BASAL AREA AS A CONTROL FOR PARTIAL CUTTING

By D. S. BRUCE¹

Selection cutting is rapidly becoming the vogue in white and red pine stands in Ontario and replacing the diameter limit as a means of preventing clear cutting in second growth timber stands.

The selection of trees for cutting however, is a matter of personal opinion which is subject to wide variation unless standard procedures are used. Hence the cutting of crown timber in pine stands is now done under a selection cutting system controlled by basal area and current increment. The method can best be explained by reference to the following basal area table of a typical mixed wood stand considered for marking.

BASAL AREA PER ACRE

W & R Pine					Other Conifers				Poplar			
Class					Class				Class			
DBH	1	2	3	Total	1	2	3	Total	1	2	3	Total
5"	4.0	1.0	0.2	5.2	3.7	0.4	0.1	4.2	0.2	0.6	0.5	1.3
8"	13.2	2.6	0.3	16.1	4.9	0.7	0.3	5.9	1.3	2.9	2.1	6.3
11"	14.5	4.3	0.3	19.1	4.1*	0.3	0.2	4.6	1.7	2.3	0.9	4.9
14"	14.8	2.1	0.1	17.0	2.0	0.3	0.4	2.7	0.4	0.6	0.5	1.5
17"	11.9	1.0	0.1	13.0	0.3	—	0.1	0.4	0.1	—	0.1	0.2
Total	58.4	11.0	1.0	70.4	15.0	1.7	1.1	17.8	3.7	6.4	4.1	14.2

Other Hardwoods					Total			
Class					Class			
DBH	1	2	3	Total	1	2	3	Total
5"	0.4	0.8	0.1	1.3	8.3	2.8	0.9	12.0
8"	1.5	2.2	0.3	4.0	20.9	8.4	3.0	32.3
11"	0.7	2.2	0.1	3.0	21.0	9.1	1.5	31.6
14"	0.2	0.5	—	0.7	17.4	3.5	1.0	21.9
17"	—	—	—	—	12.3	1.0	0.3	13.6
Total	2.8	5.7	0.5	9.0	79.9	24.8	6.7	111.4

Underline indicates B.A. to be removed in the partial cut.

* B.A. in this class reduced to 2.3 sq. ft.

The information shown in the table is obtained from a 5% operating cruise in which trees tallied in quality class. For simplicity Class I comprises well formed trees containing no defects, Class II trees contain some defects but are presently merchantable for sawlogs or pulpwood, Class III trees are poorly formed trees or defective trees not now merchantable nor likely to develop into Class II or Class I trees.

To facilitate the work the trees are tallied in inch diameter classes

¹ Department of Lands and Forests, Province of Ontario, Toronto, Ontario.

from 4" DBH and up, but are grouped into 3" diameter classes for compilation.

To calculate the allowable cut the following procedure is used. Material from Classes I and II only are considered for marking.

Trees per acre 242.6 (Classes I & II).

Basal area 111.4 — 6.7 (Class III) = 104.7 sq. ft. per acre.

Average basal area per tree $\frac{104.7}{242.6} = 0.431$ sq. ft.

Average DBH = 8.9" as determined from average B.A.

$$\text{Present average spacing per acre } D = \sqrt{\frac{43560}{242.6}} = 13.4'$$

Average annual diameter growth = 0.115 inches.

(determined from increment borings)

Length of cutting cycle 20 years.

∴ In 20 years the average diameter will become

$$8.9 + (20 \times .115) = 11.2''$$

Average spacing required for maximum growth for 20 years = $1.35 \times 11.2 = 15.1'$

(1.35 is the spacing factor for a basal area of 130 sq. ft. which is the desired maximum B.A.)

The average spacing is presently 13.4 feet so obviously a partial cut can be made.

Hence the spacing factor that should apply immediately after thinning should be $\frac{15.1}{8.9} = 1.70$ which corresponds to a basal area of 82 sq. ft. per acre.

∴ A cut of 104.7' — 82' or 22.7 sq. ft. can be made.

The selection of diameter classes and species can now be made, and in this case we are favouring the growth of pine by removing other material insofar as economic conditions permit.

In theory it would now be a simple matter to set a 17" diameter limit on the pine and an 11" limit on other species, but in practice a marking crew is engaged to mark the pine for removal and decide on the ground how practical it is to adhere to the 17" stump limit.

Either axes or paint can be used to mark the trees. The process of marking needs no explanation except to mention costs. The job of marking with axes is a time consuming one which is likely to cost about 75 cents per M Doyle. This of course must be related to the total volume per acre and volume to be marked per acre in order to compare it to other stands. The use of paint speeds up the work considerably, but is partially offset by the increased cost of materials. However, the use of paint can reduce the cost of marking by over 20% and better paints and equipment are in process of development.

A word may be said about the use of marking with paint, a procedure which is in widespread use in the United States. The paint is applied with the use of hand operated guns, obtained from any automotive supply outlet. They must be adapted in a minor way to prevent clogging up with paint and to do so requires the nozzle bore to be reamed to .03" and the intake valve screen to be removed.

The guns themselves do not present any difficulty if they are kept clean, but it has been difficult in the past to obtain a paint of the right consistency combined with adequate colour which is not absorbed in the crevices of the bark. It is with pleasure that we can report that a commercial paint is now available which requires no thinning, it does not penetrate the bark and it has lots of vivid colour. It has been developed by Canadian Industries Limited at our request and is in the medium price range.

This system of marking will continue to be developed, but already it has taken a lot of the guesswork out of the hands of individuals and applied a measure of uniformity over a considerable area. The costs are not too high a price to pay for conserving our forests, but the next step is to develop a type of jobber who will direct his men to cut precisely the correct trees without being marked so that he will improve the residual stand and still make a profit on his present operation.