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FOREST FIRE WEATHER IN WESTERN OREGON AND WESTERN WASHINGTON IN 1956

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The 1956 fire season will be remembered for the record number of lightning storms in nearly all parts of the area. In other respects, fire-weather severity was slightly below the average of the previous ten years. In western Oregon, fire weather over the entire season (April through October) was slightly less severe than in 1955, while in western Washington it was slightly more severe.

Following an unusually wet and cold winter, April was comparatively dry and warm. Occasional rains in May and generally rainy conditions the first 20 days in June gave the summer part of the season a damp start. Wetting rains in both August and September interrupted the summer dry spell, which extended from about July 6 to September 18 in Washington and June 20 to October 8 in Oregon. The summer part of the season (July 1 to September 15) west of the Cascade summit in both states was actually more severe than average

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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.

despite the rains. Fall was wetter than average in western Oregon and the wettest of record (1936-56) in western Washington.

Weather conditions during the 1956 fire season (April 1 to October 31) are compared with those of previous years through the 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. 2/ A 1956 analysis of records from one national forest indicated that occurrence and size of man-caused fires are closely related to the 3 seasonal indexes.

Supplementary information on other features of fire weather during 1956 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

Indexes for the entire season indicate that rainless days were less plentiful and rainless periods shorter than average 3/ during 1956 (table 1). Season burning index was average. As judged by all three indexes, the 1956 season was slightly less severe than in 1955.

Spring indexes were all below average, with number of rainless days at a near record low. April, with only a third of normal rainfall and above-normal temperatures, followed seven months of above-normal precipitation and two months of well below normal temperature. May rainfall and temperature were near normal and June was cooler and rainier than normal.

2/ 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.

3/ Reference to average level of any index is to the average for the 10-year period of 1946-55. Normal refers to Weather Bureau normals.

Table 1.--1956 fire-weather indexes and comparative data for western Oregon [1/]

Item	Current year (1956)	Previous year (1955)	10-year average (1946-55)	Record low [2/]	Record high [2/]
Spring (April 1-June 30)					
Burning index	22.8	29.0	25.1	15.9 (1953)	33.7 (1951)
Average days since wetting rain	9.6	16.9	13.6	5.5 (1933)	22.9 (1935)
Total rainless days	49.0	53.8	59.9	46.2 (1948)	75.8 (1924)
Summer (July 1-Sept. 15)					
Burning index	35.2	32.4	30.8	25.3 (1954)	37.8 (1945)
Average days since wetting rain	28.2	37.8	37.0	15.9 (1947)	75.5 (1935)
Total rainless days	71.5	66.7	66.7	59.3 (1954, 1947)	74.8 (1929)
Fall (Sept. 16-Oct. 31)					
Burning index	15.0	19.0	17.5	10.0 (1940)	26.4 (1936)
Average days since wetting rain	10.8	5.3	17.2	5.3 (1955)	94.4 (1932)
Total rainless days	28.8	30.3	31.0	22.2 (1950)	42.5 (1936)
Season (April 1-Oct. 31)					
Burning index	25.5	28.0	25.5	18.5 (1953)	31.3 (1951)
Average days since wetting rain	16.6	21.9	22.7	13.5 (1941)	48.8 (1932)
Total rainless days	149.2	150.8	157.6	139.5 (1948)	176.0 (1952)

1/ 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.

2/ Burning index computed 1932-56 except for 1933, 1934, 1937, and 1939. Average days since wetting rain and total number of rainless days computed 1922-56 except for 1923 and 1927.

The spring pattern was reversed during the summer when burning index and number of rainless days approached record-high levels. Although the period from June 20 to October 8 was predominantly rainless, wetting rains in the northern half of the area around August 1, August 25, and September 9 reduced average time since a wetting rain considerably below the 10-year average. Extreme burning conditions with general easterly winds were experienced on July 8 and September 4 and 5. Temperatures over 100° F. (106° at Portland and Salem) resulted in extreme fire danger July 18, 19, and 20.

Fall rainfall indexes were both below average as a result of general rainy weather after October 8. Burning index was about average due to predominantly dry weather September 16 to October 8, including a severe easterly wind October 5 and 6.

Fire-Weather Indexes for Western Washington

All three indexes for the entire season were below average though burning index was higher and wetting rains were more widely spaced than in 1955 (table 2). Despite a comparatively dry summer, rainless days were fewer in number than in any year since 1941.

Spring burning index was about average even though average time since a wetting rain was the third highest on record. April, which followed a 6-month period of well above normal rainfall, was the driest of record with only one fourth of normal rainfall. With normal temperature, it also was the first month in fifteen that did not have below-normal temperature in western Washington. The half-of-normal rainfall and above-normal temperature of May were followed by a cool and predominantly rainy June.

All summer indexes were higher than in 1955. Burning index, although about average, was the highest since the summer of 1952, while total number of rainless days was within two of the record. After July 6, summer was predominantly dry with wetting rains around August 1 and September 9. As in western Oregon, severe easterly winds occurred July 8 and September 4 and 5. Temperatures near 100° F. and moderate east winds occurred around July 19.

Fall was mostly rainy after September 18. Both rainfall indexes reached record lows and the record low burning index was nearly equalled.

Table 2.--1956 fire-weather indexes and comparative data for western Washington [1/]

Item	Current year (1956)	Previous year (1955)	10-year average (1946-55)	Record low [2/]	Record high [2/]
Spring (April 1-June 30)					
Burning index	16.4	14.4	17.8	11.6(1953)	24.3(1951)
Average days since wetting rain	13.3	4.7	8.2	4.0(1942)	15.7(1938)
Total rainless days	45.0	44.3	53.8	43.7(1953)	69.7(1938)
Summer (July 1-Sept. 15)					
Burning index	18.1	12.8	17.9	10.0(1954)	24.8(1945)
Average days since wetting rain	17.6	15.7	21.9	8.3(1943)	60.5(1951)
Total rainless days	65.7	61.0	59.7	49.3(1948)	67.5(1951)
Fall (Sept. 16-Oct. 31)					
Burning index	5.3	5.1	9.8	5.1(1955)	15.6(1952)
Average days since wetting rain	2.7 [3/]	3.4	7.6	2.9(1941)	28.3(1942)
Total rainless days	15.7 [3/]	23.0	26.1	19.0(1941)	38.0(1936)
Season (April 1-Oct. 31)					
Burning index	14.6	11.8	16.1	11.8(1955)	21.4(1951)
Average days since wetting rain	12.6	8.4	13.0	7.0(1948)	28.9(1951)
Total rainless days	126.3	128.3	139.5	122.7(1941)	162.3(1938)

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

2/ Burning index computed 1944-1956. Average time since wetting rain and total number of rainless days computed 1936-1956.

3/ New record low.

Supplementary Fire-Weather Data

Relative humidity. -- Relative humidities of 30 percent and lower were slightly more frequent in the western parts of both states than during the 1955 fire season, except in the Medford area (table 3). In most areas west of the Cascades these low-humidity days were the most frequent since 1952. Humidities of 30 percent or lower are particularly meaningful to the logging industry as power logging operations west of the Cascades shut down when the humidity drops to this level.

Table 3. --Number of days between April 1 and October 31 with relative humidity 1/ 30 percent or lower

Station	1956	1955	Record low	Record high
Western Oregon				
Portland	11	9	8 (1941, 1948)	37 (1938)
Eugene	30	24	12 (1941)	65 (1951)
Sexton Summit	16	4	4 (1955)	53 (1945)
Medford	100	114	46 (1948)	135 (1951)
Western Washington				
Toledo	12	4	1 (1948)	26 (1951)
Stampede Pass	7	6	1 (1948)	20 (1951)
Boeing Field	11	4	2 (1948)	30 (1951)
Bellingham	1	1	0 (1945, 1948, 1952, 1953)	6 (1946)

1/ Observed at 4:30 p.m.

High burning index. --The number of days with dangerously high burning index was the greatest since 1952 in western Washington and northwestern Oregon. From about Eugene southward, in Oregon, days with this condition were less frequent than in 1955 (table 4). 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.

Table 4. --Number of days between April 1 and October 31 with burning index 1/ greater than 2/ 28

Station	1956	1955	Record low	Record high
Western Oregon				
Portland	15	11	7 (1935, 1953)	27 (1944, 1945)
Eugene	34	45	14 (1942)	76 (1951)
Sexton Summit	17	23	8 (1947)	47 (1936)
Medford	65	82	17 (1953)	94 (1949)
Western Washington				
Toledo	3	0	0 (1955)	12 (1951)
Stampede Pass	13	4	4 (1955)	34 (1951)
Boeing Field	12	7	4 (1953)	44 (1951)
Bellingham	1	1	0 (1945, 1948)	7 (1951)

1/ Observed at 4:30 p.m.

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

Lightning storms. --Except for the Mt. Baker and Umpqua National Forests, lightning storms were more frequent over national forests of western Oregon and western Washington than in any fire season during the preceding 6-year period of record (table 5). In many years lightning causes a majority of the fires on the National Forests of western Oregon and Washington. Frequency of lightning storms thereby greatly affects the total number of fires.

Table 5. --Number of days 1/ with lightning storms over western Oregon and western Washington, by national forests, between July 1 and September 15

National forest	1950	1951	1952	1953	1954	1955	1956
Western Oregon							
Rogue	14	16	13	13	3	2	*19**
Umpqua	1	4	10	11	2	2	* 8
Willamette	2	3	9	7	1	1	16**
Mt. Hood	2	2	12	14	2	8	20**
Siskiyou	2	2	8	6	0	2	*12**
Siuslaw	0	1	2	4	1	1	* 8**
Average	3.5	4.7	9.0	9.2	1.5	2.7	*13.8**
Western Washington							
Gifford Pinchot	5	2	4	6	2	9	13**
Snoqualmie	10	8	10	10	5	6	19**
Mt. Baker	7	6	6	11	3	1	*4
Olympic	1	1	1	4	0	1	8**
Average	5.8	4.3	5.3	7.8	2.5	4.2	*9.5**

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

* Complete field records not available.

** New record high.