Penn State Extension

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Forest Stewardship

Timber Harvesting: An Essential Management Tool

Are you one of Pennsylvania's many thousands of woodland owners? Have you ever thought about managing your forest resources? If so, sooner or later you may want to sell timber from your land. Harvesting timber can bring you income; it can also have a lasting, positive impact on your forest.

Many woodland owners are reluctant to harvest timber for fear of destroying their forestland's beauty, recreational value, and wildlife habitat. But there are ways to safeguard against poor harvesting practices and the landscape disturbances often associated with logging operations. As steward of your forest resources, you can use harvesting as a management tool to improve your woodlands. You then pass them on in as good or better condition than when you found them.

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We have written this bulletin for private forest landowners who don't intend to use their forestland primarily for timber production, but who may be considering a timber sale now or in the future. The bulletin is not about conducting a timber sale (see *Pennsylvania Woodlands 5: Marketing Products from Your Woodlands*), but about the benefits of harvesting timber and its importance in woodland stewardship.

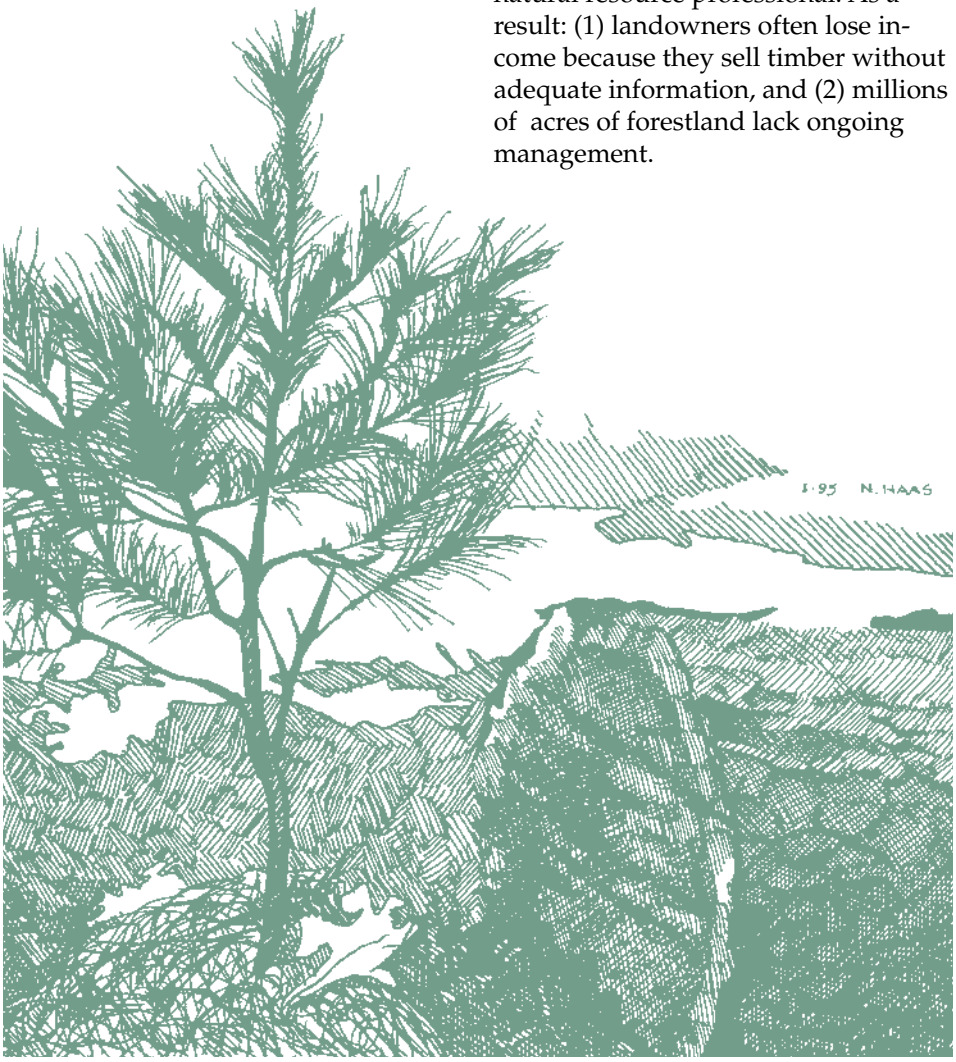
We identify poor harvesting techniques that can degrade your forestland. We also describe forestry practices that can improve your forest's value and your enjoyment of it. Throughout the bulletin we stress the importance of long-term planning.

Your decision to harvest trees from a tract of forestland may be the most consequential you will make during the forest's life. The results will have a substantial effect on you, your forestland, and the environment.

A Diverse Community of Plants and Animals

Since colonial settlement, Pennsylvania's forests have supplied the Commonwealth with the raw materials it needed to grow and develop. Our resilient forests are renewable resources that have withstood past abuses. Nonetheless, forests are living communities of plants and animals, and they will not remain productive and healthy if continually mistreated. Forest stewardship recognizes that proper harvesting techniques can sustain the vigor, productivity, and diversity of these communities.

While timber production is not a priority for most of Pennsylvania's 500,000 private "nonindustrial" forest landowners, many people sell timber at some point during their ownership. Unfortunately, fewer than 20 percent of all timber harvests in Pennsylvania involve the services of a forester or natural resource professional. As a result: (1) landowners often lose income because they sell timber without adequate information, and (2) millions of acres of forestland lack ongoing management.



The forest is a complex natural system. To use it rationally requires a broad understanding of the biological processes involved as well as an appreciation for the economic, social, and personal pressures that influence woodlot management decisions. By practicing sound forest management, you can reap great benefits from your forests: clean water, forest products, wildlife, aesthetic enjoyment, and a sense of stewardship.

Timber Harvesting: Tool of Many Uses

For there is hope of a tree, if it be cut down, that it will sprout again and that the tender branch there of will not cease.
—Job 14:7

While a decision to harvest may be motivated more by finances than a sense of forest stewardship, no inherent conflict exists between realizing income from your woodlot and practicing forest stewardship. Indeed, the income you get from selling timber will often pay for a number of other woodland management activities. Timber harvesting is just one of many management practices—not an end in itself, but part of an integrated, long-term management plan.

A forest is more than a collection of trees. It is a dynamic ecosystem, defined by the interactions of living organisms with their environment. To manage a forest, we need to understand a little about forest ecology, the study of life in the forest—how the forest grows and how it interacts with its surroundings.

Undisturbed by human activity, a forest changes; like all living systems it cannot remain static. Natural disturbances such as windstorms, fire, insects, and diseases interrupt natural *succession* and affect forest structure and composition. Timber harvesting is an artificial disturbance that also affects the ecosystem.

Like any other science, forestry has a technical jargon. The art and science of tending a *stand* of trees based on ecological principles is called *silviculture*. Silviculture's goal is to establish forests while controlling stand structure.

Foresters influence growth of individual trees and the overall stand by manipulating *stand structure*.

SELECTED TIMBER MANAGEMENT TERMINOLOGY

- **Clearcut**—a regeneration technique that removes all the trees, regardless of size, on an area in one operation. Clear-cutting is most often used with species like aspen or black cherry, which require full sunlight to reproduce and grow well, or to create specific habitat for certain wildlife species. Clearcutting produces an even-aged forest stand.
- **Diameter-limit cut**—a timber harvesting treatment in which all trees over a specified diameter may be cut. Diameter-limit cuts often result in high-grading.
- **Even-aged stand**—a group of trees that do not differ in age by more than 10 to 20 years or by 20 percent of the rotation age.
- **High-grading**—a type of timber harvesting in which larger trees of commercially valuable species are removed with little regard for the quality, quantity, or distribution of trees and regeneration left on the site.
- **Intermediate treatment**—(improvement cut) a collective term applied to forest cutting treatments in even-aged stands between regeneration harvests; includes thinnings and TSI.
- **Regeneration**—the replacement of one forest stand by another as a result of natural seeding, sprouting, planting, or other methods; also young trees that will develop into the future forest.
- **Regeneration method**—a timber harvest designed to promote and enhance natural establishment of trees. Even-aged stands are perpetuated by three regeneration methods: seed tree, shelterwood, and clearcutting. Uneven-aged stands are perpetuated by selecting individual or small groups of trees for removal (e.g., the selection system).
- **Release**—removal of overtopping trees to allow understory or overtopped trees to grow in response to increased light.
- **Residual stand**—trees remaining following any cutting operation.
- **Salvage cut**—the removal of dead, damaged, or diseased trees with the intent of recovering maximum value prior to deterioration.
- **Sawlog**—a log large enough to yield lumber. Usually the small end of a sawlog must be at least 6 to 8 inches in diameter for softwoods and 10 to 12 inches for hardwoods.
- **Seed tree method**—a regeneration technique where mature trees are left standing in a harvested area to provide seed for regeneration of the cut-over site.
- **Selection method**—a regeneration technique designed to create and perpetuate an uneven-aged forest. Trees may be removed singly or in small groups. A well-designed selection cut removes trees of lesser quality and trees in all diameter classes along with merchantable and mature high-quality sawlog trees. Should be differentiated from “select” or “selective” cuts, which often equate to high-grading.
- **Silviculture**—the art, science, and practice of establishing, tending, and reproducing forest stands.
- **Silvicultural treatment**—altering the existing composition and structure of a stand to achieve a given management objective, such as thinning a timber stand.
- **Site**—the combination of biotic, climatic, topographic, and soil conditions of an area; the environment at a location.
- **Site quality**—the inherent productive capacity of a specific location (site) in the forest affected by available growth factors (light, heat, water, nutrients, anchorage); often expressed as tree height at a base age.
- **Stand**—a grouping of vegetation sufficiently uniform in species composition, age, and condition to be distinguished from surrounding vegetation types and managed as a single unit.
- **Stand structure**—the vertical and horizontal arrangement of plant communities in a stand; usually refers to the relative position, size, and age of trees and other plants.
- **Stumpage**—the commercial value of standing trees.
- **Succession**—the natural series of replacements of one plant community (and the associated fauna) by another over time and in the absence of disturbance.
- **Sustained yield**—historically, a timber management concept in which the volume of wood removed is equal to growth within the total forest. The concept is applicable to non-timber forest values as well.
- **Thinning**—removal of trees to encourage growth of other selected individual trees. May be commercial or pre-commercial.
- **Timber stand improvement (TSI)**—a combination of intermediate treatments designed to improve growth and composition of the forest.
- **Understory**—the smaller vegetation (shrubs, seedlings, saplings, small trees) within a forest stand, occupying the vertical zone between the overstory and the herbaceous plants of the forest floor.
- **Uneven-aged stand**—a group of trees of a variety of ages and sizes growing together on a site.

CASE STUDY: HARVESTING TIMBER TO IMPROVE WILDLIFE HABITAT

Jean and Marshall Brooks live in the Philadelphia suburbs but own 83 acres of woodland in Sullivan County. While the Brookses aren't opposed to timber harvesting, they don't view their forest primarily as a source of timber. More than anything else, they enjoy the wildlife they see when they come up on summer weekends.

Marshall recognized that he had some good timber, but he was more interested in opening the area around the house and clearing the underbrush for a better view of the woods. On advice from a neighbor, he contacted a forester to help plan a timber sale. Instead of a large partial cut, their forester suggested a series of small patch cuts. Hollow den trees and nut-bearing trees like oak were left for black bears and small mammals. Grapevines were left along the jagged edge of the cut, and log-loading areas were seeded to grasses and legumes to attract turkeys, ruffed grouse, fox, deer, and rabbits.

These were some of the techniques used, and the Brookses noticed a surge in the number and species of animals they saw shortly after the cutting. The money from the timber sale covered part of their taxes and paid for the trees and shrubs they planted for wildlife. The Brookses are now considering further treatments to encourage wildlife.

For more information on incorporating wildlife considerations into your logging operation, refer to the Pennsylvania Game Commission publication *Timber Sales and Wildlife* or the Penn State Extension booklet *Woodlands and Wildlife*. For information on obtaining both publications, contact your county office of Penn State Extension, Game Commission, or Bureau of Forestry.

They use their understanding of the way a forest develops to apply *silvicultural* treatments, such as harvesting or *thinning*, at different stages in a forest's life. These treatments mimic changes that occur naturally.

For example, *clearcutting* large areas may mimic the effect of a wildfire by creating a large opening and allowing trees whose seeds are carried easily by the wind and/or sun-loving trees like aspen or pin-cherry to colonize the site. On the other hand, harvesting by selecting individual trees mimics the natural process whereby small openings are created when individual trees die. This process maintains a continuous forest cover and may favor shade-tolerant species, like sugar maple or beech, that persist in the shaded understory.

Silvicultural treatments like thinning are not used just for timber management. They can also be practiced to achieve a wide variety of management objectives. Whether you harvest a large area for forest products or cut a few cords of firewood to heat your home, you affect wildlife and its habitat. Proper planning during a timber harvest can benefit wildlife.

Silvicultural treatments to regulate light and moisture for timber production can also be used to manipulate vegetation and create openings, increase edge (the boundary between open land and woodland), and improve browse for wildlife. As a landowner, you should be aware that any decision to harvest, whether a partial cut or a clearcut, can incorporate special considerations for wildlife into the operation. Although timber harvesting is an essential tool for achieving many objectives, it may be incompatible with specific goals, such as protecting natural areas or preserving habitats for rare or endangered species.

Conducting a commercial timber harvest may be one way to develop a network of woods roads that will provide long-term access to your woodlot while meeting other forest management objectives. Sometimes income from the timber sale may be reduced in exchange for little or no out-of-pocket roadbuilding expenses. Roads can provide access for silvicultural treatments, as well as trails for hiking, horseback riding, or cross-country skiing. The same roads can serve as nature trails or as travel lanes for observing songbirds and other wildlife. Where the fire hazard is high, roads act as firebreaks and provide access for fire-fighting equipment.

In what other ways is timber harvesting an essential tool for you, the woodland steward? Harvesting to *salvage* dead or dying trees can reduce fire risk and contain outbreaks of insects and disease. Removing high-risk or infected trees can maintain forest health and vigor, thereby reducing the stand's susceptibility to outbreaks. Selected dead trees or snags may be left as den trees for cavity-nesting species or as perches for raptors and other birds. (Please remember, timber harvesting poses a risk of injury to the logging crew. Dead trees compound the risk. Make sure your requirements are in concert with safe logging practices.)

Any timber harvest disturbs the natural ecosystem. But proven cost-effective practices are known to lessen the negative impacts during and immediately after logging. For example, reseeding the log landing (where logs are prepared for hauling) after harvesting is a simple, relatively inexpensive way to improve the appearance of the harvested site while benefiting wildlife and reducing erosion.

Creating small openings in dense forest can provide habitat for different wildlife species and may create a vista for you and your family to enjoy. In some cases, thinning a stand can improve recreational access as well as stand appearance.

Before conducting a timber harvest, discuss your concerns with your forester and incorporate into your stewardship plan those practices that best meet your objectives. For more information on protecting the visual value of your woodlot, see *A Guide to Logging Aesthetics: Practical Tips for Loggers, Foresters, and Landowners.*

DIAMETER-LIMIT CUTTING VS. EVEN-AGED FOREST MANAGEMENT

A recent study of a 40-year-old stand of upland, mixed oak-hickory type in southern Missouri (Dwyer and Kurtz 1991) points out the potential loss of income from diameter-limit cutting. The study compared two stands: one an unmanaged stand that was cut using diameter limit and one a stand managed over time using a series of thinnings before its final harvest with a *seed tree cut*. The current cash flow generated by an 11-inch diameter-limit harvest was $115.23 per acre, while thinning returned only $78.06 per acre. This was a difference of $37.17 per acre—an attractive proposition if you're only looking at the short-term gain (see table below).

However, if all the standing timber in both stands is harvested 23 years later, a significant difference in values comes to light. The present value of the diameter-limit cut stand in real dollars adjusted for inflation is $378.23 per acre. On the other hand, the properly managed stand, where two thinnings were made prior to the final harvest, is valued at $579.05 per acre, a difference of more than $200.00 per acre. This difference represents the premium in large, high-quality timber from sound forest management and the equity lost through high-grading.

VOLUMES AND REVENUES ASSOCIATED WITH ALTERNATIVE REGIMES

STAND AGE (YR)	SAW-TIMBER (BF)	PRICE ($/MBF)	CORD-WOOD (CD)	PRICE ($/CD)	TOTAL VALUE ($/ACRE)	PRESENT VALUE ($/ACRE)
Diameter-limit cutting regime						
40	1,152	94.82	1.0	6.00	115.23	115.23
63	7,019	75.70	17.0	6.00	633.34	263.00
Managed stand regime						
40	443	94.82	6.0	6.00	78.06	78.06
50	1,322	81.42	3.0	6.00	125.64	84.08
60	2,813	122.47	3.0	6.00	362.51	165.45
63	3,303	181.55	3.0	6.00	617.66	250.66
TOTAL						579.05

Note: bf = board feet, MBF = thousand board feet, CD = cord

Source: J. P. Dwyer and W. B. Kurtz, "The Realities of Sustainable Management vs. Diameter Limit Harvest," *Northern Journal of Applied Forestry* 8 (1991).

Although this study was conducted in Missouri, the underlying principles apply anywhere. The study makes clear that diameter-limit cutting is a universal practice that takes place wherever timber is harvested, *but it is not a substitute for good forestry*.

Diameter-based Cutting: A Matter of Concern

As Pennsylvania's hardwood forests approach maturity, the growing demand for high-quality hardwoods has driven *stumpage*—the commercial value of standing timber—to an all-time high. Higher timber prices have prompted many landowners, even those who previously had little or no interest in selling timber, to consider a logging operation.

Unfortunately, many landowners underestimate the complexities of timber harvesting and often are unprepared for a long-term commitment to forest management. To maximize profits, landowners often sidestep the assistance of a professional forester and sell their "biggest and best" trees rather than investing in sound forest management. The sad result is often a lower price for the timber and a reduction in their forestland's value.

WHAT IS DIAMETER-BASED CUTTING?

Diameter-based cutting, or some variation of it, is the most widely used harvest method in Pennsylvania. Diameter-based harvest treatments can incorporate good forestry, but they seldom do. In fact, these practices can degrade the forest and subsequently reduce its future value for timber and other benefits. There is concern that, because of its prevalence, diameter-based cutting may be contributing to a broad-scale decline in forest resource quality.

In a strict diameter-based cutting, called *diameter limit*, trees to be harvested are selected solely on the basis of diameter at stump or breast height—without regard for other values. All merchantable or commercial trees above the limit are cut, while those below the limit are left as the remaining or *residual stand*. Without any other controls, a diameter-based harvest may eliminate trees with superior genetic potential and disregard nontimber values, such as seed source or *mast* (tree-borne nuts and berries) for wildlife.

Many forest landowners inadvertently use a diameter-based harvest because they believe selective logging or some form of partial cutting is the least disruptive way to harvest timber. In reality, such "selective" cutting often does far more harm than a properly prescribed and implemented clearcut.

Most of Pennsylvania's current forests are the same age or *even-aged*, resulting from extensive turn-of-the-century logging (see Figure 1). Yet even in a fairly uniform stand (composed of only a few species) there is some variation in tree diameter size. Some trees develop larger crowns and increase in diameter more quickly. Others are crowded or overtopped by dominant trees; their crowns are smaller and their diameter growth slower.

The bell curve in Figure 2 illustrates the distribution of trees by diameter that would be found in an even-aged stand composed of only one species. Note that variations in diameter among individual trees in a homogenous even-aged stand are due to variations in sunlight, water, and growing space available to each individual, as well as to genetic differences among individuals.

Many even-aged stands are more complex than the stand represented in Figure 2 and contain a wide range of species with varying growth rates. Figure 3 is more representative of the

distribution in a stand composed of several species. Within each species a range of size classes will exist, and the distribution of each species will approximate a bell curve. But the average diameter of more slowly growing species, such as sugar maple or beech, will be smaller than that of faster-growing species, such as red or black oak.

The average diameter of short-lived, fast-growing species like black cherry would be even larger than that of the oaks. As Figure 3 shows, the stand would contain many slow-growing individuals with a small average diameter, and a smaller number of fast-growing individuals with a larger average diameter. The variation in size classes among the trees may lead the casual observer to conclude that the stand is *uneven-aged*. Remember that the reverse is true—the trees in this stand are all of the same age. Variations in size classes are more a result of differences in growth rates among species than differences in age.

What is known as an uneven-aged stand may look like a complex even-aged stand. An uneven-aged stand contains a wide range of diameter classes, from seedlings to mature trees, at all times. Theoretically, all ages of each species are present in the stand. While this stand may resemble a more complex even-aged stand, it differs in that variation among diameter classes reflects varying ages as well as varying growth rates among species. The distribution of trees by diameter class for each species in the stand would appear different from that of the even-aged stand. For each species present, the graph of the distribution would be similar to that shown in Figure 4: an "inverse J-shaped curve," indicating a large number of very young seedlings and saplings and a small number of the largest mature trees.

The distribution curve for the entire stand would look like that for the individual species, with many young trees and fewer mature trees all present in the same stand. This curve resembles the curve in Figure 3; the difference is in the stand composition. Keeping the stand composed of a representative number of trees in each age class and species is a complex process that is in reality difficult to accomplish. Maintaining different ages within the stand

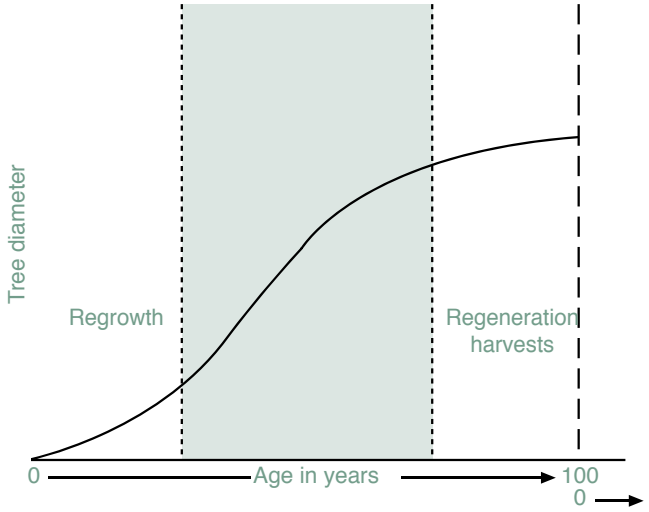


Figure 1. Stand development under even-aged management.

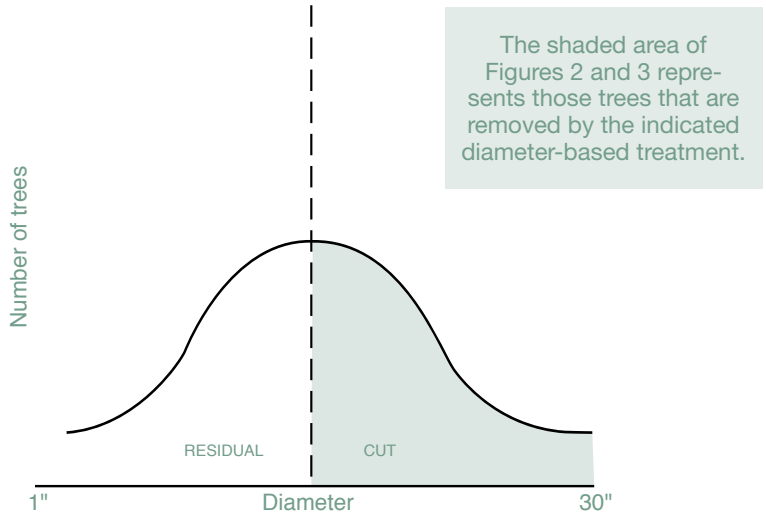


Figure 2. Normal distribution typical of a "single" species even-aged stand (such as a pine plantation).

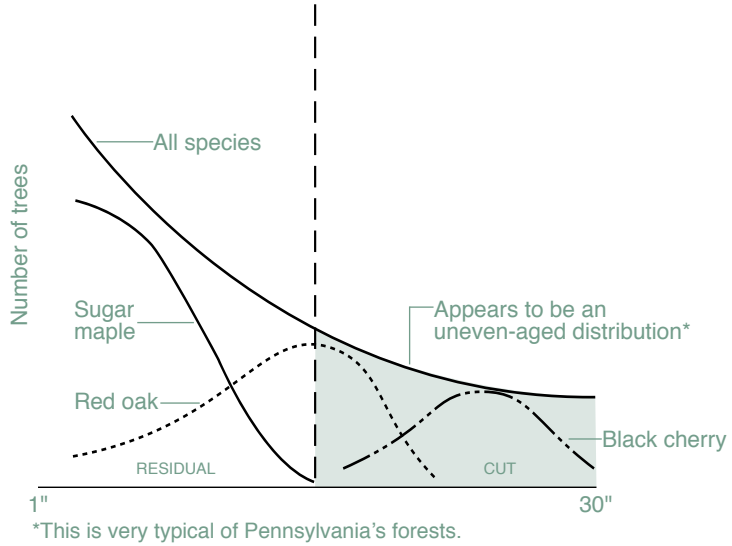


Figure 3. Even-aged multispecies stand.

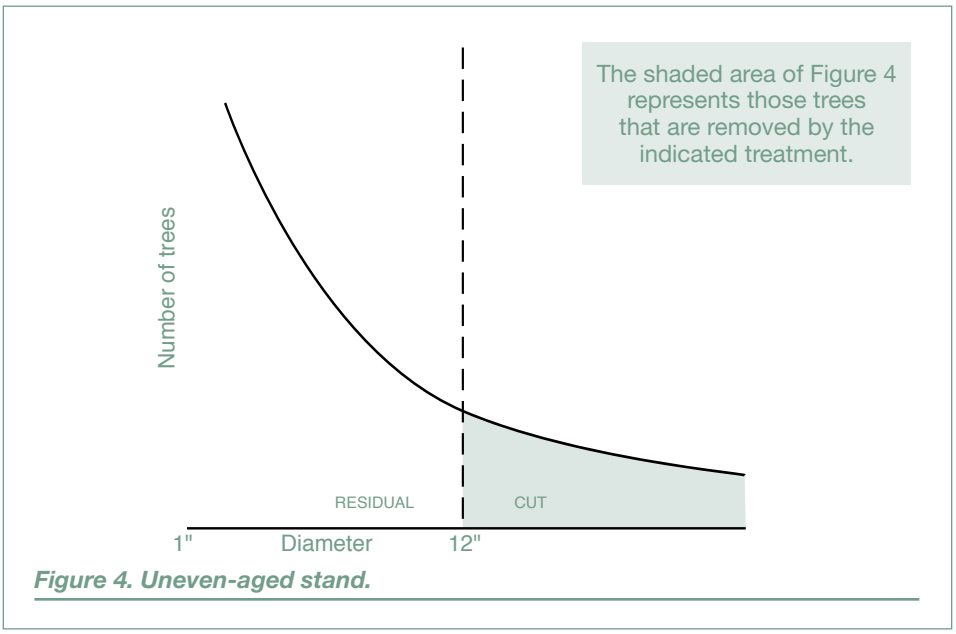


Figure 4. Uneven-aged stand.

is done most simply by making small clearcuts or "patch" cuts throughout the stand every 15 to 20 years.

Now let's look at what happens to each stand in a diameter-limit cut. In the single species, even-aged stand, those removed would be within the shaded area in Figure 2. These are trees of a set diameter and larger—in other words, the biggest and often genetically superior of the stand. The long-term detrimental effect is severe when only less competitive individuals are left in the stand. While the remaining trees will benefit from the increased resources, they are inferior to those removed and will not perform as well.

In the more complex even-aged stand shown in Figure 3, the diameter-limit cut could change the stand's species composition. As illustrated by the shaded area, the larger trees are those of faster-growing species. They are removed from the stand rather than carried through to maturity. The result is a stand poorer in species diversity than the original stand. The seed source for the next generation of some species may be lost as well, so that if seed from another source is not introduced, future stands on the site will also lack diversity. Often no consideration is given to removing poorer quality trees of other species in the stand; only the largest trees are removed.

Even in an uneven-aged stand where the size of trees actually does correlate with the age of the trees, a diameter-limit cut can negatively affect stand structure. When younger age classes are not thinned, competition can reduce growth and delay development in the residual stand. In addition, the removal of all large trees extends the time to the next commercial harvest. Forest science simply does not support a strict diameter-based treatment in either even- or uneven-aged stands.

ARE DIAMETER-BASED HARVESTS EVER RECOMMENDED?

There are legitimate uses for diameter-based harvests. Diameter-limit cutting is a simple, low-cost means of conducting a timber sale and requires little or no supervision—hence its universal appeal. Although a strict diameter-limit cut is seldom justified, a modified diameter-based cutting with silvicultural "standards" is an intermediate treatment that does have its place.

In a fairly uniform, low-grade stand with a high proportion of decayed or defective trees in the larger diameter ranges, a modified diameter-based cut can be prescribed to regulate stand structure and species composition. By removing the larger, low-grade material, you can convert a previously unmanaged, overmature stand to a productive, thrifty one.

Diameter-based cutting without standards is usually driven by faulty economic premises. Possibly the biggest misconception is that a diameter-based harvest will make the most money. It may generate the highest immediate cash flow, but it does not take other costs, such as potential environmental degradation and future timber values, into consideration.

Selective Cutting vs. the Selection Method

A pervasive form of selective cutting is *high-grading*—a term used to describe any harvesting method that removes only the most valuable timber. Diameter-based cutting and selective cutting are two common forms of high-grading. Diameter-limit cutting removes trees over a certain minimum size; selective cutting arbitrarily selects the higher-value, fastest-growing individuals or species. Selective cutting is a vaguely defined term that has little meaning. It is often used to mask highgrading.

The Society of American Foresters defines selective cutting as "a type of exploitation cutting that removes only certain species (a) above a certain size (b) of high value. Known silvicultural requirements and/or *sustained yields* [are] being wholly or largely ignored or found impossible to fulfill" (from *Terminology of Forest Science, Technology, Practice and Products*).

This misleading term—selective cutting—refers to a practice that has no basis in scientific forestry. There is no indication of how and why the trees are selected or what the objective of the cutting is. Inappropriate use of terms like selective cutting leads to misunderstandings that impede the practice of forestry.

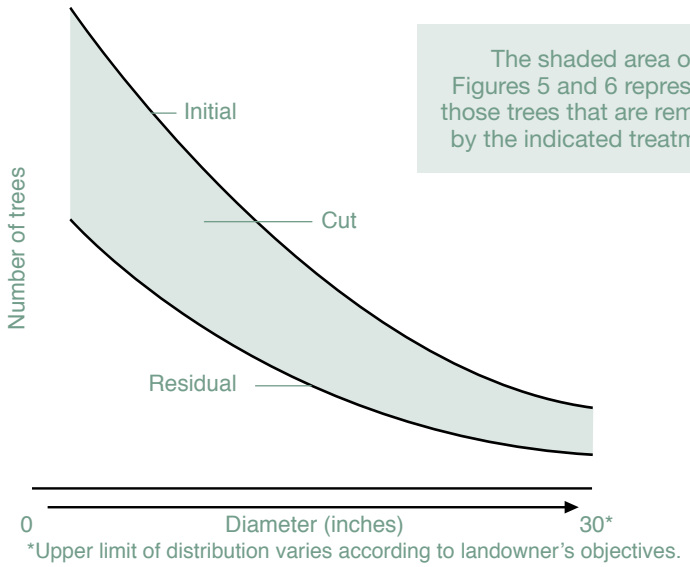


Figure 5. Harvesting an uneven-aged stand using a selection method.

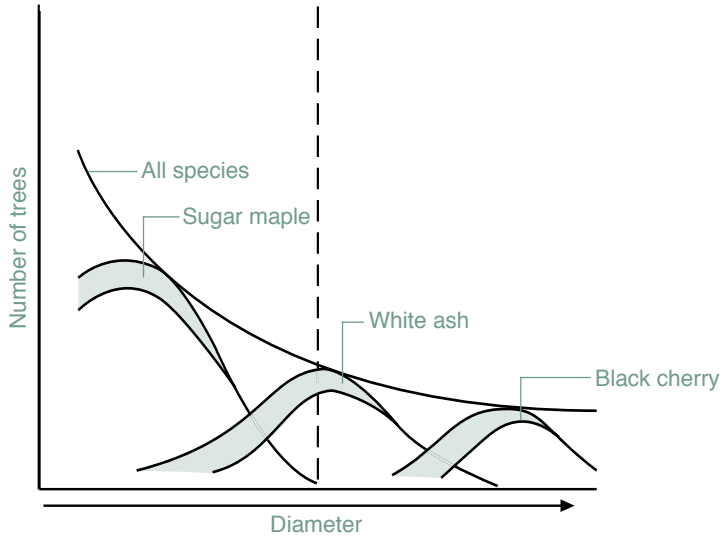


Figure 6. Thinning in even-aged multispecies stand.

Conversely, careful forest management under the guidance of a competent professional can yield a profit while improving forestlands through the application of appropriate silvicultural practices and harvesting. Sound forestry practices are designed to control stand density and species composition, to allocate site resources, and to encourage selected trees, known as "crop trees," to regenerate and grow.

Selective harvesting, however, should not be confused with the term *selection method*. Selection is a *regeneration method* designed to create or perpetuate an uneven-aged forest. Trees may be removed singly or in small groups. A selection cut removes trees from all diameter classes, leaving the stand with a variety of sizes. The intent of the cut shown in Figure 5 is to improve the residual stand, encourage regeneration in the gaps created, and, most important, retain trees in all size classes, especially some larger trees.

Figure 6 shows a preferred thinning for an even-aged multispecies stand. This cut tends to remove the slower-growing trees in each species. The effect is to increase the average tree size, retain trees that grow better, and reduce the time until the next harvest. In contrast to a diameter-limit cut, thinning improves the stand and retains species diversity.

High-grading removes so many trees of a merchantable diameter that it simplifies stand structure. Without consideration for the distribution and composition of the residual stand, the remaining trees, which are usually of lesser quality and value, are thus unable to efficiently use the nutrient and light resources made available by the harvest. Unfortunately, high-grading rather than the selection method is often standard procedure on private woodlands. In the long run, it's a no-win situation—the forest's long-term value is compromised and its quality is progressively degraded.

DECIDING WHICH TREES TO CUT AND WHICH ONES TO LEAVE

In any timber sale, some large trees should be allowed to remain in the stand because:

- they may still be increasing in diameter at an acceptable rate
- they provide a seed source for regeneration, and mast for wildlife
- they act as a "nurse" crop by providing protection for shade-loving seedlings
- they give the stand aesthetic appeal and structural diversity

Conversely, some smaller-diameter trees often should be removed for equally valid reasons:

- they have been suppressed so long, they may not respond to release
- they are poor-quality trees that interfere with the growth of desirable species
- they may be undesirable species and have little timber value in the future stand
- they may suffer from surrounding soil compaction or their stem may be damaged during harvesting

Trees may also suffer from "thinning-shock," a stress that may lead to mortality or dieback of branches in the crown.

Furthermore, carefully removing a portion of the "4d" trees—

- defective
- dead
- diseased
- dying

—can bring additional profit without adversely affecting stand biodiversity and productivity.

How Poor Cutting Practices Affect the Stand

The extent of damage caused by high-grading varies according to:

- original age, size, species composition (structure)
- types of limits set
- *site quality*
- intensity or type of harvest
- species remove
- past cutting practices

High-grading often produces a residual stand that contains low-value, undesirable species, trees of poor form, and little, if any, advanced regeneration of desirable species. Without *timber stand improvement*, repeated high-grading diminishes the proportion of healthy growing stock and reduces the stand's capacity to produce sawtimber and provide suitable wildlife habitat.

With high-grading methods there are no long-term management goals. High-grading is just a blanket treatment that does not consider site or stand variation, residual stand composition, biological diversity, and regeneration.

Defining Your Objectives

Most woodlot owners have no written management plan; they don't see how a plan can add to their profits or the enjoyment of their forestlands. Some landowners are reluctant to interfere with nature and think the best management is to let the forest grow unattended. Others are uncertain what is involved or how much it will cost.

Ironically, many landowners are indifferent until they've had a negative experience with a timber harvest. But as a forest steward, you need to define your ownership objectives and develop a long-term management plan before you decide to log your woodlot. In the sections that follow, we encourage you to consult a forester or other natural resource professional to develop a management plan for your woodlot.

The Forest Stewardship Plan

Do you really need a plan to manage your woodlot or harvest your timber? Yes. A forest stewardship plan allows you to define and organize your land-use objectives so you get the most from your woodlands. Technical assistance and cost-sharing is available through the Pennsylvania Forest Stewardship Program.

Details about the Forest Stewardship Program and the Stewardship Incentive Program's (SIP) cost-sharing activities are presented in F*orest Stewardship 1*: *Pennsylvania Forest Stewardship: Our Link to the Past, Our Legacy for the Future*. How to develop a stewardship plan is outlined in *Forest Stewardship 6*: *Forest Stewardship—Planning Your Forest's Future*. Both publications are available from your county extension or Bureau of Forestry office.

Even if you don't plan to harvest timber, working with a stewardship resource professional to prepare a plan will provide an overview of all your forest resources—not just timber—and give you specific recommendations for achieving your goals.

The Bureau of Forestry compiles a list of forest stewardship resource professionals who have completed stewardship training and are authorized to write forest stewardship plans. For a current listing of these professionals, contact your local Bureau of Forestry office.

CASE STUDY: HIGH-GRADING

Bill and Sarah Wolcott, recently retired, decided to build a second home on the 800-acre woodlot they inherited in northwestern Pennsylvania. They wanted to develop a portion of the property for real estate and expected that income from a timber sale would offset some of the development costs. They hoped to use the logging roads to "rough in" more permanent gravel roads for building sites. Based on this plan, they contacted a local forester to help them find their boundaries and assess the value of their timberland.

As it turns out, more than half the woodlot was heavily cutover 25 years ago. The impacts of a diameter-limit harvest on forest structure and species composition had persisted for decades. The cutover land had grown back, but the stands had developed into an open forest with fern and grass occupying the understory space.

The large deer herd in the area had eliminated most of the *regeneration* in the understory. Most of the overstory was made up of defective beech or sugar maple and multiple-stemmed red maple (originating from stump sprouts) and scattered pine—so badly deformed by white-pine weevil that it had little or no commercial value. Throughout the area, there were dense patches of timber, probably trees too small to have been cut 25 years ago, alternating with brushfields.

Although the landowner still had a valuable resource, the woodlot offered little income potential for the immediate future. In the end, the forester recommended a thorough inventory of the entire parcel and developed a plan for a stepwise rehabilitation of the degraded stands through timber stand improvement and fencing, and herbicide treatments to exclude deer and control competing vegetation. In some places, a thinning was prescribed; in others, there was nothing to do but start over with a series of patch cuts.

If the original treatment had incorporated a sense of stewardship and sound forest management, the Wolcotts would have been able to use their timber asset to meet current objectives.

When You Harvest Timber, It Pays to Hire a Forester

In a timber sale, the "sale item," trees, are more than a market commodity—they form the major component of a vital forest ecosystem. Disruptions from careless logging practices have environmental impacts that go beyond one landowner's boundaries. A poorly planned and executed timber sale can cost money and peace of mind.

As part of normal operating procedures, a timber harvest supervised by a qualified natural resource professional includes erosion and sedimentation controls and safeguards to protect residual timber. A performance bond usually is posted to ensure that the logging operation meets the landowner's expectations of appearance and that roads and skid trails are left in a stable condition in order to minimize impacts on water resources and aquatic life.

From a purely financial perspective, it pays to have a forester prepare a comprehensive management plan and, if a harvest is scheduled, to oversee the sale of timber. Most loggers are skilled professionals who do a careful job of extracting timber, but they may not maximize the return on your timber.

A recent study of mixed hardwood forests in the Midwest confirms these facts. The study showed that the average forester-assisted competitive bid sale yielded more than twice the actual sale revenue of the comparable nonassisted or "*logger's choice*" sale. In addition, the merchantable volume in the residual stand was twice as great for the forester-assisted sales. Furthermore, the projected value of residual stand volume (adjusted for inflation) for 20 years was 1.5 times greater than for the nonassisted sales.

Woodland owners who do not work with a forester risk receiving a lower income from the current timber sale. They also risk a reduced return from lower-quality growing stock on future sales and a longer period between harvests.

For a more complete guide to forestry services and how to work with a consulting forester, refer to *Pennsylvania Woodlands 11*: *Managing Your Woodlot with the Help of a Consulting Forester*. This bulletin is available from your county extension office.

Working Together: The Keystone of Forest Stewardship

Communication is necessary for a successful timber harvest. The symbol below* depicts the three "legs" of any timber harvest: the landowner, logger, and natural resource professional. One of forest stewardship's challenges is to improve interactions among these players. If there is understanding and open communication among all three, the harvest will reward everyone involved; if not, the triangle will collapse.

As a forest landowner, what can you do? First, you serve your own best interest by understanding your forest resources and the options for managing them. Work with a capable forest stewardship resource professional to help you interpret your objectives; adopt a written forest stewardship plan to carry them out. If you decide to harvest timber, a working stewardship plan can be the framework for harvesting.

Using a forester does not guarantee an environmentally sound timber sale, nor does it mean you will always maximize your profits or that you'll be happy with the results. But being well informed and working together is a giant step in the right direction.

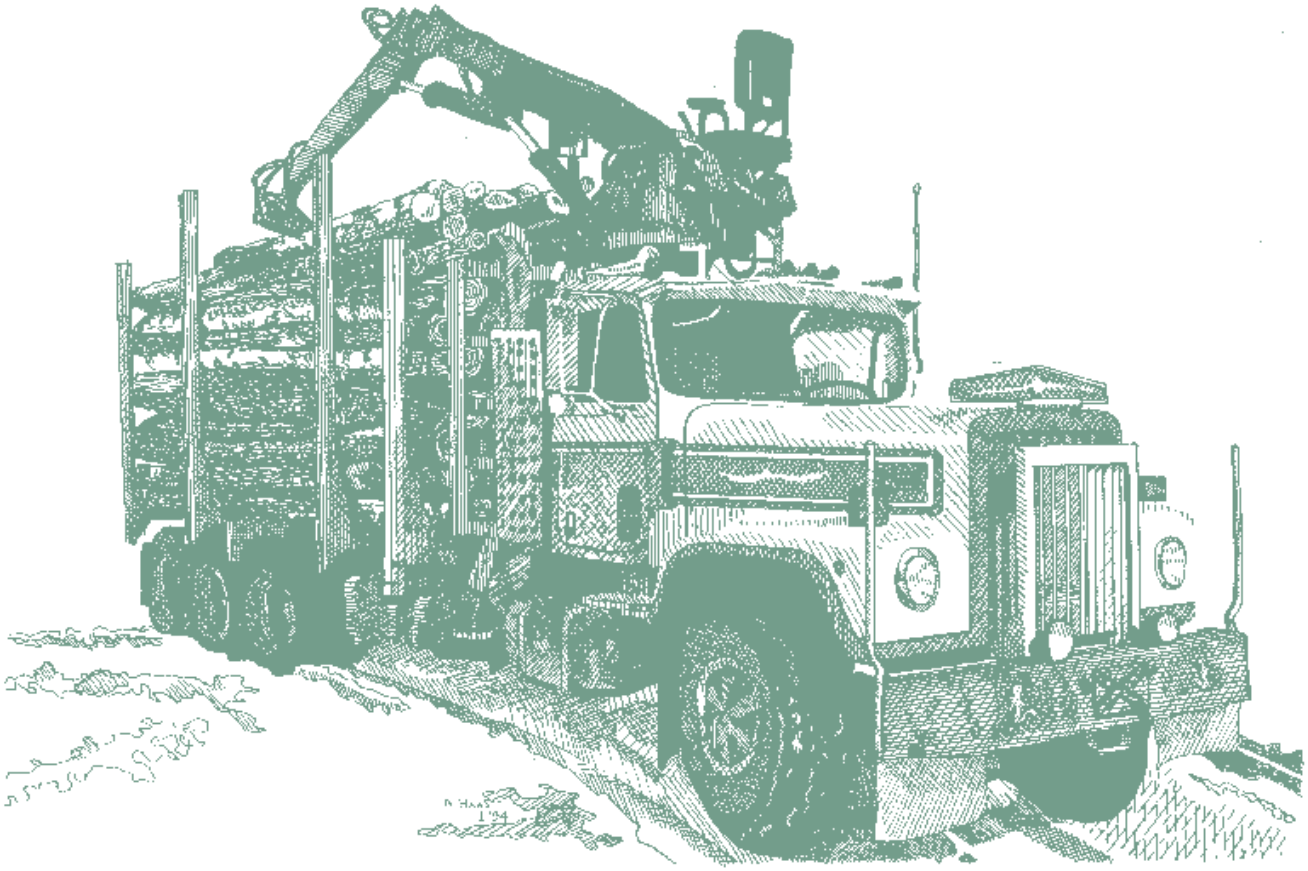
**American Forests*, March 1986.

Caretaking a Renewable Natural Resource

Although twice as much timber is growing in Pennsylvania's forests as is being harvested, mounting demands on a productive but limited resource means we need to manage our forests more intensively to meet future needs. We must balance our growing demand for timber and fiber with the realization that our forest resources have other benefits and values.

Throughout this bulletin, we've identified the benefits of timber harvesting as a tool of forest stewardship. Plan your timber sale carefully—the long-term impacts of poor logging practices, such as repeated high-grading, threaten a rude awakening to the vision of sustainable forest management.

As forest stewards, we are temporary caretakers of a renewable natural resource. We have a choice—to repeat past errors at the expense of our woodlands' productivity or work together to sustain our forest resources into the future. Pennsylvania's forests are our true *common wealth*. With proper management and care, they will thrive well into the twenty-first century.



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Pennsylvania DCNR Forestry