OPERATIONS REPORTS

A Winter Pruning Operation in White and Red Pine

W. G. Murray

Petawawa Forest Experiment Station,
Chalk River, Ontario

Introduction

Pruning, to improve future lumber grades through the formation of knot-free wood, is a well-known silvicultural procedure; encouraging the growth of pruned trees by some form of release cutting hastens production of the clear wood shell. Calvert and Brace (1969) described the benefits of pruning selected crop trees in middle-aged stands of white pine to a height of 18 ft (5.5 m); these trees realized a substantial value increase when harvested and sawn 27 years later, earning 14% compound interest on the pruning investment. While much information has been published on pruning pine species, it has usually been based on treating a few small plots, and the emphasis has nearly always been on subsequent rates of growth and clear wood formation. Relatively little has been forthcoming on pruning on an operational scale, least of all on pruning in winter.

Methods

Seven stands, totalling 73 ha, were pruned in February and March, 1972 on the Petawawa Experiment Station. Immediately prior to pruning, all merchantable white birch and poplar and selected, marked conifers had been removed by a release and stand improvement cut. The residual stands were made up principally of white pine with varying amounts of red pine and white spruce, aged 30 to 70 years, 5 to 18 m tall and 10 to 30 cm dbh. Live-crown lengths ranged from 25 to 50%, and stems per hectare from 205 to 613 (Brace and Stewart 1974).

Some stands were adjacent to each other, and the maximum road distance between them was one mile. Terrain was rugged. Snow conditions varied from poor (soft and powder) at the beginning of the pruning operation, to good (compacted and crusted) when the last four stands were pruned. Snow depth remained constant at from 1 to 1.25 m, and snowshoes were necessary throughout the job (Fig. 1).

The labour force, which had been hired under the Federal Government's Economics Stimulation Program, varied from 8 to 14 men.

They were instructed to prune only healthy, vigorous white and red pine trees, 10.2 cm dbh and larger, to a maximum of 250 stems/ha (approximately 6.1 x 6.1 m spacing), except in one stand where only 205 trees/ha remained. All branches were to be removed as high as could be reached (about 5.5 m), and cut as close to the bole as possible. In the case of the shorter trees no more than half the live crown was to be removed. For the majority of trees it was unnecessary to prune any live branches. California-type saws with 1.2-m and 3.7-m handles were used. Detailed time records were kept.

Fig. 1. Pruner on snowshoes.

Fig. 2. Pruning with long-handled (3.7-m) saws.

At first, the men were organized in crews of three, with two men with saws with 3.7-m handles following one man with a saw with a 1.2-m handle. Later, all were equipped with the long-handled saws (Fig. 2). With this latter approach the whole tree was pruned by one individual, and the necessity of backtracking to finish off partially pruned trees was avoided.

Table 1 shows that estimated man-hours required per hectare varied from a high of 60 to a low of 19, with labour accounting for about 94% of the time, and supervision the remainder. Total man-hours per tree ranged from 0.17 to 0.08, of which supervision made up a flat 0.01 man-hour in each case.

Pruning with 3-man crews, poor snow conditions, cold weather and inexperience were judged to account for the maximum times shown. Once the crews became accustomed to the use of snowshoes and the pruning technique, and were provided with the long-handled saws, efficiency increased markedly. When, in addition, crusted snow gave good mobility, average costs per hectare were reduced by one half.

Conclusions

The attributes of winter pruning can be summed up as follows:

- Pro's — pruning can be carried out in late winter when other woods work is not feasible.
— the supervisor can easily keep track of the crew's progress.

Table 1. Range of productivity rates

	Minimum	Maximum	Mean
Stand area — ha	3.80	19.18	10.41
Trees pruned — per stand	1410	4740	2591
— per ha	247	371	264
Labour-man-hours/ha ¹			
— productive	12.6	31.8	20.6
— total	17.9	56.8	33.6
-man-hours/tree			
— productive ²	0.05	0.11	0.08
— total	0.07	0.16	0.12
Supervision — man-hours/ha ³	1.3	3.3	2.0
— man-hours/tree	0.01	0.01	0.01
Total man-hours			
— per ha	19.2	60.1	35.6
— per tree	0.08	0.17	0.13

¹Labour rate — \$2.52/hr in 1972.

²Productive time — excludes lunch and tea breaks and travelling to and from job.

³Supervisory costs — \$5.00/hr in 1972.

- with good crusted snow, 1+ m deep, the pruner has good mobility and can walk over most of the underbrush.
- it is possible to prune higher with less effort.
- bark on smooth-barked trees does not tear when frozen, and frozen branches are easier to prune because there is no fluid pitch to clog the saw.
- there are no biting insects.

Con's — cold weather.

- unpleasant pruning after a snowfall when overhead snow is easily dislodged.
- difficult to move in soft snow, particularly for those not used to snowshoes.

It was concluded that the advantages made winter pruning a distinctly feasible proposition, and that experienced crews working as described should be able to prune 250 trees in about 22 man-hours.

References

- Brace, L. G. and D. J. Stewart. 1974. Careful thinning can preserve amenities and increase yield. *Pulp. Pap. Mag. Can.* 75(8): 36-42.
- Calvert, W. W. and L. G. Brace. 1969. Pruning and sawing eastern white pine. *Dep. Fish. For., Can. For. Serv. Publ.* 1262.