

RESEARCH DIVISION NOTES

BRITISH FOREST RESEARCH COLUMBIA SERVICE



A bulletin put out for the purpose of disseminating the information available in the Research Division. Suggestions for further topics are welcomed.

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A REPORT ON THE IMMATURE VALUES BEING SACRIFICED IN THE PROCESS OF LOGGING MATURE TREES FROM CERTAIN AREAS ON VANCOUVER ISLAND

The past year has witnessed considerable activity, on the part of small operators, in logging areas where the stand is composed of scattered individual or small groups of mature Douglas fir with an understory of immature trees ranging in age from 10 to 60 years. After the operation of harvesting the mature values is completed, the scene is frequently one of devastation wherein the younger trees have been either pulled over or so badly damaged they will never make proper growth. This method of handling a forest is wasteful, to say the least, and it was for the purpose of obtaining some measure of the values being destroyed that the study was made.

This particular type of operation employs a small crew with a gas-donkey or tractor for yarding, and trucks for the haul to mill or tide-water. It is a mobile form of equipment, readily adaptable to a variety of conditions and entirely suitable for going into remote corners or picking up scattered trees. However, there is a marked difference between operations as regards the condition in which the residual stand is left. One operation visited, but not studied, was remarkably well conducted in that the only large openings were one to two acres around each landing, and beyond that the scattered mature trees had been removed with a minimum of damage to the understory. It was possible to trace the logging back for three and four years by means of the age of the seedlings coming in, and it was my observation that the larger openings were fully restocked while the openings created in the process of constructing tractor-roads and, following that, removal of the mature trees, were causing very little more wind-throw than is normal to a young stand in which no cutting has taken place. Such an operation could be adapted to good forest practice with little change, and the mature values realized at this time have not been at the sacrifice of growing stock. Furthermore, the roads built will serve as a means of entry for protection purposes and in the future as a means of exit for material removed in improvement cuttings.

On the other hand, many operations are carried out in a wasteful manner--that is, wasteful both of immature and mature trees. The young trees are pulled down or otherwise damaged by what appears to be unjustified high-lead logging (with a gas rig). A tractor would do considerably less damage and leave behind much less fire risk, but if a gas donkey is used the yarding should be confined to a small circle and abolish reaching out to long corners. In addition to the damage to young growth is the poor utilization of the mature tree itself. It is conceded that there is often a great deal of defect and perhaps some of the logs encountered would not pay for removal; however, until a study would prove otherwise, my contention is that some of these operators do not log clean by any means.

In attempting to evaluate the damage to young stands, three quarter-acre plots were put in on two operations, one of which is near Horne Lake and the other at Dove Creek, near Courtenay. The plots were chosen so as to give as representative a sample as possible of conditions in that neighbourhood, and a tally made of all immature trees damaged by logging.* It was early seen that some criterion was needed of what had or had not been growing on the area; therefore, it was decided to tally only such butts of trees as came within the confines of the plot and, in addition, qualify that these butts should have grown there and not been dragged in during the yarding.

Results of the tally are as follows:-

(A) Block 370 - Spider Lake, near Horne Lake.

Damaged trees per acre	272
Basal area per acre of damaged trees	52.83 sq. ft.
Av. basal area per tree of damaged trees194 sq. ft.
Diam. of tree of av. basal area (damaged)	6.0 inches
Breast height age of stand	65 years
Distribution of stand by species	
Douglas fir	9%
Western red cedar	11%
Western hemlock	80%

Normal yield of the total stand (Site 110) at 120 years, breast high, will be 37,500 feet board measure, trees 10" d.b.h. and over.

Actual yield of this total stand at 120 years, breast high, will probably be nearer $.6 \times 37.5 = 22,500$ f.b.m. gross. Deducting 10 per cent for breakage and defect will give a possible future net yield of 20,000 bd. ft. per acre.

Calculating stumpage on the present day prices of Douglas fir \$2.00, Cedar \$1.50, and Hemlock 75 cents per thousand board feet, will give this stand a weighted average value of $.95 \times 20 = \$19.00$ per acre in 55 years.

Volume removed in logging, based on total area logged and total scale, is approximately 10M f.b.m. per acre. This represents a value per acre of approximately \$15.00, based on an average stumpage value of \$1.50 per M. f.b.m. for this type of timber.

*By damaged trees is meant all trees pulled over and uprooted; all trees from whose trunk so much of the bark was torn that future growth would be seriously retarded; and all trees whose crowns were badly damaged.

(B) S.W. $\frac{1}{4}$ of the S.E. $\frac{1}{4}$ of Section 31, Township 9,
Comox District, being at Dove Creek, near Courtenay.

Damaged trees per acre	1,064
Basal area per acre of damaged trees	48.91 sq. ft.
Av. basal area per tree of damaged trees	0.45 sq. ft.
Diam. of tree of av. basal area (damaged)	3.0 inches
Breast height age of stand	50 years
Distribution of stand by species	
Douglas fir	20%
Western red cedar	30%
Western hemlock	50%

Normal yield of the total stand (Site 120) at 120 years, breast high, will be 50,000 bd. ft. per acre, trees 10" d.b.h. and over.

Actual yield of the total stand at 120 years, breast height, will probably be nearer $.25 \times 50,000 = 12,500$ bd. feet gross. Deducting 10% for breakage and defect will give a possible future net yield of 11,250 board feet per acre.

Calculating stumpage on the same current prices as listed above will give this stand a weighted average value of $1.40 \times 11.25 = \$15.75$ per acre in 70 years.

23M f.b.m. per acre removed in logging, calculated on the basis of total acreage logged and total scale. This represents a value per acre of approximately \$34.50, again basing the calculation on an average wood's run value of \$1.50 per M. f.b.m.

Valuation of Immature Stands

Immature stands of timber may be valued in either of two ways. The value may be based on the costs incurred in producing it, with compound interest added to all costs from the time when the money was spent to the time of valuation. This is the cost value method. In contrast, the value may be based on the anticipated returns which will be received from the stand and the returns discounted from the time at which it is expected that they will be received to the time of valuation. This is the expectation value method.

When timber is ripe for felling, then its standing value is the basis for valuation, but when stands are not mature it is financially profitable to let them grow on; i.e. their expectation value is greater than their utilization value. (Thus the utilization value of a 5-year-old plantation is probably nil, but there is money invested in it by way of planting, protection, administration, etc.)

The stands under consideration are a gift of Nature and consequently have no money invested in them apart from that expended for protection and administration, (Vancouver District averaged 4 cents per acre per annum for protection and administration over the period 1924 to 1933 inclusive) so the cost value method is not directly applicable. This leaves the expectation value method, with all its pitfalls and difficulties of assigning a rate of discount and predicting stumpage prices fifty to seventy years hence.

Any prediction of stumpage prices for such a long period would be without significance, so for the purposes of this study current prices for second-growth were used; to wit, Douglas fir \$2.00, Cedar \$1.50, and Hemlock 75 cents per thousand board feet. The rate of discount used, 3 per cent, is the same as that at which the last Provincial bond issue was refunded, so gives a good criterion of the value of money to the Province.

Results.

(A) Block 370, near Horne Lake.

Present value per acre of \$19.00, discounted at 3% for 55 years, is \$3.74, but if cost of administration and protection is figured in, the value is negative - \$1.70. This result is not absurd but is a consequence of the process of discounting future values when there is no present utilization value on which to base your appraisal. However, there is another way of looking at the present value of this stand, and that is from the point of view that the Government is about to embark on a planting program and that such plantations will be valued on a cost basis. Therefore why cannot this stand be appraised in the same way? Here we have a 65-year old stand which is six-tenths fully stocked, and if it costs \$10.00 per acre to plant, then our stand should be worth \$30.48 plus an additional \$5.44 for carrying charges, or a total of \$35.92.

From this area mature values of approximately \$15.00 per acre were realized, while at the same time possibly \$36.00 of immature values were sacrificed.

(B) Section 31, Township 9, Comox District.

The residual stand on this area seems to have been somewhat suppressed, with the result that the average basal area per tree is only one-quarter normal, thus greatly reducing the yield which might have been expected at maturity.

Again discounting the future yield at 3 per cent gives a present value of \$1.98 per acre, but when administration and protection costs are included, the value is negative - \$5.28. However, figuring on the basis of planting costs for a plantation one-quarter normal, we have a potential value of \$27.06 (including carrying charges).

From the area mature values of approximately \$34.50 per acre were realized, at a sacrifice of possibly \$27.00 in immature trees.

Conclusion

It is not possible to arrive at a clear-cut evaluation of the loss in growing stock on these areas, as the stands have no utilization value at the present time and the use of the expectation value method is beset with pitfalls. However, these stands have considerable potential value, as is shown by comparing them with the value of planted areas at the same age. Furthermore, these potential values are sufficiently large, in comparison with the returns from the mature trees, to warrant much care in the process of logging so as to preserve as large a portion of the understory as possible, and we certainly need the growing stock on the lower part of the Island for social, if not economic, reasons.

In the case of the Horne Lake operation, and the same is true for the Dove Creek area, assuming that such areas must be logged, it would seem worth while to investigate the possibility of combining the present type of operation, where only mature trees are removed, with an operation which would include the making of mine props from the young growth. The feasible procedure would seem to be to go into the area in advance and cut props out of the understory, then proceed to log the large trees. This method would go a long way towards utilizing all the existing values and at the same time confine the slash to relatively small proportions.