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Maturity Selection System

APPLIED TO PONDEROSA PINE

DURING recent years there has been a tremendous amount of discussion of sustained yield forestry, what it is and what it is not. The logger and timber owner has of necessity been studying the problem and there has been a growing belief as a result that good silviculture is based upon good economics and vice versa. More and more timberland owners are applying practical forestry and finding that it pays. It is true that conditions vary from one section to another, from one species to another species, and that consequently no inflexible formula may ever be evolved. However, the accompanying basic considerations in the management of ponderosa pine forests by the maturity selection system and explanation of the conclusions and recommendations from studies made by the Pacific Northwest Forest Experiment Station, Portland, are worthy of very careful study. They accentuate the growing practicality of one group of foresters... The statement is a joint one, by Thornton T. Munger, Axel J. F. Brandstrom and Ernest L. Kolbe of the Pacific Northwest Experiment Station.—Editor

RECENT studies of this station of log and tree value, forest stand structure and logging finance, in conjunction with our present knowledge of silvics, growth and mortality rates, are throwing new light on the problems of the ponderosa pine tyne. It appears from these studies that the objectives of permanent forest management can be achieved better by light and frequent selection cuttings than by heavy and infrequent cuttings. This has been in the minds of many foresters for some time, but the exigencies of horse and railroad logging did not permit light cuttings. Now tractors and trucks give a flexibility to logging and lower the fixed per acre costs to a degree that makes light cutting not only possible but apparently more profitable to both operator and land owner.

A factual basis for weighing the possibilities and advantages of light selection cutting has been given by recent studies of Brandstrom of the Logging Engineering Section, and Lodewick of the Products Section, combined with Meyer's growth studies, Keen's bark-beetle mortality studies, and other silvical and slash disposal information.

There will be available for distribution within the next few months the detailed results of these timber management and production studies, some of which are still in the making. Meanwhile the Experiment Station is proposing for experimental trial a system of ponderosa pine management, involving rather light and frequent cutting, which we have named the "maturity selection system", because it is predicated on the financial and biological maturity of the trees.

New Management System Suggested

To clarify the conception that underlies this new system of ponderosa pine management, we are suggesting, in advance of a more complete treatise on the subject, 18 basic considerations, which are the premises upon which this maturity selection system is founded, as follows:

1. The objective of forest management, both for the public and private owner, should be the attainment of the maximum sustained-value production of forest products, unless there be conflicting consideration of aesthetics, watershed protection, range or game management, etc.

2. Hence the function of silviculture is to show the way to maximum quantity and quality production, using means that are economically feasible and justifiable. "Silvicultural" and "economic" considerations therefore are not antagonistic but are to a considerable degree parallel. Good silviculture is good economics and vice versa.

3. The irregular virgin ponderosa pine forests in Oregon and Washington are silviculturally neglected and unmanaged. Partial cutting converts them to productive forest stands. Light and frequent cuttings are desirable since these help to maintain forest conditions, assist in building up the soil fertility, eliminate or retard the growth of shrubby vegetation, surplus reproduction and grass. The gradual removal of the timber helps to develop wind-firm trees and also permits corrections and modifications not possible under heavy cutting, and thus gives rather complete control over the composition and character of the forest.

4. The volume of the virgin forest is in the long run stationary, with periods when losses exceed growth, as during insect epidemics or hurricanes, which are made up for later by periods of net growth.

5. The removal of the overmature element of the stand (mostly the high mortality trees) converts the stationary forest to a growing forest. If only the trees likely to die before the next cutting were removed the gross growth of the stand would be realized as the net growth. Unfortunately these high-mortality trees cannot be accurately foretold.

6. It is sound policy for both a public and a private forest owner to liquidate the low-earning trees and to reserve for volume and/or value increment the high-earning trees.

7. If a large percentage of the stand is cut the forest capital is so reduced that the net increment is small, even though mortality is nearly eliminated and the growth of all the reserve trees is good. Thus in one case it was calculated that after an 80 per cent cut the net annual growth per acre will be 72 board feet, while after a 40 per cent cut it will be 94 board feet, in a stand which in the virgin condition is making a gross growth of about 120 board feet per acre per year.

Light Versus Heavy Cutting

8. In comparing the merits of one system of selection cutting with another, e. g., light versus heavy cutting, the effect upon the whole forest should be considered and not the effect upon the current cutting area alone. Thus, considering the whole working circle, it is more desirable to remove the most overripe half of the mature trees from the whole area in 30 years than to take twice that length of time to get over the whole area with a cutting that takes all the mature trees. In this way a 30-year cutting cycle converts the whole forest from the stagnant to the growing condition twice as quickly as does a 60-year cutting cycle.

9. The shorter the cutting cycle the better the chances for salvaging before deterioration windfalls and insect-killed trees in the course of the regular periodic cutting.

10. The shorter the cutting cycle the quicker will the whole working circle be put under control with roads, and hence the better will be the opportunities for special salvage cutting of timber killed by fire, insect epidemic or wind throw.

11. The lighter the cut the lower will be the charges for slash disposal and cut-over land protection.

12. The lighter the cut the greater will be the logging cost per M feet, but with modern tractor and truck logging the fixed per-acre costs are so small that the cost does not increase rapidly with lowering of the cut.

13. If the light cut is composed largely of the financially (and physically) mature trees their average value will be enough higher than the value of a heavy cut to offset extra logging costs.

14. It is not sound policy to cut a tree of no present value merely to make growing space for reproduction. The idleness of the small area of cheap land is immaterial in comparison to the economic loss of cutting minus value trees or in comparison to the idleness of the great areas of stagnant virgin forest that are getting no selective cutting treatment whatsoever.

15. In a working circle with a prescribed cutting budget or contracts providing a fixed cut, it must be assumed that if a certain class of tree is reserved from cutting another class of tree will be cut somewhere else. Hence the reserving through a lighter cut of a moderately overripe tree here should result in the cutting of a very overripe tree somewhere else, with resultant silvicultural benefit to the forest as a whole.

16. The enhancement, or depression, of stumpage value through changes in the prescribed system of cutting should all accrue to the forest owner.

Selecting Trees To Be Cut

17. Assuming that a light cut should be made, for example 40 per cent with an assumed return cut in 30 years (the exact percentage depending on circumstances and the character of the stand), the following considerations should control the selection of the trees to be cut:

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TRUCK LOGGING

With Biles-Coleman

THIS year has witnessed a great deal of progress in coordinating new equipment and new methods with old equipment and old methods. Take, for example, the motor truck. No one today doubts the efficiency of motor truck haulage in getting into isolated bodies of timber or even in logging substantial stands where the development can start from scratch.

But there are a number of loggers today who are wondering how the motor truck, for example, can be made to fit into railroad operations. As has been previously pointed out by articles in West Coast Lumberman a few firms have found it feasible to integrate truck and railroads, using trucks to log in place of spur roads and this number is steadily increasing.

Biles-Coleman Lumber Co., Omak, Wash., of which E. R. Ashton is logging superintendent, may be numbered among the firms which have successfully coordinated truck and railroad logging operations. This firm has been using trucks for some years and this year added some GMC trucks and Isaacson "Karry-Quad" trailers. Of experience with this equipment Mr. Ashton said in part to West Coast Lumberman:

Like New Trucks

"We are very much pleased with the performance of our two T-95 GMC trucks. Our truck loader was not worked over, but was originally built especially for bunching logs up to 40 feet in length during the days when we used hydraulic wheels with "Caterpillars." It was not necessary for us to make any changes for it to skid and load 32-ft. logs on the trucks. This machine weighs 84,000 pounds and has a 32-ft. boom, box girder type, 90 h.p. gas motor. We find that our biggest handicap with this type of machine is that its locomotion is too slow for scattered timber. It only travels ⅝-mile per hour, but will go up or down 25 percent grades without any trouble.

"This machine is the full revolving type and is arranged so that it is possible to raise the boom, hoist, swing and travel all at the same time.

"The GMC trucks have a load capacity of 40,000 pounds and the trailers are Isaacson "Karry-Quad" 16-ton. Both trucks and trailers are equipped with 10-50 tires.

Hauling On Steep Grades

"During July these two trucks hauled 155 loads. Total scale was 1,037,560 feet of ponderosa pine. In August they hauled 148 loads; total scale 1,146,690 feet. The average haul, starting from the woods, would be approximately 1 mile dirt road, average slope 20 percent to main road; then 3 miles up continuous 5 percent grade to summit and then 5 miles down from 5 percent to 7 percent continuous grade to landing at railroad, a total of 9 miles. We consider this distance as a 4-trip haul per 9-hour day. However, there were several days that the last truck out made only three trips, caused usually by reasons not pertaining to the truck.

"We have hauled as high as 10,300 feet at one load. The logs in such loads were all large, of course. However, our aim is to average 7,000 feet and all indications are that a combination of this truck and trailer will handle this size load without any effort whatsoever.

"All wheels are equipped with water on the brake drums and when we are dropping down the 5 miles of 5 to 7 percent grade we average approximately 18 miles per hour.

"Our bunks are coupled out 22 feet from center to center when we load long logs. We have not experienced any trouble in being able to make any kind of turns in the road that a short wheel base truck could make. The trailer will track within 12 inches of the front drivers on a 20 degree curve. The trailer is also arranged so that when we have unusually large logs we cut them into 16-foot lengths and couple the trailer up to 12-ft. bunk centers and load straight loads of short logs."

Maturity Selection System

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(a) Cut all positive value trees that will not survive until the next cut.

(b) Cut the trees that show a positive conversion value above the average of the whole stand but a low value increment; these are ordinarily in the oldest and largest diameter classes, of slow growth and high mortality probability.

(c) Cut some of the low value increment trees whose conversion value is below the average of the whole stand as a measure of stand betterment.

18. The above principles will on the average result in removing the trees which for both financial and silvical reasons it is most desirable to cut now, but there are considerations which involve the individual tree which must be taken into account, particularly the relation of an individual tree to its neiglibor. Consideration (c) will be used to remove a tree thereby to benefit the whole forest and conversely to leave trees of (b) and (c) description that are needed to maintain the percentage of reserve, for protection, seed, aesthetics, etc.