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COMPARATIVE RATINGS OF 1951 FOREST FIRE WEATHER IN WESTERN OREGON

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The 1951 forest fire weather in western Oregon is generally conceded to have been unusually severe. In order to compare this season with others, this report uses a scheme for rating fire seasons recently developed by the Fire Research section of the Experiment Station. The rating is based on indices of three weather characteristics which generally control burning conditions. These characteristics and the indices used to measure them are as follows:

1. The severity of burning conditions during dry spells is indicated by the average 4:30 p.m. burning index[1] on the worst 50 percent of the days.

1/ Burning index indicates the combined effect of relative humidity and wind speed on the rate of fire spread in light forest fuels. It is frequently used as a guide to the degree of fire protection effort required. The index used here is the average of burning indices at Portland, Eugene, Sexton Summit and Medford.

2. The length of dry spells or degree of drought buildup is indicated by the average number of days since a wetting rain.[2/]

3. The proportion of the season during which fires might have spread and during which fire protection effort is needed is indicated by the total number of rainless days.[2/]

Number of Years

Because relative humidity observations are not available at all four stations prior to 1932, the analysis of burning index is limited to the period 1932-51, inclusive. The analysis of the other two indices both based on precipitation records covers the 30-year period 1922-51.

Division of the Fire Season

In this study the fire season was divided into three periods: Spring (April to June 30), summer (July 1 to September 15), and fall (September 16 to October 31). This arbitrary division segregates the usual midseason drought period west of the Cascade Range from the usual spring and fall periods of intermittent fire weather and rain. Dangerous fire weather does occasionally occur outside the April 1 to October 31 period but not with sufficient regularity to justify inclusion in this analysis. Each period was analyzed separately and combined with other periods to arrive at indices for the entire season. Results of this analysis follow.

Entire Season (April 1 - October 31)

1. The 1951 burning index was the highest of record starting in 1932.

2. The 1951 average time since a wetting rain was exceeded only in 1932, which in contrast had a more nearly normal burning index and a much smaller number of rainless days. The 1935 average time equalled that of 1951.

3. The total number of rainless days in 1951 equalled the totals of 1924 and 1949, both of which had a much shorter time between wetting rains.

4. In recent years the 1949 season was probably the closest approach to 1951 conditions. It was very nearly equal in total number of rainless days and had the second highest season burning index for the 22-year period of record, being slightly higher than 1945 which ranks third. In terms of the spacing of wetting rains, however, 1949 was near average. (Years with extreme ratings in each index are listed in table 1.)

2/ Wetting rain is defined as .25 inch or more in one day at four low elevation stations: Portland, Eugene, North Bend and Medford. These stations were also used for the tally of rainless days.

Table 1.--Years with highest[1] fire season index numbers for each period of the fire season

Index	Spring (Apr 1-Jun 30)	Summer (Jul 1-Sep 15)	Spring-Summer	Fall (Sep 16-Oct 31)	Season
Burning index[2]	1951	1945	1951	1936	1951
Days since wetting rain[3]	1935 1924	1951 1935	1951 1935	1932	1932
No. of rainless days[3]	1951 1924	1929	1951 1924	1929	1951 1949 1924
Combination of burning index & days since wetting rain[2]	1951 1935	1951	1951	1936 1932	1951 1932

1/ Years not significantly different from the highest index are also listed.
2/ Period of record begins with 1932.
3/ Period of record begins with 1922.

5. The 1951 burning index differed considerably between stations from day to day, but the trends between periods of high and low burning index are more general (figure 1). The burning indices at the stations in figure 1 do not necessarily represent the local conditions at any of the fires mentioned.

Spring (April 1 - June 30)

1. In 1951, the spring burning index averaged higher than in any spring since 1932, when complete records were first available.

2. The average time since a wetting rain was greater than in any spring since 1935.

3. The total number of rainless days was the greatest since 1924.

4. The 1951 combination of high burning index and long periods between wetting rains was most nearly approached by 1935.

5. The spring period began with the longest April dry spell of record: 25 days with no rain in western Oregon. May rainfall was well below normal, and June had the least rainfall of record for that month. Portland went 54 days, May 8 to June 30, without a wetting rain of .25 inch or more in 24 hours. Similar dry spells were experienced throughout western Oregon.

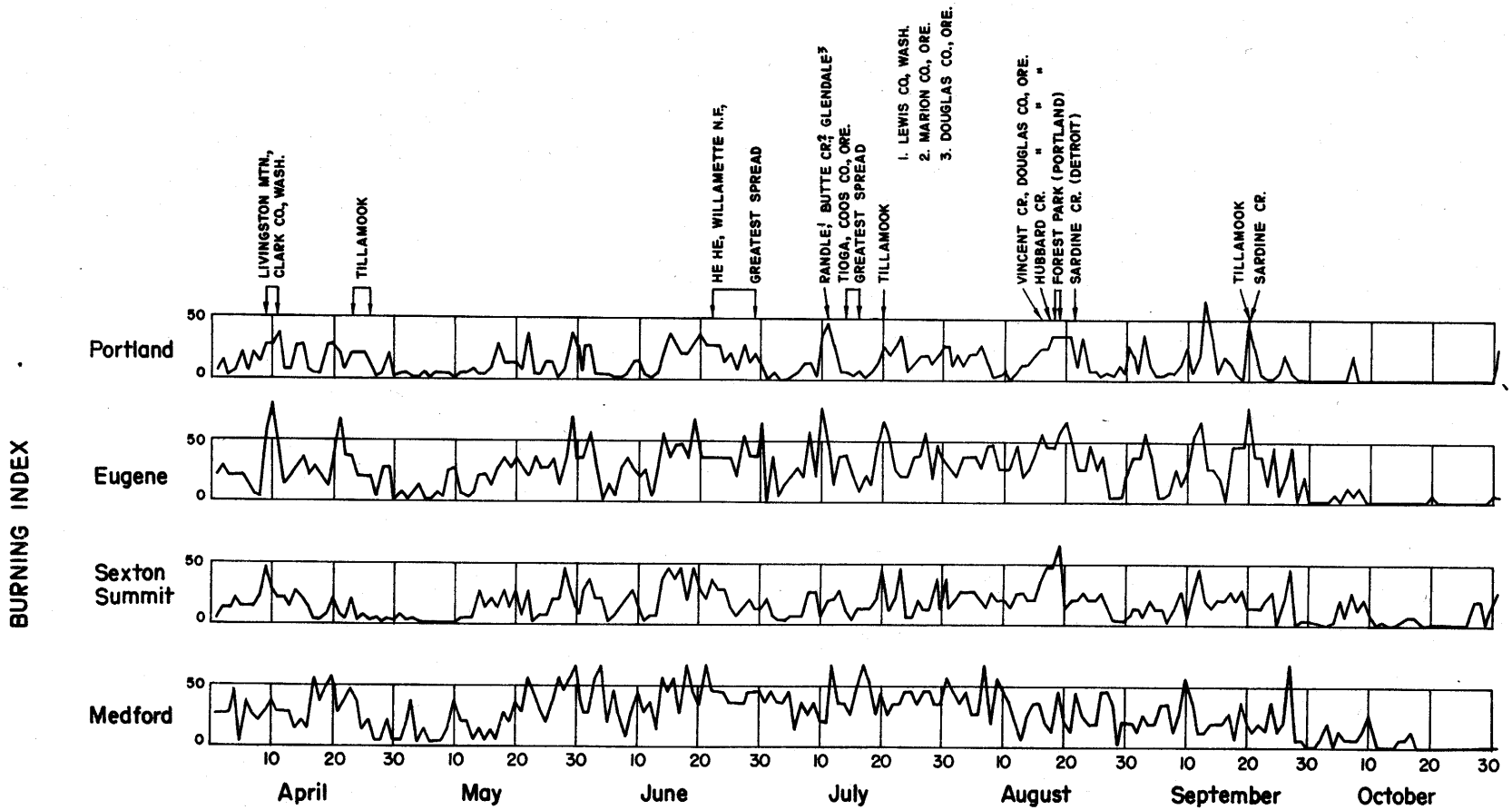

Figure No. 1 -- 4:30 p.m. Burning Index Values for 1951 Fire Season at Western Oregon Stations with Occurrence of Major Fires Indicated

6. The unusually dry spring followed a period of six consecutive months, in each of which rainfall in western Oregon averaged well above normal.

Summer (July 1 - September 15)

1. The average summer burning index in 1951 was the second highest for the period studied. It was exceeded slightly in 1945, equalled in 1944, and nearly equalled in 1950 and 1936.

2. The average time since a wetting rain was the second greatest in the period of record beginning in 1922, having been exceeded slightly in 1935.

3. The total number of rainless days was exceeded only by 1929 and was equalled in 1931.

4. The combination of high burning index and long intervals between wetting rains was without precedent.

5. The drought continued through July, though scattered light rains fell during the first week in some localities. Some rain occurred August 26, and wetting rains fell in some sections on the 28th and 29th. These rains ended the time since a wetting rain in Eugene at 106 days and in Medford at 116 days. Portland had a wetting rain September 7, after 122 days. Other sections had light rains on the 7th and 8th.

Combined Spring-Summer Period

1. The 1951 burning index for spring and summer combined was well above that for any other year studied.

2. The average number of days since a wetting rain was second greatest of the years analysed, being exceeded slightly in 1935.

3. The total number of rainless days was equalled in 1924, but the 1951 spring-summer total is well above the total for any other years studied.

4. In terms of the combined effects of high burning index and long intervals between wetting rains, burning conditions during the 1951 spring-summer period were the most severe on record.

Fall (September 16 - October 31)

1. The burning index for the worst 50 percent of the fall days was about average in 1951--slightly lower than in 1949 but definitely above the 1950 rating.

2. The average number of days since a wetting rain was less than average as was the total number of rainless days.

3. Rains started about September 25 but were not generally wetting until October 1. The period without wetting rain at North Bend began May 14 and ended September 30, a total of 139 days. October was generally rainy except for the periods 5 - 10 and 26 - 31.

Conclusions

After six months of above-normal precipitation, the weather changed abruptly at the end of March, 1951, and western Oregon experienced the most dangerous fire season since at least 1932. This conclusion is based on study of three indices of weather elements controlling burning conditions: (1) the average 4:30 p.m. burning index for the worst 50 percent of the days, (2) the average number of days since a wetting rain, and (3) the total number of rainless days.

Spring had as dangerous a combination of high burning index and long intervals between wetting rains as any spring in the years analysed. The combination of these two indices for the 1951 summer was the most severe on record. Fall was slightly damper than average in 1951, when general rains started near the end of September. Nevertheless, the season as a whole had the highest burning index, the second highest average time since a wetting rain, and the most dangerous combination of the two factors during the years studied. The total number of rainless days in 1951 equalled or very nearly equalled past records--for spring, summer, spring-summer combined, and the season as a whole--though no new record was established.

Despite the unequalled severity of the fire season when considering these three indices combined, neither the season nor any major portion thereof was record breaking in more than one of the indices. This indicates that worse fire seasons probably have occurred in western Oregon before the period analysed, and worse seasons may be expected in the future when all of the indices may be extreme in the same year.