

CHAPTER 7 – FORESTRY AND WATER QUALITY IMPACTS

Forests are an ideal land use for water quality protection because they stabilize soil and filter stormwater runoff from adjoining, non-forested areas. In order to sustain a forest's ability to protect water quality, some degree of management is often required. Timber harvesting is part of the forest renewal cycle and is usually the most intensive forest management activity that requires special attention to assure water quality is protected. Inappropriate management practices can impact water quality by destabilizing streambanks, reducing riparian vegetation and removing tree canopies. Any one of these impacts can alter the interface of the aquatic and terrestrial ecosystem, influence downstream flooding and change watershed functions.

Sedimentation is the most common water pollution agent that may result from forestry activities. Potential sources of sedimentation include stream crossings, forest roads, skid trails and log decks. As a result, the majority of regulations and erosion control recommendations pertaining to forestry focus on these four main areas. This chapter explores forestry in North Carolina. It includes information on forestland ownership, resources and management. It also includes information related to best management practices (BMPs) and forestry operations. More information on any of the topics in this chapter can be found on the NCDENR Division of Forest Resources Web site (www.dfr.state.nc.us).

7.1 FORESTRY REGULATIONS IN NORTH CAROLINA

Forestry activities in North Carolina are regulated through a series of state and federal rules, laws and regulatory guidance documents. Ongoing forestry, or silviculture, activities should not be confused with land-clearing activities that are undertaken for construction, development, real estate or highway projects. These types of non-forestry activities must have all applicable federal, state and local permits with engineered erosion and sedimentation control plans and stormwater discharge permits. In addition, land-clearing for agriculture or horticulture can include pastures, Christmas tree farms or winery vineyards, none of which are considered forestry silviculture activities.

Major water quality regulations that can directly affect forestry are provided below. All forestry activities must also remain in compliance with state and federal surface water quality standards, including standards for wetland waters.

- ❑ Catawba River Basin: Protection and Maintenance of Existing Riparian Buffers 15A NCAC 02B .0243.
- ❑ Discharges Not Requiring Permits: 33 Code of Federal Regulations (CFR) 323.4.
- ❑ Forest Practices Guidelines (FPGs) Related to Water Quality: 15A NCAC 01I .0100 - .0209.
- ❑ Neuse River Basin Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Existing Riparian Buffers: 15A NCAC 02B .0233.
- ❑ North Carolina Coastal Area Management Act (CAMA): GS 113A-103(5)(b).
- ❑ North Carolina Dredge & Fill Law: GS 113-229.
- ❑ North Carolina Sedimentation Pollution Control Act (SPCA): GS 113A, Article 4.
- ❑ Obstructing streams a misdemeanor: GS 77-13.

- ❑ Obstructions in streams and drainage ditches: GS 77-14.
- ❑ Randleman Lake Water Supply Watershed Protection and Maintenance of Riparian Areas: 15A NCAC 02B .0250.
- ❑ Tar-Pamlico River Basin Nutrient Sensitive Waters Management Strategy: Protection and Maintenance of Existing Riparian Buffers: 15A NCAC 02B .0259.

7.1.1 HISTORY OF THE FOREST PRACTICES GUIDELINES (FPGs) RELATED TO WATER QUALITY

The North Carolina Sedimentation Pollution Control Act (SPCA) (G.S. Ch.113A Art.4) was passed in 1973. Its purpose is to prevent sediment from reaching streams by requiring the installation and maintenance of adequate sediment control measures during site-disturbing activities. The initial law provided a blanket exemption for agriculture and forestry. In 1974, a Forest Practices Act study committee concluded that forestry was not a major contributor of sediment and recommended that voluntary BMPs be developed and used during forestry activities. These generic BMPs were summarized in the publication *Forest Practices Guidelines Related to Water Quality*, referred to as the FPGs.

The FPGs were followed voluntarily until the end of 1989 when they became required. Following an amendment to the SPCA, FPG regulations became effective January 1, 1990. The amendment maintains that forestry operations in North Carolina are subject to regulation under the SPCA but may be exempted if those operations comply with the FPG performance standards defined within Rule 15A NCAC 01I .0100 - .0209. Today, the FPGs are the regulatory foundation upon which all forestry operations are evaluated regarding water quality protection.

7.1.2 MONITORING FPG COMPLIANCE

The NC Division of Forest Resources (NCDFR) is delegated the authority to monitor and evaluate forestry operations for compliance with the FPGs as well as other water quality laws and/or rules. In addition, the NCDFR works to resolve identified FPG compliance questions brought to its attention through citizen complaints. Violations of the FPG performance standards that cannot be resolved by NCDFR are referred to the appropriate state environmental agency for possible enforcement action (Table 7-1)

In addition to state regulations, NCDFR also monitors the implementation of federal rules or guidance relating to water quality and forestry operations in wetlands. These include:

- ❑ Clean Water Act Section 404 silviculture exemption.
- ❑ Fifteen mandatory practices related to road construction in wetlands
- ❑ Six mandatory practices related to mechanical site preparation activities for the establishment of pine plantations in wetlands of the southeastern US.
- ❑ Information Regarding Compliance with the Federal Clean Water Act Section 404(f)(1) Provisions for the Construction of Forest Roads within Wetlands, in North Carolina.

Table 7-1 FPG Inspections and Compliance (1995 to 2006)

| State Fiscal Year | Total FPG Site Inspections | Notices of FPG Non-Compliance | Percent of Sites in Compliance with FPGs |
|-------------------|----------------------------|-------------------------------|--|
| 1995-96 | 3,318 | 192 | 94% |
| 1996-97 | 3,779 | 197 | 95% |
| 1997-98 | 3,782 | 175 | 95% |
| 1998-99 | 3,904 | 176 | 95% |
| 1999-00 | 3,662 | 209 | 94% |
| 2000-01 | 4,700 | 274 | 94% |
| 2001-02 | 4,287 | 205 | 95% |
| 2002-03 | 3,609 | 215 | 94% |
| 2003-04 | 4,129 | 249 | 94% |
| 2004-05 | 4,241 | 229 | 95% |
| 2005-06 | 3,903 | 181 | 95% |
| Totals | 43,314 | 2,302 | 95% |

7.1.3 FPGs vs. BMPs in North Carolina

North Carolina is one of only a few southern states in which regulatory standards exist for how forestry activities are expected to protect water quality. FPGs are codified in the NC Administrative Code; therefore, they are required by law. BMPs, on the other hand, are practical recommendations that can be implemented to help comply with the stated goals of the FPG standards.

Structuring the FPGs in this manner allows for flexibility and best professional judgment of the individuals responsible for the forestry activity. For example, 15A NCAC 01I .0201(a) states:

A streamside management zone (SMZ) shall be established and maintained along the margins of intermittent and perennial streams and perennial waterbodies. The SMZ shall be of sufficient width to confine within the SMZ visible sediment resulting from accelerated erosion.

Note that FPG .0201 does not specify exactly how wide the SMZ must be since each site location and circumstance is different depending upon the type of soil, slope of land, intensity of activity and other factors. In this case, the BMP related to SMZ widths is to establish a SMZ that is 50 feet wide along each side of the stream or waterbody, with provisions for adjusting this width depending upon the site-specific conditions.

7.2 FORESTRY BEST MANAGEMENT PRACTICES (BMPs)

In North Carolina, forestry BMPs are effective, economical and practical treatments, methods or practices that can be implemented to help protect or maintain water quality. NCDFR strongly recommends implementing applicable BMPs when forestry activities occur. It is also important to realize that even good BMPs may not always result in FPG compliance. Just using a BMP does not automatically result in FPG compliance. Think of BMPs as the tools in the toolbox. Examples of forestry BMPs include:

- ❑ Use temporary portable bridgemats for stream or ditch crossings instead of culverts or fords.
- ❑ Avoid de-limbing logs or felling trees into the SMZ.
- ❑ Retain a representative mix of tree species, size and spacing when harvesting in the SMZ.
- ❑ Minimize the number and slope angle of skid trails and roads.
- ❑ Set trails and roads along the land contour, avoiding alignment straight downslope.
- ❑ Avoid operating on a site during saturated soil conditions.

From 2003 to 2006, the first-ever revision to the *North Carolina Forestry BMP Manual* was undertaken. The revision was led by the statutory-defined forestry Technical Advisory Committee (TAC). This comprehensive revision to the BMP manual includes significantly expanded recommendations on many topics, including pre-harvest planning, stream crossings, wetland activities and site stabilization. The new manual should be available by early 2007 and will be accessible via the NCDFR Web site www.dfr.state.nc.us.

7.2.1 BMP IMPLEMENTATION SURVEYS

Beginning in 2000, NCDFR conducted a comprehensive statewide BMP Implementation Survey of active harvest sites in order to determine the degree to which loggers are using BMPs and assess the relative value of each BMP in accomplishing its intended goal. This detailed survey adheres to protocols set forth jointly by the Southern Group of State Foresters and the USDA-Forest Service's Southern Region. Round 1 of this survey ran from 2000 to 2003 and included 565 harvest sites. The average statewide BMP implementation rate was 82 percent. The areas of concern most commonly found in the survey were stream crossings, skid trails and site stabilization. The final report is available in the Water Section of the NCDFR Web site (www.dfr.state.nc.us). Round 2 of this survey began in May 2006 and will evaluate 200 additional harvest sites.

7.2.2 WATERSHED STUDY – EVALUATING RIPARIAN BUFFERS

In cooperation with the USDA-Forest Service's Southern Global Change Program, NCDFR will begin collecting data by early 2007 as part of a five-year paired watershed study in the piedmont of North Carolina. This long-term monitoring project will evaluate the effectiveness of the Neuse/Tar-Pamlico riparian buffer protection rules as they apply to forestry operations. Additional cooperators include the NCSU Department of Forestry & Environmental Resources (www.cnr.ncsu.edu/for/) and the NC Department of Agriculture & Consumer Services (NCDA&CS) Research Stations Division (www.ncagr.com/research/index.htm).

7.2.3 BRIDGEMAT LOAN & EDUCATION PROJECT

To promote the BMP recommendation of using portable bridgemats at stream and ditch crossings, NCDFR has been loaning bridgemats to loggers across the state since the late-1990's. Bridgemats (Figure 7-1) have been purchased through grants awarded by the federal Environmental Protection Agency (EPA) Nonpoint Source (NPS) Section 319 Grant Program and the Albemarle-Pamlico National Estuary Program. The successful efforts and examples set by NCDFR has led to similar bridgemat projects by the state forestry agencies in Florida, Georgia, Tennessee, Kentucky and Virginia. Additional bridgemats will be incorporated into North Carolina's project during 2007. Table 7-2 shows an accounting of the project.



Figure 7-1 Portable Bridgemats Protecting a Stream Crossing

Table 7-2 Success of the Bridgemat Project (2000 to 2005)

| Year | Bridgemat Sets Available | Number of Times Bridgemats Loaned | Number of Crossings Protected | Acres of Timberland Accessed by Bridgemats |
|---------------|--------------------------|-----------------------------------|-------------------------------|--|
| 2000 | 6 | 7 | 13 | 433 |
| 2001 | 6 | 15 | 25 | 933 |
| 2002 | 6 | 12 | 14 | 244 |
| 2003 | 10 | 21 | 25 | 775 |
| 2004 | 10 | 33 | 49 | 1,085 |
| 2005 | 16 | 38 | 46 | 1,405 |
| TOTALS | | 126 | 172 | 4,875 |

7.2.4 BMP VIDEO TRAINING SERIES

Starting in 2005, NCDFR began production of a series of training and informational videos that focus on specific problem areas related to FPG compliance or BMP implementation. A fourth video is planned for release during 2007-2008, which will outline proper site stabilization techniques. Starting in 2007, NCDFR also plans to begin in-woods "tailgate" BMP video training sessions with logging crew woods-workers to deliver these BMP messages directly to its audience. The videos produced thus far are listed below, with copies available free of charge from NCDFR.

- ❑ Video 1 (11:23 minutes) Forestry Stream Crossings with Bridgemats (July 2005).
- ❑ Video 2 (24:24 minutes) Forestry Stream Crossings (July 2005).

- Video 3 (17:45 minutes) BMPs for Logging Skid Trails (July 2006).

Each of these videos has been incorporated into the annual continuing education modules required through the North Carolina ProLogger Program. The logger training and certification program has approximately 1,500 members. More information about ProLogger is available from the North Carolina Forestry Association Web site (www.ncforestry.org).

7.3 FOREST RESOURCES

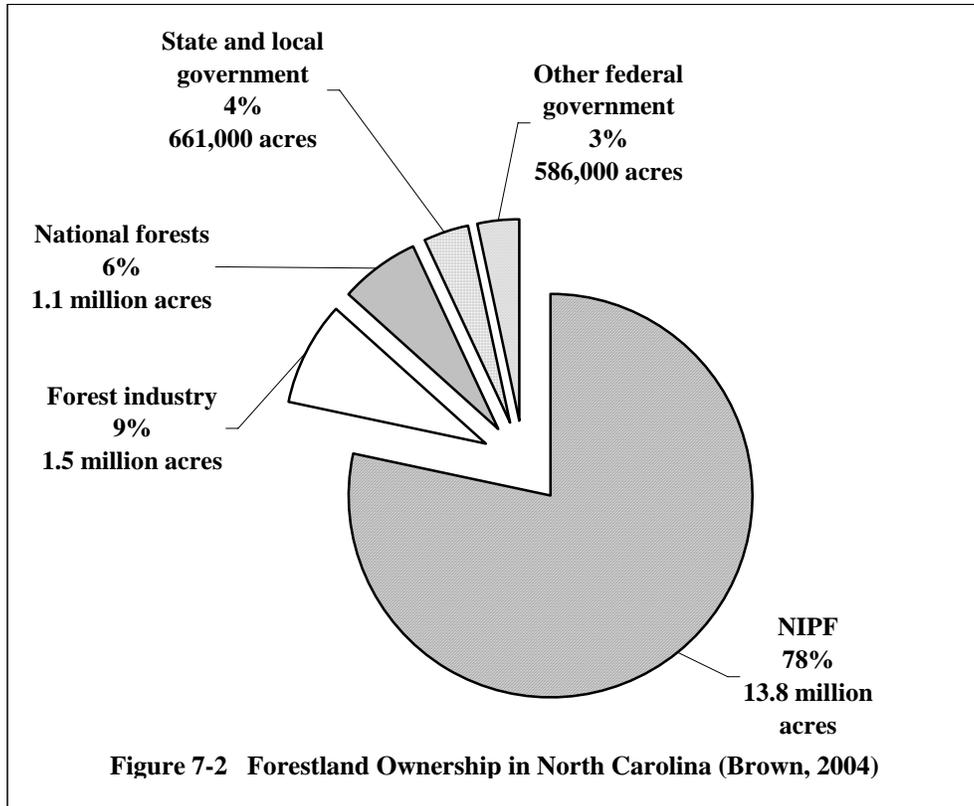
7.3.1 FOREST OWNERSHIP TRENDS

Nearly 59 percent (18 million acres) of North Carolina is forestland. Hardwoods are the predominant forest species at an estimated 12.7 million acres (nearly 71 percent of the total). Figure 7-2 shows timberland ownership as reported in the most recent USDA Forest Service Report (Brown, 2004). In North Carolina, non-industrial private forest (NIPF) landowners own the majority of forestland. NIPF landowners include individual and corporate timberland owners. Forest industry and national forest ownership are the second and third largest with 1.5 and 1.1 million acres, respectively.

Between 1990 and 2002, nearly 1 million acres of timberland were lost. Much of this timberland was lost as a result of conversion to a non-forestry land use, primarily urbanized development. Timberland owned by forest industry declined 33 percent during this same time period. In 2006, hundreds-of-thousands of acres of timberlands were sold by International Paper Company, one of the two leading industry landowners in North Carolina. This sale suggests that the traditional forest industry class of owners will no longer represent a major holding of forests in the state. It remains uncertain whether the new class of owners (investment and real estate groups) will continue to manage these lands to the same high level of sustainability and water quality protection that the forest industry historically has.

7.3.2 FOREST INDUSTRY AND MARKETS

The forest industry is estimated to contribute nearly \$18 billion annually to North Carolina's economy and could easily be considered the most economically significant manufacturing sector remaining in the state. While forest companies have reduced their land holdings, they continue to support large-scale manufacturing facilities. Examples include the five pulp and paper mills in the state as well as numerous sawmills, plywood and structural panel mills all of which are known as "primary processors." In North Carolina, primary processors must pay a fee to the state according to the amount of raw material they consume each year. These fees contribute to funding NCDFR's cost-share payment program for forest landowners. The program assists with tree planting and enhancing forest tree growth.



7.3.3 FOREST CERTIFICATION AND BMPs

Forest certification programs establish protocols on how forestland owners and forest products companies should manage, utilize and protect forests in a way that promotes the sustainability of the resource. Each certification program requires its member-subscribers to help maintain clean water by requiring them to implement or exceed the recommended BMPs described by each state in which they conduct their forest management or raw material procurement activities. By subscribing to a forest certification program, a member company or landowner vows to implement BMPs even if there are no laws or rules that otherwise require them to do so.

Forest certification programs have become a market-based, demand-driven method to encourage BMP usage across the country. Each certification program member-subscriber must undergo and pass an independent third-party audit in order to remain certified by the program. In essence, forest certification accomplishes the enhanced protection of water quality through the required use of BMPs without the need for further regulation of forest owners.

7.4 TECHNICAL ASSISTANCE

7.4.1 NORTH CAROLINA DIVISION OF FOREST RESOURCES (NCDFR)

Currently, the NCDFR has an assigned Water Quality Forester within 10 of its 13 Districts. Three of these positions were added in 2005, representing the first program expansion since its inception in 1999. While County Ranger staff are the lead contact for all forestry issues at the local level, the Water Quality Foresters serve as the field experts regarding technical assistance and guidance on FPG, BMP, harvesting, wetland and other water quality topics. In many cases, the Water Quality Foresters come to know area loggers and landowners on a first-name basis and foster these relationships. Though difficult to quantify, it would seem certain that nurturing this local network of contacts proves valuable for promoting compliance with water quality regulations and improved use of BMPs. Implementation rates of BMPs have shown to be slightly higher in Districts that have a Water Quality Forester. As required by agency protocol, these foresters also undertake wildfire control and limited forest management work.

In addition to the Water Quality Foresters, the NCDFR administers several programs that may directly or indirectly benefit North Carolina's water resources. All of these programs are explained on the NCDFR Web site (www.dfr.state.nc.us).

- ❑ Educational State Forests and State Forests
- ❑ Forest Development Program
- ❑ Forest Land Enhancement Program
- ❑ Forest Legacy Program
- ❑ Forest Stewardship Program
- ❑ Forestry Nonpoint Source (NPS) Unit
- ❑ FPG Self-Audit Program
- ❑ Nursery & Tree Improvement Program
- ❑ Southern Pine Beetle Prevention Program
- ❑ Urban & Community Forestry Program
- ❑ Water Resources Assessment and Technical Response Support
- ❑ Young Offenders Forest Conservation Program: Building, Rehabilitating, Instructing, Developing, Growing, Employing (BRIDGE)

7.4.2 USDA FOREST SERVICE

As the largest forestry research organization in the world, the USDA Forest Service provides technical and financial assistance to state and private forest agencies and manages public lands in national forests and grasslands. There are four National Forests in North Carolina: Croatan, Nantahala, Pisgah and Uwharrie. In the Nantahala National Forest, the 5,750-acre Coweeta Hydrologic Laboratory near Franklin has been the site of comprehensive research regarding the interaction of forest practices and watershed hydrology since its establishment in 1933. Scientists have conducted a variety of watershed experiments and the knowledge gained in these early trials have laid the foundation for the development of BMPs to protect the southeast's water resources. More information about Coweeta is available at <http://coweeta.ecology.uga.edu>.

Forest research stations are also located in Asheville and Raleigh. More information about the forest research stations and the USDA Forest Service is on the Web at www.cs.unca.edu/nfsnc and www.fs.fed.us.

7.4.3 OTHER AFFILIATED AGENCIES

Because North Carolina's forestland owners have historically been closely aligned with farming and hunting, the statewide network of affiliated state and federal natural resource agencies oftentimes have local staff with knowledge of BMPs and water quality topics. These agencies include:

- ❑ NC Cooperative Extension Service (www.ces.ncsu.edu)
- ❑ NC Division of Soil & Water Conservation (www.enr.state.nc.us/DSWC)
- ❑ NC Wildlife Resources Commission (www.ncwildlife.org)
- ❑ USDA Natural Resources Conservation Service (www.nc.nrcs.usda.gov)

REFERENCES

Brown, M.J. January 2004. *Forest Statistics for North Carolina, 2002*. Southern Research Station Resource Bulletin SRS-88. USDA.