

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.

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TITLE PAGE

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

Mt. Eddy Research Natural Area

MAPS

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MAP 2: Access to Mt. Eddy RNA

MAP 3: Vegetation Types

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, T40N, R5W and sec. 13, T40N, R6W) and southwest (sec. 25, T40N, R6W) of the MERNA (Map 1). Southern Pacific Company owns a 10 acre parcel in NE1/4, sec. 19, T40N, 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 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).

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

(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. carosula (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°21'N latitude and 122°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 (T40N, R6W) and sec. 18 (T40N, 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, T40N, R5W on the north and sec. 25, T40N, 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, T40N, R5W, thence;

(a) southwestwardly (S55°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°W)-southeast (S20°E) trending ridge (Point b), said point being approximately at 8000 ft (2438 m) elevation;

(b) thence southeastwardly (S20°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, T40N, R6W (Point c), said point being approximately 2000 ft (610 m) due east from the found southwest section corner of sec. 24, T40N, 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, T40N, R6W (Point d);

(d) thence northwestwardly (N5⁰W), 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, T40N, R5W (Point e);

(e) thence due east, in a direct line following the southern section line of sec. 18, T40N, R5W, for approximately 1.6 miles (2.6 km), to the found southeast section corner of sec. 18, T40N, R5W (Point f);

(f) thence northwardly (N2⁰E), in a direct line following the eastern section line of sec. 18, T40N, R5W, for approximately 1000 ft (305 m), to its junction with a ridge (Point g);

(g) thence northwestwardly (N35⁰W), 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 (N10⁰E), along the top of the ridge, for approximately 400 ft (122 m), to its junction with the northern section line of sec. 18 (T40N, 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 (S27⁰E), 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

<u>SAF Type (Eyre 1980)</u>	<u>Code</u>	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
California Mixed Subalpine	256	651	264	73
Whitebark Pine	208	169	68	20
Unclassified		70	28	7
Total		890	360	100

<u>Holland Type (Holland 1986)</u>				
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

<u>Kuchler Type (Kuchler 1966)</u>				
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 serpentized 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]):			Precipitation: (Inches [mm])
	Max.	Min.	Mean	
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 sparse 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. carosula (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 create 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 cascades). 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.

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

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 (T40N, R5W). The chromite deposits occur in dunite or serpentized 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 serpentized 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).

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. humistratum, 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 serpentized 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 trail (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 (Crompton and Dias 1994)

D1. Modified Wildlife Habitat Relationship (WHR) model for Shasta-Trinity National Forests (Crompton 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

Appendix A2. Management prescription for Parks-Eddy Management Area

Appendix A3. Management prescription for Special Areas

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

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

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)

Appendix D2. Strongly associated list

Appendix D3. Moderately associated list

Appendix D4. Generally associated list

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)

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