

HARVESTING YOUR TIMBER?

FACTORS TO CONSIDER
TO ENSURE A
PROFITABLE AND HEALTHY
FOREST



Virginia Cooperative Extension
Knowledge for the Commonwealth



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INTRODUCTION

You own forest land and you are considering a timber harvest. Whether you own 20 acres of hardwood forest on a cattle farm in Bath County or 500 acres of loblolly-pine forest in Southampton County, there are some things you may want to consider before selling timber. Selling your timber and watching it be harvested, like building a house, can be exciting and rewarding. Unfortunately, improperly done, it can turn into a nightmare. In this bulletin you will learn some useful tips about timber harvesting and the future of your forest.



Private forest in Appomattox County.

The process of growing high-quality, valuable timber, while caring for the ecological processes that make our forests unique, is called sustainable forestry. It is concerned with the future as well as the present, and often, harvesting timber is an important tool toward achieving the lofty goal of sustainable forestry. Let's learn more so you can be sure your timber harvest experience will be a positive one.

WHY HARVEST TIMBER?

There are many reasons why landowners decide to harvest their timber. Certainly you may have your own. Sometimes landowners are approached by foresters or loggers looking for timber to supply to local mills. If you own high-quality timber, chances are that you may be approached by a timber buyer. Timber buyers use aerial photographs, local referrals, and a network of contacts to locate promising tracts of timber. Perhaps you have decided to sell your timber for income, to provide a nest egg for retirement, pay off a

college education for your children, add a new room onto the house, or a myriad of other economic reasons. Whatever the reason, selling your timber should generate some income for you, and will certainly cause changes in your forest that you will see for the rest of your life. A favorite professor of mine used to say, "Doctors bury their mistakes, dentists pull theirs, while foresters and forest owners must look at theirs for the rest of their lives!" Let's be sure you don't make any mistakes that you will regret later.

TYPES OF HARVESTS

Just as there are many different reasons for harvesting, there are many different types of harvests. Some harvests are focused solely on making the most money from the forest; they are strictly commercial harvests - that is, they focus on maximizing economic return and may neglect other important aspects of sustainable forestry such as forest regeneration, future growth and development of remaining trees, ensuring water quality, etc. If a commercial harvest like this is your interest, and you don't care about the future forest, please read more. Often we see commercial harvests associated with real estate sales, where the forest will be heavily cut and then the land subdivided into building lots and sold for development. This essentially changes the forest forever, converting it to a different land use.

There is another category of timber harvests known as silvicultural harvests. Don't think that these are not commercial harvests in the sense that they don't yield income to the forest owner. On the contrary, they also provide a financial return. However, they are designed harvests that are prescribed based on the current condition of the forest, the species present, and the need for regeneration. Silvicultural harvests are usually prescribed by professional foresters who have carefully examined a forest and who understand the forest's particular needs, as well as the owner's objectives for the land. Indeed, proper forest management, of which timber harvesting is just a part, involves a careful blending of management practices with the biology and ecology of the forest and the owner's objectives and interests. If your primary management interest is producing high-quality sawlogs for sale, the silvicultural prescription for your forest might be different than if your primary objective is enhancing habitat for deer, turkeys, and songbirds.



COMMERCIAL HARVESTS

Commercial harvests are referred to in many ways. They are sometimes called “selective harvests,” “select cuts,” or perhaps “selection harvests.” Generally, they involve a process by which the timber buyer or logger chooses which trees to remove. Essentially this involves removing the largest, most valuable trees in the forest, while leaving the smaller trees, or any trees that are not desirable due to forked stems, rot, twisted stems, etc. You may have heard the term “culling” a herd of animals - that is, removing the weakest, sickliest animals so that the strongest and healthiest can maintain a breeding population. In essence, these commercial harvests are the opposite of culling a herd. Removing the largest, healthiest, and most valuable trees degrades your forest, leaving the runts to provide for future growth and to provide seed for future trees. If you are concerned about sustainable forestry and building quality and value for the future, this is exactly what you do not want to do! Foresters use the term highgrading to describe this type of harvest. Unfortunately, recent studies in West Virginia and Pennsylvania revealed that harvests like this are common (Fajvan and others, 1998), something foresters have long suspected.

Another common type of commercial harvest is the diameter limit cut. With this type of cutting, the timber buyer generally specifies a minimum diameter of tree to be cut. Common diameter limits are 12 or 14 inches. Presumably, all merchantable trees above the diameter limit will be harvested. The idea is that this type of cut will leave smaller “young growth” intact to become the future forest. The problem is that the smaller trees are not necessarily “young growth.” They are usually the same age as the larger trees, but are smaller



Commercial harvest with many skid roads. Photo by Tom Gallagher.

because of slower growth, species, or perhaps disease or some other damage. They are weaker, lower-quality trees that will eventually result in a weak, sickly, poor-quality, and low-value forest in the future. Although diameter limit cutting results in more income today, in the future this will not be the case. Studies conducted by the U.S. Forest Service on the Fernow Experimental Forest in West Virginia have shown that if some timber stand improvement work is done in the smaller size classes to remove the poorest quality trees, some of the problems with diameter limit cutting can be removed (Miller and Smith 1993). In all but a few rare cases, diameter limit cutting is not suitable for sustainable forestry.

A final type of commercial harvest that should be mentioned is commercial clearcutting. Clearcutting generally involves removing all the trees in the forest, usually down to a small diameter such as six inches. A commercial clearcut, however, usually leaves a jumble of larger, poor-quality trees that are not merchantable, though such trees may sometimes be knocked over, broken off, or left leaning. Such cuts are highly unsightly, and you don't need to see many of them to know that this is probably not what you want for your forest! In fact, this revulsion with commercial clearcutting usually leads timber buyers to sell the merits of the other types of commercial harvests, such as diameter limit cuts, since all of the trees are not cut. Logging slash, stumps, broken and leaning trees, etc., can make a powerful image and can make something like a selective cut or a diameter limit cut sound pretty enticing.



Diameter limit cut showing poor-quality residual trees. Photo by David Wm. Smith.

SILVICULTURAL HARVESTS

As previously mentioned, silvicultural harvests usually are prescribed for sustainable forestry, to ensure adequate and desirable regeneration, and to protect the quality of the residual trees (trees that are not harvested). These harvests are made using the many variations of the “silvicultural methods” developed by German and French foresters in the last century. In essence, they are classical methods that every forestry student in the United States studies. But they are not only theoretical methods. They can be, and are, applied to forests around the country every day. Making them work requires some care and skill, but it is far from rocket science. Let’s take a look at some of them.

Selection Methods

The selection method was designed by early German foresters to allow for a system by which a forest is cut at regular intervals, such as every 10 years. Only a small portion of the trees are cut at any one time, hence the term “selection.” This method leads to the development of an uneven-aged forest since regeneration occurs in pulses following each harvest. This is not to be confused with the other types of “selective,” “select,” or “selection” cuts described earlier. This method is probably the most complicated of all the methods to pull off, and is most useful in forests where the desirable trees are capable of germinating and developing in a shady environment. Since the cutting is light and periodic, the forest understory is shady. This method is used commonly in the North, where the sugar maple, which grows well in the shade, is an important species. Sugar maple is a valuable species that produces abundant



Selection in a northern hardwood forest. Photo by Jim Johnson.



Group selection cuts on the Jefferson National Forest. U.S. Forest Service photo.

seed crops that germinate early in the spring every year. However, the sugar maple is not a common commercial species in Virginia, except perhaps in Highland County. In fact, most of the valuable species in Virginia are not well adapted to growing in shady environments. While we have quite a few species that grow in the shade (eastern hemlock, American beech, hickories, red spruce), they are not widespread or key commercial species.

To accommodate the problem of needing more light for most of our important timber species, foresters have created a modification of the selection system, called group selection (Miller and others 1995). Unlike the selection system, which involves cutting throughout the entire forest, group selection involves cutting small patches of perhaps a half-acre to an acre in size. The patches are scattered about throughout the forest. With each cutting cycle, perhaps every 10 years, a new set of patches is cut. This allows more light to reach the forest floor and stimulates regeneration of species such as the oaks and yellow poplar.

Advantages of both the selection system and its variant, group selection, are that they allow for continuous forest, since only a small amount of the forest is cut at any one time. They also allow for a periodic flow of income, not a large flush of cash with one cutting. They favor the growth and development of tree species adapted to shade, which foresters term “tolerant,” but can also be used with other species if the cutting is in patches or if the cuts are heavier and more frequent. Indeed, further south, this method has been used for many years with loblolly pine, a species that requires much light to become



established and grow. The trick is to cut more heavily and more frequently, and to use other means to control competing vegetation like hardwood brush, if it becomes a problem.

Disadvantages to the selection systems are that they are expensive to set up and implement. To be done correctly, they require careful supervision by competent foresters to mark each tree to be cut. Tree marking is essential to be sure that the system doesn't degenerate into just another form of highgrading. Income is generated more slowly, and since smaller volumes of wood are removed with each cutting, income is less. Also, logging costs are higher, the road system needs to be more extensive and maintained because it is used more frequently, and careful logging is necessary to avoid damage to the residual trees. Loggers must run their harvesting equipment over a much larger area to extract fewer trees, which increases costs. Finally, this method often results in conditions favorable to non-commercial understory tree and shrub species that are tolerant of shade at the expense of tree species valuable for timber and wildlife.

Shelterwood Methods

The shelterwood methods were developed to use partial cuttings over time to remove an entire forest, but gradually, so that natural regeneration of desirable tree species can become established and grow into the new forest. Usually the existing forest is removed in a series of two to four cuts occurring over a period of 10 to 20 years. There are many modifications of the basic system that may be applied in special situations; for example, where wind can cause problems to the residual trees. In general, this method is used for tree species that are somewhat intolerant of shady conditions, or can tolerate some shade. Species such as eastern white pine and the oaks are adapted to this system. It can also be used for species that tolerate little shade, such as loblolly pine, if the cuts are heavy and frequent.

The idea with shelterwood is that after the first partial cut, light reaches the forest floor and stimulates regeneration. The young seedlings begin to grow and get established, but before they become stunted and killed off from the shade of the remaining overstory trees, another cut occurs and more light comes through to keep them going. After two or three cuts, the entire overstory is removed and the forest consists of the new growth. The young trees may be 20 to 30 feet tall by the time the final overstory trees are removed.





Shelterwood in loblolly pine forest. Photo by Jim Johnson.

Advantages of the shelterwood system are that it allows for adequate natural regeneration of the desirable species before the entire forest is cut, and it works for many of the commercial tree species in Virginia. It also can be adapted to favor certain tree species. For example, if you want to favor oak and hickory trees for their nuts for wildlife, you can cut out other tree species and leave those to regenerate the forest. Since many people interested in wildlife do not want to completely harvest an oak-hickory forest because it takes about 30 years before young trees can bear nuts again, a few overstory trees may be left indefinitely to continue to provide a source of nuts. This is a common modification known as reserve shelterwood. Once again, it is important that this method be carefully applied by qualified professional foresters, lest it degenerate into yet another form of highgrading. In recent years here in Virginia, a cutting practice in which poor-quality, non-commercial trees have been left as reserve shelterwood trees has become common. Foresters, ever witty, nicknamed these cuts “junk shelterwoods,” for that is what they were. Some residual trees were left behind, but they were “junk” trees that met no known timber or wildlife objectives.

Disadvantages of the shelterwood methods are not surprising. Again, timber marking is necessary to be sure that the correct species and strong seed-bearing trees are not cut early in the process, for these are the trees you want to be sure to provide the seed for regeneration.

Because the cutting takes place over time, as with the selection methods, logging costs are higher, income is slower over time, and roads must be kept open until the process is finished. Also, damage to the young growth by continued harvesting operations is a concern and should be minimized.

Seed-Tree Methods

The seed-tree methods are similar to the shelterwood methods, except that fewer trees are left, and the method usually involves only two cuts. The first cut removes nearly all of the trees, except a few trees left behind as seed trees. The purpose of these trees is to supply a source of seed to establish a new forest.



Seed tree cut in a pine forest. Photo by Jim Johnson.

Once the new seedlings are established, the seed trees may be removed in a second harvest. This method is best used for species like loblolly and white pine, where the intent is to rely on natural regeneration rather than planted seedlings. In fact, Virginia has a state law that requires leaving seed trees in loblolly or white pine forests that are harvested without subsequent planting. Eight high-quality seed trees, at least 14 inches in diameter, are to be left on each acre of harvested land that is not planted. Nevertheless, the seed tree methods are not common in Virginia, since planting pines has become very cost-effective.

Clearcutting Methods

Probably none of the harvesting methods mentioned above causes as much concern as the clearcutting methods. This concern is very understandable, because clearcutting a forest causes a dramatic change with significant visual impact. If a mature 100-year-old forest is quickly removed, visual effects will be dramatic and may last several years. However, clearcutting is one of the classic forestry methods of

regenerating forests. Why? Simply because clearcutting mimics a large-scale natural disturbance like a huge blowdown from strong winds, a wildfire, or a massive insect epidemic. Many of our common tree species have adapted to respond quickly to the high light conditions that occur following such disturbances. Many of our mature forests in Virginia today resulted from widespread clearcutting early in the 1900s. Regeneration here in Virginia following such disturbances, or clearcuts, is prolific. Also, if the intent is to create a plantation forest, clearcutting is the best way to remove the existing vegetation so that there is an adequate site for the planting operation.



*Clearcut followed by pine reforestation.
Photo by Jim Johnson.*

Let's look a little more closely at the clearcutting methods. First, most of the concerns about clearcutting relate to the visual impact. Foresters have studied this problem, and have developed many ways that the visual impact can be reduced. Harvested areas may be shaped so that they blend into the landscape. Buffer strips may be left along roads, streams, or other sensitive areas to screen the view, provide



Clearcutting a loblolly pine forest near Franklin, Virginia. Photo by Jim Johnson.

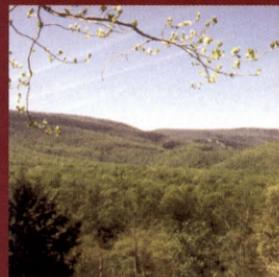
wildlife habitat, and protect water quality. Reserving some trees in small patches or individually, removing or knocking down leaning and broken trees, seeding all roads and landings to cover exposed soil, and other techniques all serve to lessen the visual impact. In many cases it is helpful to come in after the cut and remove smaller stems that flush out and shade the ground, making it more difficult for

young seedlings and sprouts to become established and grow. The difference between a commercial clearcut and a silvicultural clearcut is that these extra measures are taken with a silvicultural clearcut to be sure that adequate conditions exist for the regeneration of desirable species. Thus, the economic gain will be less using a silvicultural clearcut, but the long-term impact, both visually and ecologically, will be less. Clearcutting has gotten a bad rap as a silvicultural method mainly because it has been overused and abused all across the country. Unfortunately, many of our forests have been so degraded following generations of highgrading that the best silvicultural prescription to get a productive forest started is to conduct a clearcut and start over with new, young trees.

Since so much timber is removed at once, clearcuts are often the most economic of all of the cutting methods. However, remember that conducting a silvicultural clearcut requires an added investment.

Two-Age Methods

During the past 20 years there has been the influx of a new series of cutting practices that have become known as the two-age methods. These cuts result in a partial removal of the overstory trees, which allows light to penetrate to the forest floor, stimulating natural regeneration. After the young seedlings become established, the remaining overstory trees may be removed, or they may be left for many years. If they are left, the resulting forest has two age classes, consisting of the young growth and the older, remaining trees, hence the term two-age. The methods were developed in Germany and were originally called deferment cuts. They originated as an alternative to clearcutting and have been studied since the early 1980s by U.S. Forest Service researchers in West Virginia (Smith and others 1989). The two-age methods



Sequence of views of a two-age harvest in West Virginia. Photos by Jim Johnson.

have gained widespread use on both national forests and industrial forests in recent years. Overall, they result in regeneration similar to what would occur with a clearcut, but are visually more appealing.

Damage to residual trees can be a problem, so it is important to use a logger with the equipment, care, and patience to do the job properly. Also, the trees to be left should be carefully chosen to meet objectives. Because they will be released from competition, the residual trees will grow faster. But they will also be more prone to produce side branches, which reduces quality, and they may blow over in strong winds. Research results and experience have shown that, in general, about 10 percent of the residual trees will die or blow over as a result of the shock of the cut or logging damage, and this will occur in the first 10 years following the cut.



Logging wounds like this may result in serious tree damage.

Photo by Jim Johnson.

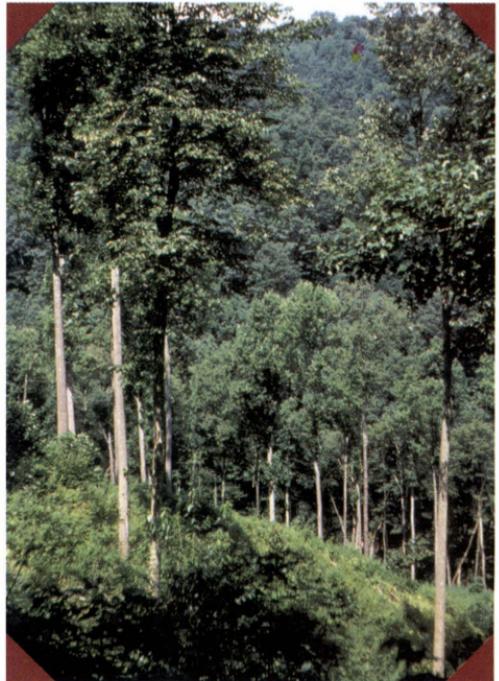
CONCLUSION

The intent of this bulletin is to put the practice of timber harvesting into the perspective of sustainable forestry for you, the private forest owner. Timber harvesting is very much a part of managing your forest, whatever your objectives. Careful timber harvests can provide valuable income, and meet many other objectives such as enhanced wildlife habitat. Furthermore, if done correctly, timber harvests can actually enhance the visual appearance of your forest, as well as its recreational value. Erosion, stream sedimentation, and other harmful effects can be reduced or eliminated altogether by carefully adhering to the Best Management Practices that have been developed by the Virginia Department of

Forestry. And most importantly, regeneration of the new forest, probably the most important component of sustainable forestry, will be much more likely.

Virginia's Best Management Practices (BMPs) are a voluntary set of guidelines that should be employed with every timber harvest. Prior notification to the Virginia Department of Forestry of any timber harvest in the state is required by law! Department of Forestry inspectors will likely visit the harvesting operation at some time to review the BMPs and provide advice. The BMPs prescribe treatments designed to minimize soil erosion and the resulting stream sedimentation. Stream crossings, streamside management zones, the use of water bars and other water control structures on roads and trails, seeding, and planting are but a few of the common BMPs.

To be sure you get the type of harvest that you want, it is best to engage the services of a professional forester. Your first stop should be the Virginia Department of Forestry. Call your local forester or check out the services the department can provide to you by viewing its web site at <http://www.vdof.org>. If you proceed to a timber harvest, you would be well-advised to engage the services of a qualified professional forester. Consulting foresters work for you, and studies have shown that by working with a consulting forester, landowners receive higher prices for their timber and are generally more satisfied with the results of the timber harvest. Your consultant can provide many oversight services that you may not be able to handle yourself. Although you will have to pay a consultant a fee, usually set as a percentage of the timber sale, the services you will get may be worth the added cost. The Virginia Department of Forestry maintains a consulting forester list on its website. When choosing any service provider, like a logger, consulting forester,



*Two-age harvest four years after cut.
Photo by David Wm. Smith.*

plumber, or auto mechanic, it pays to ask around. Find out about previous jobs the service provider has done for friends, neighbors, or relatives. Is your potential consulting forester a member of the Association of Consulting Foresters and/or the Society of American Foresters? Does the logger have both workers' compensation and general liability insurance? Is the logger a member of the Virginia Loggers Association, or has he or she completed the educational requirements for the Virginia Sharp Logger Program? A little up-front homework can save a lot of headaches down the road.

Finally, learn more about sustainable forestry by participating in the Virginia Forest Landowner Education Program (VFLEP). Run by Virginia Cooperative Extension in cooperation with the Virginia Forestry Association, the Virginia Department of Forestry, the Virginia Tree Farm Committee, and the forest industry (through the Sustainable Forestry Initiative State Implementation Committee), VFLEP provides a host of educational programs and materials for forest owners. Visit the VFLEP website at <http://www.cnr.vt.edu/forestupdate/> or contact your local Extension office. To learn more about the Virginia Sharp Logger Program, visit <http://www.sharplogger.vt.edu>.

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