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
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TITLE PAGE

Establishment Record for
Cedar Basin Research Natural Area
Within Shasta-Trinity National Forest
Siskiyou County, California

Cedar Basin Research Natural Area

Maps

MAP 1: Location and Boundaries
MAP 2: Access
MAP 3: Vegetation Types

A. INTRODUCTION

Research Natural Areas (RNAs) of the Forest Service are lands that are permanently protected for the purposes of maintaining biodiversity, research, monitoring, and fostering education. They are part of the national network of the RNA system, which includes a representative array of widespread ecosystem types as well as unique ecosystems. Only non-manipulative research, observation, and study are allowed in the RNAs. There are more than 300 RNAs already established in the nation.

In California, the selection of candidate RNAs on National Forest lands is based on the identification of "target elements". These target elements include plant communities described in various ecological reference works, such as Kuchler (1966), Eyre (1980), and Holland (1986), and unique ecosystems, such as geologically unusual or aquatic areas. The intention is to accurately reflect the natural diversity of vegetation types on Forest Service lands in California (Pacific Southwest Region) and lead to the long-term study of each.

Most RNAs contain a far greater diversity of vegetation types than just the designated target elements and their representation within the RNA is of equal importance. For an overview of Forest Service's RNAs in California please refer to Todd Keeler-Wolf (1990), "Ecological Surveys of Forest Service Research Natural Area in California" (USDA Forest Service General Technical Report PSW-125).

The Cedar Basin Research Natural Area (CBRNA) is located within the Mount Shasta Ranger District, Shasta-Trinity National Forests. It is approximately 12.5 air miles (20 km) southwest of Mt. Shasta City and approximately 2 air miles (3.2 km) west of the Castle Crags Wilderness Area.

Cedar Basin RNA receives its name for the Port-Orford-cedar (*Chamaecyparis lawsoniana*)[1] stands in the basin. The botanical value of CBRNA was recognized in the late 1970's and early 1980's when several botanists and other researchers visited the area (Keeler-Wolf 1982). During the summer of 1980 the Pacific Southwest (PSW) Research Station/Region 5 RNA Committee did a field reconnaissance of the area, and in October 1980 nominated the area as a candidate RNA. Keeler-Wolf did the Ecological Survey in 1982 and in 1989 prepared a draft Establishment Record, on which this report is mainly based. However, until 1995 when the Land and Resource Management Plan (LRMP) of Shasta-Trinity National Forests was finalized, the progress of RNA establishment has been impeded.

The CBRNA is primarily on land managed by the Shasta-Trinity National Forests. It is part of the Parks-Eddy Management Area in Mount Shasta Ranger District. The Shasta-Trinity National Forests is the principal administrator of this RNA. There is a private land holding in the center of the RNA.

1) Land Management Planning.

The Shasta-Trinity National Forests LRMP (1995) recommends establishment of the Cedar Basin RNA (Shasta-Trinity National Forests 1995a, Appendix A). The land allocation decision for the CBRNA was made with the signing of the Record of Decision for the LRMP by the Regional Forester

[1] Tree names are in accordance with Little (1979), all other plant names follow Munz (1968)

(1995). The analysis for this decision was included in the Final Environmental Impact Statement for the LRMP (Shasta-Trinity National Forests1995b, Appendix B). CBRNA is one of the nine RNAs recommended by the Record of Decision for the Shasta-Trinity National Forests LRMP.

B. OBJECTIVES

The primary objective of establishing CBRNA is to represent the Port-Orford-cedar/Douglas-fir (*Pseudotsuga menziesii*) vegetation type (Society of American Foresters [SAF] Forest Cover Type 231, Eyre 1980) in the Klamath Mountains Physiographic Province.

Since the Port-Orford-cedar (POC) stands in CBRNA are the highest elevation ones known (up to 6400 ft [1950 m]) in its inland distribution, establishment of the RNA will serve the objectives of preserving: (1) the genetic diversity of the species, and (2) the unique interactions among the species and the high elevation plant communities, including Alpine Talus and Scree Slope, Red Fir-Mountain Hemlock Forest, Mixed Conifer Forest, Mountain Chaparral, and Bog and Meadow.

CBRNA lies at the head of the South Fork of the Sacramento River. It contains ten permanent or semi-permanent lakes and ponds. Establishment of CBRNA will also serve the objective of maintaining the interrelationships of the terrestrial and aquatic systems, which is particularly valuable as baseline areas for research and monitoring.

C. JUSTIFICATIONS FOR ESTABLISHMENT

POC has two distinct geographical distributions, coastal and inland. The coastal populations range from Coos Bay, Oregon to the central Mad River drainage in Humboldt County, California. The inland populations are concentrated along the headwaters of the Trinity, East Fork of the Trinity, and the upper Sacramento rivers (Griffin and Critchfield 1972). The inland sites are distinct ecologically from the coastal sites, and occupy the highest, driest, and coldest environments for the species. Inland populations of POC are genetically distinct from the coastal populations. The two areas may have been isolated long enough or subject to distinct enough selection regimes for regional differences in allozyme frequencies to evolve (Millar and Marshall 1991).

The high market value of POC timber and the horticultural interest in the species (Bailey 1978 mentions that over 80 horticultural "varieties" have been bred) suggest that genetic differences found between the lower elevation coastal stands and these high interior stands may bring about many useful traits if breeding is initiated. Conservation of the inland stands deserves special attention because the stands in the inland population show more heterogeneous than the stands in the coastal region (Millar and Marshall 1991).

The coastal populations have been strongly decimated by root rot (*Phytophthora lateralis*) in the past several decades. The inland portions had been spared from the invasion of the *Phytophthora lateralis* until recently (Kliejunas and Adams 1980, Zobel and Hawk 1980, D. Schultz, pers. comm. May, 2002). In the past seven years the root rot disease has killed POC in the Sacramento River main drainage below Dunsmuir. The latest find of the disease is in a stretch of Scott Camp Creek in

September 2001. This location is about 5 air miles southwest of CBRNA. However, it is unlikely that the disease would move in the CBRNA by natural processes, because streams of the infested area drain to the northeast (Dave Schultz, pers. comm. May, 2002). The location of the CBRNA, at the head of a drainage, is near optimum for protection from invasion of root rot, as long as the uphill movement of spores transported by the mud on vehicles, bicycles, horses, or foot traffic, is prevented.

From the ecological perspective, the CBRNA stands of POC are interesting because they associate with typical high montane conifers such as Shasta red fir (*Abies magnifica* var. *shastensis*), red fir (*Abies magnifica*), lodgepole pine (*Pinus contorta* ssp. *murrayana*), and mountain hemlock (*Tsuga mertensiana*). Cedar Basin may be one of only a handful of such areas where POC associates with these high montane trees. POC is remarkable among Klamath Province conifers in its elevational range, and soil and air temperature tolerance (Zobel and Hawk 1980).

A new plant species, the Klamath manzanita (*Arctostaphylos klamathensis*), was discovered during the ecological survey of Cedar Basin (Keeler-Wolf 1982, Edwards, Keeler-Wolf, and Knight 1983). This is a very distinct viscid-hairy, grayish, matted species of the open forests of upper elevations in the vicinity of Terrace Lake (see Map 2and photos 1 and 2). It is endemic to California and listed as a rare, threatened, or endangered plant (Listed 1B) in the California Native Plant Society's (CNPS) rare plant list (Skinner and Pavlik 1994). It is also on the Forest Service Region 5 Sensitive Plant List. At this point this plant is found only on National Forest System land in Klamath and Shasta-Trinity National Forests.

Several other species present in the CBRNA are also in CNPS's rare and endangered vascular plants list (Skinner and Pavlik, 1994) (see Flora section). Other botanical values of the area include an extremely diverse representation of Ericaceae (9 genera and 13 species) and a possible new taxon of *Penstemon* (photo 3) related to *Penstemon rupicola* (Keeler-Wolf 1982).

A recent analysis of the pollen profile of Cedar Lake, adjacent to the CBRNA (West 1986) provides much information regarding the paleo-environment of Cedar Basin for the past 10,000+ years. This record is one of the few taken in this part of the Klamath Province and provides a unique insight into the recent past of the study area.

Earliest samples (radiocarbon dated as about 10,200 yrs.) indicate an open pine forest with fir and an understory of species in the *Ericaceae* (heath family) with cooler temperatures than present. Beginning about 10,000 years ago major vegetation changes took place including the addition of Port-Orford-cedar and an increase in aquatic marsh plants, implying higher water levels. This period was also characterized by increased plant productivity, possibly due to higher temperatures. This period, which lasted from about 10,000-3500 years ago, was inferred to also be drier than present. By 3500 years ago a cool-moist period began as indicated by increases in fir, Douglas-fir, and *Ericaceae* pollen in addition to high pine pollen values. Present day vegetation patterns were established at this time. The significance of these findings involving the timing of relatively wet-cool and warm-dry periods may be interpreted as support for recent theories regarding orbital changes in the earth as the prime cause of climatic change (West 1986).

Zoologically, the CBRNA contains habitat useful for a number of sensitive or special interest forest species. Spotted owls (*Strix occidentalis caurina*[2]) and pileated woodpeckers (*Dryocopus pileatus*) have been noted in the area as have a high diversity of carnivores including marten (*Martes americana*), bobcat (*Felis rufus*), mountain lion (*Felis concolor*), black bear (*Ursus americanus*), fisher (*Martes pennanti*), and the State listed threatened wolverine (*Gulo gulo*) (Keeler-Wolf 1982).

D. PRINCIPAL DISTINGUISHING FEATURES

Cedar Basin lies at the head of the South Fork of the Sacramento River. It contains ten permanent or semi-permanent lakes and ponds (the largest about 18 acres, 7.3 ha), several lateral moraines, polished gabbro bedrock, and steep cirque headwalls, all attesting to the powerful Pleistocene glacial influence (photos 4 and 5).

The CBRNA contains a high concentration of distinctive botanical features including high elevation POC stands, five species of rare vascular plants listed by Skinner and Pavlik (1994), well developed bog and aquatic habitats, extensive enriched mixed conifer forest on both gabbro and serpentinite rock types, as well as well developed rock outcrop, mountain chaparral, red fir, and mountain hemlock plant associations. The area is within a relatively high precipitation area of the eastern Klamath Mountains, which shows evidence of extensive glaciation.

E. LOCATION

1) National Forest involved

The CBRNA is located on the Shasta-Trinity National Forest. No other National Forest system land is involved.

2) Longitude and Latitude

The CBRNA is located at Latitude 41°12'N and Longitude 122°27'W.

3) Boundary Description

The RNA falls partly within Sections 30 and 31, T39N, R5W and Sections 25 and 36 of T39N, R6W, Mount Diablo Base and Meridian (MDBM) (maps 1 and 2).

The boundaries of the proposed Cedar Basin RNA follow by-in-large, topographical prominences on the western, eastern and southern portions of the area and the private property lines along the western boundary. The northern boundary is drawn as a bearing line across the lowest portion of the basin to the edge of the access road.

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[2] Names for animal follow Laudenslayer, et al. (1991)

(a) Beginning from the top of the highest point in the basin known as Peak 7149 (2179 m) in the SE1/4 of Section 36 (T39N, R6W) (point a), the boundary runs eastward along the ridge dividing the South Fork of the Sacramento River drainage from the Castle Creek drainage for approximately 0.9 miles (1.4 km) until reaching point 6956 (2120 m) (point b).

(b) At this point in the SE1/4 of Section 31 (T39N, R5W) the boundary turns northward and follows the dividing ridge between the Devils Gulch and the South Fork of the Sacramento River drainages for approximately 0.9 miles (1.4 km) to point 6934 (2113 m) (point c).

(c) At this point in the SE1/4 of Section 30 (T39N, R5W) the boundary follows a short, steep ridge northwest about 2800 ft (853 m) to its foot in the central portion of said Section 30, about 700 ft (213 m) northwest of a semi-permanent pond (point d).

(d) At this point the boundary crosses the low valley bottom of the South Fork of the Sacramento River on a corrected compass bearing of 310°. This bearing continues across the valley bottom and uphill to a point where Road 39N05Y intersects the boundary between Section 25 of T39N, R6W MDBM, and Section 30 of T39N, R5W MDBM (point e). This point also lies along the southern edge of a (ca. 1986) selectively logged block of the Devil's Zoo Timber Sale. It is marked with a survey marker surveyed in 1980 and indicates that it is 20 chains (1320 ft or 402 m) due south from the northwest corner of said Section 30.

(e) At this point the boundary crosses road 39N05Y and ascends the crest of the low morainal ridge in the NE1/4 Section 25 T39N, R6W MDBM. The boundary continues in a southwesterly direction along said divide as it becomes more pronounced and ascends steeply through the SW1/4 Section 25T39N, R6W MDBM. The boundary tops the divide between the South Fork of the Sacramento and Mumbo Creek drainages approximately 500 ft (152 m) northwest of the southwest corner of said Section 25 (point f).

(f) At this point the boundary follows the Mumbo Creek-South Fork Sacramento divide southeast for approximately 0.5 miles (0.8 km) to the private property line in the NE1/4 Section 36 T39N, R6W MDBM (point g).

(g) The boundary then follows the property line north for approximately 1000 ft (305 m), thence east for approximately 1320 ft (402 m), thence north for 1320 ft (402 m), thence east for 1320 ft (402 m) to the northeast corner of Section 36 T39N, R6W, thence south for approximately 0.5 miles (804 m), thence west for approximately 1320 ft (402 m), thence south for approximately 1320 ft (402 m) to a point along the South Fork of the Sacramento-Castle Creek divide about 100 ft (30 m) northeast of the peak 7149 (point h).

(h) The boundary thence continues the final 100 ft (30 m) southwest to the point of beginning (point a).

4) Acreage

The Cedar Basin RNA as described above encompasses an area of 972 acres (393.4 ha). The area in each section is in the following way:

T39N, R5W:	acres	hectares
Section 30	198	80.1
Section 31	270	109.3
T39N, R6W:		
Section 25	339	137.2
Section 26	2	0.8
Section 36	163	66.0
Totals:	972	393.4

5) Elevations

Elevations range from a high of 7149 ft (2179 m) to a low of approximately 5420 ft (1652 m).

6) Access

From Mt. Shasta City following the paved road (40N26) past the turns for Castle Lake and Lake Siskiyou for approximately 18 miles (29 km), a jeep road (39N05Y) leads to the center of CBRNA. This route includes 18 miles (29 km) of good, paved road and 1.5 miles (2.4 km) of poorly maintained jeep road. The jeep road terminates on private land near the outlet for Cliff Lake (Map 1).

Travel within the area is generally straightforward. The aforementioned jeep road (39N05Y) leads past Cedar and Lower Cliff Lakes and terminates at Cliff Lake. Unmarked fishermen's trails from Cliff Lake lead to Terrace Lake and to upper Cliff Lake. Climbing the cirques above Upper Cliff and Terrace lakes can make access to the upper elevation ridgelines.

To reach the upper elevation ridge lines on the western and southern boundaries of the RNA, a less strenuous route can be taken by continuing on Road 40N26 for approximately 3 miles (4.8 km) past the junction with the fore-mentioned jeep road (39N05Y) to a point in the central portion of section 26 where the Pacific Crest Trail crosses. The Pacific Crest Trail traverses the upper ridges just to the south of the RNA boundary in sections 36 and 31. It is about 2.5 miles (4 km) walking on this relatively level trail from the Road 39N05Y to a point opposite the southwestern corner of the RNA.

F. AREA BY COVER TYPES (with code numbers)

SAF TYPES (Eyre 1980)	Percent	Acres	Hectares
Mountain Hemlock (205)	14.3	139	56.3

Port-Orford-Cedar (231)	7.6	74	30.0
Red Fir (207)	5.4	53	21.5
Sierra Nevada Mixed Conifer (243)	40.3	392	158.6
Unclassified	32.3	314	127.1
Totals:	100.0	972	393.5
KUCHLER TYPES (Kuchler 1966)			
Fir-Hemlock (K-4)	14.3	139	56.3
Spruce-Cedar-Hemlock Forest (K-1)	7.6	74	30.0
Red Fir Forest (K-7)	5.4	53	21.5
Chaparral (K-29)	21.9	213	86.2
Mixed Conifer Forest (K-5)	40.3	392	158.6
Unclassified	10.5	101	40.9
Totals:	100.0	972	393.5
HOLLAND TYPES (Holland 1986)			
Huckleberry Oak Chaparral (37542)	21.9	213	86.2
Darlingtonia Bog (51120)		un-mappable	
Montane Freshwater Marsh (52430)	1.4	14	5.7
Port-Orford-Cedar Forest (82500)	7.6	74	30.0
Ultramafic Mixed Coniferous Forest (84180)	14.9	145	58.7
Red Fir Forest (85310)	5.4	53	21.5
Salmon-Scott Enriched Conifer Forest (85420)	25.4	247	100.0
Whitebark Pine-Mountain Hemlock Forest (86210)	14.3	139	56.3
Alpine Talus and Scree Slope (91200)	7.8	76	30.8
Totals:	100.0	972	393.7
UNCLASSIFIED TYPE:			
Open Lake (without appreciable vegetation)	1.3	11	4.5

G. PHYSICAL AND CLIMATIC CONDITIONS

Cedar Basin lies at the head of the South Fork of the Sacramento River. The basin is oriented to the northeast and has had its entire major features shaped by glaciations in the Pleistocene. The basin contains ten permanent or semi-permanent lakes and ponds (the largest about 18 acres, 7.3 ha), several lateral moraines, polished gabbro bedrock, and steep cirque head walls. All attest to the powerful Pleistocene glacial influence (photos 4 and 5).

There is no permanent weather recording station within or nearby the CBRNA. The isohyetal map of Rantz (1972) suggests that the Cedar Basin area receives precipitation at an average in the upper

50's to low 60's inches (ca. 1470-1575 mm) annually, while the map in Kahrl (1979) indicates an average annual precipitation of between 70 and 80 inches (1778-2032 mm).

The nearest NOAA (National Oceanic and Atmospheric Administration) weather station is Mount Shasta City. This station, in the rain shadow of the Trinity Mountains, is at an elevation of 3544 ft (1080 m) and has been recording precipitation since 1887 and temperature since 1915. It is located 12 air miles (19.3 km) east-northeast of the CBRNA. Table 2 summarizes a 12-year (from 1974-1985) average temperature record from Mount Shasta City and Table 3 summarizes precipitation for the same period. The long-term average precipitation from Mount Shasta City is 37.49" (952.2 mm) with an average of 6.65" (169 mm) in January and 0.32" (8.1 mm) in July.

The nearest recording station for snow depth is the Mumbo Basin Snow Course. It is located at an elevation of 5700 ft (1737 m) approximately 1.75 miles (2.8 km) due west of Cliff Lake. The Snow Course has been taking data since 1947. According to records kept by the Snow Survey Branch of the California Department of Water Resources, the average April 1 snow depth is 60.5" (1537 mm) and the water content is 24.7" (627 mm) or ca. 41%. This percent water content is slightly lower than three other stations summarized in Montane Northern California in Kahrl (1979), which range from 43-45%.

Snow depths at the upper elevation areas of the RNA are deep. A grove of mountain hemlock on a northeast-facing slope at ca. 6800 ft (2073 m) has trunks bare of *Letharia* lichen (an indicator of average winter snow depth) up to 15 ft (4.5 m) from the base (Photo 9). In contrast, at the lower elevations on southeast-facing slopes snow rarely averages deeper than 36 inches (91 cm).

Table 2: Temperature data from Mount Shasta City from 1974 to 1985

yr.	Jan. °F (°C)	July °F (°C)	highest (date) °F (°C)	lowest (date) °F (°C)	ann. °F (°C)	Date last spring frost	date 1st fall frost	# days between 1st & last frost
'74	32.2 (0.1)	68.5 (20.3)	96 (7/28) (35.6)	13 (1/2) (-10.6)	44.9 (7.2)	5/20	10/6	139
'75	34.3 (1.3)	66.9 (19.4)	98 (7/26) (36.7)	11 (1/30) (-11.7)	48.3 (9.1)	5/11	10/11	153
'76	35.6 (2.0)	68.5 (20.3)	96 (7/26) (35.6)	10 (2/5) (-12.2)	49.7 (9.8)	6/1	7/1	30
'77	30.8 (-0.7)	67.5 (19.7)	100 (8/2) (37.8)	5 (1/6) (-15.0)	49.1 (9.5)	5/27	10/1	127
'78	37.9 (3.3)	66.8 (19.3)	100 (8/7) (37.8)	8 (12/20) (-13.3)	48.5 (9.2)	6/11	9/19	100
'79	31.0 (-0.6)	67.3 (19.6)	100 (7/19) (37.8)	0 (1/29) (-17.8)	49.1 (9.5)	5/29	10/20	144
'80	36.3 (2.4)	67.4 (19.7)	97 (7/27) (36.1)	7 (1/30) (-13.9)	49.8 (9.9)	5/23	10/16	146
'81	39.4	67.1	105 (8/7)	18 (11/29)	50.9	5/16	10/4	141

	(4.1)	(19.5)	(40.6)	(- 7.8)	(10.5)			
'82	31.1	63.9	97 (8/22)	6 (1/7)	47.6	5/11	9/15	127
	(-0.5)	(17.7)	(36.1)	(-14.4)	(8.7)			
'83	38.4	61.7	97 (8/6)	12 (12/22)	49.1	5/10	10/15	158
	(3.6)	(16.5)	(36.1)	(-11.1)	(9.5)			
'84	38.1	70.3	---	---	---	5/16	9/24	131
	(3.4)	(21.3)						
'85	---	70.4	---	---	---	5/30	9/11	104
		(21.3)						

Table 3: Precipitation data from Mount Shasta City from 1974 to 1985

Year	Total in January		Total in July		Annual total	
	inch	(cm)	inch	(cm)	inch	(cm)
1974	13.11	(33.36)	0.67	(1.70)	43.63	(111.02)
1975	2.79	(7.10)	0.10	(0.25)	31.50	(79.01)
1976	0.48	(1.22)	0.28	(0.71)	14.21	(36.16)
1977	1.07	(2.72)	0.71	(1.81)	23.69	(60.28)
1978	21.18	(53.89)	0.42	(1.07)	53.72	(136.69)
1979	4.63	(11.78)	0.07	(0.18)	39.63	(100.84)
1980	3.55	(9.03)	T*	T*	30.93	(78.70)
1981	9.75	(24.81)	0.05	(0.13)	47.69	(121.35)
1982	2.84	(7.23)	0.31	(0.79)	45.06	(114.66)
1983	11.45	(29.13)	0.08	(0.20)	70.95	(180.53)
1984	0.19	(0.48)	1.56	(3.97)	-----	
1985	----		1.69	(4.30)	-----	

T: Trace, an amount too small to measure.

H. DESCRIPTION OF VALUES

1) Flora

The flora of the Cedar Basin RNA is diverse, with 260 taxa of vascular species so far identified (Appendix C). The following species are considered rare and endangered by the California Native Plant Society (Skinner and Pavlik 1994): holly fern (*Polystichum lonchitis*, List 3); California pitcher plant (*Darlingtonia californica*, List 4); Klamath manzanita (*Arctostaphylos klamathensis*, List 1B); purple-flowered Shasta lily (*Lilium washingtonianum* ssp. *purpurascens*, List 4); and Siskiyou sedge (*Carex gigas*, List 4). None is considered sensitive by the Pacific Southwest Region of the USDA Forest Service (Region 5).

Originally known only from the RNA, the Klamath manzanita has recently been located in several drainages near and adjacent to the RNA including Devil's Pocket, Picayune Creek, Cedar Creek, and the Scott Mountain area (Keeler-Wolf 1989 and Jack Callihan pers. comm. October 1987).

The *Penstemon* aff. *rupicola*, previously mentioned as a possible new taxa, is sufficiently distinct in flower color and degree of anther exsertedness from typical *P. rupicola* to warrant further investigation (Larry Heckard, Jepson Herbarium, U.C. Berkeley, pers. comm. 1983). Unlike the typical *P. rupicola* the flowers are purple-blue and not rose-red (see photo 3). Taxonomic status of this species has not been confirmed at this point.

The vegetation map (map 3) accompanying this report is organized using the system of Holland (1986) with Kuchler and SAF equivalents indicated. Following is a brief description of the major plant associations found in the CBRNA as defined by Holland.

(a) Huckleberry oak chaparral (Holland 37542)
Kuchler: Chaparral (K29)
no SAF equivalent

This vegetation covers about 213 acres (86 ha) of the RNA, occurring on shallow rocky soils, particularly on the open west-facing slopes to the east of Terrace and Lower Cliff lakes. Dominants are Huckleberry oak (*Quercus vaccinifolia*), Green leaf manzanita (*Arctostaphylos patula*), and pinemat manzanita (*A. nevadensis*). Other important species include: *Ceanothus prostratus*, *Amelanchier pallida*, and *Holodiscus boursieri*. *Prunus emarginata*, *Ceanothus velutinus*, and *Castanopsis sempervirens* are occasional.

The rare endemic Klamath manzanita locally dominates the mountain chaparral to the west of Terrace Lake. The rockiest, most xeric forms of mountain chaparral appear to be semi-climax vegetation. However, conifers from surrounding associations are clearly colonizing some mountain chaparral areas.

(b) Darlingtonia bog (Holland 51120)
No SAF and Kuchler equivalents

The best developed California pitcher plant (*Darlingtonia californica*) bogs occur around the southern half of Cedar Lake (photo 6). Bog vegetation also occurs around portions of Lower Cliff Lake and along the outlet streams of both Cedar and Lower Cliff lakes to the northeast boundary. In addition to *Darlingtonia*, the shrubs *Kalmia polifolia* var. *microphylla*, *Ledum glandulosum* var. *californicum*, *Vaccinium occidentale*, *Gaultheria humifusa*, and *Spiraea douglasii* are common. Other characteristic herbs include *Drosera rotundifolia*, *Tofieldia glutinosa* ssp. *occidentalis*, *Narthecium californicum*, and several species of *Carex*.

Included within this classification are relatively insignificant areas of more meadow vegetation lining the outlet streams from Lower Cliff Lake and Cedar Lake.

(c) Montane freshwater marsh (Holland 52430)
No SAF and Kuchler equivalents

This association is also best represented in Cedar Lake (see photo 6), but does occur in Lower Cliff Lake. The following species are characteristic of the freshwater marsh vegetation in Cedar Basin: *Isoetes occidentalis*, *I. bolanderi*, *Nuphar polysepalum*, *Menyanthes trifoliata*, *Potamogeton natans*, *Sparganium angustifolium*, *Scirpus validus*, *Heleocharis montividensis* var. *parishii*, *Dulichium arundinaceum*, and *Carex rostrata*.

(d) Port-Orford-Cedar Forest (Holland 82500)
SAF: Port-Orford-cedar (231)
Kuchler: Spruce-Cedar-Hemlock Forest (K1)

POC groves fringe Terrace, Cedar, Cliff, and Lower Cliff lakes and follow their outlet streams to well beyond the northeastern boundary of the RNA. Groves also occur above these lakes and streams at seeps and along intermittent rivulets up to nearly 6400 ft (1951 m) (see photo 5).

There are two types of POC forest locally, the bottomland type and the streamside type. The bottomland type has higher densities with 1600-2100 trees/acre (3936-5166 trees/ha). This type often lies immediately back from the *Darlingtonia* bog vegetation surrounding the lakes and low gradient streams where it typically shares with such species as *Darlingtonia*, *Ledum*, *Gaultheria*, and *Leucothoe* (photo 7). Other species include shade-tolerant, but hydrophilic species such as *Botrychium multifidum* ssp. *silaifolium*, *Athyrium filix-femina*, *Caltha howellii*, *Viola glabella*, *Prunella vulgaris* ssp. *lanceolata*, *Mitella pentandra*, *Allium validum*, *Physocarpus capitatus*, *Alnus tenuifolia*, and *Listera convallarioides*. Typical bottomland type POC individuals near the northeast boundary are between 2.5 and 3 ft (76-91 cm) dbh (diameter at breast height). The largest bottomland tree seen was ca. 48" (122 cm) dbh.

The streamside, rocky lakeshore type of POC forest tends to have lower densities, but higher basal area than the previous type (up to 984 ft^2/acre (225 m^2/ha). This type lines the steeper gradient streams such as the outlet from Terrace Lake and also occurs around the margins of lakes such as Cliff and Terrace which have a relatively widely fluctuating water level (photo 8). The largest POC in the RNA occur in this type (ecological survey found the largest one measured 52" dbh or 132 cm). The understory is less diverse and more mesophilic than the previous type with typical species including: *Leucothoe davisiae*, *Goodyera oblongifolia*, *Chimaphila umbellata*, *Pyrola picta*, *Vaccinium arbuscula*, *Pteridium aquilinum* and *Pedicularis semibarbata*.

(e) Ultramafic Mixed Conifer Forest (Holland 84180)
Kuchler: Mixed Conifer Forest (K5) in part
SAF: Sierra Nevada Mixed Conifer (243) in part

This type is present on the serpentinite morainal deposits on the northwestern portion of the RNA, adjacent to the access road. It is an open forest with dominance traded between Douglas-fir, white fir (*Abies concolor*), Jeffrey pine (*Pinus jeffreyi*), and sugar pine (*Pinus lambertiana*). Incense-

cedar (*Libocedrus decurrens*) and western white pine (*Pinus monticola*) also commonly occur in this forest. Understory shrubs include: *Quercus vaccinifolia*, *Arctostaphylos patula*, *A. nevadensis*, *Ceanothus prostratus*, *Amelanchier pallida*, *Ribes roezlii*, and *Rhamnus californica* ssp. *occidentalis*. The latter two species appear to be indicators of this community.

This forest was logged very lightly in 1968 and apparently also many years ago when a few trees were taken.

(f) Red Fir Forest (Holland 85310)
SAF: Red Fir (207)
Kuchler: Red Fir Forest (K7)

This forest occurs predominantly on the northwest-facing upper slopes along the eastern portion of the area and sporadically in the Terrace Lake area on northwest and northeast-facing exposures. Because of the rocky, gabbroic soil, these forests are not typically dense, tall, and closed, but are relatively open with a fair component of montane chaparral shrubs in the understory and western white pine in the canopy. The endemic Klamath manzanita is an important member of this open red fir forest in portions of the Terrace Lake basin (see photo 1).

(g) Salmon-Scott Enriched Conifer Forest (Holland 85420)
SAF: Sierra Nevada Mixed Conifer (243) in part
Kuchler: Mixed Conifer Forest (K5)

This forest is loosely named in reference to its diverse, mixed nature and not because it bears a great similarity to the type forests in the Russian Peak area of the Salmon Mountains.

The local forest occurs on glacially derived rocky gabbro soil in the lower portions of the basin in Sections 25 and 30. It is not as open as the ultramafic mixed conifer, dominated by lodgepole pine and Shasta red fir. It also contains some POC, white fir, Douglas-fir, sugar pine, western white pine, Jeffrey pine, mountain hemlock, and incense-cedar.

Although it rarely reaches above 6000 ft (1829 m), this type has the aspect of a relatively high elevation forest because of the two dominants and such understory shrubs as *Leucothoe davisiae* and *Vaccinium arbuscula*. Portions of the forest in the central portion of Sect. 31 in the Terrace Lake basin ca. 6200-6400 ft (1890-1950 m) is transitional between this type and the upper elevation mountain hemlock-dominated forest. Portions of the forest in the lowest portion of the basin in Section 30 are transitional with ultramafic mixed conifer forest.

(h) Whitebark Pine-Mountain Hemlock Forest (Holland 86210)
SAF: Mountain Hemlock (205)
Kuchler: Fir-Hemlock Forest (K4)

Although whitebark pine (*Pinus albicaulis*) does not occur within the RNA, the mountain hemlock-dominated forests at the highest elevations on steep sheltered locations most closely resembles the description of this forest type in Holland (1986).

This is typically a closed forest (photo 9) with little understory and heavy duff. Snow accumulation is great in the winter and typically lingers in patches until mid summer. Red fir is also an important member of this forest. Western white pine and lodgepole pine occur in this forest in the high cirque basin above Terrace Lake. The highest elevation individuals of Port-Orford-cedar also occur in this community above Terrace Lake.

(i) Alpine talus and scree slope (Holland 91200)
No Kuchler and SAF equivalents

A large portion of the RNA is predominantly open rocky gabbroic slope. These exposures harbor a specific group of plants growing in the crevices and small hollows in these outcrops. The species may be divided into xeric and mesic to hydric types. Included in the xeric types are such species as: *Penstemon* aff. *rupicola*, *Juncus parryi*, *Lewisia leana*, *Elymus elymoides*, and *Achnatherum lemmonii*. Species of the more mesic crevices include: *Cryptogramma acrostichoides*, *Polystichum lonchitis*, *P. lemmonii*, *Romanzoffia sitchensis*, *Heuchera pringlei*, *Sibbaldia procumbens*, *Luetkea pectinata*, *Antennaria alpina* var. *media*, *Epilobium angustifolium*, *Carex gigas*, and *Carex spectabilis* (photo 10).

2) Fauna

The fauna of Cedar Basin RNA is diverse because of the variety of habitats in the area. The juxtaposition of lakes and stream courses with cliff, forest, and chaparral provides ideal habitat for many animal species.

Appendix D lists 125 species of confirmed or possibly occurring vertebrates. This includes such sensitive species as wolverine (*Gulo gulo*, State-listed Threatened and Category 2 Candidate for Federal listing), spotted owl (*Strix occidentalis caurina*, Federal-listed Threatened), and goshawk (*Accipiter gentilis*, California Species of Special Concern, Forest Service Sensitive Species, and Category 2 Candidate for Federal listing).

3) Geology

The CBRNA is underlain by the Trinity ultramafic sheet (Irwin 1966, 1981), the largest and perhaps oldest ultramafic (ophiolitic) exposure in the Klamath Mountains. Gabbroic rocks within this sheet have been radiometrically dated at 439 million years (Irwin 1981).

There is an inferred fault line between the serpentinized peridotite of the northwestern portion of the RNA and the gabbro, which predominates throughout the remainder of the RNA (Jennings et. al 1977). This fault roughly corresponds with the main outlet stream from Cedar Lake. All major rock

outcrops in the cliffs to the south of Cliff and Terrace lakes and to the east of Lower Cliff Lake are composed of early Paleozoic gabbro.

The basin was dominated by two glaciers in the last ice age; one which spilled down the slopes southeast of Cedar Lake, and a larger one that flowed from hanging glaciers beneath the high ridges south of Cliff and Terrace lakes and converged with the Cedar Lake glacier below Lower Cliff Lake. The jeep road (39N05Y) crosses two lateral moraines. One in the NE1/4 of Sect. 25, which divided the Gumboot Lake glacier from the Cedar Lake glacier, and a smaller one in the SE 1/4 of Sect. 25, which separated the Cedar Lake from the Cliff Lake glaciers.

4) Soils

According to the Soil Survey of Shasta-Trinity Forest Area, California (U.S.D.A. Forest Service et al. 1980) there are ten Order 3 soil mapping units within the CBRNA. The mapping units are associations, complexes, and consociations of soils classified to phases of families, family, subgroup or suborder. Delineations for Order 3 soil survey are as small as 10 acres (4ha) for highly contrasting soils and 40 acres (16 ha) for non-contrasting soils.

The ten soil types occurring in the CBRNA are briefly described in the following and depicted on the soil map (Fig. 1). Detailed descriptions for each soil type can be found in Appendix E.

(1) Endlich family, 20 to 60 percent slopes (map unit 56)

This soil type occurs on the slopes above Cedar Lake. It contains 75% Endlich family soil with 25% inclusions of basic intrusive Rubble Land and Rock Outcrop and Typic Cryaquolls. Vegetation on this soil type is mixed conifer forest with small groves of POC.

The surface soil is 5 inches (12.7 cm) thick (soil profile: 0-5" [0-12.7 cm]), yellowish brown, very fine sandy loam and very gravelly sandy loam, moderate and weak very fine granular structure with 10-45% gravel and cobbles, strongly to medium acid.

At the depth from 5 to 16 inches (12.7-40.7 cm) in the soil profile is the subsoil. The subsoil has the same properties as the surface soil except that it contains 55% gravel and cobbles.

(2) Endlich family-Rubble land association, 50 to 70 percent slopes
(map unit 58)

This soil type occurs in the steep mid-slopes in the eastern portion of the RNA. It contains 55% Endlich family soil and 20% Rubble land with 25%inclusion of Skymor family, Entic Cryumbrepts, basic intrusive Rock Outcrop, and Wapal family soils. Major vegetation on this soil is chaparral.

Soil properties are described in the preceding section.

(3) Inville-Jayar, deep families complex, 15 to 40 percent slopes
(map unit 146)

This glacially derived rocky gabbro soil type is located in the lower portions of the basin in the northeastern part of the RNA (Section 30, R5W, T39N). It is the deepest and most productive soil type in the RNA. Vegetation cover is the Salmon-Scott enriched conifer forest.

The soil consists 55% Inville family and 30% Jayar family with 15% inclusions of Wintoner, Skymor, and Jayar family soils.

The surface soil of Inville family is 15" (38.2 cm) deep (soil profile:0-15" [0-38.2 cm]), light yellowish brown gravelly loam and reddish yellow very gravelly loam, moderate fine granular to moderate medium subangular blocky structure, 25-35% gravel and cobbles, strongly to medium acid. The subsoil (soil profile: 15-44" [38.2-112.0 cm]) is very to extremely cobbly (38-70% gravel and cobbles) clay loam.

Jayar family soil has a shallow surface soil layer (soil profile: 0-4"[0-10.2 cm]), which is yellowish brown very gravelly (40% gravel and cobbles) sandy loam, strong fine and very fine granular structure, and strongly acid. The subsoil (soil profile: 4-20" [10.2-50.9 cm]) is yellowish brown, very gravelly (45-50% gravel and cobbles) sandy loam, weak fine and very fine subangular blocky structure, medium acid.

(4) Jayar, deep-Wapal families complex, 10 to 50 percent slopes
(map unit 163)

To the south of soil type 146, on the northwest-facing slopes lies this soil type 163. On this soil type, in addition to the Salmon-Scott enriched conifer forest, Port-Orford-cedar stands can be found in areas surrounding the Lower Cliff Lake and along stream. 40% Jayar family, deep and 30% Wapal family constitute this soil complex with 25% inclusion of Skymor family soil, Glacial till, and Typic Cyraquolls.

Soil property of Jayar family can be found in previous sections. The Wapal family is a poorly developed soil with the following characteristics: In the soil profile, surface soil takes place from 0 to 4" (0-10.2 cm) and from 4 to 65 inches (10.2-165.4 cm) is the substratum. There is no subsoil layer. The surface soil is brownish yellow very stony (47% gravel and stones) loam, weak fine granular structure, and slightly acid. The substratum is very pale brown, very stony sandy loam to light brownish gray extremely stony loamy sand, single grain and massive, 55-80% gravel and cobbles, neutral.

(5) Lithic Xerumbrepts-Rubbles land-Nanny family complex, 5 to 40 percent slopes (map unit 172)

This soil type occurs on gentle to moderately steep, ground and lateral moraines and cirque bottoms in the center portion of the RNA. It consists of 50% Lithic Xerumbrepts, 20% Rubble land, and 15% Nanny family with 15% inclusions of Skymor family, deep Jayar family, Tallac family, and

granitic Rock outcrop. Chaparral is the typical vegetation cover of this soil type, however, along stream courses and lakes POC stands occur and in some areas mixed conifer forests take place.

The Lithic Xerumbrepts has very dark grayish brown very cobbly fine sandy loam and dark yellowish brown cobbly loamy sand surface soil layer at depth from 0 to 12 inches (0-30.5 cm) in the soil profile. It is moderate very fine granular and weak medium subangular blocky structure, contains30-40% cobbles and gravel, and is medium to very strongly acid. There is no subsoil layer and the substratum is yellowish brown very cobbly (55% gravel and cobbles) loamy sand.

The Nanny family soil has the surface soil layer at depth from 0 to 13inches (0-33.1 cm) in the soil profile. It is black very cobbly (55% gravel and cobbles) fine sandy loam, moderate very fine granular structure, and is medium acid. From 13 to 19 inches (33.1-48.3 cm) in the soil profile is the subsoil layer. It is yellowish brown extremely gravelly (70% gravel and cobbles) sandy loam. Underneath the subsoil at depth between 29 and 48 inches (73.8-122.1 cm) is the substratum, which is pale brown extremely cobbly (70-80% gravel and cobbles) loamy sand.

(6) Rock outcrop, basic intrusive (map unit 248)

This basic intrusive rock outcrop is located on the ridges forming the eastern border of the RNA, and the headwalls and threshold of glacial cirques, and glacial aretes and horns between Cedar Lake and Cliff Lake, Cliff Lake and Terrace Lake. Vegetation types on this rock outcrop are alpine talus, scree and chaparral.

(7) Rock outcrop-Endlich family association, 5 to 90 percent slopes
(map unit 257)

This soil type consists of 55% Rock outcrop and 30% Endlich family with15% inclusions Lithc Cryochrepts, Skymor family, and Typic Cryaquolls. It occurs on ridges demarcating the southern and southwestern boundaries of the RNA. Vegetation types on this soil unit are whitebark pine-mountain hemlock and alpine talus, scree.

Descriptions of Rock outcrop and Endlich family can be found impervious sections.

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

Rock outcrop (40%), Lithic Cryochrepts (35%), and Deadfall family (15%) constitute this soil complex with 10% inclusions of Rubble land. Only small ridge top area in the extremely western tip of the RNA is of this soil type.

Both Lithic Cryochrepts and Deadfall family soils are Ca/Mg imbalanced (serpentine). Only limited plant species (typically chaparral) occur on this soil type.

The surface soil (soil profile: 0-7" [0-17.8 cm]) of Lithic Cryochrepts is very pale brown gravelly (40% gravel) sandy clay loam, moderate fine and very fine subangular blocky structure, neutral. Subsoil (soil profile: 7-17" [17.8-43.3 cm]) is pale brown very gravelly (50% gravel) sandy clay loam, weak fine and very fine subangular blocky structure, mildly alkaline.

Deadfall family has the surface soil at depth from 0 to 14 inches (0-35.6 cm) in the soil profile and subsoil at depth from 14 to 24 inches (35.6-61.1 cm). The surface soil is pale brown and yellowish brown very gravelly (35-45% gravel and cobbles) sandy loam, moderate to weak fine and very fine granular structure, slightly acid to neutral. The subsoil is yellowish brown extremely gravelly (75% gravel and cobbles) sandy loam, weak very fine granular structure, mildly alkaline.

(9) Toadlake-Gozem families association, 50 to 80 percent slopes
(map unit 315)

This soil type occurs on the east-facing slopes in the northwest portion of the RNA. It consists 50% Toadlake family and 30% Gozem family soils with 20% inclusions of ultramafic Rock Outcrop, ultramafic Rock Rubble, Merkel family and Grell family soils.

Both Toadlake and Gozem family soils are Ca/Mg imbalanced (serpentine) and the soil is the poorest, besides the rock outcrop, in the RNA. Open ultramafic mixed conifer forest is the vegetation type on this soil map unit.

Surface soil of the Toadlake family is 10 inches (25.4 cm) deep, grayish brown and light gray very gravelly (35-45% gravel and cobbles) loam, moderate very fine granular and very fine subangular blocky structure, slightly acid to neutral. The subsoil (soil profile: 10-56" [25.4-142.5cm]) is very deep, 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.

Gozem soil has a very shallow surface soil layer (soil profile: 0-4"[0-10.2 cm]) and shallow subsoil layer (soil profile: 4-18" [10.2-45.8 cm]). The surface soil is yellowish brown, very cobbly (35% gravel and cobbles) loam moderate fine and medium subangular blocky structure, slightly acid. The subsoil is yellowish brown very cobbly and very gravelly (45-55% gravel and cobbles) loam, moderate to strong medium subangular blocky structure, neutral to slightly acid.

(10) Toadlake family, till substratum, 10 to 40 percent slopes
(map unit 322)

This soil map unit occurs on the gentle east-facing slopes in the northern portion of the RNA. It consists 75% till substratum Toadlake family with 25% inclusions of till substratum Merkel family and ultramafic Glacial till. Vegetation of this soil type is mixed conifer forest type.

The surface soil layer is from 0 to 12 inches (0-30.5 cm) in the soil profile. It is yellowish brown very and pale brown extremely cobbly (45-65%gravel and cobbles) loam, strong fine granular and moderate fine subangular blocky structure, strongly to medium acid. The subsoil (soil profile: 12-31"

[30.5-78.9 cm]) is pale brown very gravelly (35-50% gravel and cobbles) loam and clay loam, moderate fine and medium subangular blocky structure, slightly acid to neutral.

5) Lands

Most land within the proposed RNA is managed by the Shasta-Trinity National Forest. A private enclave within the hydrologic basin in Section 36 (see map 2) contains 130 acres (52.6 ha). Boundary to this land is approximately 2 miles (3.1 km) long. This private land is accessed by the road 39NO5Y.

6) Cultural

There are no known cultural sites in Cedar Basin. The Shastan people occupied the territory included in the RNA (Silver 1978). Wintu people may also have occasionally entered the basin from the Trinity drainage (Lapena1978), because the RNA is adjacent to the Sacramento-Trinity River divide.

According to Julie Krieger Cassidy, Zone Archaeologist (McCloud and Shasta Ranger Districts) there is no known archaeological site in the RNA. The ecologically similar Mumbo Basin 1.5 miles to the west has produced some lithic deposits (Kreiger Cassidy pers. comm. Nov. 1987) including obsidian flakes. This suggests that Cedar Basin was probably used seasonally similarly to Mumbo Basin.

There are many prehistoric sites recorded at slightly lower elevations along the South Fork of the Sacramento and Soapstone Creek near the RNA. These sites contained obsidian debitage material and projectile points on the surface of the sites. Gunther-barbed points and a large corner-notch point were noted.

7) Fire Regime

The last major fire swept through the basin took place approximately 100 years ago (year 1890). Charred stumps of POC at the south end of Cedar Lake, fire scars on the trunks of POC lining the outlet stream from Terrace and Upper Cliff Lakes, and occasional pieces of charcoal in the mountain chaparral in the NE1/4 of Sect. 31 probably harken back to this last fire.

The forests in the basin are generally relatively young, with the oldest trees occurring in the open ultramafic mixed conifer, streamside POC forest, and Salmon-Scott enriched conifer associations. The oldest POC is probably about 450-500 years. The low-lying POC groves have a high degree of natural resistance to fire because of their hydric nature, but if allowed to crown-out they could be destroyed as evidenced in the grove near the south end of Cedar Lake adjacent to the RNA.

The role of fire in the upper elevation mountain hemlock and red fir forest is minimal.

Montane chaparral in the RNA is undoubtedly a fire type that requires periodic burning for maintenance. However, relatively large portions of the montane chaparral are on poor sites (steep,

xeric, and rocky) and may not harbor coniferous forest even under conditions of unchecked succession for hundreds of years.

The ecosystem of the basin should be able to sustain under a let burn policy. However, in order to protect the old growth POC stands a minimal amount of fire fighting techniques may be considered, should a fire threaten them.

I. IMPACTS AND POSSIBLE CONFLICTS

1) Mineral Resources

According to the analysis in the Environmental Impact Statement for the Forest the entire CBRNA is not suitable for minerals use (Appendix B). The predominant gabbro is of no economic importance and the small amount of serpentinized peridotite does not contain any significant quantity of economically important minerals associated with such rocks elsewhere in the Klamath Province.

Establishment of the CBRNA will have no impact on the mineral resource value of the area.

2) Grazing

At this time there is no known grazing use of the area (Julie Nelson, Shasta-Trinity National Forest, pers. comm. 2002). However, Keeler-Wolf (1990) indicated (Jerry Anderson, Shasta-Trinity National Forests, S.O., pers. comm. 1987) the proposed RNA was within the South Highland Grazing Allotment. That allotment allows for 356 AUMs (animal-unit months) between mid-June and mid-September.

The grazing use status has not adversely affected the RNA values of Cedar Basin, since little or no evidence of grazing, even in the most sensitive marsh and bog areas, was observed.

Therefore, establishment of the RNA will have no impact on the current level of grazing use of the area. However, if grazing intensified in the RNA, it would threaten the integrity of the hydric associations, particularly the *Darlingtonia* bogs, and measures should be taken to fence or exclude grazing from the RNA.

3) Timber

According to the Final Environmental Impact Statement for the LRMP (Appendix B) nearly 57% of the CBRNA contains tentatively suitable timberland. There are about 500 acres (202 ha) of not suitable and 660 acres (267 ha) of M3P (mixed conifer, small saw timber [13-24 ft, 4-7 m], poor stocking [10-40%]) timber strata in the proposed CBRNA. About 260 mbf (thousand board feet) of potential sustained annual yield would be foregone under RNA designation.

4) Watershed Values

CBRNA is located at the head of the drainage where South Fork Sacramento River originates. As mentioned earlier, the hydraulic system in the RNA plays an important role for the vegetation and wildlife communities. Lakes in the RNA (Upper Cliff, Cliff, Lower Cliff, and Terrace) also support stocked populations of brook trout. The South Fork Sacramento River drains into Siskiyou Lake that provides important water supply, hydraulic power, and recreation for the community.

Establishment of the RNA will enhance the watershed values of the area, help maintaining the inter-relationships of the terrestrial and aquatic systems, and ensure water quality in the Siskiyou Lake.

5) Recreation Values

Cedar Basin has long been used by fishermen, campers, woodcutters, and hunters. The private holding of 120 acres (48.6 ha) is regularly visited by the owners. The road (jeep road 39N05Y) into the basin has been in existence for many years (perhaps over 50) and has always been in generally poor condition. There is a hunters' camp at the northwest corner of Cedar Lake that has been used for several generations of hunters.

There is a well-used undesignated camp at Lower Cliff Lake. Tracks indicate that some motorized vehicles visite Lower Cliff Lake. There are frequently tents pitched near the eastern side of the outlet from Upper Cliff Lake during the summer. A small number of people regularly ride mountain bikes to Upper Cliff Lake (Dave Schultz, Entomologist, Shasta-Trinity National Forest 2002 per. comm.)

Cedar Lake, Lower Cliff Lake and Upper Cliff Lake have all been stocked with trout in the past.

Away from the lakes, the proposed RNA appears relatively pristine with little evidence of human disturbance. Although the Pacific Crest Trail skirts the western and southern boundaries, access to the basin is steep and difficult from the trail and there is no appreciable disturbance in these areas.

The threat of introducing root rot disease into Cedar Basin RNA through the mud on vehicles, mountain bikes, horses, and foot traffic of the recreational visitors is the major concern at this point. Camping and firewood collecting are other issues challenging the management of this area once it is established.

6) Wildlife and Plant Values

Establishment of CBRNA will maintain the pristine nature of the area and continue to provide suitable habitat for numerous species of plants and animals.

Although insufficient in size for the complete requirements of many of the larger carnivores and raptors known from the basin (see Appendix D) the maintenance of this area in a pristine state will

provide an important portion of breeding and/or foraging territory for many species such as mountain lion, pine martin, bobcat, and goshawk.

The several previously mentioned rare and unusual plants found in the basin should continue to thrive as long as low human impact is ensured by the establishment of an RNA and the precautions as outlined above are taken regarding root rot infestation.

7) Special Management Area Values

The CBRNA is not within any special management or congressionally designated area. Establishment of CBRNA will have no conflict with current land management.

8) Transportation Plans

There is no plan to construct new roads within or nearby the area. Establishment of CBRNA will have no impact on the transportation plan for the Forest.

Measures to prevent the spread of root rot disease may affect the current transportation pattern in the area.

J. MANAGEMENT PRESCRIPTION

Appendix A contains the management prescription for the CBRNA as stated in the Shasta-Trinity National Forest LRMP (USDA Forest Service 1995a). Within it standards and guidelines are provided.

1. RNA management strategy

The Shasta-Trinity National Forest will develop a specific management strategy to maintain the target element and other resource values in the best possible condition after the establishment of CBRNA. Attention will be given to the management of recreational use in the area, particularly at Lower Cliff and Cedar lakes. Strictest attention will be given to preventing the infestation of POC in Cedar Basin by Port-Orford-cedar root rot.

K. ADMINISTRATION RECORDS AND PROTECTION.

The official responsibility for administration and protection of the RNA is with the District Ranger, Mount Shasta Ranger District, 204 West Alma, Mt. Shasta, California, 96067.

The research coordinator is the Director of Pacific Southwest Research Station, 800 Buchanan St., Albany, California 94710. This person is responsible for approving and coordinating observational or non-manipulative applied research in the area, and maintaining research data files.

L. ARCHIVING

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

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Appendices

Appendix A: Excerpts from the Shasta-Trinity National Forest Land and Resource Management Plan (1995)

Appendix B: Excerpts from the Shasta-Trinity National Forest Final Environmental Impact Statement for Land and Resource Management Plan

Appendix C: List of vascular plants in the Cedar Basin Research Natural Area

Appendix D: Vertebrates known or suspected from Cedar Basin Research Natural Area

Appendix E: Excerpts from Soil Survey of Shasta-Trinity Forest Area, California

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CEDAR BASIN Photo captions

Photo 1: View of the dense carpet of Klamath manzanita in the understory of the open red fir forest in the NW 1/4 Section 31, September 1982.

Photo 2: Close-up of the flowering branches of Klamath manzanita, June1987.

Photo 3: A flowering plant of *Penstemon aff. rupicola* on the upper slopes above Cliff Lake (NW 1/4 Section 31), August 1983.

Photo 4: Panorama of the steep cirque headwalls above Cliff Lake. Photo taken from ridgetop in the NE 1/4 Section 31 looking southwest (Trinity Alps in distance), June 1987.

Photo 5: View looking southwest from the ridge in the NE 1/4 Section 31showing the glacially carved Terrace Lake basin. The basin to the left of the lake holds the highest elevation stands of Port Orford cedar. Note extensive montane chaparral dominated by huckleberry oak in foreground. June 1987.

Photo 6: Boggy and hummocky margins of the south shore of Cedar Lake. Darlingtonia bog vegetation in foreground, montane freshwater marsh beyond hummocks in lake. August 1982.

Photo 7: The bottomland POC forest just south of Cedar Lake in the SW 1/4Section 25. Note California pitcher plant, *Ledum*, and other bog species in the understory. August 1982.

Photo 8: Streamside type of POC forest lining the outlet stream from Terrace Lake in the NW 1/4 Section 31. June 1987.

Photo 9: Dense closed mountain hemlock forest on steep northeast-facing slope in the SW 1/4 Section 31. Snow depth as indicated by lichen growth is about 14 ft (4.3 m). September 1982.

Photo 10: *Romanzoffia sitchensis* (white flowers) and *Saxifraga ferruginea*, typical associates of the mesic talus and scree slope type. June 1987.