A. INTRODUCTION

The Devil's Basin Research Natural Area (DBRNA) lies within the Corning Ranger District, Mendocino National Forest (Maps 1 and 2). The California black oak (Quercus kelloggii[1])stands and surrounding areas of Devil's Basin were first reconnoitered in 1984 (Henry 1984), and subsequently proposed as a representative of the California Black Oak Woodland type (Holland 1986). An ecological survey of the basin was completed in 1987 (Newton 1987). Unless otherwise noted, information contained in this Establishment Record is based on this ecological survey. The DBRNA has had no history of intensive use such as logging or grazing. The DBRNA is entirely under public ownership with the Mendocino National Forest.

1) Land Management Planning
The establishment of Devil's Basin RNA is recommended and evaluated in the Mendocino National Forest Land and Resource Management Plan (LRMP 1995) and the Environmental Impact Statement and Appendices for the LRMP (U.S.D.A. Forest Service 1995a-c). The land allocation for the Devil's Basin RNA was decided by the signing of the Record of Decision (ROD) for the LRMP by the Regional Forester (1995). The establishment of the DBRNA is completed upon signature of this Establishment Record with concurrence of the Station Director. The area lies within the Research Natural Areas Management Area #5 allocated to Management Prescription #11 which emphasizes the preservation of natural conditions and the protection of features for which the RNA was established (Appendix 3).

B. OBJECTIVES

The primary purpose for establishment of the DBRNA is to preserve a representative of a Black Oak Woodland ecosystem and its associates in a condition minimally modified by humans within the North Coast Physiographic Province for their scientific value and educational importance. The DBRNA will provide onsite educational opportunities, serve as a baseline for measuring long-term ecological changes, and function as a control area for comparing results from manipulative research and monitoring.

The Black Oak Woodland is one of 13 botanical elements presently targeted for RNA representation within this province. In addition, establishment of the DBRNA will contribute to the genetic diversity of the National Forest resource base.

C. JUSTIFICATION FOR ESTABLISHMENT

California black oak has broad distribution in California (Griffin and Critchfield 1972). Within the DBRNA, a wide elevational zone of the species (2500 feet, 762 m), as well as a gamut of seral stages are represented, providing opportunities for the study of succession and long-term ecological changes. The pure oak stand that embodies the bulk of the area is large, facilitating the continuance of current ecological conditions. Biological diversity is enhanced with the occurrence of common associates of the type throughout the remaining area (Map 3) (Henry 1984).

Additionally, oak habitats are important for wildlife species. Nearly 110 avian species use California oaks (Quercus spp.) during the breeding season for foraging, nesting, or perching (Verner 1979). Many persistent,

sub-climax California black oak stands are found on lower elevations in the DBRNA and form an important part of the winter range for wildlife species. Kerns (1979) found that of the California black oak and "edge" habitats he sampled, mature California black oak stands provided the most valuable habitat for wildlife. The second most important oak habitat was determined to be the edge between mature oak stands and young oak stands. The edge between mature oak and conifer stands was the third most important. Many studies investigate the value of oak habitat for wildlife and the DBRNA provides an important location to persue these and other wildlife habitat relationships further.

One listed species, the foothill yellow-legged frog, was observed in the RNA. This frog is a Federal Category 2 and California species of special concern. The area contains potential habitat for the California red-legged, a proposed endangered species.

D. PRINCIPAL DISTINGUISHING FEATURES

Overlooking the perennial Thomes Creek, on the north slope of Log Springs Ridge, the DBRNA covers an area of 671 acres (272 hectares) and is centered around a large flat on the toe of an old land failure. The area features a diverse mixture of vegetation types, including (Map 3): Black Oak Woodland (Holland 1986), Coast Range Mixed Conifer Forest, Blue Oak Woodland, Canyon Live Oak Forest, and Northern Mixed Chaparral. Within the DBRNA, California black oak can be found in a continuum of stages, from a large, persistent sub-climax stand, to non-persistent seral stands of black oak forests or mixed evergreen forests.

E. LOCATION

1) The DBRNA is located within the North Coast Range Physiographic Province in the Mendocino National Forest, Corning Ranger District (Map 1).

2) The center of the DBRNA lies at 122° 43' west longitude and 39° 51' north latitude.

3) The DBRNA includes all or parts of the following National Forest System lands:

T. 23 N., R. 8 W., Mount Diablo Meridian;
E1/2 Section 14, SE1/4 SE1/4 Section 11, SW1/4 SW1/4 Section 12, and Section 13 (Map 3).

The northern boundary of the DBRNA follows Thomes Creek from a point 0.1 mile (0.2 km) southeast of its confluence with Horse Trough Creek to its confluence with an unnamed tributary 1.1 mile (1.8 km) downstream to the southeast. The boundary then follows the ridgeline west of this unnamed tributary in a southwesterly direction for aproximately 0.7 mile to the southern section line of section 13. The southern boundary of the DBRNA follows this section line due west for aproximately 0.6 mile, and then turns due north at the western section line of section 13. The boundary then follows said section line 0.5 mile (0.8 km) due north, then 0.25 mile (0.4 km) due west, and finally 0.5 mile (0.8 km) due south to juncture with the southern section line of section 14. Here, the boundary runs due west along said section line for 0.3 mile (0.5 km) to the ridgetop above the unnamed east fork of Horse Trough Creek. Following this ridgetop north for 0.5 mile (0.8 km), and then northeast for 0.6 mile (1.0 km), the boundary returns to its starting point at Thomes Creek (Maps 2 and 3).

4) Total acreage of the DBRNA is 671 acres (272 hectares).

5) The DBRNA rises from an elevation of 1400 feet (427 meters) at its northeast corner to 3660 feet (1116 meters) at its southeast corner. Steep slopes to 60% rise to the east and west, while slopes to the south are less steep (30-60%).

6) Map 2 illustrates the best access route to the DBRNA. From Corning on Interstate 5, take the Corning Road (A9) to Paskenta (about 31 miles, 49.9 km) west to its intersection with Forest Service Road 23N02. This is a hard surfaced road also delineated as M4. Yearlong access is provided by 23N02 from the town of Paskenta to Hall Ridge. Just south of Hall Ridge (at about 7 miles, 11.3 km), turn north onto dirt road 23N70 at the "plantation" gate and follow this road for one mile (.6 km) to the Louisiana Pacific (L-P) gate. Through this gate, the road becomes accessible only by 4-wheel drive vehicle. Keys are available from the Corning Ranger District office. The L-P road runs the length of a 80-acre (32 ha) L-P parcel into the DBRNA and stops at a slide located above the inner gorge of Thomes Creek. A right-of-way agreement is currently being developed between L-P and the Forest Service to ensure that no conflicts develop over access across private land. It is recommended to walk the 4-wheel drive road, which will require approximately 30 minutes going down the steep slope into the unit, and one hour returning. The dirt road (23N70) and 4-wheel drive road are inaccessible by vehicle during wet months (normally November-April), when walking is the best mode of travel to and from paved road 23N02. The western and eastern boundaries of the site can be accessed by traversing the slopes from the flat in the center of the unit.

F. AREA BY COVER TYPE

SAF TYPES (Eyre 1980)	acres	hectares
California Black Oak (246)	436	177
Pacific ponderosa pine-Douglas-fir (244)	43	18
Blue oak-Digger pine (250)	23	9
Canyon live oak (249)	85	34
Unclassified	84	34
TOTALS	671	272

KUCHLER TYPES (Kuchler 1966)	acres	hectares
Components of Mixed Conifer and California Mixed Evergreen Forests (K-5 and K-25)	436	177
Mixed Conifer Forest (K-5)	43	18
California Mixed Evergreen Forest (K-25)	85	34
California Oakwoods (K-26)	23	9
Chaparral (K-29)	84	34
TOTALS	671	272

HOLLAND TYPES (Holland 1986)	acres	hectares
Black Oak Woodland (71120)	436	177
Coast Range Mixed Conifer Forest (84110)	43	18

Blue Oak Woodland (71140)	23	9
Canyon Live Oak Forest (81320)	85	34
Northern Mixed Chapparal (37110)	84	34
TOTALS	671	272

G. PHYSICAL AND CLIMATIC CONDITIONS

The DBRNA is located on the east side of the California Coast Ranges. It encompasses Devil's Basin, which is enclosed on the west by Horse Trough Ridge, on the south by Log Springs Ridge and Hall Ridge, and on the north by Thomes Creek. Characterized by northeasterly-facing slopes, the rugged topography of the DBRNA ranges from 30% slopes in the southern quarter, to 60% slopes toward the east and west. Devil's Basin itself forms a flat in the center of the RNA (Map 3).

The climate of the area is predominately Mediterranean, but somewhat montane at the higher elevations. Winters are typically cold and wet, with the majority of the precipitation falling between November and March. Some snow falls at higher elevations. Summers are usually hot and dry, and little to no precipitation falls between May and September.

No permanent weather recording devices exist near the DBRNA. Limited weather data for the summer months from May to October are available for the towns of Covelo, and Alder Springs, and year-round weather data is available for Paskenta and Stonyford. Weather data records from all four stations have been kept from 1967 through the present. Covelo is located on the west side of the Coast Ranges, is influenced by maritime weather, and hence data from this location is the least applicable to the DBRNA site.

The climate at the upper elevations of the DBRNA is probably most similar to Alder Springs, located on the east side of the Coast Ranges at similar elevations. Alder Springs is situated 14 aerial miles (23 km) southwest of Devil's Basin. Based on weather data between 1976 and 1985, average annual precipitation at Alder Springs is 34.70 inches (88.14 cm) (U.S. Forest Service, unpublished data).

Conversely, the climate at the lower elevations of the DBRNA is probably most like Paskenta and Stonyford, which are both located at low elevations on the east side (Map 1). Paskenta is the nearest station, located approximately ten aerial miles (16 km) east of Devil's Basin at an elevation of 750 feet (229 m). Stonyford is located approximately 34 aerial miles (55 km) southeast of Devil's Basin at an elevation of 1200 feet (366 m).

Table 1 summarizes ten years of precipitation data for Paskenta and Stonyford. Average annual precipitation for ten years between 1976 and 1985 was 27.06 inches (689 mm) for Paskenta, and 23.95 inches (609 mm) for Stonyford. Minimum average precipitation occurred during the month of July, and maximum average precipitation occurred during January (U.S. Forest Service unpubl. data). It is interesting to note that, although Paskenta is at a lower elevation than Stonyford, average precipitation values over the ten years between 1976 and 1985 were higher for Paskenta in eight out of twelve months. This probably indicates the influence of topography and exposure, which should be considered when extrapolating data to the DBRNA site for research purposes. Table 2 presents temperature and relative humidity data for Stonyford. Temperatures are relatively high in the summer, often reaching 100°F (38°C) or more. Winter occasionally brings temperatures below 32°F (0° C) and temperatures at the higher elevations of the DBRNA would be expected to drop below freezing more often than at Stonyford.

TABLE 1: Rainfall Patterns for Paskenta and Stonyford, California between 1976 a nd 1985 in inches (mm in parentheses) *.

PASKENTA

	JULY	AUG	SEPT	OCT	NOV
1985	0.00	0.02 (0.51)	2.48 (63.10)	1.13 (28.75)	3.45 (87.79)
1984	0.00	0.18 (4.58)	0.10 (2.54)	1.71 (43.51)	8.12 (206.62)
1983	0.30 (7.63)	0.00	1.91 (48.60)	0.65 (16.54)	8.43 (214.50)
1982	0.00	0.00	0.80 (20.36)	1.42 (36.13)	4.40 (111.96)
1981	0.00	0.00	0.55 (13.99)	3.05 (77.61)	5.35 (136.13)
1980	0.00	0.00	0.38 (9.67)	1.13 (28.75)	0.30 (7.63)
1979	0.00	0.00	0.64 (16.28)	2.72 (69.21)	4.83 (122.90)
1978	0.00	0.00	0.84 (21.37)	0.00	1.91 (48.60)
1977	0.08 (2.04)	0.00	0.84 (21.37)	0.12 (3.05)	2.71 (68.96)
1976	0.10 (2.54)	0.76(19.34)	0.73 (18.58)	0.21 (5.34)	1.00 (25.45)
	---	---	---	---	---
10-yr X	0.05 (1.27)	0.10 (2.54)	0.93 (23.66)	1.21 (30.79)	4.05 (103.05)

	DEC	JAN	FEB	MAR
1985	2.71 (68.96)	5.31 (135.11)	10.52(267.68)	5.04 (128.24)
1984	2.58 (65.65)	0.47 (17.81)	0.00	1.24 (31.55)
1983	0.00	0.25 (6.36)	1.50 (38.17)	1.19 (30.28)
1982	0.89 (22.65)	7.61 (193.64)	7.42 (188.80)	12.85(326.97)
1981	4.71(119.59)	3.77 (95.93)	2.40 (61.07)	4.44 (112.98)
1980	4.18(106.36)	9.96 (253.44)	1.98 (50.38)	4.68 (119.08)
1979	3.84 (97.71)	3.14 (79.90)	9.61 (244.53)	1.79 (45.55)
1978	0.01 (0.25)	5.94 (151.15)	4.57 (116.28)	3.51 (89.31)
1977	5.82 (148.09)	13.18(335.37)	6.70 (170.48)	5.13 (130.53)
1976	0.34 (8.65)	1.72 (43.77)	1.25 (31.81)	2.73 (69.47)
	---	---	---	---
10-yr X	3.51 (89.31)	5.14 (130.79)	4.60 (117.05)	4.26 (108.40)

	APR	MAY	JUN	ANNUAL TOTALS
1985	1.11 (28.24)	0.26 (6.62)	0.00	32.03 (815.01)
1984	0.30 (7.63)	0.00	0.00	14.70 (374.05)
1983	1.27 (32.32)	0.00	0.12 (3.05)	25.62 (651.91)
1982	3.79 (96.44)	1.04 (26.46)	8.18 (208.14)	48.40 (1231.55)
1981	1.21 (30.79)	0.15 (3.82)	1.27 (32.32)	26.90 (684.48)

1980	1.94 (49.36)	1.46 (40.71)	0.00	25.71 (654.20)
1979	1.15 (29.26)	0.37 (9.41)	0.64 (16.28)	28.73 (731.04)
1978	1.46 (40.71)	0.30 (7.63)	0.00	18.27 (464.89)
1977	2.78 (70.74)	0.08 (2.04)	0.00	37.44 (952.67)
1976	0.48 (12.21)	3.23 (82.19)	0.00	12.55 (319.34)
	---	---	---	---
10-yr X	1.55 (39.44)	0.69 (17.56)	1.02 (25.95)	21.04 (688.04)

continued--

TABLE 1: (continued) **Rainfall in inches (mm in parentheses).**
STONYFORD

	JULY	AUG	SEPT	OCT	NOV
1985	0.00	0.10 (2.54)	0.88 (22.39)	0.77 (19.59)	2.93 (74.55)
1984	0.00	0.23 (5.85)	0.22 (5.60)	0.57 (14.50)	6.96 (177.10)
1983	0.00	0.92 (23.41)	0.26 (6.62)	0.57 (14.50)	9.51 (241.98)
1982	0.06 (1.53)	0.18 (4.58)	0.52 (13.23)	1.73 (44.02)	4.86 (123.66)
1981	0.00	0.00	0.45 (11.45)	1.61 (40.97)	4.40 (111.96)
1980	0.00	0.00	0.32 (8.14)	0.30 (7.63)	0.25 (6.36)
1979	0.00	0.23 (5.85)	0.13 (3.31)	2.15 (54.71)	2.45 (62.34)
1978	0.00	0.00	0.63 (16.03)	0.00	1.27 (32.32)
1977	0.00	0.00	0.47 (11.96)	0.40 (10.18)	2.42 (61.58)
1976	0.10 (0.25)	0.71 (18.07)	0.61 (15.52)	0.41 (10.43)	0.53 (13.49)
	---	---	---	---	---
10-yr X	0.01 (0.25)	0.24 (6.11)	0.45 (11.45)	0.85 (21.63)	3.56 (90.59)

	DEC	JAN	FEB	MAR
1985	2.51 (63.87)	5.60 (142.49)	10.46 (266.16)	4.95 (125.95)
1984	1.94 (49.36)	0.34 (8.65)	1.24 (31.55)	1.88 (47.84)
1983	0.96 (278.88)	0.57 (14.50)	1.46 (37.15)	1.07 (27.23)
1982	2.16 (54.96)	6.22 (158.27)	8.44 (214.76)	9.00 (229.01)
1981	4.15 (105.60)	3.94 (100.25)	1.43 (36.39)	4.05 (103.05)
1980	4.40 (111.96)	7.10 (180.66)	1.32 (33.59)	2.42 (61.58)
1979	6.05 (153.94)	4.29 (109.16)	9.69 (246.56)	1.86 (47.33)
1978	0.08 (2.04)	8.65 (220.10)	5.51 (140.20)	2.55 (64.89)
1977	5.03 (127.99)	11.71 (297.96)	7.53 (191.60)	4.16 (105.85)
1976	0.66 (16.79)	1.61 (40.97)	1.23 (31.30)	2.50 (63.61)
	_____	_____	_____	_____
10-yr X	3.79 (96.44)	5.00 (127.23)	4.83 (122.90)	3.44 (87.53)

	APR	MAY	JUN	ANNUAL TOTALS
1985	0.50 (12.72)	0.00	0.00	28.70 (730.28)
1984	0.31 (7.89)	0.00	0.00	13.69 (348.35)
1983	0.42 (10.69)	0.05 (1.27)	0.00	25.79 (659.03)
1982	3.58 (91.09)	0.70 (17.81)	0.33 (8.40)	37.78 (961.32)
1981	1.93 (49.11)	0.00	0.77 (19.59)	22.73 (578.37)
1980	1.03 (26.21)	0.19 (4.83)	0.00	17.33 (440.97)
1979	2.16 (54.96)	0.56 (14.25)	0.12 (3.05)	29.69 (755.47)
1978	1.32 (33.59)	0.80 (20.36)	0.00	20.09 (511.20)
1977	1.27 (30.53)	0.00	0.01 (0.25)	33.00 (839.69)
1976	0.14 (3.56)	1.56 (39.69)	0.00	9.97 (253.69)
10-yr $\bar{X}$	1.27 (30.53)	0.39 (9.92)	0.12 (3.05)	23.87 (607.38)

TABLE 2: Climate Data for 1983 at Stonyford, California. Temperatures in ^{o}F (^{o}C in parentheses). Relative humidity is in percent. *

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Dry Bulb Temp $\bar{X}$	54 (12)	54 (12)	56 (13)	54 (12)	75 (24)	84 (29)	74 (23)	86 (30)	85 (29)	76 (24)	57 (14)	50 (10)
$\bar{X}$ MAX	62 (17)	61 (16)	62 (17)	65 (18)	79 (26)	93 (34)	93 (34)	95 (35)	96 (36)	84 (29)	66 (19)	59 (15)
$\bar{X}$ MIN	34 (1)	40 (4)	40 (4)	39 (4)	46 (8)	54 (12)	53 (12)	60 (16)	54 (12)	46 (8)	44 (7)	44 (7)
EXT LOW	25 (-4)	30 (-1)	29 (-2)	30 (-1)	32 (0)	44 (7)	43 (6)	53 (12)	48 (9)	40 (4)	34 (1)	32 (0)
EXT HI	78 (26)	70 (21)	72 (22)	80 (27)	101 (38)	102 (39)	109 (43)	110 (43)	106 (41)	95 (35)	80 (27)	66 (19)

RELATIVE

HUMID. X	60	70	62	55	54	27	27	32	30	40	60	70
$\bar{X}$ MAX RH	99	97	94	93	87	70	74	78	81	89	90	92
$\bar{X}$ MIN RH	47	55	50	42	29	20	20	20	22	28	45	53

H. DESCRIPTION OF VALUES

1) Flora

The flora of the DBRNA includes at least 145 taxa of vascular plants, none of which has been listed as rare, endangered or threatened plants by the CNPS (Skinner and Pavlik 1994) or sensitive by the Forest Service. Brodiaea coronaria ssp. rosea, a CNPS list 1B species and State-listed endangered subspecies, has been reported from surrounding areas. All but one of the recorded Brodiaea populations within the RNA have been found to contain either a non-rosy variety of Brodiaea or no Brodiaea at all. The closest recorded site is on private land, and the site has not been examined for Brodiaea recently. Additionally, conditions favorable for the occurrence of the Forest Service sensitive species Epilobium nivium occur in the Buttermilk Springs Management Area, but its occurrence on the DBRNA is unlikely due to the elevation and aspect of the DBRNA. Appendix 1 lists the plant species found within the DBRNA during the ecological survey.

Map 3 illustrates the major vegetation types occurring on the DBRNA, using Holland's (1986) classification with Kuchler (1966) and SAF (Eyre 1980) equivalents indicated. Following is a description of these major plant communities. Numbers following the plant community names are Holland (1986) type codes.

(a) Black Oak Woodland (71120). This is the most abundant vegetation type found in the area. It is generally located on the poorer gravelly soils of colluvial origin on lower benches. Black Oak Woodland sites are composed of either persistent, sub-climax stands, or of non-persistent seral stages of Black Oak Woodland collectively forming a continuum of seral stages developing toward a climax Mixed Conifer Forest. Most individual stands are even-aged. Additionally, on better sites, California black oak can act as a nurse crop for conifer species, recovering quickly following major perturbations such as fire.

The persistent sub-climax stands of black oak have a variable canopy layer from 50-90% cover, dominated by oak with lesser amounts of ponderosa pine (Pinus ponderosa) and Douglas-fir (Pseudotsuga menziesii). Reproduction of all canopy species is present, although California black oak dominates and may be as high as 20% in cover. Basal area values for these sub-climax stands vary from 63-360 square feet per acre (14-83 sq. m/ha), and ages range from 70-120 years or more (8-30", 20-76 cm dbh).

The shrub layer of the persistent sub-climax stands of California black oak varies from 5-20% in cover and is generally more diverse than in younger stands. The constituent species are poison oak (Rhus diversiloba) and squaw bush (Rhus trilobata). Redbud (Cercis occidentalis), mountain mahogany (Cercocarpus betuloides), and Sierra gooseberry (Ribes roezlii) are present in lower proportions. Water is relatively abundant in spring and summer, giving rise to a dense, diverse population of annual and perennial grasses and forbs. Total herbaceous cover is consistently 60% and dominated by California fescue (Festuca californica). Other abundant species include starflower (Trientalis latifolia), sweetroot (Osmorhiza chilensis), soft chess (Bromus mollis), and Collinsia sparsifolia.

Occasional species on these sites include Bolander's bedstraw (Galium bolanderi), Monardella villosa, Lemmon's needlegrass (Stipa lemmonii), pussy ears (Calochortus spp.), mule-ears (Wyethia

angustifolia), Shelton's violet (Viola sheltonii), milkweed (Asclepias cordifolia), red-flowering larkspur (Delphinium nudicaule), Dichelostemma multiflora, and wild hyacinth (Arbrodiaea pulchella).

The young seral stands of Black Oak Woodland have an average canopy cover of 60% dominated by California black oak with occasional Douglas-fir and canyon live oak (Quercus chrysolepis). Unlike the persistent sub-climax stands, reproduction in the young stands of the California black oak and Douglas-fir is low primarily due to a heavy duff layer and heavy crown cover (Henry 1984). Basal area values range from 100-130 square feet per acre (23-30 sq.m/ha), and ages range from 60-70 years (4-8 inches, 10-20 cm dbh). Young conifers do not appear to be converting the area to a conifer-hardwood type, but are maintaining the existing conifer component at a steady low level (Henry 1984).

The shrub layer of these seral stands varies from 10-20% cover and is dominated by poison oak, redbud and squaw bush. The herbaceous layer ranges from 15-30% cover, and commonly contains California fescue, bedstraw (Galium triflorum), wild pea (Lathyrus nevadensis), California catchfly (Silene californica), and soap root (Chlorogalum pomeridianum).

(b) Coast Range Mixed Conifer Forest (84110). This type is found only at the highest elevations on the southern boundary of the area and on the better soils. The upper canopy layer is open (20% cover) and is dominated by Douglas-fir with small amounts of ponderosa pine and knobcone pine (Pinus attenuata). The lower canopy layer, however, averages 70% cover, ranges from 50-90 feet (15-27 m) in height, and contains California black oak. Basal area is approximately 220 square feet per acre (51 sq. m/ha), and ages range from 150-200 years, with some trees over 300 years old. Reproduction of California black oak and Douglas-fir is low.

The shrub layer is either low in total cover or absent, and species include Sierra gooseberry and poison oak. The herbaceous layer is also low in total cover, averaging 10%, but is somewhat diverse and dominated by barberry (Mahonia dictyota). Other common species include hound's tongue (Cynoglossum grande), sweetroot, bedstraw, Shelton's violet, and snowberry (Symphoricarpos mollis). Occasional species include starflower, pipsissewa (Chimaphila menziesii), and California fescue.

(c) Blue Oak Woodland (71140). This type is found on the western edge of the site on deeper soils. It forms a savannah with an open canopy (5% cover) dominated by 100 year-old blue oak (Quercus douglasii) with some Oregon white oak (Quercus garryana). Basal area is approximately 40 square feet per acre (9 sq. m/ha) and heights reach 50 feet (15 m). No shrub species are present.

The diverse herbaceous layer, generally totalling 100% cover, is dominated by grass species. Lemmon's needlegrass is the dominant species, and other abundant grass species include hairgrass (Aira caryophyllea), wild oats (Avena barbata), soft chess, foxtail chess (Bromus rubens), onion grass (Melica harfordii), and annual fescue (Vulpia microstachys var. ciliata, and Vulpia myuros var. hirsuta). Other abundant species include poison oak, buckwheat (Eriogonum nudum), larkspur (Delphinium hesperium var. hesperium), hedge-parsley (Torilis arvensis), fringe-pod (Thysanocarpus curvipes), clover (Trifolium albopurpurem), and hairy clover (Trifolium ciliolatum).

(d) Canyon Live Oak Forest (81320). On the steep slopes of the eastern edge of the DBRNA, with shallow or no soil, Canyon Live Oak Forests occur. The canopy layer of canyon live oak is approximately 60 feet (18 m) in height and the trees often have multiple trunks, probably from crown-sprouting following fire. Saplings and seedlings of canyon live oak and California bay (Umbellularia californica) are sparse.

The shrub layer ranges from 10-70% cover, and 5-30 feet (2-9 m) in height. California buckeye (Aesculus californica) and poison oak are the dominant species, while mountain mahogany and wild walnut (Juglans hindsii) are occasionally present. Cover of herbaceous plants varies from less than 5% to as much as 90% depending on the sparsity of the canopy and shrub layer, and the amount of moss coverage and soil development. Bolander's bedstraw and twining brodiaea (Dichelostemma volubilis) are the most common herbaceous species. Grass species similar to those found beneath the Blue Oak Woodland dominate in some areas that have deeper soils. Stonecrop (Sedum spp.) favors outcrops and is confined to this vegetation type on the DBRNA. Some rocky outcrops also are densely covered in bryophytes.

(e) Northern Mixed Chaparral (37110). This type occupies the steep, rocky, unstable slopes along Thomes Creek. The canopy of foothill pine (Pinus sabiniana), California black oak, and canyon live oak, when present, reaches only 5% in cover and 50 feet (15 m) in height. Saplings of oak species are present and compose a component of the shrub layer.

The shrub layer is very dense, averaging 90% cover, and dominated by scrub oak (Quercus dumosa). Other abundant species are California buckeye, mountain mahogany, and poison oak. Present in lesser amounts are squaw bush, chamise (Adenostoma fasciculatum), deer brush (Ceanothus integerrimus), and toyon (Heteromeles arbutifolia). Cover of herbaceous plants is generally less than 5%, and is dominated by California fescue, starflower, and twining brodiaea. A more diverse herbaceous layer develops on slides and slumps where the shrub layer has been removed. In these areas, the herbaceous vegetation resembles that of the Blue Oak Woodland.

2) Fauna

The DBRNA is within a transition range and a major migration route between summer and winter range for black-tailed deer (Odocoileus hemionus columbianus). Portions of the RNA are also within the Thomes Creek key winter range for this species. Parts of the RNA are also included within a Late Successional Reserve (LSR RC313) and contain dispersal and critical northern spotted owl habitat and dispersal habitat for goshawk, marten and fisher. Thomes Creek provides an important rainbow trout fishery. Appendix 2 lists those wildlife species likely to be found within the DBRNA. Species observed during the 1987 Ecological Survey are marked on this list and the habitat in which it was seen is annotated. Foothill yellow-legged frog is the only observed species with Federal or State listing. It is a Federal Category 2 species and California species of concern. The area contains potential habitat for the California red-legged frog, a proposed endangered species.

3) Geology

The Franciscan Formation, a core, eugeosynclinal complex covering much of the North Coast Range region dating from the late Jurassic or the early Cretaceous, forms the bedrock of the DBRNA (Gowen 1967). The Franciscan Formation is a vast, diverse assemblage of marine sedimentary, volcanic, and metamorphic rocks

with local intrusions of serpentine, all of which have experienced unsystematic disturbance. Sandstone, primarily graywacke, is the dominant rock type of the Franciscan assemblage, and shale may amount to 10% of the Franciscan sedimentary rocks, occurring as intercalations between graywacke beds and as thicker units that locally predominate over other rock types (Page 1966).

Schistose meta-sedimentary rock (predominately micaschist) is the dominant rock of the DBRNA. There is considerable evidence of instability in the form of slumps and stream erosion on the lower slopes of the site that consist of colluvium. There is also
colluvial movement of soil and rock on the steep slopes and rocky ridgelines throughout the area, especially beneath the rocky outcrops common on the eastern edge of the unit.

4) Soils

Four soil series characterize the DBRNA (Map 4). The Tyson and Sheetiron series are the two dominant soil types, the Tyson occuring on the poorer, and the Sheetiron on the better sites. Hulls gravelly loam underlies the brushland on the extreme northern corner of the area, and the Laughlin series is found only in the area containing Blue Oak Woodland. Overall, soils are derived from the highly fractured metasedimentary parent material, and are 24-36 inches (61-91 cm) deep (State Coop. Soil-Veg. Survey 1962). Colluvial material from above the central flat is common throughout the area (Henry 1984).

The Tyson series coincides with the Canyon Live Oak Forest and Black Oak Woodland vegetation types. It is characterized by moderately shallow, slightly acid gravelly loams with moderate permeability and good drainage. Generally of north aspects, these soils are commonly found on steep to very steep (30-70%) canyon slopes.

The upper slopes of the DBRNA, clothed in Black Oak Woodland or Coast Range Mixed Conifer Forest, are characterized by the Sheetiron soil series. In fact, the Coast Range Mixed Conifer Forest is restricted to this soil series. A shallow to moderately shallow, moderately acid gravelly loam, the Sheetiron series has moderate permeability and good drainage. Topography is gentle to steep (10-70% slopes), and generally of north aspect.

Hulls series soils, on the northern corner of the area on moderately steep slopes, are shallow, moderately acid clay loams with moderate permeability and good drainage.

Found only in the Blue Oak Woodland, Laughlin series soils are shallow, slightly acid gravelly to silty loams on very steep (80%) east-facing slopes. Permeability is moderate, and drainage is good.

Remaining areas within the DBRNA are either residual metasedimentary rockland with slopes of 50-100%, or colluvial metasedimentary rock. Rocklands include steep bluffs, ridgetops, or outcrops where exposures of sandstone, shale, schist, or greenstone cover more than 50% of the surface. These areas are usually devoid of vegetation or sparsely vegetated with canyon live oak, shrubs, grasses and forbs. Colluvial lands are excessively drained steep-sided slopes (to 75%) formed by soil material and rubble of various rocks. These areas support scattered canyon live oak, foothill pine (Pinus sabiniana), brush, grasses and forbs.

On the lower slope adjacent to Thomes Creek, bank erosion contributes to slope instability, and consequently grasses, forbs, and brush (notably poison oak) predominate, with a few scattered California black oaks and canyon live oaks.

5) Lands
All lands within the DBRNA are controlled by the Mendocino National Forest. No lands presently within the DBRNA boundaries have been acquired, are reserved, or have outstanding rights. Thomes Creek has been identified in the Mendocino National Forest Land and Resources Management Plan as eligible for National Wild and Scenic River status. The suitability evaluation leading to classification recommendation will be completed within two years of Forest Plan approval.

An 80-acre (32 ha) land parcel owned by L-P in the E1/2 of the SE1/4 of section 14 is surrounded on three sides by the DBRNA (Map 3). L-P has recently proposed the parcel for possible land exchange, however, the priority for acquiring the parcel has not been determined.

Another private landholding borders the DBRNA to the southeast (Map 2).

6) Cultural
Little is known of the cultural values of the DBRNA due to the undeveloped character of the area, and the project-oriented nature of cultural resource compliance activities. There is evidence of heavy use of the south aspect of Thomes Creek by Native Americans, however little use of the north aspect has been detected.

I. IMPACTS AND POTENTIAL CONFLICTS

1) Mineral Resources
There are no known mineral deposits, nor evidence of former mining claims within the DBRNA (R.Teixeira pers. com.). Hence, conflicts due to withdrawing the area from mineral entry are not anticipated.

2) Grazing
The DBRNA is contained within the Hall Ridge grazing allotment. A total of 55 cow/calf pairs are permitted for National Forest lands within this allotment. However the RNA is generally inaccessible to livestock and significant utilization of the forage within the DBRNA by cattle is not expected (Molly Fuller, pers. com.). The steep slopes and the dominance of Stipa lemmonii (a highly palatable native perennial) in the Blue Oak Woodland further suggest that this area does not contribute significantly to the forage base of the Hall Ridge allotment. This level of cattle use
in the RNA is not thought to compromise the objectives for which the RNA is to be established.

3) Timber
The area contained within the DBRNA has been classified as unsuitable for timber production in the Mendocino National Forest Land and Resource Management Plan. Hence, no timber value is foregone with

establishment of the DBRNA. Coast Range Mixed Conifer Forest occurs on 43 acres (18 ha) of the DBRNA, but cover is only 20 percent.

4) Watershed Values

Thomes Creek, along the northern boundary of the area, is a major perennial stream with important fisheries values. The Thomes Creek watershed as a whole, with an estimated yield of 334,125 ac-ft/yr (411,976,130 m^3/yr), provides water for domestic uses to the community of Paskenta. The establishment of DBRNA will help to maintain water quality by maintaining vegetation cover to steep slopes adjacent to Thomes Creek. An unknown risk of wild fire does exsist within the DBRNA and if the area should burn, sedimentation in the creek would be expected. The cumulative impacts of timber harvest, road construction and prescribed burning in other parts of the watershed must be considered in conjunction with activities within the DBRNA when evaluating impacts on watershed values.

5) Recreation Values

Light dispersed recreation may occur within the DBRNA, and management direction emphasizes improving fishing access to Thomes Creek while maintaining the undeveloped character of much of the roadless area. There is limited access to the DBRNA due its remoteness and the presence of locked gates along Forest Service and private roads into the unit. The area has little recreational value, and no problems or conflicts are anticipated (Henry 1984).

6) Wildlife Values

The undeveloped nature of the DBRNA enhances wildlife values through the protection of key oak habitat. Establishment of the DBRNA will not conflict with Wildlife values within the area.

7) Special Management Areas

The DBRNA lies within or adjacent to the Thomes Creek Backcountry Area and a late successional reserve (RC309). Thomes Creek has been identified in the Mendocino National Forest Land and Resource Management Plan as eligible for National Wild and Scenic River status. Evaluation for classification has not yet been completed.

8) Transportation Plans

Located at the end of a private 4-wheel drive road, with no current plans for timber harvesting in the unit, establishment of the DBRNA will have no effect on current or proposed Forest Service transportation systems.

J. MANAGEMENT PRESCRIPTION

Management direction for the DBRNA calls for protection of the natural integrity of the area for non-manipulative scientific and educational purposes. Specific management direction and associated standards and guidelines for Research Natural Areas on the Mendocino National Forest are itemized in Appendix 3.

1) Management Plan

Following direction in FSM 4063, a RNA management plan will be developed by the Mendocino National Forest in consultation with the Pacific Southwest Forest and Range Experiment Station. The plan will outline specific management practices, project prescriptions, use, and monitoring of activities to achieve specific objectives for the DBRNA.

K. ADMINISTRATIVE RECORDS AND PROTECTION

The District Ranger of the Corning Ranger District (PO Box 1019, Corning, CA., 96021, (916)824-5196), is responsible for administration, protection and management of the DBRNA in accordance with approved plans and prescriptions. Responsibility for approving management implementation plans and for overseeing and coordinating approved research on the DBRNA lies with the Director of the Pacific Southwest Forest and Range Experiment Station (PO Box 245, Berkeley, CA., 94701 (510)559-6300).

L. ARCHIVES

The Director of the Pacific Southwest Forest and Range Experiment Station is the research coordinator, and is responsible for maintaining a file of research data.

M. REFERENCES

Edwards, Milton B. 1957. California black oak--its management and economic possibilities. Journal of Forestry. 55(7):506-510.

Eyre, F.H.(ed). 1980. Forest Cover Types of the US and Canada. Society of American Foresters, Washington D.C. 148p.

Flor, Molly. Personal communication. Telephone conversation to Mendocino National Forest, Corning Ranger District. December 5, 1989.

Gowen, K. 1967. Soil Survey of Tehama Co., California. USDA and the UC Agricultural Experiment Station.

Griffin, James R. and William B. Critchfield. 1972. The distribution of forest trees in California. USDA Forest Service Research Paper; PSW-82. 118p.

Henry, W. Thomas. 1984. Reconnaissance Report; Proposed Devil's Basin Research Natural Area. Corning Ranger District, Mendocino NF. PSW Forest and Range Exper. Station. RNA files, Berkeley. Mimeo. 6p.

Holland, Robert F. 1986. Preliminary descriptions of the terrestrial natural communities of California. Unpubl. mimeo. California Dept. of Fish and Game, Sacramento, CA.

Kerns, Steven J. 1979. Observations on wildlife abundance in several California black oak habitats in Northern California. Symposium on the Ecology, Management and Utilization of California oaks. Claremont, CA. June 26-28, 1979.

Kuchler, W. 1966. Potential Natural Vegetation. USDI, Geological Survey. 1969. Washington, D.C.

Little, Elbert L., Jr. 1979. Checklist of United States trees (native and naturalized). U.S. Dep. Agric., Agric. Handb. 541, 375p.

McDonald, P.M. 1969. Silvical characteristics of California black oak (Quercus kelloggii Newb.). USDA Forest Service Research Paper PSW-53. 20p.

Munz, Philip A. 1968. A California Flora and Supplement. UC Press, Berkeley. 1904 p.

Newton, Gail and Associates. 1987. Ecological survey of the Devil's Basin proposed RNA. PSW Forest and Range Experiment Station, Berkeley, CA. Unpublished. 31p.

Page, B. 1966 Geology of the Coast Ranges of California. In: E. Bailey (ed.), Geology of Northern California. Cal. Div. Mines Bull. 190.

Plumb, Timothy R., and P.M. McDonald. 1981. Oak management in California. USDA Forest Service Gen. Tech. Rep. PSW-54. 12p.

Shippey, John. 1989. Personal communication. Mendocino NF, Forest Supervisor's Office, Willows, CA. August 1989.

Skinner, M.W. and B.M. Pavlik. 1994. Inventory of rare and endangered vascular plants of California, fifth edition. California Native Plant Society, Berkeley, CA.

State Cooperative Soil-Vegetation Survey. 1962. Soil-Vegetation Map of Quadrangle 42A-3.

Tappeiner, J. and P.M. McDonald. 1979. Preliminary recommendations for managing California black oak in the Sierra Nevada. Symposium on the Ecology, Management and Utilization of California Oaks, Claremont, CA. June 26-28, 1979.

U.S.D.A. Forest Service. 1986. Proposed Mendocino National Forest Land and Resources Management Plan. Supervisor's Office of the Mendocino National Forest. Willows, CA.

U.S.D.A. Forest Service. 1995a. Final Environmental Impact Statement for Mendocino National Forest Land and Resource Management Plan. Supervisor's Office of the Mendocino National Forest. Willows, CA.

U.S.D.A. Forest Service. 1995b. Final Environmental Impact Statement Appendices Mendocino National Forest. Supervisor's Office of the Mendocino National Forest. Willows, CA.

U.S.D.A. Forest Service. 1995c. Mendocino National Forest Land and Resource Management Plan. Supervisor's Office of the Mendocino National Forest. Willows, CA.

U.S.D.A. Forest Service. Unpublished weather data from Stonyford, Paskenta and Alder Springs. Forest Supervisor's Office, Willows, CA.

Verner, Jared. 1979. Birds of California oak habitats—management implications. Symposium on the Ecology, Management and Utilization of California oaks. Claremont, CA. June 26-28, 1979.

APPENDICES

APPENDIX 1: Plant Species List

APPENDIX 2: Wildlife Species List

APPENDIX 3: Sections from the Mendocino National Forest Land and Resources Management Plan (1990) Applicable to the Devil's Basin RNA