

SIGNATURE PAGE

for

RESEARCH NATURAL AREA ESTABLISHMENT RECORD

Manzanita Creek Research Natural Area

Shasta-Trinity National Forests

Trinity County, California

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

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TITLE PAGE

Establishment Record for
Manzanita Creek Research Natural Area
within Shasta-Trinity National Forests
Trinity County, California

Manzanita Creek Research Natural Area

MAPS

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A. Introduction

The Research Natural Area (RNA) system is a national network of ecological areas designated in perpetuity for research, education, and to maintain biological diversity on National Forest System and other federal ownerships lands. The selection of RNAs is by the identification of 'target elements', which are determined by vegetation associations within physiographic provinces. The RNA system is intended to include representative examples of common or widespread vegetation associations in each province, as well as any associations unusual or unique to that province. The Manzanita Creek Research Natural Area was chosen as a representative of the Pacific Ponderosa Pine - Douglas-fir (*Pinus ponderosa* - *Pseudotsuga menziesii*¹) forest type².

The Manzanita Creek Research Natural Area (MCRNA), located in Trinity County, California, was nominated in 1973 by the Big Bar Ranger District and the Shasta-Trinity National Forests. A reconnaissance report was completed in November, 1978 and reviewed by the Pacific Southwest Forest and Range Experiment Station (PSW) Director. The RNA Committee then contracted an ecological survey to take place in 1979. While the area was pending further evaluation, the Big Bar Ranger District control burned small portions of the RNA's upper slopes as part of a wildlife enhancement project to promote deer browse (Ryberg 1995, Appendix A2). In Oct. 1979, D. W. Taylor and K. A. Teare completed the ecological survey of the area and submitted it to the RNA Committee. After evaluating the survey report, the PSW/Region 5 (R5) RNA Committee and Station Director recommended its candidate status in Sep. 30, 1980 and renamed it Manzanita Creek Candidate Research Natural Area. Other names, "Trezanita RNA" and "Trelorita RNA", were used earlier. Land allocation for the MCRNA was made in the Record of Decision for the Shasta-Trinity National Forests Land and Resource Management Plan, 1995.

In 1985 approximately 54% of the MCRNA was burned in the Treloar Fire (Appendix A1). Because of the RNA's extensive fire history, the fire was not viewed by the RNA Committee as detracting from the value of this land as a RNA. A Matching Grant was received from the Washington Office in 1994 for continuing research on the RNA in the form of a stream channel survey and vegetation survey. The stream channel survey (Veevaert 1994) is in Appendix B.

MCRNA is under the management of Shasta-Trinity National Forests. The entire area is within the boundaries of the Trinity Alps Wilderness (Management Area #4, Appendix C1). Its southeast boundary is adjacent to Trinity River Management Area (Management Area #15). Areas adjacent to the southeast border of the MCRNA are mainly managed either as roaded natural recreation, or for wildlife management, with small areas of

¹ All scientific names for vascular plants in this report are in accordance with Munz (1959), except for trees, which follow Little (1979).

² Vegetation types adapted in this report is based on the Society of American Foresters (SAF) Forest Cover types (Eyre 1980).

threatened, endangered and sensitive species. A small piece of private land, an old homestead, is adjacent to the southern end of the RNA (Map 1).

1) Land Management Planning

The recommendation for establishment of the MCRNA is included in Shasta-Trinity National Forests Land and Resource Management Plan (LRMP)(USDA Forest Service 1995a, Appendix C2) and the effects of its establishment are analyzed in the Environmental Impact Statement (USDA Forest Service 1995b) for this document. Land allocation for the MCRNA was made by the signing of the Record of Decision (ROD) for the LRMP by the Regional Forester, 1995. The RNA is included within Management Prescription X (Special Area Management), which includes the one established RNA and thirteen RNA candidates (Appendix C3). In 1984 the entire MCRNA was incorporated into the Trinity Alps Wilderness.

B. Objectives

Objectives for establishing MCRNA are: (1) to enhance the Regional and National RNA systems by the addition of the Pacific Ponderosa Pine - Douglas-fir (SAF 244) forest type and its associated ecosystems within the Klamath Mountains physiographic region. Only one other proposed RNA (Smoky Creek on the Hayfork District) in the Klamath Mountains region contains significant amounts of this vegetation type. (2) to maintain the interrelationships of terrestrial and aquatic systems for education and research by including the entire upper portion of the Manzanita Creek watershed. (3) to promote biodiversity on Forest System lands by protecting the CNPS List³ 1b plant *Lewisia cotyledon* var. *heckneri*.

Establishment of MCRNA will also serve the objective of encompassing other vegetation types and their interrelationships with the target forest type. These include: White Fir (*Abies concolor*, SAF 211), Knobcone Pine (*Pinus attenuata*, SAF 248), Oregon White Oak (*Quercus garryana*, SAF 233), Sierra Nevada Mixed Conifer (SAF 243), and Pacific Douglas-fir (SAF 229) Forests.

C. Justification

The proposed MCRNA is a complete, small watershed. This reduces the chance of outside disturbances other than fire in the RNA and so increases the area's importance as a research site. The boundary of MCRNA is well defined by Treloar Ridge on the west and Manzanita Ridge on the east. They join at the southwest summit of Twin Sisters Mountain, which is the northern end of the RNA. The southern end is a narrow opening

³ California Native Plant Society's (CNPS) inventory of rare and endangered vascular plants of California (Skinner and Pavlik 1994).

and only a few minutes' walk from the Big Bar Ranger Station. The northern and higher elevations of the RNA are difficult to reach, but the southern and lower elevations are easily accessible. The presence of the Big Bar District Office increases the control of access.

Fire has played an important role in creating the high number of plant communities found in the RNA, and has increased the RNA's value for research on successional trends and fire dominated processes. In 1985 the Treloar Fire consumed approximately 54% of the RNA (map in Appendix A1). This contributed to the existing mosaic of vegetation associations and helped reduce the immediacy of management issues surrounding fuels accumulation and fire suppression practices. No artificial seeding followed the fire, so the existing pre-burn data in the Ecological Survey provides many research opportunities for post-fire succession monitoring and observation.

The target element, Pacific Ponderosa Pine - Douglas-fir is adequately represented here. Additionally, the MCRNA has a great diversity of elevations, slopes and aspects which contribute to the diversity of associated vegetation types.

Lewisia cotyledon var. *heckneri* is a California endemic found in the high ridgetop areas in the MCRNA. It is listed on the California Native Plant Society List 1b (Skinner and Pavlik 1994), plants rare, threatened or endangered in California and elsewhere.

One structure, a gauging station, located on the lower third of the creek, enhances the RNA's value for research. The Manzanita Creek drainage is a tributary to the main stem of the Trinity River.

D. Principal distinguishing features

The southwest summit of the Twin Sisters Mountain (5916 ft [1803 m]), the large pristine watershed, and the diversity of vegetation types are the principal distinguishing features of the MCRNA. At least eight SAF forest types are included in the RNA. Taylor and Teare (1979) classified the vegetation cover into seventeen plant associations after extensive sampling of the area. These include riparian types as well as forest types ranging from foothill (or gray) pine (formerly digger pine, *Pinus sabiniana*) to montane white fir (*Abies concolor*).

E. Location

1) National Forests involved

The MCRNA is located on the Big Bar Ranger District, Shasta-Trinity National Forests, in Trinity County, California. No other Forest System lands are involved. The southern end of the MCRNA is adjacent to private land, which is an old homestead. The boundary with the private land is approximately 1920 ft (585 m) long.

2) Latitude/Longitude

The approximate center of the RNA is at 40°47'30"N latitude and 123°13'30"W longitude.

3) Boundary description

The MCRNA includes all or portions of sec. 2, 3, 4, 9, 10, 11, 14, 15, 16, 21, 22, 23, 26, 27, 28, 29, 32, 33, 34 in T34N, R12W, and 33, 34, 35 in T35N, R12W, Mount Diablo Baseline and Meridian (40°48'N., 123°14'W.) USGS Helena and Hayfork quad (Map 2), in Trinity County, California.

The boundaries of MCRNA are delineated using mostly topography and trails except for the southern end which follows the land ownership divisions. The following describes the boundary of MCRNA. For further clarification, please refer to Map 1.

Beginning at the Twin Sisters Triangulation Station (VABM 5884, 40°50'N latitude, 123°14'W longitude) (Point a), elevation 5884 ft (1793 m), in SE1/4SE1/4, Sec. 33, T34N, R12W, said point being located approximately a quarter mile (0.4 km) southwestwardly from Buck Spring, which is just outside the boundary of MCRNA:

- a) thence, northeastwardly (N50°E), along the bottom of a swale for approximately 800 ft (244 m), to its junction with Trail 11W13 (Point b);
- b) thence, northeastwardly, eastwardly, and southeastwardly, following Trail 11W13 and 12W5 for approximately 2 miles (3.2 km), to the locked gate at the end of Trail 12W5 (Point c);
- c) thence, southwardly, along Road 33N46 (Jeep Trail) for approximately 1 mile (1.6 km), then following the top of ridge for approximately another mile (1.6 km) to a triangulation station marked Shaley, elevation 4917 ft (1501 m) (Point d);
- d) thence, southeastwardly, along the top of ridge for approximately 0.3 mile (0.5 km), to a triangulation station marked Helena, elevation 4885 ft (1489 m) (Point e);
- e) thence, southwestwardly, along the top of ridge for approximately 2 miles (3.2 km), to a knoll of 3794 ft (1158 m) elevation (Point f);
- f) thence, westwardly (N70°W), descending along the top of ridge, for approximately 3000 ft (914 m), to a saddle at approximately 3051 ft (930 m) elevation (Point g);
- g) thence, southwestwardly (S25°W), along the top of ridge for approximately 2400 ft (731 m), to a peak of 3278 ft (998 m) elevation (Point h);

- h) thence, southwestwardly, along the ridge top for approximately 2600 ft (792 m), passing a wide saddle, to a knoll of 3064 ft (934 m) elevation (Point i);
- i) thence, southwestwardly, along the top of a ridge for approximately 2400 ft (731 m), to a small knoll, elevation 2877 ft (877 m) (Point j);
- j) thence, westwardly, along the top of ridge for approximately 2300 ft (700 m) to the point of elevation approximately 2250 ft (686 m)(Point k);
- k) thence, northwestwardly (N55°W), in a direct line for approximately 1500 ft (457 m), to the northeast corner of private land (Point l);
- l) thence, westwardly, southwardly and westwardly along the demarcation of the private land, for approximately 1920 ft (585 m) to the northwest corner of the private land (Point m);
- m) thence, westwardly (N90°W), in a direct line for approximately 370 ft (113 m), to the junction with Trail 12W17 (Point n);
- n) thence, northeastwardly, along the trail, for approximately 0.9 miles (1.5 km), to the point of a sharp turn (360°) on the trail (Point o);
- o) thence, northeastwardly (N30°E), in a direct line for approximately 1600 ft (488 m), to the point on the top of the ridge, said point being located at the head of a swale (Point p);
- p) thence, northwardly, along the ridge top, for approximately 4 miles (6.4 km), passing through 4 peaks, elevations 3986 ft (1215 m), 4360 ft (1328 m), 4702 ft (1433 m), and 4604 ft (1405 m), to the end of the narrow ridge (Trail 12W17), elevation 4500 ft (1371.5 m) (Point q);
- q) thence, northwardly, along the trail (Trail 11W13) to the west of the ridge, for approximately 1.2 miles (1.9 km), to its junction with a stream thread and trail 11W13 (Point r);
- r) thence, northeastwardly (N30°E), ascending in a direct line, for approximately 2000 ft (610 m), to the trail at the convergence of two ridges (Point s);
- t) thence, northeastwardly, along the top of ridge, for approximately 1500 ft (457 m), to the Twin Sisters Triangulation Station (Point a), elevation 5884 ft (1793 m), the point of beginning.

4) Acreage

The acreage for the MCRNA as described above is 7,250 acres (2935 ha).

5) Elevation

Elevations in the MCRNA range from 1200 ft (365 m) at Big Bar to 5916 ft (1803 m) at the headwaters of Manzanita Creek on the southwest summit of Twin Sisters Mountain.

6) Access

The main access to MCRNA is through Big Bar Ranger Station, which is located along California State Highway 299, approximately 71 road miles (114 km) west from Redding (connecting Interstate 5) and 75 road miles (121 km) east from Arcata (connecting Highway 101). Highway 299 crosses over Manzanita Creek just south of the MCRNA, and about 50 feet (15 m) from its Trinity River confluence (Map 2).

Manzanita Ridge Trail (33N46, also called Jeep Trail), on the eastern border of MCRNA, can be accessed from Big Flat Campground. It is a steep four-wheel drive vehicle road which runs 5 road miles (8 km) north from Big Flat Campground and ends on the high point, which is the Trinity Alps Wilderness boundary. From here the Manzanita Ridge Trail (12W15) runs along the ridge (the eastern boundary of MCRNA) until it connects with the Waldorff Crossing Trail (11W13) which runs east-west and crosses the south flank of Twin Sisters Mountain. The Waldorff Crossing Trail connects to the Treloar Ridge Trail (12W17) which runs along the western border of the RNA. All of these trails are Level 3 and are not likely to be maintained but every three to four years.

The abandoned trail (12W18) leading to the center of the RNA is along an old ditch system from the Big Bar Ranger Station. This ditch system is long abandoned, but does provide easy access to the lower reaches of the Manzanita Creek drainage, to about 1500 ft (457 m) elevation. A more obscure trail continues up the drainage to about 2500 ft (762 m), where a small corral and primitive log structure are found. These structures were apparently associated with a minor grazing operation. This grazing operation has been terminated and the structures will be removed some time in the near future.

F. Area by cover type

Table 1: Area by cover type

<u>SAF Types (Eyre 1980)</u>	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
221 Red Alder	376	152	5.2
250 Blue Oak-Foothill Pine	118	48	1.6
233 Oregon White Oak	1037	420	14.3
249 Canyon Live Oak	1871	757	25.8
244 Pacific Ponderosa Pine-Douglas-fir	3127	1266	43.1
229 Pacific Douglas-fir &			
243 Sierra Nevada Mixed Conifer	85	34	1.2
211 White Fir	184	74	2.5
248 Knobcone Pine	81	33	1.1
Unclassified	371	150	5.1
Totals	7250	2934	99.9
<u>Kuchler (Kuchler 1966)</u>	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
5 Mixed Conifer Forest	3396	1374	46.8
22 Oregon White Oak	1037	420	14.3
25 California Mixed Evergreen Forest (<i>Quercus-Arbutus-Pseudotsuga</i>)	1871	757	25.8
26 California Oakwoods (<i>Quercus</i>)	118	48	1.6
Unclassified	828	335	11.4
Totals	7250	2934	99.9
<u>Holland (Holland 1986)</u>	<u>Acres</u>	<u>Hectares</u>	<u>Percent</u>
61510 White Alder Riparian Forest	376	152	5.2
71322 Non-Serpentine Foothill Pine- Chaparral Woodland &			
37810 Buck Brush Chaparral	118	48	1.6
71110 Oregon Oak Woodland	1037	420	14.3
81100 Mixed Evergreen Forest	1871	757	25.8
84110 Coast Range Mixed Coniferous Forest	3127	1266	43.1
82420 Upland Douglas-fir Forest	85	34	1.2
84240 Sierran White Fir Forest &			
63500 Montane Riparian Scrub	184	74	2.5
83210 Knobcone Pine Forest	81	33	1.1
Unclassified	371	150	5.1
Totals	7250	2934	99.9

G. Physical and climatic conditions

The MCRNA is bounded by two ridges, Treloar Ridge on the west and Manzanita Ridge on the east. Elevations within the RNA range from 1200 ft (365 m) at Big Bar to 5916 ft (1803 m) at the headwaters of Manzanita Creek on the northwest summit of Twin Sisters Mountain. The average gradient within the Manzanita Creek basin as estimated along the creek bed is 56 m/km. Slopes in the Manzanita Creek basin are generally very steep, averaging from 36 to 84 percent (20 to 40 degrees). Small areas of lesser relief are found on minor terraces along the bottom of the drainage and on ridges bordering the basin.

Manzanita Creek is a perennial stream below about 2953 ft (900 m) elevation. There is a gauging station located on the lower third of the creek which has not been monitored for 12-15 years. Data of previous years is available at the Big Bar Ranger District. A detailed channel investigation conducted by the District (Veevaert 1994) is included in Appendix B. The minor tributaries of Manzanita Creek are either ephemeral, or intermittent. One perennial spring, Trimble Spring, occurs in the basin. It is located in the W1/2 of the SE1/4 of section 14 of T34N, R12W and is accessible via Jeep Trail (33N46). Buck Spring, located in SW1/4 sec.34 (T35N, R12W), is outside the boundary of MCRNA.

The region containing the headwaters of the Trinity River in the vicinity of the Manzanita Creek drainage transects a steep regional climatic gradient. Typically, areas to the west of the RNA are more mesic, and areas to the east, more xeric. The climate of Manzanita Creek is mediterranean, with heavy rainfall from November through March and little rain in the summer months. Snowfall is only a minor component of the precipitation at lower elevations but increases greatly with elevation. Snowfall at the 4265+ ft (1300+ m) level in the Manzanita Creek drainage is probably considerable, as indicated by evidence of past wet-snow avalanches from the summit and surrounding ridges of Twin Sisters Mountain. There are no snow depth monitoring stations within the RNA.

Big Bar Ranger Station, at the south end of the RNA at an elevation of 1260 ft (383 m) has 38 years of temperature records and 48 years of precipitation records. Table 2 gives a normal monthly climatic summary of the available record from the Big Bar Ranger Station. The mean temperature at Big Bar is 56.1°F (13.4°C), with a mean annual rainfall of 38.96 inches (991 mm).

Table 2: Monthly summary of normals from Big Bar Ranger Station

	Temperature* °F (°C)	Precipitation** inches (mm)
Jan.	39.3 (4.1)	8.16 (208)
Feb.	42.4 (5.8)	5.84 (149)
Mar.	47.7 (8.7)	4.47 (114)
Apr.	52.9 (11.6)	2.13 (54)
May	60.4 (15.8)	1.19 (30)
June	68.0 (20.0)	0.50 (13)
July	74.7 (23.7)	0.11 (3)
Aug.	73.4 (23.0)	0.45 (11)
Sep.	68.2 (20.1)	0.68 (17)
Oct.	58.1 (14.5)	2.43 (62)
Nov.	46.8 (8.2)	5.52 (140)
Dec.	40.6 (4.8)	7.48 (190)
Ann.	56.1 (13.4)	38.96 (991)

* - from U.S. Department of Commerce (1953-1978)

** - from National Oceanic and Atmospheric Administration (1990)

H. Values

1) Flora

At least 249 species of vascular plants are found in MCRNA (Appendix D). They compose a diverse assemblage of forest vegetation types interdigitating with brush, riparian, and rocky-site types.

Taylor and Teare (1979) conducted a detailed vegetation survey in this area. They sampled twenty-six 3380 ft² (314m²) plots in addition to 70 releves, which are summary plant lists of representative habitat types and plots. Releve, micro-environment data and site factors were analyzed, and resulted in a classification of 17 associations in 6 alliances. The relative positioning of these associations by elevation and aspect is depicted in Figure 1. Taylor and Teare did not produce a map of existing vegetation with their 1979 study. However, the correlations they found between vegetation type, aspect, and elevation were used along with aerial photos to delineate an existing post-burn vegetation map (Map 3). This vegetation map links Taylor and Teare's classification with SAF and Holland classification systems.

Because of the MCRNA's large size, topographic relief, and fire history, eight forest types (including riparian types) and several scrub types (associated with steep slopes, rock outcrops, and cliffs) are identified. Along with SAF types, the equivalent Holland

vegetation types and Taylor and Teare's plant associations are also listed to facilitate the use of this information.

Figure 1. Generalized relationships of the major vegetation types of the Manzanita Creek drainage to the topographic moisture gradient (from Taylor and Teare 1979)

1. Red Alder (*Alnus rubra*, SAF 221)

Holland 61510: White Alder (*Alnus rhombifolia*) Riparian Forest

Taylor and Teare: *Alnus rhombifolia*-*Peltiphyllum peltatum* Alliance

- a. *Alnus rhombifolia*-*Carex nudata* Association
- b. *Alnus rhombifolia*-*Cornus sessilis* Association
- c. *Alnus rhombifolia*-*Cornus stolonifera* Association

The dominant species in this vegetation type is white alder. This is a variant of the SAF Red Alder type, which is common in the bottomlands along the streams and benches in the Pacific coast region and on moist slopes of the Coast and Cascade Ranges. This white alder dominated type typically occurs in the Sierra Nevada. Taylor and Teare further divided this type into three associations largely corresponding to elevation.

a. *Alnus rhombifolia*-*Carex nudata* Association

This association occurs in the lowest elevations of the RNA, generally below 2500 feet (762 m), and on north exposures.

b. *Alnus rhombifolia*-*Cornus sessilis* Association

This association is found along the main channel of Manzanita Creek, and on the lower reaches of its tributaries in areas of perennial flow. Other trees include Oregon ash (*Fraxinus latifolia*) and big-leave maple (*Acer macrophyllum*). Pacific yew (*Taxus brevifolia*) is found occasionally along with Douglas-fir and canyon live oak (*Quercus chrysolepis*). Shrubs are diverse and include *Acer circinatum*, *Corylus cornuta* ssp. *californica*, *Symphoricarpos mollis*, *Crataegus douglasii*, *Rhamnus purshiana*, *Philadelphus lewisii* ssp. *gordanianus*, and *Ribes roezlii*. Vines, such as *Lonicera hispidula*, *Rubus leucodermis*, *R. procerus*, and *Vitis californica* festoon the trees and shrubs in sunnier areas. Herbs are few, but include *Aralia californica*.

c. *Alnus rhombifolia*-*Cornus stolonifera* Association

This is the upper elevation equivalent of the previous association. It occurs generally above 4000 ft (1200 m). Creek dogwood (*Cornus stolonifera*), *Rhododendron occidentale*, and the willow *Salix commutata* dominate under a scattered canopy of white alder. Other shrub species are generally absent. Herb cover is high, often dominated by *Carex amplifolia* and *Torreyochloa pauciflora*.

2. Blue Oak - Foothill Pine (SAF 250)

Holland 71322: Nonserpentine Foothill Pine-Chaparral Woodland

37810: Buck Brush Chaparral

Taylor and Teare: *Pinus sabiniana* Alliance

- a. *Pinus sabiniana*-*Cercis occidentalis* Association
- b. *Ceanothus cuneatus* Association

This is the northwestern limit of the distribution of Blue Oak-Foothill Pine forest type. Blue oak (*Quercus douglasii*) doesn't extend into this area but is replaced by other oaks, such as canyon live oak and Oregon white oak (*Quercus garryana*). Taylor and Teare further divided this type into two associations.

a. *Pinus sabiniana*-*Cercis occidentalis* Association

This vegetation occupies the lower, south and east-facing, steep, nonserpentine, rocky slopes. It includes a canopy of scattered (48 stems/ac [119 stems/ha]) foothill pine (basal area 94 ft²/ac [22 m²/ha]), canyon live oak, and Oregon white oak with chaparral shrubs such as *Ceanothus cuneatus*, *Cercis occidentalis*, and *Toxicodendron diversilobum*.

b. *Ceanothus cuneatus* Association

Small areas within this vegetation type, on rocky, xeric slopes, are dominated by *Ceanothus cuneatus*. They are distinguished by Holland as type 37810. Distribution of this type is patchy.

3. Oregon White Oak (SAF 233)

Holland 71110: Oregon Oak Woodland

Taylor and Teare: *Pseudotsuga menziesii* Alliance

a. *Quercus garryana* Association

This type has a dense canopy of Oregon white oak with a very sparse shrub layer. According to Taylor and Teare (1979) it has two forms in terms of their "successional standing". The late seral form, occupying steep, rocky, but mesic slopes, is dominated by Oregon white oak and thought not to be replaced by Douglas-fir. The other form is thought to be a seral stage to Douglas-fir forest under the condition of fire suppression.

In addition to Oregon white oak, California black oak (*Quercus kelloggii*) can be found occasionally in this vegetation type. The sparse shrub layer is dominated by *Ceanothus integerrimus*. Herbaceous cover is principally the native grass *Bromus marginatus*, and occasionally *Lathyrus jepsonii* ssp. *californicus*. *Quercus kelloggii*, *Ceanothus integerrimus*, and *Bromus marginatus* are also found in the following Canyon Live Oak (SAF 249) and Pacific Ponderosa Pine - Douglas-fir (SAF 244) forest types.

4. Canyon Live Oak (SAF 249)

Holland 81100: Mixed Evergreen Forest

Taylor and Teare: *Pseudotsuga menziesii* Alliance

a. *Pseudotsuga menziesii*-*Quercus chrysolepis* Association

This is a widespread vegetation type in the MCRNA. It occurs at lower elevations on north-facing slopes but ranges to south-facing slopes at mid to upper elevations.

Douglas-fir forms an open canopy over a subcanopy of dense canyon live oak. Big leaf maple and Pacific madrone (*Arbutus menziesii*) are important codominants in the subcanopy. The average basal area and density of Douglas-fir are 89 ft²/ac (20 m²/ha) and 103 stems/ac (254 stems/ha) respectively, and that of canyon live oak are 40 ft²/ac (9 m²/ha) and 240 stems/ac (593 stems/ha).

Herbaceous species found in this forest type are *Bromus marginatus*, *Elymus glaucus*, *Trientalis latifolia*, *Berberis nervosa*, *Iris tenuissima*, *Hieracium greenei*, and *Polygala cornuta*.

5. Pacific Ponderosa Pine - Douglas-fir (SAF 244)

Holland 84110: Coast Range Mixed Coniferous Forest

Taylor and Teare: *Pseudotsuga menziesii* Alliance:

a. *Pinus ponderosa-Quercus kelloggii* Association

This distinct association is less mesic than the previous one. Open park-like stands of ponderosa pine and sugar pine (*Pinus lambertiana*) form a high canopy over large scattered California black oak trees, with dense Douglas-fir reproduction in some areas. Ponderosa pine averages 272 ft²/ac (63 m²/ha) basal area, Douglas-fir averages 152 ft²/ac (35 m²/ha), and sugar pine, 82 ft²/ac (19 m²/ha). Densities of these species are 77, 22, and 126 stems/ac (190, 55, and 310 stems/ha), respectively.

Dense reproduction of Douglas-fir is often seen in areas where recent fire has been excluded (Taylor and Teare 1979). This suggests that without disturbance (fire), this ponderosa pine dominated type will be replaced by a Douglas-fir dominated type. In places following crown fire, *Ceanothus integerrimus* is the pioneer shrub.

Associated herbaceous species in this forest type are: *Amelanchier pallida*, *Corylus cornuta* var. *californica*, *Hieracium greenei*, *Iris tenuissima*, *Lathyrus polyphyllus*, *Osmorhiza chilensis*, *Pedicularis densiflora*, and *Polygala cornuta*.

6. Pacific Douglas-fir (SAF 229)/Sierra Nevada Mixed Conifer (SAF 243)

Complex

Holland 82420: Upland Douglas-fir Forest

Taylor and Teare: *Abies concolor* Alliance

a. *Abies concolor-Pseudotsuga menziesii* Association

b. *Pseudotsuga menziesii-Cornus nuttallii* Association

a. *Abies concolor-Pseudotsuga menziesii* Association

Distribution of the Pacific Douglas-fir forest type in the western United States is wide, from southern British Columbia to northern California and it is found on a wide diversity of site conditions. However, in the MCRNA, the Pacific Douglas-fir type is limited to the lower elevations because the temperature at higher elevations is too cold

for the Douglas-fir. At higher elevations it is replaced by white fir dominated forest. Therefore, a transitional area of Sierra Nevada Mixed Conifer (SAF 243) or Taylor and Teare's *Abies concolor*-*Pseudotsuga menziesii* Association can be found within the Pacific Douglas-fir forest type. The Sierra Nevada Mixed Conifer type has an average basal area of 218 ft²/ac (50 m²/ha) and 144 ft²/ac (33 m²/ha) for white fir and Douglas-fir respectively.

b. *Pseudotsuga menziesii*-*Cornus nuttallii* Association

The Pacific Douglas-fir SAF type occurs on the more mesic, lower elevation, non-riparian sites. Douglas-fir forms a dense closed canopy averaging 292 ft²/ac (67 m²/ha) basal area and 43 stems/ac (106 stems/ha). White fir is codominant, averaging 85 ft²/ac (20 m²/ha) basal area and 163 stems/ac (403 stems/ha). Pacific dogwood (*Cornus nuttallii*) and big-leaf maple form a subcanopy. The shrub and herb layers are well-developed and include *Symphoricarpos mollis*, *Toxicodendron diversilobum*, *Polystichum munitum* var. *imbricans*, and *Rosa pisocarpa*.

7. White Fir (SAF 211)

Holland 84240: Sierran White Fir

63500: Montane Riparian Scrub

Taylor and Teare: *Abies concolor* Alliance

a. *Abies concolor*-*Acer glabrum* Association

b. *Abies concolor* Association

c. *Salix jepsonii*-*Paxistima myrsinites* Association

a. *Abies concolor*-*Acer glabrum* Association

This vegetation type occurs on upper mesic slopes where white fir is the dominant tree and has an average basal area of 392 ft²/ac (90 m²/ha). *Acer glabrum* forms a low subcanopy along with *Sorbus scopulina*. A diverse shrub layer includes *Sambucus melanocarpa*, and *Ribes nevadense*. The herb layer is also well-developed and diverse with such species as *Castilleja miniata*, *Actaea rubra* ssp. *arguta*, *Agastache urticifolia*, and *Epilobium angustifolium*.

b. *Abies concolor* Association

A typical stand has dense even-aged white fir over dead or senescent *Quercus vaccinifolia*, with a sparse understory. Following fire, *Quercus vaccinifolia* or knobcone pine, or both establish as pioneer species.

c. *Salix jepsonii*-*Paxistima myrsinites* Association

There is a distinct variant of the White Fir SAF type which occurs in ravines and north-facing hollows. It can also be distinguished as Holland's Montane Riparian Scrub Association (63500). Typical stands have a scattered overstory of white fir over a tall-

shrub canopy of *Salix jepsonii*, *Euonymus occidentalis*, *Rhamnus purshianus*, *Acer glabrum*, *Amelanchier pallida*, and *Ribes nevadense*. *Paxistima myrsinites* is a conspicuous, small shrub. Herbs such as *Elymus glaucus*, *Trientalis latifolia*, *Disporum hookeri* ssp. *trachyandrum*, *Smilacina racemosa* var. *amplexicaulis*, *Ligusticum californicum*, *Eupatorium occidentale*, *Campanula prenanthoides*, and *Adenocaulon bicolor* line the rocky ravine bottoms.

8. Knobcone Pine (SAF 248)

Holland 83210: Knobcone Pine Forest

Taylor and Teare: *Abies concolor* Alliance

a. *Pinus attenuata-Quercus vaccinifolia* Association

This association develops on steep slopes at mid-elevations after intense fire. In the absence of disturbance, these areas will probably become the SAF White Fir type. Knobcone pine forms a dense even-aged canopy averaging 148 ft²/ac (34 m²/ha) basal area and a density of 240 stems/ac (594 stems/ha). *Quercus vaccinifolia* forms a dense shrub understory. *Pedicularis densiflora* and *Apocynum pumilum* are among the few herbs.

The next few vegetation types, identified by Taylor and Teare, are associated with steep rocky sites, or rock outcrops below treeline and do not correspond with any SAF or Holland delineations.

9. Taylor and Teare: *Quercus vaccinifolia* Alliance

a. *Cercocarpus betuloides* var. *macrourus* Association

This vegetation type occurs on the steepest slopes at the headwaters of the drainage. On rocky sites it is the dominant vegetation type, but on deeper soils it can be an early seral community to white fir dominated forests. The most conspicuous species of this type are the shrubs: *Quercus vaccinifolia*, *Garrya fremontii*, *Arctostaphylos patula*, *Prunus emarginata*, *Ceanothus integerrimus*, and *C. velutinus*. The ridgetop phase is dominated by *Cercocarpus betuloides*, *Quercus vaccinifolia*, and *Q. garryana* var. *breweri*.

Keeler-Wolf (1990) indicated this type is equivalent to Holland 37510: Mixed Montane Chaparral, but the dominance of *Quercus vaccinifolia* of this vegetation type does not quite fit the description.

10. Taylor and Teare: *Holodiscus microphyllus-Penstemon corymbosus* Alliance

a. *H. microphyllus-Eriogonum compositum* Association

b. *H. microphyllus-Silene grayi* Association

c. *H. microphyllus-Lewisia cotyledon* var. *heckneri* Association

a. *Holodiscus microphyllus-Eriogonum compositum* Association

This association occurs on flat or rounded summits of rock outcrops at the headwaters of Manzanita Creek, and on nearby ridges, where soil development is minimal. The vegetation is sparsely scattered large *Holodiscus microphyllus* shrubs and clumps of *Eriogonum compositum*.

b. *Holodiscus microphyllus*-*Silene grayi* Association

This vegetation type occurs at the highest xeric, rocky summit of Twin Sisters Mountain, above approximately 5700 ft (1740 m). Other species defining this association are the herbs *Lunia hypoleuca* and *Galium grayanum*.

c. *Holodiscus microphyllus*-*Lewisia cotyledon* var. *heckneri* Association

This type is restricted to near vertical cliff faces where it occurs with *Selaginella wallacei* and *Pellaea brachyptera*. These plants occur in the small crevices and ledges of the cliff faces. *Lewisia cotyledon* var. *heckneri* is a rare plant listed as CNPS 1b (Skinner and Pavlik 1994).

2) Fauna

There are; one California Species of Special Concern, Forest Service Sensitive and Federally listed Category 2 species, fisher (*Martes pennanti pacificus*⁴); one California Species of Special Concern and designated Forest Service sensitive carnivore, marten (*Martes americana*); and one Federally listed threatened species (Federal Register, 50 CFR 17.11), northern spotted owl (*Strix occidentalis caurina*) in the immediate area (Dias 1994). Sighting records are as follows:

Owl No 401; pair; location and reproduction last verified in 1986; T34N, R12W, Sec 5, SE. This is approximately 1 mile (1.6 km) from the RNA.

Fisher No 505; Location last verified in 1969; T34N, R12W, Sec 28, SE, SW.

Marten No 405; Location last verified in 1990; T34N, R12W, Sec 14, Nw, SE.

A species list for the RNA was generated using the modified Wildlife Habitat Relationship (WHR) model for the Shasta-Trinity National Forests (Crumpton and Dias 1994, Appendix E1). Parameters used to create the species lists were WHR habitat types (based on the ecological survey), elevation, watershed and the habitat index. Three separated lists using different habitat indexes are included in the appendix. List 1 is created by using index value of '1' and generates a list of species strongly associated with the habitat parameters above (Appendix E2). List 2, moderately associated species was generated using an index value '2' (Appendix E3). Index value '3' and 'M' are used to

⁴ Nomenclature for fauna species follows Laudenslayer and Grenfell (1983).

create the third, generally associated species list and containing the largest number of species (Appendix E4). Lists 1 through 3 include 120, 205 and 251 species respectively.

Of the species strongly associated with the habitats in MCRNA, bald eagle is both Federal and California listed endangered species; western pond turtle and foothill yellow-legged frog are California Species of Special Concern, Federally listed Category 2 and Forest Service Sensitive species; and osprey, sharp-shinned hawk, Cooper's hawk, purple martin, and yellow warbler, are California Species of Special Concern (USDA Forest Service 1995c).

Moderately associated with the habitats in MCRNA are golden eagle, a California Species of Special Concern and Fully Protected species; mountain quail, a Federally listed Category 2 species; marten, a California Species of Special Concern and Forest Service Sensitive species; and northern spotted owl, fisher, and northern goshawk, all California Species of Special Concern, Federally listed Category 2 and Forest Service Sensitive species

Generally associated with the habitats in MCRNA are yellow-breasted chat and merlin, California Species of Special Concern (USDA Forest Service 1995c).

3) Geology

The MCRNA is located within the Klamath Mountains geologic province, which is a west-facing arcuate-form region that extends from northwestern California into southwestern Oregon. The province consists predominantly of marine arc-related volcanic and sedimentary rocks of Paleozoic and Mesozoic ages. Oceanic plate-related ultramafic and associated ophiolitic rocks are also important components. Granitic plutons intruded many parts of the province during Jurassic and early Cretaceous time. Structurally, the province consists of a series of north to northwest-trending slices of ancient crustal blocks that have collided to form an imbricate eastward-dipping sequence of volcanic, sedimentary and oceanic crustal rocks.

The province has been subdivided into four major lithotectonic units that from east to west are called the Eastern Klamath belt, the Central Metamorphic belt, the Western Paleozoic and Triassic belt, and the Western Jurassic belt.

The MCRNA lies within the Hayfork terrane of the Western Paleozoic and Triassic belt. The entire RNA is underlain by the Eastern Hayfork subterrane, a middle Jurassic melange unit composed of argillite and other clastic sedimentary rocks, thin-bedded chert, volcanoclastic rock, amphibolite, serpentinite and limestone (Teixeira 1994a [Appendix F]).

The upper portion of the Manzanita Creek drainage is cut by a fault trending northwest-southeast which separates the pre-Cretaceous metamorphics of the lower basin from metavolcanics of the same relative age in the upper basin. Twin Sisters Mountain is

underlain mostly by these metavolcanic rocks. Along the fault line mentioned are slivers of ultrabasic intrusive rock, with serpentine being evident along the contact zone in two ridgetop localities (Taylor and Teare 1979). Vegetation of scrub type occupies this area.

Geology in the vicinity of the Manzanita Creek drainage is mapped at a scale of 1:125,000 on the Redding sheet (Cal. Div. Mines & Geol. 1962), and the Helena Quadrangle at 1:62,500 (Cox 1956).

4) Soils

Soils in the MCRNA are delineated into 5 (order 3) map units (Figure 2, USDA F.S. *et al.* 1980). They are mainly very steep gravelly sandy loams. The following describes their major characteristics, detailed soil descriptions are included in Appendix G.

(1) Deadwood family, 60 to 80 percent slopes (Map symbol 33)

This soil type is distributed in the mid-section of MCRNA, on the east side of Manzanita Creek. It is located on the lower and middle portions of the west and northwest facing slopes. Typical vegetation types on this soil are Canyon Live Oak (SAF 249) and Pacific Ponderosa Pine-Douglas-fir (SAF 244) forest types. Deadwood is a shallow soil, less than 20 inches (51 cm) deep. The surface soil extends to 3 inches (7.6 cm), is dark brown, and has a very gravelly (55% gravel) sandy loam texture. The subsoil extends to 15 inches (38.2 cm), and has an extremely cobbly (55% to 65% gravel and cobbles) heavy loam texture. Parent material is metamorphosed sedimentary rock.

(2) Deadwood-Neuns families complex, 60 to 80 percent slopes (Map symbol 36)

This unit of soils lies on the west side of Manzanita Creek, mainly on the lower to middle portions of northeast, east and southeast facing slopes. Typical vegetation on this soil is the Pacific Ponderosa Pine-Douglas-fir (SAF244) forest type, with small areas of Oregon White Oak (SAF 233) and Canyon Live Oak (SAF 249). The soil of Deadwood family is described in the preceding section. The Neuns soil is moderately deep, 20 to 40 inches (51 to 102 cm). The Neuns family surface soil extends to 11 inches (27.9 cm), is brown to light brown, and has a very gravelly (35-45% gravel) sandy loam texture. The subsoil extends to 23 inches (58.5 cm), and has a very gravelly (55% gravel and cobbles) sandy loam texture. Parent material for both soil families is metamorphosed sedimentary rock.

(3) Deadwood family-Rock outcrop complex, 60-80 percent slopes (Map symbol 37)

This soil type is located in the western portion of the MCRNA, between Treloar Ridge and Manzanita Creek. The soil is distributed on very steep dissected mountain slopes where rock outcrops make up 30 percent of the complex. Deadwood family soils support vegetation of Canyon Live Oak (SAF 249) forest type in the upper portion of

the basin, and Pacific Ponderosa Pine-Douglas-fir (SAF 244) and Oregon White Oak (SAF 233) in the lower portion of the basin. Low montane, shrub land types dominated by *Quercus vaccinifolia* and *Holodiscus microphyllus* are found in the rock outcrop area. Parent material is metamorphosed sedimentary rock.

(4) Goulding family, 60-80 percent slopes (Map symbol 81)

This soil type is distributed on very steep, dissected mountain sideslopes in the eastern portion of the MCRNA, between Manzanita Creek and Manzanita Ridge. Typical forest types on this soil are Canyon Live Oak (SAF 249) and Pacific Ponderosa Pine-Douglas-fir (SAF 244). Goulding is a shallow soil, less than 20 inches (51 cm) deep. The surface soil extends to 7 inches (17.8 cm), is yellowish brown, and has a very gravelly (40% gravel and cobbles) loam texture. The subsoil extends to 15 inches (38.2 cm), and has a very gravelly (55% gravel and cobbles), loam texture. Parent material is metavolcanic rock.

(5) Rock outcrop-Dubakella-Weitchpec families complex, 40-60 percent slopes (Map symbol 256)

This soil type is limited to the northeast corner of MCRNA which is the southeast flank of Twin Sisters Mountain. On this soil, plants of serpentine scrub types are found. Dominant species are *Quercus vaccinifolia* and *Holodiscus microphyllus*. Dubakella and Weitchpec soil are moderately deep soil, 20 to 40 inches (51 to 102 cm) deep. The surface soil of Dubakella family is 11 inches (27.9 cm) deep, reddish brown, and has cobbly loam and very stony clay loam textures (30-50% gravel, cobbles and stones). The subsoil extends to 18 inches (45.8 cm), is extremely stony (65% gravels and stones) clay textured, and mildly alkaline. The surface soil of Weitchpec family soil is 5 inches (12.7 cm) deep, light gray, with a gravelly (30% gravel) loam texture, and is slightly acid. The subsoil extends to 25 inches (63.6 cm), has a very gravelly (35-45% gravel) loam texture, and is slightly acid to neutral. Parent material of both soil families is ultramafic rock. Rock outcrops make up 45 percent of the complex.

Figure 2: Soils in the Manzanita Creek RNA
(from Soil Survey of Shasta-Trinity Forest Area, California)

5) Lands

All lands within the MCRNA are managed by the Shasta-Trinity National Forests; no private inholdings are involved.

6) Cultural sites

There is a long history of land use in this area, due to the Manzanita Creek area's proximity to the Trinity River. The Native Americans are known to have occupied the general area for at least 8000 years. Early European and Asian settlers first arrived here in 1849. Big Bar was the first settlement in Trinity County, earlier than the city of Weaverville by one month. The actual townsite of Big Bar was where Big Flat is now, but miners and settlers soon spread throughout the region (Berrien 1995).

Seventeen years ago (1978) an archaeological survey was conducted in several areas on the west side of Manzanita Creek. The study was preparatory work for a controlled burn to enhance wildlife habitat (Berrien 1995, Henn 1995). Additional survey would undoubtedly uncover more sites.

There are seven cultural sites identified within or along the perimeter of this drainage including three prehistoric lithic scatter sites. Locations and information on these sites and one sensitive geological feature in the RNA are confidential. Further inquiries should be directed to the Archaeologist in the Shasta-Trinity National Forest Supervisor's Office (2400 Washington Ave., Redding, CA 96001).

Manzanita Ridge Trail (33N46 and 12W15), Waldorff Crossing Trail (11W13) and Treloar Ridge Trail (12W17) are historic travel routes. The old ditch system along the Manzanita Creek was constructed for mining in the basin.

7) Fire History

Fire has been the primary disturbance factor in the RNA. It has contributed to the diversity of plant communities, seral stages and forest age classes within the RNA.

The predominantly young stands mapped in the MCRNA are a result of the most recent fire, Treloar Fire of July 1985, which burned 54 percent (3,950 acres [1599 ha]) of the area (Fire Report is in Appendix A1). The fire was caused by lightning and burned for 11 days. The burn intensity and coverage were variable, and created a mosaic of burned and unburned islands. This mosaic provides excellent research opportunities and cover and forage for numerous wildlife species. There was no burn rehabilitation seeding after this fire.

In 1978 and 1979, while the area was pending evaluation for RNA candidacy, the Big Bar Ranger District performed a controlled burn on a small area on the upper west slopes

of the RNA in an effort to promote browse for deer. The burn was not extensive and the burned area is shown on the map in Appendix A2. No seeding followed this control burn.

There have been numerous fires in the drainage during the past century. In a memo, dated Nov. 7, 1978, to the PSW/R5 RNA Committee, Glenn Davis, a forester in Shasta-Trinity National Forest stated, "Approximately 100 years ago a very severe fire burned through this drainage. Based on the scattered remnants of the pre-fire stands, Douglas-fir and ponderosa pine may have been approximately equal in numbers before the fire. However, regeneration following the fire was almost entirely Douglas-fir. Another fire occurred in the drainage about twenty-five years ago, but it was not nearly as severe and it crowned out only on some of the steep slopes up out of the creek bottom..... Deer brush, green leaf manzanita and madrone are found where the fire of 25 years ago crowned out..."

I. Impacts/Conflicts

1) Mineral resources

The area encompassed by the MCRNA does not have a history of significant mining related activity and has a low potential for hosting mineral deposits. The area was withdrawn from mineral entry with the Congressional designation of the Trinity Alps Wilderness Area (Teixeira 1994b). There are no known mining claims existing in this area at present. Establishment of the MCRNA will have no impact on the mineral resources in the area. A geology report was provided by R. Teixeira, the Klamath Province minerals geologist (2400 Washington Ave., Redding, CA 96001). It is included in Appendix E.

There is a cave within this area known as Manzanita Cave. It has been explored but few people know of its exact location.

2) Grazing

The area is within a suballotment of the Big Bar C & H grazing allotment, which is inactive this year. This suballotment has been temporary and has never been established as term permit. It permits 15 head only and the normal use pattern is in the lower 1/3 of the drainage. The permittees typically use the Manzanita Ridge Trail as the main access to check their cattle. There are no fences in the allotment (Stiliha 1994). Grazing use within the MCRNA has a minimal impact on the vegetation. It does not conflict with the objectives of establishing the MCRNA.

3) Timber

The MCRNA was withdrawn from timber harvest (USDA Forest Service 1995b) when Congress designated the Trinity Alps Wilderness Area. Therefore, establishment of Manzanita Creek as an RNA will have no impact on the Forest's harvestable timber resources. There were no past timber harvests in this area prior to Wilderness designation.

4) Watershed values

MCRNA includes the entire upper watershed of Manzanita Creek, which is a minor order stream entering the Trinity River near Big Bar, Trinity County. The Trinity River is a tributary of the Klamath River, which drains into the Pacific Ocean. The Forest Service has a small gauging station, which once served as the water source for the Big Bar Ranger Station. The gauging station has not been kept up for over 12 years. Establishment of the MCRNA will protect the watershed of Manzanita Creek, maintain its unique vegetation along the perennial water courses, seeps and springs, improve habitats for fish and wildlife, and enhance water quality in the Trinity River.

5) Recreation values

Although recreational use occurs in the areas outside the MCRNA along the Treloar and Manzanita Ridge Trails, there is little recreational use found within the MCRNA boundaries. Some seasonal use does occur during deer hunting season, from mid-August to mid-October. This use is primarily along the Treloar Ridge Trail (approximately 20 visitor days) and the Manzanita Ridge Trail (approximately 40 visitor days). In spring, some local people use these two trails for hiking. A small amount of horse back riding also takes place (McLean, 1995). This low level of activity is not considered to compromise the objectives for which the RNA is established.

As part of the Trinity Alps Wilderness, off-highway vehicle (OHV) use along Manzanita Ridge Trail up to the foot of Twin Sisters Mountain has been eliminated. That is favorable to the protection of MCRNA.

6) Wildlife & plant values

Establishment of the MCRNA will protect and preserve the wildlife and plant values in the RNA. Fire has played an important role in maintaining the diversity within this basin. For example, the 1985 fire created large areas of young forests and shrublands which in the short term provide important browse for deer populations. However with time and in the absence of fire, many of the existing plant communities will become Douglas-fir dominated forests (Davis 1978). Prescribed burning to enhance forest health and maintain the diversity of the plant communities in the MCRNA is consistent with the

objectives of establishing the RNA and should be addressed in the management strategy for this area.

Vegetation confined by the topography, soil, and geology, such as the Red Alder, *Quercus vaccinifolia*, and *Holodiscus microphyllus* types, will remain stable. The rare plant, *Lewisia cotyledon* var. *heckneri*, since it inhabits rocky cliffs which afford it some protection, will also remain stable.

Fire and fuel management on the areas adjacent to the south (private land) and southeast (Management Area #15) borders of the RNA may influence the fire regime of the MCRNA.

7) Special management area

The MCRNA is part of the Trinity Alps Wilderness. There may be some conflicts with Wilderness area users, as recreational use in RNA is limited to activities not interfering the objectives of establishing the MCRNA (Forest Service Manual 4063.3).

Manzanita Cave is found within the MCRNA, but it has not been given any special management area status.

8) Transportation plans

Establishment of the MCRNA will have no effect on current transportation systems on the Shasta-Trinity National Forest. No future trails or roads are proposed within or near the MCRNA.

9) Cultural sites

Establishment of the MCRNA will be beneficial to the protection and preservation of all the uncovered and potential cultural sites in the area, since disturbance, except fire, will be minimized.

J. Management prescription

Appendix C3 contains the management prescription for the MCRNA as stated in the Shasta-Trinity National Forests Land and Resource Management Plan (USDA Forest Service 1995a). The prescription calls for protection and management of associated amenity values, including unique plants, animal, and aquatic systems, to be consistent with the objectives of establishing MCRNA.

1) RNA Management plan

The Shasta-Trinity National Forests will prepare a management plan for the MCRNA in consultation with the Pacific Southwest Research Station. The plan will specify management prescriptions, practices, uses, and monitoring conducive to the objectives for establishment of the MCRNA.

K. Administration records and protection

The official responsibility for administration and protection of the RNA is with the Wilderness and Dispersed Recreation Director, Star Route 1, Box 10, Big Bar, CA 96010; Tel: (916) 623-6106. Attention should be given to the recreational use on the trails bordering the RNA and to fire response procedures.

The research coordinator is the Director, Pacific Southwest Forest and Range Experiment Station, 800 Buchanan Street, Albany, CA 94710. This person is responsible for coordinating observational or nonmanipulative applied research, and for maintaining the areas's research data file and list of herbarium and species samples collected. Because the RNA is within a Wilderness area, authority to approve activities in the RNA belongs to the Regional Forester with concurrence of the Station Director.

L. Archives

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

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Appendices

A. Fire history

- A1. Treloar Fire Report (1985)
- A2. Map of 1978, 1979 prescribed burn area

B. "Manzanita Creek channel investigation" prepared by John Veevaert, Big Bar Ranger District Hydrologist, Oct. 1994.

C. Excerpts from Shasta-Trinity National Forests Land and Resource Management Plan.

- C1. Location of MCRNA in Management Areas
- C2. Management prescription for Management Area #4
- C3. Management prescription for Special Areas

D. Plant list of Manzanita Creek RNA (from Taylor and Teare, 1979)

E. Lists of animal species that may occur in the Manzanita Creek RNA, generated from Modified WHR model for Shasta-Trinity National Forests (Crumpton and Dias 1994)

- E1. Modified WHR model for Shasta-Trinity National Forests (Crumpton and Dias 1994)
- E2. Strongly associated list
- E3. Moderately associated list
- E4. Generally associated list

F. Geology of Manzanita Creek RNA (Teixeira, 1994)

G. Descriptions of soil types (from Soil Survey of Shasta-Trinity Forest Area, California)

Appendix A. Fire history

A1. Treloar Fire Report (1985)

A2. Map of 1978, 1979 prescribed burn area

Appendix A1. Treloar Fire Report (1985)

Appendix A2. Map of 1978, 1979 prescribed burn area

Appendix B. Manzanita Creek channel investigation (Veevaert 1994)

Appendix C. Excerpts from Shasta-Trinity National Forests Land and Resource
Management Plan (USDA Forest Service 1995)

- C1. Location of MCRNA in Management Areas
- C2. Management prescription for Management Area #4
- C3. Management prescription for Special Areas

Appendix C1. Location of MCRNA in Management Areas

Appendix C2. Management prescription for Management Area #4

Appendix C3. Management prescription for Special Areas

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- E1. Modified WHR model for Shasta-Trinity National Forests (Crompton
and Dias 1994)
- E2. Strongly associated list
- E3. Moderately associated list
- E4. Generally associated list

Appendix E1. Modified WHR model for Shasta-Trinity National Forests (Crompton and
Dias 1994)

Appendix E2. Strongly associated list

Appendix E3. Moderately associated list

Appendix E4. Generally associated list

Appendix F. Geology of Manzanita Creek RNA (Teixeira, 1994)

Appendix G. Descriptions of soil types (from Soil Survey of Shasta-Trinity Forest Area,
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