GEORGIA FORESTRY
COMMISSION

Results of Georgia's 2011 Silvicultural Best Management Practices Implementation and Compliance Survey

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Prepared by the

Georgia Forestry Commission

in cooperation with
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of the
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EXECUTIVE SUMMARY

By designation from the Georgia Environmental Protection Division (GAEPD), the Georgia Forestry Commission (GFC) is the lead agency for statewide development, education, implementation and monitoring of forestry Best Management Practices (BMPs). Beginning in March of 2011, the GFC began the eighth Statewide Forestry BMP Implementation and Compliance Survey.

The objectives of the 2011 Statewide Forestry BMP Survey were to determine the: rates of BMP implementation; acres in BMP compliance; effectiveness of BMPs for any needed modifications; actual miles of streams that may have forestry water quality impairments; and ownerships and regions to target for future training.

The protocol and scoring methodology for this eighth 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* (http://nafoalliance.org/wp-content/uploads/Regional-BMP-Report-2008.pdf). The SGSF Task Force is composed of hydrologists and water specialists from state forestry agencies, the U.S. Forest Service, forest industry and the National Council for Air and Stream Improvement (NCASI), in consultation with EPA Region IV nonpoint source specialists.

The 2011 Statewide Forestry BMP Survey evaluated 187 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, 110 sites occurred on non-industrial private forest land (NIPF), 21 sites on forest industry land, 46 sites on corporate (TIMO) land and 10 sites on public land. By Region, 18 sites were in the Mountains, 51 sites in the Piedmont, 35 sites in the Upper Coastal Plain and 83 sites in the Lower Coastal Plain.

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 5711 individual BMPs evaluated, the statewide percentage of correct implementation was 95.3 percent. This is a 1.2 percent increase in BMP implementation from the 2009 survey**. By ownership, the percentage of BMP implementation statewide was 96.9 percent on forest industry lands, 96.3 percent on corporate (TIMO) lands, 98.2 percent on public lands and 94.1 percent on NIPF lands. Of particular interest, the number of observed Water Quality Risks remained low at 26, which shows no statistical difference from the 2009 survey. The number of Water Quality Risks for this survey is calculated at .13 risks per site. A more detailed discussion of Water Quality Risks can be found later in this report.

Additionally, a per unit of measure BMP compliance scoring methodology was assessed on all sites evaluated 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 the units of measure specific to the forestry practice (# acres, # miles of road) that were in compliance with BMPs by the total number of units measured for that particular practice. On the 187 sites, 21,977 acres of separate forestry operations were evaluated. Approximately 99.8 percent of those acres were in compliance with BMPs. This rate is statistically the same as was recorded in the 2009 survey. Of the 66.32 miles of stream evaluated, 62.09 miles, or 93.6 percent, were observed to have no impacts or impairment from the forestry practices. This figure is statistically the same as the 2009 survey. By practice or category, statewide percentage of BMP implementation and compliance were as follows:

Practice or Category:	*% BMP Implementation*	*% BMP Compliance*
Streamside Management Zones (SMZs)	95.0	99.1 (acres)
Stream Crossings	92.9	NA
Main Haul Roads	93.7	95.0 (miles)
Timber Harvesting	98.1	99.8 (acres)
Mechanical Site Preparation	95.0	99.9 (acres)
Chemical Site Preparation	100	100 (acres)
Control Burning	100	100 (acres)
Artificial Regeneration	100	100 (acres)
Equipment Servicing	97.9	NA
Special Management Areas	95.7	NA
Stream Miles	NA	93.6 (miles)
Overall	*95.3*	*99.8 (acres)*

With public attention focusing on water and the protection of riparian areas or streamside management zones, there should be much interest in the fact that the forestry community's BMP implementation rate for streamside management zones (SMZ's) is 95.0 percent, with 99.1 percent of SMZ acres in full compliance with BMPs. Forest operators continue to do an excellent job of protecting these sensitive areas. In addition, with basically a 95 percent overall statewide BMP implementation rate, and with 99.8 percent of those acres in compliance with BMPs, forest operators as a whole are doing a very good job of implementing forestry BMPs.

There was also notable improvement in stream crossing BMP implementation. However, there continues to be some room for improvement in this area, particularly on private lands in north Georgia. There were 143 stream crossings evaluated on 68 sites with an overall implementation rate of 92.9 percent, which represents a three percent improvement over the 2009 survey. The upward trend in stream crossing BMP implementation continues, meaning that for the evaluated stream crossings, there continue to be fewer deficiencies recorded. An increased effort to avoid stream crossings in carrying out forest operations is being maintained.

Most noted stream crossing problems were associated with skidder fords or debris type crossings - 11 of 143 total crossings, or 7.7 percent. These automatically count as non-compliant, since BMPs do not recommend their use. Simply eliminating these type crossings offers the greatest potential to increase implementation.

Landowners with potential water quality problems were advised about recommendations for remediation in a letter

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

As a result of the 1972 Federal Clean Water Act, the Georgia Environmental Protection Division (GAEPD) has been responsible for managing and protecting the state's waters from point and nonpoint sources of pollution. Since 1977, the GAEPD 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 90,000 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 2,592 BMP talks to over 84,073 persons and participated in 474 field demonstrations of BMPs (through December 2011). The education process is ongoing, with workshops routinely provided for foresters, timber buyers and loggers through the American Forest and Paper Association's (AF&PA) Sustainable Forestry Initiative (SFI) Program in Georgia. GFC foresters have also provided BMP advice in over 77,000 cases covering almost 5.2 million acres.

Implementation of BMPs is determined through monitoring surveys and during complaint resolution procedures. Of statistical importance are the monitoring surveys. The GFC conducted BMP Implementation and Compliance Surveys in 1991, 1992, 1998, 2002, 2004, 2007, and 2009. This statewide survey completes over 20 years of BMP monitoring in Georgia. The statewide percentage of acres in compliance averaged 86 percent in 1991, 92 percent in 1992, 98 percent in 1998, 99.1 percent in 2002, 99.4 percent in 2004, 99.7 percent in 2007 and 99.8 percent in 2009.

The purpose of this report is to present the results of the 2011 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 U.S. Forest Service's "Forest Statistics for Georgia, 2004" report – Average Annual Removals of Growing Stock on Timberland by County and Species Group. This method resulted in 187 sites being targeted to survey. The next step was to target the sample to reflect ownership where the practices occurred. Ownership classes are categorized into non-industrial private forest (NIPF) land, forest industry (FI), Timber Investment Management Organizations (TIMOs) or corporate lands, and public lands,

which includes 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 2011 BMP survey, 110 sites (58.8 percent) were inspected on NIPF lands, 21 sites (11.2 percent) on forest industry lands, 46 sites (24.6 percent) on TIMO or corporate lands, and 10 sites (5.3 percent) on public lands were inspected. Of interest in this discussion is the divestiture of almost 2.1 million acres of formerly forest industry lands. These lands are now held by TIMO/corporate landowners or by NIPF landowners, resulting in potential changes in the level of forest management.

In order to randomize the stratified sample, GFC personnel went to county government offices and researched timber harvests using the PT 283-T "Report of Timber Harvest" notification forms in the county tax assessor's office or the county's "Notification of Timber Harvesting Activity" records. Only harvest information from the past two years and preferably during the previous six months was used to compile a list of potential random selection sites. The forms were separated by ownership category and the appropriate number of sites was drawn randomly. Figure 1 in the appendix shows the distribution of survey sites by county.

Site Evaluation

For this eighth 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* (http://nafoalliance.org/wp-content/uploads/Regional-BMP-Report-2008.pdf). After sites had been selected and verified in the field by County Foresters or Chief Rangers, attempts to contact all landowners were made to obtain permission to conduct site evaluation. All evaluations were conducted by trained forest water Specialists or by district water quality foresters to provide accuracy, consistency and quality control using the BMP Compliance Survey Form. See Exhibit 1 in Appendix.

Once a site was selected, the 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, forest types before treatment, 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 where available or USGS topographical maps. Data could be extracted by each of these fields of information.

BMP Implementation

Each site was then 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 occurred at three levels on each site: (1) individual BMP; (2) category of practice; and (3) overall site implementation.

For a 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.

For 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
Main Haul Roads
Timber Harvesting Outside SMZs
Mechanical Site Preparation Outside SMZs
Chemical Site Preparation Outside SMZs
Control Burning Outside SMZs
Artificial Regeneration Outside SMZs
Equipment Servicing Outside SMZs
Special Management Areas
Stream Miles

Firebreak construction BMPs have been excluded from this survey, due to the lack of a statistically viable sample. Firebreak BMPs will be evaluated in a separate survey in 2012 and the results will be available in a separate report. Forest fertilization has also been excluded, due to a lack of verifiable sites.

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.

BMP Compliance

BMP Compliance was also determined for each category of practice and overall site where the units of measure were the same. 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. Streamside Management Zones (SMZs), harvesting, mechanical site preparation, chemical applications, control burning and artificial regeneration were all measured in *acres*. Main haul roads, firebreaks, and streams 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 the landscape. As with the implementation evaluation, the lack of BMP implementation may not necessarily equate to large-scale areas being out of compliance. For those areas out of compliance, it provides a better picture of locations to be prioritized for improvements.

RESULTS AND DISCUSSION

The 2011 Statewide Forestry BMP Survey evaluated 187 sites comprising 21,977 acres. One hundred forty-three stream crossings, 187.2 miles of main haul roads and 66.3 stream miles were evaluated. Table 1, pages 17-20, shows the distribution of survey sites by county. Figure 1, page 45, shows the spatial location of the 187 survey sites. Figure 2, page 46, is a map of the state showing the different physiographic regions for reference. The Statewide BMP Compliance Survey Report in the Appendix provides a summary of the distribution of the sites evaluated by region, ownership, specific questions regarding timber sales on NIPF lands and specific site information and the BMP implementation and compliance results for each practice and BMP evaluated.

Statistical Analysis

The 187 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 1.9 percent or 2.7 percent sample at best. In order to result in a statistically valid monitoring report, Georgia has decided to adopt 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.

Use of the formula gives a needed sample size of 89 sites in order achieve a five percent margin of error. We have evaluated more than twice the needed number of sites, so, using the formula, this level of survey should yield a margin of error of 3.4% for this survey. The reason the additional sites were assessed is so that the 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 type streams. In these zones, 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, zones along intermittent streams vary in width from 20 to 50 feet on most streams, depending on slope, and 100 feet along trout streams. Zones 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 2, page 21-22, provides a summary of the results by ownership, region and state totals. Notable findings include:

- Statewide implementation for SMZs is 95.0 percent.
- Statewide BMP compliance for SMZs is 99.1 percent.
- Five WQRs were identified.
- Implementation for SMZs in the mountain region declined by 5.2 percent across all ownership categories from 2009.

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 or 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 22-23) provides a summary of the results by ownership, region and state totals. A total of 143 crossings were evaluated on 68 sites statewide.

Significant findings include:

- Statewide implementation for stream crossings is 92.9 percent. This is a three percent improvement over 2009, in spite of an 11.8 percent decline in the mountains.
- The largest increases in implementation occurred on TIMO and public holdings.
- One of the largest problem areas in the past has been the use of skidder fords and debris crossings. This number declined from 18.7 percent of the total crossings assessed in 2009 to 7.7 per cent of crossings assessed in 2011.

- Areas for improvement in stream crossing design continue to be culvert sizing with respect to storm flow, culvert placement with respect to migration of aquatic species, and stream crossing approach design.
- Fifteen WQRs were associated with stream crossings.

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, which may lead to changing stream flow patterns, degrading fish and aquatic organism habitat, and adversely affected aesthetics.

Table 4 (page 23-24) provides a summary of the results by region, ownership and state totals. Approximately 187.2 miles of road were evaluated on 183 sites.

Significant findings include:

- Forest roads BMP implementation across all ownerships is 93.7 percent.
- Forest roads compliance is 95.0 percent.
- There were four WQRs associated with forest roads.
- Challenges for forest roads BMP implementation continue to be the proper installation of water diversions and the stabilizing and reshaping of forest roads after activities are complete.

A notable finding about forest roads BMP implementation was an increase of nearly six percent over the 2009 survey for NIPF.

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 waterbodies. These areas should be provided some measure of protection, but normally do not need to be treated as streams.

Table 5 (page 25-26) provides a summary of the results by region, ownership and state totals. Statewide, there were 142 sites with canals, ditches, ephemeral areas, gullies and wetland features.

Other significant findings include:

- Special management area BMP implementation across all ownerships was 95.7 percent.
- There was one WQR associated with special management areas.
- A notable finding is that Special Management Area BMP implementation increased by more than 10 percent in the mountain region.

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 seasonal weather conditions, soil type, soil moisture, topography, and matching the type of equipment to be used with the particular harvesting site are considered. The location, construction and maintenance of log decks and skid trails are the primary concerns.

Table 6 (page 26-27) provides a summary of the results by ownership, region and state total. Approximately 17,030 acres were evaluated on 185 sites.

A total of 619 log decks were evaluated, of which 99.5 percent were in compliance. A total of 1,170 main skid trails were evaluated, of which 98.5 percent were in compliance.

Other significant findings include:

- Timber harvesting outside SMZs' BMP implementation across all ownerships is 98.1 percent.
- BMP compliance is 99.8 percent.
- All BMP categories for Timber Harvesting scored 95 percent or better for BMP implementation, except for stabilization of skid trails with water diversions or slash dispersal.
- There was one WQR 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, sub-soiling, chopping, windrowing, piling, bedding, and other physical methods to cut, break apart or move logging debris, or 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 27-28) provides a summary of the results by region, ownership and state totals. Statewide, approximately 669 acres were evaluated on 10 sites.

Significant findings include:

- Mechanical Site Prep BMP implementation is 95.0 percent
- BMP compliance for Mechanical site prep is 99.9 percent.
- 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 challenge observed for Mechanical Site Prep is bedding directing 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 and enhance tree survival and growth. On many highly erodible sites, the use of herbicides is actually better 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 28-29) provides a summary of the results by region, ownership and state totals. Statewide, approximately 1,455 acres were evaluated on 14 sites.

Significant findings include:

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

Control Burning Outside SMZs

Controlled fire 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 593 acres were evaluated on seven sites. BMP implementation and compliance was 100 percent. No challenges were observed. No water quality risks were identified.

Artificial Regeneration 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 9 (page 30-31) provides a summary of the results by region, ownership and state totals. Approximately 1,539.8 acres were evaluated on 15 sites. Overall, the percentage of acres in BMP compliance was 100 percent. A total of 23 BMPs were evaluated and overall BMP implementation was 100 percent. No water quality risks were identified.

Significant findings include:

- Machine planting on slopes of five to 20 percent generally followed the contour on 100 percent of sites. No water quality risks were identified.
- On slopes > 21 percent, hand planting was conducted on 100 percent of sites.
- Pine establishment was avoided on specified wetlands identified in the EPA/COE memo.

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 10 (page 31-32) provides a summary of the results by region, ownership and state totals. A total of 613 landings were evaluated on 180 sites.

Significant findings include:

- BMP implementation for Equipment Servicing was 97.9.
- All BMPs assessed for Equipment Servicing were implemented at or above 95 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 66.3 miles of streams on 93 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, or impaired stream bank or channel integrity due to forestry practices.

Table 11 (page 32-33) provides a summary of the results by region, ownership and state totals by stream type.

A total of 31.4 miles of perennial streams were assessed on these sites. Of these, 91.8 percent are in compliance.

A total of 35.0 miles of intermittent streams were assessed on these sites. Of these 95.3 percent are in compliance.

Significant findings include:

- Overall stream BMP compliance is 93.6 percent.
- 26 water quality risks were identified statewide.
- There were 15 WQRs (58 percent of the total) involving stream crossings.
  - ✓ Eight of these were associated with steam crossing approaches.
- Forest roads accounted for four water quality risks (approximately 15 percent of the total).
  - ✓ The lack of properly installed water diversions at SMZs accounted for two of the four risks for forest roads.
  - ✓ The failure to adequately reshape and stabilize critical road segments also resulted in 2 WQRs.
- Within SMZs, there were five WQRs (19 percent of the state total).
  - ✓ Three of the WQRs were associated with lack of water diversions in roads and skid trails near streams.
- One WQR was associated with Special Management Areas.
- One WQR was associated with Timber Harvesting outside of SMZs.

The overall 93.6 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 12 (page 34-35) provides the statewide compliance and 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, is approximately 95.3 percent. **This is a 1.2 percent increase from the 2009 survey**. While this score is not statistically different from the 2009 survey, it does continue an upward trend in BMP compliance and implementation. Overall, statewide acres in BMP compliance have remained unchanged at 99.8 percent for another survey cycle, indicating a plateau.

Education Opportunities

Charts 1 through 7 (pages 37-42, and page 45) 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 and compliance by practice and ownership and provide impetus for continued training and improvement.

BMP education targeting deficiencies found in the last few survey cycles continues to pay off. BMP compliance and implementation on roads, in SMZs, and even at stream crossings, has noticeably improved. Stream crossing BMP implementation has improved, but more training is needed statewide across all landownership classes. BMP implementation for stream crossings on the 2011 survey shows that for each crossing that was attempted, fewer BMP problems were found.

Finally, Chart 7 (page 45) shows the dramatic decline in Water Quality Risks observed in BMP implementation surveys between the 1998 survey and the present.

BMP Implementation available by River Basin and ecoregion

Similar statistics can be extracted for each of the 14 major river basins (page 16), 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 16).

CONCLUSION

Since the 1991 survey, the percentage of acres in BMP compliance has increased from 86 percent to 99.8 percent. The percentage of BMP implementation has increased from 64.9 percent to 95.3 percent. The percentage of stream miles in compliance has increased to around 93.6 percent. Since the 1998 survey, the number of water quality risks has decreased dramatically and seems to have bottomed out. Chart 7 (page 45) shows the decrease in Water Quality Risks since the 1998 survey.

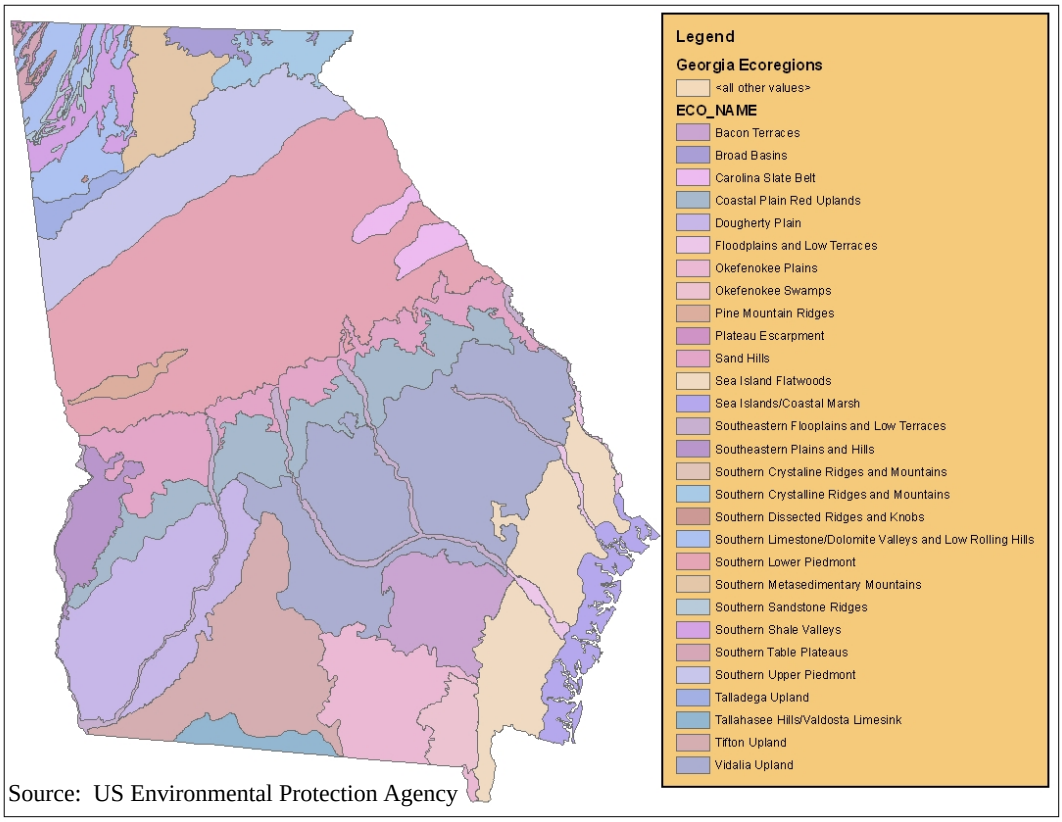
The 2011 implementation survey shows continued increases in BMP implementation in categories where there is room for improvement and continued high rates of implementation in the remaining categories. Although the survey shows high overall rates of BMP implementation, it does reveal areas for BMP implementation improvement within certain landownership categories and across certain regions of the state. This information will be used to target BMP training at Master Timber Harvester, forester and landowner workshops.

GFC will continue to use available means to resolve forestry BMP complaints. The GFC, 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.

Portable Logging Bridge

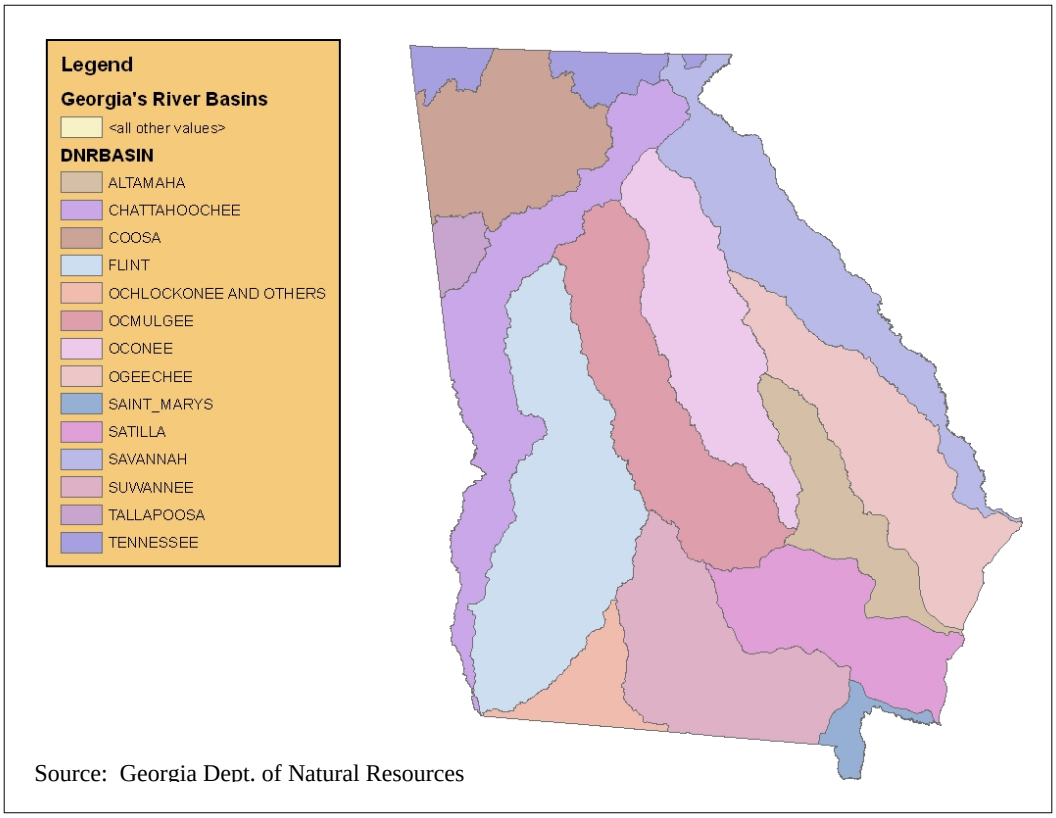
Stabilized Logging Deck and Access Road

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	Federal	State/Local	Forest Industry	TIMO Corporate	NIPF
Appling			1	2	
Atkinson			1		1
Bacon		1			1
Baker					1
Banks					1
Bartow			1	1	
Ben Hill					1
Berrien					1
Bleckley				1	1
Brantley			1	1	
Brooks					1
Bryan	1			1	
Bulloch					3
Burke				1	
Butts			1		
Calhoun					1
Camden				1	1
Candler				1	
Carroll					1
Charlton			1	1	
Chattahoochee	1			1	
Chattooga	1			1	
Clay					1
Clinch			2		1
Coffee				1	1
Colquitt					1
Columbia			1		
Cook					1
Coweta				1	1
Crawford			1	1	
Crisp					1
Dade					1
Dawson					1
Decatur			1		

County	Federal	State/Local	Forest Industry	TIMO Corporate	NIPF
Dodge					1
Dooly					1
Early					1
Echols			1	1	
Elbert					1
Emanuel				1	1
Evans					1
Fannin					1
Franklin					1
Gilmer					1
Glascock				1	
Glynn				2	1
Gordon			1	1	
Grady					2
Greene					2
Hancock				1	1
Haralson				1	
Harris				1	1
Hart					1
Heard					1
Houston					1
Irwin					1
Jackson					1
Jasper					1
Jeff Davis					1
Jefferson			1		1
Jenkins					1
Johnson					2
Jones					1
Lamar					1
Lanier					1
Laurens				1	1

County	Federal	State/Local	Forest Industry	TIMO Corporate	NIPF
Lee					1
Liberty	1				
Lincoln	2				2
Long			2	1	
Lowndes			1		
Lumpkin	1				1
Macon					1
Madison					1
Marion					1
McDuffie					1
McIntosh					1
Meriwether				1	1
Miller					1
Mitchell					1
Monroe				1	
Montgomery					1
Morgan		1			1
Murray				2	1
Oconee					1
Oglethorpe				1	1
Paulding					1
Peach					1
Pickens					1
Pierce					1
Pike					1
Polk			1		
Pulaski				1	
Putnam				1	1
Quitman					1
Randolph					1
Schley					1
Screven					2
Seminole					1
Stephens					1
Stewart				1	1
Sumter					1

County	Federal	State/Local	Forest Industry	TIMO Corporate	NIPF	
Talbot				2		
Taliaferro				1	1	
Tattnall					1	
Taylor				1	1	
Telfair					2	
Terrell				1		
Thomas			1		1	
Tift					1	
Toombs				1	1	
Treutlen					1	
Turner					1	
Twiggs					1	
Union	1					
Upson					1	
Walker				1		
Ware			1	1	1	
Warren					1	
Washington				1	1	
Wayne			1		1	
Webster				1		
Wheeler					1	
White					2	
Wilcox					2	
Wilkes					1	
Wilkinson				2		
Worth					2	
Totals	**8**	**2**	**21**	**46**	**110**	**Total Sites 187**

Tables 2 a – e: Distribution of Sites with Streamside Management Zones Evaluated By Region Ownership, Acres Evaluated, %Compliance, BMP Assessed, and %BMPs Implemented, and # Water Quality Risks

Table 2a

Streamside Management Zones - NIPF

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	4	21.2	99.53%	34	91.18%	0
Piedmont	17	127.56	98.75%	157	90.45%	1
Upper Coastal Plain	10	44.29	98.26%	83	91.57%	0
Lower Coastal Plain	18	82.57	99.75%	162	95.68%	0
Total	49	275.62	99.03%	436	92.66%	1

Table 2b

Streamside Management Zones - Public

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	1	10.62	100.00%	11	100.00%	0
Piedmont	3	32.02	96.78%	31	96.77%	0
Upper Coastal Plain	1	3.55	100.00%	9	100.00%	0
Lower Coastal Plain	2	50.03	100.00%	17	100.00%	0
Total	7	96.22	98.93%	68	98.53%	0

Table 2c

Streamside Management Zones - TIMO

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	3	4	99.99%	20	95.00%	1
Piedmont	7	63.64	99.84%	64	96.88%	1
Upper Coastal Plain	9	86.23	99.99%	84	98.81%	0
Lower Coastal Plain	8	24.24	99.99%	69	98.55%	0
Total	27	178.11	99.94%	237	97.89%	2

Table 2d

Streamside Management Zones - Forest Industry

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	1	2.4	99.58%	12	91.67%	1
Piedmont	2	84.52	100.00%	19	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	7	81.29	96.92%	62	95.16%	1
Total	10	168.21	98.51%	93	95.70%	2

Table 2e						
Streamside Management Zones - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	9	38.22	99.71%	77	93.51%	2
Piedmont	29	307.74	99.11%	271	93.36%	2
Upper Coastal Plain	20	134.07	99.43%	176	95.45%	0
Lower Coastal Plain	35	238.13	98.86%	310	96.45%	1
Total	93	718.16	99.12%	834	94.96%	5

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

Table 3a					
Stream and Wetland Crossings - NIPF					
Region	**No. Sites**	**Crossings**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	5	29	68.97%	0
Piedmont	11	15	124	86.29%	6
Upper Coastal Plain	4	5	45	82.22%	0
Lower Coastal Plain	13	23	206	94.66%	0
Total	31	48	404	88.86%	6

Table 3b					
Stream and Wetland Crossings - Public					
Region	**No. Sites**	**Crossings**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	1	4	19	84.21%	0
Piedmont	2	4	33	100.00%	0
Upper Coastal Plain	1	3	12	100.00%	0
Lower Coastal Plain	1	3	19	100.00%	0
Total	5	14	83	96.39%	0

Table 3c					
Stream and Wetland Crossings - TIMO					
Region	**No. Sites**	**Crossings**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	1	2	9	77.78%	2
Piedmont	6	10	78	91.03%	5
Upper Coastal Plain	5	12	58	100.00%	0
Lower Coastal Plain	10	24	159	99.37%	0
Total	22	48	304	96.71%	7

Table 3d					
Stream and Wetland Crossings - Forest Industry					
Region	**No. Sites**	**Crossings**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	10	33	156	94.23%	2
Total	10	33	156	94.23%	2

Table 3e					
Stream and Wetland Crossings – All Ownership					
Region	**No. Sites**	**Crossings**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	5	11	57	75.44%	2
Piedmont	19	29	235	89.79%	11
Upper Coastal Plain	10	20	115	93.04%	0
Lower Coastal Plain	34	83	540	96.11%	2
Total	68	143	947	92.93%	15

Tables 4 a – e: Distribution of Forest Road Sites Evaluated By Region, Ownership, Miles Assessed, % Compliance, # BMP Assessed, % BMPs Implemented, and Water Quality Risks

Table 4a						
Forest Road Sites - NIPF						
Region	**No. Sites**	**Miles**	**% Miles Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	1.73	88.44%	43	93.02%	0
Piedmont	33	16.61	82.12%	249	85.14%	2
Upper Coastal Plain	21	16.32	95.22%	158	93.04%	0
Lower Coastal Plain	47	32.68	97.71%	345	97.10%	0
Total	107	67.34	93.02%	795	92.33%	2

Table 4b						
Forest Road Sites - Public						
Region	**No. Sites**	**Miles**	**% Miles Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	4.26	100.00%	26	100.00%	0
Piedmont	3	8.69	98.04%	30	93.33%	0
Upper Coastal Plain	1	4.23	100.00%	9	100.00%	0
Lower Coastal Plain	2	2.24	100.00%	17	100.00%	0
Total	9	19.42	99.12%	82	97.56%	0

Table 4c						
Forest Road Sites - TIMO						
Region	**No. Sites**	**Miles**	**% Miles Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	5.26	86.69%	37	94.59%	0
Piedmont	11	12.88	94.80%	84	92.86%	2
Upper Coastal Plain	12	16.48	83.13%	101	89.11%	0
Lower Coastal Plain	17	21.68	99.12%	113	98.23%	0
Total	46	56.3	92.29%	335	93.73%	2

Table 4d						
Forest Road Sites - Forest Industry						
Region	**No. Sites**	**Miles**	**% Miles Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	2.8	96.43%	17	94.12%	0
Piedmont	3	3.87	100.00%	28	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	15	37.46	99.73%	108	99.07%	0
Total	21	44.13	99.55%	153	98.69%	0

Table 4e						
Forest Road Sites - All Ownership						
Region	**No. Sites**	**Miles**	**% Miles Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	18	14.05	92.88%	123	95.12%	0
Piedmont	50	42.05	90.94%	391	88.49%	4
Upper Coastal Plain	34	37.03	90.39%	268	91.79%	0
Lower Coastal Plain	81	94.06	98.89%	583	97.77%	0
Total	183	187.19	94.97%	1365	93.70%	4

Table 5 a – e: 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**	**WQR**
Mountains	4	14	78.57%	0
Piedmont	28	139	95.68%	0
Upper Coastal Plain	16	66	96.97%	0
Lower Coastal Plain	29	94	95.74%	0
Total	77	313	95.21%	0

Table 5b				
Special Management Areas - Public				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	2	5	100.00%	0
Piedmont	3	26	100.00%	0
Upper Coastal Plain	1	3	100.00%	0
Lower Coastal Plain	3	12	91.67%	0
Total	9	46	97.83%	0

Table 5c				
Special Management Areas - TIMO				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	5	11	90.91%	1
Piedmont	10	54	98.15%	0
Upper Coastal Plain	12	60	93.33%	0
Lower Coastal Plain	11	42	97.62%	0
Total	38	167	95.81%	1

Table 5d				
Special Management Areas - Forest Industry				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	1	8	100.00%	0
Piedmont	3	21	100.00%	0
Upper Coastal Plain	0	0	NA	0
Lower Coastal Plain	14	54	94.44%	0
Total	18	83	96.39%	0

Table 5e				
Special Management Areas - All Ownership				
Region	**No. Sites**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	12	38	89.47%	1
Piedmont	44	240	97.08%	0
Upper Coastal Plain	29	129	95.35%	0
Lower Coastal Plain	57	202	95.54%	0
Total	142	609	95.73%	1

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

Table 6a						
Timber Harvesting Outside SMZs - NIPF						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	356.68	99.94%	47	93.62%	0
Piedmont	33	1833.11	98.89%	232	96.98%	0
Upper Coastal Plain	22	1401.41	99.17%	145	99.31%	0
Lower Coastal Plain	48	4077.76	99.95%	315	99.05%	0
Total	109	7668.96	99.55%	739	98.11%	0

Table 6b						
Timber Harvesting Outside SMZs - Public						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	274	100.00%	23	100.00%	0
Piedmont	3	331.81	100.00%	21	100.00%	0
Upper Coastal Plain	1	151	100.00%	8	100.00%	0
Lower Coastal Plain	3	676.41	100.00%	20	100.00%	0
Total	10	1433.22	100.00%	72	100.00%	0

Table 6c						
Timber Harvesting Outside SMZs - TIMO						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	588.7	99.96%	46	95.65%	0
Piedmont	11	1284.17	99.97%	83	97.59%	0
Upper Coastal Plain	12	2120.06	99.99%	85	94.12%	0
Lower Coastal Plain	16	1498.91	100.00%	111	100.00%	0
Total	45	5491.84	99.99%	325	97.23%	0

Table 6d						
Timber Harvesting Outside SMZs - Forest Industry						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	174	100.00%	23	100.00%	0
Piedmont	3	524.35	99.99%	23	95.65%	1
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	15	1737.82	100.00%	99	100.00%	0
Total	21	2436.17	99.99%	145	99.31%	1

Table 6e						
Timber Harvesting Outside SMZs - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	18	1393.38	99.97%	139	96.40%	0
Piedmont	50	3973.44	99.48%	359	97.21%	1
Upper Coastal Plain	35	3672.47	99.68%	238	97.48%	0
Lower Coastal Plain	82	7990.9	99.97%	545	99.45%	0
Total	185	17030.19	99.80%	1281	98.13%	1

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

Table 7a						
Mechanical Site Preparation Outside SMZs - NIPF						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	2	20	100.00%	2	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	2	176.83	99.58%	7	85.71%	0
Total	4	196.83	99.62%	9	88.89%	0

Table 7b						
Mechanical Site Preparation Outside SMZs - Public						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
There were no Public sites surveyed containing mechanical site preparation.						

Table 7c						
Mechanical Site Preparation Outside SMZs - TIMO						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	4	345.01	100.00%	7	100.00%	0
Total	4	345.01	100.00%	7	100.00%	0

Table 7d						
Mechanical Site Preparation Outside SMZs - Forest Industry						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	2	126.82	100.00%	4	100.00%	0
Total	2	126.82	100.00%	4	100.00%	0

Table 7e						
Mechanical Site Preparation Outside SMZs - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	2	20	100.00%	2	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	8	648.66	99.89%	18	94.44%	0
Total	10	668.66	99.89%	20	95.00%	0

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

Table 8a						
Chemical Site Preparation Outside SMZs - NIPF						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	3	242.2	100.00%	6	100.00%	0
Upper Coastal Plain	2	165.63	100.00%	4	100.00%	0
Lower Coastal Plain	4	174	100.00%	8	100.00%	0
Total	9	581.83	100.00%	18	100.00%	0

Table 8b						
Chemical Site Preparation Outside SMZs - Public						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
There were no Public sites surveyed containing chemical site preparation.						

Table 8c						
Chemical Site Preparation Outside SMZs - TIMO						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	1	85.49	100.00%	2	100.00%	0
Upper Coastal Plain	1	162.5	100.00%	2	100.00%	0
Lower Coastal Plain	1	120	100.00%	2	100.00%	0
Total	3	367.99	100.00%	6	100.00%	0

Table 8d						
Chemical Site Preparation Outside SMZs - Forest Industry						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	1	310.05	100.00%	2	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	1	195.07	100.00%	2	100.00%	0
Total	2	505.12	100.00%	4	100.00%	0

Table 8e						
Chemical Site Preparation Outside SMZs - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	5	637.74	100.00%	10	100.00%	0
Upper Coastal Plain	3	328.13	100.00%	6	100.00%	0
Lower Coastal Plain	6	489.07	100.00%	12	100.00%	0
Total	14	1454.94	100.00%	28	100.00%	0

Table 9 a – e: Distribution of Artificial Regeneration Operations Evaluated By Region, Ownership, Acres Assessed, % Compliance, BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 9a						
Artificial Regeneration Outside SMZs - NIPF						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	5	282.2	100.00%	10	100.00%	0
Upper Coastal Plain	1	123.98	100.00%	1	100.00%	0
Lower Coastal Plain	4	149.03	100.00%	6	100.00%	0
Total	10	555.21	100.00%	17	100.00%	0

Table 9b						
Artificial Regeneration Outside SMZs - Public						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	1	141	100.00%	2	100.00%	0
Piedmont	0	0	NA	0	NA	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	0	0	NA	0	NA	0
Total	1	141	100.00%	2	100.00%	0

Table 9c						
Artificial Regeneration Outside SMZs - TIMO						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0
Upper Coastal Plain	1	162.5	100.00%	3	100.00%	0
Lower Coastal Plain	1	27	100.00%	1	100.00%	0
Total	2	189.5	100.00%	4	100.00%	0

Table 9d						
Artificial Regeneration Outside SMZs - Forest Industry						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	0	0	NA	0	NA	0
Piedmont	1	310.05	100.00%	1	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	2	316.82	100.00%	4	100.00%	0
Total	3	626.87	100.00%	5	100.00%	0

Table 9e						
Artificial Regeneration Outside SMZs - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	1	141	100.00%	2	100.00%	0
Piedmont	6	592.25	100.00%	11	100.00%	0
Upper Coastal Plain	2	286.48	100.00%	4	100.00%	0
Lower Coastal Plain	7	492.85	100.00%	11	100.00%	0
Total	16	1512.58	100.00%	28	100.00%	0

Table 10 a – e: Distribution of Equipment Servicing Operations Evaluated By Region, Ownership, No. of Landings Assessed, BMPs Assessed, % BMP Implementation, and Water Quality Risks

Table 10a						
Equipment Servicing and Trash Clean-up - NIPF						
Region	**No. Sites**	**Landings**	**% Landings Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	10	99.99%	18	88.89%	0
Piedmont	33	72	98.61%	99	98.99%	0
Upper Coastal Plain	22	45	99.99%	65	98.46%	0
Lower Coastal Plain	46	144	97.92%	137	97.81%	0
Total	107	271	98.52%	319	97.81%	0

Table 10b						
Equipment Servicing and Trash Clean-up - Public						
Region	**No. Sites**	**Landings**	**% Landings Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	3	9	100.00%	8	100.00%	0
Piedmont	3	22	100.00%	8	100.00%	0
Upper Coastal Plain	1	5	100.00%	3	100.00%	0
Lower Coastal Plain	3	29	100.00%	9	100.00%	0
Total	10	65	100.00%	28	100.00%	0

Table 10c						
Equipment Servicing and Trash Clean-up - TIMO						
Region	**No. Sites**	**Landings**	**% Landings Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	6	20	100.00%	18	100.00%	0
Piedmont	11	38	100.00%	33	100.00%	0
Upper Coastal Plain	12	50	98.00%	36	88.89%	0
Lower Coastal Plain	15	58	100.00%	43	100.00%	0
Total	44	166	99.40%	130	96.92%	0

Table 10d						
Equipment Servicing and Trash Clean-up - Forest Industry						
Region	**No. Sites**	**Landings**	**% Landings Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	2	4	100.00%	6	100.00%	0
Piedmont	3	10	100.00%	9	100.00%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	14	97	100.00%	42	100.00%	0
Total	19	111	100.00%	57	100.00%	0

Table 10e						
Equipment Servicing and Trash Clean-up - All Ownership						
Region	**No. Sites**	**Landings**	**% Landings Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	17	43	99.99%	50	96.00%	0
Piedmont	50	142	99.30%	149	99.33%	0
Upper Coastal Plain	35	100	99.00%	104	95.19%	0
Lower Coastal Plain	78	328	99.09%	231	98.70%	0
Total	180	613	99.18%	534	97.94%	0

Table 11 a – e: Distribution of Stream Types, Miles Assessed, and % Compliance By Region, and Ownership

Table 11a						
Stream Assessment - NIPF						
Region	**No. Sites**	**Intermittent Miles Assessed**	**% Miles Compliance**	**Perennial Miles Assessed**	**% Miles Compliance**	**Total % Miles Compliance**
Mountains	4	2.19	100.00%	3.55	97.18%	98.26%
Piedmont	17	5.18	95.56%	5.32	98.50%	97.05%
Upper Coastal Plain	10	1.61	74.53%	3.75	87.47%	83.58%
Lower Coastal Plain	18	5.97	99.66%	3.52	99.15%	99.47%
Total	49	14.95	95.59%	16.14	95.79%	95.69%

Table 11b						
Stream Assessment - Public						
Region	**No. Sites**	**Intermittent Miles Assessed**	**% Miles Compliance**	**Perennial Miles Assessed**	**% Miles Compliance**	**Total % Miles Compliance**
Mountains	1	0.06	100.00%	0.66	100.00%	100.00%
Piedmont	3	0	NA	3.05	93.44%	93.44%
Upper Coastal Plain	1	0.68	100.00%	0.16	100.00%	100.00%
Lower Coastal Plain	2	3.43	100.00%	0	NA	100.00%
Total	7	4.17	100.00%	3.87	94.83%	97.51%

Table 11c						
Stream Assessment - TIMO						
Region	**No. Sites**	**Intermittent Miles Assessed**	**% Miles Compliance**	**Perennial Miles Assessed**	**% Miles Compliance**	**Total % Miles Compliance**
Mountains	3	0.76	100.00%	0.41	100.00%	100.00%
Piedmont	7	3.59	97.21%	4.12	100.00%	98.70%
Upper Coastal Plain	9	4.34	100.00%	3.47	85.30%	93.47%
Lower Coastal Plain	8	2.11	100.00%	0.77	100.00%	100.00%
Total	27	10.8	99.07%	8.77	94.18%	96.88%

Table 11d						
Stream Assessment - Forest Industry						
Region	**No. Sites**	**Intermittent Miles Assessed**	**% Miles Compliance**	**Perennial Miles Assessed**	**% Miles Compliance**	**Total % Miles Compliance**
Mountains	1	0	NA	0.49	97.96%	97.96%
Piedmont	2	1.63	100.00%	0.55	100.00%	100.00%
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	7	3.41	73.61%	1.54	24.03%	58.18%
Total	10	5.04	82.14%	2.58	54.26%	72.70%

Table 11e						
Stream Assessment - All Ownership						
Region	**No. Sites**	**Intermittent Miles Assessed**	**% Miles Compliance**	**Perennial Miles Assessed**	**% Miles Compliance**	**Total % Miles Compliance**
Mountains	9	3.01	100.00%	5.11	97.85%	98.65%
Piedmont	29	10.4	96.83%	13.04	97.85%	97.40%
Upper Coastal Plain	20	6.63	93.82%	7.38	86.72%	90.08%
Lower Coastal Plain	35	14.92	93.83%	5.83	79.42%	89.78%
Total	93	34.96	95.25%	31.36	91.80%	93.62%

Table 12 a – e: Overall Distribution of Sites Evaluated By Region, Ownership, Acres Evaluated, % Compliance, BMPs Assessed, % BMPs Implemented, and Water Quality Risks

Table 12a

Overall Distribution - NIPF

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	6	377.88	99.92%	185	87.57%	0
Piedmont	34	2682.27	99.18%	1034	91.68%	9
Upper Coastal Plain	22	1870.89	99.34%	583	94.17%	0
Lower Coastal Plain	48	4940.36	99.94%	1303	97.01%	0
Total	110	9871.4	99.62%	3105	94.14%	9

Table 12b

Overall Distribution - Public

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	3	425.62	99.99%	94	96.81%	0
Piedmont	3	363.83	99.72%	149	97.99%	0
Upper Coastal Plain	1	154.55	100.00%	44	100.00%	0
Lower Coastal Plain	3	726.44	99.99%	94	98.94%	0
Total	10	1670.44	99.94%	381	98.16%	0

Table 12c

Overall Distribution - TIMO

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	6	592.7	99.96%	141	94.33%	4
Piedmont	11	1433.3	99.97%	398	95.48%	8
Upper Coastal Plain	12	2531.29	99.99%	429	94.17%	0
Lower Coastal Plain	17	2015.16	99.99%	551	99.09%	0
Total	46	6572.45	99.99%	1519	96.31%	12

Table 12d

Overall Distribution - Forest Industry

Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQR
Mountains	3	176.4	99.99%	72	93.06%	1
Piedmont	3	1228.97	99.99%	103	99.03%	1
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	15	2457.82	99.90%	531	96.99%	3
Total	21	3863.19	99.93%	706	96.88%	5

Table 12e						
Overall Distribution - All Ownership						
Region	**No. Sites**	**Acres**	**% Acres Compliance**	**BMPs Assessed**	**% BMPs Implemented**	**WQR**
Mountains	18	1572.6	99.97%	492	92.07%	5
Piedmont	51	5708.37	99.59%	1684	93.59%	18
Upper Coastal Plain	35	4556.73	99.73%	1056	94.41%	0
Lower Coastal Plain	83	10139.78	99.95%	2479	97.54%	3
Total	187	21977.48	99.81%	5711	95.32%	26

WATER QUALITY

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Chart 1: Statewide Trends in BMP Implementation

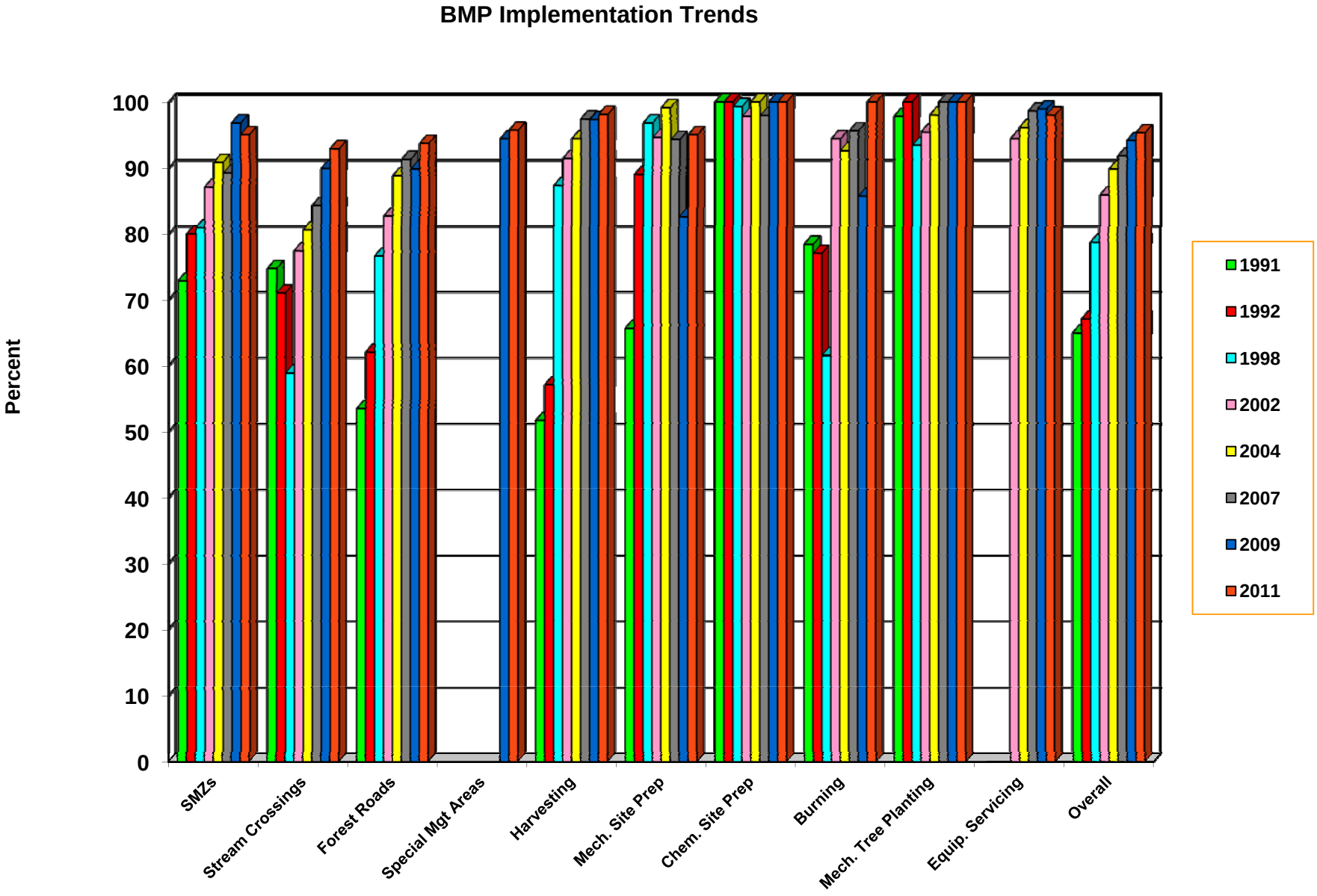


Chart 2: Statewide Trends in BMP Implementation on NIPF Sites

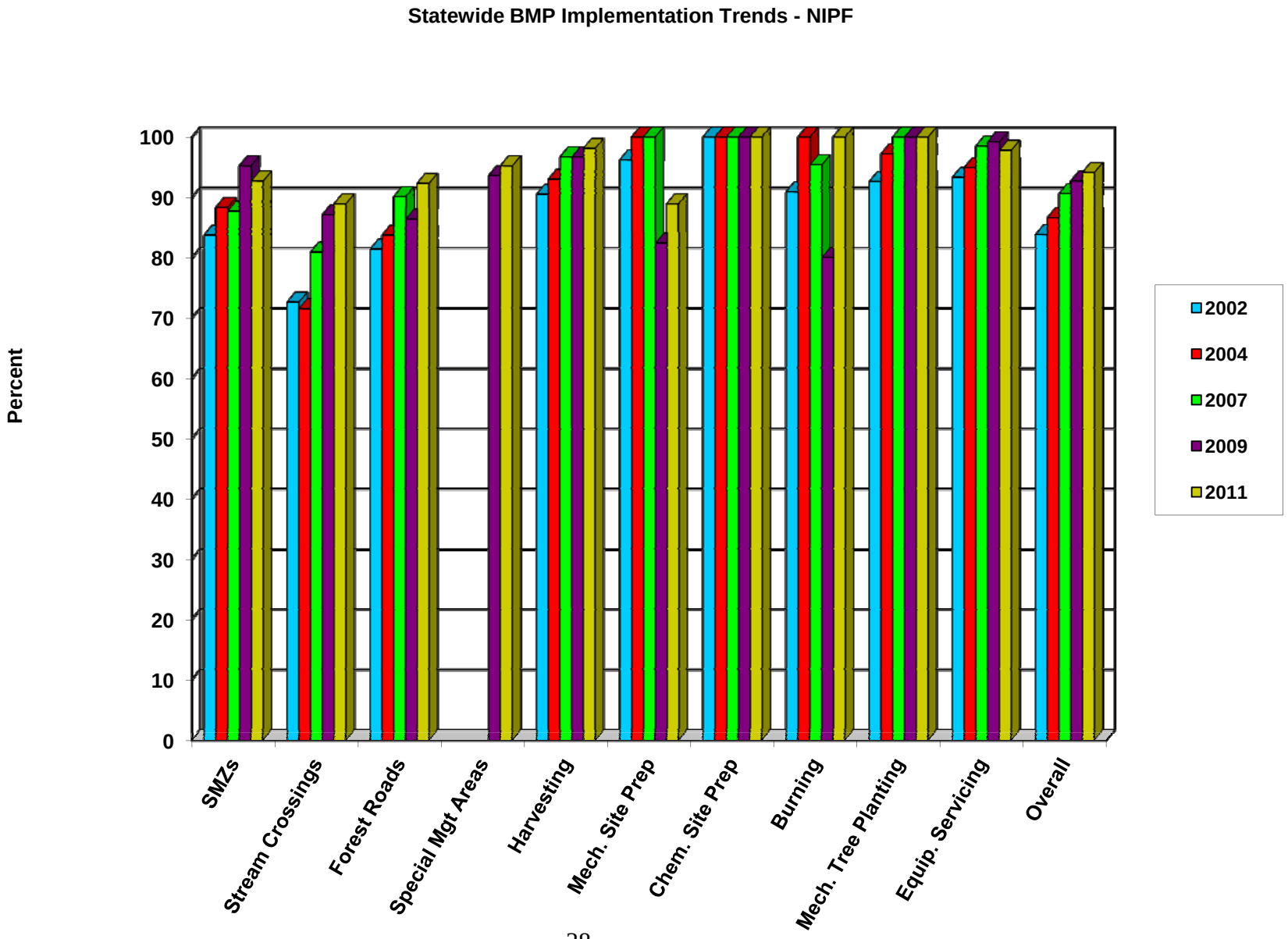


Chart 3: Statewide Trends in BMP Implementation on Forest Industry Sites

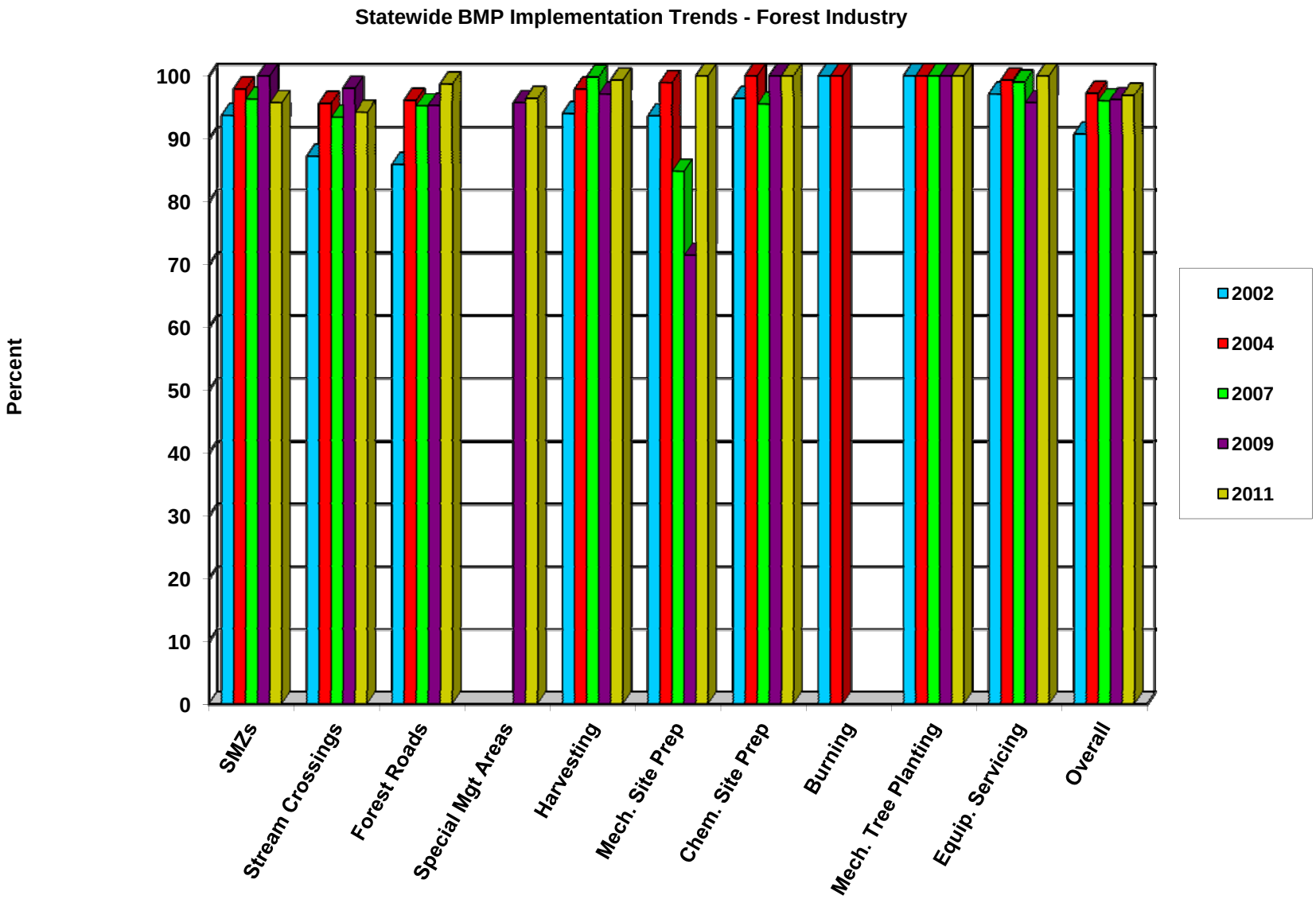


Chart 4: Statewide Trends in BMP Implementation on Corporate (TIMO) Sites

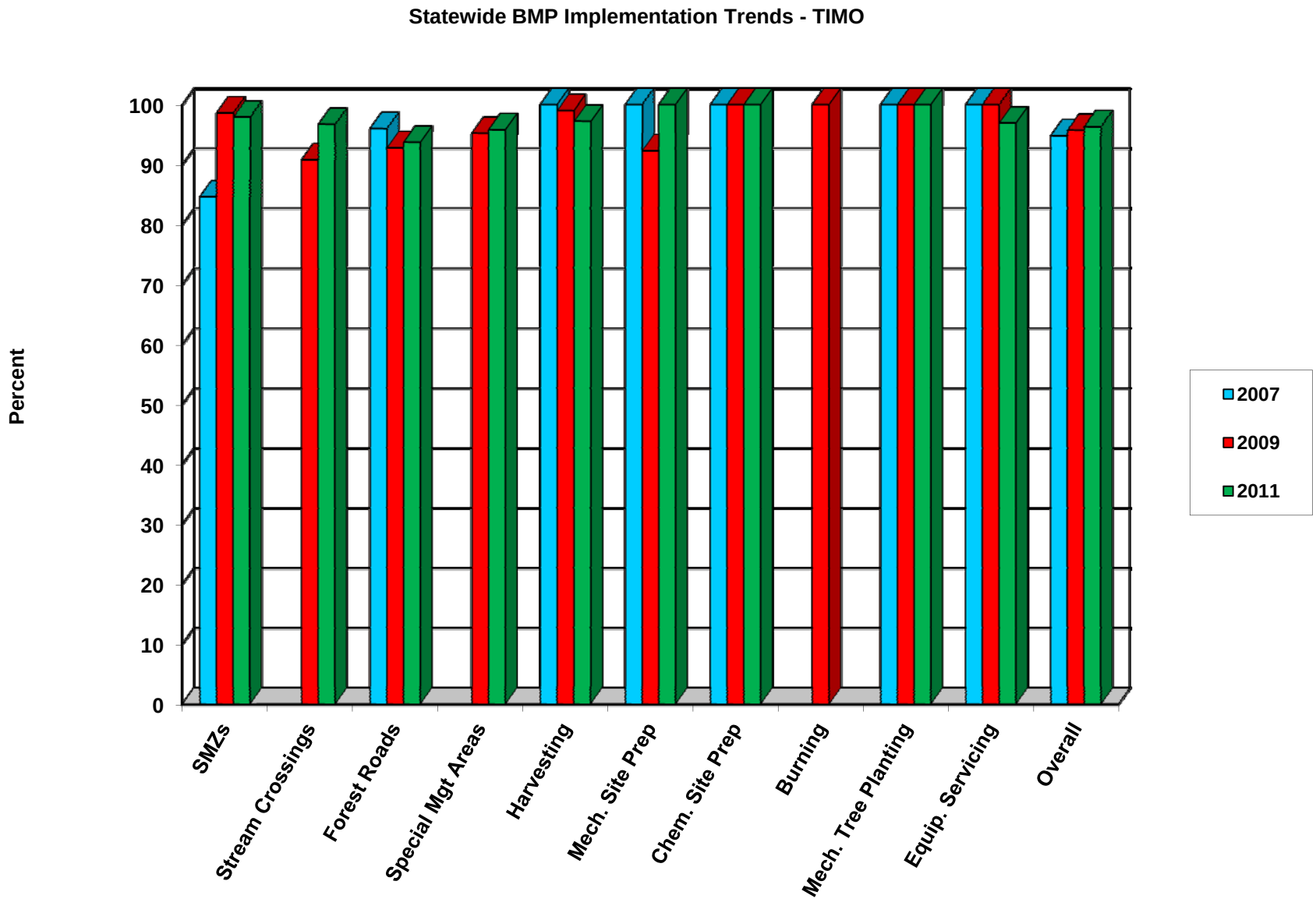


Chart 5: Statewide Trends in BMP Implementation on Public Sites

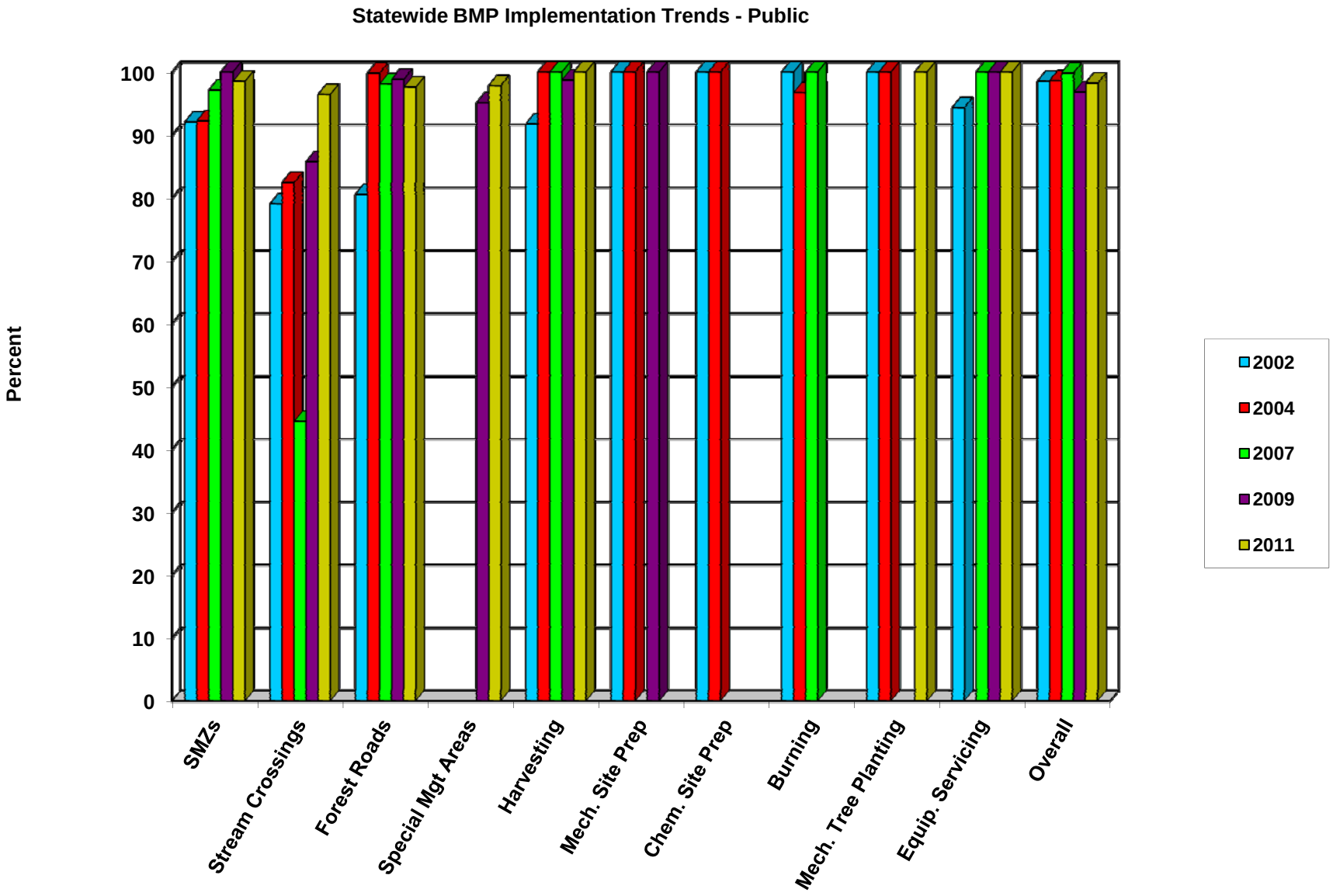
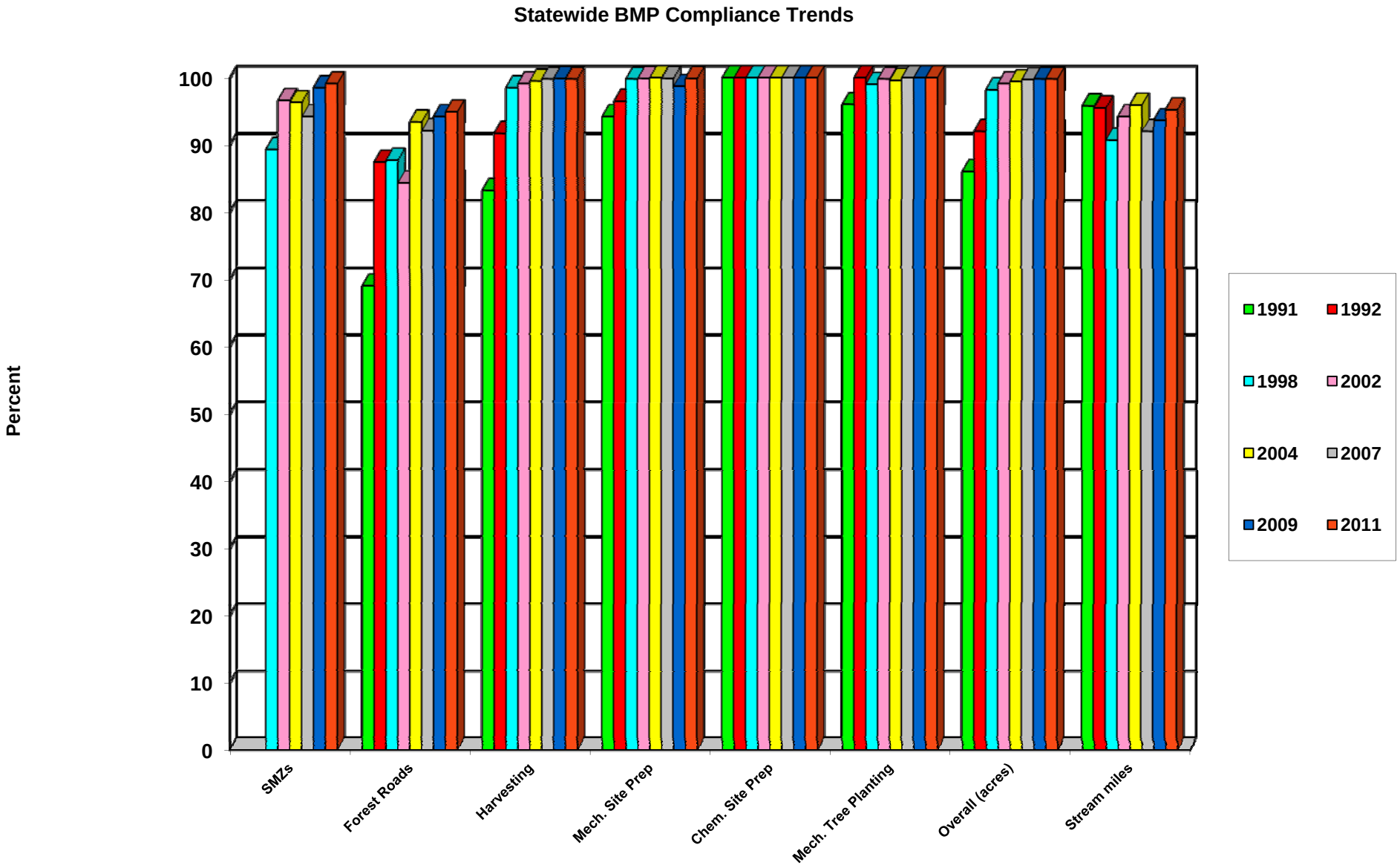


Chart 6: Statewide Trends in BMP Compliance



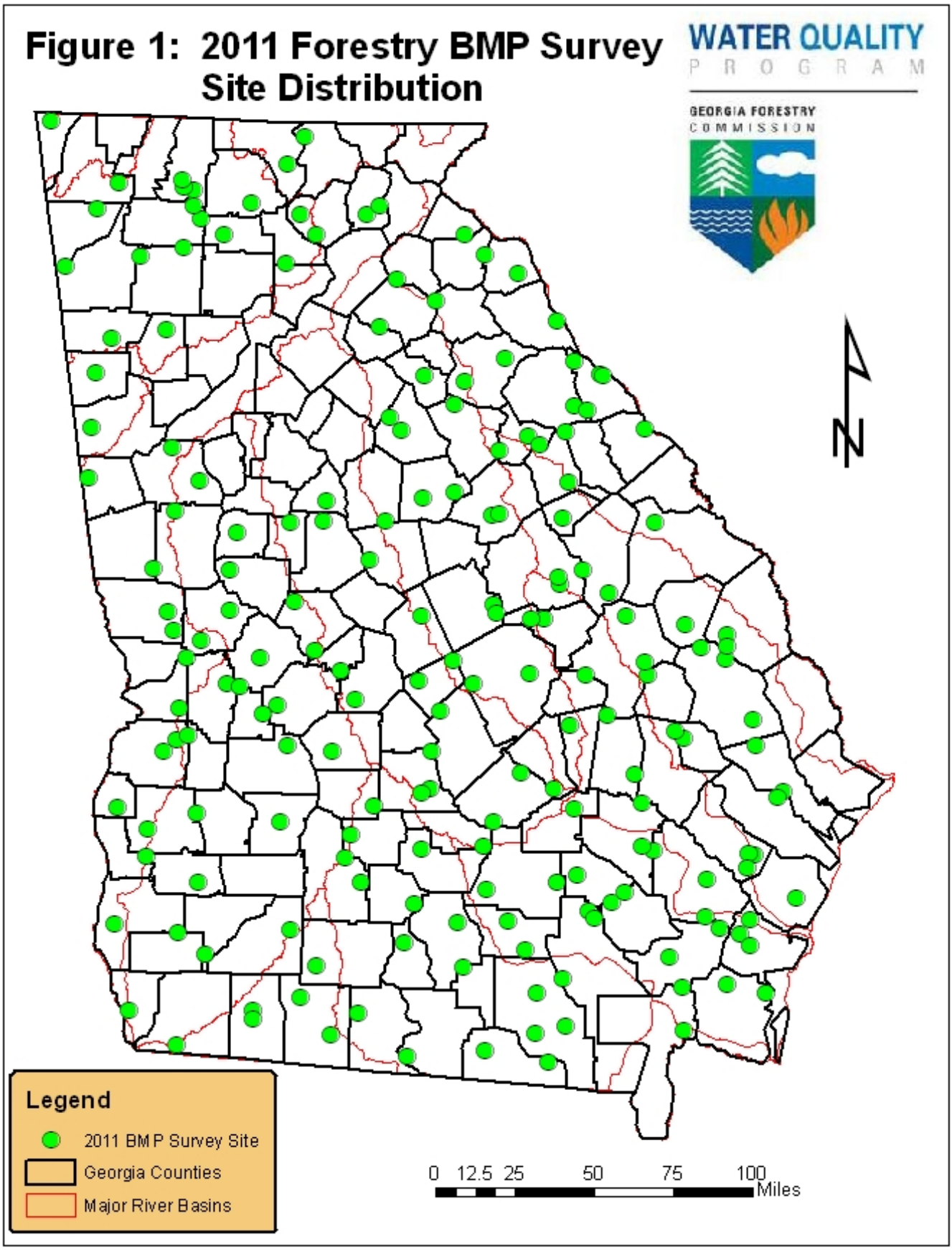


Figure 1: 2011 Forestry BMP Survey Site Distribution
WATER QUALITY PROGRAM
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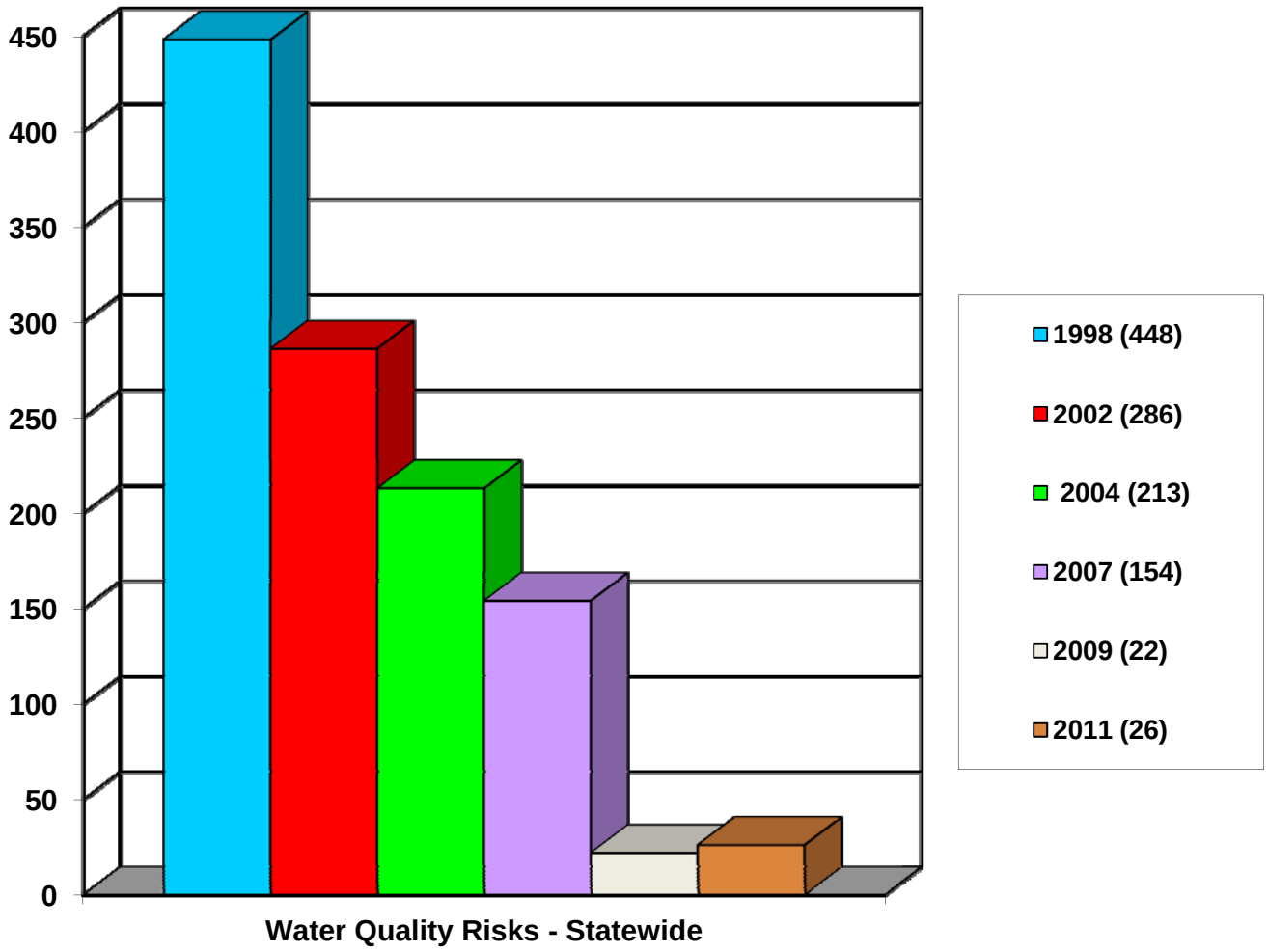
N
Legend
2011 BMP Survey Site
Georgia Counties
Major River Basins
0 12.5 25 50 75 100
Miles

Figure 2


Physiographic Regions of Georgia
MOUNTAINS
PIEDMONT
UPPER COASTAL PLAIN
LOWER COASTAL PLAIN

Chart 7: Statewide Trends in Reduction of Water Quality Risks from 1998 through 2011 Surveys



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