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U. S. DEPARTMENT OF AGRICULTURE

FOREST SERVICE

PACIFIC NORTHWEST FOREST AND RANGE EXPERIMENT STATION

R. W. COWLIN, DIRECTOR

Research Note



Number 185

Portland, Oregon

April 1960

IT'S TIME TO LOOK AT YARDING PROBLEMS

ON STEEP SLOPES

by

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In many parts of the Pacific Northwest, logging operations are moving into rugged terrain as access roads probe deeper into the back country. Because of this trend, it's time to look more carefully at steep slopes and decide on the best possible management practices consistent with maximum protection against erosion.

Until recently the forest manager could avoid this decision. Road construction progressed up main drainages and into principal tributaries until steep slopes and difficult construction were encountered. At this point, operations were often shifted to another drainage where road costs were less and the timber was of better quality than the so-called inferior species growing at high elevations. This was done, despite the fact that merchantable timber on most steep slopes has long been included in management plans and allowable-cut calculations.

Economics and the steady progress of timber harvesting have changed this situation. Most of the gentle topography has now been opened up with a road system. The lower quality timber on steep slopes and the high-elevation species are becoming more valuable every year.

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How much commercial timberland is included in these problem areas? Estimates for the national forests of Oregon and Washington range from 1,500,000 to 3,800,000 acres. These are lands that should be managed with special effort to minimize soil disturbance, an objective calling for fewer roads and therefore longer yarding distances. Included are very steep slopes, together with erosive- or shallow-soil areas, and some municipal watersheds. In U.S. Forest Service management plans prepared 15 to 20 years ago, the most rugged of these areas were labeled "inoperable" and left out of allowable-cut calculations.

What problems are involved? For one thing, road costs normally increase as slope increases. More soil must be moved, back and fill slopes must be longer, creek crossings are more difficult, rock is more prevalent, and--except in rock areas--maintenance is more costly. Secondly, the road system occupies a greater part of the logging area. Silen and Gratkowski found that about 5.2 miles of road per square mile are needed to log with standard high-lead yarding techniques and an average maximum yarding distance of 700 feet.^{2/} This figure was for a typical Douglas-fir drainage. It was estimated that 6.2 percent of the total surface area was disturbed by road construction, and an additional 3.6 percent was disturbed by construction of the areas needed for landing and loading the logs. For steeper topography, the percentage of disturbed area would be greater, perhaps averaging 11 or 12 percent.

Part of the disturbed area is taken permanently out of timber production. In the study mentioned above, this was estimated to be 2.9 percent for roads, plus 1.2 percent for landings. These amounts also would be greater on steep slopes. A total production loss figure of 5 percent, due to roads and landings, is frequently used in management planning.

European foresters were faced with problems similar to these immediately after World War II. Readily accessible timber had been exploited during the war, and still more was needed for reconstruction. Consequently, attention was turned to stands on the upper slopes,

^{2/} Silen, Roy R., and Gratkowski, H. J. An estimate of the amount of road in the staggered-setting system of clearcutting. U.S. Forest Serv. Pac. NW. Forest and Range Expt. Sta. Res. Note 92, 4 pp. (Processed.) 1953.

and this led to development of a new cable-yarding technique combining the principles of high-lead yarding and aerial transportation. In one continuous operation logs are yarded laterally, lifted to a suspended cable (skyline), and transported either uphill or downhill to a landing. Usually the logs are lowered down the skyline, with gravity supplying the power.

Gravity-skyline systems offer a solution to some of our problems on moderate as well as on steep slopes. Disturbance to ground surfaces and stream channels is minimized because logs are quickly lifted off the ground. Yarding distances of a mile and more are possible, thus permitting a substantial reduction in costly road construction, and thereby reducing the capital investment needed to open up an area. Reduced road construction means reduced soil disturbance and less land taken out of production. Also, the wide road spacing would make it easier to locate the roads away from areas of unstable soil. Yet with gravity-skyline systems, road spacing would still appear adequate for protection and recreation needs.

Gravity-skyline yarding is adaptable to a variety of cutting methods. It can be used for selective logging as well as for clear cutting. There is also the possibility that, like the Europeans, we can use it for thinning and shelterwood cutting, thus bringing intensive management to steep slopes.

What action should be taken? One of the first steps should be to thoroughly investigate gravity-skyline yarding to see if it is applicable to Northwest conditions. Two test operations conducted in the State of Washington indicate some promise for the method. A Swiss skyline crane used on the Okanogan National Forest caused only a quarter of the soil disturbance resulting from a standard tractor-yarding operation on a nearby area. Road construction needed for the skyline operation was only 10 percent of that estimated necessary had the same area been yarded by tractors.^{3/} A recently developed modification using a radio-controlled carriage is now operating on the Mount Baker National Forest (fig. 1).

^{3/} Wooldridge, David D. Watershed disturbance from tractor and skyline-crane logging. U.S. Forest Serv. Pac. NW. Forest and Range Expt. Sta. 1959. (In process of publication by Jour. Forestry.)



Figure 1.--A radio-controlled carriage in operation on the Mount Baker National Forest. Logs are yarded to the skyline by an engine in the carriage; then the carriage, controlled by a winch at the top of the hill, moves downhill by gravity. The skyline span is 5,000 feet, and lateral yarding to the skyline is effective up to 200 feet.

These and other gravity-skyline systems need further study to determine logging costs, silvicultural effects, and amounts of soil disturbance. When this information is available, problem areas can be reexamined, and improved management policies can be formulated.