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Mechanized Timber Harvesting to Improve Ruffed Grouse Habitat

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Introduction

Some 40 percent of Minnesota's 17 million acres of commercial forest land is in small private ownerships (Stone 1966:6); often, maintenance of wildlife is a prominent owner objective. A 1967 study of absentee owners of Pine County timber lands showed that 20 percent would not allow their timber to be harvested, fearing it would destroy the hunting (Noreen and Hughes 1968). This reflects a belief that

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standing forest preserves wildlife habitat.

Continuing studies relating ruffed grouse (*Bonasa umbellus*) populations to forest-cutting practices on the Cloquet Forestry Center document these game birds' dependence upon diverse habitats created by forest disturbance, such as logging. These studies indicate optimum benefits occur when clearcutting to favor aspen (*Populus tremuloides*; *P. grandidentata*) regeneration is limited to dispersed blocks not exceeding about 10 acres (Gullion 1972). This size limitation presents economic constraints on logging. Larger-scale cutting also benefits grouse; however, the benefit diminishes as the clearing increases beyond the 10-acre size.

Study objectives

This study was part of a 5-year project which began in 1969 at the Crow Wing Natural History Area, on property of Donald S. Burris, about 15 miles southeast of Brainerd. The goal was to monitor distribution of breeding male ruffed grouse, to determine the character of forest habitats they occupied as well as those types not being used, and to manipulate forest cover in unused areas to make it acceptable to grouse. For this manipulation, various sizes and configurations of cutting units were proposed to examine both the feasibility of commercial timber harvesting and the grouse response to situations ranging from the farm woodlot of a few acres to industrial or public forest lands extending over thousands of acres. The project ended in fall 1974.

This publication reports the results of one test operation in which seven 10-acre blocks were harvested in patterns meeting the objectives of grouse habitat improvement.

Study area

The study area was 280 acres of 50- to 60-year-old mixed northern hardwood forest within the Crow Wing Natural History Area. This area had been identified as a virtual "biological desert" for ruffed grouse; it was set up for rejuvenation as wildlife cover. The stand overstory was a mixture of aspen, paper birch (*Betula papyrifera*), red oak (*Quercus rubra*), and sugar maple (*Acer saccharum*), a stand composition common in central Minnesota's upland hardwood forests. Overstory trees ranged from 6 to 14 inches in diameter breast high (dbh) and 45 to

Figure 1 (left). This is a representative mixed hardwood stand on the study area.

60 feet tall (figure 1). The understory contained a good stocking of ironwood (*Ostrya virginiana*) trees and a medium stand of hazel (*Corylus spp.*). The soils are mostly glacial moraine of the Hibbing-Chetek association. The topography varies from gently rolling to fairly steep, with several low, wet areas.

The merchantable volume of trees 6 inches in diameter and larger with two or more 100-inch sticks per tree was estimated at 12.5 cords per acre (11.5 cords of pulpwood plus 350 board feet sawtimber). Trees were used to an 8-inch top diameter for sawtimber and 4-inch top diameter for pulpwood. The remainder was left as slash on the cutover area.

Operating constraints to meet requirements of habitat improvement

Several requirements for harvesting assured that the results would meet the project objectives. (1) The harvesting area was laid out either as 10-acre strips (330 feet by 1320 feet) oriented on a north-south alignment or as 10-acre square blocks (660 feet on the side) (figure 2). (2) All trees 2 inches in diameter and larger were to be cut. (3) Trees were to be skidded to a central landing area. As much as possible, skidders were to operate over new routes with each load to ensure maximum disturbance of brush and of small hardwood and softwood regeneration.

Figure 2. The 10-acre strips (330 feet by 1,320 feet) of the study area are shown in this aerial view.

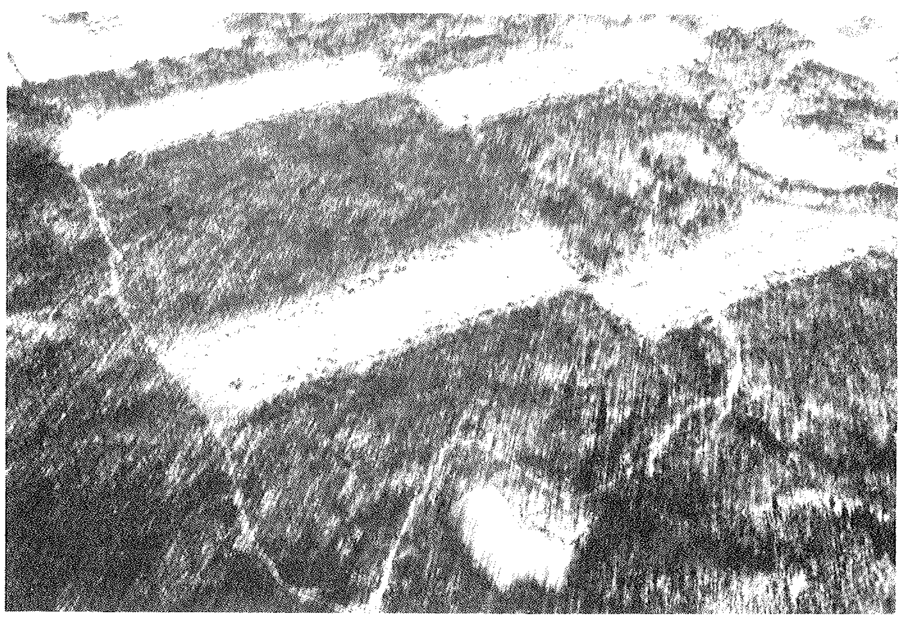

Figure 3. This felling and bunching machine was used in the harvesting operation.

The felled and bunched timber here is ready for skidding. The strip is 36 feet wide.

Harvesting operation

All seven blocks received identical treatment. The logging operation was fully mechanized, using the tree length system of timber removal. Trees were felled and bunched into piles of 5 to 10 trees with a feller-buncher. This machine cut over the 10-acre blocks in 36-foot-wide strips (figure 3, 4). Two men using chain saws limbed and topped the felled trees in the woods. They also felled the large sawtimber trees. Two rubber-tired skidders (one with chokers and one with a grapple) moved the tree length wood to a central landing (figure 5). Maximum skidding distance was ½ mile in fall 1973 and ¼ mile for spring 1974 logging. At the landing, the tree length material was loaded on pole-trailers by a mobile heel-boom loader. The truck haul was 25 miles to the mill, mostly on hard-surfaced roads. A primary road network had already been established on the Crow Wing Natural History Area to facilitate wildlife research; therefore, little additional road development was necessary.

The wood was delivered to the Ratzlaff Logging and Lumber Company of Onamia. Trees containing sawtimber were fed into a Morbark Chip-Saw Complex where the suitable portions of the tree were sawn into lumber; the slabs, edgings, and top material were processed into chips. Trees below sawlog size were fed into a Morbark Chip Harvester for processing into chips. This resulted in complete use to a 4-inch top diameter.

Figure 5. A rubber-tired skidder dragged the tree-length logs to the landing.

Figure 6. The area is shown here immediately after spring cutting. Note the main skid trail in the center of the area and the scattered slash to the sides.

Figure 7. This aerial view of the area after cutting shows slash distribution.

Four 10-acre blocks were logged during the winter (Nov. 26 to Dec. 12, 1973). The three remaining blocks were logged in late spring (May 22 to June 7, 1974). On spring-logged blocks, no logging was done in wet areas or on steep slopes. This resulted in a diversity of habitat within blocks (figure 6, 7).

Results

Economic considerations

Timber in this study was of low quality; also, the constraints put on the operation had not been previously required. Thus, stumpage revenue to the landowner was somewhat less than would have been realized under other conditions, but return still was generated.

Based on the cruised volume and the total expenditure figures given by the operator, the harvesting cost of wood delivered—not including stumpage — was $12.35 per cord. This is comparable to logging costs on areas requiring no special provisions for wildlife habitat improvement.

Ground disturbance

Ground and shrub disturbance resulting from the logging operations were measured in three classes:

(1) No disturbance.
(2) Area having no mineral soil exposure, but with humus layer compacted or with mixed humus and mineral soil.
(3) Area with mineral soil exposed and soil compacted.

Here are the results in percentage of total area, excluding areas utilized for landings:

Area	No disturbance	Compacted humus layer	Mineral soil exposed
4 blocks logged fall 1973	65	25	10
3 blocks logged spring 1974	43	40	17

To log the seven blocks, 4.5 acres were utilized for landings—6.8 percent of the total area.

Ground and understory disturbance on the landings were:

Area	No disturbance	Compacted humus layer	Mineral soil exposed
4 blocks logged fall 1973	0	51	49
3 blocks logged spring 1974	0	16	84

Figure 8. Aspen sucker reproduction is shown here in August 1974. The area was cut during November-December 1973.

Vegetation response

First year aspen regeneration on the fall-cut strips was very satisfactory, much of it growing 5 to 7 feet by the end of August and at adequate densities (figure 8). As expected, first-season response on the area logged in May and June, as the aspen was leafing out, was less satisfactory; however, 1975 growth did densify the stand to a satisfactory level.

Discussion

More slash was left on the Crow Wing Natural History Area cutting areas than is believed desirable for ruffed grouse habitat (figure 6). This slash is the horizontal cover that provides more concealment for grouse predators than for grouse. Slashing can be especially detrimental to hens and their broods the first few seasons when dense aspen sucker regeneration is best as brood habitat. This problem can be alleviated by use of the full tree harvesting system. In this system, the whole tree is skidded to the landing where it is limbed and topped. The slash can also be disposed of by windrowing and burning or by total tree utilization through chipping.

Based on research at Cloquet and on the Mille Lacs Wildlife Area, we do not expect significant response (*i.e.* increases) by the ruffed grouse population until the early 1980s—6 to 10 years after the cutting was done (Gullion, 1970). Maximum grouse densities of at least a pair per 10 acres on the affected areas will not be realized until additional logging has been done.

Ideally, cutting should be done so that four age classes are established, each to be harvested as the aspen stand reaches maturity. This provides maximum wildlife benefits and fiber yield.

But in a uniformly overmature aspen forest such as that on the Crow

Wing Project, the initial cutting rotation should be accelerated to preserve basic wildlife habitat resources. This recognizes that an accelerated cutting program will result in a less satisfactory diversity of age classes, representing some short term loss in wildlife values.

Remember, the cutting schemes reported here are to maximize the development of ruffed grouse habitat. These procedures may have to be modified to meet constraints imposed by species composition or by maturity of the forest stand, operability of the site, access, and market conditions. Under these conditions, development of less-than-optimum habitats may have to be accepted, while still producing habitat qualities much preferable to those existing before treatment.

The heavily disturbed soil at landings and on skid trails should not be considered a loss, but rather an asset (figure 6). The skid trails will usually fill in with herbaceous plants, especially clovers, strawberries, and other plants grouse and other wildlife eat. In addition, these provide hunter access.

Landings provide a permanent wildlife opening where woodcock can sing, grouse can dust, and deer can find the openings they prefer. In this cutting scheme, the same landings will be used for later logging operations; they can be maintained as permanent openings without additional attention.

This operation demonstrates that a private landowner, with an adequately stocked timber stand, can realize income from his timber resource while he is developing or restoring high-quality wildlife habitat. In most instances, not cutting Minnesota forests where aspen is a substantial component will result in the ultimate loss of both aspen and wildlife resources.

Cutting to benefit wildlife alone, without utilizing the timber, is quite expensive—varying from $20 to $50 or more an acre. Since a minimum of 1 acre in 10 must be cut to substantially affect the numbers of ruffed grouse in forested tracts having aspen, the high cost of this scale of operation is readily apparent.

Mechanized logging provides an economical means to use the timber on an operating scale which can produce maximum diversity and quality of habitat for ruffed grouse as well as most other forest wildlife species—game and nongame alike.

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