

Habitat Management - Sensitive and Endemic Plants

Research Natural Area Establishment and Management

Special Interest Area Establishment and Management

Permitted:

Heritage Resource Management - Archaeological and Historical Sites

Heritage Resource Management - Native American Sacred Places

Fire Management

Livestock Grazing

Minerals Development (SIAs)

Semi-Primitive Non-Motorized Recreation

Streamside and Wetlands Management

Trail Construction and Reconstruction

Wildlife Habitat Management - Existing T&E Species

Wildlife Habitat Management - Sensitive Animals

C. Description of Areas Where Prescription X Will Be Applied

This prescription applies to RNAs which are currently established or are proposed Forest candidates. These are areas which: (1) contribute to the preservation of examples of all significant natural ecosystems for the purposes of research and ecological study; (2) provide genetic diversity (gene pools); and (3) protect, where appropriate, habitats of T&E (or sensitive) species of plants and animals. This prescription also applies to proposed SIAs.

D. Standards and Guidelines

1. No natural fuels treatment or construction of shaded fuel breaks will be made within RNAs without appropriate planning and approval by the Research Natural Area Committee (RNAC).
2. Wildfire suppression tactics will favor low impact techniques and minimize mechanical disturbance.
3. Allow off-highway vehicle (OHV) use on existing, designated roads only. Where no existing roads occur, prohibit OHV use. Close roads if necessary to maintain RNA and SIA values.
4. Management activities should be compatible with Semi-Primitive Non-Motorized Recreation Opportunity Spectrum (ROS) guidelines.
5. Once RNAs have been classified by the Regional Forester, recommend that they be withdrawn from mineral location and leasing.
6. Permit livestock grazing in SIAs within established allotments as long as that use preserves and does not detract from the original values for which the area was established. Discontinue livestock grazing in RNAs.
7. Develop a management plan for each RNA and SIA to safeguard the particular values while encouraging intended uses.

8. Monitor the condition of each SIA annually and each RNA bi-annually.
9. Identify and give priority to projects based on special area evaluations. Identify objectives, audiences, messages, methods, and requirements for each. Prepare maps, brochures, and interpretive devices to explain special features and reduce area damage.
10. Management activities within RNAs should be compatible with the objective of the establishment report and any guidelines developed by RNAC.
11. Special use permits or cooperative agreements will be used to coordinate planned research activities within RNAs. These will be executed between the research proponent and Station Director, with review and approval by the District Ranger and Forest Supervisor. Permits for activities within designated or recommended wildernesses will be approved by the Regional Forester.
12. When possible, acquire private land within RNA and SIA boundaries.
13. Manage to meet the designated VQO for the management area.
14. Use this Prescription to help provide additional habitat for fisher, marten, and goshawk.

XI. HERITAGE RESOURCE MANAGEMENT

A. Objective

The primary theme of this prescription is to protect designated cultural resource values, interpret significant archaeological and historical values for the public, and encourage scientific research of these selected properties. Visual resources, water quality, wildlife habitat, and vegetation will be protected.

B. Management Practices

Emphasized:
Heritage Resource Management - Archaeological and Historical Sites

Permitted:
Habitat Management - Sensitive and Endemic Plants

Integrated Pest Management

Livestock Grazing

Semi-Primitive Motorized Recreation

Semi-Primitive Non-Motorized Recreation

Soils and Water Improvement

Streamside and Wetlands Management

Vegetation Treatment by Burning

Wildlife Habitat Management - Existing T&E Species

Wildlife Habitat Management - Sensitive Animals

C. Description of Areas Where Prescription XI Will Be Applied

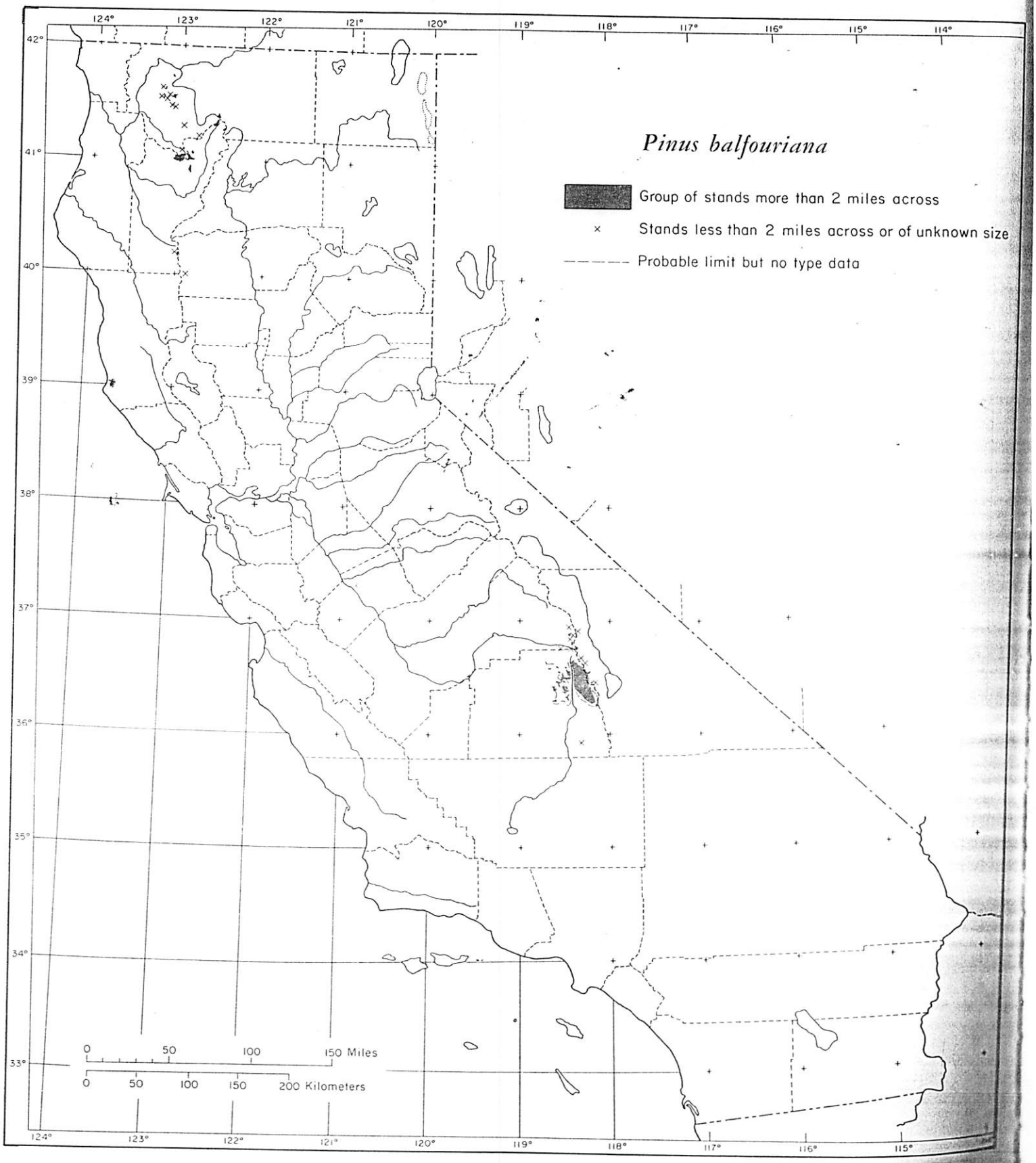
This prescription will be applied to specific sites within areas that have been determined to be eligible for the National Register of Historic Places, and which have one or more of the following attributes:

- The site has known or potential scientific values that are highly important or unique and are conducive to long-term study.
- The site has a potential for interpretation of cultural resource values to Forest visitors.
- The site has cultural importance to Native Americans.

D. Standards and Guidelines

1. Heritage resources will be protected primarily by locating trails and camp sites away from sensitive areas. Recreational activities and development will be limited in such a way that visitor use does not take place on or in the immediate vicinity of cultural resources, unless it is an interpretive activity.
2. Archaeological and ethnographic surveys will be designed to inventory the area so that all cultural resources are located and recorded.
3. All cultural resources associated with this prescription will have a protection plan that specifies the need for signing, patrolling, flagging, etc. Periodic monitoring of sites will also be conducted, as needed, to determine success of protection efforts. (Refer to the Monitoring and Evaluation Requirements in Chapter 5).
4. Consult with Native Americans so that management direction can be developed for those areas having cultural importance and that they may participate in watershed/project planning to assure that Native American concerns are addressed as part of the process.

Appendix B. Distribution of foxtail pine (*Pinus balfouriana*) in California (from Griffin and Critchfield 1972)


Pinus balfouriana
Group of stands more than 2 miles across
Stands less than 2 miles across or of unknown size
Probable limit but no type data
0 50 100 150 Miles
0 50 100 150 200 Kilometers
124°
123°
122°
121°
120°
119°
118°
117°
116°
115°
114°
42°
41°
40°
39°
38°
37°
36°
35°
34°
33°

Map 43

Appendix C. Plant list of Mt. Eddy Research Natural Area
(from Whipple and Cope 1979)

Vascular plants known to occur within the proposed Mt. Eddy Research Natural Area. Collected plants were identified using the facilities of the Humboldt State University Herbarium (HSC). Vouchers are deposited there. Nomenclature mainly follows P. Munz. 1959, A California Flora. University of California Press, Berkeley. 1681 p.

Aspidiaceae

Cystopteris fragilis (L.) Bernh.

Polystichum lemmonii Underw.

Polystichum scopulinum (D.C.Eat.) Maxon.

Boraginaceae

Cryptantha affinis (Gray) Greene.

Cryptantha subretusa Jtn.

Cryptantha torreyana (Gray) Greene.

Hackelia jessicae (McGreg.) Brand.

Plagiobothrys hispidulus (Greene) Jtn.

Campanulaceae

Campanula rotundifolia L.

Campanula scabrella Engelm.

Caprifoliaceae

Lonicera conjugialis Kell.

Symphoricarpos vaccinoides Rydb.

Caryophyllaceae

Arenaria congesta Nutt. ex T.& G.

Arenaria jamesiana (Torr.) Skinners.

Arenaria nuttallii ssp. *gregaria* (Gray) Macquire

Cerastium arvense L.

Sagina saginoides (L.) Karst. var. *hesperia* Fern.

Silene grayi Wats.

Stellaria crispa Cham. & Schlecht.

Stellaria umbellata Turcz.

Compositae

Achillea lanulosa Nutt.
Agoseris aurantiaca (Hook.) Greene.
Antennaria dimorpha (Nutt.) T. & G.
Antennaria rosea Greene.
Arnica discoidea Benth. var. alata (Rydb.) Cronq.
Arnica mollis Hook.
Artemisia tridentata Nutt.
Aster alpigenus (T. & G.) Gray. ssp. andersonii (Gray) Onno.
Aster ledophyllus (Gray) Gray.
Aster occidentalis (Nutt.) T. & G.
Aster subspicatus Nees.
Brickellia grandiflora (Hook.) Nutt.
Chaenactis douglasii (Hook.) H. & A.
Chrysothamnus nauseosus (Pall.) Britton. ssp albicaulis (Nutt.) Hall & Clem.
Cirsium cymosum (Greene) J.T. Howell.
Cirsium drummondii T. & G.
Crepis occidentalis Nutt. ssp. pumila (Rydb.) Babc. & Steb.
Crepis pleurocarpa Gray.
Erigeron compositus Pursh. var. glabratus Macoun.
Erigeron inornatus (Gray) Gray. var. viscidulus Gray.
Erigeron tener (Gray) Gray.
Eriophyllum lanatum (Pursh.) Forbes.
Eupatorium occidentale Hook.
Happlopappus greenei Gray.
Happlopappus whitneyi Gray. ssp. discoideus (J.T. Howell) Keck.
Helenium bigelovii Gray.
Helianthella californica Gray.
Hieracium albiflorum Hook.
Hulsea nana Gray.
Machaeranthera shastensis Gray var. eradiata (Gray) Cronq. & Keck.
Madia glomerata Hook.
Rudbeckia californica Gray. var. intermedia Perdue.
Senecio canus Hook.

Compositae (continued)

Senecio fremontii T. & G.

Senecio integerrimus Nutt. var. *major* (Gray) Cron.

Senecio triangularis Hook.

Solidago multiradiata Ait.

Taraxacum officinale Wiggers.

Tragopogon dubius Scop.

Crassulaceae

Sedum lanceolatum Torr.

Sedum oregonense (Wats.) Peck.

Cruciferae

Arabis divaricarpa A. Nels.

Arabis holboellii Hornem.var. *retrofracta* (Grah.) Rydb.

Arabis puberula Nutt.

Arabis suffrutescens Wats.

Barbarea orthoceras Ledeb.

Dentaria californica Nutt.

Descurainia richardsonii (Sweet) O.E. Schulz ssp *viscosa* (Rydb.) Det

Draba aureola Wats.

Draba howellii Wats. var. *carnosula* (O.E. Schulz) C.L. Hitchc.

Draba stenoloba Lebed. var. *nana* (O.E. Schulz) C.L. Hitchc.

Erysimum perenne (Wats. ex Co[illegible].) Abrams.

Lesquerella occidentalis Wats.

Rorippa curvisiliqua (Hook.) Bessey.

Streptanthus barbatus Wats.

Thelypodium brachycarpum Torr.

Thlaspi fendleri Gray. var. *hesperium* (Pays) C.L. Hitchc.

Cyperaceae

Carex arthrostachya Olney.

Carex aurea Nutt.

Carex breweri Boott.

Carex gigas (Holm) Mkze.

Carex hoodii Boott.

Carex jonesii Bailey.

Carex luzulaefolia W. Boott.

Carex luzulina Olney. var. *ablata* (Bailey) F.J. Herm.

Carex multicaulis Bailey.

Cyperaceae (continued)

Carex scopulorum Holm.

Carex subfusca W. Boott.

Eleocharis montevidensis Kunth var. *decumbens* (Clarke) V. Grant.

Scirpus congdonii Britton.

Scirpus criniger Gray.

Scirpus microcarpus Presl.

Ericaceae

Arctostaphylos nevadensis Gray.

Cassiope mertensiana (Bong.) G. Don.

Phyllodoce empetriformis (Sm.) D. Don.

Vaccinium arbuscula (Gray) Merriam.

Fagaceae

Quercus vaccinifolia Kell.

Fumariaceae

Dicentra pauciflora Wats.

Gentianaceae

Gentiana amarella L.

Gentiana calycosa Griseb. in Hook.

Gentiana newberryi Gray.

Gramineae

Agropyron spicatum (Pursh) Scribn.& Smith.

Agropyron trachycaulum (Link.) Malte.

Agrostis exarata Trin.

Agrostis thurberiana Hitchc.

Bromus carinatus Hook. & Arn.

Calamagrostis breweri Thurb.

Calamagrostis koelerioides Vasey.

Danthonia californica Boland.var. *americana* (Scribn.) Hitchc.

Deschampsia caespitosa (L.) Beauv.

Deschampsia elongata (Hook.) Munro ex Benth.

Elymus glaucus Buckl.

Festuca idahoensis Elmer.

Festuca rubra L.

Hordeum brachyantherum Nevskii.

Melica bulbosa Geyer ex Porter & Coult.

Melica fugax Bol.

Melica stricta Bol.

Melica subulata (Griseb.) Scribn.

Gramineae (continued)

Muhlenbergia andina (Nutt.) Hitchc.
Muhlenbergia filiformis (Thurb.) Rydb.
Phleum alpinum L.
Poa incurva Scribn. & Will.
Poa leptocoma Trin.
Poa nervosa (Hook.) Vasey.
Poa nevadensis Vasey ex Scribn.
Poa pratensis L.
Poa pringlei Scribn.
Sitanion hystrix (Nutt.) J.G. Sm.
Stipa occidentalis Thurb.
Trisetum spicatum (L.) Richt.

Grossulariaceae

Ribes binominatum Heller.
Ribes cereum Dougl.
Ribes montigenum McClat.
Ribes roezlii Regel. var cruentum (Greene.) Rehd.

Hydrophyllaceae

Hydrophyllum occidentale (Wats.) Gray.
Nemophila pedunculata Dougl. ex Benth.
Phacelia corymbosa Jeps.
Phacelia hastata Dougl. ex Lehm. ssp. compacta (Brand.) Heckart.
Phacelia mutabilis Greene.
Phacelia pringlei Gray.

Hypericaceae

Hypericum formosum HBK.var. scouleri (Hook.) Coult.

Iridaceae

Sisyrinchium idahoense Bickn.
Sisyrinchium elmeri Greene.

Isoetaceae

Isoetes muricata Durieu var. hesperia Reed.

Juncaceae

Juncus balticus Willd.
Juncus ensifolius Wikstr.

Juncaceae (continued)

Juncus howellii F.J. Herm.

Juncus mertensianus Bong. subsp. *gracilis* (Engelm.) F.J. Hermann.

Juncus mertensianus Bong. ssp. *mertensianus*

Lazula comosa E. Mey.

Labiatae

Monardella odoratissima Benth ssp. *pallida* (Heller) Epl.

Prunella vulgaris L. ssp. *lanceolata* (Barton) Hult.

Scutellaria antirrhinoides Benth.

Stachys rigida Nutt. ex Benth.

Leguminosae

Astragalus whitneyi Gray.var. *siskiyouensis* (Rydb.) Barneby.

Lupinus croceus Eastw.

Lupinus sellulus Kell. ssp *ursinus* (Eastw.) Munz.

Trifolium cyathiferum Lindl.

Trifolium longipes Nutt.

Liliaceae

Allium campanulatum Wats.

Allium falcifolium H. & A.

Allium validum Wats.

Calochortus nudus Wats.

Fritillaria atropurpurea Nutt.

Lilium kelleyanum Lemmon.

Narthecium californicum Baker.

Schoenolirion album Durand.

Smilacina stellata (L.) Desf.

Tofieldia glutinosa (Michx.) Pers. ssp *occidentalis* (Wats.) C.L. Hitchc.

Veratrum californicum Durand.

Limnanthaceae

Floerkea proserpinacoides Willd.

Linaceae

Linum perenne L. ssp. *lewisii* (Pursh) Hult.

Loasaceae

Mentzelia dispersa Wats.

Loranthaceae

Arceuthobium campylopodum Engelm. in Gray. forma blumeri (A. Nels.) Gill.

Malvaceae

Sidalcea oregana (Nutt.) Gray. ssp spicata (Regel) C.L. Hitchc.

Onagraceae

Epilobium angustifolium L.

Epilobium halleanum Hausskn.

Epilobium minutum Lindl. ex Hook.

Epilobium obcordatum Gray. ssp siskiyouense Munz.

Epilobium paniculatum Nutt. ex T. & G.

Epilobium pringleanum Hausskn.

Gayophytum diffusum T. & G. ssp. parviflorum Lewis & Szweykowski.

Gayophytum humile Juss.

Orchidaceae

Platanthera dilatata Lindl. var. leucostachys (Lindl.) Luer.

Platanthera sparsiflora (S. Wats.) Schltr.

Orobanchaceae

Orobanche fasciculata Nutt. var franciscana Achey.

Orobanche uniflora L. var. minuta (Suksd.) Achey.

Pinaceae

Abies concolor (Gord. & Glend.) Lindl.

Abies magnifica A. Murr. var shastensis Lemmon.

Pinus albicaulis Engelm.

Pinus balfouriana Grev. & Balf. in A. Murr.

Pinus contorta Dougl. ex Loud. ssp. murrayana Critchf.

Pinus jeffreyi Grev. & Balf. in A. Murr.

Pinus monticola Dougl.

Tsuga mertensiana (Bong.) Carr.

Polemoniaceae

Collomia grandiflora Dougl. ex Lindl.

Collomia tinctoria Kell.

Gilia capillaris Kell.

Ipomopsis aggregata (Pursh.) V. Grant.

Leptodactylon pungens (Torr.) Rydb. ssp hookeri (Dougl.) Wherry.

Polemoniaceae (continued)

Microsteris gracilis (Hook.) Greene.

Phlox diffusa Benth.

Polemonium chartaceum Mason.

Polygonaceae

Eriogonum alpinum Engelm.

Eriogonum marifolium T. & G.

Eriogonum nudum Dougl. ex Benth. var. *nudum*

Eriogonum siskiyouense Small.

Eriogonum strictum Benth.ssp. *proliferum* (T. & G.) S. Stokes.

Eriogonum umbellatum Torr. var. *argus* Reveal ined.

Eriogonum umbellatum Torr. var. *humistratum* Reveal ined.

Polygonum bistortoides Pursh.

Polygonum davisiae Brew.ex Gray.

Polygonum douglasii Greene.

Polygonum kelloggii Greene.

Polygonum minimum Wats.

Polygonum sawatchense Small.

Rumex acetosella L.

Portulacaceae

Calytridium umbellatum (Torr.) Greene.

Claytonia lanceolata Pulrsh.

Lewisia leana (Porter) Rob. in Gray.

Lewisia nevadensis (Gray) Rob. in Gray.

Montia perfoliata (Donn.) Howell. var. *depressa* (Gray) Jeps.

Primulaceae

Dodecatheon alpinum (Gray) Greene. ssp *majus* H.J. Thomps.

Pteridaceae

Cheilanthes gracillima D.C. Eat. in Torr.

Cryptogramma acrostichoides R. Br. in Richards.

Ranunculaceae

Aconitum columbianum Nutt.

Anemone drummondii Wats.

Aquilegia formosa Fisch in DC.

Caltha howellii (Huth.) Greene.

Delphinium glaucum Wats.

Delphinium sonnei Greene.

Ranunculus alismaefolius Geyer ex Benth. var. *alismellus* Gray.

Rhamnaceae

Rhamnus californica Esch. ssp. occidentalis (Howell) C.B. Wolf.

Rosaceae

Amelanchier pallida Greene.

Cercocarpus ledifolius Nutt.

Holodiscus microphyllus Rydb. var. glabrescens (Greene) Ley.

Ivesia gordonii (Hook.) T. & G.

Potentilla breweri Wats.

Potentilla fruticosa L.

Potentilla glandulosa Lindl. ssp nevadensis (Wats.) Reck.

Potentilla gracilis Dougl. ex Hook.

Prunus emarginata (Dougl.) Walp.

Spiraea densiflora Nutt. ex T. & G.

Rubiaceae

Galium aparine L.

Galium bifolium Wats.

Galium glabrescens (Ehrend.) Demp. & Ehrend.

Kelloggia galiodes Torr.

Sarraceniaceae

Darlingtonia californica Torr.

Saxifragaceae

Heuchera merriami Eastw.

Parnassia palustris L. var. californica Gray.

Saxifraga aprica Greene.

Scrophulariaceae

Castilleja applegatei Fern. var. fragilis (Zeiter) Holmg.

Castilleja arachnoidea Greenm.

Castilleja miniata Dougl. ex Hook.

Castilleja pruinosa Fern.

Collinsia parviflora Dougl. ex Lindl.

Collinsia rattanii Gray.

Collinsia torreyi Gray. var. wrightii (Wats.) Jth.

Mimulus breweri (Greene) Coville.

Mimulus guttatus Fisch. ex DC.

Mimulus moschatus Dougl. ex Lindl.

Mimulus nanus H. & A.

Scrophulariaceae (continued)

Mimulus primuloides Benth.

Mimulus primuloides Benth. ssp *linearifolius* (Grant) Munz

Mimulus tilingii Regel.

Orthocarpus copelandii Eastw.

Pedicularis attolens Gray.

Pedicularis racemosa Dougl. ex Hook.

Penstemon davidsonii Greene.

Penstemon laetus Gray. ssp *roezlii* (Regel) Keck.

Penstemon newberryi Gray.

Penstemon parvulus (A. Gray) Krautter.

Penstemon procerus Dougl. ex Grah. ssp.*formosus* (A. Nels.) Keck.

Veronica copelandii Eastw.

Veronica serpyllifolia L. var. *humifusa* (Dickson) Vahl.

Umbelliferae

Angelica arguta Nutt. ex T. & G.

Ligusticum grayi Coult. & Rose.

Lomatium Engelmannii Math.

Lomatium macrocarpum (H. & A.) Coult. & Rose.

Osmorhiza chilensis H. & A.

Osmorhiza occidentalis (Nutt.) Torr.

Perideridia parishii (Coult. & Rose) Nels. & Macbr.
ssp. *latifolia* (A. Gray) Chuang & Constance.

Sanicula graveolens Poepp. ex DC.

Sanicula tuberosa Torr.

Valerianaceae

Valeriana capitata Pall. ex Link. ssp. *californica*
(Heller) F.G. May.

Violaceae

Viola adunca Sm.

Viola macloskeyi Lloyd.

Viola purpurea Kell.

Appendix D. List of fauna species generated by modified Wildlife Habitat Relationship (WHR) model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

D1. Description of Modified WHR model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

D2. Strongly associated list

D3. Moderately associated list

D4. Generally associated list

Appendix D1. Description of Modified WHR model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

Modified WHR model for Shasta-Trinity National Forest
June 1994 - Paula Crumpton and Heidi Dias

Four WHR-model based tools were developed to complete Watershed Analysis for wildlife and their habitat: 1. Guilds, 2. Elements, 3. Habitat Trends, and 4. Risk Ranks. These four tools are interrelated and are to be used in concert to answer key questions, tell the watershed story, and meet the Goals and Products for the Wildlife Habitat module of the Federal Guide to Watershed Analysis.

1. Guilds

The wildlife species on the Forest were grouped into guilds based on their habitat use and life history needs. First, habitat use and habitat element needs were listed. These lists were based on WHR habitat types considered able to support healthy populations and habitat elements considered necessary for the existence of a species. Second, additional literature provided further information on the habitat types used, seral stages, aquatic characteristics and microhabitat components (snags, rocks, cliffs, etc). A final, revised list of the WHR habitats types and essential elements were produced. These lists shaped the structure of each guild and the associated species. Within each guild, all WHR habitat types existing on our Forest are represented along with key elements.

Guilds, as tools are useful for the initial steps of analysis in the following ways:

Guilds are used to meet the first goal of the wildlife habitat module: Develop potential habitat maps for wildlife species and guilds of wildlife.

The first product requested in the wildlife module is to develop a list of known and suspected species/guilds in the watershed. The species distribution maps are categorized by watershed location. Therefore this product is now easily created.

Guilds can help answer key questions related to habitat types (e.g. riparian) or seral stages (e.g. late seral). Since our Ecological Unit Inventory translates vegetation types into wildlife habitat types (WHR types) our GIS maps and reports tier directly to the wildlife guilds.

Guilds represent some habitats or components in which information gaps exist (e.g. aquatic and riparian wildlife). Information on the species in the guilds may help to fill in the gaps (e.g. turtle sightings and bird banding data). The guilds also may help to market the need for future inventory to fill in the gaps (e.g. sensitive frog species for the aquatic guilds).

The guilds are actually the second generation for the Forest since Assemblages were previously developed for the LMP. The guilds are more specific than the LMP assemblages and include every species on the Forest. The guilds will replace the assemblages for the final LMP.

2. **Elements**

Habitat types do not tell the whole story for wildlife. Microhabitat needs such as prey base data (e.g. fish for many birds), seral stages, aquatic characteristics, and habitat components should also be analyzed. These microhabitats are represented by elements. Elements, then, as another tool, display those non-habitat type needs of species. With the creation of the guilds, a list of essential elements for species was developed. Literature gathered, as mentioned previously, established this list of elements. Element summaries were written for every species.

Elements, as a tool are crucial for analysis:

Elements contribute to the second goal of the module:
Rank habitat conditions for species/guilds.

Used in conjunction with the guilds, the biologist will understand why a species is in the guild and what other microhabitat components are needed beyond the vegetation type.

The third product requested in the module is a list of ranking criteria for habitat conditions by priority species/guilds to help with identifying areas of concern. Missing elements or low quantities of elements indicate poor microhabitat conditions that may need a high ranking for concern.

3. **Habitat Trend Index**

Some species are highly associated with certain habitat types. Other species can use a variety of habitats. The highly associated species can be used for analysis or monitoring because their population would be more effected by habitat changes. The species that use a variety of habitats, or generalists, would not be suitable for monitoring habitat types changes. Instead, many generalists are associated with specific habitat elements and therefore could be tied to habitat elements such as snags or fish for prey. Guilds are a useful grouping tool for generalists.

Like the guilds, the habitat trend index was based on the WHR habitat associations and related literature. Of all the habitats a species used the most important habitats were filtered out and given a "1" index. For example a species using six forest habitats and grasslands, may be an early seral/grassland specialist. The six forests habitats would be indexed a 2, while the grasslands would index 1. Another species may use two forest habitats. In most cases, both habitats were indexed "1". Finally, a species like the northern spotted owl has seven habitats listed. Yet, the spotted owl is associated with late seral stages, not any one habitat type. All seven habitats would be indexed "2". Instead of a habitat trend indicator, the spotted owl would be a guild or element indicator.

This index of by habitat trends contribute to telling the watershed story and making recommendations:

Product 6 in the module refers to monitoring. The trend index assists in selecting species that are suitable for monitoring.

The trend index is useful to select indicator species.

4. Risk Ranking

Ranking or setting priorities for species is important for assessing risk within watersheds. Since it was one of the six information needs that needed to be developed for the module, we developed our own.

Risk Ranking is useful to balance formally listed species with others of local concern or less charismatic. This tool is useful to target species in the guilds for monitoring or to fine tune the list of habitat trend indicator species.

Risk ranking was either based upon variable found in the AVESBASE database for Neotropical Migratory Birds or were recommended by local biologists. The variables used in the calculation of the risk score were:

CB — What is the breeding/wintering range for a species in California?
The smaller the range the higher the risk.

RS — Of the breeding/wintering range existing in California how much is found in the Shasta-Trinity National Forest?
The larger the portion the higher the risk.

HAB_RISK — How many habitats are considered able to support a high population of a species and what is the average number of seral stages for all habitats?
The number of habitat used had greater weight in risk than the number of seral stages and therefore, were valued differently. Fewer habitats used indicates a higher risk. Fewer seral stages indicates a higher risk.

ELEMENT — Does the species require a specialized microhabitat, i.e. specific habitat elements?
The more specialized the higher the risk.

REPRO1 — What is the reproductive potential for each species?; number of young produced * the number of clutches each year
The fewer the young produced each year the higher the risk; ability to repopulate itself (this value dropped for species not reproducing on our forest).

REPRO2 — What is the reproductive maturity for each species?
The longer a species takes to mature the greater the risk (this value dropped for species not reproducing on our forest).

TES — Does the species have any Threatened, Endangered, or Sensitive status?; State to Federal level, including all agencies.
Risk dependant upon state or federal, threatened, endangered, candidate, forest or BLM sensitive.

BBS — Is the species population declining, maintaining, or increasing. Is this change significant. Based on the Breeding Bird Surveys.
Declining population indicate a higher risk.

WHR Types and names:

Fresh Emergent Wetland (FEW)
Riverine (RIV)
Lacustrine (LAC)

Montane Riparian (MRI)
Valley Foothill Riparian (VRI)

Valley Foothill Hardwood (VFH)
Valley Hardwood-Conifer (VHC)
Montane Hardwood-Conifer (MHC)
Montane Hardwood (MHW)
Aspen (ASP)

Alpine-Dwarf Shrub (ADS)
Bitterbrush (BBR)
Montane Chaparral (MCP)
Mixed Chaparral (MCH)
Chamise-Redshank Chaparral (CRC)

Annual Grassland (AGS)
Perennial Grassland (PGS)
Wet Meadow (WTM)

Klamath Mixed Conifer (KMC) - also known as Mixed Conifer (MCN) in WHR
Douglas Fir (DFR)
Jeffrey Pine (JPN)
Ponderosa Pine (PPN)
Eastside Pine (EPN)
Lodgepole Pine (LPN)
Red Fir (RFR)
Subalpine Conifer (SCN)
Closed-cone Pine-Cypress (CPC)
Juniper (JUN)
Pinyon-Juniper (PJN)

Guilds from modified WHR model of the Shasta-Trinity Forest
May 1994

WHR-Type Guilds:	
1. Aquatic habitat in general*	FEW, LAC, RIV
2. Fast moving aquatic habitat only*	
3. Slow moving aquatic habitat only*	
4. Riparian Vegetation	VRI, MRI
5. Chaparral Community	ADS, BBR, MCP, MCH, CRC
6. Hardwoods	VFH, VHC, MHW, MHC, ASP
7. Open habitat in general**	PGS, AGS, WTM, includes all types in the Shrubs-early seral stage guild
8. Grass and meadows specifically **	PGS, AGS, WTM
9. Shrubs (early seral stage)**	PPN, CPC, JUN, PJN, EPN, RFR, SCN, LPN, KMC, JPN, DFR
10. Late Seral forests	PPN, CPC, EPN, RFR, SCN, LPN, KMC, JPN, DFR

ELEMENT Type Guilds:
11. Cavities
12. Dead and down component
13. Talus and rock
14. Cliffs and caves

* Species in Aquatic guild are mutually exclusive.
** Species in open habitats are mutually exclusive. For example: brush rabbits are in the shrub guild. Meadowlarks are in the grass guild. Deer eat forbs and shrubs; they are in the open habitat guild.

ELEM_CODE	ELEM_NAME	CAT_DESCR
AQFA	AQUATIC, FAST	Fast water required, usually indicating river or streams
AQSL	AQUATIC, SLOW	Areas of slow water required, be they in a Lac or Riv habitat
AQUAT	BOTH SLOW AND FAST AQUATIC	Can use either the fast or slow water components
CHAP	CHAPARRAL	Chaparral Communities by WHR type: ADS, BBR, MCP, MCH, CRC
C/C	CLIFF/CAVES	Cliffs and Caves
D/D	DEAD AND DOWN	Dead and Down material; logs, stumps, slash, litter, duff
OPEN-GRASS	EARLY SERAL STAGE, GRASSY	Habitat Types PGS, AGS, WTM: Meadows, grasslands; seral stage 1
OPEN-SHRUB	EARLY SERAL STAGES, SHRUBBY	All forested habitat types: Openings; seral stages 2 and 3a
HDWD	HARDWOOD	Habitat types VFH, VHC, MHW, MHC, ASP: Oaks, madrone, aspen
LATE	LATE SERAL STAGE-OLD GROWTH	Late Seral stages 4a, 4b, 4c and Multi-layered
OPEN	OPENINGS AND EARLY SERAL STG	Meadows, open areas, seral stages 1, 2 and 3a
RIPAR	RIPARIAN	Associated with riparian vegetation; VRI, MRI
SNAGCAV	SNAG	Tree cavity dependant species found in snags or live trees
T/R	TALUS/ROCKS	Talus and rocks

Appendix D2. Strongly associated list

REPORT FOR SPECIES POSSIBLY OCCURRING IN MOUNT EDDY RNA
(WITHIN WATERSHEDS 7, 9, 10)
AND STRONGLY ASSOCIATED WITH HABITAT TYPES WTM AND SCN

WHRI	COMMON NAME	PRIORITY	GUILD(S)
A042	CASCADES FROG	5.01	AQSL ✓ - CA Sp of Special Concern Federal Endangered
B537	CASSIN'S FINCH	3.79	OPEN-GRASS
M052	MOUNTAIN BEAVER	4.11	RIPAR
M133	MONTANE VOLE	2.71	OPEN-GRASS
M136	LONG-TAILED VOLE	2.32	OPEN-GRASS
M143	WESTERN JUMPING MOUSE	4.26	RIPAR

6 records selected.

Appendix D3. Moderately associated list

REPORT FOR SPECIES POSSIBLY OCCURRING IN MOUNT EDDY RNA
(WITHIN WATERSHEDS 7, 9, 10)
AND MODERATELY ASSOCIATED WITH HABITAT TYPES WTM AND SCN

WHRI	COMMON NAME	PRIORITY	GUILD(S)
B117	NORTHERN GOSHAWK	4.11	LATE
B141	MOUNTAIN QUAIL	4.18	OPEN
B318	DUSKY FLYCATCHER	3.45	OPEN-SHRUB
B375	GOLDEN-CROWNED KINGLET	3.11	LATE
B381	MOUNTAIN BLUEBIRD	2.06	SNAGCAV
B537	CASSIN'S FINCH	3.79	OPEN-GRASS
M052	MOUNTAIN BEAVER	4.11	RIPAR
M055	YELLOW-PINE CHIPMUNK	2.37	OPEN-SHRUB
M057	ALLEN'S CHIPMUNK	2.55	OPEN-SHRUB
M075	GOLDEN-MANTLED GROUND SQUIRREL	1.91	OPEN-SHRUB
M080	NORTHERN FLYING SQUIRREL	2.41	LATE SNAGCAV
M128	BUSHY-TAILED WOODRAT	2.21	T/R
M136	LONG-TAILED VOLE	2.32	OPEN-GRASS
M147	RED FOX	2.01	OPEN
M154	MARTEN	3.88	LATE
M155	FISHER	3.71	LATE

17 records selected.

Appendix D4. Generally associated list

REPORT FOR SPECIES POSSIBLY OCCURRING IN MOUNT EDDY RNA
(WITHIN WATERSHEDS 7, 9, 10)
AND GENERALLY ASSOCIATED WITH HABITAT TYPES WTM AND SCN

WHRI	COMMON NAME	PRIORITY	GUILD(S)
A042	CASCADES FROG	5.01	AQSL ✓
B117	NORTHERN GOSHAWK	4.11	LATE ✓
B134	BLUE GROUSE	3.41	LATE
B141	MOUNTAIN QUAIL	4.18	OPEN
B263	FLAMMULATED OWL	2.32	SNAGCAV
B289	CALLIOPE HUMMINGBIRD	3.93	OPEN
B318	DUSKY FLYCATCHER	3.45	OPEN-SHRUB
B356	MOUNTAIN CHICKADEE	4.12	LATE SNAGCAV
B375	GOLDEN-CROWNED KINGLET	3.11	LATE
B381	MOUNTAIN BLUEBIRD	2.06	SNAGCAV
B537	CASSIN'S FINCH	3.79	OPEN-GRASS
M010	WATER SHREW	3.54	RIPAR
M027	LONG-LEGGED MYOTIS	2.83	C/C
M052	MOUNTAIN BEAVER	4.11	RIPAR
M055	YELLOW-PINE CHIPMUNK	2.37	OPEN-SHRUB
M057	ALLEN'S CHIPMUNK	2.55	OPEN-SHRUB
M075	GOLDEN-MANTLED GROUND SQUIRREL	1.91	OPEN-SHRUB
M080	NORTHERN FLYING SQUIRREL	2.41	LATE SNAGCAV
M084	WESTERN POCKET GOPHER	3.45	OPEN-GRASS
M128	BUSHY-TAILED WOODRAT	2.21	T/R
M133	MONTANE VOLE	2.71	OPEN-GRASS
M136	LONG-TAILED VOLE	2.32	OPEN-GRASS
M143	WESTERN JUMPING MOUSE	4.26	RIPAR
M147	RED FOX	2.01	OPEN
M154	MARTEN	3.88	LATE ✓
M155	FISHER	3.71	LATE ✓

28 Spc.

Appendix E. USDA Forest Service Mineral potential report for lands proposed for mineral withdrawal in the Mt. Eddy Research Natural Area (Richard W. Teixeira, 1990)

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

MINERAL POTENTIAL REPORT FOR LANDS PROPOSED FOR MINERAL WITHDRAWAL IN THE MT. EDDY RESEARCH NATURAL AREA

LANDS INVOLVED

T. 40 N., R. 5 W., Mount Diablo Base and Meridian,
Section 18 - portion;

T. 40 N., R. 6 W., Mount Diablo Base and Meridian,
Section 24 - portion;

containing 890 acres.

Summary

The subject lands are not known to contain locatable, leasable or salable minerals of more than nominal value. The potential for their occurrence is considered to be low, based on the geologic setting, historic mining in the area, and current mineral interest.

No critical and strategic minerals are known or likely to be found in the vicinity of the subject land, and the potential for their occurrence is low. The subject land is not within an area that has been nominated or identified as an Area of Critical Mineral Potential.

Prepared By:

Richard W. Teixeira
North Zone, Minerals Management

February 21, 1990

INTRODUCTION

The purpose of this report is to evaluate the potential for the occurrence of valuable minerals on the subject land. It was requested by the Forest Supervisor, Shasta-Trinity National Forests, as part of the Environmental Impact Statement for the Land and Resource Management Plan, to address the mineral potential of lands being proposed for withdrawal from location and entry under the General Mining Laws. The proposed withdrawal is in support of the lands being proposed for establishment as a Research Natural Area (RNA). In addition, potential surface disturbing activities associated with leasable or salable minerals would not be allowed in a designated RNA. Opinions and conclusions in this report are based upon a review of available literature. I did not conduct a field exam of the subject land. This report should not be used for purposes other than that for which it was prepared.

LANDS INVOLVED

Mt. Eddy RNA

T. 40 N., R. 5 W., Mount Diablo Base and Meridian,
Section 18 - portion;

T. 40 N., R. 6 W., Mount Diablo Base and Meridian,
Section 24 - portion;

890 acres.

LOCATION

The subject lands are located in Siskiyou County, approximately 10 air miles west of Mt. Shasta City. The proposed RNA lies on the south flank of Mt. Eddy.

GEOLOGY AND MINERALIZATION

The subject land lies on the eastern portion of the Klamath Mountains Geologic Province, within the Trinity ultramafic sheet, a part of the Eastern Klamath Mountains subprovince. Bedrock underlying the subject land consists of Paleozoic dunite and peridotite (Peterson and others, 1983; Wagner and Saucedo, 1987).

Chromite has been the principal metallic mineral mined in the region. Dunite, the host rock for chromite deposits forms small tabular bodies, inches to feet in size up to thick (up to 300 feet) tabular bodies more than 0.6 miles long (Peterson and others, 1983). Lateritic soils overlying the dunite or peridotite may contain chromite or nickel prospects. One gold prospect has been identified in iron-stained quartz lenses in hornblende diorite at the Half Century prospect in section 6, 2 miles north of the subject lands. Small amounts of chalcopyrite, bornite and malachite occur in the lenses. A grab sample reportedly assayed 0.271 ounces per ton.

MINING HISTORY

One chromite mine (Johnson mine) with past production occurs within the subject lands. The Johnson mine produced an unrecorded amount of chromium ore during WWII from a 35 foot decline in podiform chromite in dunite. A grab sample from the remaining stockpile assayed 39.8% chromite. Reserve estimates were not possible due to limited surface exposures. One chromite prospect (Ratero prospect) and one gold prospect (Half Century prospect) were identified north of this parcel in section 6. The chromite deposits occur in dunite or serpentinized peridotite. Several other chromite, nickel and asbestos prospects occur in peridotite, dunite and serpentine to the north, south and west (Peterson and others, 1983; Bureau of Mines, 1979).

The most recent B.L.M. mining claim records dated October 5, 1989 show no mining claims in or adjacent to the subject land.

MINERAL POTENTIAL

Locatable Minerals: Although small amounts of chromite and nickel are present at the surface of the parcel, and chromite has been mined within the subject lands, the limited reserves, low concentrations and lack of government purchasing program would indicate a low potential for significant deposits of these commodities occurring in the parcel. The subject land is not known to contain locatable minerals of more than nominal value. The potential for their occurrence is low, based on the geologic setting, lack of historic mining of minerals other than chromite in the area, and current mineral interest.

Leasable Minerals: The subject land has not been classified by the U.S. Bureau of Land Management as being "prospectively valuable" for any mineral commodities. There are no leases or lease applications on or adjacent to the subject lands. It is my opinion that the subject land has a low potential for hosting any energy or nonenergy leasable mineral deposit.

Salable Minerals: The subject land is not known to host salable mineral deposits of more than nominal value. There is no known past or present production from the subject land. It is my opinion that the subject land has a low potential for the occurrence on economic deposits of salable mineral commodities.

Critical and Strategic Minerals: The subject land is not known to contain any critical or strategic minerals of more than nominal value, and the potential for their occurrence is low.

Area of Critical Mineral Potential: According to B.L.M. records, the subject land is not within an area that has been nominated or identified as an Area of Critical Mineral Potential.

REFERENCES

Peterson, J.A., Caress, M.E., Denton, D.K., Jr., and Spear, J.M., 1983, Mineral Resource Potential of the Mount Eddy and Castle Crags Roadless Areas, Shasta, Siskiyou, and Trinity Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1529-B, scale 1:62,500.

U.S. Bureau of Land Management, 1985, Prospectively Valuable Maps, scale 1:500,000.

U.S. Bureau of Land Management, 1989, Geographic Index of Mining Claim Locations, California.

U.S. Bureau of Mines, 1979, Mineral Industry Location System (MILS), Weed Sheet, scale 1:250,000.

Wagner, D.L., and Saucedo, G.J., 1987, Geologic Map of the Weed Quadrangle, California: California Division of Mines and Geology, Regional Geologic Map Series, Map No. 4A, scale 1:250,000.

Appendix F. Descriptions of soil types in the Mt. Eddy Research Natural Area (from Soil Survey of Shasta-Trinity Forest Area, California)

276 Rock outcrop, ultramafic-Rubble land association, 60 to 80 percent slopes

Map Unit Components	Rubble land (60%)	Rock outcrop (30%)
Geomorphic Position	Complex, undissected, very steep, linear, rough cirque headwalls and talus slopes.	Ridge tops including glacial aretes and horns.
Typical Vegetation Series	Rock rubble	

Soil Profile Description

Surface Soil		
Subsoil		
Substratum		

Soil Properties & Management Interpretations

Forest Survey Site Class		
Adapted Species Group		
Soil Erodibility		
AWC for Profile Depth		
AWC for Surface 24"		
Seedling Survival Potential		
Plantability Potential		
Hydrologic Soil Group	D	D
Potential for Roadbed Damage	Low	Low
Inclusions (10%)	Deadfall family Lithic Cryochrepts	
Remarks:		

30 Deadfall family-Lithic Cryochrepts, 40 to 60 percent slopes

Map Unit Components	Deadfall family (60%)	Lithic Cryochrepts (30%)
Geomorphic Position	Steep, linear to broken ridge tops.	Similar position as Deadfall family.
Typical Vegetation Series	Upper Montane Serpentine Semi-Barrens	Similar vegetation as Deadfall family.

Soil Profile Description

Surface Soil	0-14" pale brown and yellowish brown very gravelly sandy loam, moderate to weak fine and very fine granular structure, 35-45% gravel and cobbles, slightly acid to neutral.	0-7" very pale brown gravelly sandy loam, moderate fine and very fine subangular blocky structure, 40% gravel, neutral.
Subsoil	14-24" yellowish brown extremely gravelly sandy loam, weak very fine granular structure, 75% gravel and cobbles, mildly alkaline.	7-17" pale brown very gravelly sandy clay loam, weak fine subangular blocky structure, 50% gravel, mildly alkaline.
Substratum	24-34" highly fractured ultramafic rock with coatings of soil. 34-40" ultramafic rock.	17-20" highly fractured moderately weathered ultramafic rock.

Soil Properties & Management Interpretations

Forest Survey Site Class	7	7
Adapted Species Group	GL	GL
Soil Erodibility	Low	Low
AWC for Profile Depth	0.9-1.5	0.8-2.0
AWC for Surface 24"	0.9-1.5	0.8-1.9
Seedling Survival Potential	V.Low-Low	V.Low-Low
Plantability Potential	High-Moderate	High-Moderate
Hydrologic Soil Group	A-B	D
Potential for Roadbed Damage	Moderate	Low

Inclusions (10%)

Rock outcrop, ultramafic
Rubble land, ultramafic

Remarks:

Deadfall and Lithic Cryochrepts, ultramafic limitations: Ca/Mg imbalance, possible toxicity, poor aeration and extreme cold.

33 Deadwood family, 60 to 80 percent slopes

Map Unit Components	**Deadwood family (75%)**
Geomorphic Position	Very steep, dissected mountain sideslopes, ridgetops.
Typical Vegetation Series	Open Mixed Conifer-Canyon Oak Forest, Canyon Oak Woodland, Greenleaf Manzanita Chaparral

Soil Profile Description

Surface Soil	0-3" dark brown very gravelly, sandy loam, weak fine granular structure, 55% gravel, neutral.
Subsoil	3-15" yellowish brown and light brown very gravelly loam and extremely cobbly heavy loam, weak fine and medium subangular blocky structure, 55 to 65% gravel and cobbles, slightly to medium acid.
Substratum	15-17" metamorphosed shale, moderately fractured, slightly weathered.

Soil Properties & Management Interpretations

Forest Survey Site Class	6-7
Adapted Species Group	DF, PP, SP, BL
Soil Erodibility	Low
AWC for Profile Depth	0.9-1.5
AWC for Surface 24"	0.9-1.5
Seedling Survival Potential	V.Low-Low
Plantability Potential	V.Low-Low
Hydrologic Soil Group	C
Potential for Roadbed Damage	Low
Inclusions (25%)	Typic Xerorthents, Goulding family Neuns family Rock outcrop, metamorphic

263 Rock outcrop-Lithic Cryochrepts-Deadfall family complex, 20 to 70 percent slopes

Map Unit Components	Rock outcrop (40%)	Lithic Cryochrepts (35%)	Deadfall family (15%)
Geomorphic Position	Complex, steep to very steep, linear, smooth to broken, ridge tops.	Position similar to that described for rock outcrop.	Position similar to that described for rock outcrop.
Typical Vegetation Series	Rock Outcrop	Upper Montane Serpentine Semi-Barren, Mt. Mahogany Scrub	Vegetation similar to that described for Lithic Cryochrepts, ultramafic

Soil Profile Description

Surface Soil		0-7" very pale brown gravelly sandy clay loam, moderate fine and very fine subangular blocky structure, 40% gravel, neutral.	0-14" pale brown and yellowish brown very gravelly sandy loam, moderate to weak fine and very fine granular structure, 35-45% gravel and cobbles, slightly acid to neutral.
Subsoil		7-17" pale brown very gravelly sandy clay loam, weak fine and very fine subangular blocky structure, 50% gravel, mildly alkaline.	14-24" yellowish brown extremely gravelly sandy loam, weak very fine granular structure, 75% gravel and cobbles, mildly alkaline.
Substratum		17-20" highly fractured moderately weathered ultramafic rock.	24-34" highly fractured ultramafic rock with coatings of soil. 34-40" ultramafic rock.

Soil Properties & Management Interpretations

Forest Survey Site Class		7	7
Adapted Species Group		GL	GL
Soil Erodibility		Low	Low
AWC for Profile Depth		0.8-2.0	0.9-1.5
AWC for Surface 24"		0.8-1.9	0.9-1.5
Seedling Survival Potential		V. Low-Low	V. Low - Low
Plantability Potential		Low-V. Low	Low-V. Low
Hydrologic Soil Group	D	D	A-B
Potential for Roadbed Damage	Low	Low	Moderate
Inclusions: (10%)	Rubble land		
Remarks:	Lithic Cryochrepts and Deadfall limitation: Ca/Mg imbalance limits species and productivity. Also extreme cold and short growing season.		

87 Gozem-Toadlake families association, 20 to 40 percent slopes

Map Unit Components	Gozem family (50%)	Toadlake family (30%)
Geomorphic Position	Moderately steep broken slopes of cirques and ridge tops.	Similar topography as Gozem family.
Typical Vegetation Series	Upper Montane Serpentine Barrens, Very Open Jeffrey Pine - Woodland	Jeffrey Pine Mixed Conifer Forest Mixed Upper Montane Coniferous Forest

Soil Profile Description

Surface Soil	0-4" yellowish brown very cobbly loam moderate fine and medium subangular blocky structure, 35% gravel and cobbles, slightly acid.	0-10" grayish brown and light gray very gravelly loam, moderate very fine granular and very fine subangular blocky structure, 35-45% gravel and cobbles, slightly acid to neutral.
Subsoil	4-18" yellowish brown very cobbly and very gravelly loam, moderate to strong medium subangular blocky structure, 45 to 55% gravel and cobbles, neutral to slightly acid.	10-56" light brownish gray very gravelly sandy clay loam to light yellowish brown very gravelly clay loam, moderate fine to weak coarse subangular blocky structure, 45-50% gravel and cobbles, mildly alkaline.
Substratum	18-22"+ highly fractured serpentinized peridotite bedrock.	56-59" hard, moderately fractured ultramafic rock.

Soil Properties & Management Interpretations

Forest Survey Site Class	7	5-6
Adapted Species Group	BL, GL	JP, WWP, WF
Soil Erodibility	Moderate	Moderate
AWC for Profile Depth	1.5-2.4	2.5-5.0
AWC for Surface 24"	1.5-2.4	2.3-3.0
Seedling Survival Potential	Low-Moderate	Moderate
Plantability Potential	V. Low	High-Low
Hydrologic Soil Group	C	B
Potential for Roadbed Damage	Low	Moderate

Inclusions (20%) Grell family, Rock outcrop, ultramafic, Typic Cryaquolls

Remarks: Gozem limitation: Ca/Mg, poor aeration and possible toxicity. Toadlake limitation: Ca/Mg limits species and productivity.

321 Toadlake-Tamflat families complex, 40 to 70 percent slopes

Map Unit Components	Toadlake family (65%)	Tamflat family (20%)
Geomorphic Position	Steep to very steep, undissected, linear, mountain sideslopes.	Position similar to Toadlake family.
Typical Vegetation Series	Jeffrey Pine Mixed Conifer Forest	Jeffrey Pine - Incense Cedar Woodland

Soil Profile Description

Surface Soil	0-10" grayish brown and light gray very gravelly loam, moderate very fine granular and very fine subangular blocky structure, 35-45% gravel and cobbles, slightly acid to neutral.	0-1" brown very cobbly loam, moderate thin and medium platy structure, 58% gravel and cobbles, neutral.
Subsoil	10-56" light brownish gray very gravelly sandy clay loam to light yellowish brown very gravelly clay loam, moderate fine to weak coarse subangular blocky structure, 45-50% gravel and cobbles, mildly alkaline.	1-19" yellowish red extremely gravelly clay loam and strong brown extremely gravelly clay, moderate medium to strong fine subangular blocky structure, 62-75% gravel and cobbles, mildly alkaline to neutral.
Substratum	56-59" hard, moderately fractured ultramafic rock.	19-24" high fractured peridotite rock.

Soil Properties & Management Interpretations

Forest Survey Site Class	5	6-7
Adapted Species Group	JP, WWP, WF	BL, JP, IC, DF
Soil Erodibility	Moderate	Moderate
AWC for Profile Depth	3.0-5.0	1.7-3.9
AWC for Surface 24"	2.3-2.1	1.7-2.8
Seedling Survival Potential	Moderate	Low-Moderate
Plantability Potential	Low-V. Low	Low
Hydrologic Soil Group	B	C-D
Potential for Roadbed Damage	Moderate	Low
Inclusions (15%)	Rock outcrop, ultramafic Gozem family	

Remarks:

Toadlake limitation: Ca/Mg imbalance limits species. Tamflat limitations: Ca/Mg imbalance, possible toxicity, and poor aeration.

57 Endlich family-Rubble land complex, 15 to 40 percent slopes

	Endlich family (45%)	Rubble land, ultramafic (30%)
Map Unit Components		
Geomorphic Position	Dissected, moderately steep, cirque basins and ridge tops.	Similar position as Endlich family.
Typical Vegetation Series	Mixed Subalpine Coniferous Subalpine Woodland Mountain Hemlock Forest	

Soil Profile Description

Surface Soil	0-5" dark yellowish brown very fine sandy loam and yellowish brown very gravelly sandy loam, moderate and weak very fine granular structure, 10-45% gravel and cobbles, strongly to medium acid.
Subsoil	5-16" yellowish brown very gravelly very fine sandy loam, weak very fine granular structure, 55% gravel and cobbles, medium acid.
Substratum	16-38" yellowish brown very gravelly sandy loam and very cobbly coarse sandy loam, weak medium subangular blocky structure and single grain, 40-50% gravel and cobbles, strongly acid. 38-47" moderately fractured gabbro.

Soil Properties & Management Interpretations

Forest Survey Site Class	5-6	
Adapted Species Group	WF, RF, JP	
Soil Erodibility	Low	
AWC for Profile Depth	1.8-3.4	
AWC for Surface 24"	1.5-2.0	
Seedling Survival Potential	Low-Moderate	
Plantability Potential	Low-V. Low	
Hydrologic Soil Group	B	D
Potential for Roadbed Damage	Moderate	Low
Inclusions (25%)	Deadfall family Lithic Cryochrepts Typic Cryaquolls	
Remarks:	Endlich limitations: Extreme cold and short growing season.	

322 Toadlake family, till substratum, 10 to 40 percent slopes

Map Unit Components	**Toadlake family, till substratum (75%)**
Geomorphic Position	Gentle to moderately steep, ground moraine.
Typical Vegetation Series	Mixed Upper Montane Coniferous Forest, Jeffrey Pine Mixed Conifer Forest

Soil Profile Description

Surface Soil	0-12" yellowish brown very and pale brown extremely cobbly loam, strong fine granular and moderate fine subangular blocky structure, 45-65% gravel and cobbles, strongly to medium acid.
Subsoil	12-31" pale brown very gravelly loam and clay loam, moderate fine and medium subangular blocky structure, 35-50% gravel and cobbles, slightly acid to neutral.
Substratum	31-34" hard compacted glacial till.

Soil Properties & Management Interpretations

Forest Survey Site Class	5
Adapted Species Group	JP, WWP, WF
Soil Erodibility	Moderate
AWC for Profile Depth	3.0-5.0
AWC for Surface 24"	2.3-2.1
Seedling Survival Potential	Moderate
Plantability Potential	High-Moderate
Hydrologic Soil Group	B
Potential for Roadbed Damage	Moderate
Inclusions (25%)	Merkel family, till substratum Glacial till, ultramafic
Remarks:	Toadlake limitation: Ca/Mg imbalance limits species and productivity.