

Results of Georgia's 2009 Silvicultural Best Management Practices Implementation and Compliance Survey



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WATER QUALITY
P R O G R A M

GEORGIA FORESTRY
COMMISSION



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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 January of 2009, the GFC began the seventh Statewide Forestry BMP Implementation and Compliance Survey.

The objectives of the 2009 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 seventh survey was consistent with the Southern Group of State Foresters (SGSF) BMP Monitoring Task Force revised recommendations developed and adopted in June 2002 titled *Silvicultural Best Management Practices Implementation Monitoring, a Framework for State Forestry Agencies*. The SGSF Task Force is composed of hydrologists and water specialists from state forestry agencies, U.S. Forest Service, forest industry and the National Council of the Paper Industry for Air and Stream Improvement (NCASI) in consultation with EPA Region IV nonpoint source specialists.

The 2009 Statewide Forestry BMP Survey evaluated 221 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 past six months. By ownership, 133 sites occurred on the non-industrial private forest landowner (NIPF), 32 sites on forest industry land, 46 sites on Corporate (TIMO) land and 10 sites on public land. By Region, 23 sites were in the Mountains, 60 sites in the Piedmont, 44 sites in the Upper Coastal Plain and 94 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 6,217 individual BMPs evaluated, the statewide percentage of correct implementation was 94.15 percent. This is a 2.4 percent increase in BMP implementation from the 2007 survey.** By ownership, the percentage of BMP implementation statewide was 96.6 percent on forest industry lands, 95.7 percent on corporate (TIMO) lands, 96.8 percent on public lands and 92.7 percent on NIPF lands. Of particular interest, the number of observed Water Quality Risks decreased dramatically from 154 in the 2007 survey to only 22 in the 2009 survey. The number of Water Quality Risks for this survey is calculated at .1 risks per site, compared to .41 risks per site in the 2007 survey. **This represents a 75.6 percent decrease!** A more detailed discussion of Water Quality Risks can be found later in this report.

BMP Compliance was determined by dividing the units of measure specific to the forest practice (# acres, # stream crossings, # miles of road) that were in compliance with BMPs by the total number of units measured for that particular practice. Because multiple operations occurred over the same acres on numerous sites, acreage figures were duplicated. Therefore, of the 22,732 acres contained on the 221 sites, approximately 27,142 acres of separate forest operations were evaluated. Approximately 99.8 percent of those acres were in compliance with BMPs. This rate is statistically the same as for the 2007 survey. Of the 70.5 miles of stream evaluated, 65.9 miles, or 93.6 percent, were observed to have no impacts or impairment from the forestry practices. This figure represents a 1.6 percent increase in stream miles compliance compared to the 2007 survey. By practice or category, statewide percentage of BMP implementation and compliance were as follows:

<i>Practice or Category:</i>	<i>% BMP Implementation</i>	<i>% BMP Compliance</i>
Streamside Management Zones (SMZs)	96.8	98.5 (acres)
Stream Crossings	89.9	61.7 (# crossings)
Main Haul Roads	89.8	94.2 (miles)
Timber Harvesting	97.3	99.9 (acres)
Mechanical Site Preparation	82.6	98.8 (acres)
Chemical Site Preparation	100	100 (acres)
Firebreak Construction	88.1	99.0 (miles)
Control Burning	85.7	99.1 (acres)
Artificial Regeneration	100	100 (acres)
Equipment Servicing	98.9	99.0 (# landings)
Special Management Areas	94.4	NA
Stream Miles	NA	93.6 (miles)
<i>Overall</i>	<i>94.1</i>	<i>99.8 (acres)</i>

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 96.8 percent, with 98.5 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 94 percent overall statewide BMP implementation rate, and with 99.8 percent of those acres in compliance with BMPs, forest operators as a whole appear to be doing a very good job of implementing forestry BMPs.

There was also notable improvement in stream crossing BMP implementation and compliance. However, there continues to be room for improvement in this area. There were 107 stream crossings evaluated on 64 sites with an overall compliance of 61.7 percent, which represents a 17.5 percent improvement over the 2007 survey. This means that 38.3 percent of stream crossings evaluated had some BMP deficiencies, which in many cases were minor deficiencies. The overall stream crossing BMP implementation score increased to 89.9 percent, representing a 5.6 percent increase over the 2007 survey. The upward trend in stream crossing BMP implementation continues, meaning that for the evaluated stream crossings with BMP deficiencies, there continues to be fewer and fewer deficiencies. In addition, the number of stream crossings evaluated per site continues to go down, indicating that fewer crossings are being attempted per forestry activity.

Most noted stream crossing problems were that of the 107 total crossings, 20 (18.7 percent) were associated with skidder fords or debris type crossings. These automatically count as non-compliant since the BMPs do not recommend their use. Simply eliminating these type crossings offers the greatest potential to increase compliance.

Landowners with potential water quality problems were advised by letter with recommendations for remediation.

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 23.6 million acres 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 states 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 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 89,244 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 2,520 BMP talks to over 81,434 persons and participated in 470 field demonstrations of BMPs through December 2009. 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 on 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 and 2007. 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 and 99.7 percent in 2007.

The purpose of this report is to present the results of the 2009 BMP Implementation and Compliance Survey.

SURVEY PROCEDURE

Methodology for Sampling Intensity and Site Selection

The number of sites to evaluate in each of Georgia's 159 counties was based on the amount of timber harvested in each county as determined using 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 approximately 221 sites being targeted to survey. The next step was to target the sample to reflect ownerships 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 2009 BMP survey, 133 sites (60.2 percent) were inspected on NIPF lands, 32 sites (14.5 percent) on forest industry lands, 46 sites (20.8 percent) on TIMO or corporate lands, and 10 sites (4.5 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 the county government offices and looked up timber harvests using the PT 283-T "Report of Timber Harvest" notification forms in the county tax assessor's office or looked up timber harvests in the county's "Notification of Timber Harvesting Activity" records. Only harvest information from the past two years and preferably during the last 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

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* for this seventh survey as noted in the Executive Summary.

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 prior to the site being evaluated. 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
- Firebreak Construction
- Control Burning Outside SMZs
- Artificial Regeneration Outside SMZs
- Forest Fertilization Outside SMZs
- Equipment Servicing Outside SMZs
- Special Management Areas
- Stream Miles

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 allowed for comparison with previous surveys in determining trends. Streamside Management Zones (SMZs), harvesting, mechanical site preparation, chemical applications, control burning and artificial regeneration all used *acres* as the unit of measure. Stream crossing was the *actual number* present.

Main haul roads, firebreaks, and streams used *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 where attention should be focused to make improvements.

RESULTS AND DISCUSSION

The 2009 Statewide Forestry BMP Survey evaluated 221 sites comprising 22,732 acres. Because multiple practices occurred on these same areas, approximately 27,142 acres, 107 stream crossings, 166.7 miles of main haul roads and 70.5 stream miles were evaluated. Table 1, pgs 31-34 shows the distribution of survey sites by county. Figure 1, pg 62, shows the spatial location of the 221 survey sites. Figure 2, pg 35 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.

By practice or category, the statewide percentage of BMP implementation and compliance are as follows and will be explained in further detail in the following sections.

<i>Practice or Category:</i>	<i>% BMP Implementation</i>	<i>% BMP Compliance</i>
Streamside Management Zones (SMZs)	96.8	98.5 (acres)
Stream Crossings	89.9	61.7 (# crossings)
Main Haul Roads	89.8	94.2 (miles)
Timber Harvesting	97.3	99.9 (acres)
Mechanical Site Preparation	82.6	98.8 (acres)
Chemical Site Preparation	100	100 (acres)
Firebreak Construction	88.1	99.0 (miles)
Control Burning	85.7	99.1 (acres)
Artificial Regeneration	100	100 (acres)
Equipment Servicing	98.9	99.0 (# landings)
Special Management Areas	94.4	NA
Stream Miles	NA	93.6 (miles)
<i>Overall</i>	<i>94.2</i>	<i>99.8 (acres)</i>

Of the 70.5 miles of stream evaluated on 116 sites, 65.9 miles or 93.6 percent were observed to have no impacts or impairment from the forestry practices. The total number of water quality risks observed was 22.

Statistical Analysis

The 221 sites evaluated during this survey represent only a sample of all operations that met the criteria for selection. Data compiled from county tax assessor’s offices indicate that the number of timber harvesting operations conducted annually range from 7,000 to 10,000. Therefore, one could assume the sample reflects a 4.1 percent or 5.9 percent sample at best. Having enough samples to pass a statistical analysis with some degree of confidence is a concern. Therefore, the SGSF appointed a sub-task force composed of Dr. Ron McNew,

Professor, University of Arkansas; John Greis, USFS; and Hughes Simpson, Texas BMP Coordinator, to develop the *Statistical Guidebook for BMP Implementation 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 5 percent was recommended by the SGSF framework.

Using the above formula and the overall statewide BMP implementation rate of 91.8 percent from the 2007 survey results for p and margin of error at 5, the formula would be:

$$n = \frac{4(91.8) * (100 - 91.8)}{5^2} = \frac{367.2 * 8.2}{25} = \frac{3,011.04}{25} = 120.4 \text{ sites}$$

This equation calculates the minimum number of sites necessary for evaluation. Increasing the sample size will yield an even more accurate estimate of BMP implementation. Therefore, the 221 sites evaluated are almost twice what were necessary.

Standard Error (se): $se = \sqrt{\frac{p(1-p)}{n}}$

Where p = statewide BMP implementation (94.1)
 n = total applicable BMPs evaluated (6,217)

$$se = \frac{\sqrt{.941(1 - .941)}}{6217} = \frac{\sqrt{0.941(.059)}}{6217} = \frac{\sqrt{.055519}}{6217}$$

$$se = \sqrt{.0000089} = .0030$$

95% Confidence Interval (ci)

The 95 percent confidence interval is a tool that statisticians use to demonstrate their confidence in the measured mean of a sample. It provides a range for which they are 95 percent confident that the actual mean will be found within that range. To calculate confidence interval, the mean, variance, standard deviation, standard error and margin of error must also be calculated.

$$\begin{aligned} \text{ci} &= p \pm 2 \text{ se} \\ &= .941 \pm 2(.0030) = .941 \pm .006 = .935, .947 \end{aligned}$$

For the 2009 survey, the overall estimate of statewide BMP implementation (p) is 94.1 percent with an estimated standard error of .0030. Using the 95 percent confidence interval (ci), the data indicates that 95 percent of the time it is reasonable to expect implementation with BMPs to be at least 93.5 percent but no more than 94.7 percent.

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 for in the control of southern pine beetle or salvage operations from natural disasters.

Table 2, page 36, provides a summary of the results by ownership, region and state total. Statewide, approximately 1,102.6 acres within the SMZ were evaluated on 116 sites. Approximately 1,085.9 acres or 98.5 percent were in compliance with BMPs. A total of 1,028 applicable BMPs were evaluated of which 995 or 96.8 percent were fully implemented. A total of two water quality risks (WQRs) were identified when BMPs were not implemented. Specific findings include:

- Appropriate SMZs widths were established on 94.8 percent of the sites. One WQR was identified.
- The recommended tree canopy was maintained on 96.5 percent of the SMZs. One WQR was identified.
- As recommended, stream bank trees were left un-harvested within SMZs on 97.3 percent of the sites. No WQRs were identified.
- Soil disturbance by harvesting equipment w/in SMZs was minimized on 100 percent of the sites. No WQR was identified.
- Treetops, limbs and logging debris were kept out of stream channels on 97.1 percent of the sites. No WQR was identified.

- De-limbing gates or trees used as such were avoided within SMZs on 99.1 percent of sites, with no observed WQR.
- New forest roads were located outside the SMZ on 97.7 percent of the sites. Where roads did occur within SMZs, they were stabilized on 85.7 percent of the sites. No WQRs were identified.
- Water control structures directed surface flow away from stream and water bodies on 92.5 percent of sites. No WQRs were identified.
- Skid trails, log decks and staging areas were located outside SMZs on 98.2 percent of sites. No WQRs were identified.
- Mechanical site preparation was kept out of SMZs on 100 percent of sites.
- The handling, mixing, loading and application of chemicals were kept out of SMZs on 87.5 percent of sites. No WQR identified.
- Pre-suppression firebreaks were installed outside the SMZ on 100 percent of sites. No WQRs were identified. Breaks tied into streams had adequate diversions installed at SMZ margins on 66.7 percent of sites. No WQRs were identified. Where prescribed fire occurred within SMZs, the intensity of the fire was minimized on 75 percent of the sites with no WQR identified.
- Machine tree planting was kept outside SMZs on 100 percent of sites, with no WQR identified.
- Equipment was properly serviced outside SMZs on 100 percent of sites.

SMZs by Region

In the mountain region, approximately 243.1 SMZ acres were evaluated on 16 sites. The percentage of acres in BMP compliance was 95.1. A total of 149 individual BMPs were evaluated of which 98.7 percent were fully implemented. There were two water quality risks identified.

In the Piedmont, approximately 217.6 SMZ acres were evaluated on 45 sites. The percentage of acres in BMP compliance was 99.1. A total of 381 individual BMPs were evaluated of which 96.3 percent were fully implemented. There were no water quality risks identified.

In the Upper Coastal Plain, approximately 356.6 SMZ acres were evaluated on 19 sites. The percentage of acres in BMP compliance was 99.9. A total of 167 individual BMPs were evaluated of which 93.4 percent were fully implemented. There were no water quality risks identified.

In the Lower Coastal Plain, approximately 285.2 SMZ acres were evaluated on 36 sites. The percentage of acres in BMP compliance was 99.1. A total of 331 individual BMPs were evaluated of which 98.2 percent were fully implemented. There were no water quality risks identified.

SMZs by Ownership

For NIPF ownership, approximately 636.1 acres were evaluated on 72 sites. Overall, the percentage of acres in BMP compliance was 97.4 and ranged from a low of 91.6 percent in the Mountains to a high of 99.9 percent in the Upper Coastal Plain. Overall BMP implementation was 95.2 percent and ranged from a low of 87.3 percent in the Upper Coastal Plain to a high of 97.2 percent in the Lower Coastal Plain. There were a total of two water quality risks, both occurring in the mountains. The main problems and challenges associated with SMZs on NIPF lands involve water control structures in roads within SMZs, where 84.6 percent of these roads have these structures correctly installed. Logging debris (tops and limbs) was properly removed from stream channels on 96.9 percent of the sites. Firebreaks were installed outside SMZs in all cases. Broadcast chemical site prep kept out of SMZs on 80 percent of sites.

On forest industry lands (FI), approximately 106.4 acres of SMZs were evaluated on 14 sites. Overall, the percentage of acres in BMP compliance was 100. Overall BMP implementation was 100 percent. There were no water quality risks identified. All BMPs were fully implemented.

On corporate (TIMO) lands, approximately 241.9 acres of SMZs were evaluated on 23 sites. BMP compliance for these sites was 99.9 percent and BMP implementation was 98.6 percent. There were a total of 211 BMPs assessed with no water quality risks observed.

On public lands, approximately 118.2 acres of SMZs were evaluated on seven sites. Overall, the percentage of acres in BMP compliance was 99.9. Overall BMP Implementation on public lands for SMZs was 99.9 percent and there were no water quality risks identified in any of the regions.

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 can 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 37) provides a summary of the results by ownership, region and state total. A total of 107 crossings were evaluated on 64 sites statewide. According to the survey, 11 main haul road fords, 49 permanent culverts, 18 temporary culverts, nine bridges, eight skidder fords and 12 debris and dirt type crossings were observed. Multiple numbers and types of crossings occurred on many sites.

Of the 107 total crossings, 58 existed prior to the forestry practice being conducted and 67.2 percent of those were in compliance. There were 49 new crossings associated with the forest practices that were evaluated, of which 55.1 percent were in compliance. Overall stream crossing compliance was 61.7 percent.

The biggest concern, and the potential area for the greatest improvement, is eliminating the skidder fords and debris and dirt type crossings. Together they make up almost 50 percent of the total non-compliant crossings. By eliminating these types of crossings, compliance would increase to 75.9 percent. New permanent culvert installation compliance was 33.3 percent.

A total of 840 individual stream crossing BMPs were evaluated, of which 89.9 percent were fully implemented. A total of 15 water quality risks were identified.

Other significant findings and areas for improvement include:

- Crossings were minimized on 98.4 percent of the sites. No WQRs were identified.
- Approaches to stream crossings were within acceptable road grades on 100 percent of the sites. No WQRs were identified.
- Of the 46 pre-existing permanent culverts, 69.6 percent were in compliance.

- Of the three new permanent culverts, 33.3 percent were in compliance. Of the 18 new temporary culverts, 94.4 percent were in compliance.
- Culverts on 72.7 percent of the sites were of the recommended size diameter for the watershed. Two WQRs were identified where they were not adequately sized.
- Fill over culvert ends met a 2:1 slope, or was armored on 82.9 percent of the sites. Two WQRs were identified.
- Exposed soils in wetland fill roads and at stream crossings were stabilized on 79.0 percent of the sites. One WQR was identified.
- Fords for skidder crossings occurred at eight different places on five sites. One WQR was identified.
- Debris and dirt type crossings occurred at 12 different places.
- Temporary crossings were removed and approaches stabilized as recommended on 80.0 percent of the sites. Two WQRs were identified.
- Of the total water quality risks identified statewide over all practices, 15 - or 68.2 percent - were attributed to stream crossings.

Stream Crossings by Region

In the Mountains, 17 crossings were evaluated on 11 sites. Overall the percentage of crossings in BMP compliance was 47.1 percent and BMP implementation was 87.3 percent. There were four water quality risks identified.

In the Piedmont, 24 crossings were evaluated on 17 sites. Overall the percentage of crossings in BMP compliance was 58.3 percent and BMP implementation was 88.7 percent. There were six water quality risks identified.

In the Upper Coastal Plain, 21 crossings were evaluated on 11 sites. Overall the percentage of crossings in BMP compliance was 66.7 percent and BMP implementation was 87.3 percent. There was one water quality risk identified.

In the Lower Coastal Plain, 45 crossings were evaluated on 25 sites. Overall the percentage of crossings in BMP compliance was 66.7 percent and BMP implementation was 92.8 percent. There were four water quality risks identified.

Stream Crossings by Ownership

On NIPF lands, 64 crossings were evaluated on 36 sites. Overall the percentage of crossings in BMP compliance was 53.1 percent and ranged from a low of 45.5 percent in the mountains to a high of 61.5 percent in the Piedmont. Overall BMP implementation was 87.1 percent and ranged from a low of 82.1 percent in the mountains to a high of 88.5 percent in the Piedmont. There were nine water quality risks identified with the majority (four) occurring in the mountains. The main problems identified were that a total of six skidder fords and nine debris and dirt type crossings made up 23.4 percent of the 64 total crossings on NIPF lands. These are automatic non-compliant. In fact, 71.4 percent of these type crossings occurring statewide across all ownerships were found on the NIPF lands. Other problems were similar to those found statewide.

On forest industry lands, 19 crossings were evaluated on 10 sites. Overall the percentage of crossings in BMP compliance was 94.7 percent and ranged from a low of 92.9 percent in the Lower Coastal Plain to highs of 100.0 percent in the Piedmont and Upper Coastal Plain. Overall BMP implementation was 98.0 percent and ranged from a low of 97.2 percent in the Lower Coastal Plain to highs of 100.0 percent in the Piedmont and Upper Coastal Plain. There were two water quality risks identified, both in the Lower Coastal Plain. Again, the biggest problem involved skidder fords and debris crossings as they made up 100 percent of the non-compliance.

On public lands, three crossings were evaluated on two sites. Overall the percentage of crossings in BMP compliance was 66.7 percent and ranged from a low of 0.0 percent in the mountains to a high of 100.0 percent in the Piedmont. Overall BMP implementation was 85.7 percent and ranged from a low of 77.8 percent in the mountains to a high of 100.0 percent in the Piedmont. One of the crossings was a skidder ford, which is automatically out of compliance. No crossings were observed in the Upper and Lower Coastal Plains.

On the corporate (TIMO) ownership class, 21 crossings were evaluated on 16 sites. Overall, the percentage of crossings in BMP compliance was 57.1 percent and ranged from a low of 28.6 percent in the Piedmont to a high of 100.0 percent in the Lower Coastal Plain. Overall BMP implementation was 90.8 percent and ranged from a low of 80.9 percent in the Piedmont to a high of 100.0 percent in the Lower Coastal Plain. There were four water quality risks identified, three of those in the Piedmont. The biggest problem involved permanent culvert installation, as they made up about 33.3 percent of the non-compliance.

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 cause minimal soil and water quality impacts. However, poorly located, poorly constructed or poorly maintained roads can result in sediment reaching streams that may lead to changing stream flow patterns, degrading fish and aquatic organism habitat, and adversely affecting aesthetics.

Table 4 (page 38) provides a summary of the results by region, ownership and state totals. Approximately 166.7 miles of road were evaluated on 202 sites. The number of miles in BMP compliance was 157.1 or 94.2 percent of the total. A total of 1457 individual BMPs were evaluated and the percentage of BMP implementation was 89.8 percent. There were four water quality risks identified.

Significant findings include:

- Construction of new roads was kept within allowable grades on 91.7 percent of the sites. There were no water quality risks identified for this BMP.
- Roads were located on the sides of ridges to allow for proper drainage on 94.7 percent of sites. No water quality risks were associated with this BMP.
- Roads were well-drained by the use of adequately installed and spaced water diversion measures on 63.8 percent of sites. There were no water quality risks identified.
- Water diversion measures with turnouts were installed prior to SMZs only on 75.4 percent of sites leading to one water quality risk.
- Rutting of roads was avoided on 96.4 percent of sites.
- Roads were reshaped and adequately stabilized on 81.4 percent of sites. No water quality risks were identified.
- Critical upland road segments stabilized on 87.8 percent of sites with one water quality risk identified.
- Mud and debris was kept off public roads at tract entrances on 99.9 percent of sites, with no water quality risks.

Roads by Region

In the mountain region, 13.27 miles were evaluated on 20 sites. The percentage of miles in BMP compliance was 97.7 percent. A total of 167 BMPs were evaluated, of which 91.6 percent were implemented. There were two water quality risks identified.

In the Piedmont, approximately 29.83 miles of roads were evaluated on 51 sites. Overall the percentage of miles in BMP compliance was 85.3 percent. A total of 417 BMPs were evaluated of which 80.6 percent were implemented. There were two water quality risks identified.

In the Upper Coastal Plain, 41.06 miles of road were evaluated on 41 sites. Overall the percentage of miles in BMP compliance was 92.9 percent. A total of 265 individual BMPs were evaluated with BMP implementation at 89.1 percent. There were no water quality risks identified.

In the Lower Coastal Plain, 82.56 miles of road were evaluated on 90 sites. Overall the percentage of miles in BMP compliance was 97.6 percent. A total of 608 individual BMPs were assessed with BMP implementation at 96.1 percent. There were no water quality risks identified.

Roads by Ownership

On NIPF lands, a total of 75.66 miles of road were evaluated on 115 sites. Overall the percentage of miles in BMP compliance was 91.8 percent and ranged from a low of 80.3 percent in the Piedmont to a high of 98.1 percent in the Lower Coastal Plain. Overall BMP implementation was 86.4 percent and ranged from a low of 75.8 percent in the Piedmont to a high of 95.4 percent in the Lower Coastal Plain. There were a total of four water quality risks identified, with two each occurring in the Piedmont and mountains. The main findings and concerns were that roads were well drained with diversion measures on only 54.0 percent of the sites, water diversions were installed prior to SMZs on only 64.2 percent, permanent roads were reshaped and stabilized on only 76.3 percent of the sites, and temporary roads adequately retired on only 72.5 percent of sites.

On forest industry lands, a total of 45.08 miles of road was evaluated on 31 sites. Overall the percentage of miles in BMP compliance was 97.4 percent and ranged from a low of 90.2 percent in the Piedmont to a high of 100 percent in the mountains. Overall BMP implementation was 95.3 percent and ranged from a low of 81.0 percent in the Upper Coastal Plain to a high of 100 percent in the mountains. There were no water quality risks identified on forest industry lands.

On corporate (TIMO) lands, a total of 39.16 miles on 46 sites were evaluated. Overall the percentage of miles in BMP compliance was 94.4 percent. BMP compliance ranged from 90.5 percent in the Lower Coastal Plain to 100 percent in the mountains. Overall BMP implementation was 92.8 percent, with no water quality risks. BMP implementation ranged from 88.5 percent in the Upper Coastal Plain to 100 percent in the mountains.

On public lands, a total of 6.82 miles of road were evaluated on 10 sites. Overall the percentage of miles in BMP compliance was almost 99.9 percent. Overall BMP implementation was 98.8 percent with no water quality risks identified.

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 39) provides a summary of the results by region, ownership and state totals. Statewide, there were four sites with canals, 21 with ditches, 107 with ephemeral areas, 22 with gullies, one sinkhole, four with floodplain features and 23 with wetlands that were evaluated. Overall BMP implementation was 94.4 percent. There were no water quality risks identified.

Other significant findings and areas for improvement include:

- Of the six sites evaluated for canals and ditches culvert crossings, only one - or 16.7 percent - was not stabilized.
- Of the three sites evaluated that had high intensity fire and gullies, only one site or 33.3 percent was in compliance.

- On floodplain features containing continuous side channels, seeps and braded channels, where all bank trees are recommended to be left, only one of two sites or 50.0 percent were in compliance.

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 use with the site are considered. The location, construction and maintenance of log decks and skid trails are the primary concerns.

Table 6 (page 40) provides a summary of the results by ownership, region and state total. Approximately 20,715 acres were evaluated on 215 sites. Approximately 99.9 percent of these acres were in compliance with BMPs. A total of 1486 applicable BMPs were evaluated of which 97.3 percent were fully implemented. No water quality risks were identified.

A total of 654 log decks were evaluated, of which 98.3 percent were in compliance. A total of 1061 main skid trails were evaluated of which 96.5 percent were in compliance.

The main problems associated with harvesting outside SMZs seem to be:

- Main skid trails on rolling terrain were adequately water barred and stabilized on 84.6 percent of sites. No water quality risks were identified.
- Rutting was minimized on 93.1 percent of wetlands or sites with saturated soils. No water quality risks were identified.

Timber Harvesting by Region

In the mountain region, 1,610 acres were evaluated on 23 sites. The percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 99.9 percent with no water quality risks identified. There were 55 log decks on those sites with 98.2 percent in compliance with BMPs. There were 77 main skid trails with 100 percent in compliance with BMPs.

In the Piedmont, 4,223 acres were evaluated on 58 sites. The percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 94.7 percent with no water quality risks identified. There were 126 log decks evaluated, of which 94.4 percent were in compliance. There were 270 main skid trails with 94.1 percent in compliance. No water quality risks were observed.

In the Upper Coastal Plain, 5,024 acres were evaluated on 42 sites. The percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 97.3 percent with no water quality risks identified. There were 122 log decks evaluated, of which 100 percent were in compliance. There were 177 main skid trails evaluated, of which 90.4 percent were in compliance.

In the Lower Coastal Plain, 9,857 acres were evaluated on 92 sites. The percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 98.5 percent with no water quality risks identified. There were 351 log decks evaluated, of which 99.2 percent were in compliance. There were 537 main skid trails evaluated, of which 99.3 percent were in compliance.

Harvesting By Ownership

On NIPF lands, 9,035 acres were evaluated on 129 sites. The percentage of acres in BMP compliance was 99.9 percent. Overall BMP implementation was 96.7 percent and ranged from a low of 93.8 percent in the Piedmont to a high of 100 percent in the mountains. There were no water quality risks in any ownership category. Significant findings and concerns were that skid trails on rolling or steep terrain should have been stabilized and retired better. Implementation rates were 81.3 percent for this BMP for NIPF landowners.

On forest industry land, 5520 acres were evaluated on 31 sites. The percentage of acres in BMP compliance was 99.9 percent. Overall BMP implementation was 97.1 percent.

On corporate (TIMO) lands, 4835 acres were evaluated on 45 sites. The percentage of acres in BMP compliance was 99.9 percent. Overall BMP implementation was 99.0 percent.

On public land, 1324 acres were evaluated on 10 sites. The percentage of acres in BMP compliance was 99.9 percent. Overall BMP implementation was 98.7 percent.

Mechanical Site Preparation Outside SMZs

Site preparation methods prepare harvested and non-forested areas for both natural and artificial regeneration for desired tree species and stocking. Methods include shearing, raking, sub-soiling, chopping, windrowing, piling, and 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 debris, lessen logging impacts, 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 41) provides a summary of the results by region, ownership and state totals. Statewide, approximately 1,304.8 acres were evaluated on 16 sites. Approximately 98.8 percent were in compliance with BMPs. A total of 46 applicable BMPs were evaluated, of which 82.6 percent were fully implemented. One water quality risk was identified.

Significant findings include:

- Site prep bedding avoided directing surface runoff into roadways and road ditches on 53.9 percent of the sites.
- Mechanical site prep for pine regeneration in wetlands identified in EPA/Corps of Engineers memo did not occur on any applicable sites surveyed.

Mechanical Site Prep by Region

In the mountains and Upper Coastal Plain, no sites were evaluated.

In the Piedmont, 45.5 acres were evaluated on one site. The percentage of acres in BMP compliance was 78.3 percent and BMP implementation was 50.0 percent, with one water quality risk identified.

In the Lower Coastal Plain, 1,259.4 acres were evaluated on 15 sites. The percentage of acres in BMP compliance was 99.5 percent and BMP implementation was 84.1 percent with no water quality risk identified.

Mechanical Site Prep by Ownership

On NIPF lands, approximately 426.3 acres of mechanical site prep were evaluated on seven sites. Overall, the percentage of acres in BMP compliance was 97.2 percent on the sites in the Piedmont and Lower Coastal Plains. No sites were evaluated in the mountains or Upper Coastal Plain. Overall BMP implementation was 82.4 percent. One water quality risk was identified. The main problems observed were windrows not aligned on the contour and planting beds connected to road ditches.

On forest industry land, approximately 568.5 acres were evaluated on five sites in the Lower Coastal Plains. No sites were evaluated in the other three regions. Overall, the percentage of acres in BMP compliance was 99.3 percent. BMP implementation was 71.4 percent. No water quality risks were identified. The main problem seen was that site preparation bedding avoided directing surface runoff into roadbeds and ditches on only 40.0 percent of the sites.

On corporate (TIMO) lands, approximately 218.9 acres were evaluated on three sites, which occurred in the Lower Coastal Plain. Overall, the percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 92.3 percent. Site prep bedding avoided tying into road ditches on 66.7 percent of sites.

One site was evaluated on public land. A total of 91.2 acres were evaluated and BMP compliance and implementation were both 100 percent.

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 so 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 42) provides a summary of the results by region, ownership and state totals. Statewide, approximately 1569.5 acres were evaluated on 15 sites. Overall, the percentage of acres in BMP compliance was 100 percent. A total of 30 BMPs were evaluated of which 100 percent were fully implemented. No water quality risks were identified.

Chemical Site Prep by Region

No chemical site prep practices were evaluated in the mountain region.

In the Piedmont region, 290.4 acres were evaluated on five sites. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent.

In the Upper Coastal Plain region, 656.7 acres were evaluated on three sites. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent.

In the Lower Coastal Plain region, 622.4 acres were evaluated on seven sites. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent.

Chemical Site Prep by Ownership

For the NIPF land, approximately 504.2 acres were evaluated on eight sites. Overall, the percentage of acres in BMP compliance was 100 percent. Overall BMP implementation was also 100 percent.

For the forest industry land, approximately 462.7 acres were evaluated on five sites. Overall, the percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent.

For corporate (TIMO) lands, approximately 602.6 acres were evaluated on two sites, one in the Lower Coastal Plain and one in the Upper Coastal Plain. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent.

No chemical site preparation sites were evaluated on any publicly owned lands.

Firebreak Construction

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 to perpetuate certain endangered plant and animal ecosystems. When properly planned and conducted, firebreaks and controlled fire have minimal impacts on water quality. However, firebreaks and fires that expose significant mineral soil on moderate and steep slopes may increase erosion potential.

Table 9 (page 43) provides a summary of the firebreak results by region, ownership and state totals. Approximately 36.8 miles of breaks were evaluated on 22 sites. Overall, the percentage of miles in BMP compliance was 99.0 percent. A total of 84 BMPs were evaluated on these sites, of which 88.1 percent were fully implemented. No water quality risks were identified.

Other significant findings and areas for improvement include:

- On slopes > 3 percent, water bars or turnouts were constructed in pre-suppression firebreaks on 72.7 percent of sites.
- Water bars or turnouts were installed in pre-suppression breaks at approaches to SMZs, roads and gullies on 66.7 percent of sites.
- Pre-suppression firebreaks were back bladed away from the edge of streams or roads on 75.0 percent of sites.

Firebreaks by Region

No firebreaks were evaluated in the mountain region.

In the Piedmont region, 2.3 miles of firebreaks were evaluated on three sites. The percentage of miles in BMP compliance was 93.5 percent and BMP implementation was 80.0 percent with no water quality risk identified.

In the Upper Coastal Plain region, 21.7 miles of firebreak were evaluated on nine sites. The percentage of miles in BMP compliance was 99.9 percent and BMP implementation was 96.6 percent.

In the Lower Coastal Plain region, there were 12.7 miles of pre-suppression firebreaks evaluated on 10 sites, of which 98.5 percent of the miles were in compliance. BMP implementation was 85.0 percent with no water quality risks.

Firebreaks by Ownership

For the NIPF lands, approximately 18.9 miles of firebreaks were evaluated on 12 sites, of which 99.2 percent of miles were in compliance. BMP implementation was 90.7 percent. No water quality risks were identified. Significant findings were that water diversions were adequately installed in pre-suppression breaks on only 80.0 percent of sites. Pre-suppression breaks were back bladed away from the edge of streams or roads on 83.3 percent of the sites. Water bars or turnouts were installed at approaches to SMZs, roads and gullies on only 60.0 percent of sites.

For forest industry lands, there were two miles of pre-suppression breaks evaluated on two sites, of which 100 percent of the miles were in compliance with BMPs. BMP implementation was also 100 percent. No water quality risks were identified on industry lands.

For corporate (TIMO) lands, there were 14.7 miles of pre-suppression breaks evaluated on six sites, of which 99.6 percent of the miles were in compliance with BMPs. BMP implementation was also 86.4 percent. No water quality risks were identified on TIMO lands.

For public lands, there were 1.2 miles of pre-suppression breaks evaluated on two sites, of which 87.5 percent of the miles were in compliance with BMPs. BMP implementation was also 66.7 percent. No water quality risks were identified on industry lands.

Control Burning Outside SMZs

Table 10 (page 44) provides a summary of the control burned sites by region, ownership and state totals. Approximately 911.1 acres were evaluated on seven sites. Overall, the percentage of acres in BMP compliance was 99.1 percent. A total of seven BMPs were evaluated and overall BMP implementation was 85.7 percent. No water quality risks were identified.

Other significant findings and areas for improvement include:

- Prescribed burning minimized soil exposure on 85.7 percent of sites. During the 2007 survey, this figures was 95.7 percent.

Burning by Region

No sites where burning occurred were evaluated in the mountain or Piedmont regions.

In the Upper Coastal Plain, 874.7 acres were evaluated on six sites. The percentage of acres in BMP compliance was 99.1 percent and BMP implementation was 83.3 percent with no water quality risks identified.

In the Lower Coastal Plain region, 36.3 acres were evaluated on one site. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent with no water quality risks identified.

Burning by Ownership

On NIPF, approximately 231.7 acres of controlled burning were evaluated on five sites. Overall, the percentage of acres in BMP compliance was 96.6 percent and ranged from a low of 95.9 percent in the Upper Coastal Plain to a high of 100 percent in the Lower Coastal Plain. No sites were evaluated for burning in the mountains or Piedmont region. Overall BMP implementation was 80.0 percent. There were no water quality risks identified.

For corporate (TIMO) lands, approximately 679.3 acres of controlled burning were evaluated on two sites in the Upper Coastal Plain. The percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent with no water quality risks.

There were no forest industry lands or public lands evaluated for controlled burning.

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 as opposed to mechanical methods.

Table 11 (page 45) 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 5 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.

Artificial Regeneration by Region

There were no artificially regenerated acres evaluated in the mountain region.

In the Piedmont region, approximately 205.7 acres were evaluated on three sites. Overall, the percentage of acres in BMP Compliance was 100% and BMP Implementation was 100%. No water quality risks were identified.

In the Upper Coastal Plain region, approximately 614.9 acres were evaluated on 2 sites. Overall the percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent with no water quality risks identified.

In the Lower Coastal Plain region, approximately 719.2 acres were evaluated on 10 sites. Overall, the percentage of acres in BMP compliance was 100 percent and BMP implementation was 100 percent with no water quality risk identified.

Artificial Regeneration by Ownership

On NIPF land, approximately 325.4 acres were evaluated on seven sites. Overall, the percentage of acres in BMP Compliance was 100 percent. Overall BMP implementation was 100 percent with no water quality risks identified.

For forest industry land, approximately 532.8 acres were evaluated on five sites. Overall, the percentage of acres in BMP compliance was 100 percent. Overall BMP implementation was 100 percent. No water quality risks were identified.

For corporate (TIMO) lands, 681.6 acres were evaluated on three sites in the Coastal Plain region. BMP compliance and implementation rates were 100 percent.

No artificial regeneration sites were evaluated for public lands.

Forest Fertilization Outside SMZs

Forest fertilization is a valuable silvicultural practice that enhances tree survival and growth. The primary nutrients applied are nitrogen and phosphorous. Applications should not be directed into water bodies or into SMZs. When conducted properly, forest fertilization poses little threat to water quality. No forest fertilization practices were evaluated for this survey cycle.

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 GA EPD Emergency Response Program, fuel and oil spills should be immediately contained and cleaned up. In addition, chemical spills of twenty-five gallons or more of fuel and oil to soils, or spills of fuels or oils into waterways which produce a visible sheen should be immediately contained, cleaned up, and reported to GA EPD.

Table 12 (page 46) provides a summary of the results by region, ownership and state totals. A total of 627 landings were evaluated on 218 sites, of which 99.0 percent were in compliance. A total of 645 BMPs were evaluated of which 98.9 percent were implemented.

Significant findings and areas for improvement include:

- Equipment was serviced or washed away from areas including ephemeral areas, which may create a water quality problem on 100 percent of sites.
- Oils, lubricants and containers were disposed of properly on 98.6 percent of sites.

- Trash, tires and batteries associated with the operation were removed or disposed of properly on 98.2 percent of sites.

Equipment Servicing by Region

In the mountain region, a total of 65 BMPs were evaluated on 38 landings on 23 sites. Overall BMP implementation and compliance was 100 percent.

In the Piedmont region, a total of 175 BMPs were evaluated on 125 landings on 59 sites. Overall BMP compliance was 99.2 percent and implementation was 98.9 percent.

In the Upper Coastal Plain region, a total of 126 BMPs were evaluated on 118 landings on 42 sites. Overall BMP compliance was 99.2 percent and BMP implementation was 99.2 percent.

In the Lower Coastal Plain region, a total of 279 BMPs were evaluated on 346 landings on 94 sites. Overall BMP compliance was 98.8 percent and BMP implementation was 98.6 percent.

Equipment Servicing By Ownership

On 130 NIPF sites a total 295 landings with 388 individual BMPs were evaluated. Overall BMP compliance was 99.3 percent and BMP implementation was 99.2 percent.

For forest industry land, a total of 93 BMPs were evaluated on 179 landings on 32 sites. Overall BMP compliance was 97.8 percent and BMP implementation was 95.7 percent.

For corporate (TIMO) lands, a total of 134 BMPs were evaluated on 123 landings on 46 sites. Overall BMP compliance was 100 percent and BMP implementation was also 100 percent.

For public land, a total of 30 BMPs were evaluated on 30 landings on 10 sites. Overall BMP compliance and implementation was 100 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 70.46 miles on 116 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 the stream bank or channel integrity has been impaired by forestry practices.

Table 13 (page 47) provides a summary of the results by region, ownership and state totals by stream type. Overall a total of 70.46 miles of perennial and intermittent streams were evaluated statewide. The number of miles in BMP compliance was 65.93 or 93.6 percent. Compliance ranged from a low of 89.0 percent in the Piedmont to a high of 99.5 percent in the Upper Coastal Plain.

A total of 29.9 miles of perennial stream were assessed on these sites. The number of miles in compliance was 27.0 or 90.4 percent and ranged from a low of 83.4 percent in the Piedmont to a high of 99.6 percent in the Upper Coastal Plain.

A total of 40.5 miles of intermittent stream were assessed on these sites. The number of miles in compliance was 38.9 or 95.9 percent and ranged from a low of 92.9 percent in the Piedmont to a high of 99.5 percent in the Upper Coastal Plain.

Significant findings and areas for improvement include:

- 22 water quality risks were identified statewide.
- **There were 15 risks (68 percent of the total) involving stream crossings:**
 - The lack of stabilization in stream crossing approaches was the number one area of concern and accounted for three or 13.6 percent of the 22 risks found statewide.
 - Improper culvert sizes and/or debris crossings that restricted flow each accounted for two risks each for 18.21 percent of all the water quality risks.
 - The lack of surface water control structures at crossing approaches accounted for another 9.1 percent of all water quality risks.
 - Fill over culverts was not on a 2:1 slope and not armored causing two risks.
 - The lack of stabilization of exposed soil over culverts accounted for one of the risks.
 - Even though there were eight sites with skidder fords, their impact only resulted in one of the 22 risks (4.5 percent).
- **Forest roads accounted for four water quality risks (approximately 18.2 percent of the total):**
 - The lack of properly installing water diversions at SMZs accounted for one of the four risks for forest roads.
 - The failure to adequately reshape and stabilize critical road segments occurred on 16 sites, with one water quality risk observed.
- **Within the SMZ, there were two risks or 9.1 percent of the state total of 22:**
 - Skid trails, log decks and staging areas were located outside the SMZ on 98.2 percent of the sites. Where they were located in the SMZ, they were stabilized only 33 percent (1 out of 3) of the sites.
 - Both risks found within SMZs were due to less than minimal SMZ width and not leaving recommended minimum number of residual trees.

- **There were no water quality risks reported under harvesting practices** outside the SMZ. The lowest implementation score was 84.62 percent for properly retiring and stabilizing skid trails on rolling or steep terrain.
- **Installation of firebreaks resulted in no risks** and 88.1 percent implementation rating. Lack of properly installing water diversions was the main concern with firebreak BMP implementation.
- **One water quality risk was reported for mechanical site preparation.**

Stream Compliance by Region

In the mountains, a total of 7.77 miles of stream were assessed on two sites. Overall the percentage of miles in BMP compliance was 94.9 percent. There were eight water quality risks identified.

In the Piedmont, a total of 24.45 miles of stream were assessed on 14 sites. Overall the percentage of miles in BMP compliance was 89.0 percent. There were nine water quality risks identified.

In the Upper Coastal Plain, 12.34 miles were assessed on five sites. Overall, the percentage of miles in BMP compliance was 99.5 percent. There was one water quality risk identified.

In the Lower Coastal Plain, 25.9 miles of stream were assessed on 36 sites. Overall the percentage of miles in BMP compliance was 94.6 percent. There were four water quality risks identified.

Stream Compliance by Ownership

On 17 NIPF sites, approximately 37.8 miles of stream were assessed. Overall the percentage of miles in BMP compliance was 90.7 percent and ranged from a low of 82.4 percent in the Piedmont to a high of 99.2 percent in the Upper Coastal Plain. A total of 16 water quality risks were identified. This represents 72.7 percent of the total 22 water quality risks occurring statewide across all ownerships. The majority of the risks (8 or 36.4 percent) occurred in the mountains. Stream crossings on NIPF lands accounted for nine, or 40.9 percent of the total 22 risks followed by roads and then practices within the SMZs as described above in the significant findings.

On forest industry land, approximately 13.81 miles of stream were assessed on 14 sites. Overall the percentage of miles in BMP Compliance was 99.9 percent. No statistical difference was seen between regions. There were two water quality risks identified statewide. This represents 9.1 percent of the 22 total risks occurring statewide across all ownerships. Both risks occurred at stream crossings in the Lower Coastal Plain.

On corporate (TIMO) lands, 11.87 miles of stream were assessed on three sites. Stream miles in compliance were 92.7 percent. There were four (18.2 percent of total) water quality risks identified, three of which were located in the Piedmont at stream crossings.

On public land, approximately 7.01 miles of stream were assessed on two sites. Overall, the percentage of stream miles in BMP compliance was 98.2 percent. There were no water quality risks identified statewide on public lands for stream assessments.

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 14 (page 48) 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, approximately 27,142 acres were evaluated on 221 sites. Overall, the percentage of acres in BMP compliance was 99.8 percent. **This is a slight increase from the 99.7 percent in the 2007 survey.** A total of 6,217 individual BMPs were evaluated for full implementation. Overall statewide implementation was 94.2 percent. **This is a 2.4 percent increase from the 2007 survey.** While these scores are not statistically different from the 2007 survey, they do continue an upward trend in BMP compliance and implementation. **However, the most significant finding was that the number of significant water quality risks dropped from 154 in the 2007 survey down to 22 in the 2009 survey. This represents a reduction of 85.7 percent, which is a dramatic improvement over the 2007 survey and a precipitous decline over the past several surveys.** Where BMPs were correctly applied, there were no water quality risks identified.

Overall Results by Region

In the mountains, approximately 1,853 acres were evaluated on 23 sites. The percentage of acres in BMP compliance was 99.3 percent and BMP implementation was 95.1 percent. There were eight water quality risks identified. *During the 2007 survey, BMP compliance was 99.2 percent and BMP implementation was 92.0 percent with four water quality risks identified.*

In the Piedmont, approximately 4,982 acres were evaluated on 60 sites. The percentage of acres in BMP compliance was 99.6 percent and BMP implementation was 91.3 percent. There were nine water quality risks identified, which represents a **90.7 percent reduction (improvement)** from the 2007 survey. *During the 2007 survey, BMP compliance was 99.6 percent and BMP implementation was 89.3 percent. The number of water quality risks checked was 97.*

In the Upper Coastal Plain, approximately 7,527 acres were evaluated on 44 sites. The percentage of acres in BMP compliance was 99.8 percent and BMP implementation was 93.4 percent. There was one water quality risk identified, which represents a **96.4 percent increase** from the 2007 survey. *During the 2007 survey, BMP compliance was 99.9 percent and BMP implementation was 92.7 percent with 28 water quality risks identified.*

In the Lower Coastal Plain, approximately 12,779 acres were evaluated on 94 sites. The percentage of acres in BMP compliance was 99.9 percent and BMP implementation was 96.4 percent. There were four water quality risks identified which represents a **84.0 percent increase** from the 2007 survey. *During the 2007 survey, BMP compliance was 96.6 percent and BMP implementation was 93.3 percent with 25 water quality risks identified.*

Overall Results by Ownership

On NIPF lands, approximately 11,159 acres were evaluated on 133 sites. The percentage of acres in BMP compliance was approximately 99.6 percent and ranged from a low of 98.3 percent in the mountains to a high of 99.8 percent in the Lower Coastal Plain. Overall BMP implementation was 92.7 percent and ranged from a low of 89.8 percent in the Piedmont to a high of 96.0 percent in the Lower Coastal Plain. There were 16 water quality risks identified with the majority of eight (50 percent) occurring in the mountains. *During the 2007 survey, BMP compliance was 99.5 percent and ranged from a low of 99.1 percent in the mountain region to a high of 99.9 percent in the Lower Coastal Plain. BMP implementation was 90.6 percent and ranged from a low of 87.5 percent in the mountain region to a high of 92.5 percent in the Upper Coastal Plain. The number of water quality risks identified was 145 with the majority of 94 (65 percent) occurring in the Piedmont.*

On forest industry (FI) lands, approximately 7191 acres were evaluated on 32 sites. The percentage of acres in BMP compliance was 99.9 percent with no statistical variation between regions. Overall, the BMP implementation was 96.6 percent and ranged from a low of 95.9 percent in the Lower Coastal Plain to a high of 100 percent in the mountains. There were two water quality risks identified, both occurring in the Lower Coastal Plain. *During the 2007 survey, BMP compliance was 99.9 percent and ranged from a low of 98.9 percent in the mountain region to a high of 99.9 percent in the other three regions. BMP implementation was 96.0 percent and ranged from a low of 95.0 percent in the Upper Coastal Plain to a high of 97.9 percent in the mountains. The number of water quality risks identified was nine, with three occurring in the Piedmont.*

On corporate (TIMO) lands, 7,260 acres were evaluated on 46 sites. The percentage of acres in BMP compliance was 99.9 percent. There was very little discrepancy across the regions varying less than two tenths of a percent. Overall BMP implementation was 95.7 percent, varying from 92.6 percent in the Piedmont, to 99.2 percent in the mountains. There were four water quality risks, three of them in the Piedmont. *During the 2007 survey, on corporate (TIMO) lands, overall BMP compliance was 99.9 percent. Overall BMP implementation was 94.8 percent with no water quality risks. All sites were in the Lower Coastal Plain during the 2007 survey cycle.*

On public land, approximately 1533 acres were evaluated on 10 sites. The percentage of acres in BMP compliance was 99.9 percent and was statistically even across the four regions statewide. Overall BMP implementation was 96.8 percent and ranged from a low of 94.8 percent in the Piedmont to a high of 100 percent in both the Upper and Lower Coastal Plain Regions. There were no water quality risks identified, just as in the 2007 survey. *During the 2007 survey, BMP Compliance was 99.8 percent and was statistically even across the four regions statewide. BMP Implementation was 88.1 percent and ranged from a low of 77.8 percent in the Upper Coastal Plain to a high of 95.3 percent in the Piedmont region. There were no water quality risks identified.*

Overall Statewide Results for Compliance and Implementation by Practice, Region and Ownership

Tables 15 and 16 (pages 49 and 50) are perhaps the most important tables in this document with regards to where further training to improve compliance should be focused. These tables provide an overall summary and comparison of BMP compliance and implementation by practice, ownership and region. This will help guide future Master Timber Harvester, consulting forester, and landowner training to those ownerships and regions.

BMP education targeting deficiencies found in the last few survey cycles seem to have paid off. BMP compliance and implementation on roads, in SMZs, and even at stream crossings, is noticeably improved. However, there still seems to be room for improvement on forest roads, particularly on NIPF lands. Stream crossing compliance has improved, but more training is needed statewide across all landownership classes. One very positive improvement for stream crossings found in this survey is that noticeably fewer crossings are being attempted overall, with alternative access methods being utilized. BMP implementation for stream crossings on the 2009 survey shows that for each crossing that was attempted, fewer BMP problems are found.

Firebreak installation training is still needed statewide across all land ownership classes, particularly for non-GFC providers. The GFC has an ongoing Firebreak BMP training program that appears to be yielding some success.

Training is needed for mechanical site preparation providers on NIPF and forest industry lands in the Piedmont and Lower Coastal Plain regions.

Evaluations of BMP Compliance and Implementation by River Basin

Similar tables and analysis can be extracted for each of the 14 major river basins, 52 sub-basins and 12-digit HUCs for use by Regional Water Councils in accordance to the Georgia Comprehensive State-wide Water Management Plan.

Statewide Trends

Charts 1 and 6 (pages 51 and 56) provide a summary and comparison of BMP compliance and implementation, respectively, from the previous surveys of 1991, 1992, 1998, 2002, 2004 and 2007 with the 2009 survey. Additional charts present a summary and comparison by ownership type of compliance (Charts 2 – 5, pages 52 – 55) and implementation (Charts 7 – 10, pages 57 – 60) since 2002. The corporate (TIMO) category was added in 2007. Finally, Chart 11 (page 61) shows the dramatic decline in Water Quality Risks observed in BMP Compliance Surveys from the 1998 Survey to the present.

Because the 1998 survey broke out the number of acres for SMZs for the first time, a comparison could not be made with the previous surveys. This was also the case with stream crossings. Additionally, the number of acres for chemical applications and control burning were included with site preparation in the 1992 survey, making a direct comparison impossible. With the new SGSF protocol, more consistency has been added for a basis for comparison between the practices.

From a BMP compliance standpoint, with the exception of forest roads on NIPF lands, the other practices show improvements with each survey across all ownerships.

Charts 1 - 5 provide a statewide BMP compliance summary for each forest practice by ownership and previous survey results. Significant observations include:

- SMZs – 4.3 percent increase in compliance statewide for all landowners;
- Stream Crossings – significant increase in compliance overall, but still below passing;
- Forest Roads –slight increase overall, 9.3 percent increase on TIMO lands;
- Harvesting – statistically unchanged with overall compliance at 99.9 percent;

- Mechanical Site Preparation – Small 2.8 percent decrease on NIPF lands, statistically unchanged on other lands;
- Chemical Applications – 100 percent across all ownerships;
- Firebreak Construction – significant increases of 20 percent overall; largest increase of 44.5 percent on forest industry lands;
- Control Burning – remains steady at nearly 100 percent across all ownerships, except for a slight 3.4 percent decrease on NIPF lands;
- Artificial Regeneration – at or near 100 percent across all ownerships;
- Fertilization – no sites contained fertilization practices;
- Equipment Servicing - statistically unchanged since last survey;
- Overall – statistically unchanged from last survey across all ownerships;
- Stream Miles – slight 1.5 percent increase in compliance overall; largest decrease of 6.8 percent on TIMO lands.

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 94.2 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 from 544 to 22, or a 96.0 percent decrease. Chart 11 (page 61) shows the decrease in Water Quality Risks since the 1998 survey.

Existing roads and stream crossings were differentiated from newly constructed forest roads and crossings in this survey. Overall compliance of pre-existing roads was 94.8 percent and compliance of newly constructed roads was 88.9 percent, where both figures are increases over the last survey. Stream crossings are still a concern. Pre-existing crossings scored 67.2 percent in compliance, a 5.7 percent increase since the last survey. However, new crossings scored 55.1 percent in compliance, a 22 percent increase, but still failing. Skidder fords and debris and dirt crossings made up 48.8 percent of the non-compliant stream crossings. Otherwise, stream crossings statewide would have scored a 75.9 percent compliance rate.

New stream crossings, especially culverts and bridges, are expensive to purchase and install. Because stream crossings are often not considered in the negotiation process during a timber sale, the responsibility and costs are often passed to the logger, who is often not the timber buyer. Consequently, the types of crossings loggers use are not adequate. Better planning and understanding of who is going to bear the cost of culverted or bridged stream crossings at the time of timber negotiations should result in better compliance. Loggers are being encouraged through training workshops to purchase portable timber or steel bridges, which can be reused and are cost effective. Cost share funds are available for the purchase of portable wood or steel bridges through the USDA's Pine Country RC&D Council. The purchase and use of these bridges should cut down on the use of temporary culverts, skidder fords, and dirt and debris type crossings.

Future MTH workshops and other BMP training for landowners and foresters should result in improved rates of BMP compliance and implementation, resulting in better stream protection. Future topics will include field instruction on road building, installing stream crossings properly, and proper construction of firebreaks. Another statewide survey is scheduled for 2012.

Violators should be dealt with expeditiously and judiciously by regulatory agencies to ensure a level playing field. 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 the state or federal regulatory agencies.

Table 1 Targeted Sites by County and Ownership

District	County	USFS	Other Federal	State/Local	Forest Industry	TIMO Corporate	NIPF
6	Appling				2	2	1
8	Atkinson				1	0	1
8	Bacon				0		1
9	Baker					1	0
5	Baldwin				0	0	1
2	Banks				0		1
2	Barrow						1
1	Bartow				1	1	0
6	Ben Hill					0	1
8	Berrien					0	1
6	Bleckley				2	0	1
8	Brantley				2		1
9	Brooks						1
10	Bryan		1		1	0	
10	Bulloch						4
3	Burke				1	1	1
4	Butts				1		
9	Calhoun			0			1
8	Camden				1	1	0
10	Chandler					1	
4	Carroll						1
1	Catoosa	1			1	1	
8	Chattahoochee		1		0	1	
1	Chattooga				1		0
9	Clay						1
8	Clinch				2	0	2
8	Coffee					1	1
9	Colquitt						1
3	Columbia				1		0
9	Cook					0	1
4	Coweta				1		1
5	Crawford				1	1	0
7	Crisp						1
1	Dade					0	1
2	Dawson						1
9	Decatur				1		0

District	County	USFS	Other	State/Local	Forest	TIMO	NIPF
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			Federal		Industry	Corporate	
6	Dodge						1
7	Dooly						1
4	Douglas						1
9	Early					0	1
8	Echols				1	1	
10	Effingham					0	1
3	Elbert						1
10	Emanuel					1	1
10	Evans						1
1	Fannin						1
4	Fayette						1
1	Floyd						2
2	Franklin						1
1	Gilmer						1
3	Glascocock				0	1	
8	Glynn				2	1	1
1	Gordon				2	0	
9	Grady					1	1
3	Greene					0	2
2	Habersham						1
2	Hall					1	0
5	Hancock					1	1
4	Haralson					1	0
7	Harris					1	1
2	Hart					1	
4	Heard				0		1
4	Henry						1
5	Houston				0	1	
6	Irwin						1
2	Jackson					0	1
5	Jasper					0	1
6	Jeff Davis						1
3	Jefferson				1	0	1
10	Jenkins						1
5	Johnson					0	3
5	Jones	0					1
4	Lamar						1
8	Lanier					0	1
6	Laurens					1	1
District	County	USFS	Other Federal	State/Local	Forest Industry	TIMO Corporate	NIPF

7	Lee						1
10	Liberty		1			0	1
3	Lincoln						2
10	Long		0		3	1	
8	Lowndes				1		1
2	Lumpkin						1
3	McDuffie		1				1
10	McIntosh						1
7	Macon						1
3	Madison					0	1
7	Marion						1
4	Meriwether				0	1	2
9	Miller			0		1	
9	Mitchell					0	1
4	Monroe					1	0
6	Montgomery						1
2	Morgan			1		0	1
1	Murray					1	1
4	Newton					1	
2	Oconee						1
3	Oglethorpe					1	1
1	Paulding						1
1	Peach						1
1	Pickens						1
8	Pierce						1
4	Pike						1
1	Polk				1		
6	Pulaski					1	
5	Putnam				1		1
7	Quitman						1
2	Rabun	1					
7	Randolph						1
7	Schley					1	0
10	Screven					1	2
9	Seminole					1	
4	Spalding						1
2	Stephens						1
7	Stewart				0	1	1
7	Sumter					1	0
District	County	USFS	Other Federal	State/Local	Forest Industry	TIMO Corporate	NIPF
7	Talbot				1	1	

3	Taliaferro				1		1	
10	Tattnall						1	
7	Taylor					1	1	
6	Telfair					1	1	
7	Terrell				1	0		
9	Thomas		0			1	1	
9	Tift					0	1	
6	Toombs				0	1	1	
2	Towns	1						
6	Treutlen						1	
4	Troup						1	
9	Turner						1	
5	Twiggs					0	1	
2	Union	1						
4	Upson				0		1	
1	Walker					1	0	
2	Walton						1	
8	Ware			1	2	1	0	
3	Warren					0	1	
5	Washington				0	1	2	
8	Wayne				1	0	2	
7	Webster				0	1		
6	Wheeler					0	1	
2	White						1	
1	Whitfield				0		1	
6	Wilcox				0		2	
3	Wilkes						1	
5	Wilkinson					2	1	
9	Worth				0		2	
Totals		4	4	2	38	47	123	Total Sites 218

Note: The zeros (0) in the above Figure1 indicate backup sites to be used in case a suitable site could not be acquired in the target landowner category.

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

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	7	139.1	91.57%	65	96.92%	2	1	50.18	100.00%	9	100.00%	0
Piedmont	32	138.62	98.67%	267	95.51%	0	5	29.29	100.00%	45	100.00%	0
U. C. Plain	9	212.59	99.86%	79	87.34%	0	1	4.08	100.00%	8	100.00%	0
L. C. Plain	24	145.79	98.29%	213	97.18%	0	7	22.85	100.00%	60	100.00%	0
Total	72	636.1	97.43%	624	95.19%	2	14	106.4	100.00%	122	100.00%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	27.04	99.63%	29	99.90%	0	5	26.82	100.00%	10	100.00%	0
Piedmont	2	6.2	100.00%	17	100.00%	0	6	43.49	99.54%	52	96.15%	0
U. C. Plain	1	0.95	100.00%	8	100.00%	0	8	138.96	99.90%	72	98.61%	0
L. C. Plain	1	84	100.00%	17	100.00%	0	4	32.6	100.00%	41	100.00%	0
Total	7	118.19	99.92%	71	99.98%	0	23	241.87	99.92%	211	98.58%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	16	243.14	95.13%	149	98.66%	2						
Piedmont	45	217.6	99.06%	381	96.33%	0						
U. C. Plain	19	356.58	99.93%	167	93.41%	0						
L. C. Plain	36	285.24	99.12%	331	98.19%	0						
Total	116	1102.56	98.49%	1028	96.79%	2						

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

NIPF							FOREST INDUSTRY					
Region	No Sites	Crossings	% Crossings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Crossings	% Crossings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	6	11	45.45%	78	82.05%	4	0	0	NA	0	NA	0
Piedmont	10	13	61.54%	148	88.51%	3	2	2	100.00%	26	100.00%	0
U. C. Plain	5	12	58.33%	51	84.27%	0	1	3	100.00%	17	100.00%	0
L. C. Plain	15	28	50.00%	180	88.33%	2	7	14	92.86%	106	97.17%	2
Total	36	64	53.13%	457	87.09%	9	10	19	94.74%	149	97.99%	2
PUBLIC							CORPORATE (TIMOs)					
Region	No Sites	Crossings	% Crossings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Crossings	% Crossings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	1	0.00%	18	77.78%	0	4	5	60.00%	61	96.72%	0
Piedmont	1	2	100.00%	10	100.00%	0	4	7	28.57%	47	80.85%	3
U. C. Plain	0	0	NA	0	NA	0	5	6	66.67%	50	84.00%	1
L. C. Plain	0	0	NA	0	NA	0	3	3	100.00%	48	100.00%	0
Total	2	3	66.67%	28	85.71%	0	16	21	57.14%	206	90.78%	4
TOTAL ALL LANDOWNERS												
Region	No Sites	Crossings	% Crossings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	11	17	47.06%	157	87.26%	4						
Piedmont	17	24	58.33%	231	88.74%	6						
U. C. Plain	11	21	66.67%	118	87.29%	1						
L. C. Plain	25	45	66.67%	334	92.81%	4						
Total	64	107	61.68%	840	89.88%	15						

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

NIPF							FOREST INDUSTRY					
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	9	5.91	94.75%	72	81.94%	2	1	1.05	100.00%	10	100.00%	0
Piedmont	36	17.04	80.28%	298	75.84%	2	5	5.69	90.16%	37	94.59%	0
U. C. Plain	20	18.45	89.65%	133	90.23%	0	4	4.85	91.75%	21	80.95%	0
L. C. Plain	50	34.26	98.07%	325	95.38%	0	21	33.49	99.40%	144	97.22%	0
Total	115	75.66	91.75%	828	86.35%	4	31	45.08	97.43%	212	95.28%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	1.3	99.90%	34	97.06%	0	7	5.01	100.00%	51	100.00%	0
Piedmont	3	2.1	100.00%	21	100.00%	0	7	5	90.60%	61	88.52%	0
U. C. Plain	1	0.49	100.00%	7	100.00%	0	16	17.27	96.47%	104	88.46%	0
L. C. Plain	3	2.93	100.00%	24	100.00%	0	16	11.88	90.49%	115	95.65%	0
Total	10	6.82	99.98%	86	98.84%	0	46	39.16	94.36%	331	92.75%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	20	13.27	97.66%	167	91.62%	2						
Piedmont	51	29.83	85.28%	417	80.58%	2						
U. C. Plain	41	41.06	92.89%	265	89.06%	0						
L. C. Plain	90	82.56	97.59%	608	96.05%	0						
Total	202	166.72	94.24%	1457	89.84%	4						

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

Region	NIPF				FOREST INDUSTRY			
	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	8	100.00%	0	1	3	100.00%	0
Piedmont	35	138	92.03%	0	3	25	100.00%	0
U. C. Plain	16	63	90.48%	0	2	15	100.00%	0
L. C. Plain	31	101	97.03%	0	20	74	93.24%	0
Total	86	310	93.55%	0	26	117	95.73%	0

Region	PUBLIC				CORPORATE (TIMOs)			
	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	7	100.00%	0	3	6	100.00%	0
Piedmont	3	29	93.10%	0	7	21	100.00%	0
U. C. Plain	1	3	100.00%	0	12	51	92.16%	0
L. C. Plain	1	2	100.00%	0	8	25	96.00%	0
Total	8	41	95.12%	0	30	103	95.15%	0

Region	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	11	24	100.00%	0
Piedmont	48	213	93.90%	0
U. C. Plain	31	132	92.42%	0
L. C. Plain	60	202	95.54%	0
Total	150	571	94.40%	0

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

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	12	562.31	100.00%	85	100.00%	0	1	388.56	100.00%	8	100.00%	0
Piedmont	43	2423.16	99.78%	320	93.75%	0	5	812.51	99.98%	35	97.14%	0
U. C. Plain	21	2525.11	99.81%	154	96.10%	0	4	555.76	100.00%	28	100.00%	0
L. C. Plain	53	3524.89	99.92%	338	98.82%	0	21	3763.37	99.97%	135	96.30%	0
Total	129	9035.47	99.86%	897	96.66%	0	31	5520.20	99.98%	206	97.09%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	148.82	100.00%	24	100.00%	0	7	510.48	99.61%	51	99.99%	0
Piedmont	3	459.5	99.95%	24	95.83%	0	7	528.12	99.96%	51	98.04%	0
U. C. Plain	1	47	100.00%	7	100.00%	0	16	1896.39	99.98%	102	98.04%	0
L. C. Plain	3	668.2	100.00%	22	100.00%	0	15	1900.46	100.00%	102	100.00%	0
Total	10	1323.52	99.98%	77	98.70%	0	45	4835.45	99.95%	306	99.02%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	23	1610.17	99.88%	168	99.90%	0						
Piedmont	58	4223.29	99.86%	430	94.65%	0						
U. C. Plain	42	5024.26	99.90%	291	97.25%	0						
L. C. Plain	92	9856.92	99.96%	597	98.49%	0						
Total	215	20714.64	99.92%	1486	97.31%	0						

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

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	1	45.46	78.31%	2	50.00%	1	0	0	NA	0	NA	0
U. C. Plain	0	0	NA	0	NA	0	0	0	NA	0	NA	0
L. C. Plain	6	380.79	99.47%	15	86.67%	0	5	568.52	99.26%	14	71.43%	0
Total	7	426.25	97.22%	17	82.35%	1	5	568.52	99.26%	14	71.43%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	0	0	NA	0	NA	0
U. C. Plain	0	0	NA	0	NA	0	0	0	NA	0	NA	0
L. C. Plain	1	91.2	100.00%	2	100.00%	0	3	218.87	99.92%	13	92.31%	0
Total	1	91.2	100.00%	2	100.00%	0	3	218.87	99.92%	13	92.31%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	0	0	NA	0	NA	0						
Piedmont	1	45.46	78.31%	2	50.00%	1						
U. C. Plain	0	0	NA	0	NA	0						
L. C. Plain	15	1259.38	99.49%	44	84.09%	0						
Total	16	1304.84	98.75%	46	82.61%	1						

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

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	4	176.43	100.00%	8	100.00%	0	1	114	100.00%	2	100.00%	0
U. C. Plain	2	101.79	100.00%	4	100.00%	0	0	0	NA	0	NA	0
L. C. Plain	2	226	100.00%	4	100.00%	0	4	348.68	100.00%	8	100.00%	0
Total	8	504.22	100.00%	16	100.00%	0	5	462.68	100.00%	10	100.00%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	0	0	NA	0	NA	0
U. C. Plain	0	0	NA	0	NA	0	1	554.92	100.00%	2	100.00%	0
L. C. Plain	0	0	NA	0	NA	0	1	47.7	100.00%	2	100.00%	0
Total	0	0	NA	0	NA	0	2	602.62	100.00%	4	100.00%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	0	0	NA	0	NA	0						
Piedmont	5	290.43	100.00%	10	100.00%	0						
U. C. Plain	3	656.71	100.00%	6	100.00%	0						
L. C. Plain	7	622.38	100.00%	14	100.00%	0						
Total	15	1569.52	100.00%	30	100.00%	0						

Table 9: Distribution of Firebreaks Evaluated By Region, Ownership, Miles Assessed, % Compliance, # BMP Assessed, % Implemented, and Water Quality Risks

NIPF							FOREST INDUSTRY					
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	1	1.39	100.00%	7	100.00%	0
U. C. Plain	6	9.01	100.00%	20	100.00%	0	0	0	NA	0	NA	0
L. C. Plain	6	9.89	98.38%	23	82.61%	0	1	0.56	100.00%	3	100.00%	0
Total	12	18.9	99.15%	43	90.70%	0	2	1.95	100.00%	10	100.00%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	1	0.3	50.00%	5	40.00%	0	1	0.63	100.00%	3	100.00%	0
U. C. Plain	0	0	NA	0	NA	0	3	12.69	99.76%	9	88.89%	0
L. C. Plain	1	0.9	100.00%	4	100.00%	0	2	1.38	97.83%	10	80.00%	0
Total	2	1.2	87.50%	9	66.67%	0	6	14.7	99.59%	22	86.36%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	0	0	NA	0	NA	0						
Piedmont	3	2.32	93.53%	15	80.00%	0						
U. C. Plain	9	21.7	99.86%	29	96.55%	0						
L. C. Plain	10	12.73	98.51%	40	85.00%	0						
Total	22	36.75	98.99%	84	88.10%	0						

Table 10: Distribution of Control Burned Sites Evaluated By Region, Ownership, Acres Assessed, % Compliance, BMPs Assessed, % BMP Implementation, and Water Quality Risks

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	0	0	NA	0	NA	0
U. C. Plain	4	195.39	95.91%	4	75.00%	0	0	0	NA	0	NA	0
L. C. Plain	1	36.34	100.00%	1	100.00%	0	0	0	NA	0	NA	0
Total	5	231.73	96.55%	5	80.00%	0	0	0	NA	0	NA	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	0	0	NA	0	NA	0
U. C. Plain	0	0	NA	0	NA	0	2	679.33	100.00%	2	100.00%	0
L. C. Plain	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Total	0	0	NA	0	NA	0	2	679.33	100.00%	2	100.00%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	0	0	NA	0	NA	0						
Piedmont	0	0	NA	0	NA	0						
U. C. Plain	6	874.72	99.09%	6	83.33%	0						
L. C. Plain	1	36.34	100.00%	1	100.00%	0						
Total	7	911.06	99.12%	7	85.71%	0						

Table 11: Distribution of Artificial Regeneration Operations Evaluated By Region, Ownership, Acres Assessed, % Compliance, BMPs Assessed, % BMP Implementation, and Water Quality Risks

NIPF							FOREST INDUSTRY					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	2	91.69	100.00%	4	100.00%	0	1	114	100.00%	1	100.00%	0
U. C. Plain	1	60	100.00%	2	100.00%	0	0	0	NA	0	NA	0
L. C. Plain	4	173.67	100.00%	7	100.00%	0	4	418.84	100.00%	6	100.00%	0
Total	7	325.36	100.00%	13	100.00%	0	5	532.84	100.00%	7	100.00%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	NA	0	NA	0	0	0	NA	0	NA	0
Piedmont	0	0	NA	0	NA	0	0	0	NA	0	NA	0
U. C. Plain	0	0	NA	0	NA	0	1	554.92	100.00%	1	100.00%	0
L. C. Plain	0	0	NA	0	NA	0	2	126.7	100.00%	2	100.00%	0
Total	0	0	NA	0	NA	0	3	681.62	100.00%	3	100.00%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	0	0	NA	0	NA	0						
Piedmont	3	205.69	100.00%	5	100.00%	0						
U. C. Plain	2	614.92	100.00%	3	100.00%	0						
L. C. Plain	10	719.21	100.00%	15	100.00%	0						
Total	15	1539.82	100.00%	23	100.00%	0						

NOTE: No sites were evaluated which contained any Forest Fertilization Operations.

Table 12: Distribution of Equipment Servicing Operations Evaluated By Region, Ownership, No. of Landings Assessed, BMPs Assessed, % BMP Implementation, and Water Quality Risks

NIPF							FOREST INDUSTRY					
Region	No. Sites	Landings	% Landings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Landings	% Landings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	12	14	100.00%	34	100.00%	0	1	6	100.00%	3	100.00%	0
Piedmont	44	84	98.81%	132	98.48%	0	5	18	100.00%	14	100.00%	0
U. C. Plain	21	58	98.28%	63	98.41%	0	4	16	100.00%	12	100.00%	0
L. C. Plain	53	139	100.00%	159	100.00%	0	22	139	97.12%	64	93.75%	0
Total	130	295	99.32%	388	99.23%	0	32	179	97.77%	93	95.70%	0
PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Landings	% Landings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Landings	% Landings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	8	100.00%	9	100.00%	0	7	10	100.00%	19	100.00%	0
Piedmont	3	7	100.00%	9	100.00%	0	7	16	100.00%	20	100.00%	0
U. C. Plain	1	1	100.00%	3	100.00%	0	16	43	100.00%	48	100.00%	0
L. C. Plain	3	14	100.00%	9	100.00%	0	16	54	100.00%	47	100.00%	0
Total	10	30	100.00%	30	100.00%	0	46	123	100.00%	134	100.00%	0
TOTAL ALL LANDOWNERS												
Region	No. Sites	Landings	% Landings Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	23	38	100.00%	65	100.00%	0						
Piedmont	59	125	99.20%	175	98.86%	0						
U. C. Plain	42	118	99.15%	126	99.21%	0						
L. C. Plain	94	346	98.84%	279	98.57%	0						
Total	218	627	99.04%	645	98.91%	0						

Table 13: Distribution of Stream Types, Miles Assessed, and % Compliance By Region, and Ownership

NIPF							FOREST INDUSTRY					
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	7	0.57	91.23%	2.73	91.94%	91.82%	1	1.65	100.00%	0	NA	100.00%
Piedmont	32	8.45	88.28%	6.46	74.77%	82.43%	5	4.08	100.00%	0.75	100.00%	100.00%
U. C. Plain	9	4.07	99.26%	2.47	99.19%	99.24%	1	0.75	100.00%	0.09	100.00%	100.00%
L. C. Plain	23	10.15	96.26%	2.87	93.03%	95.55%	7	3.48	99.71%	3.01	100.00%	99.85%
Total	71	23.24	93.76%	14.53	85.75%	90.68%	14	9.96	99.90%	3.85	100.00%	99.93%

PUBLIC							CORPORATE (TIMOs)					
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	3	0.76	82.89%	0.5	100.00%	89.68%	5	0.6	100.00%	0.96	100.00%	100.00%
Piedmont	2	0.68	100.00%	0.66	100.00%	100.00%	6	1.36	96.32%	2.01	99.50%	98.22%
U. C. Plain	1	0.39	100.00%	0	NA	NA	8	2.68	99.63%	1.89	100.00%	99.78%
L. C. Plain	2	0	NA	4.02	100.00%	100.00%	4	0.87	100.00%	1.5	46.67%	66.24%
Total	8	1.83	92.90%	5.18	100.00%	98.15%	23	5.51	98.91%	6.36	87.26%	92.67%

TOTAL ALL LANDOWNERS						
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	16	3.58	94.97%	4.19	94.75%	94.85%
Piedmont	45	14.57	92.86%	9.88	83.40%	89.04%
U. C. Plain	19	7.89	99.49%	4.45	99.55%	99.51%
L. C. Plain	36	14.5	97.31%	11.4	91.23%	94.63%
Total	116	40.54	95.93%	29.92	90.37%	93.57%

Table 14: Overall Distribution of Sites Evaluated By Region, Ownership, Acres Evaluated, % Compliance, BMPs Assessed, % BMPs Implemented, and Water Quality Risks

Region	NIPF						FOREST INDUSTRY					
	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	12	701.41	98.33%	324	91.52%	8	1	438.74	100.00%	33	100.00%	0
Piedmont	45	2875.36	99.41%	1317	89.75%	6	5	1069.8	99.98%	192	98.44%	0
U. C. Plain	23	3094.88	99.58%	573	92.32%	0	4	559.84	99.99%	101	96.04%	0
L. C. Plain	53	4487.48	99.84%	1366	95.97%	2	22	5122.26	99.90%	614	95.93%	2
Total	133	11159.13	99.56%	3598	92.69%	16	32	7190.64	99.92%	940	96.60%	2
Region	PUBLIC						CORPORATE (TIMOs)					
	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	175.86	99.94%	121	95.87%	0	7	537.3	99.63%	234	99.15%	0
Piedmont	3	465.7	99.95%	115	94.78%	0	7	571.61	99.93%	255	92.55%	3
U. C. Plain	1	47.95	100.00%	28	100.00%	0	16	3824.52	99.99%	441	93.65%	1
L. C. Plain	3	843.4	100.00%	80	100.00%	0	16	2326.33	99.99%	405	97.78%	0
Total	10	1532.91	99.98%	344	96.80%	0	46	7259.76	99.96%	1335	95.66%	4
TOTAL ALL LANDOWNERS												
Region	No. Sites	Acres	% Acres Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks						
Mountains	23	1853.31	99.25%	730	95.07%	8						
Piedmont	60	4982.47	99.64%	1879	91.33%	9						
U. C. Plain	44	7527.19	99.82%	1143	93.35%	1						
L. C. Plain	94	12779.47	99.90%	2465	96.39%	4						
Total	221	27142.44	99.79%	6217	94.15%	22						

Table 15: % BMP Compliance by Practice, Region, and Ownership

Practice	Mountain				Piedmont				Upper Coastal Plain			
	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public
Forest Roads (miles)	94.8%	100%	100%	100%	80.3%	90.2%	89.2%	100%	89.7%	91.8%	96.5%	100%
Stream Xings (#)	45.5%	N/A	60%	0%	61.5%	100%	25.0%	100%	58.3%	100%	66.7%	N/A
SMZs (acres)	91.6%	100%	100%	99.6%	98.7%	100%	100%	100%	99.9%	100%	100%	100%
Harvesting (acres)	100%	100%	99.61%	100%	99.8%	99.9%	99.9%	99.9%	99.8%	100%	99.9%	100%
Mech. SP (acres)	N/A	N/A	N/A	N/A	78.3%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chem. SP (acres)	N/A	N/A	N/A	N/A	100%	100%	N/A	N/A	100%	N/A	100%	N/A
Firebreaks (miles)	N/A	N/A	N/A	N/A	N/A	100%	100%	50.0%	100%	N/A	99.8%	N/A
Burning (acres)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	95.9%	N/A	100%	N/A
Artif. Regen. (acres)	N/A	N/A	N/A	N/A	100%	100%	N/A	N/A	100%	N/A	100%	N/A
Fertilization (acres)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equip. Service	100%	100%	100%	100%	98.8%	100%	100%	100%	98.3%	100%	100%	100%
Overall acres	98.33%	100%	99.63%	99.9%	99.4%	99.9%	99.9%	99.9%	99.6%	100%	99.9%	100%
Streams (miles)	91.82%	100%	100%	89.7%	82.4%	99.7%	100%	100%	99.2%	100%	99.8%	100%

Practice	Lower Coastal Plain				Subtotal				State Total:
	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public	
Forest Roads (miles)	98.1%	99.4%	90.5%	100%	91.8%	97.4%	94.4%	100%	94.2%
Stream Xings (#)	50.0%	92.7%	100%	N/A	53.1%	94.7%	57.1%	66.7%	61.7%
SMZs (acres)	98.3%	100%	100%	100%	97.4%	100%	99.9%	99.9%	98.5%
Harvesting (acres)	99.9%	99.9%	100%	100%	99.9%	99.9%	99.9%	99.9%	99.9%
Mech. SP (acres)	99.5%	99.3%	99.9%	100%	97.2%	99.3%	99.9%	100%	98.8%
Chem. SP (acres)	100%	100%	100%	N/A	100%	100%	100%	N/A	100%
Firebreaks (miles)	98.4%	100%	97.8%	100%	99.2%	100%	99.6%	87.5%	99.0%
Burning (acres)	100%	N/A	N/A	N/A	96.6%	N/A	100%	N/A	99.1%
Artif. Regen. (acres)	100%	100%	100%	N/A	100%	100%	100%	N/A	100%
Fertilization (acres)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equip. Service	100%	97.1%	100%	100%	99.3%	97.8%	100%	100%	99.0%
Overall acres	99.8%	99.9%	99.9%	100%	99.6%	99.9%	99.9%	99.9%	99.8%
Streams (miles)	95.6%	99.9%	66.2%	100%	90.7%	99.9%	92.7%	98.2%	93.6%

Table 16: % BMP Implementation by Practice, Region, and Ownership

Practice	Mountain				Piedmont				Upper Coastal Plain			
	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public
Forest Roads	81.9%	100%	100%	97.1%	75.8%	94.6%	88.6%	100%	90.2%	81.0%	88.5%	100%
Stream Xings	82.1%	N/A	96.72%	77.8%	88.5%	100%	80.9%	100%	86.3%	100%	84.0%	N/A
SMZs	96.9%	100%	100%	100%	95.5%	100%	96.2%	100%	87.3%	100%	98.6%	100%
Special Mgt Areas	100%	100%	100%	100%	92.0%	100%	100%	93.1%	90.5%	100%	92.2%	100%
Harvesting	100%	100%	100%	100%	93.8%	97.1%	98.0%	95.8%	96.1%	100%	98.0%	100%
Mech. SP	N/A	N/A	N/A	N/A	50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chem. SP	N/A	N/A	N/A	N/A	100%	100%	N/A	N/A	100%	N/A	100%	N/A
Firebreaks	N/A	N/A	N/A	N/A	N/A	100%	100%	40.0%	100%	N/A	88.9%	N/A
Burning	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	75%	N/A	100%	N/A
Artif. Regen.	N/A	N/A	N/A	N/A	100%	100%	N/A	N/A	100%	N/A	100%	N/A
Fertilization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Equip. Service	100%	100%	100%	100%	98.5%	100%	100%	100%	98.4%	100%	100%	100%
Overall	91.52%	100%	99.15%	95.87%	89.75%	98.44%	92.55%	94.78%	92.32%	96.04%	93.65%	100%
	Lower Coastal Plain				Subtotal				State Total:			
Practice	NIPF	FI	TIMO	Public	NIPF	FI	TIMO	Public				
Forest Roads	95.4%	97.2%	95.7%	100%	86.4%	95.3%	92.8%	98.8%		89.8%		
Stream Xings	88.3%	97.2%	100%	N/A	87.1%	98.0%	90.8%	85.7%		89.9%		
SMZs	97.2%	100%	100%	100%	95.2%	100%	98.6%	100%		96.8%		
Special Mgt Areas	97.0%	93.2%	96.0%	100%	93.5%	95.7%	95.1%	95.1%		94.4%		
Harvesting	98.8%	96.3%	100%	100%	96.7%	97.1%	99.0%	98.7%		97.3%		
Mech. SP	86.7%	71.4%	92.3%	100%	82.4%	71.4%	92.3%	100%		82.6%		
Chem. SP	100%	100%	100%	N/A	100%	100%	100%	N/A		100%		
Firebreaks	82.6%	100%	80%	100%	90.7%	100%	86.4%	66.7%		88.1%		
Burning	100%	N/A	N/A	N/A	80.0%	N/A	100%	N/A		85.7%		
Artif. Regen.	100%	100%	100%	N/A	100%	100%	100%	N/A		100%		
Fertilization	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		N/A		
Equip. Service	100%	93.8%	100%	100%	99.2%	95.7%	100%	100%		98.9%		
Overall	95.97%	95.93%	97.78%	100%	92.69%	96.60%	95.66%	96.80%	94.15%			

Chart 1: Statewide Trends in BMP Compliance

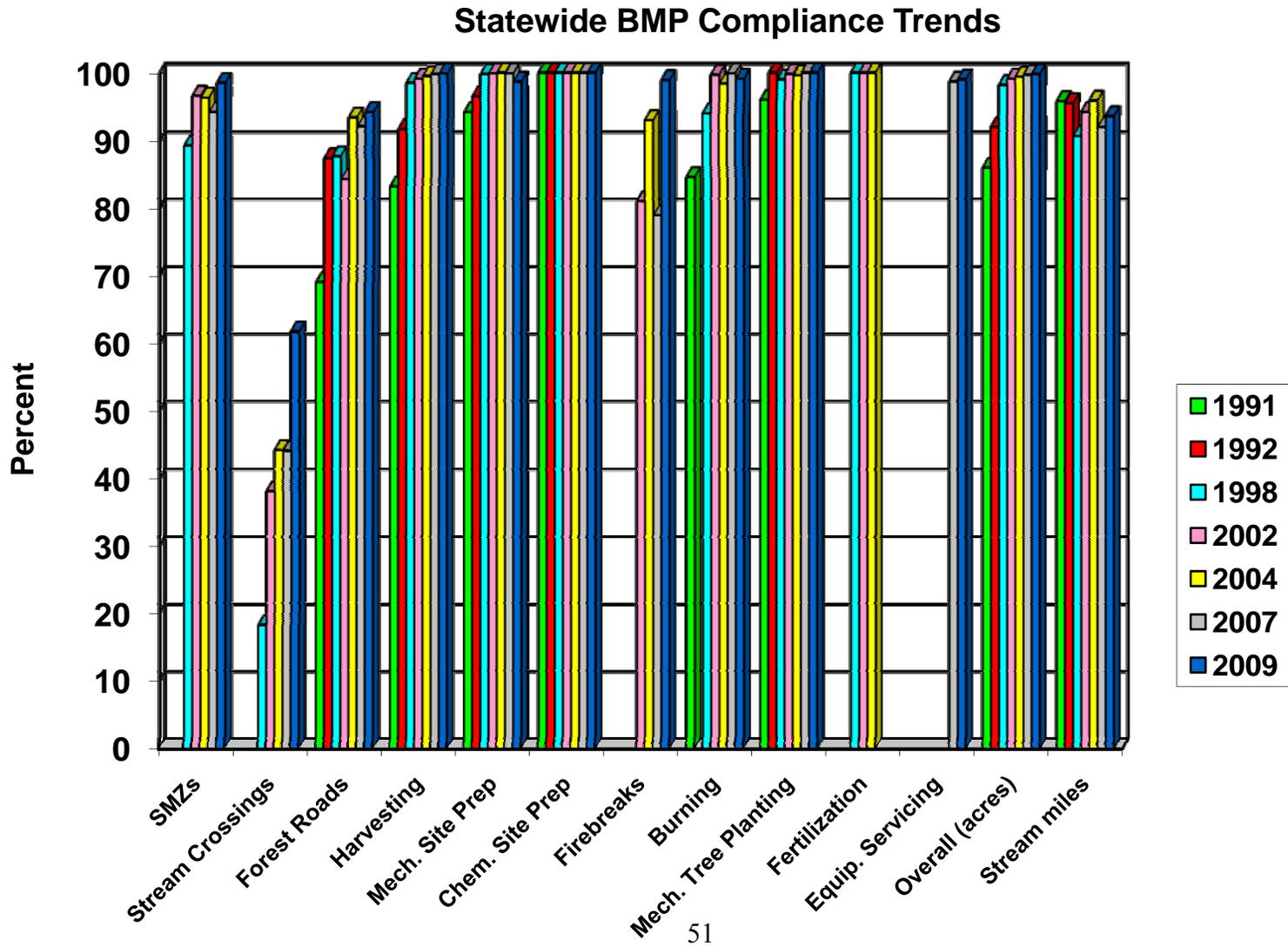


Chart 2: Statewide Trends in BMP Compliance on NIPF Sites from 2002 through 2009 Surveys

Statewide BMP Compliance Trends - NIPF

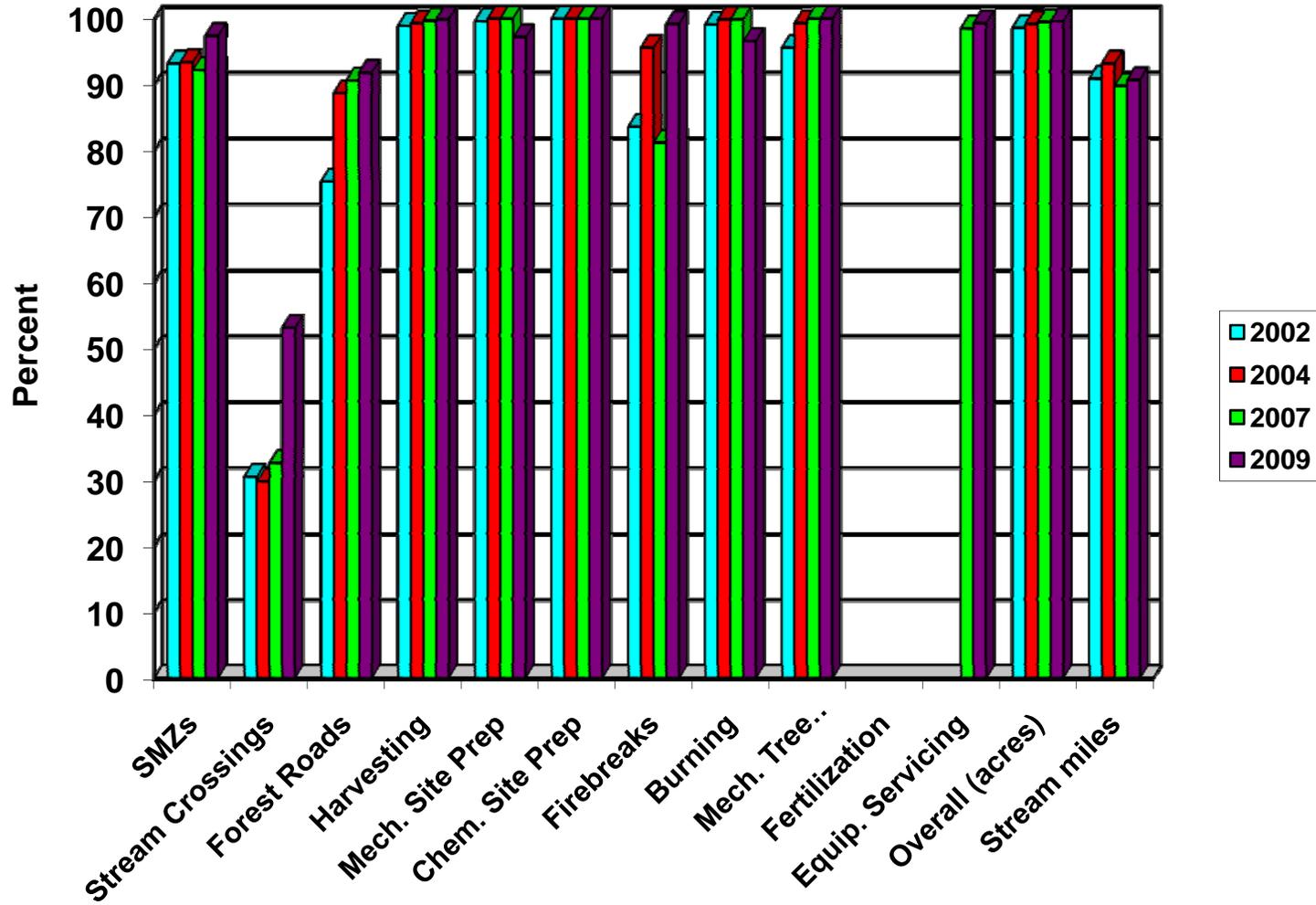


Chart 3: Statewide Trends in BMP Compliance on Forest Industry Sites from 2002 through 2009 Surveys

Statewide BMP Compliance Trends - Forest Industry

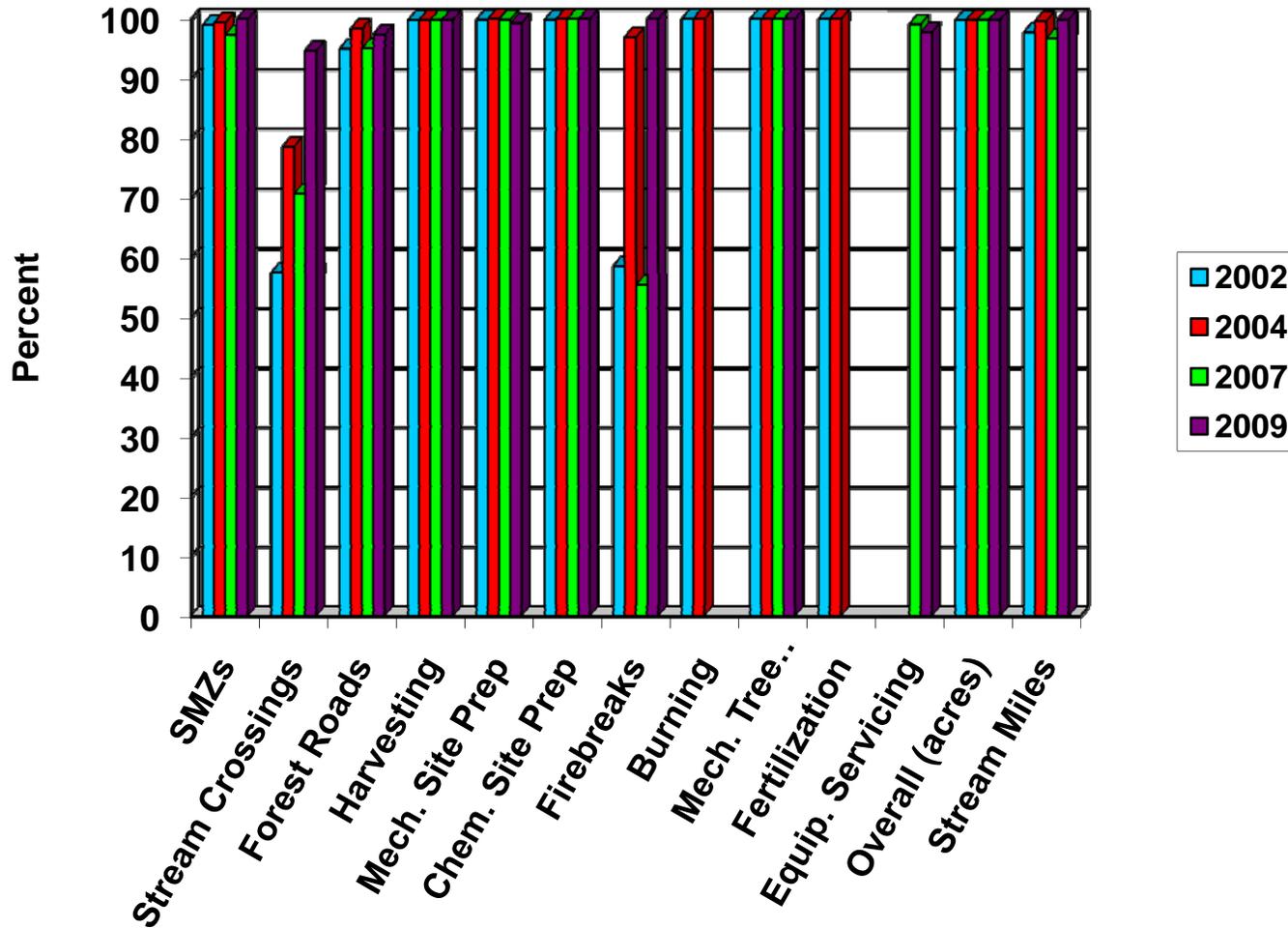


Chart 4: Statewide Trends in BMP Compliance on Corporate (TIMO) Sites from 2007 and 2009 Surveys

Statewide BMP Compliance Trends - TIMO

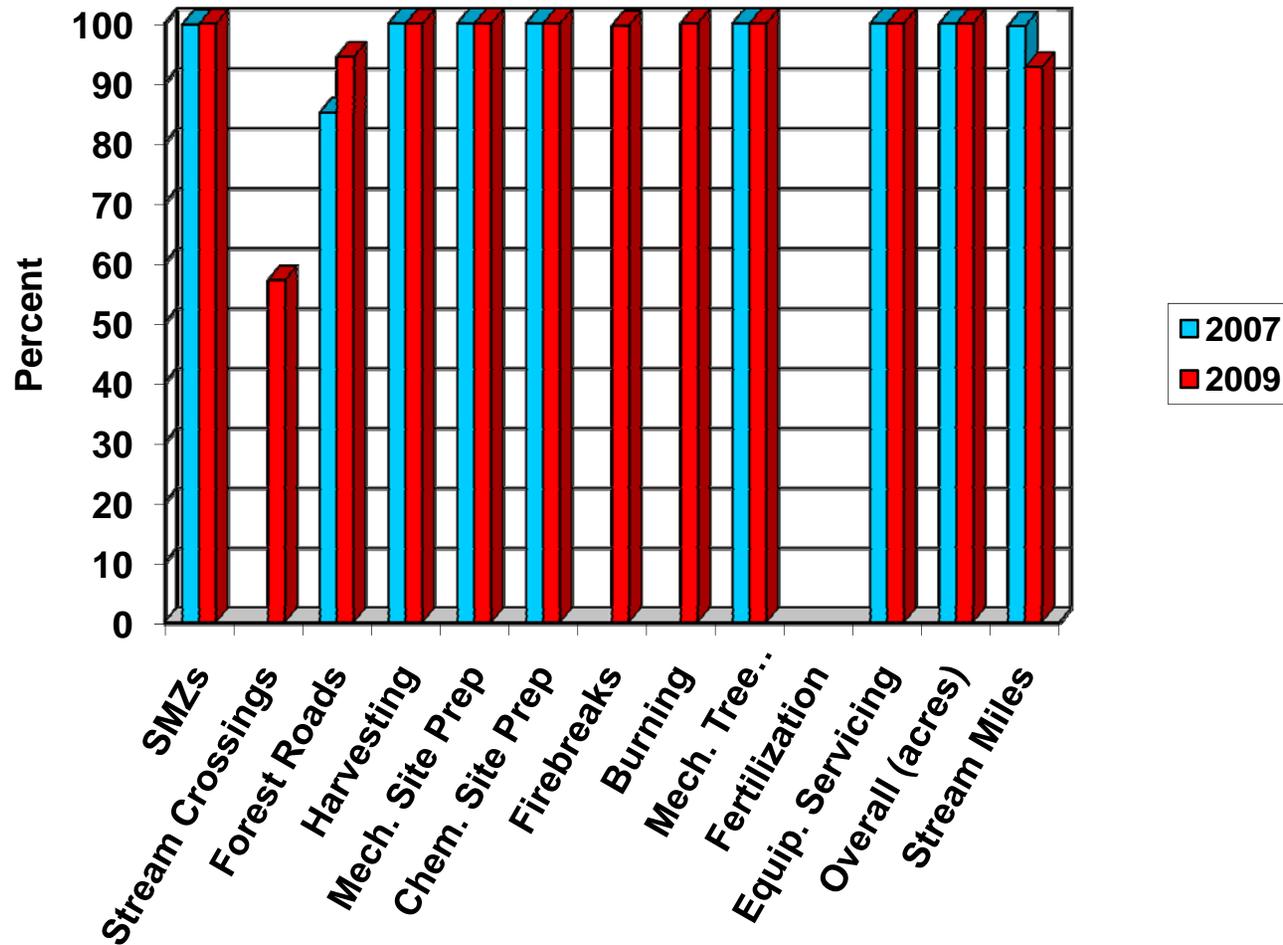


Chart 5: Statewide Trends in BMP Compliance on Public Sites from 2002 through 2009 Surveys

Statewide BMP Compliance Trends - Public

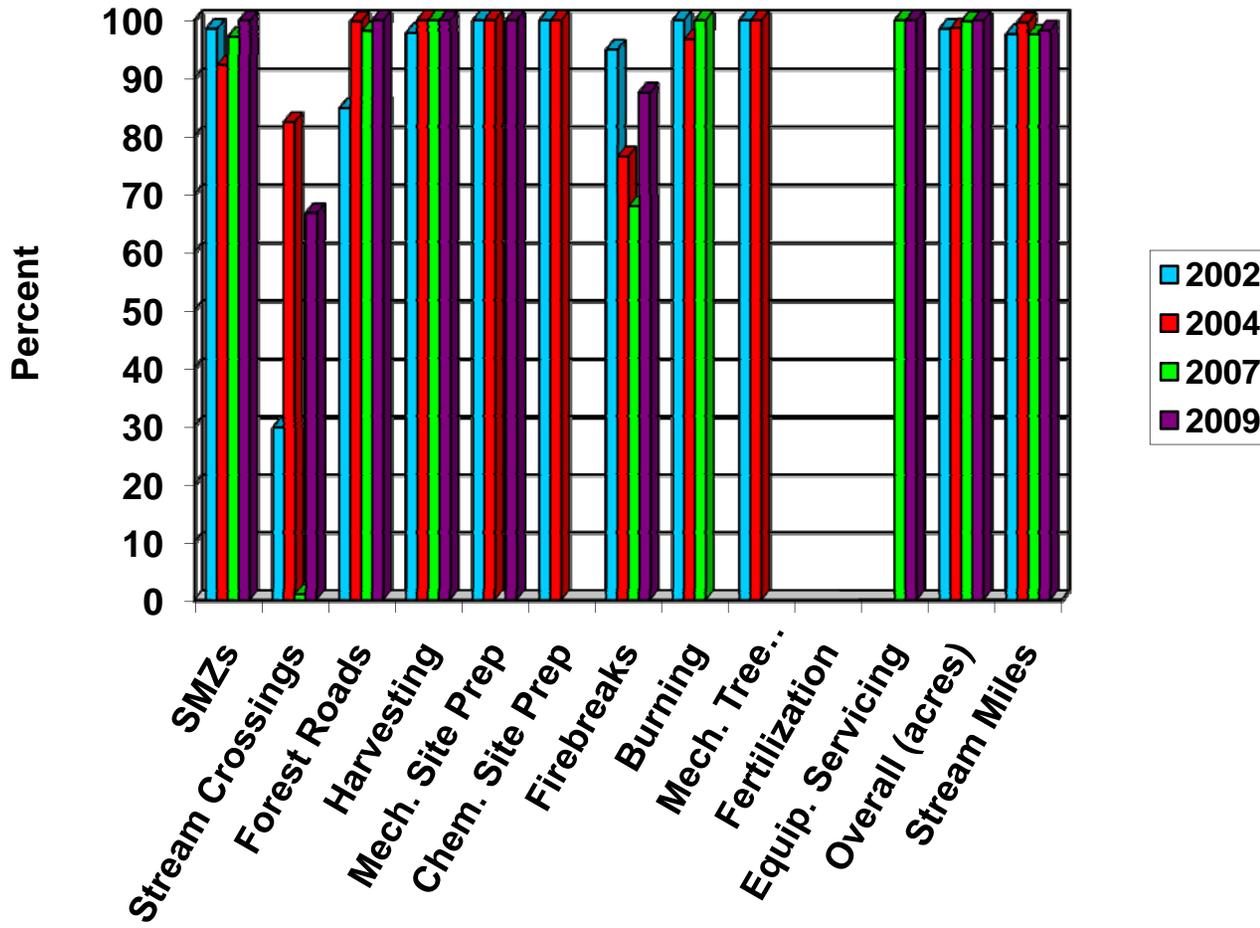


Chart 6: Statewide Trends in BMP Implementation

BMP Implementation Trends

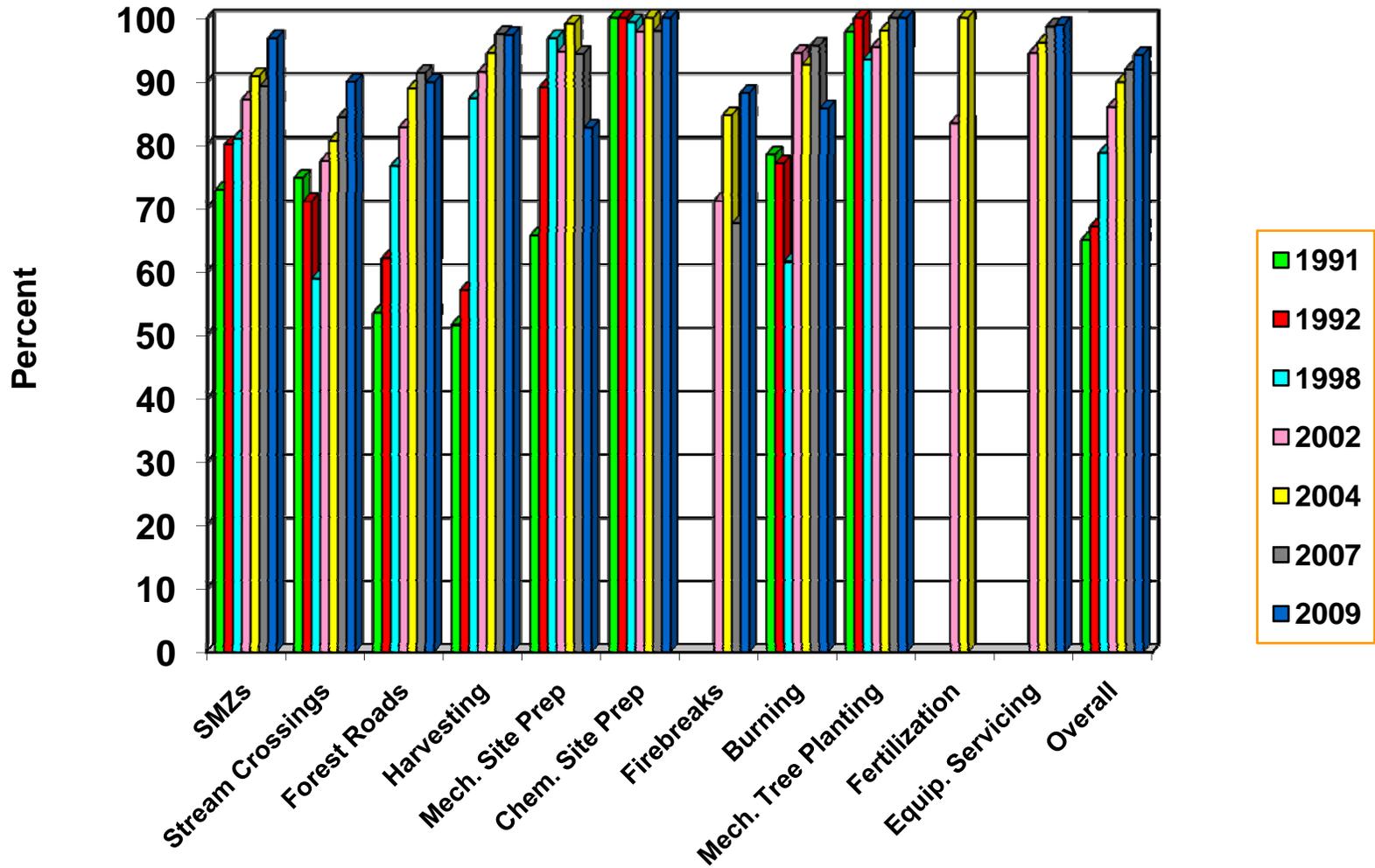


Chart 7: Statewide Trends in BMP Implementation on NIPF Sites from 2002 through 2009 Surveys

Statewide BMP Implementation Trends - NIPF

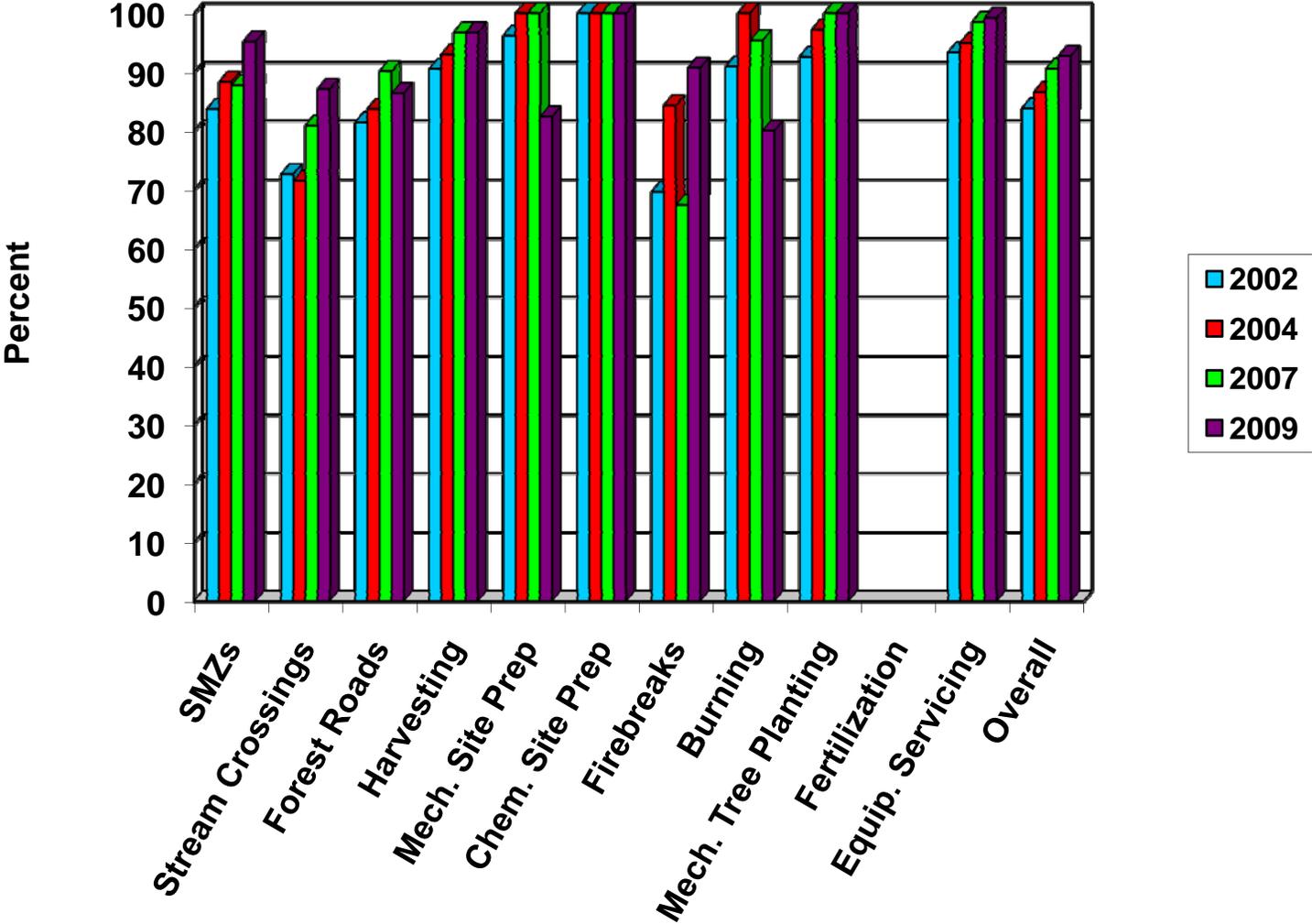


Chart 8: Statewide Trends in BMP Implementation on Forest Industry Sites from 2002 through 2009 Surveys

Statewide BMP Implementation Trends - Forest Industry

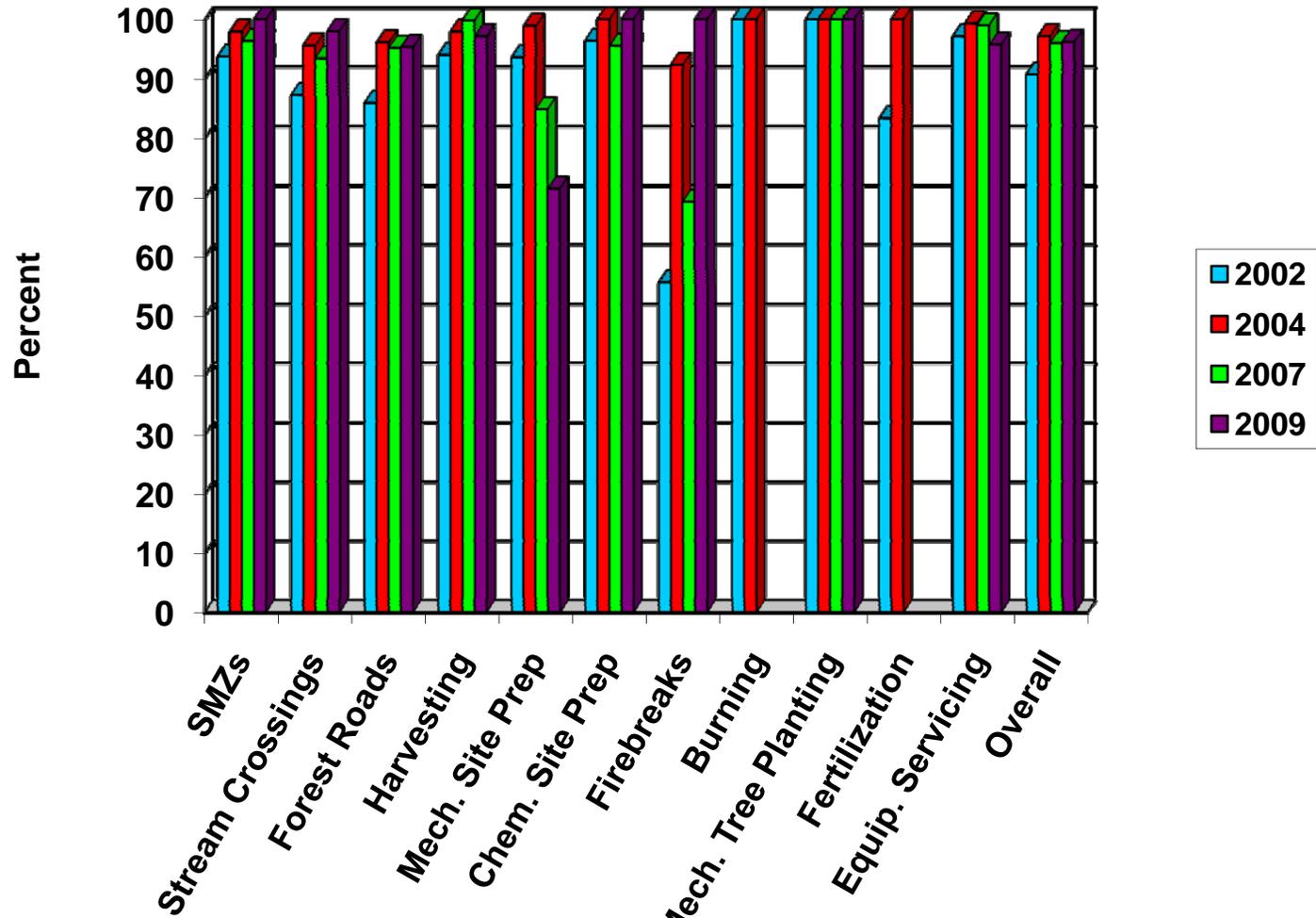


Chart 9: Statewide Trends in BMP Implementation on Corporate (TIMO) Sites from 2007 and 2009 Surveys

Statewide BMP Implementation Trends - TIMO

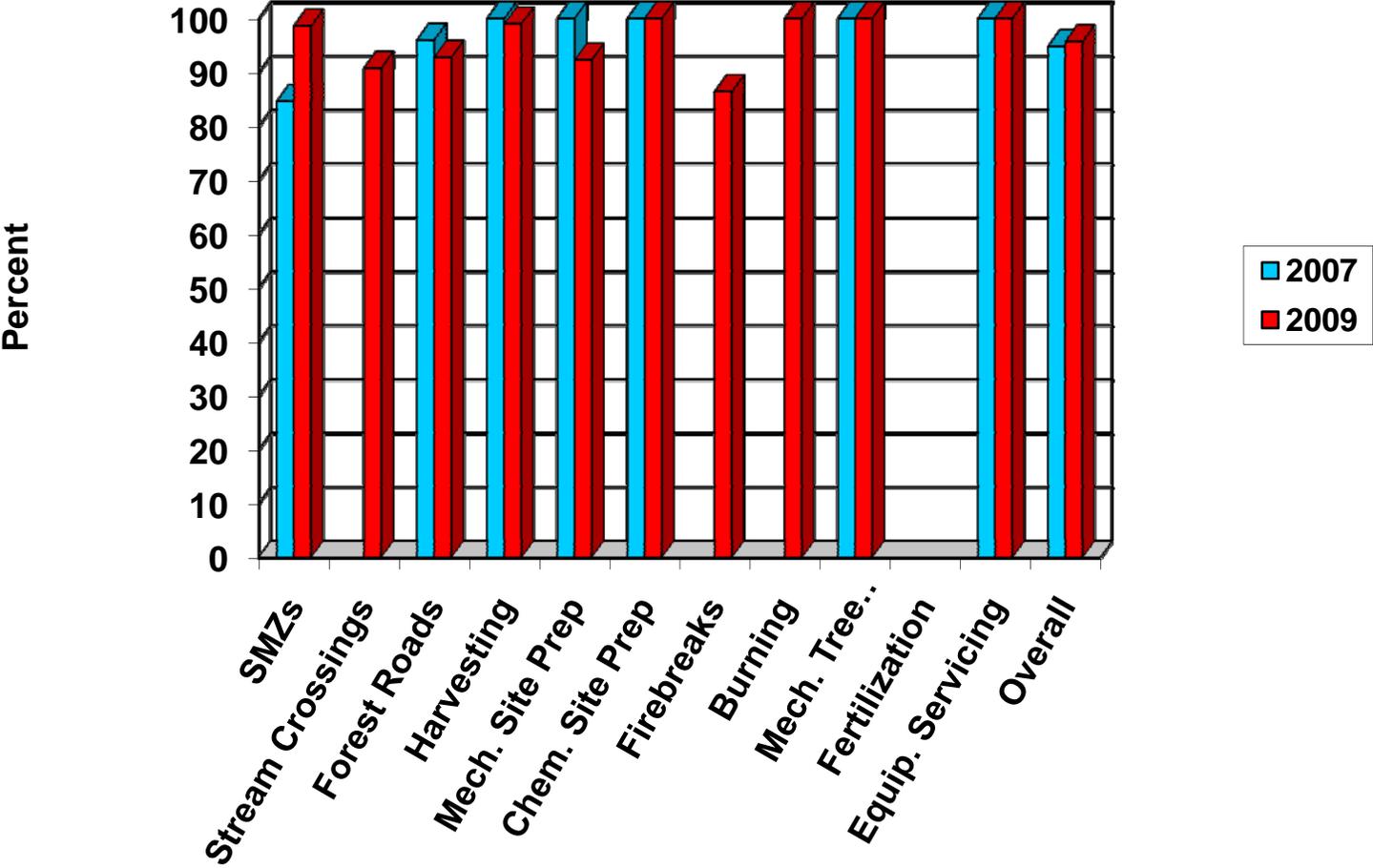


Chart 10: Statewide Trends in BMP Implementation on Public Sites from 2002 through 2009 Surveys

Statewide BMP Implementation Trends - Public

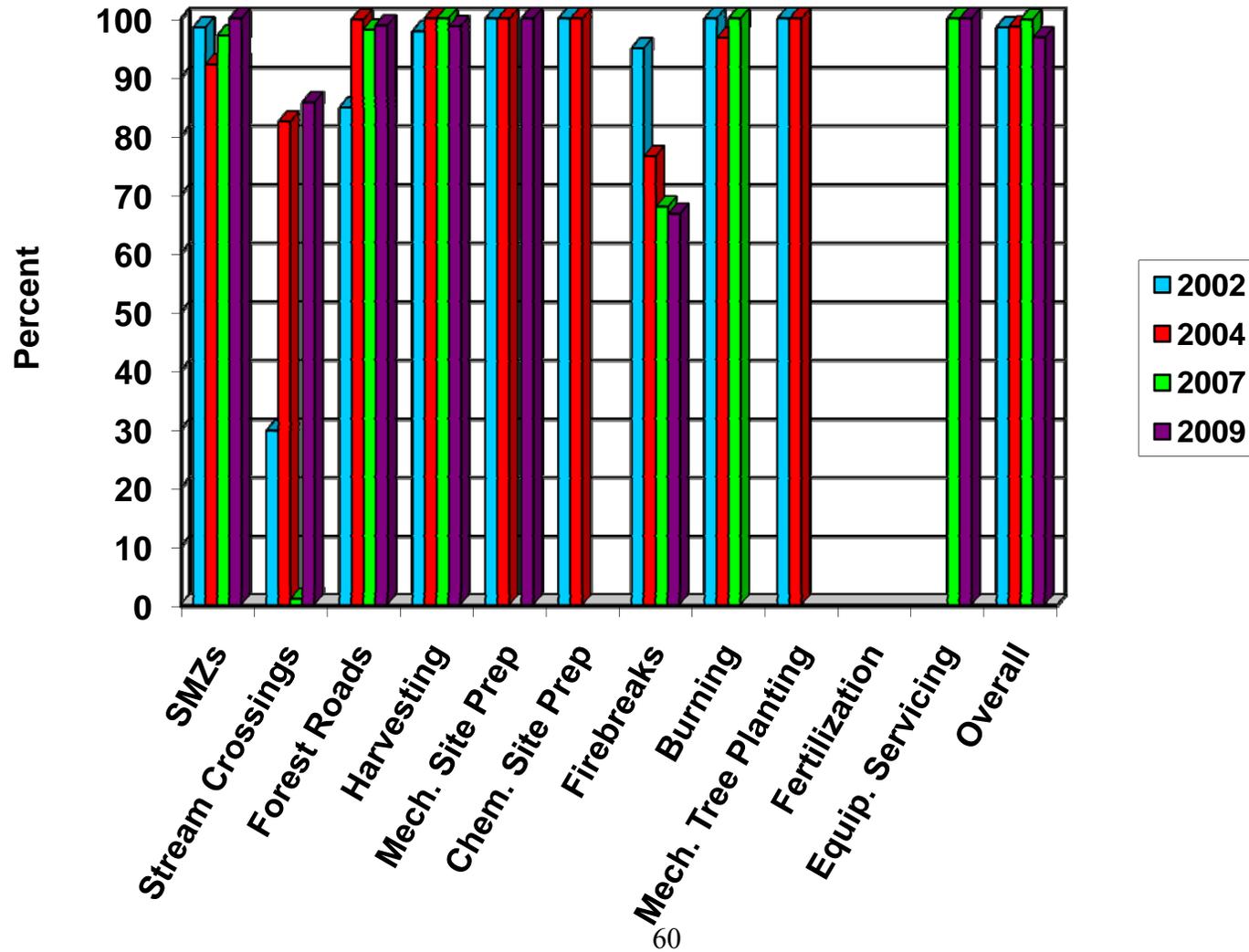


Chart 11: Statewide Trends in Reduction of Water Quality Risks from 1998 through 2009 Surveys

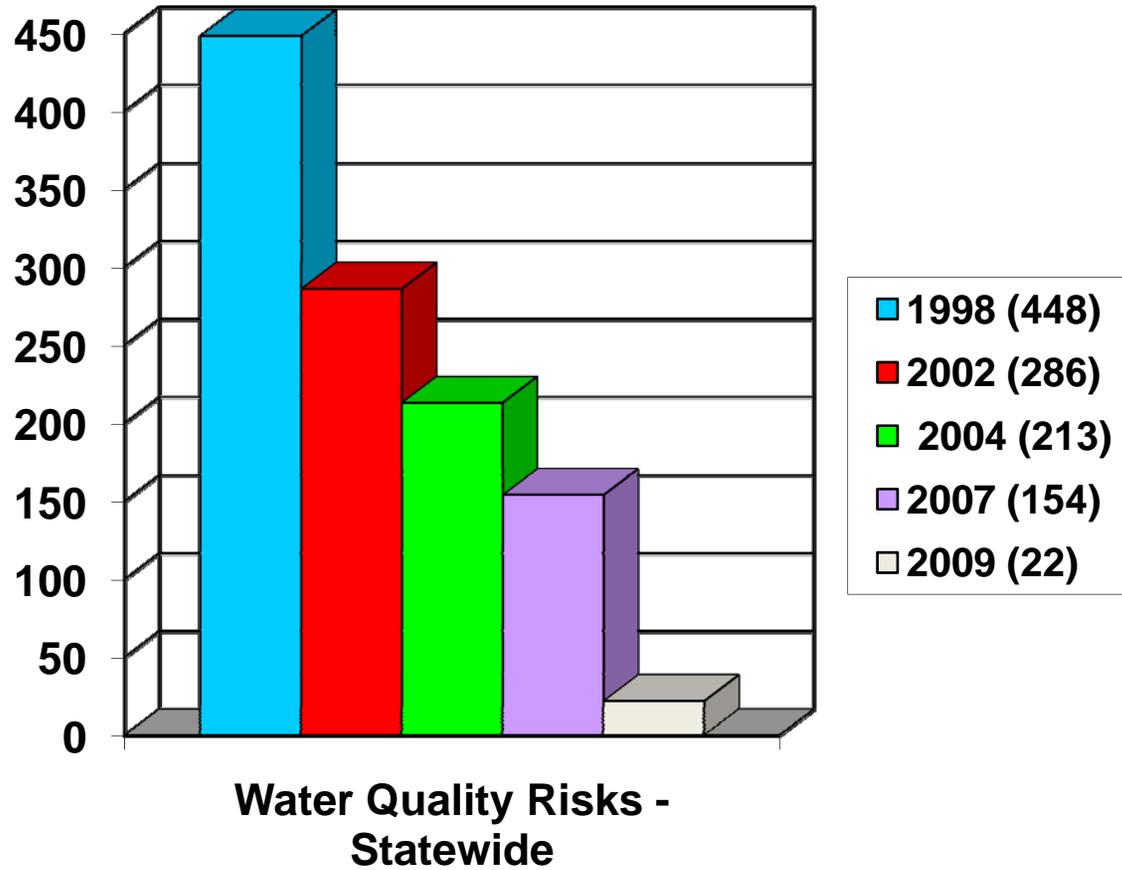


Figure 1: Spatial Location of BMP Survey Sites

