Results of Georgia's
2015 Silvicultural Best Management Practices Implementation and Compliance Survey

Prepared by the

Georgia Forestry Commission

in cooperation with the
Environmental Protection Division
of the
Department of Natural Resources,
State of Georgia

December 10, 2015

WATER QUALITY
PROGRAM

GEORGIA FORESTRY
COMMISSION

The preparation of this report was financed in part through a grant from the United States Environmental Protection Agency under the provisions of Section 319(h) of the Federal Water Pollution Control Act, as amended.

EXECUTIVE SUMMARY

The Georgia Forestry Commission (GFC) is the lead agency, as designated by the Georgia Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (DNR), for statewide development, education, implementation, and monitoring for "Georgia's Best Management Practices for Forestry" (BMPs). Beginning in January of 2015, the GFC began the tenth Statewide Forestry BMP Implementation and Compliance Survey.

The objectives of the 2015 Statewide Forestry BMP Survey were to determine the following: rates of BMP implementation, miles of streams in compliance, miles of roads in compliance, total number of *water quality risks* identified, effectiveness of BMPs for any needed modifications, and ownerships and regions to target for future training.

The protocol and scoring methodology for this tenth survey was consistent with the revised recommendations developed and adopted by the Southern Group of State Foresters' (SGSF) BMP Monitoring Task Force in June 2002, titled *Silvicultural Best Management Practices Implementation Monitoring, a Framework for State Forestry Agencies* at:

http://www.southernforests.org/resources/publications/SGSF%20Regional%20BMP%20Framework%20Protocol%20publication_2007.pdf/view

The SGSF Task Force is composed of hydrologists and water specialists from state forestry agencies, the US Forest Service, forest industry and the National Council for Air and Stream Improvement (NCASI), in consultation with EPA Region IV nonpoint source specialists.

The 2015 Statewide Forestry BMP Survey evaluated 213 sites that were selected in a stratified random sample. These sites had to have been silviculturally treated within the past two years, preferably within the previous six months. By ownership, 131 sites occurred on non-industrial private forest land (NIPF), 58 sites on forest industry / corporate land and 24 sites on public land. By region, 11 sites were in the Mountains, 12 sites were in the Ridge & Valley, 63 sites were in the Piedmont, 43 sites were in the Upper Coastal Plain and 84 sites were in the Lower Coastal Plain.

Firebreak construction BMPs have been included in this survey, including data from a separate statewide survey carried out by trained GFC water quality personnel. The survey included firebreak BMP inspections completed in fiscal year 2015. There were a total of 152 firebreak inspections that were used to supplement this survey. Since we already had the additional data for firebreak BMPs, we felt it was important to include accurate firebreak BMP implementation numbers.

BMP implementation was determined by dividing the total number of individual BMPs that were applicable and fully implemented on the sites by the total number of applicable BMPs and summarized for each practice or category, overall site, region and statewide. **Of the 6,223 individual BMPs evaluated, the statewide percentage of correct implementation was 91.13 percent. This is a 1.20 percentage point improvement in BMP implementation from the 2013 survey**. By ownership, the percentage of BMP implementation statewide was 93.62 percent on corporate lands, 96.21 percent on public lands and 89.74 percent on NIPF lands.

Of particular interest is the fact that the number of Water Quality Risks observed decreased from 100 to 63 for an improvement of 37%. The number of Water Quality Risks for this survey is calculated at 0.30 Water Quality Risks per site, significantly lower than the 0.48 risks per site seen in the 2013 BMP Survey. A more detailed discussion of Water Quality Risks can be found later in this report.

BMP compliance for stream and road length on all sites was evaluated on a mileage basis for this survey. It should be noted that this per unit BMP compliance scoring methodology goes beyond the SGSF recommendations for BMP monitoring and is specific to Georgia. BMP compliance was determined by dividing miles of streams or roads that were in compliance with BMPs, by the total miles of streams or roads. On the 213 sites, 34,932 acres of separate forestry operations were evaluated. Of the 86.86 miles of stream evaluated, 83.99 miles, or 96.70 percent, were observed to have no impacts or impairment from the forestry practices. This figure is slightly **higher** than the 2013 survey, representing a **1.4 percentage point improvement** over the 2013 survey. Of the 204.49 miles of roads evaluated, 178.12 miles, or 87.10 percent, were observed to have no impacts or impairment from the forestry practices. This figure is slightly **lower** than the 2013 survey, representing a **1.8 percentage point reduction** from the 2013 survey. By practice or category, statewide percentage of BMP implementation and compliance were as follows:

Practice or Category	2015 Implementation (% BMPs Implemented)
Streamside Management Zones (SMZs)	94.20
Stream Crossings	84.20
Forest Roads	85.80
Timber Harvesting	96.97
Mechanical Site Preparation	94.37
Chemical Site Preparation	100
Firebreaks/Burning	93.56
Artificial Regeneration (Tree Planting)	96.10
Equipment Servicing	95.92
Special Management Areas	92.04
Forest Fertilization	100
Weighted Overall Average	91.13

Practice or Category	2015 Compliance (% Miles meeting BMPs)
Stream Length	96.70
Forest Roads	87.10

Forest operators continue to do a good job of protecting sensitive areas even though some minor reductions in BMP Implementation on some categories have been observed. These sensitive areas include streamside management zones, stream crossings and special management areas. In addition, with a 91.13 percent overall statewide BMP implementation rate, forest operators as a whole are doing a good job of implementing forestry BMPs.

BMP implementation for streamside management zones **improved** by 7.7 percent since the 2013 BMP Survey. BMP implementation for stream crossings and forest roads basically stayed within about 1+/- percent of the score from the 2013 Survey. So, there continues to be some room for improvement in the areas of stream crossings and forest roads. Stream crossings on private lands in the Mountains and Lower Coastal Plain areas of Georgia need improvement. Forest roads on private lands in the Lower Coastal Plain need improvement as well. Streamside management zones on private lands showed significant improvement. There were 113 stream crossings evaluated on 60 sites with an overall implementation rate of 84.20 percent, which represents a slight decline of 1.3 percentage points from the 2013 survey. In spite of this, we continue to see an improved effort to avoid stream crossings in carrying out forestry operations. The total number of stream crossings went down from 135 on the 2013 survey, to just 113 on the 2015 survey. Most noted stream crossing problems were associated with approach design, culvert sizing, and culvert installation. BMPs related to stream crossings accounted for 40 of the total 63 water quality risks on the survey sites. A more detailed discussion of the reasons seen as the causes of the minor BMP implementation declines in some categories is located in the *Educational Opportunities* and *Conclusion* section of this report on pp. 16 – 18.

INTRODUCTION

Georgia has an abundant amount of forest and water resources that provide a variety of benefits for the people of the state and region. The 24.7 million acres (2011 forest inventory and analysis data) of commercial forestland (two-thirds of the state) provide for forest products, clean water, clean air, soil conservation, wildlife habitat, recreation, aesthetics, education, and research. Many of the state's 44,056 miles of perennial streams, 23,906 miles of intermittent streams, and 603 miles of ditches and canals begin or flow through forestlands. Therefore, it is important for forest landowners to practice responsible forestry in order to protect these water resources

The 1972 Federal Clean Water Act resulted in the Georgia Environmental Protection Division (EPD) being responsible for managing and protecting the state's waters from point and nonpoint sources of pollution. Since 1977, the EPD has designated the Georgia Forestry Commission (GFC) as the lead agency to develop, educate, implement and monitor the use of Best Management Practices (BMPs) for forestry operations to minimize or prevent our nonpoint source pollution contributions (primarily erosion and sedimentation). Upon passage of the Clean Water Act (CWA) Amendments of 1987, the EPA issued guidance on the relationship of nonpoint source controls and water quality standards as part of the Water Quality Standards Handbook. The guidance states: ***"It is recognized that Best Management Practices, designed in accordance with a state approved process, are the primary mechanism to enable the achievement of water quality standards."*** It goes on to explain: ***"It is intended that proper installation of state approved BMPs will achieve water quality standards and will normally constitute compliance with the CWA."***

BMPs for forestry were first developed and published in Georgia in 1981. A Wetlands BMP manual was developed in 1990 and revised in 1993. In January 1999, these manuals were revised and combined into one document with input from environmental groups, soil and water experts, fish and wildlife biologists, attorneys, private forest landowners, independent timber buyers and loggers, academia and state and federal water quality personnel. Since then, guidance for the treatment of canals and ditches was adopted in March 2000, and for floodplain features in riverine systems in July 2003. Guidance for headwater areas, i.e. ephemeral areas and gullies, was adopted in October 2005. This new guidance was incorporated into an updated BMP manual released in summer 2009. Since 1981, over 91,000 BMP manuals and brochures have been distributed.

The main role of the GFC is to educate and inform the forestry community of these common sense recommendations, known as BMPs, through workshops and field demonstrations. Since publication of the first BMP manual, the GFC has given 2,880 BMP talks to over 91,300 people and participated in 550 field demonstrations of BMPs (through June 2015). The education process is ongoing, with workshops routinely provided for foresters, timber buyers and loggers through the Sustainable Forestry Initiative® (SFI®) Program in Georgia. Georgia Forestry Commission foresters have also provided BMP advice in more than 77,800 cases covering over 5.33 million acres.

Implementation of BMPs is determined through monitoring surveys. The GFC also tracks BMP implementation through BMP assurance exams in the regular course of carrying out complaint resolution. Of statistical importance are the monitoring surveys. The GFC conducted BMP Implementation Surveys in 1991, 1992, 1998, 2002, 2004, 2007, 2009, 2011 and 2013. This current 2015 statewide survey continues over 20 years of BMP monitoring in Georgia. The statewide average BMP implementation over this period has ranged from 65 percent in 1991, to a high of 95 percent in 2011, to the current rate of 91.13 percent for 2015. The purpose of this report is to present the results of the 2015 BMP Implementation and Compliance Survey.

SURVEY PROCEDURE

Methodology for Sampling Intensity and Site Selection

The number of evaluation sites in each of Georgia's 159 counties was based on the amount of timber harvested in each county, as determined by the Georgia Forestry Commission's Forest Inventory Analysis report of wood removals by county for 2011. GFC's forest inventory analysis data collection is overseen by the US Forest Service. This methodology resulted in 213 sites being surveyed. The next step was to target the sample where the practices occurred to reflect ownership. Ownership classes are categorized into non-industrial private forest (NIPF) land, corporate lands including forest industry (FI) and Timber Investment Management Organizations (TIMOs), and public lands, which include federal, state, county or city ownership. The timber harvest drain for each county was used to target the number of sites to inspect per ownership class in each county. For the 2015 BMP survey, 131 sites (61.5 percent) were inspected on NIPF lands, 58 sites (27.2 percent) on corporate, and 24 sites (11.3 percent) on public lands were inspected.

Firebreak construction BMPs have been included in this survey, including data from a separate statewide survey carried out by trained GFC water quality personnel. The survey included firebreak BMP inspections completed in fiscal year 2015. There were a total of 152 firebreak inspections that were used to supplement this survey. This was done for several reasons. First, there were relatively few firebreaks found on the 213 survey sites alone. However, we know that firebreaks occur much more commonly, and we wanted to make sure that the implementation results for these firebreak BMPs were accurate. Since we already had the additional data for firebreak BMPs, we felt it was important to include accurate firebreak BMP implementation numbers.

Georgia Forestry Commission personnel used satellite data from LandSat to pull land disturbance locations within a specified timeframe for the potential survey sites. The timeframe includes sites disturbed within the last two years. The sites were checked initially to confirm which sites were actually forestry sites. The forestry sites were separated by ownership category and the appropriate number of sites was drawn randomly. Table 1 (pages 20-23) shows the distribution of survey sites by county.

Site Evaluation

For this tenth survey, and as noted in the Executive Summary, the protocol and scoring methodology was consistent with the Southern Group of State Foresters' Protocol titled *Silvicultural Best Management Practices Implementation Monitoring, a Framework for State Forestry Agencies at:*

http://www.southernforests.org/resources/publications/SGSF%20Regional%20BMP%20Framework%20Protocol%20publication_2007.pdf/view

After sites had been selected and verified in the field by county foresters or forest technicians, all landowners were contacted to obtain permission to conduct site evaluations. All evaluations were conducted by trained forest water quality specialists or district water quality foresters to provide accuracy, consistency and quality control using the BMP Compliance Survey Form. For a blank copy of the 11 page, 136 question form, please contact Scott Thackston (sthackston@gfc.state.ga.us).

Once a site was selected, the forest water quality specialist or district water quality forester completed the survey form. Each site was identified by county, district, physiographic region, ownership, river basin and sub-basin, silvicultural treatment type, terrain class, soil erodibility class, hydric soil limitation class, type water bodies within the practice area and miles of stream evaluated within the practice area. Soils and stream data were determined using NRCS county soil survey maps, Web Soil Survey, or USGS topographical maps. Data could be extracted through each of these fields of information.

BMP Implementation

Each site was evaluated for BMP implementation by observing as much of the treated area as possible and answering the 136 specific, YES/NO questions directly related to BMP implementation. Scoring was determined at three levels on each site: (1) individual BMP; (2) category of practice; and (3) overall site implementation.

Level 1 - individual BMP implementation was recorded as either a *NOT APPLICABLE, YES* or *NO*. For simplification, each question was worded so that a positive answer was recorded as a *YES* while a negative answer, indicating a significant departure from BMP recommendations, was answered with a *NO*. If an individual BMP that was applicable and needed was not fully implemented over the entire area, it received a *NO*. The "all or none principle," as recommended by the SGSF framework, applied.

Level 2 - categories of practice and level 3 - overall site implementation, scores were expressed as a percent of all applicable BMPs implemented against all applicable BMPs in the category of practice and overall site. Therefore, each category of practice and overall site could score between 0 and 100 percent. The categories of practices evaluated were as follows:

Streamside Management Zones (SMZs)
Stream Crossings
Forest Roads
Timber Harvesting
Mechanical Site Preparation
Chemical Site Preparation
Firebreaks/Burning
Artificial Regeneration (Tree Planting)
Equipment Servicing
Special Management Areas
Forest Fertilization

Significant Water Quality Risk

Each BMP was further evaluated in terms of "significant water quality risk." A risk is defined by the SGSF framework for monitoring as "an existing on-the-ground condition resulting from failure to correctly implement BMPs, that if left unmitigated will likely result in an adverse change in the chemical, physical or biological condition of a waterbody. Such change may or may not violate water quality standards." Documenting the occurrence of risks serves a number of useful and practical purposes. First, risk assessment lends much credibility and integrity to the BMP monitoring process by evaluating the effectiveness of an individual or group of BMPs and allows opportunities to analyze ineffective BMPs for possible revisions. Second, it recognizes that high-risk conditions can occur and that prevention and/or restoration is a high priority for state forestry agencies. Third, routine documentation of risks will determine whether such instances are the exception rather than the rule. Fourth, finally providing forest landowners with an objective risk assessment is a valuable public service that not only protects the environment, but can also protect the landowner and/or operator from what might otherwise result in enforcement proceedings or other personal liability. Water quality risks found on GFC firebreak BMP inspections were mediated and corrected.

BMP Compliance

BMP Compliance was also determined for the categories of forest roads and stream length. This scoring methodology goes beyond the SGSF BMP monitoring protocol and is specific to Georgia. However, this scoring methodology allowed for comparison with previous surveys in determining trends. Forest road and stream length were measured in *miles*. Scores were expressed as a percent of units of measure in BMP compliance against the total units of measure evaluated. Documenting compliance with the units of measure is important in that it allows forest managers, landowners and regulators to see the holistic picture of forestry operations and our effects on these critical categories. As with the implementation evaluation, the lack of BMP implementation may not necessarily equate to large-scale areas being out of compliance. For those two categories, it provides a better picture of locations to be prioritized for improvements.

RESULTS AND DISCUSSION

The 2015 Statewide Forestry BMP Survey evaluated 213 sites comprising 34,932 acres. There were 113 stream crossings, 204.49 miles of forestry roads and 86.86 stream miles evaluated. Table 1, pages 20-23, shows the distribution of survey sites by county. Figure 1, page 40, shows the spatial location of the 213 survey sites. Figure 2, page 41, is a map of the state showing the different physiographic regions for reference. The tables, charts, and maps included with this report provide summaries of the distribution of the sites evaluated by region and ownership, as well as the BMP implementation and compliance results.

Statistical Analysis

The 213 sites evaluated during this survey represent only a sample of all operations that met the criteria for selection. Data compiled from county tax assessors' offices indicates that the number of timber harvesting operations conducted annually range from 7,000 to 10,000. Therefore, one could assume the sample reflects a 3.0 percent or 2.1 percent sample at best. In order to achieve a statistically valid monitoring report, Georgia has adopted the guidance, *Statistical Guidebook for BMP Implementation Monitoring*. This guidance was developed by the Water Resources Committee of the Southern Group of State Foresters to be used as a model for achieving statistically valid BMP monitoring.

The guidebook should be used to determine the number of sites needed to conduct a statistically reliable survey, to calculate the margin of error for each BMP category or individual BMP and to analyze statistical trends in implementation.

Formula for Determining the Sample Size, or Number of Sites to Evaluate

$$n = \frac{4p(100 - p)}{m^2}$$

Where n = the number of sites to evaluate
p = the estimated overall percent implementation in the state
m = the margin of error (5%)

- p must be estimated because it is unknown (% implementation from the most recent survey may be used).
- The closer the estimated value of p is to 100, the lower the value of n will be.
- n is highest when p is estimated to be 50 percent.
- m is the margin of error associated with the estimate of P. That is, there is 0.95 probability that the sample taken will produce an estimate which differs from p by a value of m.
- A margin of error at five percent was recommended by the SGSF framework.

This formula provides the minimum sample size of 145 sites in order to achieve a five percent margin of error. We have evaluated nearly one and a half times the needed number of sites, so, using the formula, this level of survey should yield a margin of error of 3.90% for this survey. The reason the additional sites were assessed is so subsets of data in the survey, i.e., landowner groups, physiographic regions, river basins, etc., would be more statistically valid when used separately from statewide data.

OVERALL BMP IMPLEMENTATION AND COMPLIANCE RESULTS BY CATEGORY OF PRACTICE

Streamside Management Zones (SMZs)

Streamside Management Zones (SMZs) are designated areas of varying widths adjacent to the banks of perennial (continuous flowing) or intermittent (normally flows only during winter months) streams and other bodies of water. USGS topographical maps and Natural Resource Conservation Service county soil survey maps were used to identify these types of streams. In these SMZs, forest management practices are modified in order to minimize potential impacts so as to protect water quality, fish or other aquatic resources. According to the 2009 BMP manual, SMZs along intermittent streams vary in width from 20 to 50 feet on most streams, depending on slope, and 100 feet along trout streams. SMZs along perennial streams vary from 40 to 100 feet, depending on slope. Clear cutting is not recommended in the SMZs, except during the control of southern pine beetles or salvage operations from natural disasters.

Table 4 (page 26) provides summaries of the results by ownership, region and state totals. Notable findings include:

- Statewide implementation for SMZs is 94.20 percent.
- Statewide BMP compliance for stream length is 96.70 percent.
- Six WQRs were identified, down from 28 in 2013.
- Implementation for SMZs in the lower coastal plain region improved by 14.77 percentage points across all ownership categories compared with the 2013 survey. Implementation for SMZs in the Ridge and Valley region improved by 20.56 percentage points across all ownership categories compared with the 2013 survey. Implementation for SMZs across all regions improved by 7.7 percentage points across all ownership categories compared with the 2013 survey.
- Insufficient SMZ widths, logging debris left in stream channels, and streambank tree harvesting seem to be the most common BMP deficiencies found in the SMZ category.

Stream Crossings

Stream crossings are often necessary for access to forestlands. From a water quality standpoint, stream crossings are the most critical aspect of the road system. Failure of a stream crossing due to improper planning or construction can result in erosion and introduction of sediment into a stream, which does affect water quality. Types of acceptable crossings include main haul road fords, culvert crossings, and bridges. Debris and dirt type crossings or skidder fords are not acceptable crossing types. Permanent crossings were considered to be those still in place at the time of inspection. Temporary crossings were noted where crossing approaches were still evident, but the actual crossing facility (i.e. temporary bridge, culvert and fill, etc.) had been removed.

Table 3 (page 25) provides a summary of the results by ownership, region and state totals. A total of 113 crossings were evaluated on 60 sites statewide.

Significant findings include:

- Statewide implementation for stream crossings is 84.20 percent. This is a slight 1.32 percentage point decline from 2013.
- The largest decline in implementation occurred in the mountain region which declined by 15.73 percentage points.
- Forty WQRs were associated with stream crossings.
- The NIPF ownerships have the most problems with 37 WQRs, as compared with corporate and public ownerships having just three WQRs combined.
- Areas for improvement in stream crossing design continue to be stream crossing approach design, culvert sizing with respect to storm flow, and culvert placement with respect to migration of aquatic species.

Forest Roads

Permanent or temporary access roads are an essential part of any forest management operation and provide access for other activities. With proper planning, location, construction and maintenance, access roads allow for productive operations and minimally impact soil and water quality. However, poorly located, poorly constructed or poorly maintained roads can result in sediment reaching streams. These factors may lead to changing stream flow patterns, degrading fish and aquatic organism habitat, and adversely affected aesthetics.

Table 2 (page 24) provides a summary of the results by region, ownership and state totals. Approximately 204.49 miles of road were evaluated on 191 sites. Forest road BMP implementation showed a slight drop of 0.23 percentage points from the 2013 survey.

Significant findings include:

- Forest roads BMP implementation across all ownerships is 85.80 percent.
- Forest roads compliance is 87.10 percent.
- There were 14 WQRs associated with forest roads.
- Challenges for forest roads BMP implementation continue to be properly installing water diversions and stabilizing and reshaping of forest roads after activities are complete.

Special Management Areas

This category applies to canals and ditches, riverine floodplain features and headwater areas that could possibly transport sediments and other pollutants into other water bodies. These areas need some measure of protection, but normally do not need to be treated as streams.

Table 5 (page 27) provides a summary of the results by region, ownership and state totals. Statewide, there were 171 sites with canals, ditches, ephemeral areas, gullies and wetland features.

Other significant findings include:

- Special management area BMP implementation across all ownerships was 92.04 percent.
- There was only one WQR associated with special management areas.
- Special Management Area BMP implementation improved slightly by 0.87 percentage points overall from the 2013 survey.

Timber Harvesting Outside of SMZs

Outside of SMZs, timber harvesting poses little threat to water quality in Georgia. Potential impacts can be avoided or minimized if careful consideration is given to seasonal weather conditions, soil type, soil moisture, topography, and equipment type matched to the particular harvesting site. The location, construction and maintenance of log decks and skid trails are the primary concerns.

Table 6 (page 28) provides a summary of the results by ownership, region and state total. Approximately 18470.31 acres were evaluated on 187 sites.

A total of 632 log decks were evaluated. A total of 1,302 main skid trails were evaluated.

Other significant findings include:

- Timber harvesting outside SMZs BMP implementation across all ownerships is 96.97 percent.
- All BMP categories for Timber Harvesting scored 94 percent or better for BMP implementation, except for stabilization of skid trails with water diversions or slash dispersal, which scored 87.18 percent.
- There were 0 WQRs associated with Timber Harvesting.

Mechanical Site Preparation Outside SMZs

Site preparation methods groom harvested and non-forested areas for the natural and artificial regeneration of desired tree species and stocking. Methods include shearing, raking, chopping, windrowing, piling, bedding, and other physical methods to cut, break apart or move logging debris, or to improve soil conditions prior to planting. The purpose is to reduce logging impacts and debris, control competing vegetation and enhance seedling survival. The technique or method(s) used depends on soil type, topography, erodibility, condition of the site and any wetland limitations.

Table 7 (page 29) provides a summary of the results by region, ownership and state totals. Statewide, approximately 2,612.20 acres were evaluated on 28 sites.

Significant findings include:

- Mechanical Site Prep BMP implementation is 94.37 percent, continuing good levels of implementation since the 2013 survey.
- Mechanical Site Prep for pine regeneration in wetlands identified in EPA/Corps of Engineers memo did not occur on any applicable sites surveyed.
- The one significant challenge observed for Mechanical Site Prep is avoiding bedding that directs water into roadways and ditches.
- There were no WQRs associated with Mechanical Site Prep.

Chemical Site Preparation Outside SMZs

Herbicides are valuable tools used in forest management to control competing vegetation, invasive species, and enhance tree survival and growth. On many highly erodible sites, the use of herbicides is actually more effective than exposing too much surface area by mechanical site preparation methods. By following EPA approved labels that govern storage, transportation, handling and application, herbicide application should not pose any threat to water quality.

Table 8 (page 30) provides a summary of the results by region, ownership and state totals. Statewide, approximately 4,163.98 acres were evaluated on 40 sites.

Significant findings include:

- BMP implementation and compliance for Chemical Site Prep is 100 percent.
- No challenges were observed for Chemical Site Prep.

Firebreaks/Burning

Controlled burning is often used alone or in conjunction with chemical or mechanical site preparation to prepare sites for regeneration. It may also be used during timber stand management to control or reduce hazardous accumulations of forest fuels, manage competing vegetation, improve wildlife habitat, and perpetuate certain endangered plant and animal ecosystems.

Approximately 2,128.42 acres were evaluated for burning. There were a total of 182 sites evaluated for firebreaks/burning. BMP implementation was 93.56 percent. The main challenges involved firebreaks, including proper construction and spacing of water diversions, as well as avoiding intersections with forest roads. A total of two water quality risks were identified.

Firebreaks are created by various methods to contain and control fires, both controlled burning and wildfires. If properly installed according to BMP guidelines, firebreak impacts on water quality can be minimized.

We evaluated 30 survey sites containing a total of 47.60 miles of firebreaks. In addition to this, data from a fiscal year 2015 statewide survey specifically looking at GFC installed firebreaks has been included with this report. This additional survey examined 152 sites statewide. Together with the previously mentioned 30 sites, this section of this report covers data from a total of 182 sites. Best Management Practices implementation across these 182 sites was 93.56 percent. Of the 182 sites, 13 sites were landowner or contractor installed firebreaks where to date, no firebreak BMP training has occurred. The two water quality risks found on GFC firebreak BMP inspections were mediated and corrected. Table 9 (page 31) provides a summary of the results by region, ownership and state totals.

Artificial Regeneration (Tree Planting) Outside SMZs

Reforestation can be accomplished artificially or naturally. Natural regeneration and hand planting generally pose less of a threat to water quality than mechanical methods.

Table 10 (page 32) provides a summary of the results by region, ownership and state totals. Approximately 4,240.56 acres were evaluated on 44 sites. Overall BMP implementation for artificial regeneration was 96.10 percent. That represents a modest reduction of 3.9 percent from the 2013 survey. No water quality risks were identified.

Significant findings include:

- The main reason for the modest decline in implementation was machine planting on slopes of five to 20 percent not always following the contour. No water quality risks were identified.
- BMPs were fully implemented on the vast majority of these sites.
- Pine establishment was avoided on specified wetlands identified in the EPA/COE memo.

Forest Fertilization

Forest fertilization occurred on only two Corporate sites in the Lower Coastal Plain. A total of 155.70 acres were treated with four BMPs assessed on the two sites with a 100% BMP implementation. Indicators of this particular practice include evidence of mixing areas and containers on the site. Since the BMPs call for the removal and proper disposal of containers, there might have been additional fertilization that was not obvious.

Equipment Washing and Servicing

Improper equipment washing and servicing can introduce hazardous or toxic materials to the site, which can affect water quality. Oils, lubricants, their containers and other trash and waste should be disposed of properly. According to the Georgia Environmental Protection Division's (GA EPD) Emergency Response Program, fuel and oil spills into soils or waterways which produce a visible sheen should be immediately contained and removed. In addition, chemical spills of 25 gallons or more should be reported to GA EPD.

Table 11 (page 33) provides a summary of the results by region, ownership and state totals. A total of 642 landings were evaluated on 199 sites.

Significant findings include:

- BMP implementation for Equipment Servicing was 95.92 percent.
- The most common issue was that oil/lubricants and containers were not disposed of properly.
- All BMPs assessed for Equipment Servicing were implemented at or above 92 percent.

Stream Assessments

Perhaps the most important observation in assessing the effectiveness of BMPs was the visual assessment of the water bodies on each site. A total of 86.86 miles of streams on 107 sites were evaluated for visual signs of impairment. Those signs include obvious soil erosion entering the stream, logging debris left in the channel, improper stream crossings resulting in blocked flow, removal of excess canopy trees within the SMZs exposing the stream to elevated temperatures, and impaired stream bank or channel integrity due to forestry practices.

Table 12 (page 34) provides a summary of the results by region, ownership and state totals by stream type. A total of 39.27 miles of perennial streams were assessed on these sites. Of these, 97.40 percent are in compliance. A total of 47.59 miles of intermittent streams were assessed on these sites. Of these, 96.11 percent are in compliance. Total combined stream compliance was 96.70 percent.

Significant findings include:

- Overall stream BMP compliance is 96.70 percent.
- Sixty-three water quality risks were identified statewide.
- There were 40 WQRs (63.49 percent of the total) involving stream crossings.
  - ✓ Fifteen of these were associated with steam crossing approaches.
- Forest roads accounted for 14 water quality risks (approximately 22.22 percent of the total).
  - ✓ The lack of properly installed water diversions at SMZs accounted for six of the 14 risks for forest roads.
  - ✓ The failure to adequately reshape and stabilize critical road segments also resulted in four WQRs.
- Within SMZs, there were six WQRs (9.52 percent of the state total of WQRs).
- There was one WQR associated with Special Management Areas.
- No WQRs were associated with Timber Harvesting outside of SMZs.
- There were only two WQRs associated with firebreaks, and those were mediated and corrected.

The overall 96.70 percent stream compliance figure in Georgia supports assessments by the US Environmental Protection Agency that silvicultural operations contribute less than 10% of the nonpoint pollution to streams in the United States.

Overall Statewide Results

Table 13 (page 35) provides the statewide implementation results of the total number of sites, the acres evaluated, the number of BMPs evaluated, and the number of water quality risks determined by region and ownership. Statewide, the overall BMP implementation for all practices, all landownership classes, and all regions, was found to be 91.13 percent. **This is a 1.2 percentage point improvement from the 2013 survey**.

Water Quality Risk Assessment

Water Quality Risk assessments were made at each site as a component of the Southern Group of State Foresters BMP monitoring protocol. Water Quality Risks were observed at 63 specific locations on 16 of the 213 survey sites combined with the 152 GFC firebreak inspection sites included in the 2015 survey. That total of 63 Water Quality Risks is significantly lower than the previous BMP survey in 2013, representing a 37 percent improvement from the 2013 survey. Looking into these numbers a little deeper, it can be seen that 93.43 percent of the 213 sites surveyed for 2015 had no Water Quality Risks. Overall, it is clear that a small percentage of the sites surveyed account for all the observable Water Quality Risks seen. Below is a table showing the distribution of Water Quality Risk occurrence over the past six survey cycles.

Survey Year	Survey Done	0 WQ Risks		1-3 WQ Risks		4-6 WQ Risks		7-9 WQ Risks		10 or more WQ Risks	
2004	412	352	85.44%	36	8.74%	13	3.16%	5	1.21%	6	1.46%
2007	370	328	88.65%	21	5.68%	15	4.05%	4	1.08%	2	0.54%
2009	221	212	95.93%	8	3.62%	1	0.45%	0	0.00%	0	0.00%
2011	187	178	95.19%	7	3.74%	1	0.53%	1	0.53%	0	0.00%
2013	209	185	88.52%	13	6.22%	6	2.87%	3	1.44%	2	0.96%
2015	213	199	93.43%	7	3.29%	3	1.41%	3	1.41%	1	0.47%

A total of just two additional Water Quality Risks (WQRs) were found during the 2015 survey, one WQR each on just two sites from the 152 GFC firebreak inspection sites used to supplement the firebreak/burning data for this survey. Both are included in the total of 63 WQRs noted in this report. Please note that both of those WQRs were mediated and corrected.

Educational Opportunities

BMPs for roads and stream crossings all experienced a slight decline from our 2013 survey of about 1+/- percent. Therefore, our educational opportunities will be focused on these categories. In particular, educational opportunities in these categories include:

- Stream crossings
  - ✓ Culvert crossing design and installation information.
  - ✓ Basic stream crossing design needs, including storm flow and aquatic migration requirements.
  - ✓ Stream crossing approach design and stabilization.
  - ✓ Temporary portable bridge use.
- Forest roads
  - ✓ Stormwater control structure design and placement.
  - ✓ Proper closeout needs following harvest activities.
- In addition, for timber harvesting
  - ✓ Information on basic timber harvesting BMPs, including log deck and skid trail stabilization requirements.

Charts 1 through 4 (pages 36-39) are perhaps the most important tools in this document for determining BMP implementation trends. These charts provide an overall summary and comparison of BMP implementation by practice and ownership over recent survey cycles. They also provide impetus for continued training and improvement.

Data from this survey shows that BMP implementation decreases on average according to tract size categories. The table below illustrates this point, showing BMP Implementation average for three tract size groupings.

Overall Compliance by Tract Size					
Tract Size	**No. Sites**	**Acres**	**BMPs Assessed**	**% BMPs Implemented**	**WQ Risks**
Under 100 Acres	141	11624.65	3910	90.41%	63
101-200 Acres	41	9735.69	1315	92.55%	0
201 Acres or more	29	13270.95	952	92.96%	0
All	213 Sites	34931.87	6226	91.13%	63 Includes 2 from GFC Firebreak Inspections

As we can see from the above table, smaller tracts have a lower BMP implementation on average than larger tracts. Additionally it should be noted that all 63 WQRs found in the 2015 survey occurred on tracts 100 acres or less in size. There are several reasons smaller tracts, on average, experience lower BMP implementation rates. These reasons include potential poor road location due to tract boundary constraints; potentially more stream crossings due to the access issues and boundary locations of smaller tracts; having more roads and stream crossings simply because there are more landowners needing access across their parcels. When land is divided into larger tracts, there are fewer owners, and therefore, less need for access points from public roads.

All of these results suggest a need for additional outreach to landowners of tracts of all sizes, especially smaller acreage landowners of less than 100 acres. The GFC has already undertaken efforts to make BMP educational information available online. Currently, GFC has five BMP learning modules available for anyone to access at any time to learn about forestry BMPs. Module titles include *Temporary Stream Crossings*, *Stream Classification*, *Forest Roads*, and *Pre-Harvest Planning*, along with a slide-show depicting detailed installation steps for Geoweb rocked ford stream crossing installation. These modules are located on GFC's public website at: http://gatrees.org/forest-management/water-quality/. Additional modules are planned in the near future to continue to address these needs. These modules are available through GFC partner, the Southeastern Wood Producers Association (SWPA), for loggers to obtain their required Master Timber Harvester continuing education credits. In addition, a continued effort should be made to further promote the use of temporary portable bridges for timber harvesting. Although we continue to see efforts made to avoid the need for stream crossings during timber harvesting activities, ongoing issues persist with loaded log trucks using inadequate permanent crossings. An increased use of temporary and/or portable logging bridge stream crossings would help avoid many of these problems.

Finally, Chart 5 (page 42) shows the current number of Water Quality Risks (WQRs) observed in BMP implementation surveys between the 1998 survey and the present. There had been a dramatic decline in these observed WQRs until the 2013 survey, which exposed some issues with basic BMP implementation leading to an uptick in WQRs for that 2013 survey. However, our 2015 survey shows a significant reduction in WQRs, from 100 WQRs in the 2013 survey, to 63 WQRs in the 2015 survey, for a 37% improvement overall.

BMP Implementation data available by River Basin and ecoregion

Similar statistics can be extracted for each of the 14 major river basins (page 19), 52 sub-basins and 12-digit HUCs for use by Regional Water Councils in accordance to the Georgia Comprehensive State-wide Water Management Plan. The survey statistics can also be extracted by each of Georgia's 29 Ecoregions (page 19).

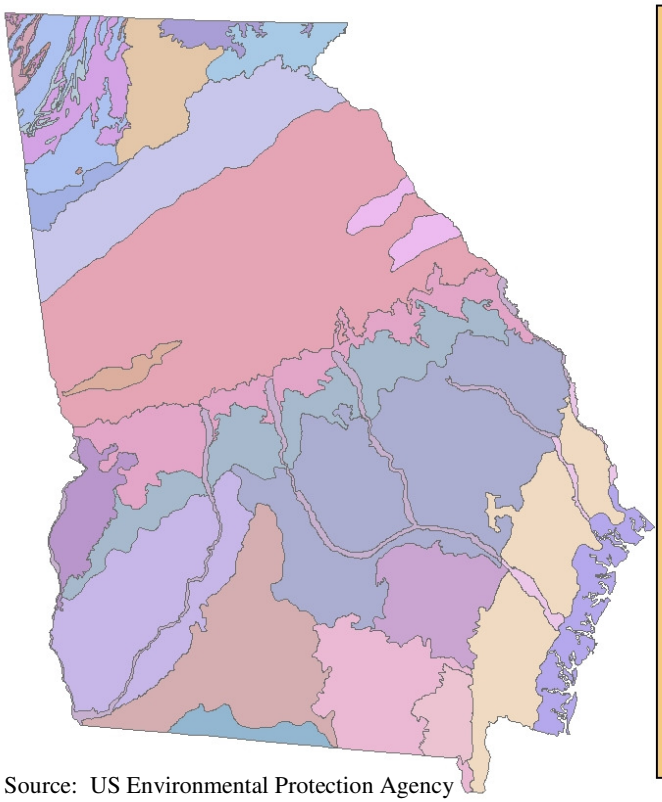
CONCLUSION

The percentage of BMP implementation has increased from 64.9 percent in 1991 and has risen to 91.13 percent for the current survey. The percentage of stream miles in compliance has increased to around 96.70 percent. Since the 1998 survey, the number of water quality risks has markedly decreased, but experienced a significant upswing in the 2013 survey. However, the number of WQRs has since decreased significantly in the 2015 survey. Chart 5 (page 42) tracks the level of observed Water Quality Risks since the 1998 survey.

The 2015 BMP implementation survey shows the need for continued BMP education efforts in order to help stabilize BMP implementation at satisfactory levels. Although the survey shows relatively high overall rates of BMP implementation, it also reveals areas for BMP implementation improvement within certain BMP categories and across certain landowner groups across the state. The information from this survey will be used to target BMP training at Master Timber Harvester, forester and landowner workshops. In addition, incentives for the increased use of portable logging bridges could be useful in helping increase stream crossing BMP implementation. Additional partnerships for these portable logging bridges are currently being pursued by GFC.

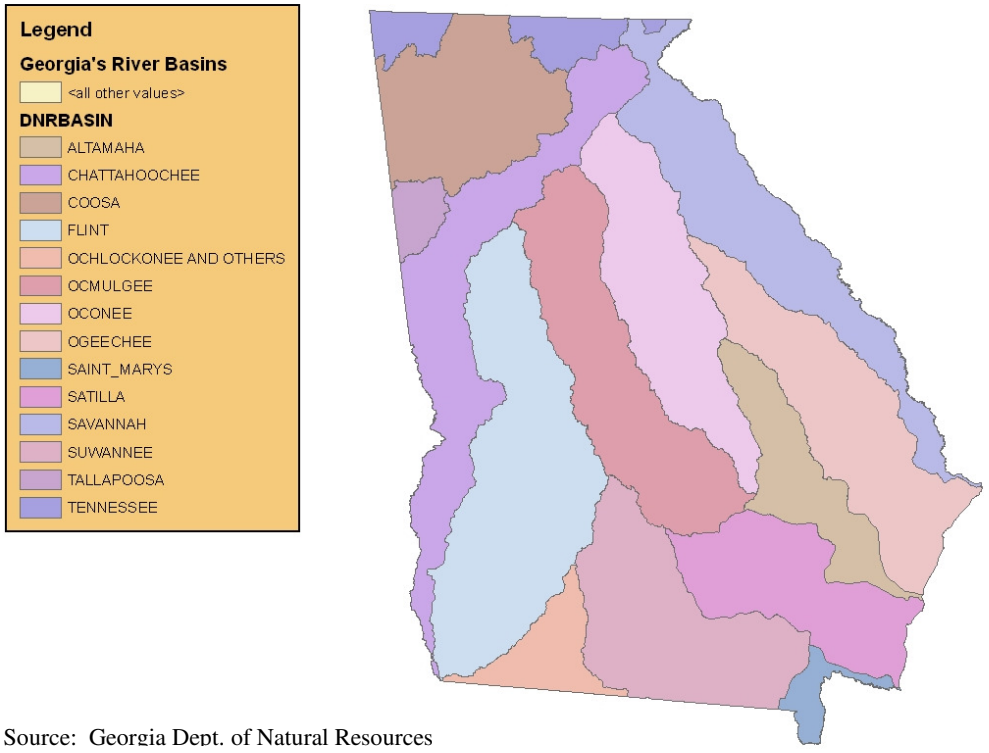
GFC will continue to use available means to resolve forestry BMP complaints. The Georgia Forestry Commission, the Georgia Forestry Association, the University of Georgia Warnell School of Forestry and Natural Resources, participating companies who subscribe to the Sustainable Forestry Initiative, and the Southeastern Wood Producers Association support this concept. The Georgia SFI committee will continue to monitor and address "violators" as reported to their Inconsistent Practices sub-committee. Non-compliance cases will be referred to state or federal regulatory agencies.

Georgia's 29 Ecoregions



Source: US Environmental Protection Agency

Georgia's 14 Major River Basins



Source: Georgia Dept. of Natural Resources

Table 1: Targeted Sites by County and Ownership

County	Public	TIMO Corporate	NIPF	Totals
Atkinson			2	**2**
Baldwin			1	**1**
Banks			1	**1**
Bartow		1	1	**2**
Ben Hill			1	**1**
Berrien		1	1	**2**
Bleckley			1	**1**
Brooks			1	**1**
Bryan		1	1	**2**
Bulloch			4	**4**
Burke		1	5	**6**
Butts		1		**1**
Camden		2	1	**3**
Candler			1	**1**
Carroll			3	**3**
Charlton		3		**3**
Chattooga	3		1	**4**
Cherokee		1	1	**2**
Clay			1	**1**
Clinch		4	1	**5**
Colquitt			1	**1**
Columbia			1	**1**
Cook			1	**1**
Crawford			2	**2**
Dawson	1			**1**
Decatur			1	**1**
Dodge			4	**4**
Dooly			1	**1**
Early			2	**2**
Echols		3		**3**
Effingham	1	1	1	**3**
Elbert			2	**2**
Emanuel			2	**2**
Evans			1	**1**
Fannin	1			**1**

County	Public	TIMO Corporate	NIPF	Totals
Floyd			1	**1**
Franklin		1		**1**
Gilmer	1		1	**2**
Glascock			1	**1**
Glynn		1		**1**
Gordon	1			**1**
Grady		1		**1**
Greene			2	**2**
Habersham	1			**1**
Hall		1		**1**
Hancock			3	**3**
Haralson			3	**3**
Harris		2		**2**
Hart	1			**1**
Houston			1	**1**
Irwin			1	**1**
Jackson			1	**1**
Jasper	1		1	**2**
Jeff Davis		1	1	**2**
Jefferson		2		**2**
Jenkins			1	**1**
Johnson			2	**2**
Jones	1		1	**2**
Lamar		1	1	**2**
Lanier			1	**1**
Laurens		3	1	**4**
Lee			1	**1**
Liberty			2	**2**
Lincoln	1			**1**
Long			1	**1**
Lumpkin			1	**1**
Madison			1	**1**
Marion			1	**1**
McDuffie	2			**2**
McIntosh	1	1		**2**
Meriwether	2			**2**
Miller			1	**1**
Mitchell			1	**1**
Monroe			2	**2**

County	Public	TIMO Corporate	NIPF	Totals
Montgomery			1	**1**
Newton		1	2	**3**
Oconee			1	**1**
Oglethorpe			2	**2**
Paulding	1			**1**
Pickens		1		**1**
Pike			2	**2**
Polk		1	1	**2**
Pulaski			1	**1**
Putnam		1		**1**
Quitman		1		**1**
Rabun	1			**1**
Randolph		1		**1**
Schley		1		**1**
Screven			2	**2**
Seminole			1	**1**
Spalding	1		1	**2**
Stephens		1		**1**
Stewart			1	**1**
Sumter			2	**2**
Talbot		1	1	**2**
Taliaferro			1	**1**
Tattnall		2		**2**
Telfair			3	**3**
Terrell			1	**1**
Thomas		2		**2**
Tift			2	**2**
Toombs	1	1		**2**
Treutlen			1	**1**
Troup			3	**3**
Turner			1	**1**
Twiggs		1	1	**2**
Upson		1		**1**
Walton			1	**1**
Ware	1	2	1	**4**
Warren		1	2	**3**
Washington			3	**3**
Wayne			3	**3**

County	Public	TIMO Corporate	NIPF	Totals
Wheeler			2	**2**
White			1	**1**
Whitfield			2	**2**
Wilcox			2	**2**
Wilkes		3	1	**4**
Wilkinson		3	1	**4**
Worth			1	**1**
Totals	23	58	132	**213**

Tables 2 a – d: Distribution of Forest Road Sites Evaluated By Region, Ownership, Miles Assessed, % Compliance, # BMP Assessed, % BMPs Implemented, and Water Quality Risks

Table 2a

Forest Road Sites - NIPF

Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	0.95	98.95%	27	88.89%	0
Piedmont	32	22.12	77.89%	273	87.55%	5
Upper Coastal Plain	30	26.78	75.84%	179	82.12%	1
Lower Coastal Plain	48	42.11	74.97%	342	74.56%	2
Ridge and Valley	6	3.27	98.78%	70	92.86%	0
Total	118	95.23	76.95%	891	81.93%	8

Table 2b

Forest Road Sites - Public

Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	5	5.22	100.00%	54	100.00%	0
Piedmont	7	9.83	92.88%	65	95.38%	0
Upper Coastal Plain	1	2.1	100.00%	5	100.00%	0
Lower Coastal Plain	3	1.75	73.14%	20	70.00%	4
Ridge and Valley	4	12.41	99.60%	46	97.83%	0
Total	20	31.31	96.10%	190	94.74%	4

Table 2c

Forest Road Sites - Corporate

Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	6.13	99.18%	32	78.13%	0
Piedmont	15	16.5	94.61%	129	91.47%	0
Upper Coastal Plain	9	10.48	97.81%	55	89.09%	0
Lower Coastal Plain	25	43.94	95.40%	178	91.57%	2
Ridge and Valley	1	0.9	98.89%	11	90.91%	0
Total	53	77.95	95.89%	405	90.12%	2

Table 2d

Forest Road Sites - All Ownership

Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	10	12.3	99.51%	113	91.15%	0
Piedmont	54	48.45	86.63%	467	89.72%	5
Upper Coastal Plain	40	39.36	82.98%	239	84.10%	1
Lower Coastal Plain	76	87.8	85.16%	540	80.00%	8
Ridge and Valley	11	16.58	99.40%	127	94.49%	0
Total	191	204.49	87.10%	1486	85.80%	14

Tables 3 a – d: Distribution of Sites with Stream Crossings Evaluated by Region, Ownership, and # Crossings Assessed, # BMPs Assessed, % BMPs Implemented and Water Quality Risks

Table 3a

Stream and Wetland Crossings - NIPF

Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	3	25	68.00%	1
Piedmont	14	22	146	79.45%	13
Upper Coastal Plain	6	9	73	82.19%	6
Lower Coastal Plain	12	23	169	75.15%	17
Ridge and Valley	5	13	55	94.55%	0
Total	39	70	468	79.49%	37

Table 3b

Stream and Wetland Crossings - Public

Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	4	14	100.00%	0
Piedmont	1	4	15	80.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	1	12	75.00%	2
Ridge and Valley	3	10	38	100.00%	0
Total	6	19	79	92.41%	2

Table 3c

Stream and Wetland Crossings - Corporate

Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	5	20	85.00%	0
Piedmont	6	12	80	91.25%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	7	7	81	96.30%	1
Ridge and Valley	0	0	0	NA	0
Total	15	24	181	92.82%	1

Table 3d

Stream and Wetland Crossings - All Ownership

Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	5	12	59	81.36%	1
Piedmont	21	38	241	83.40%	13
Upper Coastal Plain	6	9	73	82.19%	6
Lower Coastal Plain	20	31	262	81.68%	20
Ridge and Valley	8	23	93	96.77%	0
Total	60	113	728	84.20%	40

Tables 4 a – d: Distribution of Sites with Streamside Management Zones Evaluated By Region Ownership, Acres Evaluated, BMP Assessed, and %BMPs Implemented, and # Water Quality Risks

Table 4a

Streamside Management Zones - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	17.37	20	100.00%	0
Piedmont	29	494.53	250	93.60%	2
Upper Coastal Plain	11	92.71	73	94.52%	0
Lower Coastal Plain	21	181	202	85.64%	4
Ridge and Valley	5	218.25	49	95.92%	0
Total	68	1003.86	594	91.41%	6

Table 4b

Streamside Management Zones - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	6	230	51	100.00%	0
Piedmont	6	147.85	56	98.21%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	2.04	9	88.89%	0
Ridge and Valley	3	738	25	100.00%	0
Total	16	1117.89	141	98.58%	0

Table 4c

Streamside Management Zones - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	307.9	34	91.18%	0
Piedmont	11	590.11	91	98.90%	0
Upper Coastal Plain	2	5.96	17	100.00%	0
Lower Coastal Plain	11	134.98	106	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	27	1038.95	248	98.39%	0

Table 4d

Streamside Management Zones - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	11	555.27	105	97.14%	0
Piedmont	46	1232.49	397	95.47%	2
Upper Coastal Plain	13	98.67	90	95.56%	0
Lower Coastal Plain	33	318.02	317	90.54%	4
Ridge and Valley	8	956.25	74	97.30%	0
Total	111	3160.7	983	94.20%	6

Table 5 a – d: Overall Distribution of Special Management Areas Evaluated By Region, Ownership, BMPs Assessed, % BMPs Implemented, and Water Quality Risks

Table 5a				
Special Management Areas - NIPF				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQ Risks**
Mountains	2	11	100.00%	0
Piedmont	39	195	93.33%	0
Upper Coastal Plain	18	53	92.45%	0
Lower Coastal Plain	35	110	74.55%	0
Ridge and Valley	7	36	91.67%	0
Total	101	405	88.15%	0

Table 5b				
Special Management Areas - Public				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQ Risks**
Mountains	6	11	100.00%	0
Piedmont	9	67	97.01%	0
Upper Coastal Plain	1	1	100.00%	0
Lower Coastal Plain	1	2	50.00%	1
Ridge and Valley	4	8	100.00%	0
Total	21	89	96.63%	1

Table 5c				
Special Management Areas - Corporate				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQ Risks**
Mountains	3	18	100.00%	0
Piedmont	14	94	96.81%	0
Upper Coastal Plain	5	22	90.91%	0
Lower Coastal Plain	26	86	98.84%	0
Ridge and Valley	1	2	100.00%	0
Total	49	222	97.30%	0

Table 5d				
Special Management Areas - All Ownership				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQ Risks**
Mountains	11	40	100.00%	0
Piedmont	62	356	94.94%	0
Upper Coastal Plain	24	76	92.11%	0
Lower Coastal Plain	62	198	84.85%	1
Ridge and Valley	12	46	93.48%	0
Total	171	716	92.04%	1

Table 6 a – d: Distribution of Harvesting Operations Evaluated By Region, Ownership, Acres Assessed, # BMP Assessed, % Implemented, and Water Quality Risks

Table 6a

Timber Harvesting Outside SMZs - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	88.2	16	93.75%	0
Piedmont	37	2437.89	273	97.44%	0
Upper Coastal Plain	30	3205.15	205	97.56%	0
Lower Coastal Plain	43	3835.9	292	95.55%	0
Ridge and Valley	7	457	50	94.00%	0
Total	119	10024.14	836	96.53%	0

Table 6b

Timber Harvesting Outside SMZs - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	6	359	46	100.00%	0
Piedmont	7	1255.34	52	100.00%	0
Upper Coastal Plain	1	375	7	100.00%	0
Lower Coastal Plain	2	79.92	16	87.50%	0
Ridge and Valley	4	613	30	100.00%	0
Total	20	2682.26	151	98.68%	0

Table 6c

Timber Harvesting Outside SMZs - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	402	23	100.00%	0
Piedmont	15	2282.39	106	95.28%	0
Upper Coastal Plain	8	1114.06	51	94.12%	0
Lower Coastal Plain	21	1863.46	144	99.31%	0
Ridge and Valley	1	102	7	100.00%	0
Total	48	5763.91	331	97.28%	0

Table 6d

Timber Harvesting Outside SMZs - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	11	849.2	85	98.82%	0
Piedmont	59	5975.62	431	97.22%	0
Upper Coastal Plain	39	4694.21	263	96.96%	0
Lower Coastal Plain	66	5779.28	452	96.46%	0
Ridge and Valley	12	1172	87	96.55%	0
Total	187	18470.31	1318	96.97%	0

Table 7 a – d: Distribution of Mechanical Site Preparation Operations Evaluated By Region, Ownership, and Acres Assessed, # BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 7a

Mechanical Site Preparation Outside SMZs - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	3	345	5	100.00%	0
Lower Coastal Plain	5	362.88	14	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	8	707.88	19	100.00%	0

Table 7b

Mechanical Site Preparation Outside SMZs - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	88.5	8	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	22	2	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	3	110.5	10	100.00%	0

Table 7c

Mechanical Site Preparation Outside SMZs - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	2	209.67	6	66.67%	0
Lower Coastal Plain	15	1584.15	36	94.44%	0
Ridge and Valley	0	0	0	NA	0
Total	17	1793.82	42	90.48%	0

Table 7d

Mechanical Site Preparation Outside SMZs - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	88.5	8	100.00%	0
Upper Coastal Plain	5	554.67	11	81.82%	0
Lower Coastal Plain	21	1969.03	52	96.15%	0
Ridge and Valley	0	0	0	NA	0
Total	28	2612.2	71	94.37%	0

Table 8 a – d: Distribution of Chemical Site Preparation Operations Evaluated By Region, Ownership, and Acres Assessed, BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 8a

Chemical Site Preparation Outside SMZs - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	7	793.34	14	100.00%	0
Upper Coastal Plain	1	170	2	100.00%	0
Lower Coastal Plain	13	1233.72	26	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	21	2197.06	42	100.00%	0

Table 8b

Chemical Site Preparation Outside SMZs - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	88.5	4	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	2	54	4	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	4	142.5	8	100.00%	0

Table 8c

Chemical Site Preparation Outside SMZs - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	314	4	100.00%	0
Piedmont	3	317.31	6	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	10	1193.11	20	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	15	1824.42	30	100.00%	0

Table 8d

Chemical Site Preparation Outside SMZs - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	314	4	100.00%	0
Piedmont	12	1199.15	24	100.00%	0
Upper Coastal Plain	1	170	2	100.00%	0
Lower Coastal Plain	25	2480.83	50	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	40	4163.98	80	100.00%	0

Table 9 a – d: Distribution of Firebreak installation and Prescribed Burning Operations Evaluated By Region, Ownership, % BMP Implementation, and Water Quality Risks. ***Note:*** *Number of sites and BMP implementation for this category includes results from the BMP Survey and GFC's statewide firebreak survey.*

Firebreaks/Burning

Region – NIPF Ownership – Table 9a	**No. Sites**	**% BMPs Implemented**	**WQ Risks**
Mountains	0	NA	0
Piedmont	37	92.11%	0
Upper Coastal Plain	23	95.80%	0
Lower Coastal Plain	82	85.04%	2
Ridge and Valley	4	98.00%	0
Total	146	92.74%	2
Region – Public Ownership – Table 9b	**No. Sites**	**% BMPs Implemented**	**WQ Risks**
Mountains	0	NA	0
Piedmont	3	97.00%	0
Upper Coastal Plain	0	NA	0
Lower Coastal Plain	3	92.00%	0
Ridge and Valley	0	NA	0
Total	6	94.50%	0
Region – Corporate Ownership – Table 9c	**No. Sites**	**% BMPs Implemented**	**WQ Risks**
Mountains	4	99.00%	0
Piedmont	5	84.50%	0
Upper Coastal Plain	4	88.00%	0
Lower Coastal Plain	13	89.36%	0
Ridge and Valley	4	98.00%	0
Total	30	91.77%	0
Region – All Ownerships – Table 9d	**No. Sites**	**% BMPs Implemented**	**WQ Risks**
Mountains	4	99.00%	0
Piedmont	45	91.34%	0
Upper Coastal Plain	27	94.02%	0
Lower Coastal Plain	98	85.42%	2
Ridge and Valley	8	98.00%	0
Total	182	93.56%	2

Table 10 a – d: Distribution of Artificial Regeneration Operations Evaluated By Region, Ownership, Acres Assessed, BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 10a

Artificial Regeneration Outside SMZs - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	7	793.34	11	90.91%	0
Upper Coastal Plain	3	345	4	100.00%	0
Lower Coastal Plain	14	885.34	25	96.00%	0
Ridge and Valley	0	0	0	NA	0
Total	24	2023.68	40	95.00%	0

Table 10b

Artificial Regeneration Outside SMZs - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	88.5	6	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	2	54	2	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	4	142.5	8	100.00%	0

Table 10c

Artificial Regeneration Outside SMZs - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	479	6	100.00%	0
Upper Coastal Plain	3	290.37	6	83.33%	0
Lower Coastal Plain	11	1305.01	17	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	16	2074.38	29	96.55%	0

Table 10d

Artificial Regeneration Outside SMZs - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	11	1360.84	23	95.65%	0
Upper Coastal Plain	6	635.37	10	90.00%	0
Lower Coastal Plain	27	2244.35	44	97.73%	0
Ridge and Valley	0	0	0	NA	0
Total	44	4240.56	77	96.10%	0

Forest Fertilization: Forest fertilization occurred on only 2 Corporate sites in the Lower Coastal Plain. A total of 155.70 acres were treated with 4 BMPs assessed on the 2 sites with a 100% BMP implementation.

Table 11 a – d: Distribution of Equipment Servicing Operations Evaluated By Region, Ownership, No. of Landings Assessed, BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 11a

Equipment Servicing and Trash Clean-up - NIPF

Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	5	6	100.00%	0
Piedmont	37	92	111	100.00%	0
Upper Coastal Plain	32	81	95	94.74%	0
Lower Coastal Plain	48	154	140	91.43%	0
Ridge and Valley	7	13	21	100.00%	0
Total	126	345	373	95.44%	0

Table 11b

Equipment Servicing and Trash Clean-up - Public

Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	6	18	18	100.00%	0
Piedmont	7	26	20	100.00%	0
Upper Coastal Plain	1	9	3	100.00%	0
Lower Coastal Plain	4	8	11	100.00%	0
Ridge and Valley	4	21	12	100.00%	0
Total	22	82	64	100.00%	0

Table 11c

Equipment Servicing and Trash Clean-up - Corporate

Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	21	9	100.00%	0
Piedmont	15	67	43	97.67%	0
Upper Coastal Plain	8	30	24	95.83%	0
Lower Coastal Plain	24	93	72	93.06%	0
Ridge and Valley	1	4	3	100.00%	0
Total	51	215	151	95.36%	0

Table 11d

Equipment Servicing and Trash Clean-up - All Ownership

Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	11	44	33	100.00%	0
Piedmont	59	185	174	99.43%	0
Upper Coastal Plain	41	120	122	95.08%	0
Lower Coastal Plain	76	255	223	92.38%	0
Ridge and Valley	12	38	36	100.00%	0
Total	199	642	588	95.92%	0

Table 12 a – d: Distribution of Stream Types, Miles Assessed, and % Compliance By Region, and Ownership

Table 12a

Stream Assessment - NIPF

Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	2	0.36	94.44%	0.42	73.81%	83.33%
Piedmont	26	7.21	95.28%	9.6	98.75%	97.26%
Upper Coastal Plain	11	4.23	99.76%	2.34	100.00%	99.85%
Lower Coastal Plain	21	6.86	79.15%	3.79	81.00%	79.81%
Ridge and Valley	4	1.8	100.00%	1.29	96.12%	98.38%
Total	64	20.46	91.20%	17.44	94.27%	92.61%

Table 12b

Stream Assessment - Public

Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	6	2.96	100.00%	2.73	100.00%	100.00%
Piedmont	6	2.71	100.00%	5.09	100.00%	100.00%
Upper Coastal Plain	0	0	NA	0	NA	NA
Lower Coastal Plain	1	0.12	100.00%	0.36	94.44%	95.83%
Ridge and Valley	3	5.14	100.00%	1.31	100.00%	100.00%
Total	16	10.93	100.00%	9.49	99.79%	99.90%

Table 12c

Stream Assessment - Corporate

Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	3	2.27	99.12%	2.79	100.00%	99.60%
Piedmont	11	8.52	99.77%	6.39	100.00%	99.87%
Upper Coastal Plain	2	1.42	100.00%	0.27	100.00%	100.00%
Lower Coastal Plain	11	3.99	99.75%	2.89	100.00%	99.85%
Ridge and Valley	0	0	NA	0	NA	NA
Total	27	16.2	99.69%	12.34	100.00%	99.82%

Table 12d

Stream Assessment - All Ownership

Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	11	5.59	99.28%	5.94	98.15%	98.70%
Piedmont	43	18.44	98.05%	21.08	99.43%	98.79%
Upper Coastal Plain	13	5.65	99.82%	2.61	100.00%	99.88%
Lower Coastal Plain	33	10.97	86.87%	7.04	89.49%	87.90%
Ridge and Valley	7	6.94	100.00%	2.6	98.08%	99.48%
Total	107	47.59	96.11%	39.27	97.40%	96.70%

Table 13 a – d: Overall Distribution of Sites Evaluated By Region, Ownership, Acres Evaluated, BMPs Assessed, % BMPs Implemented, and Water Quality Risks ***Note:*** *Number of sites and BMP implementation for the overall distribution include results from the BMP Survey and GFC's statewide firebreak survey.*

Table 13a

Overall Distribution - NIPF

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	105.57	105	88.57%	1
Piedmont	70	5270.94	1314	92.05%	20
Upper Coastal Plain	53	4234.18	706	92.85%	7
Lower Coastal Plain	118	7195.6	1401	86.40%	25
Ridge and Valley	11	675.25	281	96.65%	0
Total	254	17481.54	3807	89.74%	53

Table 13b

Overall Distribution - Public

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	6	589	194	100.00%	0
Piedmont	10	1706.19	297	96.37%	0
Upper Coastal Plain	1	375	16	100.00%	0
Lower Coastal Plain	7	211.96	78	87.05%	7
Ridge and Valley	4	1351	159	99.37%	0
Total	28	4233.15	744	96.21%	7

Table 13c

Overall Distribution - Corporate

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	5	1494.9	157	94.23%	0
Piedmont	19	3763.81	563	93.55%	0
Upper Coastal Plain	13	1620.06	181	90.57%	0
Lower Coastal Plain	41	6236.41	751	94.59%	3
Ridge and Valley	5	102	23	97.53%	0
Total	83	13217.18	1675	93.62%	3

Table 13d

Overall Distribution - All Ownership

Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	13	2189.47	456	95.06%	1
Piedmont	99	10740.94	2174	92.87%	20
Upper Coastal Plain	67	6229.24	903	92.23%	7
Lower Coastal Plain	166	13643.97	2230	88.19%	35
Ridge and Valley	20	2128.25	463	96.87%	0
Total	365	34931.87	6226	91.13%	63

Chart 1: Statewide Trends in BMP Implementation

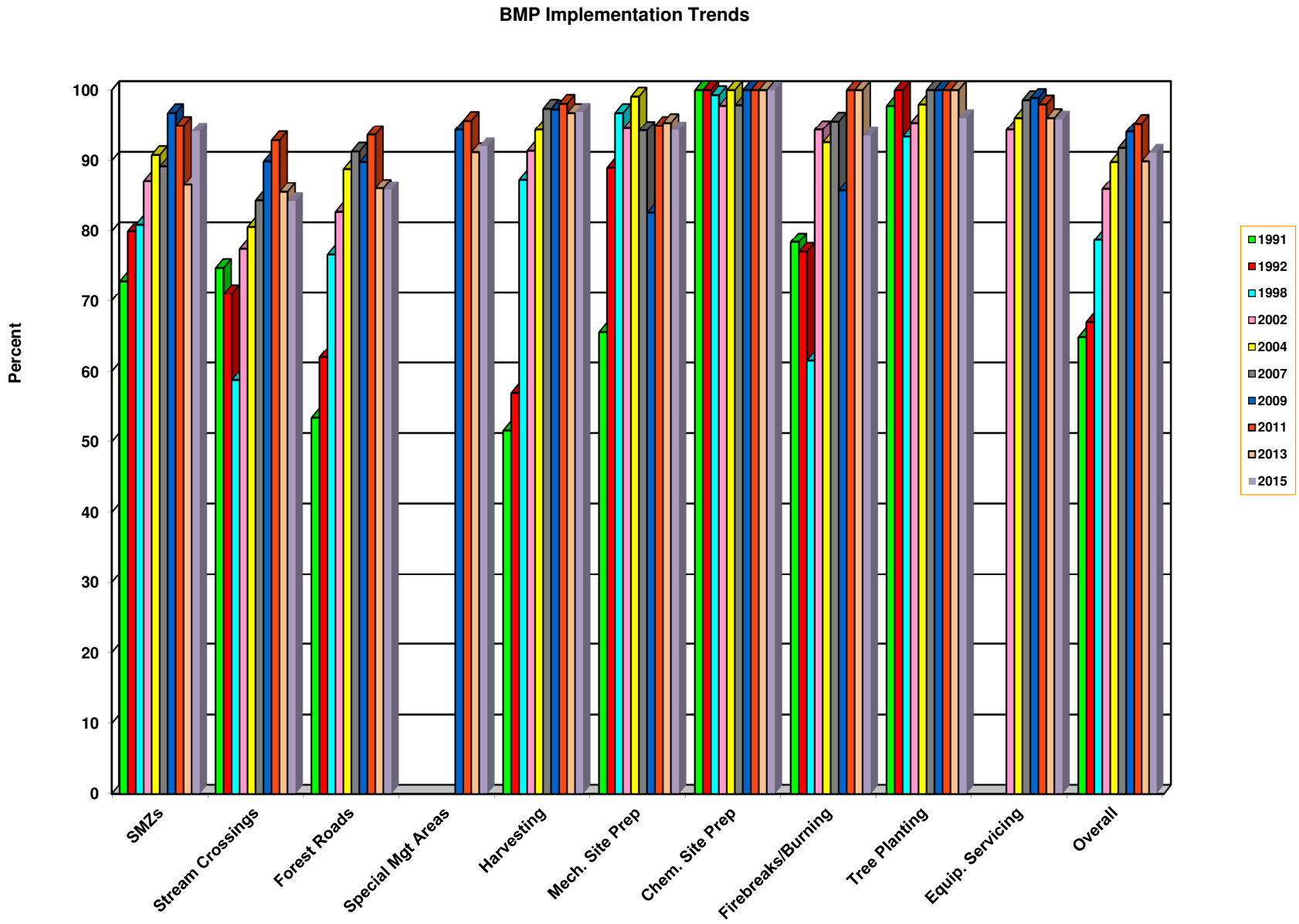


Chart 2: Statewide Trends in BMP Implementation on NIPF Sites

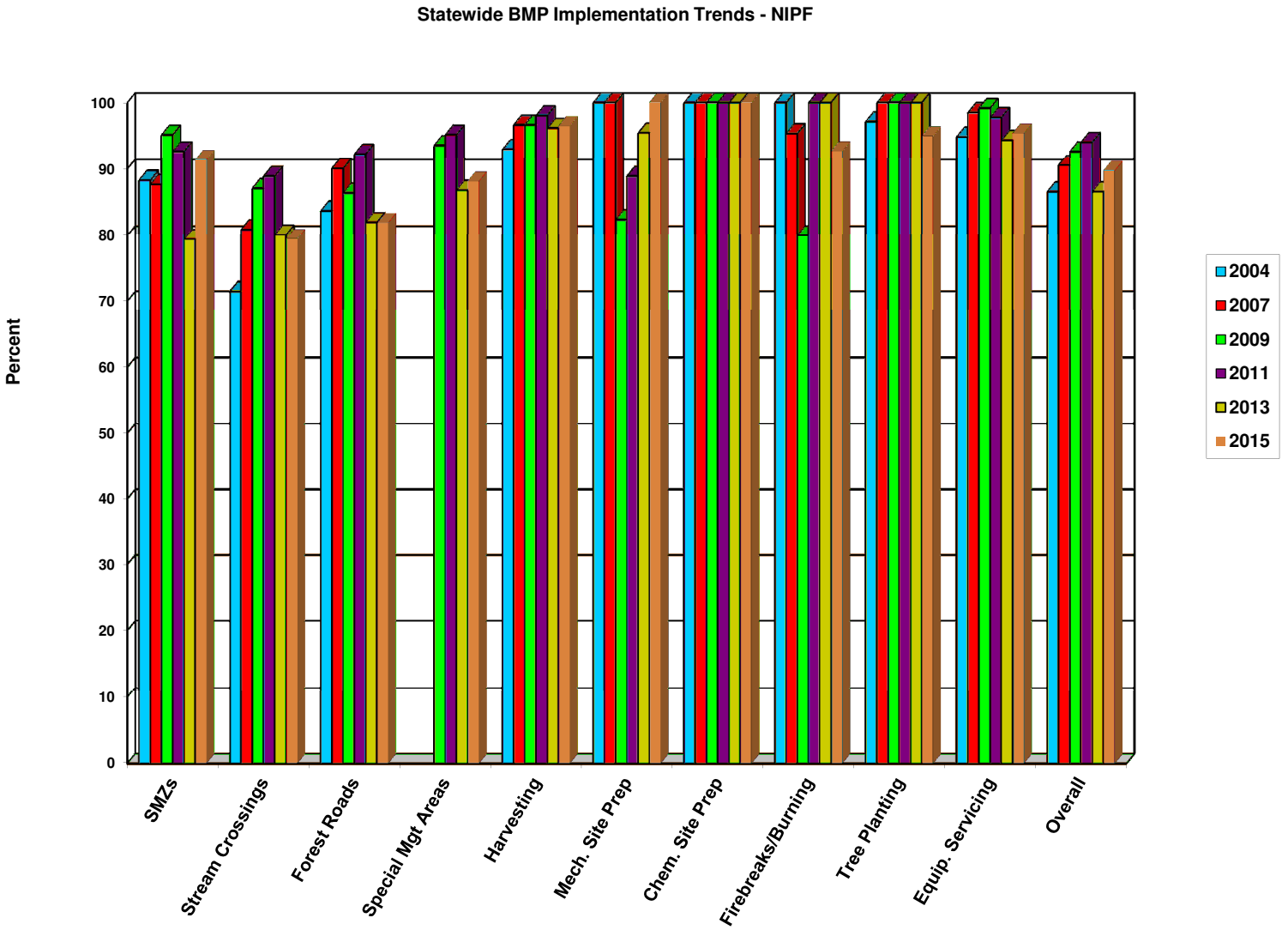


Chart 3: Statewide Trends in BMP Implementation on Corporate Sites

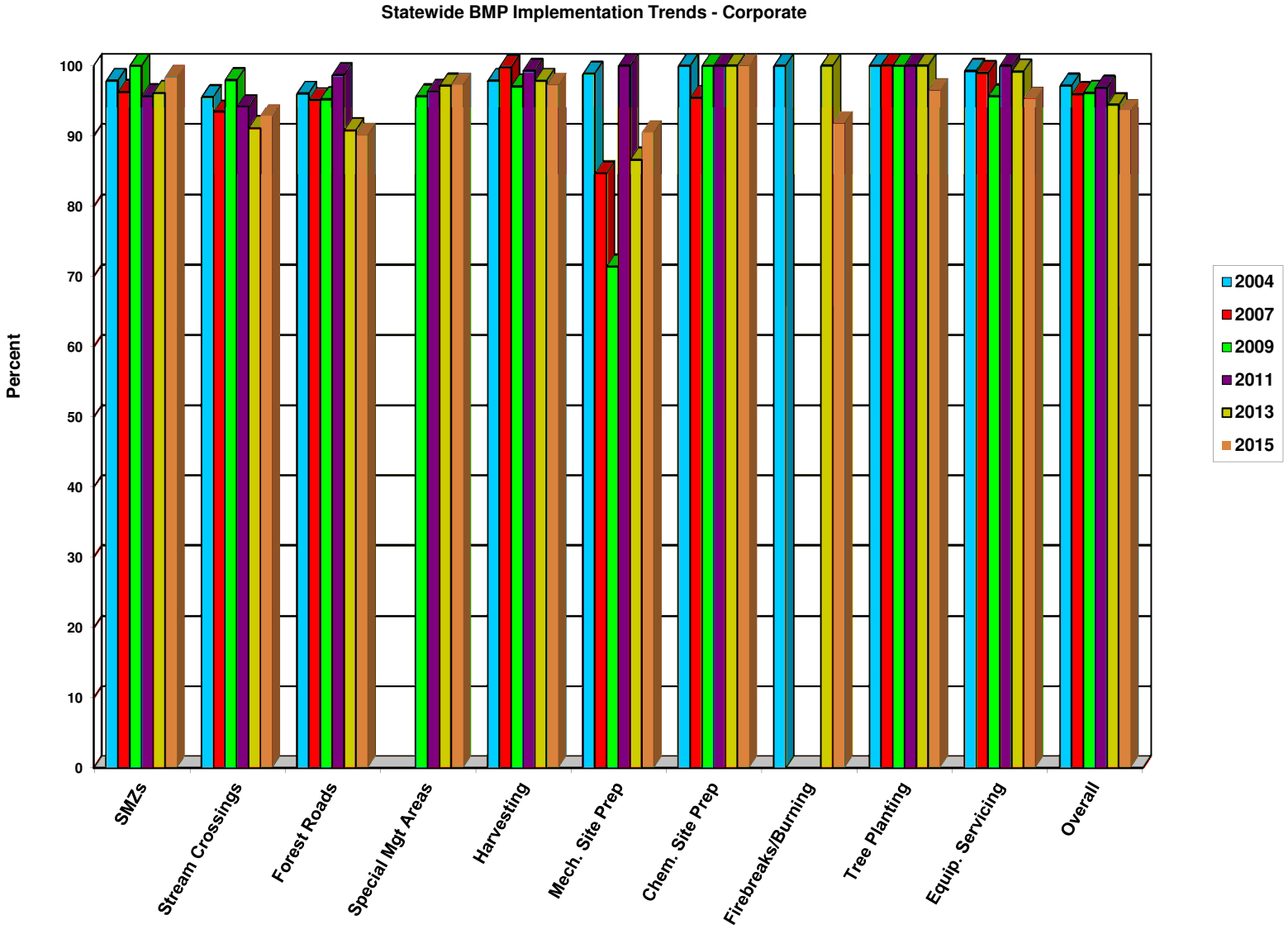
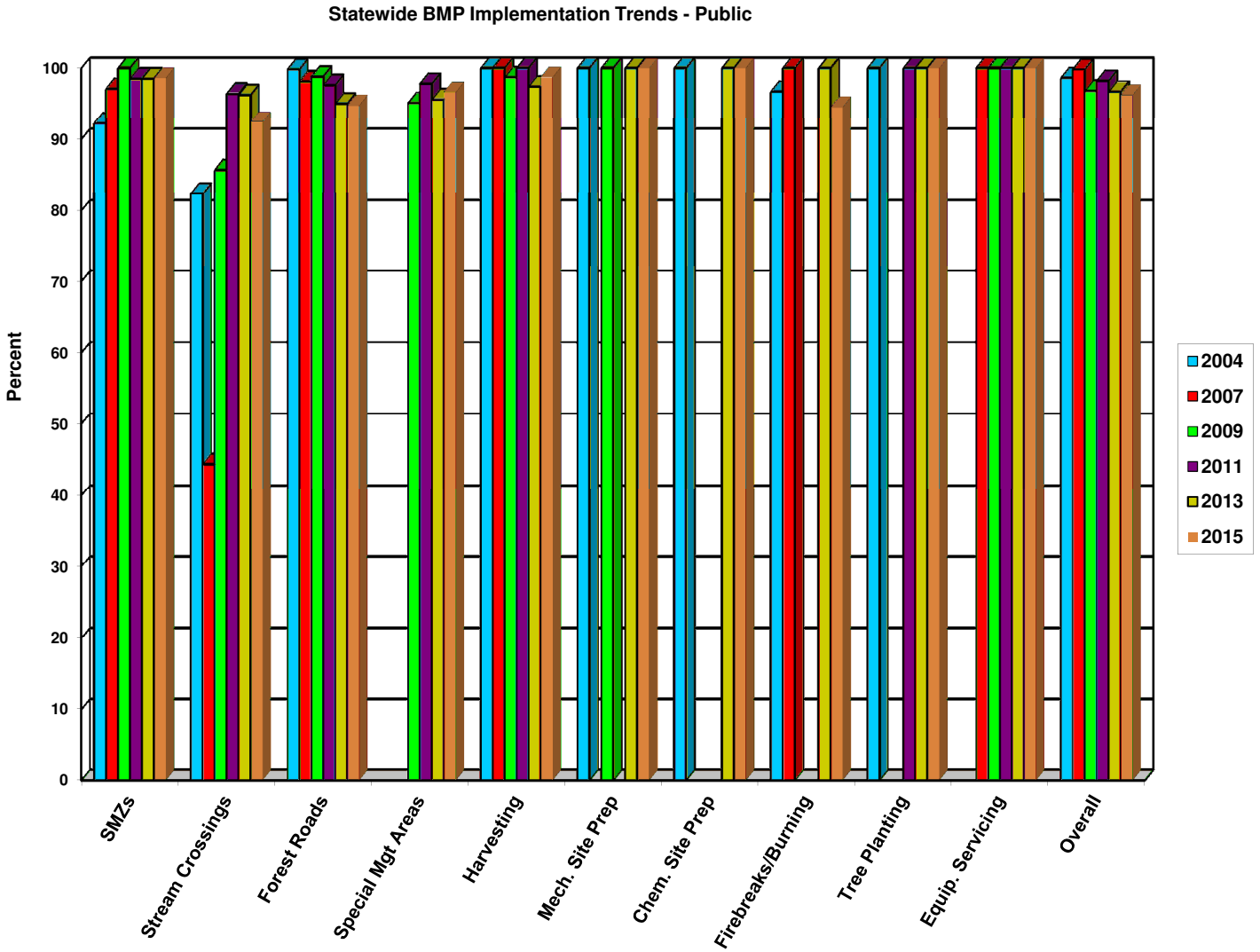


Chart 4: Statewide Trends in BMP Implementation on Public Sites



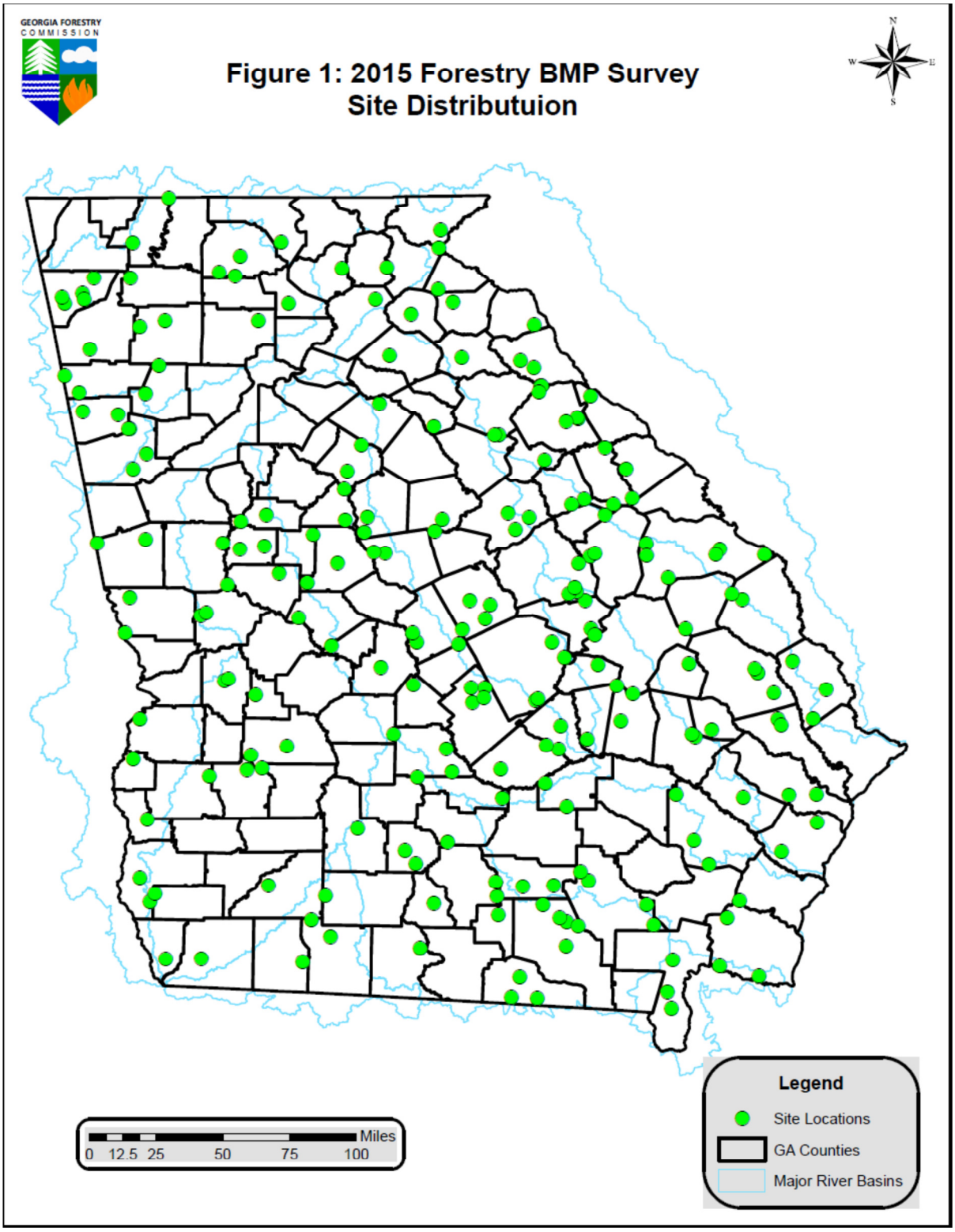
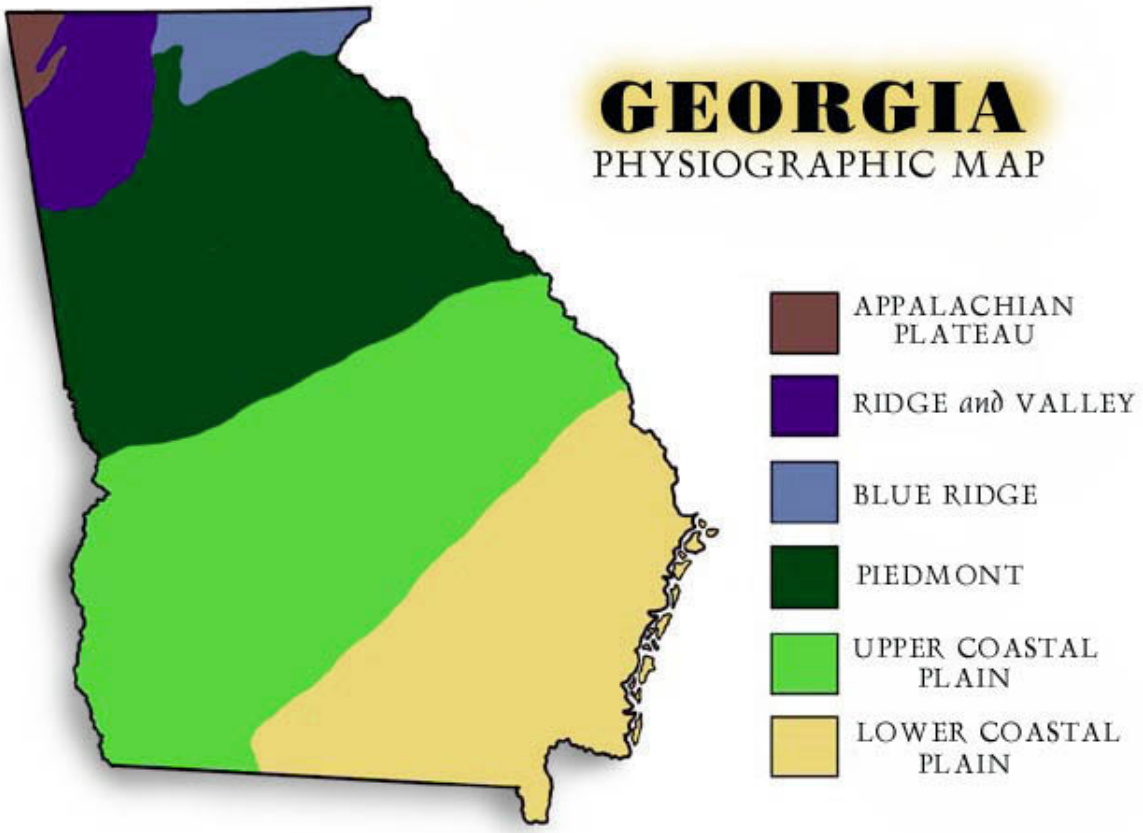

GEORGIA FORESTRY COMMISSION
Figure 1: 2015 Forestry BMP Survey
Site Distributuion
N
W
E
S
Miles
0 12.5 25 50 75 100
Legend
Site Locations
GA Counties
Major River Basins

Figure 2



Source: University of Georgia

Chart 5: Statewide Trends in Reduction of Water Quality Risks from 1998 through 2015 Surveys