

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

HALE RIDGE RESEARCH NATURAL AREA

MENDOCINO NATIONAL FOREST

LAKE 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 _____ Date _____
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Recommended by _____ Date _____
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TITLE PAGE

Establishment Record for Hale Ridge
Research Natural Area within Mendocino
National Forest, Lake County, California.

Legend for Vegetation Map (3)

Map Symbol	Holland Type	Kuchler Type (1966)	SAF Type
p	Sierra Nevada Mixed Conifer Forest		243
k(l,m,h)	Knobcone Pine Forest l = low density knobcone m = moderate density knobcone h = high density knobcone		248
cc	Chamise Chaparral		---
mc	Mixed Chaparral		---

Legend for Soils Map (4)

<u>Map Unit Number</u>	<u>Soil Type</u>	<u>Slope</u>
170	Maymen-Etsel-Speaker Association	30%-50%
201	Sanhedrin-Kekawaka-Speaker Complex	15%-30%
202	Sanhedrin-Kekawaka-Speaker Complex	30%-50%
225	Speaker-Maymen-Marpa Association	30%-50%

A. INTRODUCTION

The Hale Ridge Research Natural Area (HRRNA) was selected to represent Knobcone Pine Forest¹ for the North Coast Ranges physiographic province. The HRRNA encompasses 975 acres (395 ha) on the Upper Lake Ranger District of the Mendocino National Forest. The area was nominated for Research Natural Area (RNA) status by the Forest Supervisor (1984), and an ecological survey was completed in 1987 (Keeler-Wolf 1987). The area was recommended for establishment by the Region 5 PSW Research Natural Area Committee in 1987. Unless otherwise noted, information contained in this establishment record was taken from, "An Ecological Survey of the Proposed Hale Ridge Research Natural Area, Mendocino National Forest, Lake County, California" (Keeler-Wolf 1987).

In addition to the knobcone pine element, a number of plant species and transitional cover types typical of the knobcone woodland in the North Coast Ranges are present within this RNA. Across the northern slopes of the RNA, knobcone pine is transitional with mixed conifer forest, dominated by Douglas-fir (*Pseudotsuga menziesii*), and on the more southerly aspects a gradation from mixed stands of chaparral to dense stands of chamise (*Adenostoma fasciculatum*) is found. Of special interest is a relatively high number of species indicative of serpentine soils (Kruckeberg 1984) however, serpentine soils do not occur within the RNA. No federally or state listed plant species are known to occur within the HRRNA.

All of the lands within the HRRNA are under the jurisdiction of the Mendocino National Forest.

1) Land Management Planning

The establishment of Hale Ridge RNA is recommended and evaluated in the Mendocino National Forest Land and Resources Management Plan (LRMP) and the Final Environmental Impact Statement and Appendices for the LRMP (U.S.D.A. Forest Service 1995a-c). The land allocation for the Hale Ridge RNA was decided by the signing of the Record of Decision (ROD) for the LRMP by the Regional Forester (1995). The establishment of the RNA will be completed by the signing of this Establishment Record with concurrence of the Station Director. The HRRNA is part of Management Area #5 allocated to Management Prescription #11 which emphasizes the preservation of natural conditions and the protection of features for which the RNA was established (Appendix C).

1 Vegetation types follow Holland (1986). Tree names are in accordance with Little (1979), and all other plant names follow Munz (1968).

B. OBJECTIVES

Objectives for establishment of the HRRNA are to preserve a representative example of Knobcone Pine Forest and associated communities within the North Coast Ranges physiographic province. Establishment of the HRRNA will preserve genetic diversity and serve as a baseline area for the measurement of long-term ecological change. The RNA will also function as a control area for comparing results from manipulative research, and monitor the effects of resource management techniques and practices. The HRRNA will serve as a reference area for the study of succession in a plant community where fire plays a crucial role, and provide on site educational opportunity for the study of a plant community whose ecology is poorly understood.

C. JUSTIFICATION FOR ESTABLISHMENT

Establishment of the HRRNA meets the need within the Regional RNA program for representation of the knobcone pine target element in the North Coast Ranges physiographic province. In addition to the knobcone pine element, the HRRNA also contains an interesting transitional forest with affinities to both the Mixed Conifer type (SAF 243) and the Pacific Douglas-fir type (SAF 229). The area within the proposed RNA has been identified by the Mendocino National Forest as part of a Late Successional Reserve (RC313) and is considered critical habitat for the northern spotted owl (*Strix occidentalis caurina*²), a species that is Federally listed as threatened. The other vegetation within the HRRNA is chaparral, ranging from mixed chaparral stands to dense stands of chamise. An unusual floristic feature of the HRRNA is the relative abundance of species listed by Kruckeberg (1984) as serpentine indicators, but which do not occur on serpentine within the unit.

The vegetation types associated with the knobcone pine forest at the HRRNA are typical for the North Coast Ranges; successional relationships, soil-moisture relationships and fire history have likely been similar to those for community associates found in the lower mountains of the Inner Coast Ranges. These elements combine to make the HRRNA a good study site to better understand the ecological requirements and interrelationships between knobcone pine and its associates in this part of California.

2 Name in accordance with Hoffmann (1955).

D. PRINCIPAL DISTINGUISHING FEATURES

The HRRNA is characterized by the presence of knobcone pine with transitions to mixed conifer forest, dominated by Douglas-fir, to the north and relatively diverse mixed chaparral, with transition to chamise chaparral, on the drier south-facing slopes. The entire RNA is also within a late successional reserve (RC313) to provide and protect habitat for northern spotted owl and other late successional forest dependent species. Graywacke sandstone and shales of the Franciscan Assemblage form the underlying geologic foundation of the HRRNA, with soils consisting of: 1) Sanhedrin-Kekawaka-Speaker complex underlying the densest knobcone stands and Douglas-fir dominated forest to the north, 2) Maymen-Etsel-Speaker association underlying the chaparral on the southerly slopes, and 3) Speaker-Maymen-Marpa association underlying some knobcone and small amounts of Douglas-fir and canyon live oak (Quercus chrysolepsis). Most of the knobcone stands are 30-60 years old and are a result of extensive fires in the area, typical for this vegetation type and crucial for its regeneration.

An interesting floristic feature is the presence of serpentine indicator species occurring within the RNA where no serpentine soils occur. Arctostaphylos stanfordiana, A. glandulosa, Castilleja foliolosa, Chaenactis glabriuscula, Eriophyllum lanatum, Galium ambiguum, Phacelia imbricata, and knobcone pine are species commonly associated with serpentine. Leather oak (Quercus durata) and possibly Cordylanthus tenuis ssp. brunneus also occur within the RNA and are considered as highly restricted serpentine endemics (Kruckeberg 1984). The relatively poor soil developed on Franciscan graywacke and shale is the likely explanation for the occurrence of these species on Hale Ridge.

E. LOCATION

- 1) The HRRNA is located on the Upper Lake Ranger District of the Mendocino National Forest. No other lands are involved.
- 2) The approximate center of the unit is at 39°16'45" North latitude, and 122°48'0" West longitude.
- 3) The boundary for the HRRNA is outlined in Map 2, the Legal Boundary Description is as follows:

An area within the Mendocino National Forest, Lake County, California, comprising portions of sections 30, 31, and 32, T17N, R8W; section 36, T17N, R9W; and sections 5 and 6, T16N, R8W, M.D.M. The boundary is more particularly described as follows:

Beginning at the corner of sections 25, 30, 31, and 36, T17N, R8W and R9W, M.D.M., said corner monumented with a USFS monument per Book 54 of Records of Survey at Pages 33-38, Lake County Records;

Thence northerly coincident with the westerly line of said section 30 to Salt Creek;

Thence southeasterly and easterly up Salt Creek through said section 30 to the junction with an unnamed creek adjacent to the protracted section line of aforesaid sections 30 and 31;

Thence southeasterly and easterly up said unnamed creek through aforesaid sections 31 and 32 to a point in said creek which bears North 45° West, a distance of approximately 550 feet from the high point on a knoll on Hale Ridge within the NE1/4SE1/4 of said section 32, said knoll is designated "A" on the referenced map.

Thence South 45° East, a distance of approximately 550 feet to said point "A"; with a geographic position of 39°16'48-1/2"North, 122°46'43-1/2"West;

Thence South, a distance of approximately 450 feet to a point in a major draw within the NE1/4SE1/4 of said section 32, said point designated "B" on the reference map with a geographic position of 39°16'45"North, 122°46'43-1/2"West;

Thence southwesterly down said draw through said section 32 to the junction with an unnamed creek within the SW1/4SE1/4 of said section 32;

Thence southwesterly down said creek through aforesaid sections 32 and 5 to the junction with Rice Fork;

Thence westerly and northwesterly down said Rice Fork through aforesaid sections 5,6, 31, and 36 to the junction with a major draw within the SE1/4NE1/4 of said section 36, said junction designated "C" on the referenced map with a geographic position of 39°17'03-1/2"North, 122°48'56"West;

Thence northeasterly up said draw to a point on the top of Hale Ridge within the NW1/4NW1/4 of said section 31, said point designated "D" on the referenced map with a geographic position of 39°17'13"North, 122°48'36"West;

Thence northwesterly descending along the crest of Hale Ridge through said section 31 to a point on said ridge within the NW1/4NW1/4 of said section 31, said point designated "E" on the referenced map with a geographic position of 39°17'19-1/2"North, 122°48'45"West;

Thence North 45° West to the westerly line of said section 31;

Thence northerly coincident with the westerly line on said section 31 to the point of beginning.

- 4) The HRRNA includes 975 acres (395 ha) of the inner Coast Ranges of central Lake County.
- 5) Elevations range from 2400 feet (732 m) along Salt Creek on the northwestern boundary, to 3600 feet (1097 m) on the eastern-most boundary of the area.

- 6) The HRRNA is accessible from the Upper Lake Ranger Station, taking between 1 and 1.5 hours to reach the western edge of the unit (about 30 miles (48 km) (Map 1). Upper Lake can be reached from U.S. highway 101 from the north via state highway 20 at Calpella, or from the south via Hopland and state highways 175 and 29. Upper lake is approximately 20 road miles (32.2 km) southeast of Capella and 29 road miles (46.7 km) northwest of Hopland.

To reach the HRRNA drive north and west from the Upper Lake Ranger Station on Elk Mountain Road (the M1) approximately 12 miles (19.3 km) to the intersection with Bear Creek Road (the M10). Follow Bear Creek Road east and south for approximately 6 miles (9.7 km) to the junction of Forest Road (FR) 17N16. Follow FR 17N16 south and east to FR 17N04, approximately 2.5 miles (4.0 km). Turn right (west) on FR 17N04 and proceed approximately 2.5 miles to the northwest boundary of the RNA, approximately 0.2 mile (0.8 km) south of where FR 17N04 crosses the Rice Fork of the Eel River. FR 17N04 parallels the western boundary of the area for about one mile along the Rice Fork. The best access route from this road is where the tractor trail (8W21) steeply ascends the southwest slope of Hale Ridge in the SW 1/4 of Section 31. At this point the Rice Fork can be forded easily and the tractor trail may be followed on foot up slope from the creek into the interior of the RNA. Other points along the road are too thickly vegetated with chaparral and knobcone pine to afford easy penetration into the area. The tractor trail was most recently brushed out at least 10 years ago and is presently overgrown in some areas. However, it remains the most strategic way to traverse the site from west to east (see location map). After a steep uphill climb for about 0.75 mile (1.2 km) the level ridgetop is reached. Once atop Hale Ridge the trail continues east to the eastern boundary and ascends the western flanks of Goat Mountain until it joins FR 24N02. Access from the east via FR 24N02 is slightly more difficult because of a 1/2 mile (0.8 km) walk down the overgrown tractor trail before the upper edge of the study area is reached. FR 24N02 connects with FR 17N04 via FR 18N01. About 45 minutes is necessary to drive from one end of the tractor trail around to the other.

The eastern access point can also be reached from Willows, requiring about 3 hours drive time. A light duty 4-wheel drive vehicle is recommended for both routes.

F. AREA BY COVER TYPE (Map 3)

<u>SAF (Eyre 1980) TYPE</u>	<u>CODE</u>	<u>ACRES</u>	<u>HECTARES</u>
Knobcone Pine	248	380	154
Sierra Nevada Mixed Conifer	243	320	129
Unclassified	275	111	
TOTALS		975	394
<u>KUCHLER (1966)TYPE</u>			
Mixed Conifer Forest	5	320	129
Chaparral	29	165	67
Unclassified		490	198
TOTALS		975	394
<u>HOLLAND (1986) TYPE</u>			
Knobcone Pine Forest	83210	380	154
Sierra Nevada Mixed Conifer	84230	320	129
Mixed Chaparral	37110	113	46
Chamise Chaparral	37200	52	21
Unclassified		110	45
TOTALS		975	395

G. PHYSICAL AND CLIMATIC CONDITIONS

The HRRNA occupies an entire watershed bound on much of the southwestern and all of the southern boundary by the Rice Fork of the Eel River, and by a fork of Salt Creek on the north and northeast. Hale Ridge is the prominent topographic feature of the RNA, descending from the northwest slopes of Goat Mountain in a westerly direction. The ridge is steepest on the north side, although the southern Rice Fork Canyon is deeper. The summit of Hale Ridge is relatively flat, running for about 1.5 miles (2.4 km). To the east, the ridge summit loses definition as it ascends Goat Mountain, while to the west the plateau of the ridge steeply descends to the confluence of the Rice Fork and Salt Creek. All slope aspects are represented within the HRRNA - with southerly and southwesterly slopes dominating, followed by northerly and northeasterly slopes. Eastern aspects are uncommon and western aspects occur only on the westernmost tip of the ridge.

No weather stations are located within the HRRNA. The nearest station that has recorded rainfall in the past (incomplete data 1986-1989) is located 10 miles (16 km) SSW of the area in Upper Lake, elevation 1343 ft (409 m). Average annual precipitation is 41.5 inches (1054 mm) at Upper Lake. Estimates for the HRRNA range between 45 inches (1143 mm) at the low elevations to 55 inches (1397 mm) at the higher reaches (Kahrl 1979). Rainfall is strongly

seasonal with roughly 75% falling between November and April. Snowfall is a minor form of precipitation, even at the highest elevations, with only a few winter snows lasting on the ground more than a few days.

Temperature in the area can be characterized as typical for this part of the North Coast Ranges with July highs reaching 102-106°F (40-41°C) on the average, and the winter lows ranging in the mid 20's°F (about -4°C).

Table 1: Monthly and annual normals of precipitation 1961-1985 for Upper Lake Ranger District (Owenby, J.R. and D.S. Edzell, 1992).

Month	Ppt (inches)	Ppt (mm)
Jan	8.54	215
Feb	6.58	167
Mar	6.26	159
Apr	2.94	75
May	0.81	21
Jun	0.21	5
Jul	0.05	0.1
Aug	0.24	6
Sep	0.65	17
Oct	2.46	62
Nov	6.82	173
Dec	7.30	185
Ann	42.86	1088

H. VALUES

1) Flora

The flora of the HRRNA includes at least 104 species of vascular plants (Appendix A), identified by Keeler-Wolf (1987) during the ecological survey. The vegetation can be divided into three main communities: knobcone pine woodland, mixed conifer forest, and chaparral (Map 3). The knobcone pine woodland, while considered as a single community, can be broken down into three phases. The mixed conifer forest is transitional, varying between north and south-facing slopes, but in all cases is dominated by Douglas-fir. The chaparral is somewhat complex and can be broken into three major communities.

Following is a brief description of the major plant associations in the RNA. All scientific names are in accordance with Munz (1968) and code numbers following association names are Holland type numbers. The analysis of vegetation is based on ten 100 m² sample plots established in the knobcone woodland, six 100 m² plots established in the mixed conifer forest, and on observation of the chaparral (Keeler-Wolf 1987).

Knobcone Pine Forest (83210): Pinus attenuata stands cover roughly 40% of the HRRNA, and all of the stands appear to be the result of extensive fire which burned much of Hale Ridge about 1932. The densest stands of knobcone are on mesic sites on the western end of Hale Ridge (northwest-to-northeast aspect). They have a sparse understory of shrubs and virtually no herbaceous cover. Hoary manzanita (Arctostaphylos canescens) and shrubby interior live oak (Quercus wislizenii) are the only species commonly associated with this dense phase. On the most mesic sites, occasional small trees of canyon live oak occur. The presence of canyon live oak suggests potential for this site to be colonized by mixed conifer forest; numerous Douglas-fir seedlings growing in the tractor trail within this phase also provide evidence of successional direction. Stem density is high, running between 25-35 living stems per 100 m².

The second phase of knobcone (the most widespread phase at Hale Ridge) occurs on west-northwest to southwest-facing slopes. It is characterized by moderate knobcone stem density (modal density about 16 stems per 100 m²). Understories in this phase are dominated by eastwood manzanita (Arctostaphylos glandulosa) (6-8 ft (2 m) tall) and interior live oak (to 15 ft (4.5 m) tall). Ceanothus lemmonii and chamise also occur at low densities. Successional status of this phase is variable depending on soil depth. With a fire frequency greater than 1 per 100 years, it would be unlikely that the mixed conifer forest could effectively colonize this phase, although deeper soil sites with occasional canyon live oak suggest the potential.

The third phase of knobcone woodland is characterized by a relatively open canopy overlying a moderately dense cover of shrubs; stem densities of 10 and 13 per 100 m² were found on the two plots representing this phase. Because of the more open canopy and predominantly southern exposure, chamise and Pickeringia montana have a higher importance in this phase than in the other two, and interior live oak is reduced in representation. The successional status of this phase is unlikely to change dramatically, even in the absence of fire. The dry exposure and shallow rocky-soil are probably inadequate to support anything but knobcone woodland and chaparral. Prolonged fire-free periods would be detrimental to knobcone and short-lived chaparral genera (e.g. chamise, Pickeringia, Ceanothus), eventually reducing the floral composition to longer-lived chaparral species (manzanita sp., interior live oak, leather oak).

The highest density of herbaceous species (in association with knobcone) was found on a site which was once phase 3 knobcone forest; the site was prescribe-burned in February 1983 and wildfire reached the area in 1988 (see Values - 7 Fire History). Species include: Hypericum concinnum, Gilia capitata, Lotus humistratus, Clarkia rhomboidea, Cirsium vulgare, Wyethia angustifolia, and Mentzelia dispersa.

Sierra Nevada mixed conifer forest (84230): The most important species throughout this community, at Hale Ridge, are Douglas-fir and canyon live oak; this forest occupies the northward-facing slopes on Hale Ridge. At its best development it is an open forest with large canopy trees overlying a discontinuous understory of canyon live oak and madrone (Arbutus menziesii). The shrub and herb layers are relatively poorly represented, and none are important in either cover or density. Unlike the knobcone and chaparral associations at Hale Ridge, fire has not destroyed the canopy in parts of this forest for over 200 years. Although many of the larger trees in this association are fire scarred, indicating repeated exposure to fire, the relatively steep slopes and open understory have prevented these fires from crowning. In addition to Douglas-fir and canyon live oak, sugar pine (Pinus lambertiana) is a significant regeneration component; these three species comprise the most important juvenile elements in this forest.

Northern Mixed Chaparral (37110): This is the most extensive and variable of the three forms of chaparral at Hale Ridge, occupying westerly to southeasterly-facing slopes, with the best developed stands occurring near the eastern boundary of the RNA. It can be characterized as having relatively high species diversity and longevity, and is relatively mesophilic compared to chamise chaparral. It varies in density (from 60-100% cover), and in height (from 5-15 ft (1.5-4.5 m)). Principal woody constituents are: Arctostaphylos glandulosa, A. canescens, A. stanfordiana, chamise, Ceanothus cuneatus, Pickeringia montana, Quercus wislizenii var. frutescens, Lonicera interrupta, Cercocarpus betuloides, and Garrya fremontii. Herbaceous cover, while relatively rare, includes: Pallaea mucronata, Castilleja foliolosa, Cryptantha torreyana, Solidago californica, Phacelia imbricata, Cuscuta sp., and Clarkia rhomboidea.

Chamise chaparral (37200): This is the most xerophilic of the three types of chaparral identified at Hale Ridge, typically occurring on the driest south-facing slopes, on the shallowest and rockiest soils. Species diversity is low with chamise often composing 65-100% of the woody cover. This is also the shortest of the three chaparral types, with an average shrub height of 3.5 ft (1 m). Herb cover is rare except in controlled burn areas or areas where shrubs are senescent. Chamise chaparral is adapted to burning about once every 20 years (Vogl et al. 1976), or becomes senescent at 50 years (Hanes 1977).

Successional chaparral (not mapped): The successional chaparral, as identified by Keeler-Wolf (1987), is successional from mechanical disturbance, resulting from the clearing of the tractor trail up the ridge. This association is about 10-15 years old, with a relatively low shrub diversity compared to well-developed mixed chaparral. The shrub component is dominated by Ceanothus sp. (C. integerrimus, C. cuneatus, C. lemmonii) but also includes other species such as Pickeringia montana and chamise. Height of this chaparral form frequently reaches 15-20 ft (4.5-6 m), and successional trends are variable depending on location. The mesic ridge top portion is being invaded by young Douglas-fir and occasional young knobcone pine, while southwest facing slopes appear to remain dominated by shrubs (Pickeringia, Ceanothus cuneatus and chamise). The presence of a relatively high density and diversity of low sub-shrubs, herbs, and grasses is also characteristic of this form of chaparral. This is in response to the relative openness of the vegetation, exposed mineral soil, and a lack of phytochemical buildup found in chamise chaparral (Hanes 1977). Some

of the characteristic species include: Hypericum concinnum, Bromus tectorum, Chrysothamnus nauseosus, Cryptantha torreyana, and Agoseris heterophylla.

2) Fauna

No wildlife surveys have been conducted within the HRRNA. However the mixed conifer forest has been identified as part of the critical habitat and dispersal habitat of the Federally-listed threatened northern spotted owl (territory #60, 20, Gard 1984). The RNA is also identified in the Mendocino National Forest LRMP as being dispersal habitat for goshawk, a Forest Service sensitive species, and key winter range for black-tailed deer. Gard (1984) suggests that species and habitat usage should be typical of that found in mixed conifer stands and chaparral. A partial list of vertebrate species is compiled in Appendix B.

3) Geology

The underlying rocks of the HRRNA are all graywacke sandstones and shales of the Franciscan Assemblage (Bailey et al. 1964, Blake and Jones 1981). Maps in Blake and Jones (1981) indicate Hale Ridge within the easternmost portion of the central belt of the Franciscan formation. Graywacke is the most extensive rock type in the RNA. It has a muddy, brownish-gray sandstone appearance, ranging from rather soft and crumbly in weathered outcrops to solid rocks and boulders in the stream bed of the Rice Fork.

Shale is not as extensive as the graywacke, occurring typically as thin partings less than 5 ft (1.5 m) thick. Minor silicification occurs within joint surfaces on knobs within the western portion of the parcel. There was no evidence of additional mineralization or alteration in the vicinity of the silicified areas or elsewhere in the parcel. No areas of special geological interest are identified within the RNA (See Mineral Potential Report in Appendix D).

4) Soils

Three soil series in four Mapping Units (Smith and Broderson 1989) are found within the HRRNA (Map 4 and Appendix E). On the northerly slopes, underlying the densest knobcone stands (Soil Conservation Service (SCS) Mapping Unit Symbol 201; 15% to 30% slope) and the mixed conifer forest (SCS Mapping Unit Symbol 202; 30% to 50% slope), the soil is classified in the Sanhedrin-Kekawaka-Speaker (S-K-S) complex. This soil is typified as being moderately deep to very deep and well drained, with an effective rooting depth of 20 inches to 60+ inches (508 mm to 1524+ mm). Permeability is moderately slow; water holding capacity ranges from 2 inches to 10 inches (51 mm to 254 mm). Surface runoff is rapid; erosion hazard is moderate to severe. Soil acidity is moderate in the upper soil profile and stronger in the subsoil.

Underlying the chaparral, on southerly slopes, is the Maymen-Etsel-Speaker association (SCS Mapping Unit Symbol 170; 30% to 50% slope). This soil type is shallow to moderately deep and well drained to excessively drained, with an effective rooting depth of 6 inches to 40 inches (152 mm to 1016 mm). Permeability is moderately slow to moderate; water holding capacity ranges from 0.5 inches to 6 inches (13 mm to 152 mm). Surface runoff is rapid; erosion hazard is moderate to severe. This series is slightly more acidic than the Sanhedrin-Kekawaka-Speaker complex.

The Speaker-Maymen-Marpa association (SCS Mapping Unit Symbol 225; 30% to 50% slope) underlies the west-central portion of the HRRNA and supports some knobcone and small areas of Douglas-fir and canyon live oak dominated forest. It is considered to be intermediate in depth, water holding capacity and acidity relative to the other two series. Effective rooting depth ranges between 12 inches to 40 inches (305 mm to 1016 mm).

5) Lands

All lands within the HRRNA are under the jurisdiction of the Mendocino National Forest. No lands have been acquired, and there are no outstanding rights.

6) Heritage

The RNA has not been surveyed for archaeological or historic sites. However, it is probable that historic properties exist within the area due to the distribution of historic sites in similar natural and cultural environments.

7) Fire History

Fire swept over much of Hale Ridge around 1932 and all of the knobcone pine stands are probably a result of this fire. In February of 1983 and 1984, a total of about 80 acres (32 ha) of chamise and mixed chaparral was prescribe-burned; the purpose was to break up the continuity of fuels in the area and reduce fuels loading. The fires were permitted to burn into the knobcone. However, fuel conditions were not hot enough to benefit knobcone seed release, and only a few trees were scorched and/or killed along the interface.

Approximately 50 percent of the RNA was burned in the Letts fire in December of 1988. Because of the late season, the intensity of the fire varied greatly. Some areas did not burn, much of the area was lightly burned, and a few areas had intense ground fire with a few patches of crowning. Fire control methods included a short tractor trail in the southeast portion of the RNA (see fire map Appendix F).

I. IMPACTS AND POTENTIAL CONFLICTS

1) Mineral Resources

There are no outstanding applications or leases for any type of mineral resources. The area will be recommended for withdrawal from mineral entry with the Record of Decision on the Mendocino's Land and Resource Management Plan. Until the Bureau of Land Management determines the area's mineral entry status, no applications will be approved. Conclusions of the Mineral Potential Report (USDA Forest Service, 1992, Appendix D) state that the lands within the proposed Hale Ridge RNA have a low to moderate potential for hosting a valuable deposit for geothermal resources, and a low potential for the occurrence of any other locatable, leasable, or salable mineral resources. Based on the low to moderate mineral potential, the lack of mining related activity, and a field exam of the lands, it does not appear that the RNA designation would present any adverse impacts on the mineral resources.

2) Grazing

The HRRNA is not included within a grazing allotment.

3) Timber

Gard (1984) identifies 225 acres (91 ha) of the mixed conifer stands on the north slope of the HRRNA as capable of producing timber. Gard also estimates 182 acres (74 ha) of knobcone (phase I) as potentially suitable timber land, plus an additional unspecified acreage currently supporting knobcone that could possibly be converted to productive commercial timber. However, the entire area has been removed from the suitable timber land base because of its designation as a Late Successional Reserve. RNA designation will not conflict with Forest timber resources.

4) Watershed Values

The Hale Ridge Research Natural Area occupies portions of several sub-watersheds, flanked by Salt Creek on the north and the Rice Fork of the Eel River on the west and south; both flow perennially. Slopes are steep (60%+ on some side drainages), and numerous small ridges and drainages divide the area. Since erosion hazard is high, maintenance of vegetative cover will benefit watershed values by preventing excessive sedimentation of the streams. Burning may be prescribed to maintain the vegetation type for which the HRRNA was recommended. Proper planning of prescription burn programs should not have a long term impact on water quality.

5) Recreation Values

Some recreationists use Crabtree Hot Springs which is adjacent to the northwestern boundary of the RNA. The Rice Fork is also lightly used for recreation, but entry into the RNA is minimal. There is an unknown increase in risk of wildfire due to the human use at the hot springs.

Recreational use of the area is by unauthorized motorcyclist use of the trail providing through access from Upper Lake to Stonyford or by unauthorized 4x4 use of the upper part of the trail within the knobcone stand. In either case, due to the density of the knobcone

stand along the trail, OHV use is restricted to the trail by people "just passing through." This trail is proposed for obliteration in FY 1995 and 1996. The Management Prescription for RNAs prohibits recreational uses that would contribute to modification of the area and states that construction of new roads will not occur within the RNA and access on any existing roads into the area will be limited. The HRRNA is sparsely used by hunters.

6) Wildlife and Plant Values

With a management program that may include prescribed-burning, establishment of the HRRNA will maintain wildlife and plant habitat values typical of the ecosystem represented, and afford the opportunity to obtain a great deal of knowledge on the ecology of a widespread, but little understood vegetation type. If the area is entirely protected from fire of any kind, including prescribed-burns, habitat diversity may deteriorate in time.

The mixed conifer forest, on the north slope of Hale Ridge, is designated critical habitat for northern spotted owl, and the entire RNA is within a late successional reserve. The RNA also provides dispersal habitat for northern goshawk and is part of the Hale Ridge key winter range for deer. Establishment of the HRRNA would support protection of this timber stand and habitat for these wildlife species.

7) Special Management Areas

The Hale Ridge Research Natural Area does not fall within any congressionally designated wilderness area. The entire Hale Ridge RNA is within a late successional reserve (RC313).

8) Transportation Plans

Current access into the HRRNA is adequate for RNA objectives. The trail (8W27) which traverses the RNA is scheduled for obliteration in FY 1995 and 1996. Erosion along this trail will be repaired at this time.

9) Visual Quality

The adopted Visual Quality Objective (VQP) for HRRNA is retention. Establishment of the HRRNA, through its maintenance of natural conditions and processes, will meet this objective.

J. MANAGEMENT PRESCRIPTION

Appendix C contains management direction for the HRRNA as stated in the Mendocino National Forest Land and Resource Management Plan. Management emphasis calls for preservation of representative examples of specific botanic, aquatic, and geologic features, primarily for scientific and educational purposes. Other uses are secondary to this purpose.

Once the HRRNA is established, the Mendocino National Forest will prepare a Management Strategy for the HRRNA in consultation with the Pacific Southwest Research Station. The plan will specify management practices, project prescriptions, uses, and monitoring conducive to the objectives for establishment of the HRRNA.

1) Vegetation Management - Exposure to fire is an important requirement for regeneration of many of the plant species within this vegetation association, thus fire needs to play a role in the management of the HRRNA. Prolonged fire-free periods would be detrimental to knobcone pine and short lived chaparral species; without fire, habitat diversity will deteriorate. While it is well known that fire is crucial for survival of this plant community, exposure requirements are not well understood, creating an excellent opportunity for research.

K. ADMINISTRATIVE RECORDS AND PROTECTION

Official responsibility for administration and protection of the Hale Ridge Research Natural Area is with the District Ranger, Upper Lake Ranger District, 10025 Middle Creek Road, Upper Lake, California 95485. (707) 275-2361.

L. ARCHIVING

The research coordinator is the Director, Pacific Southwest Research Station, P.O. Box 245, Berkeley, California 94701. The Director is responsible for coordinating research in the area and for archiving research data and reports from the HRRNA in a manner conducive to facilitate the exchange and transfer of information among Stations, Forests, scientists, and land managers.

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APPENDIX C

The following pages pertinent to the Hale Ridge RNA, are taken from the Mendocino National Forest Land and Resource Management Plan, the Final Environmental Impact Statement and Appendices

APPENDIX D

Mineral Potential Report for the proposed Hale Ridge RNA

APPENDIX E

Soil descriptions from USDA Soil Conservation Service, Soil Survey of
Lake County, California, 1989

APPENDIX F

Fire Map for Letts Fire, December 1988.

Hale Ridge Research Natural Area

MAPS

MAP 1: Location and Transportation Routes

MAP 2: Boundary Description

MAP 3: Vegetation Types

MAP 4: Soil Series

HALE RIDGE RNA ESTABLISHMENT RECORD
APPENDICES

APPENDIX A

Vascular Plant List for Hale Ridge RNA

APPENDIX B

Partial list of vertebrate species for Hale Ridge RNA

APPENDIX C

The following pages pertinent to the Hale Ridge RNA, are taken from the Mendocino National Forest Land and Resource Management Plan, the Final Environmental Impact Statement and Appendices

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Fire Map for Letts Fire

APPENDIX A

Vascular Plant List for Hale Ridge RNA

This list includes species identified for the HRRNA to date. Nomenclature follows Munz (1970). The following legend describes the vegetation type symbols which accompany each taxon in the list.

p.....Douglas-fir dominated forest
k.....knobcone pine woodland
cc.....chamise chaparral
mc.....mixed chaparral
d.....successional (disturbed) chaparral (not mapped)

Achillea millefolium; p
Adenostoma fasciculatum; cc, mc, k
Agoseris heterophylla; p, k
Arctostaphylos canescens; k, mc, p
Arctostaphylos glandulosa; k, mc
Arctostaphylos manzanita; k, mc
Arctostaphylos stanfordiana; k, mc
Arnica discoidea; p, k
Arbutus menziesii; p
Avena barbata; mc, d
Bromus tectorum; mc, d
Bromus mollis; d, cc
Bromus rubens; d, cc
Brodiaea elegans; mc
Chaenactis glabriuscula; d
Chlorogalum pomeridianum; mc, d
Cirsium sp. (native); p
Cirsium vulgare; d
Ceanothus integerrimus; d, p
Ceanothus cuneatus; mc, d
Ceanothus lemmonii; d, k, mc
Centaurea solstitialis; d
Chrysothamnus nauseosus; d
Clarkia amoena subsp. *huntiana*; d, cc
Clarkia rhomboidea; cc, d
Cynoglossum grande; mc, p
Cuscuta sp.; d, cc, mc
Castilleja foliolosa; mc, cc
Cordylanthus tenuis subsp. *brunneus*?; d
Calocedrus decurrens; p

Chimaphila menziesii; p
Collomia heterophylla; p
Campanula prenanthoides; p
Cryptantha torreyana; d, cc
Eschscholzia californica; d
Elymus glaucus; p
Eriophyllum lanatum subsp.; d
Erodium cicutarium; d
Eriogonum nudum; d, mc
Epilobium minutum; d
Eriodictyon californicum; d, mc, cc
Festuca idahoensis; p
Festuca myuros; d
Festuca reflexa; cc, d, mc
Festuca californica; p
Galium ambiguum; p
Galium parisiense; d
Galium nuttallii; mc, cc
Gilia capitata; k, d
Garrya fremontii; mc
Haplopappus linearifolius; d, k, mc
Hypericum concinnum; d
Hieracium albiflorum; p
Iris sp.; p
Keckiella lemmonii; mc, d
Lonicera interrupta; mc
Lomatium utriculatum; d
Lotus humistratus; d, k, mc
Monardella villosa; mc, d
Madia gracilis; d
Malacothrix floccifera; d
Melica harfordii; p
Mentzelia dispersa; d, k
Navarretia bakeri; d
Navarretia squarrosa; d
Nemacladus capillaris; d
Orobanche fasciculata; d
Pinus attenuata; k, p, mc, cc, d
Pinus ponderosa; p
Pinus sabiniana; mc
Pinus lambertiana; p
Pedicularis densiflora; p
Penstemon azureus; d, mc
Phacelia imbricata; cc, d
Pickeringia montana; d, mc, cc, k
Pellaea mucronata; mc, cc

Pseudotsuga menziesii; p, d
Quercus dumosa; mc
Quercus durata; mc, k
Quercus kelloggii; p
Quercus chrysolepis; p, k, mc
Quercus wislizenii var. *frutescens*; k, mc, cc
Rhamnus californica; mc, k
Ribes roezlii var. *cruentum*; p
Rhus trilobata; mc, k
Solidago californica; d, mc
Symphoricarpos mollis; p
Stellaria nitens; d
Toxicodendron diversilobum; k
Wyethia angustifolia; d, k
Zigadenus micranthus; d

APPENDIX B

Partial list of vertebrate species for Hale Ridge RNA

Vertebrate species were not documented in the Ecological Survey for Hale Ridge, and in discussion with the Mendocino National Forest no faunal surveys have been conducted on the RNA. This partial list of species was composed following review of species range maps. Authorities for species are Stebbins (1966) for reptiles and amphibians; Robbins (1983) and Hoffmann (1955) for birds; and Ingles (1965) for mammals.

FISH

The absence of perennial streams or standing bodies of water within the RNA eliminates the opportunity for the establishment of a fish population.

AMPHIBIANS

Western toad (*Bufo boreas*)
Pacific tree frog (*Hyla regilla*)

REPTILES

Western fence lizard (*Sceloporus occidentalis*)
Western skink (*Eumeces skiltonianus*)
Western yellow-bellied racer (*Coluber constrictor*)
Pacific gopher snake (*Pituophis melanoleucus*)
California kingsnake (*Lampropeltis getulus*)

REPTILES (continued)

Common garter snake (*Thamnophis sirtalis*)
Western rattlesnake (*Crotalus viridis*)

BIRDS

Turkey vulture (*Cathartes aura*)
Cooper's hawk (*Accipiter cooperii*)
Sharp-shinned hawk (*Accipiter striatus*)
Red-tailed hawk (*Buteo jamaicensis*)
American kestrel (*Falco sparverius*)
Band-tailed pigeon (*Columba fasciata*)
Mourning dove (*Zenaida macroura*)
Great horned owl (*Bubo virginianus*)
Barn owl (*Tyto alba*)
Northern spotted owl (*Strix occidentalis caurina*)
Anna's hummingbird (*Calypte anna*)
Black-chinned hummingbird (*Archilochus alexandri*)
Common flicker (*Colaptes auratus*)
Acorn woodpecker (*Melanerpes formicivorus*)

Hairy woodpecker (*Picoides villosus*)
Downy woodpecker (*Picoides pubescens*)
Western kingbird (*Tyrannus verticalis*)
Olive-sided flycatcher (*Contopus borealis*)
Scrub jay (*Aphelocoma coerulescens*)
American crow (*Corvus brachyrhynchos*)
Plain titmouse (*Parus inornatus*)
Bushtit (*Psaltriparus minimus*)

BIRDS (continued)

White-breasted nuthatch (*Sitta carolinensis*)
Red-breasted nuthatch (*Sitta canadensis*)
Brown creeper (*Certhia americana*)
House wren (*Troglodytes aedon*)
American robin (*Turdus migratorius*)
Hermit thrush (*Catharus guttatus*)
Pine siskin (*Carduelis pinus*)
Rufous-sided towhee (*Pipilo erythrophthalmus*)
Brown towhee (*Pipilo fuscus*)
Dark-eyed junco (*Junco hyemalis*)
White-crowned sparrow (*Zonotrichia leucophrys*)
Golden-crowned sparrow (*Zonotrichia atricapilla*)
Fox sparrow (*Passerella iliaca*)

MAMMALS

Common opossum (*Didelphis marsupialis*)
Ornate shrew (*Sorex ornatus*)
Broad-handed mole (*Scapanus latimanus*)
Fringed myotis (*Myotis thysanodes*)
Little brown myotis (*Myotis lucifugus*)
California myotis (*Myotis californicus*)
Yuma myotis (*Myotis yumanensis*)
Long-eared myotis (*Myotis evotis*)
Red bat (*Lasiurus borealis*)
Hoary bat (*Lasiurus cinereus*)
Big brown bat (*Eptesicus fuscus*)
MAMMALS (continued)
Lump-nosed bat (*Plecotus townsendii*)
Pallid bat (*Antrozous pallidus*)
Black-tailed hare (*Lepus californicus*)
Brush rabbit (*Sylvilagus bachmani*)
Beechey ground squirrel (*Otospermophilus beecheyi*)
Sonoma chipmunk (*Eutamias sonomae*)
Botta pocket gopher (*Thomomys bottae*)
Western harvest mouse (*Reithrodontomys megalotis*)
Brush mouse (*Peromyscus boylii*)

Deer mouse (*Peromyscus maniculatus*)
Dusky-footed wood rat (*Neotoma fuscipes*)
California meadow mouse (*Microtus californicus*)
Porcupine (*Erethizon dorsatum*)
Gray fox (*Urocyon cinereoargenteus*)
Coyote (*Canis latrans*)
Raccoon (*Procyon lotor*)
Mink (*Mustela vison*)
Long-tailed weasel (*Mustela frenata*)
Spotted skunk (*Spilogale putorius*)
Striped skunk (*Mephitis mephitis*)
Badger (*Taxidea taxus*)
Bobcat (*Lynx rufus*)
Black-tailed deer (*Odocoileus hemionus columbianus*)