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FOREST FIRE WEATHER

IN WESTERN OREGON AND WESTERN WASHINGTON

IN 1957

EDITOR'S  
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by

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Severity of 1957 fire weather west of the Cascade Range summit in Oregon and Washington was near the average of the previous 10 years. The season (April 1 through October 31) was slightly more severe than 1956 in western Oregon and about the same as 1956 in western Washington. Spring fire weather was near average severity in both western Washington and western Oregon. Summer was below normal severity in western Washington and above normal in western Oregon. Fall was more severe than average in both states.

Preceded by one of the wettest Marches of record, the 1957 season got off to a favorable start. Rainy periods dominated through May 22. Rains in mid-June, mid-July and early August, with below-normal temperatures in July and August, kept severity of fire weather low until mid-August. September, however, was warmer and drier than normal and, with several days of dry easterly winds, brought the season's most severe fire weather. In Oregon, the summer dry spell was terminated by general wetting rains September 26 and 27. In

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1/ The author is indebted to the staffs of the U. S. Weather Bureau's Weather Records Processing Center at San Francisco, National Weather Records Center at Ashville, N. C. , and Airport Station at Portland for assembling much of the data used in this report.

Washington, although light rains occurred around September 6, 16, and 26, predominantly rainy weather did not begin until October 1.

Weather conditions during the 1957 fire season are compared with those of previous years through use of three indexes that provide a measure of ease with which fires start, speed with which they spread, and depth to which they burn. These indexes are: (1) Total number of days when no rain fell, (2) average number of days since a wetting rain of one-fourth inch or more, and (3) burning index, a rating of the combined effect of relative humidity and wind speed on rate of fire spread. High burning index means high rate of spread. Each index is an average of separate measurements from a number of widely distributed Weather Bureau stations.<sup>2/</sup> Statistical tests have demonstrated for western Oregon and western Washington that the number of man-caused fires and the proportion of all fires in different size classes are closely correlated with fire-weather conditions as indicated by the 3 seasonal indexes.

Supplementary information on other features of fire weather during 1957 are also presented to show number of days with (1) relative humidity of 30 percent or lower, (2) burning index greater than 28, and (3) lightning storms over the national forests.

#### Fire-Weather Indexes for Western Oregon

Although the season was not unusual, it was slightly more severe than the 1956 fire season. All season indexes were near the 10-year average (table 1). The most severe fire weather of the season occurred in September, with 4 days of drying east winds. As usual, the weather was more severe in the extreme southern part of the area, though this year the first fall rains were heaviest in the south.

Spring indexes were higher than in 1956 and were near the 10-year average, though total number of rainless days was the greatest since 1952. Highest spring fire danger occurred June 22 to 26.

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<sup>2/</sup> Although all days in the April-through-October fire season were used in the calculation of rainless days and number of days since a wetting rain, the burning index rating is based on only the 50 percent of days with highest burning index, according to the Forest Service scale used in Region 6.

Table 1. -- 1957 fire-weather indexes and comparative data

for western Oregon<sup>1/</sup>

Item	Current:		Previous:		10-year		Record	
	year	:(1957)	year	:(1956)	average	:(1947-56)	low <sup>2/</sup>	high <sup>2/</sup>
<b>Spring (April 1-June 30):</b>								
Burning index	24.3		22.8		24.9		15.9 (1953)	33.7 (1951)
Average days since wetting rain	10.2		9.6		12.9		5.5 (1933)	22.9 (1935)
Total rainless days	63.2		49.0		58.7		46.2 (1948)	75.8 (1924)
<b>Summer (July 1-Sept. 15):</b>								
Burning index	35.4		35.2		31.0		25.3 (1954)	37.8 (1945)
Average days since wetting rain	42.0		28.2		36.0		15.9 (1947)	75.5 (1935)
Total rainless days	70.2		71.5		66.9		59.3 (1954, 1947)	74.8 (1929)
<b>Fall (Sept. 16-Oct. 31):</b>								
Burning index	19.5		15.0		17.0		10.0 (1940)	26.4 (1936)
Average days since wetting rain	19.6		10.8		16.9		5.3 (1955)	94.4 (1932)
Total rainless days	27.5		28.8		30.4		22.2 (1950)	42.5 (1936)
<b>Season (April 1-Oct. 31):</b>								
Burning index	27.2		25.5		25.4		18.5 (1953)	31.3 (1951)
Average days since wetting rain	23.7		16.6		22.0		13.5 (1941)	48.8 (1932)
Total rainless days	160.9		149.2		155.9		139.5 (1948)	176.0 (1952)

<sup>1/</sup> Indexes based on observations at the following Weather Bureau stations: Burning index -- Portland (International Airport), Eugene, Sexton Summit and Medford. Rainfall indexes -- Portland, Eugene, North Bend, and Medford.

<sup>2/</sup> Burning index computed 1932-57 except for 1933, 1934, 1937, and 1939. Average days since wetting rain and total number of rainless days computed 1922-57 except for 1923 and 1927.

The summer was among the drier and more severe of record. All indexes were above the 10-year average, with average time since a wetting rain the greatest since 1951. Burning index and total rainless days were similar to those of 1956. The summer dry spell was broken by a period of light rains July 12 to 15, and by general rains--except in the extreme southern part of the area--August 5 to 10. Highest burning indexes of the summer occurred September 8 to 11 and 13 and 14.

Fall burning index and average time since a wetting rain were above both the 10-year average and the 1956 values. Total number of rainless days was slightly below both the average and the 1956 level. September brought some of the season's highest daily BI values to the entire western Oregon area September 18 to 21, and to the northern part of that area on the 29th. Starting with general rain September 26, rains dominated most of the area through October 13, with rainless periods October 14 to 22 and 26 to 29. In the southern part of the area, the rains of September 25 were the first wetting rains in 134 days.

#### Fire-Weather Indexes for Western Washington

The 1957 season indexes are similar to those of 1956 except for the greater number of rainless days in 1957 (table 2). Both burning index and average time since a wetting rain were slightly below the 10-year averages, while rainless days were slightly more numerous than average. September was the most dangerous month, with several days of east wind and average temperature among the highest in Weather Bureau history.

The spring part of the fire season was comparatively dry as indicated by above-average figures for time since wetting rain and total rainless days. The burning index, however, was unusually low, being the lowest since the wet spring of 1953. Average time since wetting rain, though little different from 1956, was highest since the dry spring of 1951, and total rainless days was highest since 1952. Rains were generally well distributed; however, wetting rains were infrequent in the north end, with Bellingham going 62 days (April 24 to June 25) between rains of a quarter inch or more. Despite lack of wetting rains, Bellingham reported the lowest spring BI of record.

All summer indexes were below normal and less than those of the preceding year, placing the summer among those with the least severe fire weather. Of particular note is average time since a

Table 2. -- 1957 fire-weather indexes and comparative data  
for western Washington<sup>1/</sup>

Item	: Current : year : (1957)	: Previous : year : (1956)	: 10-year : average : (1947-56)	: Record : low <sup>2/</sup>	: Record : high <sup>2/</sup>
<b>Spring (April 1-June 30):</b>					
Burning index	12.3	16.4	17.8	11.6 (1953)	24.3 (1951)
Average days since wetting rain	13.5	13.3	8.6	4.0 (1942)	15.7 (1938)
Total rainless days	59.0	45.0	53.1	43.7 (1953)	69.7 (1938)
<b>Summer (July 1-Sept. 15):</b>					
Burning index	16.1	18.1	17.8	10.0 (1954)	24.8 (1945)
Average days since wetting rain	10.7	17.6	21.8	8.3 (1943)	60.5 (1951)
Total rainless days	58.0	65.7	60.4	49.3 (1948)	67.5 (1951)
<b>Fall (Sept. 16-Oct. 31):</b>					
Burning index	15.3	5.3	9.4	5.1 (1955)	15.6 (1952)
Average days since wetting rain	11.0	2.7	7.5	2.7 (1956)	28.3 (1942)
Total rainless days	27.0	15.7	24.9	15.7 (1956)	38.0 (1936)
<b>Season (April 1-Oct. 31):</b>					
Burning index	14.3	14.6	16.0	11.8 (1955)	21.4 (1951)
Average days since wetting rain	11.9	12.6	13.1	7.0 (1948)	28.9 (1951)
Total rainless days	144.0	126.3	138.3	122.7 (1941)	162.3 (1938)

<sup>1/</sup> Indexes based on observations at the following Weather Bureau stations:  
Burning index--Toledo, Seattle (Boeing Field), Bellingham, and Stampede Pass.  
Rainfall indexes--Toledo, Hoquiam, and Bellingham.

<sup>2/</sup> Burning index computed 1944-1957. Average time since wetting rain  
and total number of rainless days computed 1936-1957.

wetting rain, which was half of normal and actually less than in the spring or fall. Rainy periods July 8 to 16 and August 3 to 11 dominated those two months. Although brief wetting rains occurred around September 6, some of the season's highest daily BI values occurred during a hot spell September 10 to 15.

In contrast to summer, the fall indexes were all above 10-year average values and were much higher than in 1956. Burning index was close to the record high of 1952, and station BI records were set at Bellingham and Seattle (Boeing Field). Second of the season's two periods of dangerous fire weather occurred September 18 to 24. Beginning on the first day of the month, rains dominated October and ended a predominantly rainless period that began August 13.

#### Supplementary Fire-Weather Data

Low relative humidity. -- The number of days with relative humidities of 30 percent and lower was not unusual and not greatly different from the 1956 frequencies at Oregon stations (table 3). Washington stations showed greater variation. Seattle (Boeing Field) had considerably more low-humidity days than in the previous year, whereas Toledo had considerably less. Humidities of 30 percent or lower are particularly meaningful to the logging industry as power logging operations west of the Cascades normally shut down when the humidity drops to this level.

High burning index. -- The number of days with dangerously high burning index was not particularly unusual at Oregon stations except at Medford where a record number of such days was observed in 1957 (table 4). At Medford, of the 77 days in the summer period, 56 had BIs greater than 28. These extreme days were comparatively few in western Washington. Since fires make their greatest spread at times of extreme burning index, the number of days with extreme burning index bears a direct relation to total area burned.

Lightning storms. -- Summer lightning storms were comparatively scarce over the national forests of western Oregon except on the Rogue (table 5). In western Washington storms were more numerous, particularly on the Mt. Baker forest where the 1953 record was equaled. In many years lightning causes a majority of the fires on the national forests of Oregon and Washington. Frequency of lightning storms is therefore closely related to the total number of fires.

Table 3. -- Number of days between April 1 and October 31

with relative humidity<sup>1/</sup> 30 percent or lower

Station	: 1957	: 1956	: Record low	: Record high
<b>Western Oregon:</b>				
Portland	15	11	8 (1941, 1948)	37 (1938)
Eugene	36	30	12 (1941)	65 (1951)
Sexton Summit	18	16	4 (1955)	53 (1945)
Medford	100	100	46 (1948)	135 (1951)
<b>Western Washington:</b>				
Toledo	4	12	1 (1948)	26 (1951)
Stampede Pass	8	7	1 (1948)	20 (1951)
Seattle	21	11	2 (1948)	30 (1951)
Bellingham	2	1	0 (1945, 1948, 1952, 1953)	6 (1946)

<sup>1/</sup> Observed at 4:30 p. m. until June 1, 1957; at 4 p. m.,  
June 1 - October 31, 1957.

Table 4. -- Number of days between April 1 and October 31

with burning index<sup>1/</sup> greater than 28<sup>2/</sup>

Station	: 1957	: 1956	: Record low	: Record high
<b>Western Oregon:</b>				
Portland	11	15	7 (1935, 1953)	27 (1944, 1945)
Eugene	43	34	14 (1942)	76 (1951)
Sexton Summit	10	17	8 (1947)	47 (1936)
Medford	<sup>3/</sup> 97	65	17 (1953)	94 (1949)
<b>Western Washington:</b>				
Toledo	2	3	0 (1955)	12 (1951)
Stampede Pass	7	13	4 (1955)	34 (1951)
Seattle	10	12	4 (1953)	44 (1951)
Bellingham	1	1	0 (1945, 1948)	7 (1951)

<sup>1/</sup> Observed at 4:30 p. m. until June 1, 1957; at 4 p. m. ,  
June 1 - October 31, 1957.

<sup>2/</sup> Burning index greater than 28 is equivalent to class 6 or  
greater on the Forest Service Region 6 burning index scale.

<sup>3/</sup> New record high.



Table 5. -- Number of days with lightning storms  
between July 1 and September 15<sup>1/</sup>

National forest	: 1953	: 1954	: 1955	: 1956	: <sup>2/</sup> 1957
Western Oregon:					
Rogue	13	3	2	22	11
Umpqua	11	2	2	15	4
Willamette	7	1	1	16	2
Mt. Hood	14	2	8	21	3
Siskiyou	6	0	2	13	1
Siuslaw	4	1	1	8	0
Average	9.2	1.5	2.7	15.8	3.5
Western Washington:					
Gifford Pinchot	6	2	9	13	11
Snoqualmie	10	5	6	19	9
Mt. Baker	11	3	1	4	11
Olympic	4	0	1	8	3
Average	7.8	2.5	4.2	9.5	8.5

<sup>1/</sup> Based on daily reports to U. S. Weather Bureau and on ranger district field records (82-R6), except where indicated otherwise.

<sup>2/</sup> Complete field records not yet available.