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A NEW APPROACH TO THE INSTRUCTION OF SILVICULTURE TRAINERS IN SPACING AND THINNING

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INTRODUCTION

If the current level of precommercial thinning is maintained or increases within Ontario forests, an adequate supply of trained, skilled workers will be essential, especially for reducing the cost of this silviculture treatment. The Geraldton Community Forest Project is one of four pilot projects funded under the Sustainable Forestry Initiative of the province of Ontario. One specific objective of the Geraldton project is to demonstrate the practicality of intensive forest management in a boreal forest setting. The Geraldton Community Forest Project anticipates that under its direction approximately 1 000 hectares of young forest will be precommercially thinned within the next year. To develop a competent workforce for this task, the Geraldton Community Forest initiated a *Train the Trainers Program* in August 1993. This training program, sponsored by the Northern Ontario Development Agreement (NODA), Northern Forestry Program (NFP), was designed to develop qualified instructors who would later be used to train a local workforce.

Precommercial thinning is used primarily to reduce the density of young forest stands so as to increase the growth of crop trees and reduce rotation lengths. It can be described as, "thinnings made purely as investments in the future growth of stands so young that none of the felled trees are extracted or utilized" (Smith 1986). Properly spaced stands of spruce (*Picea* spp.) are thought to produce up to three times more merchantable wood volume at the age of 40 than are natural, unthinned stands (Carlin 1974).

Precommercial thinning has been carried out on a sporadic basis in the north central region of Ontario. Between 1984 and 1989, 517 hectares of regeneration were thinned and an additional 3 366 hectares of manual cleaning within plantations was completed (Hosick 1991). The decision to reduce aerial herbicide spraying by 20 percent in the 1990/91 fiscal year and in subsequent years has put greater emphasis on precommercial thinning (Oldford 1992). Figure 1 shows that the level of precommercial thinning has been increasing in Canada, but actually declined in Ontario after 1986 (Kuhnke 1989, Forestry Canada 1992). The potential increase in demand for precommercial thinning warrants the development of a trained, professional workforce.

The chain saw and brush saw are two tools commonly used during precommercial thinning operations. Both have their inherent advantages and disadvantages, although the brush saw is designed exclusively for this type of work. Chain saws, however, are versatile and can be used for a broad variety of forest management treatments. They are particularly effective if smaller areas are being treated, but for continuous use a brush saw is considered to be more practical.

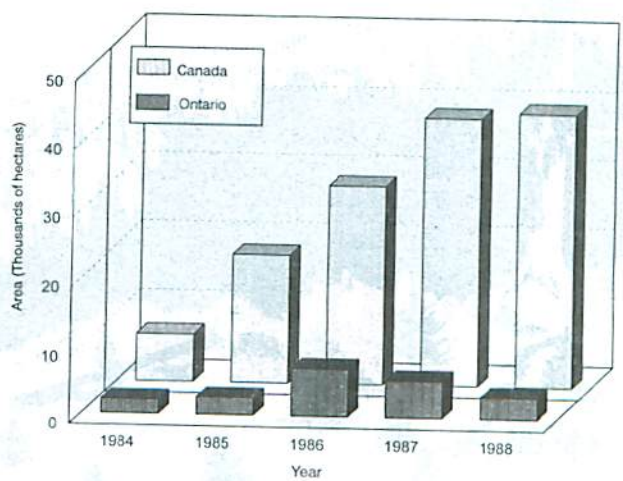

Figure 1. Area of forest land that was precommercially thinned in Canada and Ontario between 1984 and 1988.

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The brush saw is also considered to be safer to operate and easier on the operator, who can work in an upright position (Nova Scotia Department of Natural Resources 1992). In a comparison of productivity rates, Ellingston (1987) showed that trained, experienced brush saw operators are capable of producing up to 50 percent more than are comparable chain saw operators.

Figure 2 shows average worker productivity in Nova Scotia using both brush saws and chain saws on a variety of stand densities (Nova Scotia Department of Natural Resources 1992). Clearly the brush saw outperforms the chain saw over a broad range of stand densities and is the preferred tool in large-scale operations.

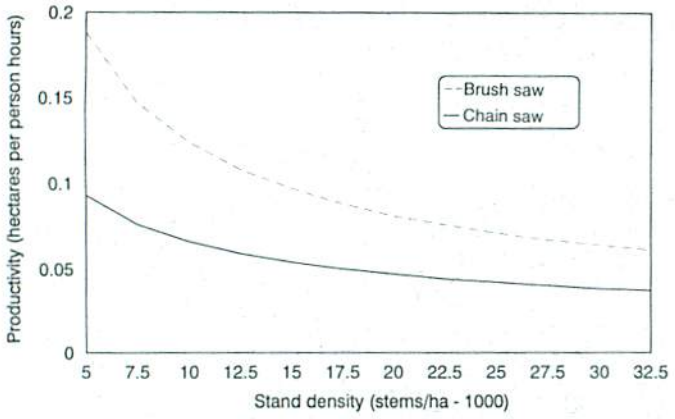

Figure 2. Predicted productivity based on stand density for brush saws and chain saws in precommercial thinnings for stands < 6.0 m tall (from *Nova Scotia Department of Natural Resources 1992*).

Most often, precommercial thinning has been carried out by forestry contractors who hire untrained, casual staff for the duration of a job or a project. Subsequent job performance and individual productivity is governed by a worker's inherent stamina, attitude, and work technique. This technique can be taught or developed over time. Individuals who are well trained and understand the dynamics of why the treatment is being done often take pride in their work. The underlying key to a successful precommercial thinning program is motivated, well trained operators and qualified supervisors (Hermalin 1991). Such individuals should be considered as specialists. Therefore, it is important to develop a proper training infrastructure when large-scale precommercial thinning operations are introduced into an area.

PROJECT DESCRIPTION

The *Train the Trainers Program* commenced on 3 August, and was completed on 21 August 1993. Training expertise was provided under contract with Nordfor Training and Consulting, Husqvarna, Sweden. This company specializes in training forestry workers and has completed similar courses in Newfoundland, New Brunswick, and Quebec. Nordfor contends that graduates of their introduction programs can increase the productivity of the workers that they train by approximately 20 percent.

A total of eight students participated in the *Train the Trainers Program*. They originated from the following organizations: 6/70 Community Forest, Kapuskasing; Elk Lake Community Forest, Elk Lake; Geraldton Community Forest, Geraldton; Ginoogaming First Nation, Longlac; Kimberly-Clark Forest Products Inc., Longlac; Ministry of Natural Resources, Geraldton; and Wikwemikong Community Forest, Manitoulin Island.

The majority of the training focused on the use of brush saws in relatively young, dense stands of softwood and hardwood. A portion of the course was also dedicated to the use of chain saws in larger, precommercial/commercial thinning operations. Course participants were outfitted with Husqvarna 265 RX brush saws and harnesses, and with tool kits.

Instructed by Roger Goransson, the course was designed to show the participants various precommercial thinning techniques and to allow them to practise those techniques until they became proficient. One of the key components of the course was to provide participants with in-depth training into the biology and reasons for precommercial thinning practices and their intended results. The course also focused on the dynamics and problems associated with instructing people and with techniques that might be used to accomplish this task. At the end of the training program the participants were evaluated and tested. All eight of the participants passed the course, returned to their original communities as new instructors, and established training courses within their respective regions.

Of the seven organizations that participated in the program, the 6/70, Elk Lake, and Wikwemikong Community Forests each trained six workers; the Geraldton Community Forest trained 17 individuals. After their training was completed, workers were employed in the field during the fall and early winter of 1993.

Within the Geraldton Community Forest trained personnel precommercially thinned approximately 300 hectares of forest land. Productivity rates varied greatly among individuals and the various job sites. Table 1 summarizes the average productivity rates that were experienced during the precommercial thinning operations. The objective of each job was to reduce stand density to 2 100 stems/hectare. There does not appear to be a direct correlation between productivity and stand density. Other researchers have found reasonable correlations, such as those shown in Figure 2. Additional productivity curves based on stand density have been produced for New Brunswick (Ellingston 1987, Schmidt et al. 1988) and Newfoundland (Brown 1991). Ellingston (1987) introduced further productivity curves based on height and density. The current study indicates that several variables have a direct effect on productivity. These include: stand density, brush density, tree species, stem diameter, ground slope, rockiness, slash levels, stand height, air temperature, precipitation, and snow depth. There is no guide within North America that incorporates

Table 1. Various stand parameters and production rates for precommercial thinning operations within the Geraldton area.

Job site	Average height (m)	Pretreatment stand densities (3/ha) Conifer	Hardwood	Brush	Total	Average productivity (ha/day)
A	5	8 200	1 500	2 250	11 950	.83
B	7	4 200	1 300	5 100	10 600	.34
C	7	5 400	800	4 100	10 300	.36
D	7	5 100	1 650	1 000	7 750	.29
E	8	5 500	1 250	2 200	8 950	.46

all of these factors when considering productivity, therefore experience is required when bidding on commercial contracts and setting productivity goals.

Stand density has a direct bearing on productivity rates, since more trees have to be cut as densities increase. Brush species such as willow (*Salix* spp.), alder (*Alnus* spp.), and cherry (*Prunus* spp.) also play a significant role in productivity, since they tend to grow in clumps and, therefore, require more time to cut. The major species within a stand also has an effect, since trees such as poplar (*Populus* spp.) are more difficult to fell to the ground than are spruce or pine (*Pinus* spp.). Accumulated snow within the crowns of softwoods further decreases productivity because the snow tends to infiltrate the air filters and carburetors of the saws and causes engine malfunction. The diameter of tree stems to be cut also affects the amount of time required to thin a stand. This influence is magnified when the stems freeze during cold weather. The slope of the work site plays a major role as well; slopes in excess of 15° cause workers to spend additional time securing a footing before starting to cut. Obviously, the presence of rock increases the amount of care a worker has to take when cutting trees. Accidental dings create downtime for resharpening after rock/blade collisions. Travel within the work site is more difficult and time consuming in conditions of slash or logging debris. Air temperatures above -20° C do not seem to have a significant effect on production, but when temperatures drop below this, saw carburetors and air cleaners tend to freeze. Both rain and snow slow production rates, as does an increasing snow depth, which restricts maneuverability.

Some of these variables can be overcome by restricting precommercial thinning operations to the warmer months of the year when weather conditions are most favorable. A cold weather kit is manufactured by Husqvarna for the brush saw, but it is only effective above -20° C. These kits were not available for the current study; therefore, in-house modifications were used to help improve performance.

It was impossible for this study to make comparisons between productivity levels before and after training, since the majority of the workers had never used brush saws before. However, production and quality increases realized during the training program were significant and noticeable after a short time.

CONCLUSIONS

The *Train the Trainers Program* was a very practical and useful training program. The course provided graduates with the detailed instruction required to train silviculture workers and thereby benefit both them and the employers. In total, 35 workers were trained by the instructors and subsequently employed for various projects throughout the fall. It is anticipated that the majority of the trained workers will continue to be involved in precommercial thinning treatments as projects and funds become available during upcoming summer and fall seasons.

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