

SIGNATURE PAGE
for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Bridge Creek Research Natural Area
Klamath National Forest
Siskiyou County, California

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

Prepared by _____ Date _____
Sheauchi Cheng, Research Plant Ecologist
Pacific Southwest Research Station

Recommended by _____ Date _____
William Heitler, District Ranger
Ukonom Ranger District

Recommended by _____ Date _____
Margaret J. Boland, Forest Supervisor
Klamath National Forest

Recommended by _____ Date _____
Jeff Walter, Forest Supervisor
Six Rivers National Forest

Concurrence of _____ Date _____
James R. Sedell, Station Director
Pacific Southwest Research Station

Established by _____ Date _____
Jack Blackwell, Regional Forester
Pacific Southwest Region

TITLE PAGE

Establishment Record for
Bridge Creek Research Natural Area
Within Klamath National Forest
Siskiyou County, California

Bridge Creek Research Natural Area

MAPS

Map 1: Location and Boundaries

Map 2: Access

Map 3: Vegetation Types

Map 4: Soils

A. INTRODUCTION

The Research Natural Area (RNA) system is a national network of ecological areas designated in perpetuity for research and education, to maintain biological diversity, and to provide biological baseline information on the Forest Service and other public lands. Only non-manipulative research, observation, and study are allowed in the RNAs. RNAs include a representative array of widespread ecosystem types as well as unique ecosystems. 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 (e.g., Munz 1959, Kuchler 1966, Eyre 1980, Holland 1986), and unique ecosystems (such as aquatic and geologically unusual areas). The intention is to accurately reflect the natural diversity of vegetation types on Forest Service lands in California 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. The representation of these associated vegetation types within the RNA is of equal importance. For an overview of California's RNA, please refer to Todd Keeler-Wolf (1990), "Ecological Surveys of Forest Service Research Natural Areas in California" (U.S.D.A. Forest Service General Technical Report PSW-125).

The Bridge Creek Research Natural Area (BCRNA) is located within the Marble Mountain Wilderness, on the Ukonom Ranger District, Klamath National Forest in Siskiyou County, California. It is approximately 10 air miles (16 km) northeast of Somes Bar, 22 air miles (35 km) south of Happy Camp. The local community has used the Bridge Creek drainage area for hunting, camping and fishing.

The BCRNA was first nominated by the Klamath National Forest in the early summer of 1984 as a substitute area for the Specimen Creek candidate RNA to provide an area representing the Douglas-fir (*Pseudotsuga menziesii*¹) target element for the Klamath Mountains Ecological Section (M261A) (Miles and Goudey 1997). In July 1984 a reconnaissance trip to the proposed BCRNA was made by a Region 5 (Pacific Southwest Region) RNA Committee member and a Klamath National Forest botanist (Barker 1984). The candidacy for BCRNA was approved by the Region 5 RNA committee later in the same year after the Reconnaissance Report was reviewed. The following year an ecological survey of the area was conducted by Keeler-Wolf, who also did a draft Establishment Record later in 1989.

The BCRNA is entirely within the Klamath National Forest boundaries on lands currently being managed by the Six Rivers National Forest. The Six Rivers National Forest is the administrator of this RNA. As mentioned earlier, it is within the Federally-designated Marble Mountain Wilderness, which surrounds the BCRNA except the southwest corner.

¹ Nomenclature for plants follows Munz (1968), except tree species which follow Little (1979).

Area abuts on the southwest of BCRNA is Klamath National Forest land in the Special Habitat Management Area managed for Late Successional Reserves. Management directions for the Research Natural Areas, Wilderness, and Late Successional Reserves are included in Appendix A.

(1) Land Management Planning

The Klamath National Forest final Land and Resource Management Plan (LRMP) (1995) recommends establishment of the BCRNA (USDA Forest Service, Klamath National Forest 1995a); refer to Appendix A. The land allocation decision for the BCRNA was made with the signing of the Record of Decision for the LRMP by the Regional Forester in 1995. The analysis for this decision was included in the Final Environmental Impact Statement for the LRMP (USDA Forest Service, Klamath National Forest 1995b-c); refer to Appendix B. Bridge Creek RNA is one of the nine RNAs recommended by the Record of Decision for the Klamath National Forest LRMP.

B. OBJECTIVES

The BCRNA is established to represent the Pacific Douglas-fir forest type, Society of American Foresters (SAF) Forest Cover Type 229 (Eyre 1980), in the Klamath Mountains Ecological Section of the Pacific Southwest Region.

Initial interest in the area focused entirely on the Pacific Douglas-fir forest. Large portions of the originally extensive Douglas-fir forest have been logged in the western Klamath Mountains in the past and few large tracts of old growth forests remain. Although five other RNAs or candidate RNAs contain some amount of this forest type in the Klamath Mountains Ecological Section, the BCRNA is the only area specifically designated to represent the Pacific Douglas-fir forest type.

The Pacific Douglas-fir type is probably the most highly productive forest in the Klamath Mountains Ecological Section, and is among the most productive forests in the world (Strothman and Roy 1984). Consequently, a recent review of silvicultural systems for the major forest types of the United States (Burns 1983) cites more references for Douglas-fir forest than for any other western forest type. The research and the baseline information values of pristine, well-developed stands of this species (Photo 1) is thus very high, and the BCRNA has potential to provide much significant information on natural rates of establishment and growth, longevity, productivity, genetic variation, and other aspects of applied ecology for this economically important forest.

C. JUSTIFICATION

The area is an excellent example of an upper-elevation Douglas-fir dominated forest in the western Klamath Mountains Ecological Section. At present it is the only such RNA within Pacific Southwest Region.

The Pacific Douglas-fir forest at Bridge Creek RNA has giant chinquapin (*Castanopsis chrysophylla*) as its major hardwood subdominant. This species is the most restricted of the major hardwoods typical of the Douglas-fir zone in the Klamath Mountains Ecological Section (Keeler-Wolf 1988). Some of the giant chinquapins in the area are among the tallest individuals reported for the species (Photo 2).

The BCRNA was one of the three principal study sites used in a study of the role of giant chinquapin in the Douglas-fir - hardwood forests of the Klamath Mountains Ecological Section (Keeler-Wolf 1988). Giant chinquapin is limited by its requirements of relatively high precipitation and sheltered, mesic exposures. Compared to two other sites where giant chinquapin is well represented, Bridge Creek RNA has the highest sexual reproduction rate for giant chinquapin and the highest diversity of understory species. The first distinction is a result of the forest's mesic understory conditions which allow chinquapin seedlings to germinate and survive, but are not so mesic so as to create extremely dense shrub understories to shade-out chinquapin seedlings.

Douglas-fir forest at BCRNA is an upper elevation representative of SAF 229 with white fir (*Abies concolor*) as the principal conifer associate. Although white fir is considered as the principal coniferous competitor of Douglas-fir at the upper elevations of the Douglas-fir zone in the Klamath Mountains Ecological Section (Atzet and Wheeler 1984, Strothman and Roy 1984), evidence at Bridge Creek RNA suggests that Douglas-fir is competitively superior to white fir. Young Douglas-fir trees grow consistently faster, live longer, and attain greater height as mature trees than white fir (Keeler-Wolf 1985). Thus, the stability of the Douglas-fir forest at BCRNA is high and the forest may be considered a climax type. Climax Douglas-fir forests are characteristic of drier conditions than those of the major coastal stands of the Pacific Northwest (Williamson and Twombly 1983).

In addition to the Douglas-fir forest, the area also contains some Douglas-fir-Tanoak (*Lithocarpus densiflorus*)-Pacific Madrone (*Arbutus menziesii*) (SAF type 234) forest on the lower and more southerly-facing slopes. The transition between this and SAF type 229 is often pronounced. Small areas of knobcone pine (*Pinus attenuata*) (SAF type 248), and white fir (SAF 211) also occur. These vegetation types are common associates with the Pacific Douglas-fir forest in northwestern California and underscore the value of the Bridge Creek RNA as providing transition to several related forest types.

Because of the location, a mixture of both montane and coastal birds and mammals can be found in the BCRNA. For example, both chestnut-backed (*Parus rufescens*, typical of coastal mixed evergreen forests) and mountain (*P. gambeli*, typical of montane

coniferous vegetation) chickadees, and both dusky-footed (more typical of coastal and/or low elevation habitats) and bushy-tailed (most typical of montane habitats) wood rats (*Neotoma fuscipes* and *N. cinerea*, respectively) are residents in the drainage. This provides research opportunities for ecologists wishing to study niche differences between closely related species.

There are three major streams and several minor rivulets, gulches, seeps, and springs occur within the RNA. The associated riparian forest and wet meadow systems significantly add the value of biodiversity to the area. One of the major streams, Bridge Creek, is a major tributary of Wooley Creek. A population of rainbow trout (*Salmo gairdneri*²) exists in the main Bridge Creek stream. Wooley Creek is one of the two long term research areas in North America chosen by U.S. Fish and Wildlife Service to look at long term changes in ecosystem.

Snow dwarf bramble (*Rubus nivalis*), a member of the California Native Plant Society's (CNPS) List 2 plants (plants rare, threatened, or endangered in California, but more common elsewhere, Tibor 2001), was found in one area along the Bridge Creek trail (Keeler-Wolf 1985).

D. PRINCIPAL DISTINGUISHING FEATURES

The Bridge Creek RNA is distinguished by its old growth Douglas-fir - hardwood forest with a significant white fir and giant chinquapin element. It covers the majority (slightly under 80%) of the RNA. The forest is generally well developed, much of it being spared from even minor ground fires for over 150 years. Consequently the multi-layer structure of the forest is typically very pronounced (Photo 1).

Mature Douglas-fir forms an open canopy of trees up to 220 ft (67 m) tall and 6.5 ft (2 m) diameter at breast height (dbh). Beneath this is a sub-canopy of white fir, giant chinquapin, younger Douglas-fir, and Pacific madrone. Below the subcanopy is a small tree layer dominated by species such as Pacific yew (*Taxus brevifolia*), Pacific dogwood (*Cornus nuttallii*), and vine maple (*Acer circinatum*). Below the small tree layer lies a frequently dense shrub layer composed of Sadler oak (*Quercus sadleriana*) and scrubby saplings of giant chinquapin and tanoak. The lowest stratum is the herb and low shrub layer which is dominated by such species as Oregon grape (*Berberis nervosa*), wood rose (*Rosa gymnocarpa*), pipsissiwa (*Chimaphila umbellata* var. *occidentalis*), twin flower (*Linnaea borealis*), vanilla leaf (*Achlys triphylla*), and rattlesnake-plantain (*Goodyera oblongifolia*).

The BCRNA occupies the lower and middle slopes of the mid-section of the Bridge Creek drainage, including the lower portions of Halfmoon Creek and Yellow Jacket

² Authorities for animal species are: Moyle (1976) for fish, Robbins *et al.* (1983) for birds, and Ingles 1965) for mammals.

Creek. East- and west-facing exposures predominate. Topography is steep at the upper elevations and in the side valleys, and moderately steep along Bridge Creek (Photo 3).

The best developed, most highly structured, and oldest Douglas-fir forests occur in the lower portions of the Bridge and Halfmoon creek drainages.

E. LOCATION (reference maps 1 and 2)

(1) National Forests Involved

The BCRNA is located entirely on the Ukonom Ranger District of the Klamath National Forest. The Ukonom Ranger District and BCRNA are administered by the Six Rivers National Forest.

(2) Latitude and Longitude

The approximate mean latitude and longitude for the RNA is 41°30'N, 123°21'W.

(3) Boundary Description

The entire boundary of the BCRNA follows topographic features and elevational contours. The following narrative description accompanies Map 1:

(a) Beginning at the confluence of Yellow Jacket Creek and Bridge Creek in SE1/4 Section 34, T13N, R7E, Humboldt Base and Meridian (Point a); the RNA boundary follows the western bank of Bridge Creek upstream, conforming with the boundary of the Marble Mountain Wilderness for approximately 0.5 mile (0.8 km) to the toe of a ridge in NE1/4 Section 34 (Point b), which forms the southern boundary of the Halfmoon Creek drainage;

(b) hence, westwardly departing the boundary of the Marble Mountain Wilderness and following the ridgetop for approximately 1.4 miles (2.3 km) to the 4200 ft (1280 m) contour (Point c);

(c) hence, following the 4200 ft (1280 m) contour northwardly and eastwardly through the Halfmoon Creek drainage, crossing over into the Bridge Creek drainage in the center of Section 27 and the main branch of Bridge Creek in SE1/4 Section 22 to the point where the Bridge Creek is met (Point d);

(d) hence, southwardly following the 4200 ft (1280 m) contour along the eastern side of the Bridge Creek drainage, entering the Yellow Jacket Creek drainage in NE1/4 Section 35 and crossing the Yellow Jacket Creek to the top of a ridge forming the

southern boundary of the Yellow Jacket Creek drainage in NW1/4SE1/4 Section 35 (Point e);

(e) hence, westwardly along the top of the ridge for approximately 0.8 miles (1.4 km) to the confluence of Yellow Jacket Creek and Bridge Creek (Point a), the point of beginning.

(4) Acreage

The total acreage of this area described above is 1700 (688 ha). This may be broken down by sections in the following way:

<u>T13N, R7E</u>	<u>acres</u>	<u>hectares</u>
Section 22	4	1.6
Section 23	200	81.0
Section 26	448	181.3
Section 27	391	158.2
Section 28	120	48.6
Section 33	4	1.6
Section 34	216	87.4
Section 35	317	128.3
TOTALS	1700	688.0

(5) Elevations

Elevations in the BCRNA range from approximately 2500 ft (762 m) at the confluence of Bridge and Yellow Jacket creeks to 4200 ft (1280 m) around the majority of the boundary.

(6) Access

From the Ukonom Ranger Station at Orleans one drives north on State Highway 96 for approximately 8 miles (12.9 km) to the junction of Highway 96 and the Salmon River Road (2B01) at Somes Bar. One then turns east onto the Salmon River Road for approximately 0.25 mile (0.4 km) to the junction with Primary Forest Route 88.

At this point one turns north and ascends the paved Forest Route 88 up the south-facing slopes of the Salmon River canyon and continues on the road for approximately 10 miles (16 km) to Camp Three (noted by sign along road). The road has turned to gravel by now. Continuing on the road past Camp Three for approximately 1.5 miles (2.4 km) one turns right onto Forest Route 15N17 for

approximately 0.5 mile (0.8 km) until an unnumbered forest road turns off to the east (right).

Take the right turn at this point. The road crosses Haypress Creek in approximately 1 mile (1.6 km) and in another mile (1.6 km) a short spur to the left of the road is reached. Total mileage from the Ukonom Ranger Station to this point is approximately 21.8 miles (35.1 km) and the travel time is approximately one hour.

From this point two different routes, one leads to the northern and the other to the southern portion of RNA, are available:

(a) Northern access route

This is the most easily accessible route.

Take the left turn onto a short 0.5 mile (0.8 km) spur that ends at the trail head for the Let-er Buck Trail (7E12). From the trailhead, the easiest route (though not the shortest) follows 7E12 to Let-er Buck Meadow, thence to Halfmoon Meadow via trail 7E09, and on to the junction of 7E09 and 7E08 in the Bridge Creek Valley, approximately 0.25 miles (0.4 km) north of the RNA boundary. One then turns south following 7E08 into the RNA. Using this trail system, it is about a 3.5 hour, 4.5 mile (7.2 km) walk to the edge of the RNA.

Some time may be taken off this trip by taking a cross-country short-cut at the saddle (at approximately 4880 ft, 1487 m, elevation) along the trail 7E12 at approximately the midpoint along the boundary between sections 28 and 29, T13N, R7E. At the saddle one turns northeast and ascends the ridge to a summit east of the trail (noted as point 5130 on the Somes Bar 7.5 minute U.S.G.S. quadrangle) and then follows this summit ridge north-northeast until it drops into an arm of Halfmoon Meadow. Here, Trail 7E09 may be picked up and followed into the Bridge Creek drainage. This route is less than half as long as the trail route to the same point in Halfmoon Meadow.

(b) Southern access route:

Cross-country access to the southern part of the RNA is by a logging spur on the north slope of Black Mountain.

To reach this spur, one should continue on the road and drop down along the northernmost of the spurs on Black Mountain. At an elevation of approximately 3800 ft (1158 m) this road tops a ridge which runs down to the southwestern edge of the RNA at a point along Bridge Creek between the junction of Halfmoon and Yellow Jacket creeks.

Although this route only about 0.5 miles (0.8 km), it is very steep and covered with thick undergrowth.

Once within the RNA, travel is easy only if one stays on trail 7E08, which traverses the area from north to south, ultimately joining with the Wooley Creek Trail approximately 2 miles (3.2 km) south of the RNA. Cross country travel is difficult because of steep slopes and dense undergrowth. Travel up the creek beds is also relatively difficult since there are many narrow, rocky gorges, log-jams, and other obstacles.

F. AREA BY COVER TYPES

SAF TYPES (Eyre 1980)	percent	acres	hectares
White Fir (211)	7.4	125	50.6
Pacific Douglas-fir (229)	77.5	1317	533.0
Douglas-fir-Tanoak-Pacific Madrone (234)	13.6	231	93.5
Knobcone Pine (248)	1.6	27	10.9
TOTALS	100.0	1700	688.0

KUCHLER TYPES (Kuchler 1966)	percent	acres	hectares
Mixed Conifer Forest (5)	7.4	125	50.6
Cedar-Hemlock-Douglas-fir (2)	77.5	1317	533.0
California Mixed Evergreen Forest (25)	13.6	231	93.5
unclassified	1.6	27	10.9
TOTALS	100.0	1700	688.0

HOLLAND TYPES (Holland 1986)	percent	acres	hectares
Freshwater Seep (45400)		unmappable	
White Alder Riparian Forest (61510)		unmappable	
Mixed Evergreen Forest (81100)	13.6	231	93.5
Knobcone Pine Forest (83210)	1.6	27	10.9
Upland Douglas-fir Forest (82420)	77.5	1317	533.0
Sierran White Fir (84240)	7.4	125	50.6
TOTALS	100.0	1700	688.0

G. PHYSICAL AND CLIMATIC CONDITIONS

The BCRNA lies in the western Klamath Mountains. It occupies the central portion of the Bridge Creek drainage, an important tributary of Wooley Creek, the largest stream within the Marble Mountain Wilderness. Slopes in the Bridge Creek drainage are primarily west- and east-facing. However, because of the side drainages of Yellow Jacket and Halfmoon creeks, significant portions of the areas also face northerly and southerly directions. The predominantly low and mid-slope position of the RNA tends to

create an overall mesic environment. Forest densely covers the slopes throughout the area and little hint of the granitic substrate occurs except for occasional boulders on the slopes and jumbles along the creek beds.

Fifteen miles (24.1 km) west of the RNA (along the Siskiyou Crest), precipitation averages about 110 inches (2794 mm) annually (Rantz 1972). However, because Bridge Creek lies to the east of the 4000-5000 ft (1219-1524 m) southern Siskiyou Mountains, there is a pronounced rain shadow effect. According to isohyets in Rantz (1972) and Kahrl (1979) the BCRNA receives between 65 and 70 inches (1651-1778 mm) of precipitation per year.

The mesic conditions in the BCRNA region is more pronounced comparing to areas to the south and east receiving the same amount of annual precipitation. Several reasons contribute to this fact:

(1) Location: The BCRNA is located in the northwest corner of the state, where it receives more winter storms and summer rains. The summer rains effectively moderate the summer drought experienced by most areas of the state. High annual precipitation and summer thunderstorms combine to make the northwestern corner of the state the only area of California where yearly evaporation is exceeded by precipitation (often by more than two times, Kahrl 1979).

(2) The cloud cover of the rain-shadow created by the mountains to the west of the RNA: Although the cloud fails to bring significant local precipitation, it reduces the amount of evapotranspiration by shading and increasing humidity.

(3) Maritime influence: Advective fog occasionally enters the lower reaches of the BCRNA during the summer months. Although fog may be a rare event within the RNA, it cools the lower elevations area and reduces evapotranspiration. The maritime influence also creates moderate temperatures throughout the year.

No weather recording stations exist in or near to the RNA. Two nearest stations are Sawyer's Bar and Orleans. Orleans is 16 miles (25.7 km) southwest of the RNA at an elevation of 403 ft (123 m) along the Klamath River (41°18'N, 123°32'W). It has been recording temperature data since 1938 and precipitation data since 1900. Sawyer's Bar Work Center is 17 miles (27.4 km) southeast of the RNA (41°18'N and 123°08'W) at an elevation of 2169 ft (661 m), and has been recording temperature and precipitation since 1938. The following table summarizes the records from these two stations.

Table 1: Temperature data °F (°C) summarized over a 12 year period from 1974 to 1985 for Sawyer's Bar and Orleans

	Jan.	July	Annual	coldest	hottest	days between last spring and 1 st fall frost
	-----	-----	-----	-----	-----	-----
Sawyer's Bar (°F)	37.8	70.5	54.9	15.3	106.1	162.5
(°C)	3.2	21.4	12.7	-9.3	41.2	
Orleans (°F)	44.2	72.7	56.8	22.1	107.2	244.7
(°C)	6.8	22.6	13.8	-5.5	41.8	

Table 2: Precipitation data in inches (and mm) summarized over a 12 year period (1974-1985) from Sawyer's Bar and Orleans

	January	July	Annual
	-----	-----	-----
Sawyer's Bar	5.57 (141.5)	0.38 (9.7)	42.4 (1078.1)
Orleans	6.98 (177.4)	0.48 (12.4)	53.5 (1358.9)

The more inland (continental) climate of Sawyer's Bar is evidenced in its greater than predicted July, annual, and maximum mean temperatures (67.4 °F [19.7 °C], 51.5 °F [10.9 °C], 101.9 °F [38.9 °C] respectively, assuming a lapse rate of 3 °F/1000 ft or 1.67 °C/305 m) compared to Orleans. The relatively greater precipitation difference between the two stations indicated in Table 2 may be the result of a relatively dry period from 1974-1985 for Sawyer's Bar. According to Rantz (1972) both areas average similar total amounts of around 50 inches (1270 mm) annually.

H. DESCRIPTION OF VALUES

(1) Flora

A list of 140 taxa of vascular plants is given in the ecological survey report (Keeler-Wolf 1985, Appendix C). Eleven species were added on later by Keeler-Wolf in 1987 (Appendix C). However, both of these field trips were made in the fall (late September 1984 and mid-November 1987). Thus, it is likely that a number of early summer or spring-flowering species have not been noted.

There are no Federally-, State-, or Forest Service-listed Threatened, Endangered, or Sensitive Plants known to occur in BCRNA. The only species known from the area appearing on the CNPS lists of rare and endangered plants (Tibor 2001) is the previously mentioned CNPS List 2 species snow dwarf bramble. In California this species is known from the areas covered by Somes Bar and the Devil's Punchbowl 7.5 minute U.S.G.S.

quadrangles. The former map includes a portion of the RNA, the latter covers the areas in the northern Siskiyou Mountains about 30 miles (48 km) northwest of the RNA. Snow dwarf bramble occurs in at least one patch along the trail 7E08 in the northern portion of the RNA. The population found in the RNA may represent its southernmost distribution.

The following is a brief account of the major vegetation types occurring at the BCRNA. These are depicted on Map 3. The code numbers in parentheses following the names are keyed to the type description in Eyre (1980), Holland (1986), and Kuchler (1966).

- (a) White Fir Forest (SAF 211)
Holland: Sierran White Fir (84240)
Kuchler: Mixed Conifer Forest (5)

The forest bearing this name in the RNA is actually a transitional type between the lower-elevation Douglas-fir dominated type (SAF 229) and the upper-elevation pure white fir type (SAF 211). It occurs at the highest, most sheltered sites in the RNA. Douglas-fir typically dominates the canopy, with white fir strongly dominating the subcanopy. Average canopy height is about 150 ft (46 m) with emergent Douglas-fir to 180 ft (55 m).

As a result of heavy snows and shade, the shrub and herb layers are poorly developed, averaging 10-25 percent cover. Typical shrub species include: California hazel (*Corylus cornuta* var. *californica*), thimbleberry (*Rubus parviflorus*), Sadler oak, wood rose, and Oregon boxwood (*Paxistima myrsinites*). Herbs include: *Apocynum pumilum*, *Anemone quinquefolia*, *Vancouveria hexandra*, vanilla leaf, *Chimaphila umbellata* var. *occidentalis*, *Smilacina racemosa* var. *amplexicaulis*, *Trillium ovatum*, *Penstemon anguineus*, *Trientalis latifolia*, and white-veined shinleaf (*Pyrola picta*).

- (b) Pacific Douglas-fir (SAF 229)
Kuchler: Cedar-Hemlock-Douglas-fir (2)
Holland: Upland Douglas-fir Forest (82420)

This is the target element and the most extensive forest type in the area. Among the 29 100-m² plots sampled by Keeler-Wolf (1985), Douglas-fir dominated (basal area) on 14 of 20 plots on east-facing slopes with white fir dominating 6; on west-facing plots Douglas-fir dominated 8 of 9 plots with giant chinquapin dominating 1.

Importance values³ for all plots were: Douglas-fir 114, white fir 73, giant chinquapin 55, Pacific dogwood 15, vine maple 13, tanoak 8, Pacific yew 7, sugar pine (*Pinus lambertiana*) 6, Pacific madrone 4, incense-cedar (*Libocedrus decurrens*) 3, and big-leaf maple (*Acer macrophyllum*), canyon live oak (*Quercus chrysolepis*), and Scouler willow (*Salix scouleriana*) at 1 each. Total basal area cover was 433.5 ft²/acre (16.3 m²/ha) and total stem density for trees was 432 stems/acre (175 stems/ha). Douglas-

³ (relative density + relative frequency + relative basal area) x 100

fir seedlings had the highest densities and frequencies, but white fir was the most numerous sapling species.

Sixteen species of shrubs and 36 species of herbs were noted in the sample. These species form a relatively dense groundcover averaging about 65 percent. The most important species include: Oregon grape, Sadler oak, wood rose, California blackberry (*Rubus ursinus*), pipsissiwa, rattlesnake-plantain, vanilla leaf, and twin flower.

- (c) Douglas-fir-Tanoak-Pacific Madrone (SAF 234)
Holland: Mixed Evergreen Forest (81100)
Kuchler: California Mixed Evergreen Forest (25)

This type has a higher density of broad-leaf sclerophyllous evergreens than conifers. Typically, there is an overstory of Douglas-fir with less than 50 percent cover and a closed canopy of tanoak, Pacific madrone, and canyon live oak (*Photo 4*). On most sites tanoak is dominant. Most mixed evergreen forest in the area is on xeric south and west exposures and is characterized by numerous stems of 8-12 inches (20-31 cm) dbh tanoak with scattered clumps of Pacific madrone and occasional emergent Douglas-fir. Occasionally there are areas with large tanoak or madrone up to 36 inches (91 cm) dbh. On steep upper xeric slopes low scrubby canyon live oak may dominate.

The understory of this forest is typically poorly developed. On the most mesic lower slope exposures ground cover may reach 25 percent. Typical understory species include poison oak (*Rhus diversiloba*), pipsissiwa, white-veined shinleaf, snowberry (*Symphoricarpos mollis*), modesty (*Whipplea modesta*), *Iris* sp., wood rose, rayless arnica (*Arnica discoidea*), America vetch (*Vicia americana*), and bracken fern (*Pteridium aquilinum*).

- (d) Knobcone Pine (SAF 248)
Holland: Knobcone Pine Forest (83210)
Kuchler: no equivalent type

This type is of limited extent in the RNA, occurring only on a small portion of the lower southwest-facing slopes of Medicine Mountain. It is more extensive at slightly higher elevations adjacent to this part of the RNA (*Photo 5*).

The knobcone pine forest occupies steep xeric slopes adjacent to and up-slope from mixed evergreen forest. Evidence shows that portions of the area were burned relatively recently, as the pine is typically strongly fire-dependant.

Species associated with knobcone pine forest are assumed by Keeler-Wolf (1989) to be a mixture of mixed evergreen dominants such as tanoak and canyon live oak, with

some chaparral species such as greenleaf manzanita (*Arctostaphylos patula*), Eastwood manzanita (*A. glandulosa*), and silktassel (*Garrya fremontii*). However, because the community was only seen through binoculars, actual species composition is uncertain.

In the ecological survey report (Keeler-Wolf 1985), this type was not mapped and was assumed to be montane chaparral, a type which has been found to not actually occur within the RNA.

(e) Freshwater Seep (Holland 45400)
no SAF or Kuchler equivalent

Numerous small springs and other moist spots occur, which vary in their degree of shadiness and moisture level. The following species are typical: western staff-tree (*Euonymus occidentalis*), creek dogwood (*Cornus stolonifera*), western azalea (*Rhododendron occidentale*), mountain ash (*Sorbus cascadiensis*), horsetail (*Equisetum hymale* var. *robustum*), spikenard (*Aralia californica*), fringe cups (*Tellima grandiflora*), *Lastrea oregana*, *Glyceria elata*, *Juncus effusus* var. *gracilis*, *Juncus xiphioides*, *Lotus oblongifolius* var. *nevadensis*, *Boykinia elata*, and *Aquilegia formosa*.

(f) White Alder (*Alnus rhombifolia*) Riparian Forest (Holland 61510)
no SAF or Kuchler equivalent

The steep gradient of streams and frequent high runoff conditions restrict development of riparian growth. Sporadic clumps of riparian species occur along the major stream courses. Typical species adjacent to permanent water include: *Alnus sinuata*, umbrella plant (*Peltiphyllum peltatum*), willow (*Salix* sp.), and torrent sedge (*Carex nudata*). In seasonally inundated alluvium, white alder, mountain maple (*Acer glabrum* var. *torreyi*), Scouler willow, colt's foot (*Petasites palmatus*), goat's beard (*Aruncus vulgaris*), hedge nettle (*Stachys rigida*), scarlet current (*Ribes sanguineum*), and Indian paintbrush (*Castilleja miniata*) occur.

(2) Fauna

Because the BCRNA is a lightly visited area within a large wilderness, there is a relatively pristine complement of large mammals and game birds within it. During his two short visits to the area (late September 1984 and mid-November 1987) Keeler-Wolf sighted four black bears (*Euarctos americanus*), five groups of blue grouse (*Dendragapus obscurus*), several mule deer (*Odocoileus hemionus*), and tracks of mountain lion (*Felis concolor*). The Federally-listed Threatened Species spotted owl (*Strix occidentalis*) has been heard in the RNA, but the BCRNA is not within its critical habitat.

Included in the list of species found in the RNA (Keeler-Wolf 1985, *Appendix D*) are a mixture of montane and coastal birds and mammals. For example, both chestnut-backed (*Parus rufescens*) and mountain (*Parus gambeli*) chickadees are residents in the drainage. The former species is typical of coastal mixed evergreen forests and the latter typical of montane coniferous vegetation. With both of their habitats present in the drainage, often in the same immediate area, it is possible to see both chickadee species foraging together. This is also true with the dusky-footed and bushy-tailed wood rats (*Neotoma fuscipes* and *N. cinerea*, respectively). The former is more typical of coastal and/or low-elevation habitats and the latter most typical of montane habitats. It is likely that other species such as certain shrews with a low and a high elevation counterpart also share the drainage.

(3) Geology

The entire RNA is underlain by granitic rocks of the Wooley Creek Batholith. This is a calc-alkaline pluton dated as *ca.* 154 million years (Jurassic). Donato *et al.* (1982) consider the Wooley Creek Batholith the largest plutonic body in the Marble Mountain Wilderness, and Davis (1966) maps it as the largest granitic pluton in the northern half of the Klamath Mountains Ecological Section. Within this large pluton, about 8 x 25 miles (12.9 x 40.2 km) in size, rocks range from gabbro to granite.

Within the RNA, according to Donato *et al.* (1982), tonalite predominates in the Halfmoon Creek drainage, shifting eastward through a central belt of quartz diorite, finally to an area of diorite on the eastern side of the RNA. The most abundant rock in the RNA is quartz diorite. This rock is usually medium grained and is similar to the granitics of the Trinity Alps region.

The subtle mineralogical differences between tonalite and diorite probably have little, if any, effect on soil development and vegetation.

(4) Soils

Based on the 1981 Soil Survey of the Klamath National Forest, there are three (Order 3) soil mapping units represented in the RNA (USDA Forest Service, Klamath National Forest 1981). Map 4 shows the distribution of these soils in the RNA.

(a) Gilligan - Goldridge families association, 30-90% slopes (Map Unit 129)

The majority of the area is mapped as this soil type. This soil is composed of 70 percent Gilligan family and 20 percent Goldridge family with 10 percent inclusions.

The Gilligan family has the following characteristics:

Position: mountain sideslopes.

Surface Layer: 0-11 inches (0-28 cm); grayish brown sandy loam; weak fine granular structure; neutral.

Subsoil: 11-29 inches (28-74 cm); light gray fine sandy loam; weak fine subangular blocky structure to massive; medium acid.
Substratum: 29-47 inches (74-119 cm); white fine sandy loam; massive; medium acid.

The Goldridge family has the following characteristics:

Position: mountain sideslopes and ridges.
Surface Layer: 0-4 inches (0-10 cm); strong brown very gravelly loam; strong very fine granular structure; slightly acid.
Subsoil: 4-41 inches (10-104 cm); reddish yellow gravelly clay loam; moderate medium subangular blocky structure; medium acid.
Substratum: 41-80+ inches (104-203+ cm); yellow loam; massive; strongly acid.

Pacific Douglas-fir forest is the major vegetation cover on this soil type.

(b) Gilligan - Chawanakee families association, 30-90% slopes (Map Unit 128)

This is the next most extensive soil mapping unit in the RNA. It occupies the upper portion of the main Bridge Creek Valley and some of the upper side canyons. It is composed of 40 percent of the previously described Gilligan family soils with 35 percent Chawanakee family. There are 25 percent inclusions made up of rock outcrop, lithic xerothents, and granitic.

The Chawanakee family has the following characteristics:

Position: narrow ridges and mountain sideslopes.
Surface Layer: 0-1 inches (0-2.5 cm); brown loam; moderate fine granular structure; strongly acid.
Subsoil: 1-15 inches (2.5-38 cm); strong brown sandy loam to gravelly sandy loam; moderate fine subangular blocky structure; medium acid.
Substratum: 15+ inches (38+ cm); soft decomposed granitic rock.

Depending on the elevation and exposure, all the major forest types in the RNA (Pacific Douglas-fir, white fir, Douglas-fir-tanoak-Pacific madrone, and knobcone pine forest) can be found on this soil type.

(c) Entic Xerumbrepts - Gerle family association, 30-90% slopes (Map Unit 124)

In the RNA this soil only occupies a small portion of the upper slopes of Snowslide Gulch. It is composed of 60% Entic Xerumbrepts, 25% Gerle family, and 15 percent inclusions of mostly rock outcrop.

Entic Xerumbrepts have the following characteristics:

Position: mountain sideslopes.

Surface Layer: 0-5 inches (0-12.7 cm); grayish brown gravelly loam; moderate fine granular structure; strongly acid.
Subsoil: 5-14 inches (12.7-35.6 cm); pale brown gravelly loamy sand; weak fine granular structure; medium acid.
Substratum: 14+ inches (35.6+ cm); soft weathered granitic rock.

The Gerle family has the following characteristics:

Position: mountain sideslopes and footslopes.

Surface layer: 0-11 inches (0-27.9 cm); very dark grayish brown gravelly fine sandy loam; weak very fine granular structure; slightly acid.

Subsoil: 11-20 inches (27.9-50.8 cm); light yellowish brown gravelly fine sandy loam; massive; strongly acid.

Substratum: 20-35 inches (50.8-88.9 cm); light gray very gravelly fine sand; massive; strongly acid.

Vegetation cover on this soil type is the Pacific Douglas-fir forest.

(5) Lands

All land within the boundaries of the BCRNA is administrated by the Six Rivers National Forest, but covered by the Klamath National Forest Land and Resource Management Plan. There is no private inholding.

(6) Cultural

The Bridge Creek drainage was part of the Karuk⁴ nation (Bright 1978). The Karuk were strongly tied to the Klamath River and its major tributaries, with all known village sites occupying the river bank area of the Klamath River. However, the surrounding mountains were regularly used for hunting, gathering, and ceremonial activities (Bright 1978). There are no known cultural or archaeological sites in the BCRNA.

(7) Fire regime

The Pacific Douglas-fir forest of the RNA is a climax association, which is indicated by the good reproduction and representation of several age classes of Douglas-fir stands throughout the RNA.

Much of the low-lying portion of the area has not experienced any type of major fire for over 150 years. The occasional large, dead Douglas-fir snags are a natural occurrence and do not indicate any major outbreak of disease. The light gaps created by the dead

⁴ formerly spelled Karok.

and fallen trees are colonized primarily by Douglas-fir which indicates that this type of climax forest regenerates primarily in light gaps.

Areas on the upper slopes and more xeric exposures, however, have evidences of past fires. Vegetation cover of these areas is dominated by sclerophyllous broad-leaf and knobcone pine forest. The most recent fire occurred in the summer of 1994. Small portion of the RNA was within the Medicine fire, which was a low intensity, light underburn (Barbara Williams, personal communication, August 1994).

I. IMPACTS AND POSSIBLE CONFLICTS

(1) Mineral Resources

There are no known mineral resources within the RNA. The wholly granitic rock type is unlikely to produce any mineral resources of economic value. Thus, establishing the BCRNA will have no impact on the value of mineral resources in the area.

(2) Grazing

The RNA has no open meadows or other areas where primary livestock grazing occurs. It is currently located within an inactive grazing allotment, which will not be affected by the establishment of BCRNA.

At this point, there is no evidence of any adverse impact of grazing in the RNA. However, any change of the current grazing level should be evaluated, since in California the primary impact of grazing has been the replacement of native vegetation with the introduced annual grasses or weedy species which is not competent to the objective of RNA establishment. Should the negative impact occur, management practices that discourage or exclude grazing uses should be explored, as stated in the LRMP; refer to Appendix A.

(3) Timber

The BCRNA lies entirely within the Marble Mountain Wilderness. No timber harvest or salvage is allowed within the Wilderness. Therefore, establishment of the RNA will have no impact on the timber resources of the area.

(4) Watershed Values

The three major streams in the BCRNA, Bridge Creek, Halfmoon Creek, and Yellow Jacket Creek, are all permanent. Bridge Creek is approximately 10 miles (16 km) long and is a major tributary of Wooley Creek, which, in turn, drains into the Salmon and the Klamath rivers. Wooley Creek is one of the two long term research areas in North America chosen by U.S. Fish and Wildlife Service to look at long term changes in ecosystem.

In addition to the three major streams, several other minor rivulets, gulches, seeps, and springs occur within the RNA. A population of rainbow trout (*Salmo gairdneri*) exists in the main Bridge Creek stream.

Establishment of the RNA will help maintain the values of these water courses and associated wet meadows, riparian forests, fisheries, and wildlife.

(5) Recreation Values

As mentioned earlier, using the natural resources is part of the life style of the local community, who has been part of the local area's ecosystem for a long period of time. They have been using the Bridge Creek drainage for camping, fishing, and hunting. The population of the immediate area has remained low and the local recreational use of the RNA is light, which has not affected the values of the RNA.

Another group of recreation user is the Wilderness hikers and riders, but they seldom visit the middle and lower Bridge Creek drainage.

The trail through the RNA is relatively easy to follow, but is clearly not well-traveled. In 1985 there were some old horse droppings on the trail, but in 1987 no evidence of pack animals was present. Also, there is no evidence of recreational use off the trail within any part of the RNA.

There is one small, flat campsite cleared just above the trail crossing Bridge Creek in SW 1/4 Section 23. This campsite has no well-established fire ring and shows only sporadic use.

Thus, the current recreational use of the area has no conflicts with the values and objectives of the RNA, and will not be affected by the establishment of RNA. Standards and guidelines for recreation management of the RNA is stated in the in the LRMP.

(6) Wildlife and Plant Values

The good reproduction and representation of several age classes of Douglas-fir throughout the main body of the RNA are indications of the climax stage of succession.

Establishment of the RNA will protect the area from human intervention and maintain the wildlife and plant values of the area.

The pristine nature of the BCRNA will insure its continued value for the study of its Pacific Douglas-fir and associated forests. The large expanse of wilderness surrounding the RNA and the light recreational use of the area have combined to maintain a near-natural ecosystem, which will continue to maintain itself at the present level of human impact.

(7) Special Management Area Values

The BCRNA lies entirely within the 223,500 acre (90,449 ha) Marble Mountain Wilderness. A small portion of the southwest boundary of the RNA coincides with the boundary of the wilderness (see *Map 1*). Establishment of the RNA does not have a conflict with the Wilderness status on the recreational values of the area, since recreational use of the RNA is not encouraged. However, as mentioned above, the current recreational use of the area is very light and has no conflicts with the values and objectives of the RNA. Therefore, the impact of RNA establishment is minimal.

(8) Transportation Plans

Being wilderness, there are no plans to construct roads or trails within the area. Establishment of the BCRNA will have no impact on the transportation plans of the area.

J. MANAGEMENT PRESCRIPTION

Management direction for Research Natural Areas is stated in the Forest Service Manual 4063 and the Klamath National Forest LRMP. The LRMP presents the standards and guidelines that provide a framework for the land management decision for the lands on the Klamath National Forest.

1) RNA Management Strategy

The Klamath National Forest, will develop a specific management strategy to maintain the target element and other resource values in the best possible condition. These are to maintain BCRNA in a natural condition and to limit use to research, study, observation, monitoring and educational activities that are nondestructive and non-manipulative.

2) Wilderness Management

Activities within the RNA must comply with the management direction for the Marble Mountain Wilderness.

K. ADMINISTRATION RECORDS AND PROTECTION

The official responsibility for administration and protection of the Bridge Creek RNA is with the District Ranger, Ukonom Ranger District, P.O. Box Drawer 410, Orleans, California 95556. The Ukonom Ranger District is currently administrated by Six Rivers National Forest.

Because the BCRNA is within a congressionally designated wilderness, the authority to approve management strategy and to oversee and coordinate approved research rests with the Regional Forester of Region 5 (1323 Club Drive, Vallejo, CA 94592) (Forest Service Manual 2323.04c, 4063.04b). In exercising this authority, the Regional Forester shall coordinate plan for research with the Director of Pacific Southwest Research Station (800 Buchanan Street, Albany, CA 94710). The Research Station Director is responsible for maintaining research data files.

L. ARCHIVING

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

M. REFERENCES

- Atzet, T.; Wheeler, D.L. 1984. Preliminary plant associations of the Siskiyou Mountains Province. Portland, OR: USDA Forest Service, Pacific Northwest Region.
- Barker, L. 1984. Reconnaissance report on the proposed Bridge Creek Research Natural Area. Unpublished report on file at Pacific Southwest Research Station, Albany, California.
- Bright, W. 1978. Karok. In: Heizer, R.F. (ed.) Handbook of North American Indians, volume 8 (California). Washington D.C.: Smithsonian Institution.
- Burns, R. M. (Technical Compiler). 1983. Silvicultural systems for the major forest types of the United States. U.S.D.A. Forest Service Agriculture Handbook 445.
- Davis, G.A. 1966. Metamorphic and granitic history of the Klamath Mountains. In: Bailey, E. (ed.) Geology of Northern California. Calif. Div. Mines and Geol. Bull 190.
- Donato, M.; Barnes, C.; Colman, R.; Ernst, W ; Kays, M. 1982. Geologic map of the Marble Mountain Wilderness, Siskiyou County, California. U.S.G.S. Denver.
- Eyre, F.H. (ed.) 1980. Forest cover types of the United States and Canada. Washington D.C.: Society of American Foresters.
- Holland, R. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpublished memo available from Calif. Dept. Fish and Game, Sacramento.
- Ingles, L.G. 1965. Mammals of the Pacific states. Palo Alto, Ca: Stanford University Press.
- Kahrl, W. (ed.) 1979. The California water atlas. State of California, Sacramento
- Keeler-Wolf, T. 1985. Ecological survey of the proposed Bridge Creek Research Natural Area, Klamath National Forest, Siskiyou County, California. Unpublished report on file at Pacific Southwest Research Station, Albany, California.
- Keeler-Wolf, T. 1988. The role of *Chrysolepis chrysophylla* (*Fagaceae*) in the Pseudotsuga-hardwood forest of the Klamath Mountains of California. Madrono 35(4): 285-308.
- Keeler-Wolf, T. 1989. Draft Establishment Record for the Bridge Creek Research Natural Area within the Klamath National Forest in Siskiyou County, California.

- Unpublished report on file at Pacific Southwest Research Station, Berkeley, California.
- Keeler-Wolf, T. 1990. Ecological surveys of Forest Service Research Natural Areas in California. Gen. Tech. Rep. PSW-125. Berkeley, CA: USDA Forest Service, Pacific Southwest Research Station; 177 p.
- Kuchler, A.W. 1966. Potential natural vegetation. National Atlas, sheet no. 90. Washington, D.C.: Geological Survey, U.S. Dept. Interior.
- Little, E.L. Jr. 1979. Checklist of United States trees (native and naturalized). Agricultural Handbook 541. U.S.D.A., Washington D.C.
- Miles, S.R.; Goudey, C.B. 1997. Ecological subregions of California – section and subsection descriptions. R5-EM-TP-005. San Francisco, CA: USDA Forest Service, Pacific Southwest Region; various paging.
- Moyle, P.B. 1976. Inland fishes of California. Berkeley and Los Angeles, CA: University of California Press.
- Munz, P.A. 1959. A California flora. Berkeley and Los Angeles, CA: University of California Press; 1681 p.
- Munz, P.A. 1968. A California flora and supplement. Berkeley and Los Angeles, CA: University of California Press.
- Rantz, S.E. 1972. Mean annual precipitation in the California region. U.S.G.S. Map, Menlo Park, California.
- Robbins, C.S.; Brunn, B.; Zim, H. 1983. Birds of North America, a guide to field identification. New York, NY: Golden Press.
- Strothman, R.O.; Roy, D.F. 1984. Regeneration of Douglas-fir in the Klamath Mountains Region, California and Oregon. U.S.D.A Forest Service Pacific Southwest Forest and Range Experiment Station Gen. Tech. Rep. PSW-81.
- Tibor, D.P. 2001. Inventory of rare and endangered vascular plants of California (sixth edition). Sacramento, CA: California Native Plant Society; 387 p.
- Williams, B. Botanist. USDA Forest Service, Klamath National Forest. August, 1994.
- Williamson, R.L.; Twombly, A.D. 1983. Pacific Douglas-fir. In: Burns, R. M. (Technical Compiler). 1983. Silvicultural systems for the major forest types of the United States. U.S.D.A. Forest Service, Agriculture Handbook 445.

USDA Forest Service, Klamath National Forest. 1981. Draft soil survey of the Klamath National Forest, California. Unpublished maps and report on file at Klamath National Forest Supervisor's Office, Yreka, California.

USDA Forest Service, Klamath National Forest. 1995a. Land and Resource Management Plan.

USDA Forest Service, Klamath National Forest. 1995b. Environmental Impact Statement.

USDA Forest Service, Klamath National Forest. 1995c. Environmental Impact Statement Appendices.

Appendices

Appendix A: Information Excerpted from the Klamath National Forest Land and Resource Management Plan (1995)

A1: Management standards and guidelines for Management Area 1 - Research Natural Areas

A2: Management standards and guidelines for Management Area 2 – Wilderness

A3: Management standards and guidelines for Management Area 5 - Special Habitat, Late Successional Reserves

Appendix B: Information Excerpted from the Klamath National Forest Land and Resource Management Plan Environmental Impact Statement and Appendices

Appendix C: Vascular Plants Known from the Bridge Creek RNA

Appendix D: Vertebrates Known from the Bridge Creek RNA

Appendix A: Information Excerpted from the Klamath National Forest Land and Resource Management Plan (1995)

A1: Management standards and guidelines for Management Area 1 - Research Natural Areas

A2: Management standards and guidelines for Management Area 2 - Wilderness

A3: Management standards and guidelines for Management Area 5 - Special Habitat, Late Successional Reserves

Appendix A1: Management standards and guidelines for Management Area 1 -
Research Natural Areas

Appendix A2: Management standards and guidelines for Management Area 2 -
Wilderness

Appendix A3: Management standards and guidelines for Management Area 5 -
Special Habitat, Late Successional Reserves

Appendix B: Information Excerpted from the Klamath National Forest Land and Resource Management Plan Environmental Impact Statement and Appendices

Appendix C: Vascular Plants Known from the Bridge Creek RNA

Total number of taxa known from the RNA is 150. Many annuals and herbaceous perennials were probably overlooked due to the late date of investigations. Taxonomy follows Munz (1968).

List 1: Species identified by Keeler-Wolf in September 20-24, 1984. The abbreviations following the taxa refer to their occurrence in vegetation types:

DF ----- Douglas-fir/Hardwood

WF/DF --- White Fir/Douglas-fir

ME ----- Mixed Evergreen

R ----- Riparian

SS ----- Spring and Seep

Aceraceae

Acer circinatum DF, SS

Acer glabrum var. *torreyi* SS, R

Acer macrophyllum R

Anacardiaceae

Rhus diversiloba ME

Apocynaceae

Apocynum pumilum DF, WF/DF

Araliaceae

Aralia californica SS

Aristolochiaceae

Asarum hartwegii

Aspidiaceae

Athyrium filix-femina SS

Lastrea oregana SS

Polystichum imbricans ME, DF

Polystichum munitum DF, SS

Berberidaceae

Achlys triphylla ME, DF, WF/DF

Berberis nervosa ME, DF, WF/DF

Vancouveria hexandra ME, DF, WF/DF

Betulaceae

Alnus sinuata R

Alnus rhombifolia R
Corylus cornuta var. *californica*

Campanulaceae

Campanula prenanthoides DF

Caprifoliaceae

Linnaea borealis ssp. *longiflora* DF, WF/DF, ME, SS
Symphoricarpos hesperius DF, WF/DF
Symphoricarpos mollis ME
Sambucus caerulea SS

Caryophyllaceae

Sagina saginoides var. *hesperia* SS

Celastraceae

Euonymus occidentalis SS, DF
Paxistima myrsinites DF, WF/DF, ME

Compositae

Adenocaulon bicolor DF, WF/DF
Anaphalis margaritacea SS
Arnica discoidea DF, ME
Hieracium albiflorum DF, WF/DF
Microseris nutans SS
Helenium bigelovii SS
Petasites palmatus R
Taraxicum officinale SS

Cornaceae

Cornus nuttallii DF, WF/DF
Cornus stolonifera SS

Cupressaceae

Calocedrus decurrens DF, WF/DF

Cyperaceae

Carex nervina SS
Carex sp.

Equisetaceae

Equisetum hymale var. *robustum* SS

Ericaceae

Arbutus menziesii ME, DF
Arctostaphylos patula WF/DF

Arctostaphylos glandulosa DF, ME
Gaultheria shallon DF
Gaultheria ovatifolia DF, WF/DF, SS
Leucothoe davisiae SS
Rhododendron occidentale SS
Vaccinium parviflorum DF

Fabaceae

Lotus oblangifolius var. *nevadensis* SS
Lotus crassicaulis ME
Lupinus adsurgens (?) DF
Lupinus sp. ME
Trifolium repens SS
Vicia americana ME, DF

Fagaceae

Chrysolepis chrusophylla DF, WF/DF, ME
Lithocarpus densiflorus ME, DF
Quercus chrysolepis ME, DF
Quercus chrysolepis var. *nana* ME
Quercus vaccinifolia WF/DF

Garryaceae

Garrya fremontii WF/DF

Iridaceae

Iris sp. DF, ME

Juncaceae

Juncus xiphioides SS
Juncus effusus var. *gracilis* SS

Labiatae

Stachys rigida SS, R

Liliaceae

Clintonia uniflora DF, WF/DF
Disporum hookeri var. *trachyandrum* DF, WF/DF
Lilium kelleyanum (?) SS
Lilium washingtonianum DF
Smilacina racemosa var. *amplexicaulis* DF, WF/DF
Streptopus amplexifolius var. *denticulatus* SS
Trillium ovatum DF, WF/DF

Onagraceae

Epilobium glaberrimum SS

Epilobium angustifolium R, SS
Epilobium sp. SS

Orchidaceae

Corallorhiza maculata ME, DF, WF/DF
Corallorhiza striata DF
Goodyera oblongifolia DF, WF/DF, ME

Pinaceae

Abies concolor DF, WF/DF, R
Pinus ponderosa ME
Pinus lambertiana ME, DF, WF/DF
Pseudotsuga menziesii ME, DF, WF/DF

Poaceae

Agrostis alba SS
Agrostis exarata SS
Bromus marginatus (?) DF, ME, WF/DF
Festuca occidentalis ME, DF
Glyceria elata SS

Primulaceae

Trientalis latifolia DF, WF/DF

Pteridiaceae

Pteridium aquilinum var. *languinosum* DF, WF/DF, ME
Adiantum pedatum var. *aleuticum* SS

Pyrolaceae

Chimaphila umbellata var. *occidentalis* DF, WF/DF, ME
Pterospora andromedea ME
Pyrola picta ME, DF, WF/DF
Pyrola picata forma *aphylla* ME
Pyrola picta ssp. *dentata* WF/DF
Pyrola asarifolia SS
Pyrola secunda DF, WF/DF

Ranunculaceae

Anemone quinquefolia WF/DF
Actaea rubra ssp. *arguta* R
Aquilegia formosa SS
Ranunculus occidentalis var. *ultramontanus* SS

Rhamnaceae

Ceanothus velutinus WF/DF
Ceanothus integerrimus var. *californicus*
Ceanothus integerrimus var. *macrothyrsus*

- Rhamnus purshiana* WF/DF
- Rosaceae*
- Amelanchier pallida* DF, WF/DF
 - Aruncus vulgaris* R
 - Fragaria californica* SS
 - Prunus subcordata* SS
 - Rosa gymnocarpa* DF, ME, WF/DF
 - Rosa pisocarpa* WF/DF
 - Rubus nivalis* DF
 - Rubus ursinus* ME, DF, WF/DF
 - Rubus leucodermis* R, DF
 - Rubus parviflorus* DF, WF/DF
 - Sorbus cascadiensis* SS
- Rubiaceae*
- Galium triflorum* SS, DF
- Salicaceae*
- Salix scouleriana* DF, SS
 - Salix sp.* R, DF
- Saxifragaceae*
- Heuchera micrantha* ME
 - Peltiphyllum peltatum* R
 - Ribes sanguineum* R, SS
 - Ribes roezlii* WF/DF
 - Tellima grandiflora* SS
 - Boykinia elata* SS
 - Whipplea modesta* ME, DF
- Scrophulariaceae*
- Castilleja miniata* SS, R
 - Minulus guttatus* SS
 - Penstemon anguineus* WF/DF
 - Penstemon deustus* R
- Taxaceae*
- Taxus brevifolia* DF, SS, WF/DF
- Umbelliferae*
- Osmorhiza chilensis* DF, WF/DF
- Violaceae*
- Viola glabella* DF, WF/DF, SS
 - Viola sempervirens* DF

List 2: Additional species identified by Keeler-Wolf in November 12-15, 1987.

Ribes lacustre: riparian along Halfmoon Cr.

Calypso bulbosa: Douglas-fir forest Halfmoon Cr. drainage

Picea breweriana: one small tree, Douglas-fir forest halfmoon Cr. drainage

Cirsium vulgare: riparian Halfmoon Cr.

Pinus attenuata: common on mid-slopes on east side of RNA

Habenaria elegans: Halfmoon Cr. drainage Douglas-fir forest

Rhododendron macrophyllum: one patch in Halfmoon Cr. drainage, N slope

Chimaphila menziesii: Halfmoon Cr. drainage Douglas-fir forest

Vaccinium membranaceum: upper elevations of Halfmoon Cr. drainage

Arctostaphylos nevadensis: upper elevations Halfmoon Cr. drainage

Blechnum spicant: seep in lower Halfmoon Cr. drainage

Appendix D: Vertebrates Known from the Bridge Creek RNA

This list is limited to species noted on two field trips made by Keeler-Wolf in September 1984 and November 1987. Undoubtedly, a much richer vertebrate fauna exists than is indicated. Authorities are Moyle (1976) for fish, Robbins et al. (1983) for birds, and Ingles (1965) for mammals.

Rainbow trout (*Salmo gairdneri*)

Blue grouse (*Dendragapus obscurus*)

Band-tailed pigeon (*Columba fasciata*)

Northern pygmy owl (*Glaucidium gnoma*)

Spotted owl (*Strix occidentalis*)

Acorn woodpecker (*Melanerpes erythrocephalus*)

Pileated woodpecker (*Dryocopus piliatus*)

Red-breasted nuthatch (*Sitta canadensis*)

Brown creeper (*Certhia americana*)

Chestnut-backed chickadee (*Parus rufescens*)

Mountain chickadee (*Parus gambeli*)

Stellar's jay (*Cyanocitta stelleri*)

Common raven (*Corvus corax*)

Winter wren (*Troglodytes troglodytes*)

American Dipper (*Cinclus mexicanus*)

Varied thrush (*Ixoreus naevius*)

Hermit thrush (*Catharus guttatus*)

Golden-crowned kinglet (*Regulus satrapa*)

Ruby-crowned kinglet (*Regulus calendula*)

Pine siskin (*Carduelis pinus*)

Shrew (*Sorex* sp.)

Broad-handed mole (*Scapanus latimanus*)

Townsend's chipmunk (*Eutamias townsendi*)

Chickeree (*Tamiasciurus douglasii*)

Bushy-tailed woodrat (*Neotoma cinerera*)

Dusky-footed woodrat (*Neotoma fuscipes*)

Black bear (*Euarctos americanus*)

Mule deer (*Odocoileus hemionus*)

Mountain lion (*Felis concolor*)

Vole (*Microtus* sp.)