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BEHAVIOR OF GROUND VEGETATION UNDER A PARTIALLY CUT STAND OF DOUGLAS-FIR

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Environmental changes resulting from logging in the Douglas-fir region often create ideal growing conditions for many woody and herbaceous plants. A rapid increase of brush and low vegetation, in turn, can seriously hinder efforts to establish a new stand. Consequently, one argument against partial cutting in Douglas-fir (Pseudotsuga menziesii) is that it opens the forest canopy sufficiently to stimulate growth of ground vegetation and thus makes future stand regeneration more difficult.

A preliminary study was started on the Wind River Experimental Forest in 1950 to provide a measure of the changes in understory vegetation following two intensities of partial cutting in 108-year-old, site IV Douglas-fir. The study area is at an elevation of 2,400 to 2,800 feet on a generally west-facing slope. Although predominantly Douglas-fir, the stand contains scattered trees of western white pine (Pinus monticola), western hemlock (Tsuga heterophylla), and Pacific silver fir (Abies amabilis).

Before treatment, the stand averaged 60,000 board feet (Scribner) per acre. In the summer of 1951, 25 acres were lightly thinned (removing 9 percent by volume) and 15 acres were moderately thinned (removing 27 percent by volume). Density and composition of the understory vegetation were estimated in July 1950, before logging, and in July 1952 and August 1958, following logging.

MEASUREMENT

Cover was determined by estimating what percentage of a circular 3-milacre plot (13.2 feet in diameter) was covered by vegetation. For example, if no bare ground could be seen on the plot surface from eye level when the observer stood at the edge of the plot, cover was rated 100 percent. Each shrub and herbaceous species was identified and its relative contribution recorded as a percentage of total cover on the individual plot. All estimates were made to the nearest 5 percent.

In the lightly cut stand, 21 plots were spaced 50 feet apart along a line perpendicular to the westerly slope of the area. In the medium-cut stand, 17 plots were spaced at 75-foot intervals to sample the southwesterly slope of this area. Because the medium-cut stand was on a more gentle slope with deeper soil and supported a denser initial ground cover, the results represent the findings from two case studies rather than a comparison of the two cutting treatments.

RESULTS

In the lightly cut stand, statistical analysis of the data shows that vegetation cover has not changed significantly since the plots were first established. Vegetation cover averaged 66 percent before logging, fell to 54 percent immediately thereafter, and in 1958 was only 53 percent. Mechanical destruction rather than an altered environment must account for most of the rapid reduction immediately following logging. With regard to individual species, vine maple (Acer circinatum) was observed in successive measurements to contribute three times more cover than the next most abundant species--deerfoot vanillaleaf (Achlys triphylla), Pacific dogwood (Cornus nuttallii), Cascades mahonia^{1/} (Mahonia nervosa), and red whortleberry^{2/} (Vaccinium parvifolium).

Cover in the medium-cut stand likewise has not changed significantly. Before logging, vegetation cover averaged 78 percent. Examination immediately following cutting showed a reduction to 66

^{1/} Commonly called long-leaved Oregon grape in the Pacific Northwest.

^{2/} Commonly called red huckleberry in the Pacific Northwest.

percent; and 6 years later, cover was 70 percent. Common beargrass (Xerophyllum tenax) contributed about three times more cover than the next most prevalent species. Pacific dogwood, salal (Gaultheria shallon), red whortleberry, and vine maple followed in abundance in that order. Although still a minor component of the vegetation, western bracken (Pteridium aquilinum var. pubescens) doubled in extent from 1952 to 1958 and now accounts for 9 percent of total cover.

Several weaknesses in this study are recognized--large plot size, which contributed to less exact estimates; possible variation between estimates of successive investigators; and the later date of the last examination. However, methods used are believed to be sufficiently accurate to detect large changes in cover density of ground vegetation. Vegetation apparently has either not been stimulated or is responding very slowly to conditions following partial cutting in these areas. Trends of vegetation development on adjacent uncut areas are unknown.

Although confirmatory studies are needed, it is apparent that the threat of increased vegetation cover should not always rule out the cautious use of light partial cutting in the management of Douglas-fir forests.