



WHAT WILL MY WOODS LOOK LIKE?

*BEFORE AND AFTER TIMBER
HARVESTING IN PENNSYLVANIA*



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Acknowledgements

Photos courtesy of:

Maine Department of Agriculture, Conservation & Forestry

Hardwoods Development Council

Allegheny Hardwood Utilization Group

Keystone Wood Products Association

Northern Tier Hardwood Association

Pennsylvania Forest Products Association

Pennsylvania State University

Pennsylvania Sustainable Forestry Initiative SIC

Gary Alt

Shelby Chorba

Chuck Coup

Jim Finley

Generations Forestry

Dan Hartranft

David R. Jackson

Eric Kuntz

Doty McDowell

Chris Spaich

Aaron Tyson

John Zehr

The harvests shown in this book were conducted by woodland owners working with a team that included professional foresters and loggers.

The Pennsylvania Hardwoods Development Council



The Pennsylvania Hardwoods Development Council (HDC) was established by the state legislature in 1988 to nurture the development, expansion, and promotion of the hardwoods industry. The HDC includes representatives from every aspect of the wood products sector in the state: foresters, loggers, sawmill operators, veneer manufacturers, value-added processors, maple syrup producers, furniture makers, pulp and paper producers, trade associations, regional hardwood groups, as well as key government leaders. Combined, this group aims to support and assist the forest products industry to develop both domestic and international markets, educate forest landowners and the public about sustainable forestry and the environmental benefits of using wood products, and provide economic and workforce development opportunities for the industry.

Pennsylvania Hardwood Utilization Groups

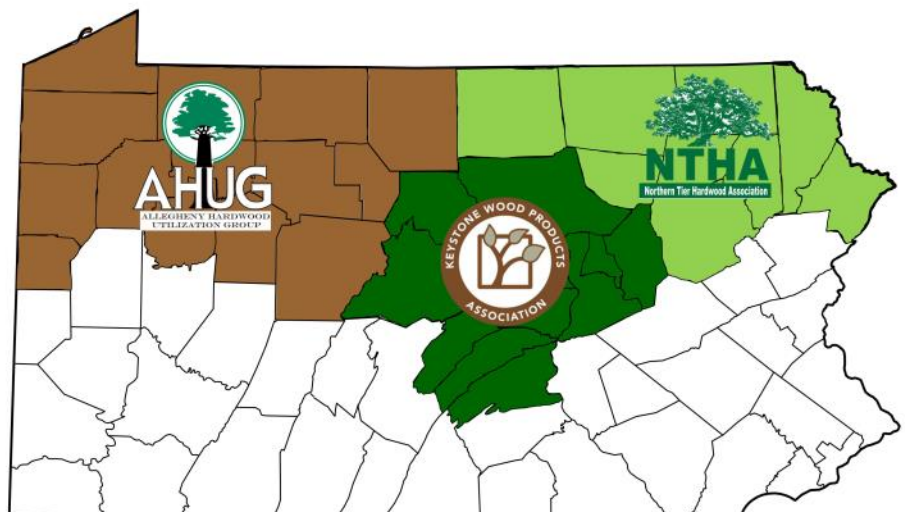
Pennsylvania is also home to regional Hardwood Utilization Groups (HUGs). The HUGs share the same goals and responsibilities of the HDC, but have a more regional approach in implementation.

Allegheny Hardwood Utilization Group (AHUG): Cameron, Clarion, Clearfield, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Potter, Venango, and Warren Counties.

Keystone Wood Products Association (KWPA): Centre, Clinton, Columbia, Juniata, Lycoming, Mifflin, Montour, Northumberland, Perry, Snyder, and Union Counties.

Northern Tier Hardwood Association (NTHA): Wayne, Pike, Lackawanna, Luzerne, Wyoming, Susquehanna, Bradford, Sullivan, and Tioga Counties.

Hardwoods Development Council
Pennsylvania Department of Agriculture
2301 North Cameron St.
Harrisburg, PA 17110
Phone: 717.772.3715
Email: hardwoods@pa.gov
www.agriculture.pa.gov



Introduction

"What will my woods look like?" This is often one of the first questions that forest landowners ponder when considering forest management options that involve harvesting timber on their property. The visual aesthetics of their forest is important to them and the fear of how a harvest might alter the look of their woodlot can often hold them back from implementing necessary management practices. The HDC & HUGs have developed this pictorial resource for forest landowners to see before and after examples of various silvicultural treatments utilized in Pennsylvania.

Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society. Silvicultural treatments are individual management practices designed to produce specific forest structures and characteristics that will achieve desired outcomes. Silvicultural treatments often involve harvesting timber in specific ways and for specific purposes.

The goal of this book is to help forest landowners understand common silvicultural treatments used in Pennsylvania that involve timber harvesting, and to give them a better idea of what those treatments might look like before and after. The photo sets are organized by silvicultural treatment (e.g. thinning, shelterwood, etc.) and include a short description of the practices, and in some cases, the goals that the landowner was trying to achieve. We have attempted to highlight forests and practices that are representative of those commonly found throughout Pennsylvania.

Timber harvesting is an important management tool. When conducted with care and planning, it allows owners to manage forests to meet multiple objectives. The decision to harvest may be recommended in a management plan or it may develop more suddenly due to an unanticipated event, such as an insect infestation or disease outbreak. Regardless of the reason, a successful timber harvest that meets landowner goals begins with a successful conversation between the landowner and a forest resource professional. Due to the unique nature of forests, we highly recommend consulting with a professional forester prior to making any management decisions about your woodlands.

Seek the Services of a Forestry Professional

Professional foresters are the first step in helping you understand your woods and prescribing science-based treatments. They can provide invaluable services to guide you through the timber sale process. Landowners who work with a professional forester in planning and implementing a harvest report greater satisfaction, increased revenue, and healthier and more valuable forestlands following the sale. Professional foresters can provide: forestry expertise, market knowledge, experience with loggers, sale oversight, sale coordination, sale closeout, post harvest site monitoring, and much more.

Selecting a Professional Forester

When hiring a professional forester, it is important to interview several before making your decision. Be sure to ask about their education, work experience, professional certifications, and memberships. Professional foresters provide a broad range of professional woodland management services for private forest landowners. They typically have at least a 2-year degree in forestry or a related field. Professional foresters are either self-employed or work for a sawmill or an existing consulting forestry firm. Credentials like being certified by the Society of American Foresters (SAF) or being a member of professional organizations like the Association of Consulting Foresters (ACF) help demonstrate a high level of technical skill and dedication to their profession.

Local references can provide invaluable information and insights to help you make your decision about who to hire. Ask prospective foresters to provide at least three forest landowners as references, preferably from their previous three timber sales. Contact these references and ask if they were satisfied with the overall work, not just the income they received. If possible, consider touring the properties to see completed work firsthand.

Having a written agreement with your forester that outlines fee structure (hourly rate, percentage of the sale, or flat fee), services, obligations, and terms is essential. The decision you make today in hiring a forester can either positively or negatively impact your ability to reach established goals for your forestlands and protect values of importance to you. A trusted professional forester is an asset for the tenure of your ownership and can assist with many other important aspects of woodlot management.

Forester Listings in Pennsylvania

The most comprehensive list of professional foresters and plan writers in Pennsylvania can be found on DCNR's "[Managing your Woods](#)" webpage. The listing includes contact information, services offered, counties served, and professional certifications the forester has obtained. The same site also provides a listing of DCNR Bureau of Forestry service foresters by county. State service foresters are a great first contact and provide information and advice to forest landowners, and are a free resource for the citizens of Pennsylvania, helping to guide and direct sustainable forestry practices.

Selling timber is complicated and requires substantial time investments and a thorough understanding of the industry. Timber sales have the potential to impact site productivity, wildlife habitat, water quality, aesthetics, income, taxes, estate planning—the list goes on. Those lacking the proper level of experience should consider seeking professional assistance and use this publication as a reference to understand what their forester is striving to accomplish on their behalf.

Conducting a Successful Timber Sale

1. Establish sale/property boundaries
2. Determine and define access
3. Identify trees to cut and appraise value
4. Advertise the sale
5. Execute a written contract
6. Monitor active logging
7. Close out the sale

A satisfactory harvest experience is no accident; it is the result of thoughtful planning and hard work. Planning is critical to ensure positive outcomes that meet sustainability guidelines. As with most endeavors, involving the right professionals makes all the difference. To ensure a successful timber sale, select vigilant and conscientious foresters, buyers, and loggers who understand stated goals and objectives and can help attain them for you, your family, and your forest.

Wind (Blowdown)

Forest landowners are strongly encouraged to seek the advice of a professional forester or other knowledgeable individuals about hardwood silviculture before making management decisions due to storm damage.

Common types of wind damage include the following:

- Windthrow (the tree is uprooted and blown down)
- Broken stems (in some cases twisted by wind)
- Broken limbs
- Leaning trees
- Bent trees
- Trees with major wounds

If it is economically feasible, you should almost always employ a simple salvage operation to remove dead trees or those not capable of responding and growing. However, the question is: do you have desirable species that will continue to grow and meet your objectives for the stand? Consider severity and type of damage, age and history of the stand, and your long-term objectives. The type and extent of damage is the most important consideration.

Before deciding whether to harvest and regenerate or salvage and manage, make a thorough assessment of the stand. Concentrate primarily on standing trees and not what could be salvaged, although you can evaluate that at the same time.

Salvage Operation: The highest priority for salvage should be given to products with the highest value. If you have both softwood and hardwood, remember that softwood will degrade more rapidly due to degradation by blue stain. Uprooted or broken hardwood sawtimber trees should be salvaged as quickly as possible, however, depending on the weather and species, salvage can take place months later and still hold value.



Pictured above is an example of windthrow scenario. These trees have been uprooted and blown down do to high winds. This was a mature maple and cherry stand on State Game Lands in Northeastern Pennsylvania.

Pictured below is an example of a mature forest that experienced tornado damage in Northeastern Pennsylvania.



Crop Tree Release

Crop tree release is a silvicultural treatment intended to provide increased growing space for selected trees by removing adjacent trees that are competing for nutrients and water in the forest floor and sunlight in the forest canopy. By reducing competition, the selected trees should thrive.

The stand shown in the examples below was clear cut by the previous owners 25-30 years ago. It is now comprised of small diameter trees that are similar in age and size; roughly 4-6" in diameter. The growth of these trees has been stunted due to the level of competition within the stand. This stand consists of black birch, yellow birch, red maple, and black cherry.

In this scenario, the forest landowners wanted to diversify the age classes and increase the likelihood of success for the red maple and black cherry trees. Foresters walked through the stand and marked the red maple and black cherry as the "crop trees" - desirable trees to leave for future growth. The trees directly competing with the marked desirable trees were removed, giving the crop trees more space to grow. Crop tree releases are intended to increase the diameter growth, vigor, and crown size of the selected trees.

Before: As an avid birder, the forest landowner worked with a professional forester that recommended this prescription because it would result in age class diversity and forest canopy layering that benefits wildlife, especially birds. Additionally, this prescription would allow for increased visibility for bird watching. The untreated stand was severely overstocked. If similar actions were taken 10-15 years earlier the remaining trees would have experienced more favorable growing conditions.

Its for the birds!

A mixture of forest age classes & canopy heights provides nesting options for a variety of bird species.



After: Note the tree marked with a red dot on the right—this is a red maple crop tree. The trees that were in close proximity and competing with this crop tree were cut. Crop trees, like this one, now have adequate light and decreased competition which will allow for increased growth and vigor. Due to their size, the trees that were cut have no commercial value. They will decay and return vital nutrients to the forest floor. The tops of the cut trees will also protect seedlings from deer browse.

Thinning

Thinning is the process of removing trees to encourage growth of remaining selected trees. Depending on the stand, a thinning could harvest mature timber and/or prepare the stand for a future timber harvest.

This woodlot owner indicated that they would like to have a future forest that will produce monetary value for their grandchildren. The forester recommended a thinning to increase the size and health of the most valuable species within the stand, so that they could be harvested in the future for a greater economic return.

Before: This is an overstocked stand, meaning there are too many trees in a given area competing for limited resources, such as sunlight, space and water.



After: This thinning resulted in multiple age classes and canopy heights. Some mature commercial trees were harvested while most were left so they could be harvested in the future—potentially 10-20 years later. A variety of mid-story trees were also left to ensure prolonged stand success. The remaining trees now have less competition. Tops and woody material were left on the forest floor, providing cover for arthropods, small mammals, amphibians, and reptiles such as salamanders.



Timber Stand Improvement Cut

A timber stand improvement (TSI) is used to remove trees of undesirable form, quality, condition, growth rate, or species. Removing these trees will increase growing space for desirable species and can increase future timber profits to forestland owners. TSI is similar to thinning except that there is almost never any commercial value to the trees being removed.

Before: This particular stand is owned by a hunting club. The members of the club were interested in improving wildlife habitat, particularly for deer, bear, and turkey. The forester recommended a TSI that targeted non-mast producing species. Since this stand was overstocked, desired species such as Oaks, Beech, and Hickory, that provide sources of food like nuts and acorns, were not thriving.



Immediately After: Non desirable species were removed, tree tops remained but were not excessive. The club members appreciated the logger's attention to detail and minimal ground disturbance.



2 Years Later: The TSI stimulated the growth of more desirable mast producing trees by removing the competition. This resulted in increased mast production for wildlife. The increased sunlight to the forest floor has improved ground layer vegetation which is utilized as browse and cover by wildlife. Since the initial TSI, the hunting club has performed additional work on their property. They have also noticed their property now supports more wildlife due to an increased abundance of food and habitat.



Clearcut

Clearcutting is a silvicultural practice where nearly all trees within the stand are harvested, with the understanding that a new stand has been propagated and will become established, typically being even-aged. Often trees greater than 2 inches in diameter at breast height (DBH) are cut, including trees of low quality and value. This process allows maximum sunlight to reach the forest floor, thus promoting vigorous new growth. Regeneration of these stands typically occurs from natural seeding and stump sprouting, however direct seeding or planting seedlings can assist in stand development. Having the seedlings that will make up the next forest already established on the ground (i.e. advanced regeneration) before removing the overstory trees is what separates a sustainable clear-cut from an unsustainable clear-cut.

Clearcutting often has a negative connotation due to its “before & after” aesthetics. However, when done with adequate regeneration, this is a sound silvicultural practice that favors tree species that thrive in full sunlight, such as black cherry, white ash, red oak, white oak, and yellow poplar.

Unsustainable clearcutting was practiced extensively across Pennsylvania's forestlands around the turn of the 20th century, contributing to the even-aged forests we have today. However, many of Pennsylvania's commercial tree species respond well to the open light conditions created by clearcutting, so it is still a practice in use, but only when adequate regeneration has already been established. "Overstory removal" is a term often used in place of clearcutting. Many professionals recognize that young understory growth can flourish by removing the mature overstory trees, ultimately enhancing the future of the forest without the need for clearcutting.

Stands that lack regeneration and have a forest floor covered in ferns, grasses, and invasives will have a difficult time regenerating trees. Additionally, sites where the water table could rise to the surface post-harvest, where shallow soils occur over rock, or where forest cover is vital in preventing stream siltation or stream temperature increases, are not ideal for clearcuts.

Typical benefits associated with clearcutting can include: creating songbird habitat, providing wildlife forage, creating young forest habitats, encouraging rapid forest regeneration, regenerating shade-intolerant tree species, controlling the spread of forest insects and pathogens.



Before (left): this forest was overstocked and lacked desired regeneration. A shelterwood harvest was employed. Years later once adequate regeneration was reached the forest was clearcut.

After (right): one year post clearcut. Note the abundance of regeneration.



Shelterwood

A shelterwood harvest is a regeneration cut designed to stimulate reproduction. The overstory is gradually removed in stages promoting the establishment of tree seedlings that grow well in partial shade. The first harvest removes mature trees, allowing for vigorous seedling regeneration. The harvested trees bring monetary value to the landowner. This also creates large canopy openings allowing sunlight to reach understory tree seedlings. The remaining overstory continues to grow and help protect the surrounding understory from weather events such as frost, high heat, or sun scorch. At some point, the remaining overstory starts to inhibit the development of understory trees through crown expansion and shading. This can depend on the density of the remaining overstory trees and the species being managed. An additional harvest removes the remaining overstory trees when the regeneration no longer needs shelter.

Before



This shelterwood harvest occurred on Pennsylvania Game Lands (PGC). The PGC foresters utilize shelterwood harvests across the whole state. This stand is a typical northern hardwood stand with black cherry, red maple, American beech, and black birch. A shelterwood was prescribed to start establishing regeneration. The initial harvest also removed American beech that was been affected by beech bark disease. Two years after the initial harvest increased desirable regeneration was already starting to be observed. When seedlings are adequately established (10-15 years later) the overstory will be harvested.

After



2 Years Later



Seed Tree

A seed tree harvest is managed similar to a clearcut. It is designed to be used in situations where a seed source is needed along with full sunlight. All the trees are harvested on the site except for a small number of high quality overstory trees that are retained across the site to supply seed for regenerating the next stand. Traditionally, natural regeneration is relied upon, however planting may be needed. Usually, the seed trees are removed in a “removal cut” once regeneration is established, although this is not always necessary.



Before: This forest landowner noticed that the forest was being overrun by non-desirable species and invasives. The forester recommended a seed tree harvest. This would provide a nearly clean slate while preserving some of the best seed producing trees to promote regeneration. The management plan also included herbicide treatment to prevent the existing invasive species from returning and taking over.

After: All red maple and birch were removed from the stand. The healthiest and strongest red oak and chestnut oak trees remained. The forester was concerned with regeneration success, so tree tops were left on the forest floor to protect the seedlings from deer browse. In this scenario, the seed trees will likely remain in the stand. The forester recommended an additional herbicide treatment or prescribed fire in future years to remove oak competition.



Group Tree Selection

Group selection is a practice that removes clusters of trees. It creates openings for preferred species to regenerate, improving forest structural and age diversity. Traditionally, this practice is repeated every 10-20 years, eventually resulting in the entire stand being cut. The footprint of the cut can impact the tree species that regenerate. For example, openings that are less than one-fourth acre favor shade-tolerant species, while larger openings favor sun-loving species. Group selection provides pockets of young vegetation for grouse, deer, and songbirds that may not have been available prior. In Pennsylvania, this is not a widespread practice because it requires intensive management and frequent access to all areas of the property, and as a result it can be an expensive forest regeneration method.

Before: The landowners consulted with a forester after noticing that over time their small woodlot was no longer attracting the variety of songbirds they had grown accustomed to seeing and hearing. The forester noted this was because their forest was lacking in species diversity and age class. The landowners shared concerns regarding a large full-scale timber harvest. The forester recommended a group tree selection to promote young forest areas within in the more mature even-aged forest.



After: Multiple small openings were created throughout the property, encourage new growth. The landowners were pleased with the minimal disturbance and viewed their forest as fully in-tact.



Single Tree Selection

Single tree selection is the periodic removal of individual trees. It is designed to create an uneven-aged forest composed of many size or age classes uniformly distributed across the forest. It accomplishes this by consistently removing trees in all size classes throughout the stand at regular intervals. This practice should not be confused with “select cutting” where only the best and largest trees are harvested.

The forest landowners were looking to improve their forest that consisted of mostly white pine and sugar maple with a few red oaks. The forester conducted a stand analysis and found that the forest was overstocked and experiencing competition from invasive Norway maples. Since pines and sugar maple are both shade tolerant species, the forester recommended a single tree selection harvest.

The management plan included removal of multiple singular trees. The trees that were selected helped balance the age class distribution while removing competition for the remaining trees. The forester also included the removal of all invasive Norway maples in this stand.

Before:



After:



The forest canopy, while still mostly closed, is more open than it previously was. White pine, sugar maple, and northern red oak now dominate the stand and have a much better chance at regeneration. Since regeneration will be established under the partial shade of the overstory, single tree selection was a useful method that will promote regeneration of shade tolerant species like white pine and sugar maple.

The landowners were pleased with the minimal disturbance and viewed their forest as fully intact. Additionally, they appreciated the removal of the invasive Norway maples. This forest now consists of both upper and mid-story layers, which are preferred by many bird species, including the wood thrush. To achieve the landowners’ goal of providing a food source for wildlife, few red oaks were removed.

Diameter Limit / High Grading

A “diameter limit” cut is harvesting only those trees that are above a specified diameter. Traditionally, larger trees will give the highest immediate economic return. Diameter limit cuts are also referred to as a “select cut” or “high grade.” No consideration is given to the health and productivity of the remaining forest.

Often coined "Harvest the best and leave the rest," high grading only removes the most economically valuable trees, leaving the weaker, less healthy ones. It can result in the removal of important seed sources and promote the growth of non-desirable species, eventually decreasing the long term income potential and will negatively impact ecosystem health.

These types of cuts are NOT recommended practices and are viewed as unsustainable.

Sustainable forestry uses responsible management practices to ensure a healthy forest grows in perpetuity, maintaining all its benefits and values. Foresters are well versed in sustainable practices and should be included/consulted in any forest management planning.

Before:



After:



Often times, as pictured above, forests that have been high-graded will consist of mostly low-value undesirable species. Additionally, the stand will include trees of bad form and condition, resulting in poor future genetics. Because they now lack seed sources, high graded stands will likely experience poor regeneration.

Common reasons high grading occurs:

- Money—High grading often results in the greatest immediate economic return. Landowners that care more about money than forest health may go this route.
- Life Event—Sometimes with a death in the family and lack of a forest management plan, the forested property could be split up, sold, or mis-managed.
- Education—There is science behind forest management. Without guidance from a forestry professional, uninformed actions can be made that result in poor forest health.

Due to the nature of this cut, the photos submitted are from past timber harvests with unknown landowners and objectives.

Non-Commercial Harvest

A non-commercial harvest is a management activity that removes herbaceous plants and shrubs that are competing with desirable young trees. The removed material typically has no value in traditional wood markets. Sometimes referred to as "cleaning" and "weeding," this type of management usually occurs in the stand establishment phase to ensure that desirable saplings have a higher likelihood of success. In some cases, material is "removed" using herbicides rather than being mechanically harvested. Since there is no merchantable timber removed, this activity usually comes at an expense to the landowner. However, this will set the stand up for increased future success and economic return. Pre-commercial thinning and timber stand improvement cuts are often non-commercial harvests because the material removed does not have commercial value.

Before:



The pictured property is managed by the Pennsylvania Game Commission. Foresters noticed that this red spruce stand was experiencing extreme competition from blueberry bush, grey birch, invasive plants and other non desirable species. Red spruce is not a common species found in Pennsylvania, so foresters wanted to retain and promote the growth of these trees. Keeping these on the landscape adds to biodiversity and provides winter cover for white-tailed deer, snow shoe hare, and other wildlife.

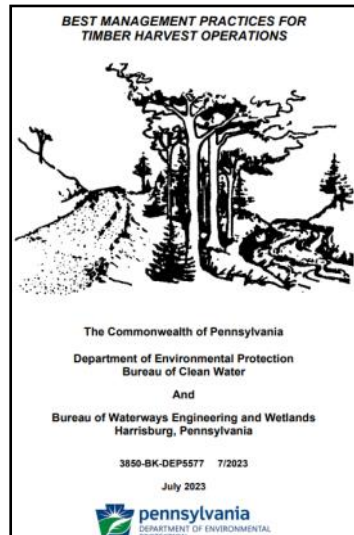
After:



Red spruce is a species that grows slowly and requires openings to thrive. This non commercial harvest removed the competing saplings, unhealthy hardwood trees, and undesirable vegetation from the stand. In the establishment phase, there can be too many saplings and competing vegetation. It is not certain what species will win over time. While this type of management usually cost the landowner, in the end, it's worthwhile to provide the desired species with assistance and to help reach your forest goals.

Landings & Roads

Timber harvesting operations require a network of cleared roads, trails and landings throughout the forest to safely and efficiently operate harvesting equipment. Haul roads, landings, skid roads, and skid trails are used to facilitate the movement of machines and equipment and the transportation of logs throughout the property. They are located where the least soil erosion, compaction and displacement will take place. Skid trails and skid roads are the corridors through the forest in which heavy equipment transports trees and logs from the stump to the log landing. A landing is the location where logs are gathered, processed, and sorted to be loaded on log trucks for transportation to the mill. The haul road is the main access road leading from the log landing to a public road and is used by trucks to haul logs off of the property on their way to the mill. The earth disturbances inherent to building haul roads, landings, and skid trails during timber harvesting operations require the use of forestry Best Management Practices (BMPs). BMPs are science-based conservation practices that help protect soil and water resources - two key elements necessary for growing a healthy, sustainable, and productive forest. They are designed to provide an economical means of preventing or reducing sediments and other nonpoint source pollutants on managed forest lands from impacting Pennsylvania's water resources. BMPs are an integral part of all forestry operations (PA SFI, 2023).



Landings and roads should be strategically laid out to minimize disturbance and in accordance with topography, property size, and landowner preferences.



Above is a log landing. From here the logs will be picked up by the log truck.

Below is a skid trail with tree tops laid down to protect from run off during muddy months.



Below is a haul road that allows access throughout the property. Landowners appreciate utilizing these trails after the harvest. Additionally, future management activities can make use of these roads.



Herbicide

Weeds, grasses, vines, invasive plants, undesirable trees, and other vegetation can severely inhibit and compete with tree seedlings. Herbicides are substances used to control undesirable plants. By using herbicides, tree seedlings will be given a competitive advantage on growth. Selective herbicides can target specific species/plant characteristics while leaving the desired species unharmed. Non-selective herbicides affect all species. When used properly, forestry labeled herbicides are effective and environmentally sound. Additional advantages of herbicide use include little/no soil disturbance, being able to use them on steep slopes and fragile soils, and minimal impact on wildlife.

Below are pictures of a stand with American beech trees infected with beech bark disease. Beech clones sprout from the parent tree's root system as a response to stressors. To improve forest health, herbicide treatment was used to kill the infected beech trees.

Before:



After:



Tree of heaven is an invasive tree species found in Pennsylvania that grows anywhere and can quickly take over disturbed areas. The image to the right shows a stand of tree of heaven that was controlled using herbicide.

Due to its accelerated growth, herbicide applications are common when dealing with this species. Tree of heaven is a preferred host species for the spotted lanternfly. Removing this invasive tree can help decrease the likelihood of spotted lanternfly on your property.



Deer Impacts

Pennsylvania consistently has one of the highest white-tailed deer densities in the nation. Deer tend to prefer timber species as browse and ignore less desirable species such as striped maple, beech, and ferns, often times impacting the regeneration success of a stand. Signs of deer damage could include undesirable plant species, lack of desirable regeneration, or a significant browse line. Recognizing, addressing, and planning for deer density issues and browsing impacts before a timber harvest is an important step that aids in regeneration success.

Deer exclosures, often in the form of fences, are an effective way to increase desirable plant species and reduce deer browsing impacts. Common deer exclosures are 7-8 feet tall, however there are other exclosure options available, such as double fencing and single tree barriers. To ensure effectiveness, exclosures require routine monitoring. Fallen trees and branches lead to exclosure failures. On average an exclosure remains functional for about 10 years, but could remain even longer. See image A and B, below to understand deer browsing impacts outside of the exclosure vs. inside.

Hunting can be a valuable tool to aid in forest regeneration, especially in areas with significant deer impacts. This can reduce overall deer densities, giving preferred species a better chance at regenerating. To learn more about hunting regulations and seasons visit the Pennsylvania Game Commission's website at www.pgc.pa.gov. Information about the landowner Deer Management Assistance Program (DMAP) can also be found here.



Slash walls are an innovative type of deer exclosure. They utilize low-value or non-merchantable logging material to form barriers around the recently harvested regenerating stands. These walls are capable of excluding deer for a decade or more before the wall deteriorates. This approach can utilize material that may not have a strong market and be a more cost effective option compared to fencing.

Prescribed Fire

Prescribed fire, also known as controlled burning, is the use of fire in a deliberate and contained manner to reach management goals and improve forest health. It can promote young forests, help prevent wildfires, control invasive species, and encourage regeneration of native plants and trees. When done correctly, prescribed fires can help restore balance in the ecosystem and control other pests and disease.

Many landscapes depend on regular fires for their existence. The extreme fires in the Western US are a result drought, climate change, fire exclusion, and lack of forest management over the years. In these forests, there has been a continual build up of dead woody debris (branches, logs, needles, etc.) This debris, also known as fuel, can lead to intense wildfires.

Prescribed burns are strategically planned and can only occur under certain circumstances. Temperature, humidity, and wind all have to be within a narrow set of parameters for a burn to take place. These special requirements limit the potential for the fire to get out of control—hence the name "controlled burn." In Pennsylvania, prescribed fires must have a burn plan and be conducted by qualified professionals.



Prescribed fires can result in short term increases in herbaceous material on the forest floor, providing browse for wildlife to eat. This “greening up” can minimize browse impacts on preferred seedlings and give native plants a chance to regenerate. Certain tree species and forest types are adapted to fire, making them a suitable candidate for this type of management treatment. For example, oaks have developed thicker trunk bark, shielding them from fire. This adaptation even extends to the seedling stage. When there is no fire, a thick layer of debris will cover the forest floor making it harder for acorn regeneration. Prescribed fire has also been shown to help control tick populations by removing components of their preferred habitat.



Forest Management Terminology

Best management practices (BMPs): Practices recommended by agencies or organizations to control pollution and erosion off a harvested site.

Board foot: A unit of wood 1 inch thick, 12 inches long, and 12 inches wide. One board foot contains 14 cubic inches of wood.

Browse: Portions of woody plants including twigs, buds, shoots, and leaves used as food by such animals as deer.

Canopy: The upper level of a forest, consisting of branches and leaves of taller trees. A canopy is complete (has 100% cover) if the ground is completely hidden when viewed from above the trees.

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.

Conservation: The wise use and management of natural resources to ensure its existence and function in perpetuity.

Crop tree: A term traditionally reserved to describe a tree of a commercially desirable species, with the potential to grow straight, tall, and vigorously. However, a crop tree can be selected for nontimber purposes (varying with landowner objectives), such as mast production or den tree potential.

Diameter at breast height, DBH, or dbh The diameter of the tree measured at 4.5 feet above ground level.

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.

Forest inventory: The survey of a forest landowner's property. Inventories are conducted by sampling plots to estimate average conditions across forest stands. The summation of stand data represents the inventory.

Forest types: Associations of tree species that commonly occur because of similar ecological requirements. Pennsylvania's three major forest types are oak-hickory, northern hardwoods, and Allegheny hardwoods.

Forester (Professional): Professional foresters have at least a 2-year degree in forestry or related field. They can provide: forestry expertise, market knowledge, experience with loggers, sale oversight, sale coordination, sale closeout, post harvest site monitoring, and much more. Industrial foresters may be employed (or self-employed) by a forest products manufacturer (sawmill, log brokerage, logging operation, fiber procurement, etc). Consulting foresters are typically self-employed (or employed by consulting forestry firms) and not tied to a specific foresters products operation.

Fragmentation: The segmentation of a large tract or contiguous tracts of forest to smaller patches, often isolated from each other by non-forest habitat. Results from the collective impact of residential and commercial development, highway and utility construction, and other piecemeal land use changes.

Hack and squirt: also known as frill and spray, herbicide applications offer one of the most target-specific, efficient, and economical means for controlling unwanted trees (not girdling).

Harvesting: The process of cutting, removing, and processing trees from the forest.

Herbicide: A substance that is toxic to plants, used to destroy unwanted vegetation.

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.

Improvement cut: A collective term applied to forest cutting treatments in even-aged stands between regeneration harvests; includes thinnings and TSI.

Insecticide: A substance used for killing insects.

Logger: A professional hired to harvest trees from the forest.

Management plan: A document prepared by natural resource professionals to guide and direct the use and management of a forest property. It consists of inventory data and prescribed activities designed to meet ownership objectives.

Mast: All fruits of trees and shrubs used as food for wildlife. Hard mast includes nutlike fruits such as acorns, beechnuts, and chestnuts. Soft mast includes the fleshy fruits of black cherry, dogwood, and serviceberry.

Natural resources professionals: Specially trained and educated natural resources managers who work with landowners and the land to achieve sustainable goals from wildlife to harvesting and regeneration.

Old-growth: Forests that approximate the structure, composition, and functions of native forests prior to European settlement. They vary by forest type, but generally include more large trees, canopy layers, standing snags, native species, and dead organic matter than do young or intensively managed forests.

Pesticide: A substance used for destroying insects or other organisms harmful to cultivated plants or to animals.

Preservation: A management philosophy or goal which seeks to protect indigenous ecosystem structure, function, and integrity from human impacts. Management activities are generally excluded from "preserved" forests.

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: The 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.

Sapling: A small tree, usually defined as DBH of between 2 and 4 inches.

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.

Stumpage: The commercial value of standing trees.

Sustainability: Caring for the water and wildlife that rely on forests and working to ensure continuant and improved health of forest resources so that future generations receive the same or increased benefits.

Thinning: Removal of trees to encourage growth of other selected individual trees. May be commercial or pre-commercial.

Timber cruise: The process of estimating the quality, quantity, and characteristics of trees in a forest.

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 over-story 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.



References

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Pennsylvania Sustainable Forestry Initiative. (2023, January) *Best Management Practices*.
<https://sfiofpa.org/pages/best-management-practices/>

Department of Agriculture, Conservation & Forestry Maine Forest Service (2019) *What Will My Woods Look Like? Before and After Timber Harvesting*. https://digitalmaine.com/cgi/viewcontent.cgi?article=1210&context=for_docs&preview_mode=1&z=1566218181

Additional Resources

Pennsylvania Department of Agriculture, www.pda.gov

Pennsylvania Department of Conservation and Natural Resources, www.dcnr.pa.gov

Pennsylvania Game Commission, www.pgc.pa.gov

Pennsylvania Sustainable Forestry Initiative, www.sfiofpa.org

Pennsylvania Forest Products Association, www.paforestproducts.org

Pennsylvania Forestry Association, www.paforestry.org

Penn State Extension, www.extension.psu.edu

Thinking of Selling Your Timber? Beware of "High Grading". <https://extension.psu.edu/thinking-of-selling-your-timber-beware-of-high-grading>



Allegheny Hardwood Utilization
Group (AHUG)
PO Box 133
Kane, PA 16735
814-837-8550
ashields@ahug.com
www.ahug.com



Keystone Wood Products
Association (KWPA)
212 N 3rd Street, Suite 203
Harrisburg, PA 17101
570-974-8946
hello@keystonewoodpa.org
www.keystonewoodpa.org



Northern Tier Hardwood
Association (NTHA)
PO Box 7
Tunkhannock, PA 18657
570-265-7753
nthapa@nthardwoods.org
www.nthardwoods.org