

# Fire Regimes and Restoration Needs in Southwestern Oregon

Thomas Atzet

The Klamath Province, straddling the Oregon and California border along the north Pacific coast, roughly forms a square between Coos Bay and Crater Lake, Oregon, to the north, and Eureka and Redding, California, to the south. It is recognized as geologically unique (Dott 1971; Orr 1992) and is the most floristically diverse province in the western United States (Whittaker 1961).

Unlike temperate ecosystems farther north, southwestern Oregon's Mediterranean climate interacts with a variety of two million year old geologic substrates and produces an array of habitats adapted to both marine and continental climatic regimes. Compared to more northerly regions, southwestern Oregon has a warmer, drier climate conducive to fire over a longer season. Until recently, fire, the main disturbance agent (table 1), has been frequent and of low severity, but the amount of high severity fire seems to be increasing.

Disturbance regimes, including fire (table 1), vary by elevation and "Plant Series," a taxonomy based on the potential climax species (Daubenmire and Daubenmire 1968). Table 2 displays elevational characteristics of each Series. Figure 1 schematically shows the Series in an east-west transect across the Province. Mountain hemlock, the highest in elevation (table 2) is also the least disturbed Series. However, fire is still the most frequently observed disturbance (29 percent). Table 3 displays the mean disturbance

characteristics of the Series. Note that in all but Tanoak, mean intervals are shorter than the number of years since the last disturbance, an indication that mean intervals are increasing.

In the post World War II era, an expanding road system, lighter chain saws, versatile vehicles, emphasis on the importance of forest resources, and the Cave Junction smoke-jumper base (operational in 1940) significantly increased the efficiency of fire suppression. Figure 2 illustrates the effectiveness of suppression after 1940. Table 4, the percent of the area burned by severity class, shows the average proportion of high severity fire is about 14 percent (except for the Longwood fire). The Longwood fire, which burned an interface area that missed three cycles of fire, burned 26 percent of the area at high severity, an indication that long-term suppression tends to increase the proportion of high severity fire.

Figure 3 illustrates the accumulation of basal area of trees per acre (by Plant Series) that has occurred since the 1940's. Fuel accumulation is a major factor contributing to the increasing probability of more high severity fires. Density management (thinning) and underburning are recommended to reduce fuel buildup, reduce stand susceptibility to insects and diseases, and reduce the probability of soil damage and erosion resulting from wildfire.

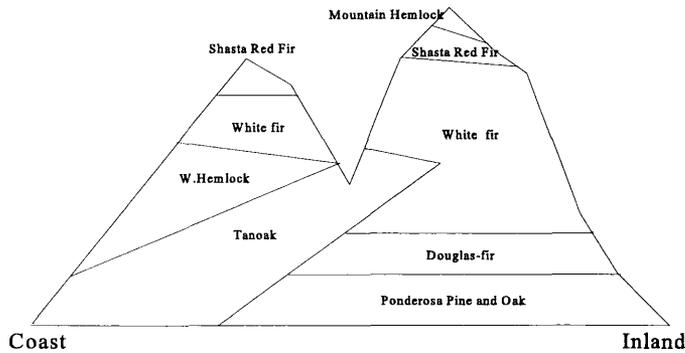
Table 1—Last major disturbance, by Plant Series.

Agent	Series							
	White fir (n = 296)	Shasta red fir (n = 40)	Port- Orford-cedar (n = 18)	Tanoak (n = 195)	Jeffrey pine (n = 31)	Douglas-fir (n = 175)	Western hemlock (n = 51)	Mountain hemlock (n = 14)
	----- Percent of plots -----							
Fire	56	48	72	74	68	72	45	29
Human	29	18	17	17	10	22	37	21
Wind	8	13	0	2	16	2	14	0
Disease	2	5	11	4	3	2	2	14
Erosion/soil creep	0	0	0	1	0	0	2	0
Ice/snow	1	8	0	0	3	0	0	21
Insects	1	0	0	0	0	0	0	0

In: Hardy, Colin C.; Arno, Stephen F., eds. 1996. The use of fire in forest restoration. Gen. Tech. Rep. INT-GTR-341. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Thomas Atzet is with the Siskiyou National Forest, USDA Forest Service, Grants Pass, OR.

**Cross Section of the Klamath Province**  
(Showing the schematic relationship among the plant series)



**Figure 1**—West-to-East cross section of the Klamath Province from Brookings, OR (Coast) to Redding, CA (Inland).

**Table 2**—Mean elevation of the Plant Series.

Plant series	Mean elevation	Standard deviation	Range
Whole Province	3,638	1,390	200-7,600
White fir	4,565	753	2,000-6,600
Shasta red fir	5,712	1,156	4,200-7,500
Port-Orford-cedar	3,876	872	1,800-4,800
Tanoak	2,394	789	200-3,800
Jeffrey pine	3,187	1,346	1,200-6,000
Douglas-fir	3,033	1,039	1,500-6,000
Western hemlock	2,740	1,094	1,600-4,600
Mountain hemlock	6,500	1,780	5,800-7,600

**Table 3**—Mean disturbance characteristics of the Plant Series.

Plant series	Mean age	Years since last disturbance	Mean interval
White fir	213	64	25
Shasta red fir	214	56	40
Port-Orford-cedar	419	129	50
Tanoak	243	58	90
Jeffrey pine	282	73	50
Douglas-fir	230	76	30
Western hemlock	281	63	65
Mountain hemlock	313	67	115

**Table 4**—Percent of area burned by severity class (Siskiyou National Forest).

Severity	Silver <sup>1</sup>	Silver <sup>2</sup>	Cedar camp <sup>3</sup>	Cedar camp <sup>4</sup>	Galice <sup>5</sup>	Longwood <sup>6</sup>
High	12	11	15	13	17	26
Med	33	35	19	28	34	43
Low	55	54	66	59	49	31

<sup>1</sup>Inside the Kalmiopsis Wilderness. The Silver fire area has a "natural" periodicity of 50 years.

<sup>2</sup>Outside the Kalmiopsis Wilderness. The Silver fire burned in 1987.

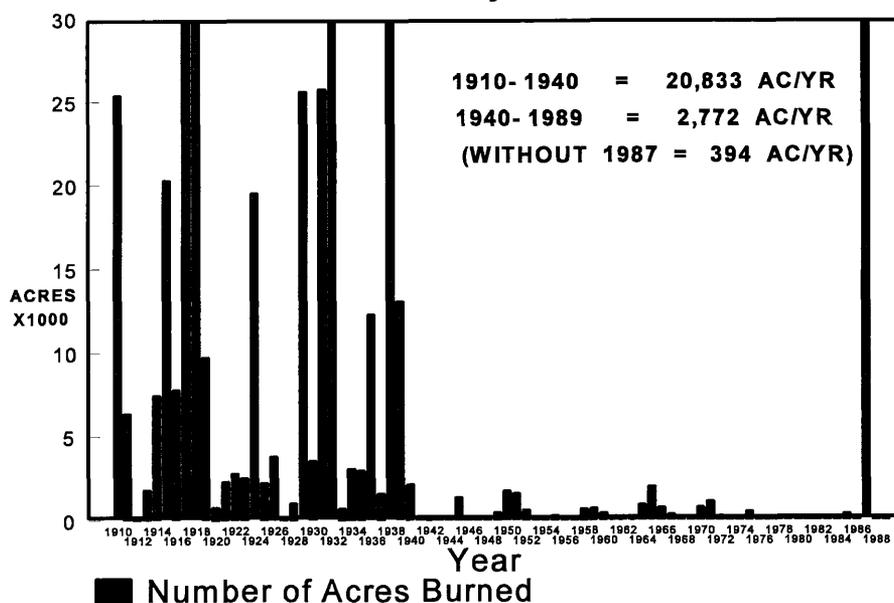
<sup>3</sup>Average severities for all the Cedar Camp fire that burned in 1937.

<sup>4</sup>Average severities for the areas that reburned during the Silver fire.

<sup>5</sup>The Galice fire burned in 1987 in a low elevation area not subject to intense suppression.

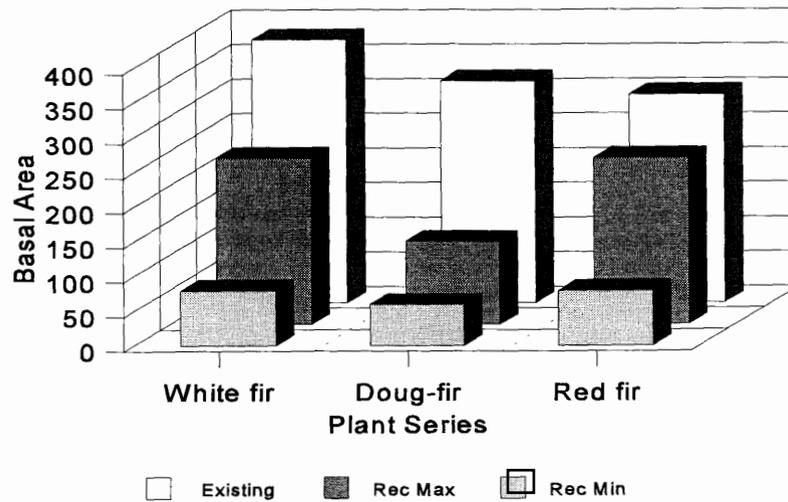
<sup>6</sup>The Longwood fire burned in 1987 in a populated area where suppression was intense.

## Acres Burned Siskiyou National Forest



**Figure 2**—Acres burned by year on the Siskiyou National Forest.

## Existing & Recommended Tree Basal Area by Plant Series (Applegate Area)



**Figure 3**—Basal area buildup in the Applegate area, showing existing, recommended maximums (Rec Max), and recommended minimums (Rec Min).

### References

Daubenmire, R. and J.B. Daubenmire. 1968. Forest vegetation of eastern Washington and northern Idaho. Wash. Agric. Exp. Stn., Tech. Bull. 60. 104 p.

Dott, R.H., Jr. 1971. Geology of the Southwestern Coast West of the 124th Meridian. State of Oregon, Dept. of Geo. and Min. Ind. Bull. 69.

Orr, E.L., W.N. Orr, and E.M. Baldwin. 1992. Geology of Oregon. 4th ed. Kendall/Hunt Pub. Co. Dubuque, Iowa 52002.

Whittaker, R.H. 1961. Vegetation History of the Pacific Coast States and the Central Significance of the Klamath Region. *Madroño* 16: 5-23 pp.