STAND DENSITY MANAGEMENT—COMMERCIAL ASPEN THINNING

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ABSTRACT.—This paper provides data and insights into Minnesota trials of commercially thinned aspen stands ranging in age from 29 to 35 and conducted by Blandin Paper Company. Initial small scale trials were conducted in 1996 and a larger operational trial was completed in the fall of 1998. The trials demonstrated that a combination of proper equipment, trained operators, and a flexible harvest design are essential components of a successful silvicultural thinning model. Recovery of 7 to 8 cords per acre underscores the potential to increase total fiber yields by salvaging anticipated mortality and be moving future merchantable volumes forward in time. The prospects for future product quality and value are enhanced. Thinning results, pulp quality, and impacts to nontimber values are also discussed.

The commercial thinning of young aspen stands provides the opportunity to salvage volume which would otherwise be lost to normal mortality. In the three Lake States Region, the aspen annual growth equates to about 7.4 million cords. However, approximately 2.4 million cords are lost to natural mortality, leaving a net growth of about 5 million cords. With growing stock removals approaching the net growth figure, it is important that this mortality be salvaged. In Minnesota, and in the 31 to 40 aspen age class, 23% of the total annual growth is lost to normal mortality. It is this volume which can be recovered through a commercial thinning operation.

Commercially thinning young aspen stands will help free up aspen volume during the age class gap period. Due to low aspen acreage in the 20 to 39 year age classes, within ten years, aspen harvest levels will exceed available merchantable volume. By commercially thinning these younger stands, this situation can be lessened.

Another important objective with an aspen commercial thinning program is that it improves the public acceptance of timber harvesting and forest management operations. By introducing selective harvesting systems, the aspen stands will be left in a more pleasing appearance.

Other opportunities realized through thinning include enhancing the value of the aspen stand by leaving the larger, better quality dominant trees. These trees will be free to grow to higher valued sawlog size. Also, by thinning from below, the future stand genetics will be improved. In addition, by thinning at a young age, the opportunity exists to generate some income during the growth of the stand.

Aspen stands which lend themselves to commercial thinning should be between 30 to 35 years old. They should have a high site index, equal to or greater than 80, and they should consist of 125 to 150 square feet of basal area. The dominant aspen tree size should be greater than 5 inches diameter at breast height.

The harvest and silvicultural design with an aspen thinning program is to thin from below, leaving the dominant aspen trees. Approximately 60 to 70 square feet of basal area should be left following thinning, leaving no damaged residual stems. It is important to employ the cut-to-length harvesting system, using a rubber tired processor with a dangle head harvester. The forwarder should also be a rubber tired machine, and it should follow in the tracks of the processor. It is recommended that 30- to 40-foot wide travel strips be maintained. Other considerations include restricting the thinning to the leaf-off period between the months of October and March. This is important in that it allows for greater operator visibility. In addition, it is recommended that harvest decisions be left to the operator. The marking of these young aspen stands becomes very difficult, and it is not advisable as long as the equipment operator is well trained and fully understands the thinning objectives.

Blandin first examined the potential of commercially thinning young aspen stands in 1996. Three young aspen stands were thinned and the results are summarized in table 1.

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The pulpwood from these trials was mixed with average run aspen and fed through the Mill’s groundwood process. Although a steady amount of this small diameter wood can contribute to slowdowns in the woodroom, by filtering the wood into the pulping process, this problem was lessened. The pulp characteristics of the small diameter aspen were analyzed in the Mill’s lab, and results were highly favorable. The fiber had higher brightness and better bulk than older mature aspen.

As a result of these trials, Blandin was encouraged to set up a large scale commercial thinning operation. Since the Company has few aspen acres in the 30-year age class, the Minnesota Department of Natural Resources (DNR) was contacted. With the excellent cooperation of the DNR’s field office in Effie, MN, two young aspen stands on state land were thinned during the fall of 1998. The results of these thinnings are summarized in table 2.

A total of approximately 322 cords of aspen was removed from the combined two thinned sites. This wood was utilized by the Mill by mixing it with mature size aspen pulpwood.

These two sites were distinctly different in age and composition. The older stand was a pure aspen type with a high site index. Only 164 total nonmerchantable trees, or less than 5 per acre were required to be felled on that site. In contrast, the younger stand had a lower site index, and consisted of more nonaspen trees, as well as considerably more nonmerchantable trees. A total of 773 nonmerchantable trees, or more than 45 per acre were felled as part of the thinning process. As a result, the operator’s production on this younger aspen site was considerably less than the required minimum 2 cords per hour.

Requirements for an economical commercial aspen thinning include large scale operations of a minimum 20-acre size. In addition, the stand has to be fairly uniform with a high site index and minimal nonaspen trees. Of course, the age of the stand is important, as the younger it is the more nonmerchantable stems that are present. Utilization to a 3” top diameter is essential for volume recovery. In addition, tying the thinning to a chipping operation will add to the volume and thus enhance the production. Also, it is critical that stumpage rates be kept low, ideally less than $8.00 per cord. This should be easily justified since the thinning is a stand improvement operation.

Blandin was interested in examining the ecological effects of commercial aspen thinning, and therefore contracted to study the immediate and long-term impacts on the aspen ecosystem. This work is being done by George Host and Mark White with the Natural Resources Research Institute, Duluth, MN. Specifically, the floristic response to thinning is being studied, as well as the effects on the avian community. The study is
designed to provide long-term data, such that the response of plant and animal communities may be tracked over time. The immediate impacts suggest that the thinning increased the floral diversity due in part to increased light penetration. In addition, the thinning created two distinct structural layers in the aspen canopy. These included a dominant canopy layer and a strong understory layer in the 0 to 2 m height class.

In summary, Blandin feels that with some refinement, the commercial thinning of aspen does indeed offer the potential to increase fiber yields and to improve future product values. The recovery of 7+ cords per acre of anticipated mortality from these 30- to 35-year-old aspen stands is obtainable. For widespread application, increases in thinning production rates will be necessary. However, opportunities will be greatly improved with high site stands, 80+, and with biomass recovery.

In addition, Blandin feels strongly that by combining the harvesting technologies of the cut-to-length system with alternative silvicultural treatments, the public acceptance of forestry practices will improve. The commercial thinning of aspen provides for an alternative to the conventional aspen clearcut system. Blandin is committed to commercially thinning aspen, and the Company will continue to promote its use.