



RESEARCH NOTES

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1951 MIDSUMMER FUEL MOISTURES ON OREGON AND WASHINGTON NATIONAL FORESTS COMPARED WITH OTHER YEARS

By

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During the past four years on most Oregon and Washington national forests average midsummer fuel moisture has shown a general downward trend. Conversely, the lowering fuel moistures have caused a rising trend in midsummer forest inflammability. These trends have been brought to light by an analysis of readings from fuel moisture indicator sticks during the midsummer portions of the past eleven fire seasons (1941-51). The records used are from 65 key fire-danger stations scattered throughout the national forests of the two states.^{1/}

The moisture content of these indicator sticks reflects the inflammability of similarly exposed wood fuels such as dead brush or branch wood and the surface of snags and logs. These fuels are particularly important to the rate of fire spread in most of this region's national forests. The indicator sticks, made of half-inch ponderosa pine dowels, react in the same way the small wood fuels react to the weather elements which affect their moisture content. These elements are relative humidity, precipitation, radiation (both incoming and outgoing), and air movement as it affects evaporation.

^{1/} A more complete analysis of the 1951 fire season in western Oregon may be found in "Comparative Ratings of 1951 Forest Fire Weather in Western Oregon," by O. P. Cramer and R. Kirkpatrick. Pacific Northwest Forest and Range Experiment Station, Research Notes No. 76, December 1951.

The severity of fire weather during any period may be shown by the average severity of the worst 50 percent of the days. We are most interested in the worst days because they have the greatest effect on the protection load. It follows that an average of the indicator-stick readings on the driest days gives an index of the severity of the fuel moisture factor. For each station used in this study we have therefore averaged the lowest 25 of the daily minimum stick readings during the 47-day midsummer period. Furthermore, an average of these worst 25 days gives a more reliable index than if all days were used. This is true because most stations are manned on these drier days but are not likely to be manned on the damper days. Similarly, fuel moisture readings are not consistently available outside the period July 15 to August 31. Accordingly, the yearly ratings given here apply only to this central portion of the fire season. They are not necessarily indicative of fuel moisture conditions during the spring or fall.

Fuel moisture stick records before 1941 are not exactly comparable with those for later years and have consequently not been considered. The period of record or period studied, therefore, begins with 1941.

Since the key stations used in this summary are located at both upper and lower elevations near the exterior boundaries of the national forests, the results may be applied to similar adjacent areas outside the national forests. Each year's stations' averages have been grouped geographically to give a series of indices which permit rather thorough comparison with midsummer fuel moisture conditions in other years (table 1).

The Region

1. In Oregon and Washington national forests together, the midsummer portion of the 1951 fire season was the driest of the period studied. Previously, the driest years were 1942 and 1946.

2. East of the Cascades, fuel moistures on national forests in both states together were also the lowest of the 11-year period. The next lowest average occurred in 1942.

3. West of the Cascades, too, the combined average for all national forests in the two states gave 1951 the driest rating. New records were also set when high and low elevations were considered separately: 1946 and 1950 previously had the lowest rating at the low levels and 1942 at the higher elevations.

4. With the exception of western Oregon, all areas in the region were drier than in 1950.

5. For the fourth consecutive year the regional average, the Oregon average, and the average for every Washington area^{2/} were lower than the previous year. Minor exceptions to this trend were noted in eastern Oregon areas,^{2/} in the Oregon Coast Range, and in the Rogue-Siskiyou area.

6. 1951 averages were lower than in 1950 at all but 17 of the 63 stations (figure 1). New low records were set at 22 stations (figure 2). The year was the second driest at an additional 13 stations.

Washington

1. The 1951 midsummer fuel moisture for all Washington national forests together was the lowest in the 11-year period; 1946 was the previous low year.

2. For eastern Washington forests the average was the lowest since 1946, but was only the fourth lowest for the period studied. The lowest average for eastern Washington was observed in 1943.

3. Western Washington forests considered together had the lowest midsummer fuel moisture of the study period in 1951. This is also true for both the higher and the lower levels considered separately. Previously 1946 was the driest year at low elevations, and 1941 and 1946 were equal as driest at higher elevations. Only the Olympic Forest area set no new records; here, the 1951 average was second lowest to 1942 and 1946.

Oregon

1. The 1951 midsummer fuel moisture for all Oregon national forests taken together was the lowest of the 11-year period. The two previous low years were 1942 and 1946.

2. Eastern Oregon forests together also set a new record, below that of 1942. Considered separately, the Blue Mountain forests equalled the previous low set in 1945, while the Deschutes-Fremont area was second lowest to 1942.

3. Western Oregon national forests had fuel moistures second driest to 1950. At upper levels 1951 was the driest but at lower elevations it was second to 1950. Considering portions of western Oregon separately, the Cascade forests had drier fuels in 1951 than in 1950, the previous record year. The Rogue-Siskiyou area was tied with 1950, and Coast Range forests had fuel moistures that were the third lowest on record.

^{2/} Washington is divided into the Olympics, the western Washington Cascades, and the eastern Washington Cascades.

^{3/} Eastern Oregon is divided into the Deschutes-Fremont area and the Blue Mountain area.

Table 1.--Yearly subregion averages of the 25 lowest daily minimum fuel moistures
at selected stations during the period July 16 - August 31

Area	No. of stations (1951)	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951
----- <u>Fuel moisture percent</u> ^{1/} -----												
Washington												
Cascades	14	7.9	8.3	8.2	9.8	8.2	7.7	9.8	12.3	9.4	7.8	6.8
Olympics	4	8.8	7.5	9.0	9.4	9.3	7.5	10.0	13.9	10.4	9.6	7.9
All W. Wash.	18	8.1	8.1	8.4	9.6	8.6	7.7	9.9	12.8	9.6	8.4	7.1
All E. Wash.	6	5.7	5.0	4.6	5.9	5.7	5.0	7.2	9.5	7.3	6.9	5.1
Entire state	24	7.4	7.3	7.5	9.0	7.8	7.0	9.2	11.8	9.0	8.0	6.6
Oregon												
Cascades	13	7.5	6.9	7.5	7.1	6.8	6.7	8.9	9.3	8.1	6.3	6.2
Rogue-Siskiyou	8	6.1	5.7	6.2	5.8	6.2	6.1	7.3	8.0	6.6	5.4	5.5
Coast Range	7	8.4	8.2	8.8	9.9	8.9	7.7	11.8	10.8	9.8	7.8	7.9
All W. Ore.	28	7.2	6.8	7.3	7.3	7.1	6.7	9.0	9.2	8.0	6.3	6.4
Blue Mts.	9	6.7	5.1	5.9	5.8	4.8	5.4	5.7	7.6	5.5	6.0	4.8
Deschutes-Fremont	4	6.8	4.4	5.4	4.8	4.8	5.5	5.8	6.8	5.6	5.6	4.5
All E. Ore.	13	6.7	4.9	5.8	5.5	4.8	5.4	5.7	7.3	5.6	5.8	4.7
Entire state	41	7.1	6.2	6.8	6.8	6.5	6.3	8.0	8.6	7.2	6.2	5.9
Entire region	65	7.2	6.6	7.1	7.5	7.0	6.6	8.4	9.6	7.9	6.8	6.1

^{1/} Each figure is a weighted average of all the stations within the particular area.

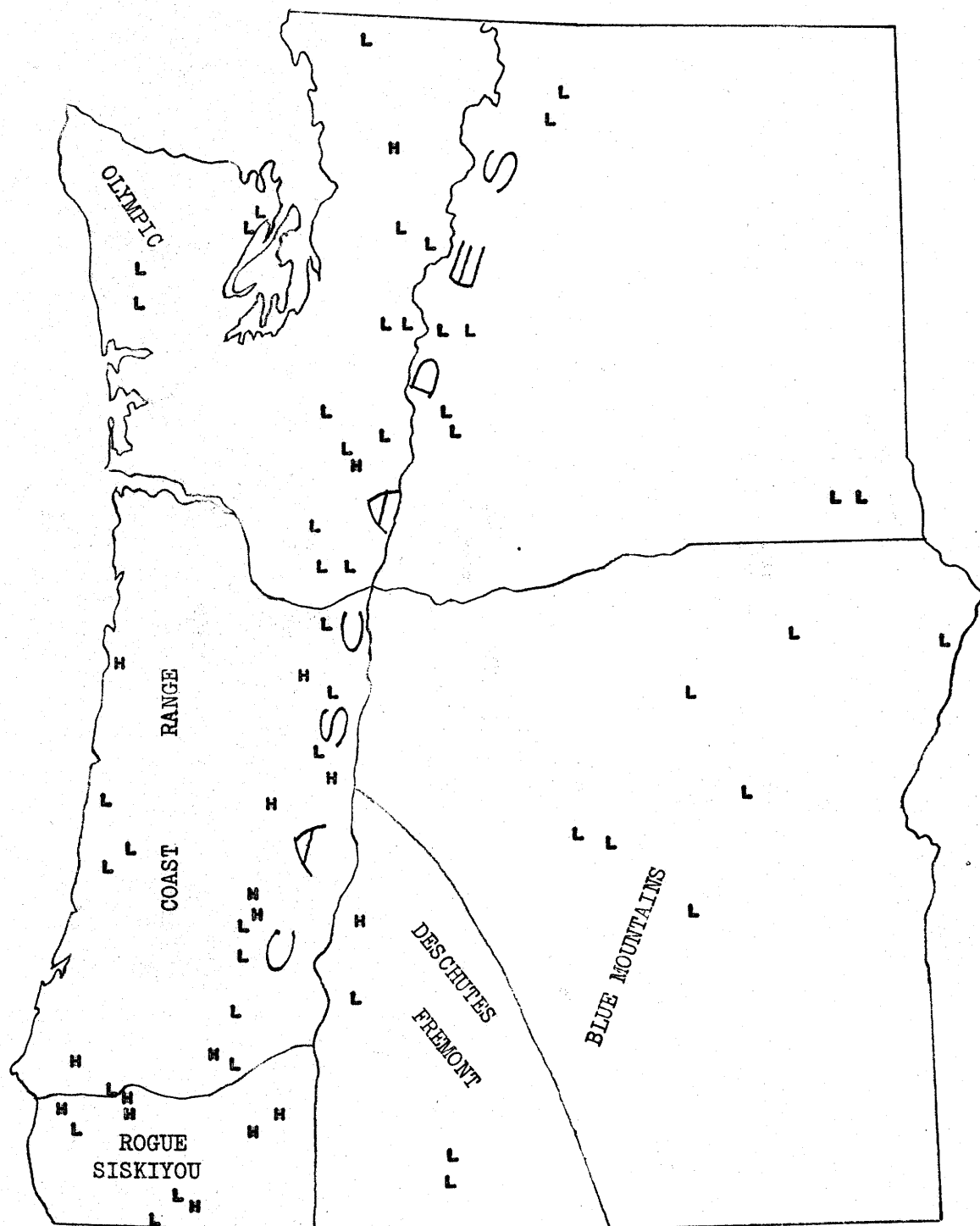


FIGURE 1. Stations where 1951 midsummer fuel moistures were higher (H) or lower (L) than in 1950.

Summary

Based on the average of the 25 days with the lowest fuel moisture readings at each of the 63 key fire-danger stations near the exterior boundaries of the national forests, the inflammability of the forests of Region 6 as a whole during July 16 to August 31, 1951, was at its highest peak for the period of record beginning in 1941. Considering portions of the region separately, it was drier than 1950 in all areas except western Oregon where 1950 retains the record for the driest midsummer period. The most unusual record was established in the western Washington Cascades, where half the stations reported new low records for the 11-year period. 1951 was the fourth consecutive year showing a decrease from the previous year in the region's midsummer fuel moisture average.

Reports for Previous Years

Cramer, O. P.

1949. Comparison of 1949 Summer Forest Fuel Moisture in Oregon and Washington with Other Years. Pacific Northwest Forest and Range Experiment Station. Research Notes No. 58, 3 pp. (Processed).

Morris, W. G.

1948. Summer Moisture of Forest Fire Fuels in Oregon and Washington in 1948 and Previous Years. Pacific Northwest Forest and Range Experiment Station. Research Notes No. 47, 2 pp. (Processed).