reclimb a pruned tree with climbing irons.

Summary

An intensive study of a select eastern white pine tree was conducted on the Pack Forest in eastern New York. This 125-year-old tree was 30 inches d.b.h., 110 feet in height and contained a volume of 1,513 board feet. The stumpage value of the tree was $133.95 after costs of manufacturing had been deducted from the value of the finished lumber. This was its value to the owner as it stood in the woods. Three-log pruning at the proper time would have increased the value to $233.86. High pruning not only provides increased lumber values, but also greatly reduces the possibility of loss in value caused by red rot. This tree is considered to be an example of the size and quality that may be expected from growing select trees on good sites under management.

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Notes

The Harvard Forest Prism Holder for Point-Sampling

A simple prismatic instrument for use in point-sampling, or plotless cruising, was designed at the Harvard Forest in 1955. This prism holder has given satisfactory results for cruising over 15,000 acres of forest land in New Hampshire and Massachusetts. One man worked alone to do most of this cruising during parts of two summers.

The principles governing the use of prisms in point-sampling have been ably discussed by David Bruce.[1] The instrument described here is merely an adaptation of these principles to give the following advantages:

1. The prism is easily set up in the line of sight.
2. The prism is compactly mounted on the cover of a 5 inch by 9 inch clip board that fits the hip pocket, leaving both hands free during travel between plots. It could be mounted on any clip board or in a special case.
3. While in use the clip board and prism are held in one hand, leaving the other hand free to record data.

[1]Bruce, David. A new look at trees. Jour. Forestry 53:163-167. 1955.

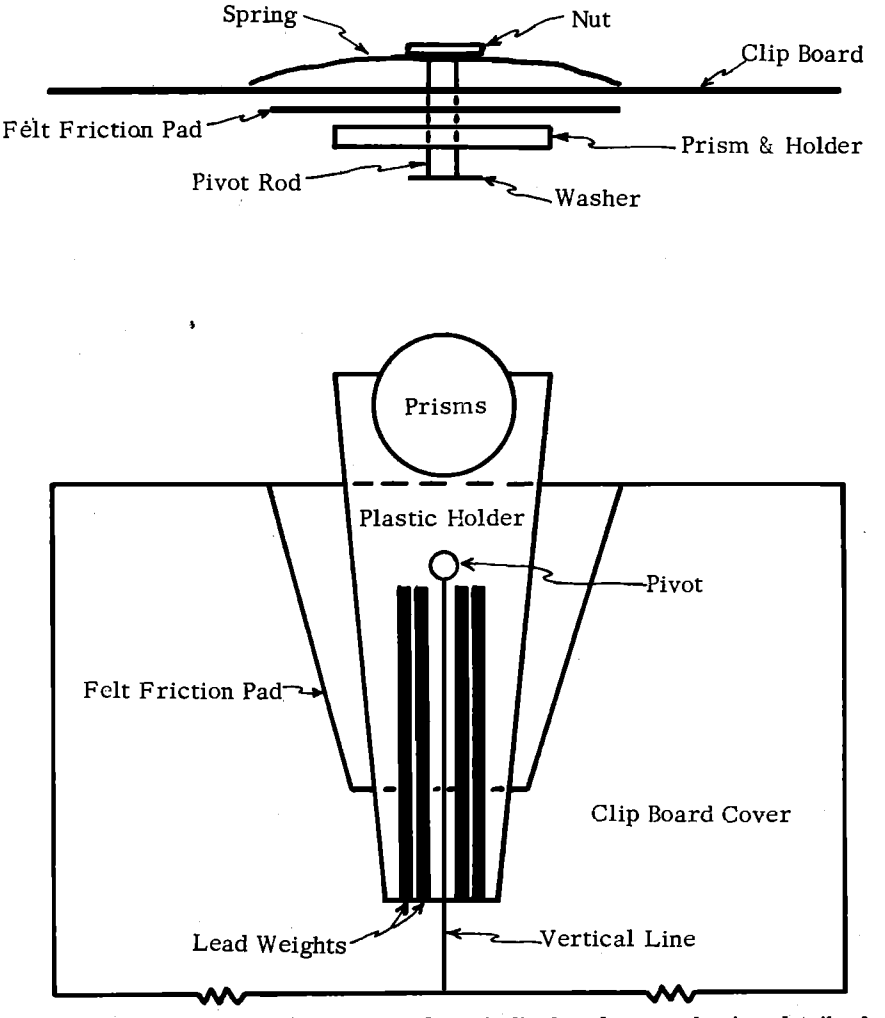

FIG. 1.—Above, exploded view to top edge of clip board cover showing detail of pivot rod arrangement; below, front view of prism holder mounted on inside of clip board cover and in position for use on slopes of 10 percent or less. Holder is swung to horizontal position for carrying.

4. On slopes of less than 10 percent the prism is set for use in a second or less. Correction for slopes over 10 percent is easily made in a few seconds.

5. On completion of use the prism is made ready for carrying by a flip of the hand, and is protected along with the tally sheets inside the closed clip board.

A pair of flat wedge prisms of about four diopter strength were used. These were ground round to about 15/16-inch in diameter. This approximate size was the best of several tried. The prisms were adjusted for a basal area factor of 10, and in such a way that they gave no vertical displacement of the image, and then were cemented together with canada balsam. (Prisms of appropriate strength can be used in the manner described by Bruce to get any basal area factor desired.)

A holder for the pair of prisms was made from a piece of clear Plexiglas about 3/16-inch thick. This material can be shaped with ordinary woodworking tools. The holder is about 3½ inches long and has the form shown in the diagram. This design can be altered to suit individual preferences. The prisms were cemented into the yoke of the holder, and lead dress weights were inserted in holes at the opposite end to act as counterweights below the pivot point.

A hole the size of the pivot was drilled in the center near the top edge of the clip board cover so that when the prism holder is mounted the prism will be seen over the end of the clip board. The pivot was ½-inch long and made of brass rod 3/16-inch in diameter with a washer soldered on the inside end, and a small nut threaded on the outside end. A thin steel strip was bent and inserted under this nut on the outer side of the clip board to give spring tension and press the prism holder against the felt friction pad glued on the inside of the cover.

When in use the base of the clip board is held against the chest and at such a slope that the open cover will be vertical and the prism at eye height. The prism holder is turned to the vertical position so that lines scribed on the back of the holder and on the clip board cover coincide. This position will serve for slopes of 10 percent or less.

For greater slopes the operator turns the side of the clip board cover toward himself, and sights along the top edge of the cover to a point at eye level up or down slope. Then he presses on the pivot screw to release the pressure on the friction pad so that the prism holder swings free like a pendulum. When the pendulum action has stopped he releases the pivot to press the holder back against the friction pad and freeze it in position. Then the clip board is returned to the vertical position, face toward the operator, and is used in the normal manner without moving the prism holder from its slanted position. Through its pendulum action the prism holder rotates by the degree of slope and at the same time turns the prism by the same amount around the line of sight. This obviates mounting the prism on a shaft and rotating this shaft by gears and a separate pendulum.

The number of times the slope is corrected on each plot will depend on the degree of slope and the accuracy desired. Often one or two settings per plot are enough, or at the other extreme a setting may be needed for each tree counted. Of course a protractor can be added to measure slope if it is desired.

This prism holder can be made by almost anyone. Round prisms have been purchased for $2.50 to $3.00 a pair and the Plexiglas is about $3.00 a square foot. Pivot material can be picked up in almost any hardware store for a few cents, and canada balsam is carried by drugstores. A piece of felt hat was used for a friction pad, and enough dress weights for one holder cost about five cents. A completed holder thus costs only a little over $3.00 for materials, plus some time and ingenuity.

E. M. GOULD, JR.
Lecturer on Economics,
Harvard Forest,
Petersham, Massachusetts

Why Do Bears Girdle Balsam Fir in Maine?

During the summer of 1956, forest survey crews and fieldmen of the Spruce-Budworm Survey, operating in the northern counties of Maine, noted a type of forest tree mortality previously unrecorded in surveys of the spruce-fir region of the Northeast. This phenomenon is the girdling of balsam fir, red spruce, and northern white-cedar by black bears.

Bear girdling that causes injury or death of pole and sawtimber trees was found to be common throughout the northern portions of Aroostook, Piccataquis, and Somerset counties. Such injuries were not observed in the coastal region.

As yet there is no detailed information on the relative importance of this kind of damage, nor has the southern limit of the affected area been determined. Total volume loss cannot compare with that resulting from insects and disease, but locally this bear damage reaches such severe proportions that fir may be eliminated from the stand.

Where pure fir stands are involved, the damage is striking. Pockets of dead firs sometimes exceed an acre in size and may reflect bear-girdling injuries sustained over one or more seasons. A pocket may be an irregular patch in deep woods or a band along an old logging trail where a feeding bear moved from tree to tree.

Bear girdling is characteristic and may be easily recognized even on trees killed several years ago. The bark is pulled up, out, and away from the base of the tree either by biting or clawing. Usually some remains attached and dan-

gling in long strips. The marks left where the bear hooked its claws in the bark can be detected upon close examination of the inside surface.

There is no evidence that any bark or wood is actually eaten: the bears probably only lick the sap and gum from the inner bark. Some woodsmen and game protectors who were interviewed said they have seen bears doing this, especially in the spring.

A bear's taste seems to run especially to balsam fir. Spruces are attacked much less. Only an occasional cedar is injured—rarely girdled completely. However, on all species even incomplete girdling still is very damaging to individual trees because it permits introduction of stain and decay organisms. There have been no observations of bears injuring the other softwoods or the hardwoods species common to the area. Large poles and small sawtimber trees are damaged more frequently than other size classes.

Further observations will be made during the 1957 field season in an attempt to define the borders of the area where girdling can be expected and to lead towards a quantitative appraisal of volume loss.

Of course, a few explanations would be interesting: Why do bears prefer balsam fir? Does it satisfy a particular dietary need? Why do they choose certain stands or locations? Is the habit newly acquired? Is it spreading?

WILLIAM D. ZEEDYK
Northeastern Forest Experiment Station, Forest Service, U. S. Dept. Agriculture

Club Pruning at Low Temperature

Pruning of forest trees usually has the objective of enhancing the quality of lumber by eliminating knots in wood laid down after the pruning. Foresters have generally emphasized that clean, smooth cuts should be made flush with the bark and that chopping or breaking off branches should be avoided because of the danger of pitch pockets, decay, and other defects. Indeed, lumber sawn from trees carelessly pruned by the axe, with stubs left projecting, has shown inferior overgrowth to those closely and carefully pruned by saw. So, in pruning selected crop trees for clear lumber, foresters are careful to see that knots are close, not only flush with the bark, but cutting through the bark callus ring; that they be sawn — not clipped, bumped, or shattered, and split. This is quite as it should be. This work requires skill, care, and good tools.

There are cases where it is desirable to remove branches for other purposes where the expense of crop tree pruning is not justified. These purposes include:

1. Clearing edges of roads and

trails.

2. Swamping out property lines.
3. Pruning trees on sample plots to facilitate measurements.
4. Pruning plantations along roadsides to reduce fire hazard.
5. Pruning dense young stands in order to facilitate marking, thinning, and inspection.
6. Marking boundaries for stand improvement work, timber sales, etc.
7. Cutting out telephone line rights-of-way.

In these and many other cases removal or reduction in length of branches on one or more sides of a tree, usually only to head height, is satisfactory by any method that does not lead to infection by wood rots, cankers, and other diseases. Commonly a light axe, machetes, clippers, etc. may be used.

Kachin (*1*) reported the use of a club for pruning, the so-called Hebo Club. This consisted of an old mattock handle with a metal shoe weighing 3½ lbs. Shorter clubs used from a ladder weighed 2¼ lbs. Douglas-fir branches were broken off within the branch collar, leaving a cavity 1 inch inside the tree stem. Branches as large as 2 inches could be broken off. Curtis (*2*) criticized this as unsuitable for pruning with the aim of producing knot-free lumber, because of the slow and abnormal healing, leaving a pitch pocket, etc. Zach (*3*) pointed out that when used to remove dead branches from Douglas-fir the club method was entirely satisfactory, due to the rapid diameter growth.

It was not the intention of following this practice to produce clear lumber, but rather David B. Cook's observation that larch twigs could easily be cracked off in very cold weather, that led to experiments with other trees. It is a familiar fact that twigs are more brittle when cold. Balsam fir twigs snap like matches at temperatures below zero. Large trees felled in heavy frost frequently break. Loggers know that it is easier to trim trees in very cold weather. Seedlings and saplings suffer more from logging injury under these conditions. A study conducted a few years ago indicated great differences among species in susceptibility to logging damage. Spruce and hemlock were resistant, the pines brittle and sensitive when very cold. There is good evidence that the moisture content of the wood has much to do with brittleness. High moisture content is associated with snapping and cracking of trees in extremely cold weather, low moisture with toughness and elasticity. Larch twigs with much sapwood, devoid of needles to transpire water, are high in moisture content and hence brittle, while other species, with a greater proportion of heartwood in twigs and lower moisture content are more resilient. However, the characteristics of the wood itself are also important; balsam fir is weak and brittle compared to spruce and hemlock. Dead branches, if sound, with lower moisture content, can be expected to be less brittle than live ones, but this

varies considerably with the species.

Bumping off branches with a club was tried January 14-20, 1957 at temperatures ranging from 5° to —28°F. Work was done on snowshoes, using an old sledge handle weighing 1 lb., a rake handle, and other similiar clubs. It was found possible to remove twigs and branches completely to 10 feet on European larch with an average of three strokes of one hand. Branches 1 to 1½ inches in diameter could be severed close to the trunk with a smart blow. Norway spruce was somewhat less easily cleaned, but live branches could be broken at any desired length. White pine and balsam fir were also easy to clean if the branches were green and not over ½ to 1 inch in diameter. Red pine offered more resistance. Green Scotch pine cleaned easily but dead branches were almost impossible to break. With the exception of larch, ease of club pruning appeared to be analogous to susceptibility to snowbreak in the species.

A week after the low temperature trial branches were clubbed in the same stand at +5°F. The temperature had dropped below zero 24 hours previously after four days at +60°F. Results at this time were poor compared to the earlier test. Larch "pruned" most easily, followed by white pine. Spruce twigs were resistant, and red pine could hardly be broken at all. Just what the critical temperature is for easiest pruning remains to be determined.

Damage to the trees compared to less violent methods of pruning is difficult to assess without following the condition of the trees for several years. In larch, it would appear that the branches break off so cleanly and close to the bole that little if any advantage could be obtained by more leisurely and gentle methods. Larger branches frequently break off inside the tree, leaving a cavity ½ to 1 inch deep. This will doubtless be slower to heal than a flush cut over which the callus can grow.

Probably the greatest advantage

of clubbing off branches at very low temperatures is that it is economically possible to prune trees like larch and spruce that have so many fine twigs that saw pruning is prohibitively expensive. It should be emphasized again that the writer does not recommend knocking off branches as a substitute for careful pruning with saw in eastern forests. It admittedly has limited application, but as a rapid, cheap means of cleaning trails, lines, and possibly shaping Christmas trees it is certainly easier, and causes less damage than an axe or other sharp tool.

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HENRY I. BALDWIN
New Hampshire Forestry & Recreation Commission

Reviews

Hough's Encyclopedia of American Woods

By E. S. Harrar. Vol. I: In two sections. 204 pp., 75 wood samples. Robert Speller & Sons, New York. 1957. $25.

Over 35 years ago as an undergraduate this reviewer thought that Hough's wood sections were marvelous. He still is of that opinion after examining the latest offspring of the *Encyclopedia of American Woods*. Romeyn Beck Hough had an idea about making wood sections, but there was no equipment for doing the job. So he designed a machine and supervised its construction. "He began cutting sections in . . . 1883, and published his first volume in 1888. The 14th and final volume of the set was released in 1928 four years after his death." Now we have a new edition, volume I of which has recently been issued. All together 15 volumes are planned, a new one to appear each six months. For this ambitious undertaking, Dean E. S. Harrar of the Duke School of Forestry is acting as editor-in-chief.

Volume I consists of two parts. The first is text, written by Dr. Harrar, containing information on 25 species: seven pines, two spruces, two hemlocks, three true firs, and in addition, Douglas-fir, western larch, baldcypress, redwood, western redcedar, incense cedar, Arizona cypress, Alaska-cedar, Atlantic white-cedar, eastern redcedar, and California torreya. It is not clear on what basis the 25 species were selected. Certainly commercial importance did not dictate the inclusion of *Torreya californica,* the California-nutmeg. On the other hand it is good to see the inclusion of true firs from the West, the grow-