

Forest Stewardship

Best Management Practices for Pennsylvania Forests

Best management practices (BMPs) for silvicultural activities in forested wetlands and for controlling erosion and sedimentation from timber harvesting operations have been established for Pennsylvania forests. (See references, pages 7 and 9.) The BMPs outlined in this bulletin supplement existing BMPs to benefit a wider array of forest resources and values. They reflect what we know today about ensuring forest sustainability.

A 48-page booklet, *Best Management Practices for Pennsylvania Forests*, includes additional information about Pennsylvania forests, ecological principles and processes, the role of timber harvesting, silvicultural practices, forest protection and health, and rules and regulations affecting timber harvesting activities. The booklet is available through the Pennsylvania Department of Conservation and Natural Resources (DCNR) Bureau of Forestry and Penn State Cooperative Extension.



This publication is written under the assumption that voluntary compliance with BMPs, reinforced with education, will serve all of us better in the long run, both economically and socially. In practical terms, voluntary compliance in implementing BMPs can help avoid the establishment of additional regulatory statutes, many of which can be burdensome, time consuming, costly, and not necessarily conducive to long-term forest health and productivity.

BMPs are universally accepted activities that have positive effects or minimize negative effects on the forest ecosystem. Their impacts can be limited to individual stands or spread over multiple ownerships.

Some BMPs are multipurpose. For example, *buffer strips* along streams designed to control sedimentation can also serve as wildlife travel corridors, result in habitat diversity, and maintain stream water temperature and nutrient levels.

BMPs must remain flexible over time to accommodate changes in the social, economic, and environmental contexts of forest resource use. Our education in this area must be ongoing.

The BMPs provide the basics—minimal acceptable standards—of good forest management, although some landowners may choose to do more. You will probably want to review the information in this publication with the natural resources

professionals who help you manage your land.

The best management practices that follow are divided into three areas of forest management: planning, forest operations, and forest values. Each forest resource management component includes an objective, the primary issue on which the BMPs are based, considerations and concerns regarding the management component, and a checklist of BMPs that address those considerations and concerns. The checklist is provided in general terms. You can get detailed information from the publications listed at the end of each management component, under “For additional information.”

HIGH-GRADING

There is concern among all sectors of the forestry community that high-grading—the harvesting of only those trees that will give the highest immediate economic return—may lead to a widespread decline in forest resource quality. Two practices, diameter-limit cutting and selective cutting, generally fall into this category. In diameter-limit cutting, all saleable trees above a certain diameter are harvested. Selective cutting usually removes the largest, most valuable trees and may leave large-diameter, poor-quality, low-value trees. In each case, most of the trees that remain after the harvest are genetically inferior or physically defective. Neither method gives any thought to the composition of the future forest.

In even-aged forests such as those in Pennsylvania, smaller-diameter trees are not necessarily younger trees. It is more probable that these smaller trees are

1. slow-growing species of the same age as different, fast-growing species;
2. the same species of the same age but growing on an inferior microsite; or
3. the same species of the same age but genetically inferior to their larger-diameter counterparts.

Because slower-growing and poor-quality trees are retained, high-grading diminishes the diversity and economic value of the future forest. Landowners may agree to high-grading because of a lack of knowledge about the practice and its undesirable consequences. High-grading also can be driven by short-term economic considerations. Immediate cash flow may be higher with high-grading, but potential environmental degradation and decreased future timber values will more than cancel the immediate cash advantage.

Stewardship requires that landowners consider the future consequences of high-grading when making a decision whether or not to accept the use of the practice on their land. Resource professionals and harvesters also have an obligation to look beyond the present when recommending forest management practices to landowners.

Definitions for italicized terms not explained within the text are provided in *Forest Stewardship No. 4: Terminology* and *No. 7: Timber Harvesting: An Essential Management Tool*.

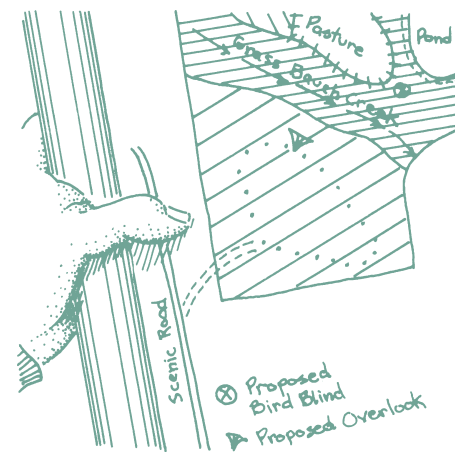
Planning

Objective

To optimize short-term and long-term benefits of forest management activities through adequate planning.

Issue

Management activities undertaken without planning can produce undesirable environmental, economic, and aesthetic consequences.



Considerations and concerns

1. Many private landowners are not aware of the values available from their forestland.
2. Many private landowners do not define what they want from their forestland.
3. Many private landowners do not involve resource professionals in forest management planning.
4. Forest management activities, particularly harvesting, are often undertaken for short-term gain without thought for the forest's future.

BMPs

1. Inventory resources on the property, including general plant-tree communities, water resources (*streams, spring seeps*—a class of wetland created by groundwater emerging in small pools surrounded by vegetation—*wetlands, vernal ponds*), soils, and unique areas (*endangered, threatened, or rare species habitat, rock outcroppings, notable views*).
 - a. Initially, inventory at a level of detail necessary to address preliminary goals and objectives.
 - b. Later, conduct a more detailed analysis to meet specific landowner operational needs, such as harvesting.
 - c. Be aware of how the resources on the property fit in with the surrounding landscape.
2. Work with a natural resources professional to identify preliminary goals and objectives.
3. Mark and maintain property boundary lines.
4. Develop realistic goals and objectives based on the resource inventory and available landowner time and finances. Be as specific as possible when enumerating objectives (e.g., does “managing for wildlife” mean creating habitat for a wide variety of wildlife or concentrating on habitat requirements for one or two species).
5. Consider the effects of planned activities on surrounding properties.
6. Create a written management plan based on the resource inventory and landowner objectives. Include a map showing stands or management units and a timetable for completion of recommended activities.

For additional information

Finley, James C. *Pennsylvania Woodlands No. 3: Resource Evaluation*. University Park: The Pennsylvania State University.

Harvey, Helene, and James C. Finley. *Forest Stewardship No. 6: Planning Your Forest's Future*. University Park: The Pennsylvania State University.

Forest Operations

REGENERATION AND RENEWAL

Objective

To ensure that the forest of the future is productive.

Issue

Timber is being harvested without regard for forest regeneration and renewal (growth of a new forest plant community).



Considerations and concerns

1. Pennsylvania's forests are maturing; harvesting should lead to renewal.
2. Preharvest assessment of advanced regeneration and potential problems will minimize the possibility of regeneration failure.
3. Deer are having a major impact on forest regeneration.
4. Pennsylvania forests lack advanced regeneration of desirable species.
5. Once seed sources of desirable species are gone, it is difficult to reproduce a productive forest for the future.

BMPs

1. Assess advanced regeneration, seed sources for postharvest regeneration, and potential stump and root sprouting.
2. Assess and, if necessary, control competing vegetation such as ferns, grasses, and other undesirable *understory* tree and shrub species.
3. Assess and, if necessary, control the potential loss of seed, seedlings, and sprouts to deer and other wildlife.
4. Provide for regeneration each time harvests are made under the uneven-aged system.
5. Consider the biological requirements of the species you want to regenerate, whether by natural reproduction or planting.

For additional information

Bihun, Yuri, James C. Finley, Stephen B. Jones, and Ellen Roane. *Forest Stewardship No. 7: Timber Harvesting: An Essential Tool of Forest Stewardship*. University Park: The Pennsylvania State University.

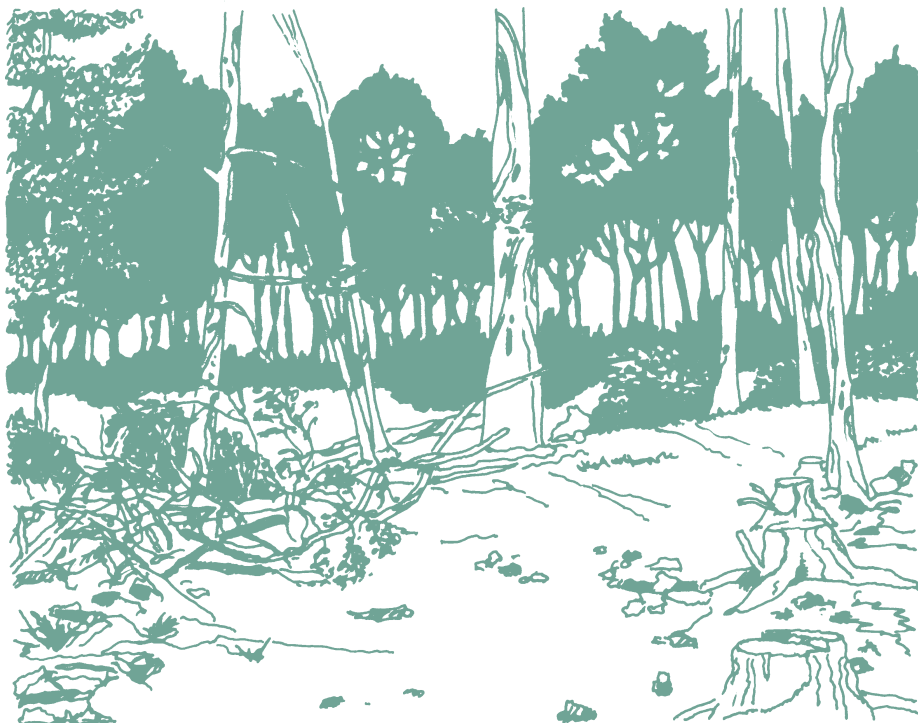
Grace, James R. *Pennsylvania Woodlands No. 8: Principles of Silviculture*. University Park: The Pennsylvania State University.

Grace, James R. *Pennsylvania Woodlands No. 10: Hardwood Management for Economic Return*. University Park: The Pennsylvania State University.

Forest Operations

TENDING

Stand—residual stand protection



Objective

To minimize the negative impacts of management activities on vegetation remaining on the site.

Issue

The stand that will remain after intermediate treatments is subject to damage or degradation during forest management operations.

Considerations and concerns

1. Intermediate treatments should leave the forest in better condition than it was in before the activity was undertaken.
2. Careless operation of equipment results in damaged trees.
3. Proper planning can minimize the chances of damaging or degrading the residual stand.

BMPs

1. Focus on protection of the residual stand rather than on the trees being removed.
2. During intermediate operations, retain seed source of species needed to achieve long-term management objectives.
3. Avoid intermediate cuttings that may increase interfering plant communities, such as grasses and ferns, or be prepared to treat interfering vegetation before the regeneration cut.
4. Design and lay out *skid trails* (trails used to drag logs that require less construction than skid roads because of less frequent use) and *skid roads* (designed for frequent use by skidding equipment and usually incorporating water control structures) to minimize damage by avoiding

residual trees and using *bumper trees* (trees left standing along skid trails and roads until the end of the harvesting operation) to protect them from skidding damage.

5. Exercise special care when harvesting trees during the growing season (usually between April and August), when residual trees are most susceptible to felling and skidding damage.
6. Identify and mark unique vegetation to be protected.
7. Ensure that a stand compatible with long-term management objectives remains after intermediate treatments. Instead of selecting for cutting, select for retention:
 - a. species adapted to the site
 - b. trees not likely to develop *epicormic branching* (branching that occurs after other branches have developed higher on the tree trunk) from exposure to increased sunlight
 - c. properly spaced trees
8. Avoid high-grading (see page 2).

For additional information

Grace, James R. *Pennsylvania Woodlands No. 10: Hardwood Management for Economic Return*. University Park: The Pennsylvania State University.

Forest Operations

TENDING

Stand—insects, diseases, and fire

Objective

To minimize the adverse effects of insects, diseases, and fire on forest resources.

Issue

Insects, diseases, and fire can make it difficult to accomplish forest management goals and objectives.

Considerations and concerns

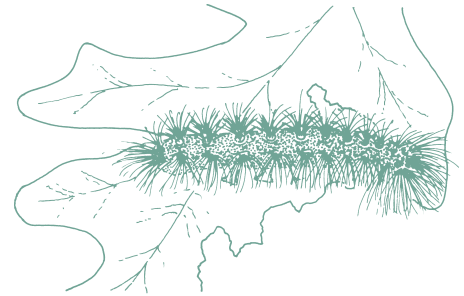
1. Most landowners and some resource professionals fail to recognize the effects of insects and diseases on forests.
2. Proper management can minimize the impacts of insects and diseases.
3. Landowner objectives may have to be modified to deal with insects and diseases.

BMPs

1. Monitor insect and disease populations.
2. Take appropriate control measures when insects or diseases are likely to prevent the accomplishment of landowner goals and objectives.
3. Consider increasing species diversity, changing species composition or stand structure to minimize susceptibility to insect and disease attack.
4. Maintain access roads to facilitate fire control.
5. Consider a timber harvest to salvage dead and dying trees.

For additional information

Skelly, J. M., et al. *Diagnosing Injury to Eastern Forest Trees*. USDA Forest Service, Forest Pest Management and The Pennsylvania State University.



Forest Operations

TENDING

Site quality protection—productivity

Objective

To protect the soil's ability to sustain desired plant and animal communities.

Issue

Operations at the wrong location and during inappropriate weather can damage soil structure and lower *site quality*.

Considerations and concerns

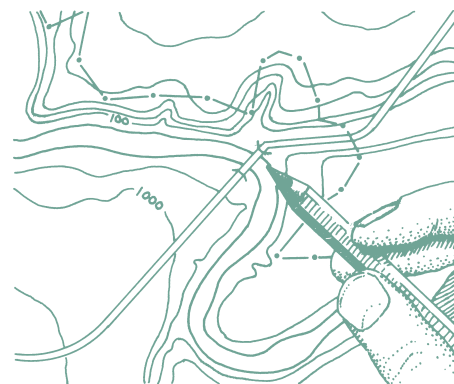
1. Current equipment makes it possible to move large volumes of timber in all kinds of weather and soil conditions.
2. Careful removal of forest products can be the key to having a productive forest in the future.
3. Soil compaction inhibits regeneration.
4. Deep ruts can damage roots, which can lead to decay, stain, reduced growth, and mortality.

BMPs

1. Minimize soil compaction and rutting by matching operating techniques, season of operation, and equipment to soil types and moisture levels.
2. Use soil surveys, topographic maps, and on-site evaluations as guides when planning *log landing* (area at end of a skid road where harvested timber is stored or prepared for transport), skid road, and *haul road* (road used by trucks to move harvested timber from the log landing to its destination) locations.
3. Modify landing and road locations to reflect actual soil, *parent material* (rock from which soil is derived), and topographic conditions.
4. Keep the landing and road network at minimum size necessary to remove harvested timber efficiently.
5. Do not contaminate soils with fuels, lubricants, and other chemicals.

For additional information

Department of Environmental Protection Bureau of Watershed Management. 2005. *Timber Harvest Operations Field Guide for Waterways, Wetlands, and Erosion Control*. Harrisburg, Pa.



Forest Operations

TENDING

Site quality protection—water resources



Objective

To minimize the movement of soil into water resources during forest management operations.

Issue

Erosion and sedimentation from forest management activities can affect water quality.

Considerations and concerns

1. Operations that affect soil and water are regulated by law.
2. Small changes in the operation can eliminate many of the negative impacts.
3. Forested wetlands are often difficult to identify, especially during dry seasons.

BMPs

1. Comply with all provisions of Chapter 102 and Chapter 105 of the Clean Streams Law and the Dam Safety and Encroachments Act, respectively.
2. Design roads to shed surface water quickly.
3. Design roads and landings to prevent or divert surface water flow.
4. Avoid locating roads and landings on *seasonally wet* soils (refers to wetlands that have water at or near the surface only during periods of abundant rainfall or snow melt).
5. Consider slope when laying out roads and landings.
6. Provide adequate riparian buffers between disturbed areas, such as roads or landings, and streams or wetlands.
7. Bridges and culverts are the preferred methods of crossing *intermittent* (not flowing continuously throughout the year) and *perennial* (continuous flow) streams.
8. Cross wetlands only when absolutely necessary.
9. If forest operations necessitate taking heavy equipment into wetlands, conduct those operations, whenever possible, during the driest periods or when the wet area is solidly frozen.
10. Do not skid through water courses or spring seeps.

11. Do not contaminate water bodies and soil with forest management chemicals and petroleum products.
12. Retire the road network properly at the completion of operations.

For additional information

Department of Environmental Protection Bureau of Watershed Management. 2005. *Timber Harvest Operations Field Guide for Waterways, Wetlands, and Erosion Control*. Harrisburg, Pa.

Forest Values

AESTHETIC CONSIDERATIONS

Objective

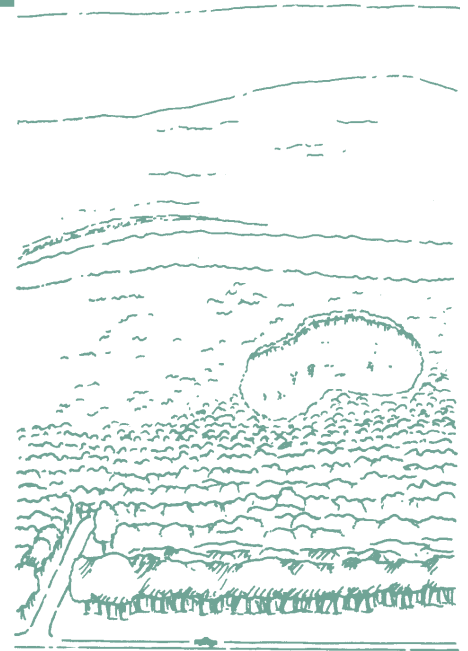
To minimize the adverse visual effects of harvesting and other forest management activities.

Issue

Much of the opposition to forest management activities, particularly harvesting, is due to the changed physical appearance of the area.

Considerations and concerns

1. Most landowners are concerned about the appearance of their property.
2. Acceptance of forest management activities by the general public is increased by having the job look good.



BMPs

1. Cut all broken trees, *leaners* (trees tipped or dislodged during a harvesting operation), and badly scarred trees except where they are being retained for a specific purpose.
2. Locate landings away from public view.
3. Protect and release from competition trees with unusual shapes and colors.
4. Design cutting areas to take advantage of natural contours; avoid straight lines when possible.
5. Lop (cut up) tops of harvested trees near public roads, frequently used trails, recreational areas, and residential sites. (Note: This might increase the adverse impacts of deer on regeneration since intact tree tops left behind help protect young growth.)
6. Use as much of the harvested wood as possible to minimize debris. (Note: This might reduce habitat for small mammals, reptiles, amphibians, and beneficial insects.)
7. Clean up all *refuse* (human-made debris) daily.
8. Regrade and seed landings using native grasses wherever possible.
9. Keep mud off public roads and out of streams.
10. Consider leaving a visual buffer along traveled roads.

For additional information

Kendra, Angelina, and Ellen M. O'Donnell. *Forest Stewardship No. 8: Planning for Beauty and Enjoyment*. University Park: The Pennsylvania State University.

Forest Values

UNDERSTANDING WILDLIFE HABITATS

Objective

To consider the impacts of forest management activities on wildlife resources and understand the trade-offs necessary to accomplish landowner goals and objectives.

Issue

Forest management activities have positive and negative effects on wildlife resources.

Considerations and concerns

1. Wildlife is important to landowners and the general public.
2. The effects of forest management activities on wildlife are often overlooked.

BMPs

1. Inventory habitat features on the property and be aware of their relationship to surrounding lands.
2. Protect sensitive habitats, such as spring seeps, vernal ponds, riparian zones, cliffs, caves, and *rubble land* (area with high content of large rock fragments).
3. Develop missing special habitats, such as evergreen cover, grape arbors, and herbaceous (nonwoody plants) openings, through planting, cutting, or other manipulations.
4. Protect cavity trees, snags, and food-producing shrubs and vines.
5. Maintain overhead shade along cold-water streams.
6. Use forest management activities to develop habitats required by species desired by the landowner.

For additional information

Brooks, Robert P., Daniel A. Devlin, and Jerry Hassinger. 1994. *Wetlands and Wildlife*. University Park: The Pennsylvania State University.

Hassinger, Jerry, Lou Hoffman, Michael J. Puglisi, Terry D. Rader, and Robert G. Wingard. 1979. *Woodlands and Wildlife*. University Park: The Pennsylvania State University.

Hassinger, Jerry, and Jack Payne. *Pennsylvania Woodlands No. 7: Dead Wood for Wildlife*. University Park: The Pennsylvania State University.

Sullivan, Kristi L., and Margaret C. Brittingham. *Forest Stewardship No. 5: Wildlife*. University Park: The Pennsylvania State University.



Forest Values

SPECIES OF SPECIAL CONCERN AND UNIQUE HABITATS

Objective

To recognize the importance and contribution of unique or special resources to the ecological integrity of the property and the Commonwealth.



Issue

Unique areas and plant and animal species of special concern need to receive specific attention in forest management activities.

Considerations and concerns

1. Landowners often are unaware of the existence of species of special concern or unique areas on their properties.
2. Many landowners would be willing to protect special resources on their properties if they had information and advice on what actions to take to protect them.
3. The loss of additional endangered, threatened, or rare species will diminish the biological wealth of our state.

BMPs

1. Become aware of the presence of and protect endangered, threatened, and rare species' habitats and unique habitat features.
2. Know the habitat requirements of endangered, threatened, and rare species on the property so that activities can be planned to either avoid disturbing or enhance these habitats.
3. Keep in mind that plant habitats can be very small and specific. Learn to recognize these special microsites (small areas in which soil nutrients, water availability, sunlight, and other resources affect only one or a few trees and other plants).
4. Develop specific management plans for unique areas and habitats with the help of a resource professional.

For additional information

McGuinness, Barbara J., ed. 1995. *A Heritage for the 21st Century: Conserving Pennsylvania's Native Biological Diversity*. Harrisburg: Pennsylvania Fish and Boat Commission.

Pennsylvania Fish and Boat Commission and Pennsylvania Game Commission. 1985. *Endangered and Threatened Species of Pennsylvania*. Harrisburg: Wild Resource Conservation Fund.

Regulations Affecting Forest Management

Timber harvesting activities are subject to a number of federal, state, and local regulations. These include Section 404 of the Federal Water Pollution Control Act, Chapter 102 of Pennsylvania's Clean Streams Law, Chapter 105 of Pennsylvania's Dam Safety and Encroachments Act, Municipal Notification of DEP Permit Application Submittal, and Pennsylvania's Fish and Boat Code. The Pennsylvania Department of Environmental Protection can provide information about these regulations. Pennsylvania Department of Transportation (PennDOT) regulations that apply include Chapter 441, Access to and Occupancy of High-

ways by Driveways and Local Roads; and Chapter 189, Road Bonding Regulations.

In Pennsylvania, the Right to Practice Forestry Act and the Timber Trespass Law also apply. The DCNR Bureau of Forestry can familiarize you with these regulations, which were enacted to protect landowners and others involved with timber harvesting.

Most municipalities have regulations concerning zoning and land use. A growing number of municipalities also have regulations concerning earth moving, timber harvesting, and other activities associated with forest management. These regulations vary considerably from one municipality to another, so be sure to familiarize yourself with the laws in your area.

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