



Extension FactSheet

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Harvesting and Reproduction Methods for Ohio Forests

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Nearly eight million acres of Ohio are forested. These forests provide a variety of benefits including timber, pulpwood, and veneer products; wildlife habitat; a high-quality water supply; recreational experiences; aesthetics; and others.

The mix of benefits and products produced by a particular forest depends on the characteristics of the forest and how it has been managed. Ohio's forests are diverse. They vary in acreage, species composition, age, size structure, and past uses. Ninety-three percent of Ohio's forest land is owned by private individuals or companies, and their goals of ownership and intensity of management vary greatly. Except where strict preservation is the primary ownership objective, the periodic harvest of trees can play an important and often necessary role in accomplishing many ownership objectives.

The theory and practice of controlling the establishment, composition, growth, and quality of forest stands to achieve management objectives is termed silviculture. Various kinds of management practices are used by foresters including timber harvesting, tree planting, prescribed burning, and the use of specific chemicals such as pesticides and fertilizers. Timber harvesting is the most common practice used by land managers to manipulate existing forest stands to meet their objectives.

There are two types of treatments that involve timber harvesting. Intermediate treatments are conducted with the objective of improving the potential of the remaining stand (the residual stand) to meet ownership objectives. If, for example, objectives include the production of high-value timber products, some of the poorer, less desirable trees may be harvested to improve the stand's overall species composition and quality. If, on the other hand, wildlife habitat were an important objective, an intermediate treatment might consist of removing competing trees in the vicinity of good mast-producing trees to allow them to expand their crowns, thereby increasing the amount of mast produced.

In contrast to intermediate treatments, the primary objective of harvesting in a mature stand is to regenerate or reproduce a new forest stand. Depending on the regeneration method used, large or small openings may be created in the stand. If the stand is regenerated using one to three harvests spaced over a short period of time, the new stand will consist of one age class of trees. Such a stand is even-aged. If the stand is regenerated using a series of harvests spaced over many years, the new stand will consist of trees of many age classes. Such a stand is uneven-aged. The remainder of this article discusses regeneration methods commonly used in Ohio.

Choosing a Regeneration/Harvest Method

Selection, clearcutting, and shelterwood (occasionally) are the regeneration methods commonly used in Ohio. All three methods are not equally applicable to every forest. The appropriateness of a particular regeneration method depends on the forest ownership objectives and the characteristics of the forest, particularly its species composition, age structure, and overall quality.

It is essential that ownership objectives be identified before considering whether trees are to be harvested, and if so, by which method. Ownership objectives define the goals of management — the type of forest that will best satisfy the owner's desires. Each regeneration method produces a forest with distinctly different characteristics — different in species composition, age and size structure, appearance, etc. If, for example, grouse habitat was an important management objective, small clearcuts or large group selection openings might be needed to create required habitat. If, on the other hand, periodic income were an important ownership objective for an uneven-aged maple-beech woodland, individual-tree selection or small group selection might be the appropriate method.

to create openings and early-successional vegetation for wildlife habitat; (3) to create vistas, campsites, roads, etc.; or (4) to clear the area for tree planting or seeding.

Clearcutting is the most dramatic regeneration method. Some people object to it because temporarily unattractive areas are created. However, the initial visual impact of clearcutting is quickly reduced in Ohio. The rapid establishment and growth of vegetation, including tree seedlings and sprouts, causes the harvested site to take on the appearance of a young forest in a relatively short time. The visual impact of clearcuts can be further lessened by: (1) exercising care in their location; (2) leaving borders of uncut trees as visual buffers where appropriate, (3) planning harvest areas that conform to the natural topography; and (4) designing irregular-shaped areas in a range of sizes, up to some acceptable maximum. Some commonly cited advantages and disadvantages of clearcutting are given in Table 2.

Where necessary to accomplish ownership objectives, clearcutting is an important and valuable regeneration method. As with all harvesting, care must be exercised so that it is properly prescribed and carried out. One form of clearcutting, called commercial clearcutting, is rarely appropriate. In a commercial clearcut, all merchantable trees are cut and removed, while the rest are left standing. Such a cut normally does not create the type of full-sunlight environment desired when a clearcut is prescribed. Further, the trees remaining after a commercial clearcut do not commonly develop into a desirable forest stand. The only situation where a commercial clearcut would commonly be appropriate is where the forest land is being converted to some other land use.

Shelterwood Method

The shelterwood method also produces an even-aged stand, but in contrast to clearcutting, this method commonly consists of a series of two or more partial cuts spaced over several years (Figure 2). The major ecological objective of a shelterwood is to create a partially shaded and protected environment in the understory where young trees can become established and grow. This is particularly beneficial for species that initially do not compete well with other trees and shrubs. Once the desired reproduction is well-established, the remaining larger trees are harvested. One advantage of the shelterwood method is that it produces far less negative visual impact than a clearcut because

the harvested area always is dominated by trees, while the debris (branches, tops, etc.) generated by the harvest is less visible.

Throughout the United States, two- or three-cut shelterwoods have been used to reproduce a variety of coniferous and hardwood species. In a three-cut system, the first cut removes enough of the stand to stimulate the crowns to increase seed production and hastens the decomposition of soil surface organic matter to form a suitable seedbed. Several years later (commonly five to 20), a second cut removes approximately half of the remaining stand to create conditions suitable for the establishment and early growth of young trees. Finally, several years later when adequate regeneration has become established, the remaining trees are harvested. Some care is necessary during the final harvest to minimize damage to the young, even-aged stand that is developing.

Most shelterwoods in Ohio use a two-cut rather than a three-cut system. In a two-cut system, 40–70 percent of the stand (depending on the species) is removed; several years (perhaps five to 20) pass until adequate reproduction is achieved; and then the remaining trees are harvested.



Figure 2. A two-cut shelterwood shortly after the first cut.

Although suitable for most Ohio forest types, the shelterwood method is uncommon for several reasons. First, the short-term planning horizons and brief land tenure of many Ohio forest landowners does not lend itself to a harvesting method that extends over several years. Second, use of the shelterwood method requires a market for the relatively small amounts of lower quality trees that are removed in the first cutting — something that has not been common in Ohio. However, with increasing public concern over widespread use of clearcutting, the shelterwood method may become more common in

situations where it can successfully achieve landowner objectives. Table 2 summarizes some of the commonly cited advantages and disadvantages of the shelterwood cutting method.

Selection Method

Selection is a regeneration method in which individual trees or small groups of trees are periodically (commonly every 10–15 years) harvested based on their size, species, quality, condition, and spacing. Selection is used to create and maintain an uneven-aged stand. As noted previously, selection can only be used to convert an even-aged stand to an uneven-aged with some difficulty, economic loss, and often with a major change in species composition.

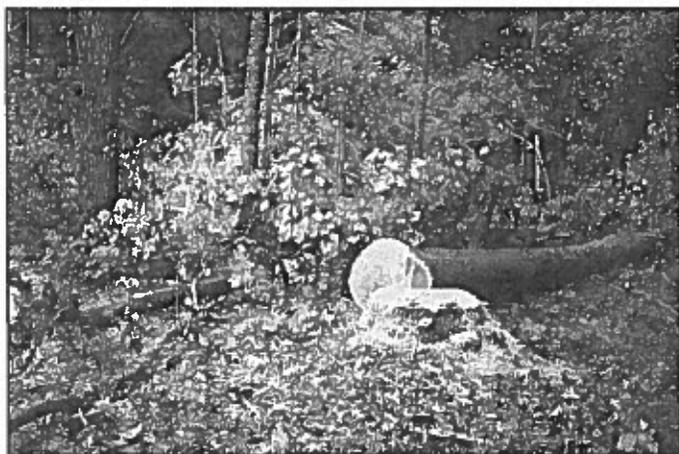


Figure 3. A single tree selection cutting.

When individual trees are selected for harvest (individual-tree selection), they are replaced either by new seedlings or by small trees already present (Figure 3). Individual-tree selection is best suited for shade-tolerant species such as sugar maple and American beech. When small groups of trees are selected for harvest at the same time (group selection), a larger opening is created (Figure 4). Depending on the size of the opening, group selection areas may favor the successful reproduction of intermediate or shade-intolerant tree species.

Aesthetically, selection has the least visual impact of any regeneration method. Periodically, a number of trees are selected for harvest approximately equal in volume to the growth of the stand since the last harvest. The openings created by the removal of individual trees or small groups are small and scattered throughout the forest. The overall integrity and appearance of the forest is only slightly modified, and after a few years much of the residue from the harvest will have decomposed.

Selection can also be economically attractive to many private woodland owners with small acreage. Most uneven-aged forests managed with selection can be economically harvested every 10–15 years. There are many advantages and some disadvantages to the selection method (Table 2).

Two important cautions must be kept in mind when using the selection method. First, extreme care must be exercised in selecting the logging company to perform the harvest. One of the strong advantages of the selection method is that a forest remains after the harvest. It is important that the harvest be carried out by a professional logger with the skills to minimize damage to the trees that remain.

The second caution involves the need to work with a professional forester to determine the need for and extent of a selection harvest. Two all-too-common and undesirable cutting practices occasionally encountered in Ohio are high-grading and diameter-limit cutting. In high-grading, all of the trees with any economic value are removed from the stand. In diameter-limit cutting, all



Figure 4. A group selection cutting.

of the trees above a certain diameter, usually specified at stump height, are cut. While both high-grading and diameter-limit cutting are often promoted as acceptable forms of "selective harvesting," both cutting methods as commonly applied ignore the sound ecological principles on which the selection method is based. Both practices will generally leave a forest composed of poor-quality, low-vigor trees with very little value or limited ability to meet most landowner objectives.

An Important Concern

Protecting the soil and water resources is an important concern during forest regeneration activities. The removal of trees typically requires the use of heavy equipment that disturbs the porous organic layer of the forest floor. The mineral soil is then exposed to the erosive forces of raindrops and surface runoff. Soil may move downslope off the area and become sediment in streams, rivers, and lakes. The implementation of best management practices (BMPs) can substantially reduce soil erosion and its negative effects. BMPs include such activities and considerations as the proper location and construction of skid trails and logging roads; preservation of forested buffer strips along streams; diversion of runoff into the forest from roads and trails; and seeding of landings, roads, and trails upon completion of the harvest. Landowners should discuss best management practices with their professional forester and with the logger who will perform the harvest. To promote discussion with the logging operator and to avoid future disagreements, the best management practices to be utilized during the harvest should be specified in the timber sale contract.

Conclusion

Forests can provide many benefits on a sustained basis, and many of these benefits can be created and enhanced by properly harvesting trees. A close working relationship between the