

Ecological Survey of the Vegetation
of the
Yurok Research Natural Area,
California

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INTRODUCTION

The Yurok Research Natural Area (Yurok RNA) is the sole Forest Service Research Natural Area representing typical old-growth Redwood (*Sequoia sempervirens*) vegetation in the central region of distribution of this type.

This report describes the composition and structure of the vegetation of the Yurok RNA, and provides a partial list of plant species found there.

Yurok RNA- Historical Background - Heavilin and Lynch (1977) describe the detailed history of the Yurok RNA. The RNA was purchased from private timber companies by the U.S. Forest Service during the Depression Years (mid-1930s). Following World War II, the nearly 1000 acre Redwood Experimental Forest (then called the Yurok EF) was established at the site. In 1976, the Yurok RNA was designated, carving out nearly 150 acres of former Experimental Forest that was not manipulated.

Other Redwood RNAs - There are presently only three designated Federal RNAs which preserve old-growth Redwood vegetation: 1) Wheeler Creek RNA, Siskiyou National Forest, Curry County, Oregon is located at the northern-most geographic limit of Redwood, 2) The Yurok RNA, described in this report, and 3) Little Lost Man Creek RNA, within Redwood National Park (cf. Fed. Comm. RNAs 1968, Franklin *et al.* 1972, Franklin & Dyrness 1973). On the face of it, only three designated RNAs within this most productive of North American forest communities would seem inadequate. There are, however, many biological reserves of varying sizes which preserve old-growth Redwood forest and its associated variants and seral stages - these being located within Redwood National Park, various California State Parks, and on lands owned by the University of California

and the Nature Conservancy. Taken together, these areas provide more than adequate protection of representative areas of Redwood vegetation throughout its geographic range, with one major exception: there is no designated preserve at the very southern geographic limit of Redwood forest in Monterey County, California.

LOCATION

Yurok RNA encompasses approximately 150 acres, and is located on the coastal front of the North Coast Ranges in very northern California (Maps 1 & 2). The RNA is situated about 2 miles inland from the Pacific Ocean, near the mouth of the Klamath River in Del Norte County, California.

The RNA is located just off a major highway, Highway 101, and is easily accessible from this point. The RNA itself (Map 3) is without roads, save for the old cordovan Road (which is now graveled) which parallels High Creek. However, most of the RNA can be easily reached by short hiking distances from similar gravel roads which provide access to the Redwood Experimental Forest. The RNA is within convenient distance of lodging and supply centers, located all along Highway 101. Electrical needs for any sort of field monitoring requiring power would have to be confined to the area immediately adjacent to the former Experimental Forest Headquarters. There is undisturbed old-growth Redwood Forest within 100 feet of the Headquarters building, which is presently not fully utilized, and is partially occupied by the National Park Service, Redwood National Park. The juxtaposition of the Yurok RNA with both logged and undisturbed areas in the Redwood Experimental Forest provide attractive research opportunities, particularly with regard to the effects of various logging methods on community recovery trends.

Map 1

Location of the Yurok RNA in Northern California

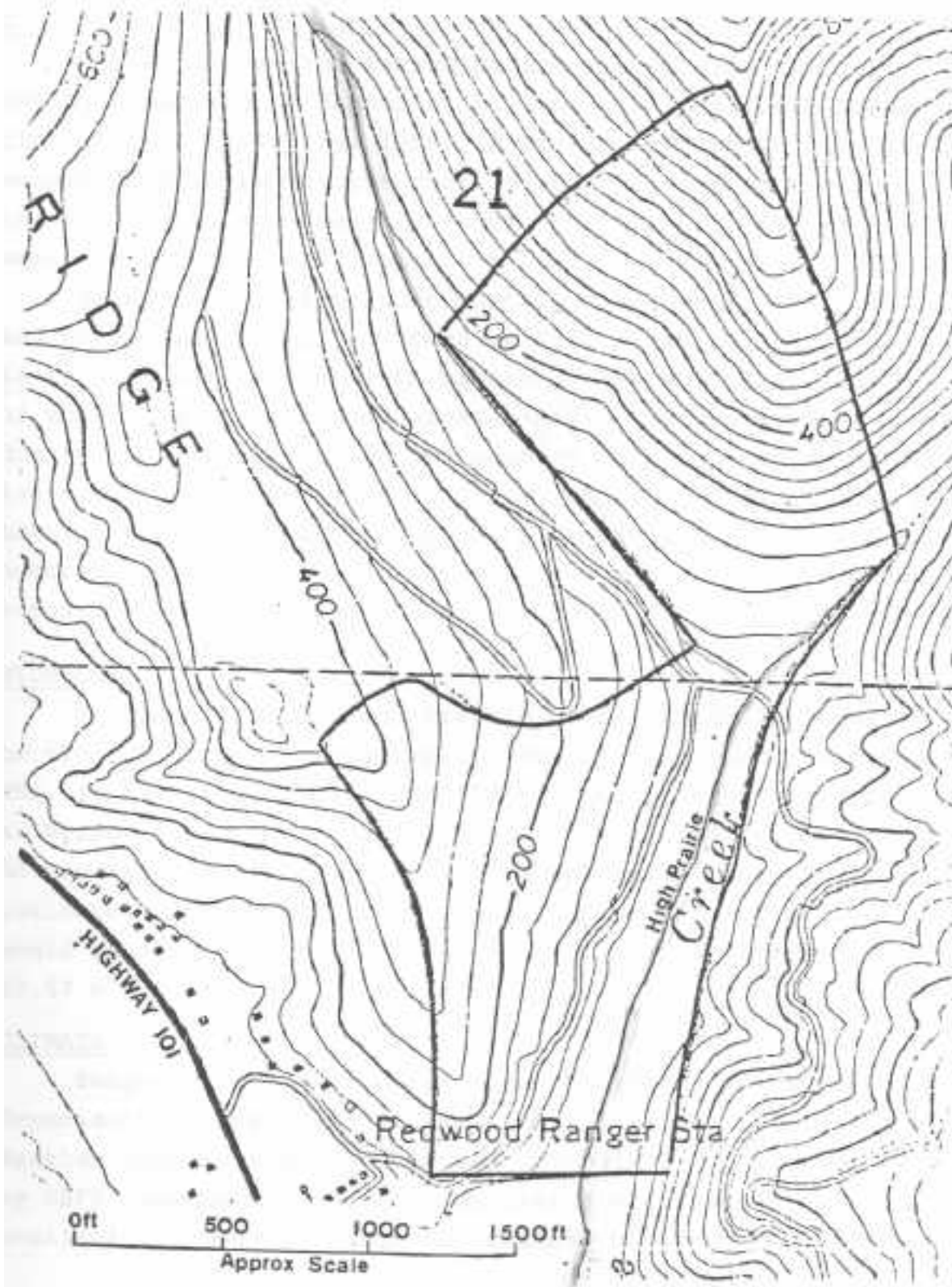


Map 2

Portion of the Six Rivers National Forest Administrative Map showing the location of the Yurok RNA and the adjacent Redwood Experimental Forest.



Map 3. Enlargement of portion of the Requa, CA 7½' USGS Quadrangle (1966 edition) showing the boundaries of the Yurok RNA [heavy line]. Scale is approximate.



GEOLOGY

The entire region including and surrounding the Yurok RNA is underlain by Mesozoic Rocks of the Franciscan Formation (Strand 1963, Page 1966) , a complex of raw to slightly metamorphic sedimentary rocks. Since the general region of the Yurok RNA is so heavily vegetated, the geology has not been mapped at a small scale.

Rocks of the Franciscan Formation are generally soft and easily weathered, and thus soil development is good in the general region, with unweathered regolith at depths of about 3 meters in most areas. Rock outcrops are few due to the soft nature of the country rock and rapid weathering rates, but where they do occur, shallow soils and exposure combine to make such sites ecologically unique. No large rock outcrops occur within the Yurok RNA, although some very small exposures occur along High Prairie Creek.

HYDROLOGY

The watershed of High Prairie Creek, which includes portions of both Redwood Experimental Forest, and the Yurok RNA, is not gauged (Cal. DWR 1981). Nearby drainages, such as Wilson Creek, which are similar in size and vegetation, do have short (since 1977) gauging records. From my visual estimate, High Prairie Creek appears to be of a size that would support a mean discharge rate of $\leq 20 \text{ ft}^3 \text{ sec}^{-1}$
($0.57 \text{ m}^3 \text{ sec}^{-1}$)

CLIMATE

Temperature and precipitation records from the Redwood Experimental Forest and Yurok RNA are limited in duration. Weather data have been collected sporadically over the years by USFS personnel, but no compilation of these data is available. However, since the climate of the North Coast

is fairly constant (varying with elevation and distance from the coast), several nearby recording stations with long-term weather records can serve to characterize the climate of the Yurok RNA. Table 1 and Figures 1-3 give climatic data from two nearby stations with similar vegetation: Klamath, about 2 miles south of the Yurok RNA and very similar in general location, and Crescent City, about 12 miles to the North. Both of these stations are typical of the superhumid conditions of the Redwood region of Northern California. Precipitation is well in excess of Potential Evapotranspiration (Pot E) in all but about a month or so in mid-summer. Thus, severe, productivity limiting drought is absent to negligible except for a short period, and during this short period stored soil-moisture can greatly supplement precipitation. Rainfall records do not show the sizable contribution from fog-drip, most abundant and important in the summer months, which can supplement precipitation by as much as 75 mm mo^{-1} (3 inch mo^{-1}) (Azevedo and Morgan 1974).

Temperatures in the general vicinity of the Yurok RNA are cool and generally constant. To be sure, low summer temperatures are likely to be nearly equally important in limiting forest productivity as is the short summer drought in this region.

Klamath, which is the recording station nearest Yurok RNA, has a mean annual temperature of $52.7 \text{ }^{\circ}\text{F}$ ($11.5 \text{ }^{\circ}\text{C}$), and a mean annual precipitation of 87 inches (2211 mm). Figures 1 & 2 show climatic diagrams for Klamath and Crescent City (using method of Walter and Leith 1967). Figure 3 shows a water balance diagram for Crescent City (taken from Major 1977, calculated using Thornthwaite method). Estimated Pot E for Crescent City is 650 mm (26 inches), while Actual Evapotranspiration is about 544 mm (21 inches). Thus, summer drought for this station is very small, on the order of 106 mm (4 inches). By the Thornthwaite estimate, about 70% of the precipitation is in excess of Pot E, and thus

Table 1

Monthly precipitation and temperature means for Klamath and Crescent City
(stations similar to the Yurok RNA).

	J	F	M	A	M	J	J	A	S	O	N	D	YR
	Precipitation												
Crescent City	320	230	210	128	102	35	16	19	38	156	267	287	1808 mm
Klamath	442	326	284	135	108	36	7	11	44	190	253	370	2211 mm
	Temperature												
Crescent City	9.5	8.9	9.1	9.3	11.9	14.2	14.6	14.8	14.7	12.9	10.7	8.9	11.4 °C
Klamath	7.6	8.5	8.6	10.2	12.1	14.0	14.8	15.0	14.8	13.1	10.6	8.5	11.5 °C

Figures 1 & 2

Climatic diagrams for Klamath and Crescent City, plotted with the method of Walter and Leith (1967) where $10^{\circ}\text{C} = 20 \text{ mm}$ water.

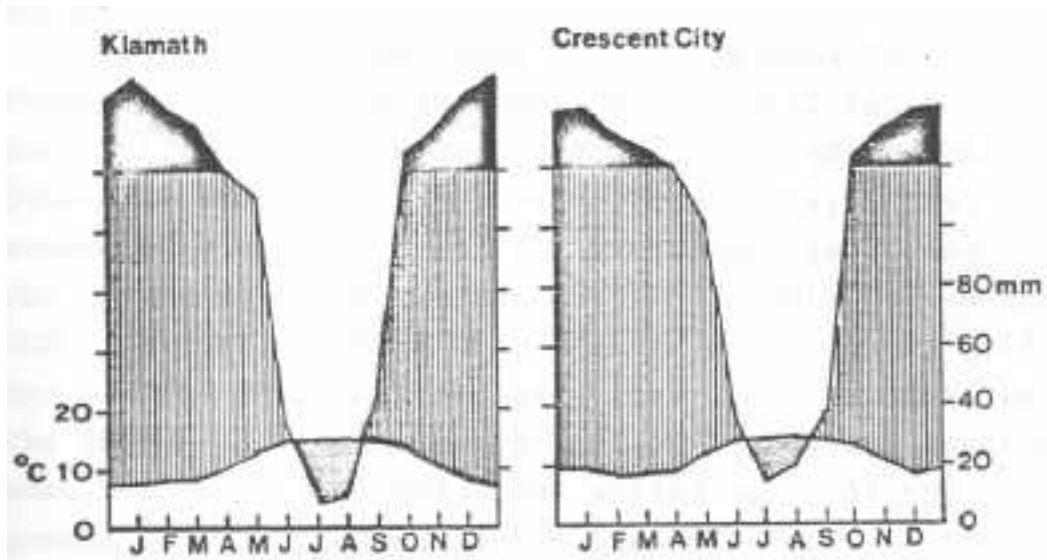
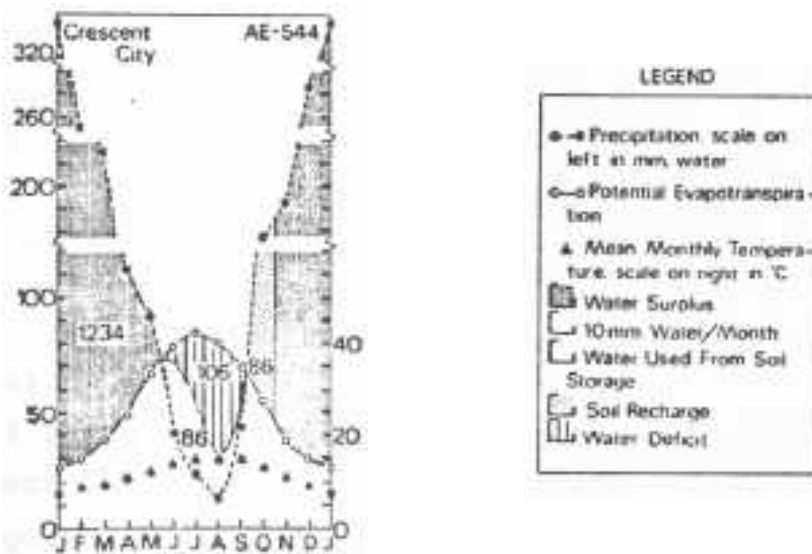


Figure 3

Water balance diagram using the method of Thornthwaite (taken from Major 1977) for Crescent City. Legend as shown.



run-off is high.

SOILS

The soils of the Yurok RNA and Redwood Experimental Forest were surveyed in detail by the Soil-Vegetation Survey (Colwell and DeLapp 1959). Soils of the RNA are generally deep (to 4 ft) sandy loams (clay ~ 15%) of moderate fertility. Profile development is strong. The upland soils of the RNA have an organic rich A-horizon (OM ~ 5-15%) which is most fertile and slightly acid (pH ~ 5.5) and moderately deep (ca. 10-13 inches), while the deeper (12-18 inches) B-horizon is heavily leached, most infertile and acid. The upland soils of the RNA are generally Nitrogen and Phosphorus deficient, while excess Iron and Aluminum concentrations are found in some ped. Soils of the more gentle slopes along High Prairie Creek are generally more fertile and less acid than upland soils due to their alluvial nature.

Soil diversity is low on the RNA, with only two major soils being present: the Melbourne Series on upland sites, and an undescribed alluvial flat soil.

Excellent soil-vegetation maps are available for the general area both North and South of the Yurok RNA (see Colwell 1974). The most extensive coverage is near the mouth of the Eel River about 30 miles South, where very similar vegetation and climate occurs (Colwell *et al.* 1958a, 1958b, 1958c, DeLapp *et al.* 1961, DeLapp and Smith 1976).

Map 4 shows a portion of the soil-vegetation map of the Yurok RNA redrawn from Colwell and DeLapp (1959). Data on specific characteristics for the Redwood region soils can be found in Storie and Weislander (1952) and Durgin (1980)

Legend to Map 4. Soil-Vegetation Map of the Redwood Experimental Forest and Yurok RNA taken from Colwell and DeLapp (1959).

Soils

Soil Characteristics are characterized by a fraction system as follows:

Numerator =	Soil Series		
	814 Melbourne Series		
	200 Undescribed alluvial soil series		
Denominator =	Soil Depth		
1st digit	Map Symbol	Soil Depth in feet	Soil Description
	1	< 1 ft	Very shallow
	2	1-2 ft	Shallow
	3	2-3 ft	Moderately Shallow
	4	3-4 ft	Moderately Deep
	5	> 4 ft	Deep
2nd digit	Map Symbol	Percent Slope	Soil Description
	1	0-30%	Nonsteep
	2	30-50%	Steep
	3	50-70%	Very Steep
	4	>70%	Extremely Steep
Prefix S =	Phase of soil with significantly more gravel and stones than normal for a series.		

Vegetation

Site Class Symbol	Site Index
I	200
II	170
III	140

Species Composition

(next page)

Map Symbol	Taxon	Common Name
Bn	<i>Mahonia nervosa</i>	Oregon Grape
Cr	<i>Corylus cornuta californica</i>	California Hazelnut
Ct	<i>Ceanothus thrysiflorus</i>	Coast Blue-blossom
D	<i>Pseudotsuga menziesii</i>	Douglas Fir
Gs	<i>Gaultheria shalon</i>	Salal
Hb	-----	Herbs
H	<i>Tsuga heterophylla</i>	Western Hemlock
L'	<i>Umbellularia californica</i>	California Bay
M	<i>Arbutus menziesii</i>	Madrone
M	<i>Acer macrophyllum</i>	Big-leaf Maple
O	<i>Chamaecyparis lawsoniana</i>	Port-Orford Cedar
Pom	<i>Polystichum munitum</i>	Sword Fern
Q	<i>Chrysolepis chrysophylla</i>	Giant Chinquipin
R	<i>Sequoia sempervirens</i>	Coast Redwood
R	<i>Alnus rubra</i>	Red Alder
Rch	<i>Rhododendron macrophyllum</i>	Coast Rhododendron,
Rix	<i>Ribes sanguineum</i>	Red-flowered Currant
Rp	<i>Rubus parviflorus</i>	Thimbleberry
Rus	<i>Rubus spectabilis</i>	Salmonberry
Rv	<i>Rubus ursinus-vitifolius</i>	Blackberry
S'	<i>Picea sitchensis</i>	Sitka Spruce
Sx	<i>Salix lasiolepis</i>	Arroyo Willow
T	<i>Lithocarpus densiflora</i>	Tan-bark Oak
Vo	<i>Vaccinium ovatum</i>	Evergreen Huckleberry
Vp	<i>Vaccinium parviflorum</i>	Red Huckleberry
Whm	<i>Whipplea modesta</i>	Modesty

As indicated on the soil-vegetation map, the total area of the two forest types on the RNA are:

Redwood Forest (SAF 232) ~ 120 acres

Alder-Maple Forest (SAF 221) ~ 30 acres

