

APPENDIX D: NONINDUSTRIAL PRIVATE FOREST (NIPF) MANAGEMENT

The approximately 10 million nonindustrial private forest (NIPF) owners in the United States include individuals, partnerships, estates, trusts, clubs, tribes, corporations, and associations (Pennsylvania State University, 2000). NIPF owners control 261 million acres of timberland and 58 percent of the commercial forests in the United States. More than two-thirds of timberland east of the Mississippi River is in NIPF ownership, whereas the majority of timberland in the West is in public ownership. NIPFs protect watersheds, provide wildlife habitat, offer scenic beauty, and supply 49 percent of the timber harvested in the United States (USDA-FS, 1992).

Many NIPF owners are not fully aware of the potential economic value of properly-managed timberland. Some are unaware of how to properly manage their timber resources (Pennsylvania State University, 2000). Proper management might be secondary to avoiding annual property taxes and capital gains taxes for some owners. Some other owners who do not plan properly for the inheritance their timberland might lose ownership upon their death, and still others, unaware of either management techniques or the economic value of the land, might decide to convert the land to other uses, such as development or agriculture. Owners who view harvesting of the timber on their land as a one-time capital gain may not be aware of the long-term economic and environmental benefits of sustainable timberland management. Andrew Egan of West Virginia University and Stephan Jones of the Alabama Cooperative Extension System studied NIPF owners and timberland management, and found that landowners with knowledge of forests and forestry are more likely to manage their forests in a sustainable manner (Pennsylvania State University, 2000).

*Forest*A*Syst*, by Rick Hamilton, extension forestry specialist with the Department of Forestry, North Carolina State University, is a self-assessment guide directed at encouraging forest owners to manage their forests for recreation and aesthetics, wildlife, and timber production, while protecting water quality. The guide discusses steps in developing a forest management plan and strongly recommends the assistance of a professional forester in this process. Major topics are site preparation, natural regeneration, artificial seeding, tree planting, weed control, and fertilization in young and middle-age stands; harvesting the mature forest; managing for wildlife habitat; enhancing the visual appearance of the site; improving recreational opportunities; and using management practices to protect water quality. A *Forest*A*Syst* guide for western North Carolina has been developed from the national *Forest*A*Syst* prototype developed by Mr. Hamilton. A similar guide is available for eastern North Carolina. Other states' programs have spun off from the national version, as well, including Tennessee and Alaska, Georgia (in process), New England (developing a *Forest*A*Syst* model for the region), and Kentucky and Hawaii (in process) (Leith, 2002). For additional information on distribution of the publication and support for adapting it to state and local conditions, contact Rick Hamilton at

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Proper implementation of forestry management measures can maintain fish and wildlife habitat, clean water, biological diversity, aesthetics, and a buffer from urban sprawl. To maintain these values, it is recommended that NIPF landowners follow the guidance of the management measures for forestry to protect water quality set forth in this guidance. Because some of the management measures and BMPs mentioned in the guidance, however, are more relevant to state, federal, and industrial timberland owners, this appendix is provided to focus on certain aspects of planning and managing timberlands that are especially intended to assist NIPF owners in addressing BMP implementation and forest management.

Individual landowners are encouraged to use this guidance to manage and protect water quality on their private forestland. If you have turned directly to this appendix, thinking perhaps that the main sections of the guidance are meant for state agencies and industrial landowners, please take the time to review the rest of the document, especially Section 3. The management measures and practices described in the guidance are applicable to all forest landowners, whether 10 acres or 10,000 acres are being managed. Some of the management measures will be more applicable to some forest management goals than others, but the concepts contained in them are equally relevant to water quality protection in all managed forests where trees are harvested.

Preharvest Planning:

Below are listed some of the more important management practices for achieving the Management Measure for Preharvest Planning. Complete discussions of these and other management practices for preharvest planning can be found in Section 3A. Additional management practices that are particularly applicable to the NIPF landowner follow this listing.

Harvest Planning Practices

- ◆ *Use topographic maps, aerial photographs, soil surveys, geologic maps, and rainfall intensity charts to augment site reconnaissance to lay out and map harvest units. Identify and mark, as needed:*
- ◆ *Consider potential water quality and habitat impacts when selecting the silvicultural system as even-aged (clear-cut, seed tree, or shelterwood) or uneven-aged (group or individual selection). The yarding system, site preparation method, and any pesticides that will be used should also be addressed in preharvest planning. As part of this practice the potential impacts from and extent of roads needed for each silvicultural system should be considered.*
- ◆ *In high-erosion-hazard areas, trained specialists (geologist, soil scientist, geotechnical engineer, wild land hydrologist) should identify sites that have high risk of landslides or that might become unstable after harvest. These specialists can recommend specific practices to reduce the likelihood of erosion hazards and protect water quality.*

Road System Planning Practices

- ◆ *Preplan skid trail and landing locations on stable soils and avoid steep gradients, landslide-prone areas, high-erosion-hazard areas, and poor-drainage areas.*
- ◆ *Identify areas that will require the least modification for use as log landings and use them to reduce the potential for soil disturbance. Use topographic maps and aerial photographs to locate these areas.*
- ◆ *Plot feasible routes and locations on an aerial photograph or topographic map to assist in the final determination of road locations.*
- ◆ *Design roads and skid trails to follow the natural topography and contour, minimizing alteration of natural features.*
- ◆ *In moderately sloping terrain, plan for road grades of less than 10 percent, with an optimal grade of between 3 percent and 5 percent. In steep terrain, short sections of road at steeper grades can be used if the grade is broken at regular intervals. Vary road grades frequently to reduce culvert and road drainage ditch flows, road surface erosion, and concentrated culvert discharges.*
- ◆ *Plan to surface most forest roads, and select a road surface material suitable for the intended road use.*
- ◆ *Lay out roads, skid trails, and harvest units to minimize the number of stream crossings.*
- ◆ *To minimize soil disturbance and road damage, plan to suspend operations when soils are highly saturated. Damage to forested slopes can also be minimized by not operating logging equipment when soils are saturated, during wet weather, or when the ground is thawing.*
- ◆ *Select waterway opening sizes to minimize the risk of washout during the expected life of the structure. Opening size will vary depending on the drainage area of the watershed where the stream-crossing structure is to be placed.*

Additional management practice recommendations for the NIPF landowner

- ◆ *Locate property lines.*

The location of property lines might restrict the use of the best access locations. If significant environmental impact (e.g., erosion, water body sedimentation, numerous stream crossing) could be avoided by crossing adjacent property to provide access, consider negotiating or purchasing a right-of-way from the owner of the property.

The USDA Forest Service has produced a document titled *A Landowner's Guide to Building Forest Access Roads* (Wiest, 1998). This document, along with the assistance of a consulting forest engineer, provides support in road planning and location. To receive a copy of this document, contact the USDA Forest Service, Northeastern Area State and Private Forestry, in Radnor, Pennsylvania, (610) 975-4017, or order a copy from the web site at <<http://www.na.fs.fed.us/spfo/pubs/stewardship/accessroads/accessroads.htm>>.

◆ *Inventory the property.*

Managing timberland requires knowledge of what is on the property. Conduct an inventory to identify features of the land such as streams, steep slopes, eroding or erodible soils, roads and trails, and sensitive wildlife habitats. Aerial photos can be useful for an inventory, but if they are not available for the property, U.S. Geological Survey (USGS) quadrangle map(s) of the area can be used to locate these resources and create a permanent record of them on a map. USGS quadrangle maps show contour lines (steepness of the terrain), existing roads, waterbodies, springs, and buildings. They cost approximately \$5 per map and are available for all of the United States.

◆ *Develop a forest management plan.*

Before harvesting operations begin, develop a forest management plan that contains goals, objectives, possible alternatives to harvesting, future planning, and the trade-offs that accompany altering the land. Contact the state department of forestry or cooperative extension service for information on forest harvesting BMPs and their implementation. A logging company is often the primary source of information regarding forestry and nonpoint source pollution control for NIPF owners, and only by first becoming familiar with the various BMPs can the NIPF landowner be assured that a contractor is choosing and implementing BMPs properly.

The use of a consulting forester or state forester is extremely helpful when developing a forest management plan. The forester can assist with all aspects of forest management and harvest, including the layout of roads and logging decks, BMP implementation, stream protection, and the proper use of chemical. The forester can also educate the NIPF owner about topics such as watershed protection and sustainable forest management.

Streamside Management Areas:

Below are listed some of the more important management practices for achieving the Management Measure for Streamside Management Areas. Complete discussions of these and other management practices for preharvest planning can be found in Section 3B.

- Minimize disturbances that would expose the mineral soil of the SMA forest floor. Do not operate skidders or other heavy machinery in the SMA.
- Locate all landings, portable sawmills, and roads outside the SMA.
- Restrict mechanical site preparation in the SMA, and encourage natural revegetation, seeding, and hand planting.
- Limit pesticide and fertilizer usage in the SMA. Establish buffers for pesticide application for all flowing streams.
- Directionally fell trees away from streams to prevent logging slash and organic debris from entering the water body. If slash and debris are in the stream as a result of harvesting practices, remove them immediately.
- Apply harvesting restrictions in the SMA to maintain its integrity.

Road Construction/Reconstruction:

Below are listed some of the more important management practices for achieving the Management Measure for Road Construction and Reconstruction. Complete discussions of these and other management practices for preharvest planning can be found in Section 3C.

Road Surface Construction Practices

- ◆ *Follow the design developed during preharvest planning to minimize erosion by properly timing and limiting ground disturbance operations.*
- ◆ *Properly dispose of organic debris generated during road construction.*
- ◆ *Prevent slash from entering streams and promptly remove slash that accidentally enters streams to prevent problems related to slash accumulation.*

Road Surface Drainage Practices

- ◆ *Install surface drainage controls at intervals that remove storm water from the roadbed before the flow gains enough volume and velocity to erode the surface. Route discharge from drainage structures onto the forest floor so that water will disperse and infiltrate. Methods of road surface drainage include the following:*
- ◆ *Install turnouts, wing ditches, and dips to disperse runoff and reduce the amount of road surface drainage that flows directly into watercourses.*
- ◆ *Install appropriate sediment control structures to trap suspended sediment transported by runoff and prevent its discharge into the aquatic environment.*

Road Slope Stabilization Practices

- ◆ *Use straw bales, straw mulch, grass-seeding, hydromulch, and other erosion control and revegetation techniques to complete the construction project. These methods are used to protect freshly disturbed soils until vegetation is established.*
- ◆ *Revegetate or stabilize disturbed areas, especially at stream crossings.*

Stream Crossing Practices

- ◆ *Construct stream crossings to minimize erosion and sedimentation.*
- ◆ *Install a stream crossing that is appropriate to the situation and conditions.*

Fish Passage Practices

- ◆ *On streams with important spawning areas, avoid construction during egg incubation periods.*
- ◆ *Design and construct stream crossings for fish passage according to site-specific information on stream characteristics and the fish populations in the stream where the passage will be installed.*

Road Management:

Below are listed some of the more important management practices for achieving the Management Measure for Road Management. Complete discussions of these and other management practices for preharvest planning can be found in Section 3D.

Road Maintenance Practices

- ◆ *Blade and reshape the road to conserve existing surface material; to retain the original, crowned, self-draining cross section; and to prevent or remove berms (except those designed for slope protection) and other irregularities that retard normal surface runoff.*
- ◆ *Maintain road surfaces by mowing, patching, or resurfacing as necessary.*
- ◆ *Clear road inlet and outlet ditches, catch basins, culverts, and road-crossing structures of obstructions as necessary.*

Wet and Winter Road Practices

- ◆ *Before winter, all permanent, seasonal, and temporary roads should be inspected and prepared for the winter months.*

Stream Crossing and Drainage Structure Practices

- ◆ *When temporary stream crossings are no longer needed, and as soon as possible upon completion of operations, remove culverts and log crossings to maintain adequate streamflow.*
- ◆ *During and after logging activities, ensure that all culverts and ditches are open and functional.*
- ◆ *Revegetate disturbed surfaces to provide erosion control and stabilize the road surface and banks.*

Section 319 requires states to assess nonpoint source pollution and implement management programs, and it authorizes EPA to provide grants to assist state nonpoint source pollution control programs.

Timber Harvesting:

Below are listed some of the more important management practices for achieving the Management Measure for Timber Harvesting. Complete discussions of these and other management practices for preharvest planning can be found in Section 3E. Additional management practices that are particularly applicable to the NIPF landowner follow this listing.

Harvesting Practices

- ◆ *Fell trees away from watercourses whenever possible, keeping logging debris from the channel, except where debris placement is specifically prescribed for fish or wildlife habitat.*
- ◆ *Immediately remove any tree accidentally felled in a waterway.*
- ◆ *Remove slash from the water body and place it outside the SMA.*

Practices for Landings

- ◆ *Landings should be no larger than necessary to safely and efficiently store logs and load trucks.*
- ◆ *Upon completion of a harvest, clean up, regrade, and revegetate the landing.*

Ground Skidding Practices

- ◆ *Skid uphill to log landings whenever possible. Skid with ends of logs raised to reduce rutting and gouging.*
- ◆ *Skid perpendicular to the slope (along the contour), and avoid skidding on slopes greater than 40 percent.*

Cable Yarding Practices

- ◆ *Use cabling systems or other systems when ground skidding would expose excess mineral soil and induce erosion and sedimentation.*
- ◆ *Avoid cable yarding in or across watercourses.*

Petroleum Management Practices

- ◆ *Service equipment at a location where any spilled fuel or oil will not reach watercourses, and drain all petroleum products and radiator water into containers.*
- ◆ *Dispose of wastes and containers in accordance with proper waste disposal procedures.*
- ◆ *Take precautions to prevent leakage and spills.*

Additional management practice recommendations for the NIPF landowner

- ◆ *Participate actively in the timber harvest.*

It is important that the NIPF landowner be an active participant in the timber harvest process. Working with the harvesting contractor and state forester, verify that road layout, stream protection, landing locations, skid trail layout, and drainage BMPs all follow the plan developed in the preharvest planning phase. Review the management measures in this guidance prior to developing a plan, note those measures and BMPs particularly relevant to your situation, discuss them with a state forester, and then participate in the harvest to be certain that it is conducted in a manner compatible with the sustainability of your property.

Site Preparation and Forest Regeneration:

Below are listed some of the more important management practices for achieving the Management Measure for Site Preparation and Forest Regeneration. Complete discussions of these and other management practices for preharvest planning can be found in Section 3F.

Site Preparation Practices

- ◆ *Mechanical site preparation should not be conducted on slopes greater than 30 percent.*
- ◆ *Do not conduct mechanical site preparation in SMAs.*

Forest Regeneration Practices

- ◆ *Order seedlings well in advance of planting time to ensure their availability.*
- ◆ *Hand plant highly erodible sites, steep slopes, and lands adjacent to stream channels (SMAs).*

Fire Management:

Below are listed some of the more important management practices for achieving the Management Measure for Fire Management. Complete discussions of these and other management practices for preharvest planning can be found in Section 3G. Additional management practices that are particularly applicable to the NIPF landowner follow this listing.

Prescribed Fire Practices

- ◆ *Carefully plan burning to take into account weather, time of year, and fuel conditions so that these help achieve the desired results and minimize impacts on water quality.*
- ◆ *Intense prescribed fire for site preparation should not be conducted in the SMA.*
- ◆ *Execute the burn with a trained crew and avoid intense burning.*

Additional management practice recommendations for the NIPF landowner

- ◆ *Contact a state forester before any prescribed burning.*

Prescribed burning poses many potential hazards, and the NIPF landowner must be aware of these. Before using fire as a management tool, consult with a professional forester to obtain information on permits, burning times and procedures, equipment, current fire conditions, and safety precautions.

- ◆ *Notify adjacent landowners.*

Before burning, notify adjacent landowners, the local county sheriff, and local fire departments to let them know the date of the burn. A permit might be required for the burn, and it might specify a time period during which the burn must occur. If the burn is not done during the specified period, a new permit must be obtained. Letting all potentially affected parties know that a burn will take place will lessen the likelihood that the fire department will be called to put out the fire. The date of the prescribed burn is always subject to change due to changing weather and fire hazard conditions, and if the date does change, inform the previously notified parties of the new date.

- ◆ *Hire a professional.*

A landowner who is not proficient in prescribed burning should hire a contractor to perform the burn. Investigate the background and record of any contractor contacted and

ask the contractor to provide testimonies of his or her work. Ask the local forestry department, cooperative extension service, or fire department if they have knowledge of the contractor as well. Remember that having a contractor perform the burn does not release the landowner of obligations to notify potentially affected parties, obtain legal information and permits, and ensure that the burn is conducted within the conditions of the permit or recommendations made by the fire or forestry department with respect to time of day, safety precautions, and so forth.

Revegetation of Disturbed Areas:

Below are listed some of the more important management practices for achieving the Management Measure for Revegetation of Disturbed Areas. Complete discussions of these and other management practices for preharvest planning can be found in Section 3H.

- ◆ *Use mixtures of seeds adapted to the site, and avoid the use of exotic species. Species should consist primarily of annuals to allow natural revegetation of native understory plants, and they should have adequate soil-binding properties.*
- ◆ *Seed during optimum periods for establishment, preferably just before fall rains or whenever the optimum period might be for the region.*
- ◆ *Fertilize according to site-specific conditions.*
- ◆ *Inspect all seeded areas for failures, and make necessary repairs and reseed within the planting season.*
- ◆ *During non-growing seasons, apply interim surface stabilization methods to control surface erosion.*

Forest Chemical Management:

Below are listed some of the more important management practices for achieving the Management Measure for Forest Chemical Management. Complete discussions of these and other management practices for preharvest planning can be found in Section 3I. Additional management practices that are particularly applicable to the NIPF landowner follow this listing.

- ◆ *Apply pesticides and fertilizers during favorable atmospheric conditions.*
- ◆ *Apply slow-release fertilizers when possible.*
- ◆ *Apply fertilizers during maximum plant uptake periods to minimize leaching.*
- ◆ *Consider the use of pesticides as only one part of an overall program to control pest problems.*

Additional management practice recommendations for the NIPF landowner

- ◆ *Contact a state forester.*

Forest landowners who intend to apply chemicals to manage their timber stands should first contact a local forester. The forester will be able to provide information on approved

pesticides and fertilizers, application guidelines or requirements, and a list of licensed applicators. It might be possible to hire state foresters to apply chemicals, or they might be willing to act as a foreman on the site to ensure that proper application procedures are followed and hire a licensed contractor to perform the work. Information on such arrangements, for which the landowner pays only part of the total cost, should be available from the state department of forestry or the local cooperative extension service.

Wetlands Forest Management:

Below are listed some of the more important management practices for achieving the Management Measure for Wetlands Forest Management. Complete discussions of these and other management practices for preharvest planning can be found in Section 3J. Additional management practices that are particularly applicable to the NIPF landowner follow this listing.

- ◆ *Select the harvesting method to minimize soil disturbance and hydrologic impacts on the wetland.*

Additional management practice recommendations for the NIPF landowner

- ◆ *Contact a state forester or soil scientist to identify forested wetlands.*

Forested wetlands can be difficult to identify. They can occupy very small areas or large areas, can be of any shape, and need not be permanently flooded. Delineation of an area as a wetland requires that three criteria be met:

- Hydrology—a degree of flooding or soil saturation
- Hydrophytic vegetation (vegetation specific to wetlands)
- Hydric soils

These three components can be very site-specific. Differentiating a forested wetland from a non-wetland forest can be difficult. Wetland areas on a property need not be contiguous, and it is possible for a property to have several wetland areas. Some wetlands might be large and easily identified, whereas others might be small and very inconspicuous (Mitsch et al., 1993). Furthermore, different plant species are adapted to the various conditions that wetlands can occupy, so the absence of wetland plants identified in one wetland area from other areas does not mean that other wetlands do not exist on the property. Because of the complexity of wetland identification, a person licensed in wetland delineation should be consulted if there is any doubt as to whether wetlands exist on a property.

An initial assessment of the existence of wetlands on a property can be done by walking the property and asking some simple questions (Maryland DNR, undated):

- Is the ground moist underfoot?
- Are there springs in the area? (Look at a USGS quadrangle map.)
- Are the tree species considered hydrophytic vegetation? (Use a wetlands tree guide.)
- Are there high-water marks or silt deposits on tree trunks?
- Is water ponded anywhere?

- Do your feet sink into the soil when you walk?
- Dig a hole about a foot deep. Is the soil mostly gray?
- Does the soil in the hole smell like sulphur or rotten eggs?
- Does the hole fill up with water? Does water leak into the hole?
- Is there lush vegetation in some areas and not in others?

To help answer some of the questions, it is useful to have field guides to identify wetland species. Field guides provide descriptions of trees and other wetland vegetation and information on their ranges and habitats.

Contact the local office of the Soil Conservation District to determine whether there are hydric soils on the property. The office will be able to provide a map of the soil series of the property.

Water Quality Protection During Invasive Species Control

Invasive species are gaining a foothold in many parts of the United States, and they can cause extensive damage to a forest. Introduced insects, diseases, and plants can all cause problems for the forest landowner, and the means of control include mechanical, chemical, and biological. Mechanical and chemical control methods, in particular, have the potential to affect water quality. Prior to attempting control of an invasive species, consider using the practices below for the protection of water quality during invasive species control activities. The U.S. Department of Agriculture, the U.S. Forest Service, state forestry agencies, cooperative extension agencies, and local or state universities can provide additional assistance with the identification of invasive species, the problems they cause, and appropriate control methods. Even if you do not believe that you have an invasive species problem, or that your problem is not serious enough to do anything about, it is advised to find out what the invasive species in your area are and what their signs are. Knowing what the problems are can help prevent them or help you identify them before the problem becomes insurmountable and your losses significant.

◆ *Consult a state forester before using mechanical control methods.*

The control of invasive species usually requires the implementation of either chemical or mechanical means of control. To ensure that water quality is not compromised when these practices are used, consult with the local county forester before taking any action.

Mechanical control methods used to eradicate an invasive plant, insect, or disease can potentially impair water quality. Some mechanical methods of invasive species removal are cutting, girdling, hand pulling, burning, and grubbing. Some species that can be managed through mechanical control are kudzu (*Pueraria lobata*), tree of heaven (*Ailanthus altissima*), leafy spurge (*Euphorbia esula*), mistletoe (*Phoradendron serotinum*), purple loosestrife (*Lythrum salicaria*), scotch broom (*Cytisus scoparius*), saltcedar (*Tamarix ramosissima*), spruce bark beetle (*Dendroctonus rufipennis*), Douglas fir beetle (*Dendroctonus pseudotsugae*), fusiform rust (the fungus *Cronartium fusiforme*), and pine pitch canker (the fungus *Fusarium subglutinans*). The cooperative extension service should be able to provide information on invasive species in your area and appropriate

control methods. The following guidelines apply to water quality protection during invasive species control activities:

- Remove invasive species from the SMA only if water quality will not be compromised.
- Do not burn SMAs to eradicate an invasive species.
- Avoid removing infected trees during wet weather periods. This will help reduce erosion potential at the site of removal and on haul roads.

Chemical control of invasive species involves the application of herbicides, pesticides, or fungicides to remove unwanted pests. Review the guidelines for chemical applications in this guidance and provided by your state forestry department before using chemicals for invasive species control.

Additional Resources for the NIPF Landowner:

Landowner's Guide to Building Forest Access Roads, by Richard L. Wiest, is a designed for landowners in the northeastern United States who will use a tractor and ordinary earth moving equipment to build the simplest access roads on their property, or who will contract for these services. Recommendations cover basic planning, construction, drainage, maintenance and closure of such forest roads. Also covers special situations involving water that require individual consideration. Describes geotextiles to be used during temporary road construction. The guide is published by the U.S. Department of Agriculture, Forest Service, Northeastern Area, State and Private Forestry Division. (1998; 47 p.; order online at <http://www.na.fs.fed.us/spfo/pubs/stewardship/accessroads/accessroads.htm>; first copy free, other copies \$8 ea.).