

Results of Georgia's 2017 Silvicultural Best Management Practices Implementation and Compliance Survey

Prepared by the

Georgia Forestry Commission

**in cooperation with the
Environmental Protection Division
of the
Department of Natural Resources,
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WATER QUALITY
P R O G R A M

**GEORGIA FORESTRY
COMMISSION**



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EXECUTIVE SUMMARY

The Georgia Forestry Commission (GFC) is the lead agency, as designated by the Georgia Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (DNR), for statewide development, education, implementation, and monitoring for “Georgia’s Best Management Practices for Forestry” (BMPs). Beginning in January of 2017, the GFC began the eleventh Statewide Forestry BMP Implementation and Compliance Survey. Such surveys have been done periodically since 1991.

The objectives of the 2017 Statewide Forestry BMP Survey were to determine the following: rates of BMP implementation, miles of streams in compliance, miles of roads in compliance, total number of water quality risks identified, effectiveness of BMPs for any needed modifications, and ownership classes and regions to target for future training.

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

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

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

The 2017 Statewide Forestry BMP Survey evaluated 232 sites that were selected in a stratified random sample. These sites had to have been silviculturally treated within the past two years, preferably within the previous six months. By ownership, 155 sites occurred on non-industrial private forest land (NIPF), 53 sites on forest industry / corporate land, and 24 sites on public land. By region, eight sites were in the Mountains, 14 sites were in the Ridge & Valley, 67 sites were in the Piedmont, 43 sites were in the Upper Coastal Plain and 100 sites were in the Lower Coastal Plain.

Firebreak construction BMPs have been included in this survey, including data from a separate statewide survey carried out by trained GFC water quality personnel. The survey included firebreak BMP inspections completed in calendar year 2017 through November 27, 2017. There were 35 firebreak inspections that were used to supplement this survey. Since we already had the additional data for firebreak BMPs, we felt it was important to include accurate firebreak BMP implementation numbers.

BMP implementation was determined by dividing the total number of individual BMPs that were applicable and fully implemented on the sites by the total number of applicable BMPs. Results were summarized for each practice or category, overall site, region, and statewide. **Of the 6044 individual BMPs evaluated, the statewide percentage of correct implementation was 93.17 percent. This is a 2.04 percentage point improvement in BMP implementation from the 2015 survey.** By ownership, the percentage of BMP implementation statewide was 95.35 percent on corporate lands, 96.21 percent on public lands and 91.71 percent on NIPF lands. Public lands remained at the same exact high level from 2015, while corporate and NIPF lands both improved nearly two percent from the good levels seen in 2015.

Of particular interest is that the number of Water Quality Risks observed decreased from 63 to 51, for an improvement of 19.05%. The average ratio of Water Quality Risks per site for the 2017 survey is calculated at 0.22, which is lower than the 0.30 risks per site seen in the 2015 BMP Survey. A more detailed discussion of Water Quality Risks can be found later in this report.

Best Management Practices compliance for stream and road length on all sites was evaluated on a mileage basis for this survey. It should be noted that this per unit BMP compliance scoring methodology goes beyond the SGSF recommendations for BMP monitoring and is specific to Georgia. BMP compliance was determined by dividing miles of streams or roads that were in compliance with BMPs, by the total number of miles of streams or roads. On the 232 sites, 33,578 acres of separate forestry operations were evaluated. Of the 63.73 miles of streams evaluated, 61.26 miles, or 96.12 percent, were observed to have no impacts or impairment from forestry practices. While this is still a good score, this figure is slightly **lower** than the 2015 survey, representing a **0.58 percentage point reduction** from the previous survey. Of the 179.87 miles of roads evaluated, 172.60 miles, or 95.96 percent, were observed to have no impacts or impairment from forestry practices. This score is significantly **higher** than the 2015 survey, representing an **8.42 percentage point improvement** from the 2015 survey. By practice or category, statewide percentages of BMP implementation and compliance were as follows:

Practice or Category	2017
	Implementation (% BMPs Implemented)
Streamside Management Zones (SMZs)	92.81
Stream Crossings	88.19
Forest Roads	90.63
Timber Harvesting	97.19
Mechanical Site Preparation	95.45
Chemical Site Preparation	100
Firebreaks/Burning	90.17
Artificial Regeneration (Tree Planting)	98.61
Equipment Servicing	98.12
Special Management Areas	92.05
Forest Fertilization	100
<i>Weighted Overall Average</i>	93.17

Practice or Category	2017
	Compliance (% Miles meeting BMPs)
<i>Stream Length</i>	96.12
<i>Forest Roads</i>	95.96

Forest operators continue to do a good job of protecting sensitive areas, even though a relatively minor reduction in BMP Implementation in the category of streamside management zones (SMZs) has been observed. The score for SMZs is still good at 92.81 percent. Stream crossings improved by 3.99 percentage points to a score of 88.19 percent, and special management areas maintained a good score of 92.05 percent. Compared to 2015, forest operators as a whole are doing a better job of implementing forestry BMPs with an overall implementation rating of 93.17 percent. This 93.17 percent represents a slight improvement of 2.04 percentage points from 2015.

While still maintaining a good score of 92.81 percent, BMP implementation for streamside management zones did **decrease** by just 1.39 percentage points since the 2015 BMP Survey. BMP implementation for stream and wetland crossings **rose** to 88.19 percent, which is an improvement of 3.99 percentage points from the 2015 Survey. BMP implementation for forest roads **improved** a fair amount by 4.83 percentage points to a score of 90.63 percent. There continues to be some room for improvement in the areas of stream crossings, and to a lesser extent, forest roads. Stream crossings on private lands in the Mountains, Ridge and Valley, and Lower Coastal Plain areas of Georgia need improvement. Forest roads on private lands in the Mountains and the Coastal Plains need improvement as well. Streamside management zones (SMZs) scored well at 92.81 percent implementation overall. However, on private lands in the Mountains, Ridge and Valley, and Lower Coastal Plain, some extra attention to SMZs is warranted. Firebreak/burning scores were good at 90.17 percent implementation, but this does represent a modest 3.39 percentage point reduction. More education about firebreak/burning BMPs is needed for landowners (including private and public lands) and private contractors. Plans are in progress to better address this issue during Prescribed Burning Certification Classes held regularly throughout the state.

There were 110 stream crossings evaluated on 60 sites with an overall implementation rate of 88.19 percent, which represents a modest increase of 3.99 percentage points from the 2015 survey. We continue to see an improved effort to avoid stream crossings in carrying out forestry operations. The total number of stream crossings went down from 113 in the 2015 survey, to just 110 in the 2017 survey. Of significance is that we inspected 19 more sites than were checked in the 2015 survey, yet found three fewer stream crossings. Most noted stream crossing problems were associated with approach design, culvert sizing, culvert installation, and the use of improper debris crossings and fill. BMPs related to stream crossings accounted for 19 of the total 47 water quality risks on the main survey sites. A more detailed discussion of the reasons seen as the causes of the minor BMP implementation declines in some categories is located in the *Educational Opportunities* and *Conclusion* section of this report on pp.15-17.

INTRODUCTION

Georgia has an abundant amount of forest and water resources that provide a variety of benefits for the people of the state and region. The 24 million acres (2015 forest inventory and analysis data) of commercial forestland (two-thirds of the state) provide for forest products, clean water, clean air, soil conservation, wildlife habitat, recreation, aesthetics, education, and research. Many of the state's 44,056 miles of perennial streams, 23,906 miles of intermittent streams, and 603 miles of ditches and canals begin or flow through forestlands. Therefore, it is important for forest landowners to practice responsible forestry in order to protect these water resources

The 1972 Federal Clean Water Act resulted in the Georgia Environmental Protection Division (EPD) being responsible for managing and protecting the state's waters from point and nonpoint sources of pollution. Since 1977, the EPD has designated the Georgia Forestry Commission (GFC) as the lead agency to develop, educate, implement and monitor the use of Best Management Practices (BMPs) for forestry operations to minimize or prevent the practice's 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 mechanisms to enable the achievement of water quality standards."*** It goes on to explain: ***"It is intended that proper installation of state approved BMPs will achieve water quality standards and will normally constitute compliance with the CWA."***

BMPs for forestry were first developed and published in Georgia in 1981. A Wetlands BMP manual was developed in 1990 and revised in 1993. In January 1999, these manuals were 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 92,000 BMP manuals and brochures have been distributed.

The main role of the GFC is to educate and inform the forestry community about these common sense recommendations, known as BMPs, through workshops and field demonstrations. Since publication of the first BMP manual, the GFC has given 2,902 BMP talks to more than 93,790 people and participated in 551 field demonstrations of BMPs (through November 2017). The education process is ongoing, with workshops routinely provided for foresters, timber buyers and loggers through the Sustainable Forestry Initiative® (SFI®) Program in Georgia. Georgia Forestry Commission foresters have also provided BMP advice in more than 78,395 cases covering over 5.41 million acres.

Implementation of BMPs is determined through monitoring surveys. The GFC also tracks BMP implementation through BMP Assurance Exams in the regular course of carrying out complaint resolution. Of statistical importance are the monitoring surveys. The GFC conducted BMP Implementation Surveys in 1991, 1992, 1998, 2002, 2004, 2007, 2009, 2011, 2013, and 2015. This current 2017 statewide survey continues over 25 years of Forestry BMP monitoring in Georgia. The statewide average BMP implementation over this period has ranged from 65 percent in 1991, to a high of 95 percent in 2011, to the current rate of 93.17 percent for 2017. The purpose of this report is to present the results of the 2017 BMP Implementation and Compliance Survey.

SURVEY PROCEDURE

Methodology for Sampling Intensity and Site Selection

The number of evaluation sites in each of Georgia's 159 counties was based on the amount of timber harvested in each county, as determined by the Georgia Forestry Commission's Forest Inventory Analysis report of wood removals by county for 2011. GFC's forest inventory analysis data collection is overseen by the US Forest Service. This methodology resulted in 232 sites being surveyed. The next step was to target the sample where the practices occurred, to reflect ownership. Ownership classes are categorized into non-industrial private forest (NIPF) land, corporate lands including forest industry (FI) and Timber Investment Management Organizations (TIMOs), and public lands, which include federal, state, county or city ownership. The timber harvest drain for each county was used to target the number of sites to inspect per ownership class in each county. For the 2017 BMP survey, 155 sites (66.81 percent) were inspected on NIPF lands, 53 sites (22.85 percent) on corporate, and 24 sites (10.34 percent) on public lands were inspected.

Firebreak construction BMPs have been included in this survey, including data from a separate statewide survey of firebreaks carried out by trained GFC water quality personnel. The separate firebreak survey included firebreak BMP inspections completed through November 27 of calendar year 2017. There were a total of 35 firebreak inspections that were used to supplement the main BMP survey. This was done for several reasons. First, there were relatively few firebreaks found on the 232 main survey sites alone. However, we know that firebreaks occur much more commonly, and wanted to make sure implementation results for these firebreak BMPs were accurate. Since we already had the additional data for firebreak BMPs, we felt it was important to include accurate firebreak BMP implementation numbers.

Georgia Forestry Commission personnel used satellite data from LandSat to pull land disturbance locations within a specified timeframe for the potential survey sites. The timeframe includes sites disturbed within the last two years. The sites were checked initially to confirm which sites were actually forestry sites. The forestry sites were separated by ownership category and the appropriate number of sites was drawn randomly. Table 1 (pages 19-21) shows the distribution of survey sites by county.

Site Evaluation

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

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

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

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

BMP Implementation

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

Level 1 - individual BMP implementation was recorded as either a *NOT APPLICABLE*, *YES* or *NO*. For all applicable BMP's, each question was worded so that a *YES* represents a BMP that was implemented properly while a *NO* represents a BMP implemented improperly or not at all. If an individual BMP that was applicable and needed was not fully implemented over the entire area, it received a *NO*. The "all or none principle," as recommended by the SGSF framework, applied.

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

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

Significant Water Quality Risk

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

BMP Compliance

BMP Compliance was also determined for the categories of forest roads and stream length. This scoring methodology goes beyond the SGSF BMP monitoring protocol and is specific to Georgia. However, this scoring

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

RESULTS AND DISCUSSION

The 2017 Statewide Forestry BMP Survey evaluated 232 sites comprising 33,578 acres. There were 110 stream crossings, 179.87 miles of forestry roads and 63.73 stream miles evaluated. Table 1 (pages 19-21) shows the distribution of survey sites by county. Figure 1 (page 38) shows the spatial location of the 232 survey sites. Figure 2 (page 39) is a map of the state showing the different physiographic regions for reference. The tables, charts, and maps included with this report provide summaries of the distribution of the sites evaluated by region and ownership, as well as BMP implementation and compliance results.

Statistical Analysis

The 232 sites evaluated during this survey represent only a sample of all operations that met the criteria for selection. Data compiled from county tax assessors' offices indicates that the number of timber harvesting operations conducted annually range from 7,000 to 10,000. Therefore, one could assume the sample reflects a 3.3 percent or 2.3 percent sample at best. In order to achieve a statistically valid monitoring report, Georgia has adopted the *Statistical Guidebook for BMP Implementation Monitoring*. This guidance was developed by the Water Resources Committee of the Southern Group of State Foresters, to be used as a model for achieving statistically valid BMP monitoring.

The guidebook has been 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 that differs from p by a value of m .
The SGSF framework recommended a margin of error at five percent.

This formula provides the minimum sample size of 130 sites in order to achieve a five percent margin of error. We have evaluated 1.78 times the needed number of sites, so, using the formula, this level of survey should yield a margin of error of 3.73% for this survey. The reason the additional sites were assessed is so subsets of data in the survey, i.e., landowner groups, physiographic regions, river basins, etc., would be more statistically valid when used separately from statewide data.

OVERALL BMP IMPLEMENTATION AND COMPLIANCE RESULTS BY CATEGORY OF PRACTICE

Streamside Management Zones (SMZs)

Streamside Management Zones (SMZs) are designated areas of varying widths adjacent to the banks of perennial (continuous flowing) or intermittent (normally flows only during winter months) streams and other bodies of water. USGS topographical maps and Natural Resource Conservation Service county soil survey maps were used to identify these types of streams. In these SMZs, forest management practices are modified in order to minimize potential impacts to protect water quality, fish or other aquatic resources. According to the 2009 BMP manual, SMZs along intermittent streams vary in width from 20 to 50 feet on most streams, depending on slope. An amendment was made to the trout stream SMZs in 2015. SMZs along intermittent trout streams are now 35 to 50 feet. SMZs along perennial streams vary from 40 to 100 feet, depending on slope, and SMZs should be 100 feet on trout streams. Clearcutting is not recommended in the SMZs, except during the control of serious health/pest issues such as southern pine beetles or salvage operations from natural disasters, and special care should still be given to avoid adverse soil disturbance.

It is worth noting that during the course of this survey many sites had areas left where no harvesting occurred adjacent to streams. Such unharvested areas are significantly wider than what is recommended by definition as an SMZ. Such areas provide all the water protection of an SMZ plus other multiple use benefits such as wildlife corridors, diversity, and aesthetics. Such areas were not judged as SMZs where they were significantly wider than normal SMZs, and therefore the forestry activities that did occur on the parcels do not have any effect on water quality. In addition, these areas were not marked to show that they were intentionally left as an SMZ. If such areas had been included as SMZs, then scores would likely have been even higher than recorded.

Table 4 (page 24) provides summaries of the results by ownership, region and state totals. Notable findings include:

- Statewide implementation for SMZs is 92.81 percent.
- Statewide BMP compliance for stream length is 96.12 percent.
- Twelve WQRs were identified for SMZs, up from six in 2015.
- Implementation for overall SMZs have decreased slightly, from 1.39 percent to a still good overall score of 92.81 percent. Of note, the Ridge and Valley area went down 5.81 percentage points to a score of 91.49 percent, and the Lower Coastal Plain area went down to a score of 87.92 percent, losing 2.62 percentage points from 2015.

- Insufficient SMZ widths, logging debris left in stream channels, poor water diversions/stabilization, and streambank tree harvesting seem to be the most common BMP deficiencies found in the SMZ category.

Stream Crossings

Stream crossings are often necessary for access to forestlands. From a water quality standpoint, stream crossings are the most critical aspect of the road system. Failure of a stream crossing due to improper planning or construction can result in erosion and introduction of sediment into a stream, which does affect water quality. Types of acceptable crossings include main haul road fords, culvert crossings, and bridges. Debris and dirt-type crossings or skidder fords are not acceptable crossing types. Permanent crossings are considered 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 23) provides a summary of the results by ownership, region and state totals. A total of 110 crossings were evaluated on 60 sites statewide. Significant findings include:

- Statewide implementation for stream crossings is 88.19 percent. This is a modest 3.99 percentage point improvement from 2015.
- Overall, each region's stream crossings improved except Ridge and Valley, which declined 9.54 percent. However, they are still showing a fair implementation score of 87.23 percent. Upper Coastal Plain improved by 13.81 percentage points to 96 percent implementation. The Piedmont improved by 9.26 percentage points to 92.66 percent implementation. The Mountains also had a significant improvement of 8.44 percentage points to 89.80 percent implementation. The Lower Coastal Plain improved minimally, by 1.59 percentage points to 83.27 percent implementation, leaving it still the lowest scoring area for stream crossings.
- Nineteen WQRs were associated with stream crossings. This represents a 52.5 percent reduction overall in Water Quality Risks for stream crossings from 2015.
- The NIPF ownerships have the most problems with 16 WQRs, as compared with corporate and public ownerships having just three WQRs combined.
- Areas for improvement in stream crossing design continue to be stream crossing approach design, culvert installation and culvert sizing with respect to storm flow, and culvert placement with respect to migration of aquatic species.

Forest Roads

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

Table 2 (page 22) provides a summary of the results by region, ownership and state totals. Approximately 179.87 miles of road were evaluated on 203 sites. Forest road BMP implementation showed a significant increase of 4.83 percentage points from the 2015 survey. Significant findings include:

- Forest roads BMP implementation across all ownerships is 90.63 percent.
- Forest roads compliance is 95.96 percent, an 8.42 percentage point improvement from 2015.
- There were five WQRs associated with forest roads, all occurring in the Lower Coastal Plain.

- Challenges for forest roads BMP implementation continue to be properly installing water diversions and stabilizing and reshaping of forest roads after activities are complete.

Special Management Areas

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

Table 5 (page 25) provides a summary of the results by region, ownership and state totals. Statewide, there were 167 sites with canals, ditches, ephemeral areas, gullies and wetland features. Other significant findings include:

- Special management area BMP implementation across all ownerships was 92.05 percent.
- There were six WQRs associated with special management areas.
- Special Management Area BMP implementation maintained a good score with virtually no change from the 2015 survey.

Timber Harvesting Outside of SMZs

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

Table 6 (page 26) provides a summary of the results by ownership, region and state total. Approximately 19,806.65 acres were evaluated on 203 sites. A total of 701 log decks were evaluated and 1,457 main skid trails were evaluated. Other significant findings include:

- Timber harvesting outside SMZs BMP implementation, across all ownerships, is 97.19 percent.
- All BMP's for Timber Harvesting scored 90 percent or better, except for minimizing rutting on wetland soils, which scored 88.41 percent.
- There were five WQRs associated with Timber Harvesting.

Mechanical Site Preparation Outside SMZs

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

Table 7 (page 27) provides a summary of the results by region, ownership and state totals. Statewide, approximately 2,683.72 acres were evaluated on 29 sites. Significant findings include:

- Mechanical Site Prep BMP implementation is 1.08 percentage points higher than the 2015 survey at 95.45 percent, continuing good levels of implementation.
- Mechanical Site Prep for pine regeneration in wetlands identified in EPA/Corps of Engineers memo did not occur on any applicable sites surveyed.

- The one significant challenge observed for Mechanical Site Prep is avoiding bedding that directs water into roadways and ditches.
- There were no WQRs associated with Mechanical Site Prep.

Chemical Site Preparation Outside SMZs

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

Table 8 (page 28) provides a summary of the results by region, ownership and state totals. Statewide, approximately 3,508.43 acres were evaluated on 39 sites. Significant findings include:

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

Firebreaks/Burning

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

Approximately 3,232.65 acres were evaluated for burning including 72.65 miles of firebreaks. There were a total of 61 sites evaluated for firebreaks/burning. BMP implementation was 90.17 percent. The score dropped by 3.39 percentage points from 2015, but the overall score remained good. The main challenges involved firebreaks including proper construction and spacing of water diversions, avoiding intersections with forest roads, and tying improperly into streamside management zones or special management areas. Four water quality risks (WQRs) were identified on three separate sites in three separate counties in the Lower Coastal Plain region. Three of the four WQRs were associated with improperly tying into streams/SMZs and one for improperly tying into a special management area. Firebreaks are created by various methods to contain and control fires, both controlled burning and wildfires. If properly installed according to BMP guidelines, firebreak impacts on water quality can be minimized.

Data from a separate firebreak inspection survey on GFC firebreaks completed in calendar year 2017 (through 11-27-2017) is included in this report. This additional survey examined 35 sites statewide. Together with the 26 sites containing firebreaks/burning from the main statewide BMP survey, this section of the report incorporates data from a total of 61 sites. Best Management Practices implementation across these 61 sites was 90.17 percent. Of the 61 sites, 22 sites were landowner (private and public) or contractor installed firebreaks where to date, relatively little firebreak BMP training has occurred. The four water quality risks found on GFC firebreak BMP inspections were immediately mediated and corrected. Table 9 (page 29) provides a summary of the results by region, ownership, and state totals.

Artificial Regeneration (Tree Planting) Outside SMZs

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

Table 10 (page 30) provides a summary of the results by region, ownership and state totals. Approximately 3,798.9 acres were evaluated on 43 sites. Overall BMP implementation for artificial regeneration was 98.61 percent. That represents a modest improvement of 2.51 percentage points from the 2015 survey. No water quality risks were identified. Significant findings include:

- The only issue found was a single site where machine planting did not fully follow the contour. No water quality risks were identified.
- BMPs were fully implemented on the vast majority of these sites.
- Pine establishment was avoided on specified wetlands identified in the EPA/COE memo.

Forest Fertilization

Forest fertilization was known to have occurred on only one survey site. It was a corporate site in the Lower Coastal Plain. A total of 184.06 acres were treated with two BMPs assessed on the one site with a 100% BMP implementation. Indicators of this particular practice include evidence of mixing areas and containers on the site. Since the BMPs call for the removal and proper disposal of containers, additional fertilization that was not obvious may have occurred.

Equipment Washing and Servicing

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

Table 11 (page 31) provides a summary of the results by region, ownership and state totals. A total of 705 landings were evaluated on 214 sites. Significant findings include:

- BMP implementation for Equipment Servicing was 98.12 percent, up 2.2 percentage points from 2015.
- The most common issue was improper disposal of oil/lubricants and containers.
- All BMPs assessed for Equipment Servicing were implemented at or above 96 percent.

Stream Assessments

Perhaps the most important observation in evaluating the effectiveness of BMPs was the visual assessment of the water bodies on each site. A total of 63.73 miles of streams on 102 sites were evaluated for visual signs of impairment. Those signs could include obvious soil erosion entering the stream, logging debris left in the channel, improper stream crossings resulting in blocked flow, removal of excess canopy trees within the SMZs exposing the stream to elevated temperatures, and impaired stream bank or channel integrity due to forestry practices.

Table 12 (page 32) provides a summary of the results by region, ownership and state totals by stream type. A total of 31.4 miles of perennial streams were assessed on these sites. Of these, 99.81 percent are in compliance. A total of 32.33 miles of intermittent streams were assessed on these sites. Of these, 92.55 percent are in compliance. Total combined stream compliance was 96.12 percent. Significant findings include:

- Overall stream BMP compliance is 96.12 percent.
- Fifty-one water quality risks (WQRs), total, were identified statewide, including four from the separate firebreak inspections added to the main survey.

- There were 19 WQRs (37.25 percent of the total) involving stream crossings.
 - ✓ Seven of these were associated with stream crossing approaches.
 - ✓ Seven involved disruption of the migration of aquatic species
 - ✓ Three were associated with temporary fills not removed in their entirety.
- Forest roads accounted for five WQRs (approximately 9.80 percent of the total).
 - ✓ The lack of properly installed water diversions at SMZs accounted for three of the five risks for forest roads.
- Within SMZs, there were 12 WQRs (23.53 percent of the state total of WQRs).
- Six WQRs were associated with Special Management Areas.
- Five WQRs were associated with Timber Harvesting outside of SMZs.
 - ✓ Three WQR's were associated with log decks failing to avoid concentrating storm runoff into water courses.
- There were four WQRs associated with firebreaks from the separate firebreak inspections added to the main survey. Those 4 WQRs were immediately mediated and corrected.
 - ✓ Three of those WQRs were associated with improperly tying into streams/SMZs.
 - ✓ One of those WQRs was associated with improperly crossing an ephemeral area.

Overall, the 96.12 percent stream compliance figure in Georgia supports assessments by the US Environmental Protection Agency that silvicultural operations contribute less than 10% of the nonpoint pollution to streams in the United States.

Overall Statewide Results

Table 13 (page 33) provides the statewide implementation results of the total number of sites, the acres evaluated, the number of BMPs evaluated, and the number of water quality risks determined by region and ownership. Statewide, the overall BMP implementation for all practices, all landownership classes, and all regions, was found to be 93.17 percent. **This is a 2.04 percentage point improvement from the 2015 survey.**

Water Quality Risk Assessments

Water Quality Risk assessments were made at each site as a component of the Southern Group of State Foresters BMP monitoring protocol. Water Quality Risks (WQRs) were observed at 51 specific locations on just 21 sites, 18 sites from the 232 main survey sites and three sites from the 35 GFC firebreak inspection sites included in the 2017 survey. This indicates that a small portion of sites contain WQRs. The total of 51 WQRs is significantly lower than the previous BMP survey in 2015, representing a 19.05 percent improvement from the 2015 survey. Looking into these numbers a little deeper, it can be seen that 92.24 percent or 214 of the 232 main sites surveyed for 2017 had no WQRs. Also 91.43 percent or 32 of the additional 35 GFC firebreak inspection sites used to supplement this 2017 survey had no WQRs. Overall, it is clear that a small percentage of the sites surveyed account for all the observable Water Quality Risks seen. Below is a table showing the distribution of Water Quality Risk occurrence over the past seven survey cycles.

Survey Year	Survey Done	0 WQ Risks	1-3 WQ Risks	4-6 WQ Risks	7-9 WQ Risks	10 or more WQ Risks
2004	412	352 85.44%	36 8.74%	13 3.16%	5 1.21%	6 1.46%
2007	370	328 88.65%	21 5.68%	15 4.05%	4 1.08%	2 0.54%
2009	221	212 95.93%	8 3.62%	1 0.45%	0 0.00%	0 0.00%
2011	187	178 95.19%	7 3.74%	1 0.53%	1 0.53%	0 0.00%
2013	209	185 88.52%	13 6.22%	6 2.87%	3 1.44%	2 0.96%
2015	213	199 93.43%	7 3.29%	3 1.41%	3 1.41%	1 0.47%
2017	232	214 92.24%	13 5.60%	4 1.72%	1 0.43%	0 0.00%

Only four additional Water Quality Risks (WQRs) were found from the 35 GFC firebreak/burning inspection sites used to supplement the firebreak/burning data for the 2017 survey. Two WQR's were found on a single site and one each was found on two separate sites. All four are included in the total of 51 WQRs noted in this report. Please note that all four of those WQRs were immediately mediated and corrected.

Educational Opportunities

BMPs for roads and stream crossings both experienced a slight to modest improvement from our 2015 survey of about four percent. Our educational opportunities continue to be focused on these categories. In particular, educational opportunities include:

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

Charts 1 through 4 (pages 34-37) are perhaps the most important tools in this document for determining BMP implementation trends. These charts provide an overall summary and comparison of BMP implementation by practice and ownership over recent survey cycles. They also provide impetus for continued training and improvement. The table below illustrates BMP Implementation according to three tract size groupings.

Tract Size	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Under 100 Acres	150	12,080.64	3,667	93.26	30
101-200 Acres	53	10,014.14	1,449	92.68	10
201 Acres or more	27	11,282.69	876	93.26	7
All	232 Sites	33,578.27	6044	93.17	47 from main survey + 4 from GFC Firebreak Inspections = 51 total

As shown in the above table, differences in the BMP implementation scores for different tract sizes appear to be minimal, but smaller tracts had more WQRs per acre on average than larger tracts. There are several reasons smaller tracts, on average, experience higher Water Quality Risks. These reasons include: potential poor road location due to tract boundary constraints, potentially more stream crossings due to the access issues and boundary locations of smaller tracts, and having more roads and stream crossings simply because there are more landowners needing access across their parcels. Therefore, parcelization of land into more and smaller parcels seems to be part of the issue. Also, since smaller landowners often have fewer resources and/or knowledge of forestry, problems are often left unnoticed or given little attention, likely resulting in more water quality risks on such

ownerships. When land is allocated into larger tracts, there are fewer owners, and therefore, less need for stream crossings and access points from public roads. Larger landowners also tend to have more resources and/or knowledge of forestry to recognize and address potential issues.

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

Finally, Chart 5 (page 40) shows the current number of Water Quality Risks (WQRs) observed in BMP implementation surveys between the 1998 survey and the present. There had been a dramatic decline in these observed WQRs until the 2013 survey, which exposed some issues with basic BMP implementation leading to an uptick in WQRs for that 2013 survey. However, our 2017 survey shows a modest reduction in WQRs, from 63 WQRs in the 2015 survey, to 51 WQRs in the 2017 survey, for a 19.05% improvement overall since 2015.

BMP Implementation data available by River Basin and ecoregion

Regional Water Councils can extract similar statistics for each of the 14 major river basins (page 18), 52 sub-basins and 12-digit HUCs for use in accordance to the Georgia Comprehensive State-wide Water Management Plan. Each of Georgia's 29 Ecoregions (page 18) can also extract the survey statistics.

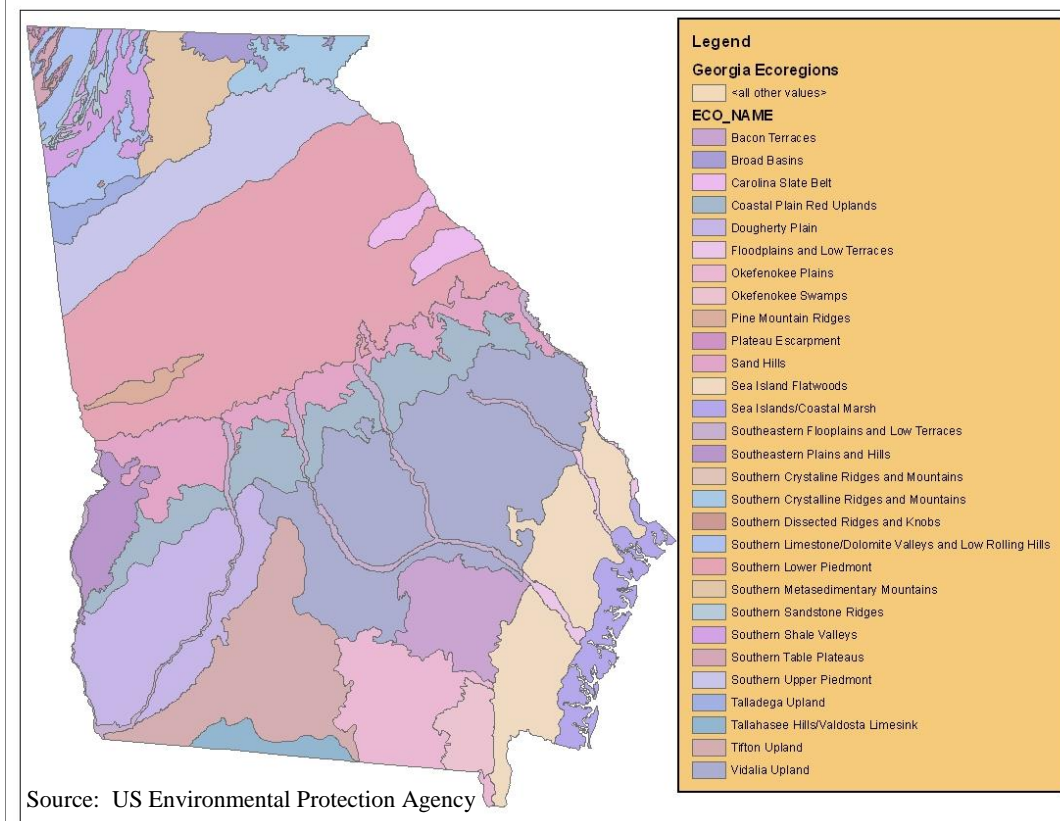
CONCLUSION

The percentage of BMP implementation has increased from 64.9 percent in 1991 to 93.17 percent for the current survey. The percentage of stream miles in compliance has increased to around 96.12 percent. Since the 1998 survey, the number of water quality risks has markedly decreased, but experienced a significant upswing in the 2013 survey. However, the number of WQRs has since decreased significantly in the 2017 survey. Chart 5 (page 40) tracks the level of observed Water Quality Risks since the 1998 survey.

The 2017 BMP implementation survey shows the need for continued BMP education efforts in order to help stabilize BMP implementation at satisfactory levels. Although the survey shows relatively high overall rates of BMP implementation, it also reveals areas for improvement within certain BMP categories and across certain landowner groups in the state. The information from this survey will be used to target BMP training at Master Timber Harvester workshops, SWPA workshops, and forester and landowner workshops. In addition, incentives for the increased use of portable logging bridges could be useful in helping increase stream crossing BMP implementation.

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

Georgia's 29 Ecoregions



Georgia's 14 Major River Basins

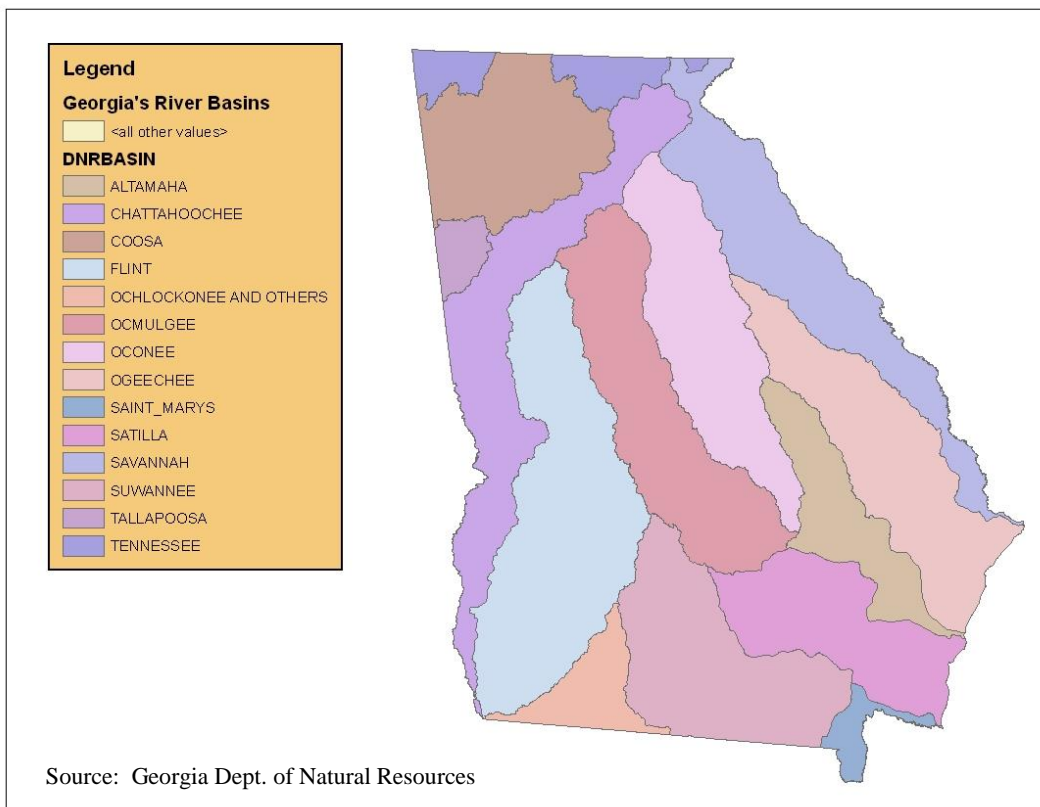


Table 1 : Site Distribution by County and Ownership

County	Public	Corporate	NIPF	Totals
Appling			2	2
Atkinson			1	1
Bacon		1	2	3
Baldwin			1	1
Banks			1	1
Bartow		2		2
Ben Hill			1	1
Barrien			1	1
Bleckley			1	1
Brantley		2	1	3
Brooks			2	2
Bryan South	1	1		2
Bulloch		1	3	4
Burke	1	2	3	6
Butts			1	1
Calhoun			1	1
Camden		2	2	4
Candler			1	1
Carroll			2	2
Catoosa			1	1
Charlton		2	1	3
Chattahoochee			1	1
Chattooga	1		1	2
Cherokee			1	1
Clay		1		1
Clinch		5	1	6
Coffee	1		2	3
Colquitt			1	1
Columbia	1			1
Cook			1	1
Coweta	1			1
Crawford			2	2
Dawson	2			2
Decatur			1	1
Dodge			1	1
Dooley			1	1
Early			2	2
Echols		3		3
Effingham		2	1	3
Elbert		2		2
Emanuel			3	3
Evans			1	1
Fayette		1		1
Floyd		1		1
Franklin		1	1	2
Gilmer			1	1
Glascocock			1	1
Glynn		1		1
Gordon			1	1
Grady			2	2
Greene			2	2

County	Public	Corporate	NIPF	Totals
Hall		1		1
Hancock		1	4	5
Haralson		2		2
Harris			2	2
Hart			1	1
Heard		1		1
Henry			1	1
Houston	1			1
Irwin			1	1
Jackson			1	1
Jasper	1		1	2
Jeff Davis			1	1
Jefferson			2	2
Jenkins		1		1
Johnson		1	1	2
Jones	1		1	2
Lamar			1	1
Lanier			1	1
Laurens			4	4
Lee			2	2
Liberty	1		3	4
Lincoln	1			1
Long			2	2
Macon			1	1
Madison		1		1
Marion			1	1
McDuffie	2			2
McIntosh	1		1	2
Miller			1	1
Mitchell			1	1
Monroe			2	2
Montgomery			1	1
Morgan			1	1
Murray	1		1	2
Newton			1	1
Oconee			2	2
Oglethorpe			2	2
Paulding	1		1	2
Pickens		1	1	2
Pierce			2	2
Pike			1	1
Polk		1	1	2
Pulaski			1	1
Putnam		1		1
Quitman		1		1
Rabun	1			1
Randolph			2	2
Schley			1	1
Screven			4	4
Seminole			1	1
Spalding		1	1	2
Stephens	2			2
Stewart		1	1	2
Sumter			1	1

County	Public	Corporate	NIPF	Totals
Talbot	1		1	2
Taliaferro			1	1
Tattnall			2	2
Taylor			1	1
Terrell			1	1
Thomas			1	1
Tift			2	2
Toombs		1	1	2
Treutlen			1	1
Troup			1	1
Turner			1	1
Twiggs			2	2
Upson			1	1
Walker	2			2
Walton			1	1
Ware		1	3	4
Warren		1	1	2
Washington			3	3
Wayne		3	1	4
Wheeler			2	2
White			1	1
Whitfield		1	1	2
Wilcox			1	1
Wilkes		1	3	4
Wilkinson		1	1	2
Worth			2	2
Total	24	53	155	232

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

Forest Road Sites - NIPF						
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	1.21	90.08%	30	80.00%	0
Piedmont	42	29.06	94.43%	285	92.98%	0
Upper Coastal Plain	35	24.68	91.65%	194	84.54%	0
Lower Coastal Plain	51	37.75	95.60%	286	87.06%	3
Ridge and Valley	6	0.3	100.00%	59	98.31%	0
Total	137	93	94.13%	854	88.99%	3
Forest Road Sites - Public						
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	9.67	100.00%	47	100.00%	0
Piedmont	7	8.95	99.66%	60	96.67%	0
Upper Coastal Plain	0	0	NA	0	NA	0
Lower Coastal Plain	2	5.87	100.00%	14	100.00%	0
Ridge and Valley	3	6.19	100.00%	34	100.00%	0
Total	16	30.68	99.90%	155	98.71%	0
Forest Road Sites - Corporate						
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	0.38	100.00%	9	100.00%	0
Piedmont	14	10.48	98.95%	121	92.56%	0
Upper Coastal Plain	5	8.85	99.55%	39	97.44%	0
Lower Coastal Plain	25	26.68	94.90%	156	92.31%	2
Ridge and Valley	5	9.8	97.24%	53	77.36%	0
Total	50	56.19	96.83%	378	91.01%	2
Forest Road Sites - All Ownership						
Region	No. Sites	Miles	% Miles Compliance	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	8	11.26	98.93%	86	93.02%	0
Piedmont	63	48.49	96.37%	466	93.35%	0
Upper Coastal Plain	40	33.53	93.74%	233	86.70%	0
Lower Coastal Plain	78	70.3	95.70%	456	89.25%	5
Ridge and Valley	14	16.29	98.34%	146	91.10%	0
Total	203	179.87	95.96%	1387	90.63%	5

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

Stream and Wetland Crossings - NIPF					
Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	4	31	83.87%	0
Piedmont	9	17	103	92.23%	0
Upper Coastal Plain	2	2	16	87.50%	1
Lower Coastal Plain	18	32	204	80.88%	13
Ridge and Valley	2	4	17	76.47%	2
Total	33	59	371	84.37%	16
Stream and Wetland Crossings - Public					
Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	1	8	100.00%	0
Piedmont	1	7	17	70.59%	1
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	1	12	100.00%	0
Ridge and Valley	2	6	23	100.00%	0
Total	5	15	60	91.67%	1
Stream and Wetland Crossings - Corporate					
Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	2	10	100.00%	0
Piedmont	9	14	98	96.94%	0
Upper Coastal Plain	3	3	34	100.00%	0
Lower Coastal Plain	5	6	59	88.14%	2
Ridge and Valley	4	11	54	85.19%	0
Total	22	36	255	92.94%	2
Stream and Wetland Crossings - All Ownership					
Region	No. Sites	Crossings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	7	49	89.80%	0
Piedmont	19	38	218	92.66%	1
Upper Coastal Plain	5	5	50	96.00%	1
Lower Coastal Plain	24	39	275	83.27%	15
Ridge and Valley	8	21	94	87.23%	2
Total	60	110	686	88.19%	19

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

Streamside Management Zones - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	2	12.54	19	84.21%	0
Piedmont	21	172.57	173	96.53%	0
Upper Coastal Plain	11	22.95	79	91.14%	4
Lower Coastal Plain	27	103.71	221	84.62%	8
Ridge and Valley	2	4.06	19	68.42%	0
Total	63	315.83	511	89.04%	12
Streamside Management Zones - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	95.47	37	100.00%	0
Piedmont	3	191.58	20	90.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	23.4	8	100.00%	0
Ridge and Valley	3	190.98	29	100.00%	0
Total	11	501.43	94	97.87%	0
Streamside Management Zones - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	3.25	9	100.00%	0
Piedmont	12	159.69	109	100.00%	0
Upper Coastal Plain	3	15.7	24	100.00%	0
Lower Coastal Plain	8	63.6	69	97.10%	0
Ridge and Valley	5	63.33	46	95.65%	0
Total	29	305.57	257	98.44%	0
Streamside Management Zones - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	7	111.26	65	95.38%	0
Piedmont	36	523.84	302	97.35%	0
Upper Coastal Plain	14	38.65	103	93.20%	4
Lower Coastal Plain	36	190.71	298	87.92%	8
Ridge and Valley	10	258.37	94	91.49%	0
Total	103	1122.83	862	92.81%	12

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

Special Management Areas (Q1-33)- NIPF				
Region	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	12	100.00%	0
Piedmont	37	171	90.06%	2
Upper Coastal Plain	20	73	91.78%	1
Lower Coastal Plain	38	122	85.25%	2
Ridge and Valley	5	33	96.97%	0
Total	103	411	89.78%	5
Special Management Areas (Q1-33)- Public				
Region	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	8	100.00%	0
Piedmont	7	31	93.55%	0
Upper Coastal Plain	1	5	100.00%	0
Lower Coastal Plain	5	14	100.00%	0
Ridge and Valley	3	25	92.00%	0
Total	20	83	95.18%	0
Special Management Areas (Q1-33)- Corporate				
Region	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	9	100.00%	0
Piedmont	11	73	95.89%	0
Upper Coastal Plain	5	13	84.62%	0
Lower Coastal Plain	22	77	94.81%	1
Ridge and Valley	5	26	100.00%	0
Total	44	198	95.45%	1
Special Management Areas (Q1-33)- All Ownership				
Region	No. Sites	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	8	29	100.00%	0
Piedmont	55	275	92.00%	2
Upper Coastal Plain	26	91	91.21%	1
Lower Coastal Plain	65	213	89.67%	3
Ridge and Valley	13	84	96.43%	0
Total	167	692	92.05%	6

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

Timber Harvesting Outside SMZs - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	226.01	26	92.31%	0
Piedmont	42	3773.32	322	95.65%	0
Upper Coastal Plain	34	3449.56	233	97.00%	2
Lower Coastal Plain	52	3605.4	343	97.67%	1
Ridge and Valley	6	205.46	41	95.12%	0
Total	137	11259.75	965	96.58%	3
Timber Harvesting Outside SMZs - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	220.33	32	100.00%	0
Piedmont	9	930.9	66	96.97%	0
Upper Coastal Plain	1	84.9	7	100.00%	0
Lower Coastal Plain	4	1326	25	100.00%	0
Ridge and Valley	3	541.8	25	100.00%	0
Total	21	3103.93	155	98.71%	0
Timber Harvesting Outside SMZs - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	32.45	8	100.00%	0
Piedmont	14	1875.71	105	100.00%	0
Upper Coastal Plain	5	461.84	34	100.00%	0
Lower Coastal Plain	20	2087.04	117	96.58%	2
Ridge and Valley	5	985.93	41	97.56%	0
Total	45	5442.97	305	98.36%	2
Timber Harvesting Outside SMZs - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	8	478.79	66	96.97%	0
Piedmont	65	6579.93	493	96.75%	0
Upper Coastal Plain	40	3996.3	274	97.45%	2
Lower Coastal Plain	76	7018.44	485	97.53%	3
Ridge and Valley	14	1733.19	107	97.20%	0
Total	203	19806.65	1425	97.19%	5

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

Mechanical Site Preparation Outside SMZs - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	1	65	3	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	16	1134.46	30	96.67%	0
Ridge and Valley	0	0	0	NA	0
Total	17	1199.46	33	96.97%	0
Mechanical Site Preparation Outside SMZs - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	0	0	0	NA	0
Ridge and Valley	0	0	0	NA	0
Total	0	0	0	NA	0
Mechanical Site Preparation Outside SMZs - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	12	1484.26	33	93.94%	0
Ridge and Valley	0	0	0	NA	0
Total	12	1484.26	33	93.94%	0
Mechanical Site Preparation Outside SMZs - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	1	65	3	100.00%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	28	2618.72	63	95.24%	0
Ridge and Valley	0	0	0	NA	0
Total	29	2683.72	66	95.45%	0

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

Chemical Site Preparation Outside SMZs - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	14	1295.85	28	100.00%	0
Upper Coastal Plain	3	288.54	6	100.00%	0
Lower Coastal Plain	7	326.78	14	100.00%	0
Ridge and Valley	1	85.4	2	100.00%	0
Total	25	1996.57	50	100.00%	0
Chemical Site Preparation Outside SMZs - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	0	0	0	NA	0
Ridge and Valley	0	0	0	NA	0
Total	0	0	0	NA	0
Chemical Site Preparation Outside SMZs - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	4	141.81	8	100.00%	0
Upper Coastal Plain	2	178.4	4	100.00%	0
Lower Coastal Plain	8	1191.65	16	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	14	1511.86	28	100.00%	0
Chemical Site Preparation Outside SMZs - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	18	1437.66	36	100.00%	0
Upper Coastal Plain	5	466.94	10	100.00%	0
Lower Coastal Plain	15	1518.43	30	100.00%	0
Ridge and Valley	1	85.4	2	100.00%	0
Total	39	3508.43	78	100.00%	0

Table 9 a – d: Distribution of Firebreak installation and Prescribed Burning Operations Evaluated by Region, Ownership, % BMP Implementation, and Water Quality Risks *Note: Number of sites, Miles, BMPs Assessed, % BMPs implemented, & WQ Risks for this category includes results from the BMP Survey and GFC’s statewide firebreak survey (Jan.1-Nov.27, 2017).*

Fire Breaks & Prescribed Burning- NIPF					
Region	No. Sites	Miles	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	0.21	11	100.00%	0
Piedmont	13	12.03	147	93.88%	0
Upper Coastal Plain	11	8.63	102	94.12%	0
Lower Coastal Plain	23	25.90	201	88.56%	4
Ridge and Valley	3	3.07	32	93.75%	0
Total	51	49.84	493	91.89%	4
Fire Breaks & Prescribed Burning- Public					
Region	No. Sites	Miles	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	2	1.56	31	80.65%	0
Upper Coastal Plain	1	15.09	6	50.00%	0
Lower Coastal Plain	1	1.01	4	100.00%	0
Ridge and Valley	1	0.64	7	85.71%	0
Total	5	18.30	48	79.17%	0
Fire Breaks & Prescribed Burning- Corporate					
Region	No. Sites	Miles	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	4	4.32	37	86.49%	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	1	0.19	12	75.00%	0
Ridge and Valley	0	0	0	NA	0
Total	5	4.51	49	83.67%	0
Fire Breaks & Prescribed Burning- All Ownership					
Region	No. Sites	Miles	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	0.21	11	100.00%	0
Piedmont	19	17.91	215	90.70%	0
Upper Coastal Plain	12	23.72	108	91.67%	0
Lower Coastal Plain	25	27.10	217	88.02%	4
Ridge and Valley	4	3.71	39	92.31%	0
Total	61	72.65	590	90.17%	4

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

Artificial Regeneration Outside SMZs - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	14	1386.34	25	96.00%	0
Upper Coastal Plain	3	336.76	4	100.00%	0
Lower Coastal Plain	15	942.18	23	100.00%	0
Ridge and Valley	1	85.4	2	100.00%	0
Total	33	2750.68	54	98.15%	0
Artificial Regeneration Outside SMZs - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	0	0	0	NA	0
Upper Coastal Plain	0	0	0	NA	0
Lower Coastal Plain	0	0	0	NA	0
Ridge and Valley	0	0	0	NA	0
Total	0	0	0	NA	0
Artificial Regeneration Outside SMZs - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	3	141.81	7	100.00%	0
Upper Coastal Plain	0	67.7	0	NA	0
Lower Coastal Plain	7	838.71	11	100.00%	0
Ridge and Valley	0	0	0	NA	0
Total	10	1048.22	18	100.00%	0
Artificial Regeneration Outside SMZs - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	0	0	0	NA	0
Piedmont	17	1528.15	32	96.88%	0
Upper Coastal Plain	3	404.46	4	100.00%	0
Lower Coastal Plain	22	1780.89	34	100.00%	0
Ridge and Valley	1	85.4	2	100.00%	0
Total	43	3798.9	72	98.61%	0

Forest Fertilization: Forest fertilization occurred on only 1 Corporate site in the Lower Coastal Plain. A total of 184.06 acres were treated with 2 BMPs assessed with 100% BMP implementation.

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

Equipment Servicing and Trash Clean-up - NIPF					
Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	3	8	9	100.00%	0
Piedmont	42	113	125	99.20%	0
Upper Coastal Plain	35	104	104	97.12%	0
Lower Coastal Plain	60	173	177	96.05%	0
Ridge and Valley	6	8	18	100.00%	0
Total	146	406	433	97.46%	0
Equipment Servicing and Trash Clean-up - Public					
Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	13	12	100.00%	0
Piedmont	9	27	27	96.30%	0
Upper Coastal Plain	1	1	3	100.00%	0
Lower Coastal Plain	4	51	12	100.00%	0
Ridge and Valley	3	15	9	100.00%	0
Total	21	107	63	98.41%	0
Equipment Servicing and Trash Clean-up - Corporate					
Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	2	3	100.00%	0
Piedmont	14	55	42	100.00%	0
Upper Coastal Plain	5	18	15	100.00%	0
Lower Coastal Plain	22	86	66	100.00%	0
Ridge and Valley	5	31	15	100.00%	0
Total	47	192	141	100.00%	0
Equipment Servicing and Trash Clean-up - All Ownership					
Region	No. Sites	Landings	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	8	23	24	100.00%	0
Piedmont	65	195	194	98.97%	0
Upper Coastal Plain	41	123	122	97.54%	0
Lower Coastal Plain	86	310	255	97.25%	0
Ridge and Valley	14	54	42	100.00%	0
Total	214	705	637	98.12%	0

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

Stream Assessment - NIPF						
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	2	0.26	80.77%	0.58	96.55%	91.67%
Piedmont	21	4.69	99.79%	8.72	100.00%	99.93%
Upper Coastal Plain	10	3.56	90.45%	0.62	100.00%	91.87%
Lower Coastal Plain	27	9.92	83.97%	2.46	98.78%	86.91%
Ridge and Valley	2	0.66	60.61%	0	NA	60.61%
Total	62	19.09	88.21%	12.38	99.60%	92.69%
Stream Assessment - Public						
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	4	1.75	100.00%	1.37	100.00%	100.00%
Piedmont	3	0.74	98.65%	2.56	99.61%	99.39%
Upper Coastal Plain	0	0	NA	0	NA	NA
Lower Coastal Plain	1	2.3	100.00%	0	NA	100.00%
Ridge and Valley	3	0.66	100.00%	3.69	100.00%	100.00%
Total	11	5.45	99.82%	7.62	99.87%	99.85%
Stream Assessment - Corporate						
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	1	0.24	100.00%	0.1	100.00%	100.00%
Piedmont	12	1.83	100.00%	7.27	100.00%	100.00%
Upper Coastal Plain	3	0.96	100.00%	0.26	100.00%	100.00%
Lower Coastal Plain	8	2.85	99.30%	1.12	100.00%	99.50%
Ridge and Valley	5	1.91	93.19%	2.65	100.00%	97.15%
Total	29	7.79	98.07%	11.4	100.00%	99.22%
Stream Assessment - All Ownership						
Region	No. Sites	Intermittent Miles Assessed	% Miles Compliance	Perennial Miles Assessed	% Miles Compliance	Total % Miles Compliance
Mountains	7	2.25	97.78%	2.05	99.02%	98.37%
Piedmont	36	7.26	99.72%	18.55	99.95%	99.88%
Upper Coastal Plain	13	4.52	92.48%	0.88	100.00%	93.70%
Lower Coastal Plain	36	15.07	89.32%	3.58	99.16%	91.21%
Ridge and Valley	10	3.23	87.93%	6.34	100.00%	95.92%
Total	102	32.33	92.55%	31.4	99.81%	96.12%

Table 13 a – d: Overall Distribution of Sites Evaluated by Region, Ownership, Acres Evaluated, BMPs Assessed, % BMPs Implemented, and Water Quality Risks *Note: Number of sites, % BMPs Implemented, and WQ Risks for the overall distribution include results from the BMP Survey and GFC’s statewide firebreak survey (Jan.1-Nov.27, 2017).*

Overall Distribution - NIPF					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	238.55	127	87.40%	0
Piedmont	51	6882.55	1261	94.21%	2
Upper Coastal Plain	43	4233.07	726	92.29%	8
Lower Coastal Plain	82	6502.89	1456	89.42%	31
Ridge and Valley	7	493.22	204	93.14%	2
Total	187	18350.28	3774	91.71%	43
Overall Distribution - Public					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	4	315.8	144	100.00%	0
Piedmont	11	1198.48	228	92.11%	1
Upper Coastal Plain	2	1130.9	21	85.71%	0
Lower Coastal Plain	5	1595.4	89	100.00%	0
Ridge and Valley	3	853.78	152	98.03%	0
Total	25	5094.36	634	96.21%	1
Overall Distribution - Corporate					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	1	35.7	48	100.00%	0
Piedmont	15	2475.71	584	96.75%	0
Upper Coastal Plain	5	723.64	163	98.16%	0
Lower Coastal Plain	29	5849.32	606	94.88%	7
Ridge and Valley	5	1049.26	235	90.21%	0
Total	55	10133.63	1636	95.35%	7
Overall Distribution - All Ownership					
Region	No. Sites	Acres	BMPs Assessed	% BMPs Implemented	WQ Risks
Mountains	9	590.05	319	94.98%	0
Piedmont	77	10556.74	2073	94.69%	3
Upper Coastal Plain	50	6087.61	910	93.19%	8
Lower Coastal Plain	116	13947.61	2151	91.40%	38
Ridge and Valley	15	2396.26	591	93.23%	2
Total	267	33578.27	6044	93.17%	51

Chart 1: Statewide Trends in BMP Implementation

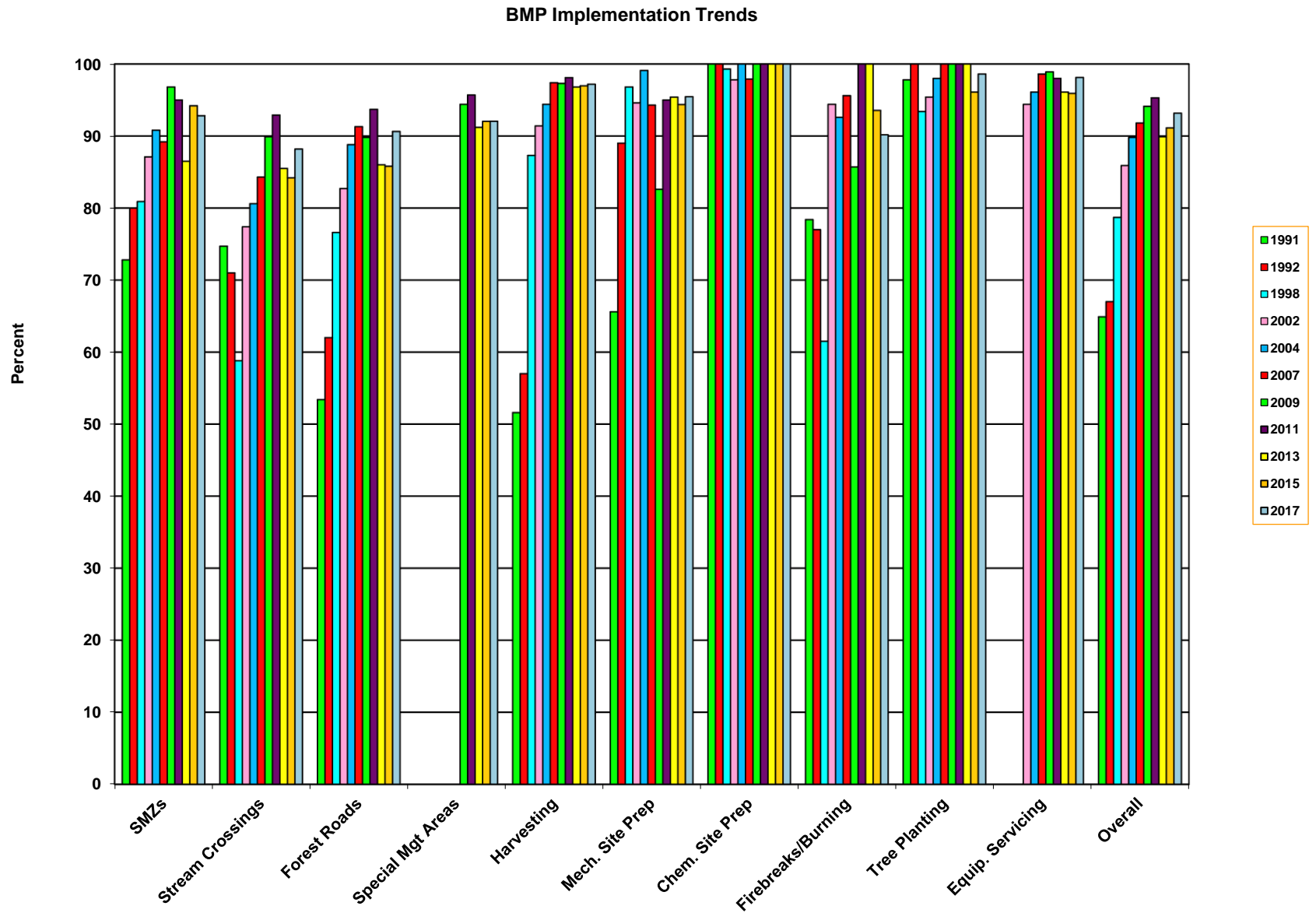


Chart 2: Statewide Trends in BMP Implementation on NIPF Sites

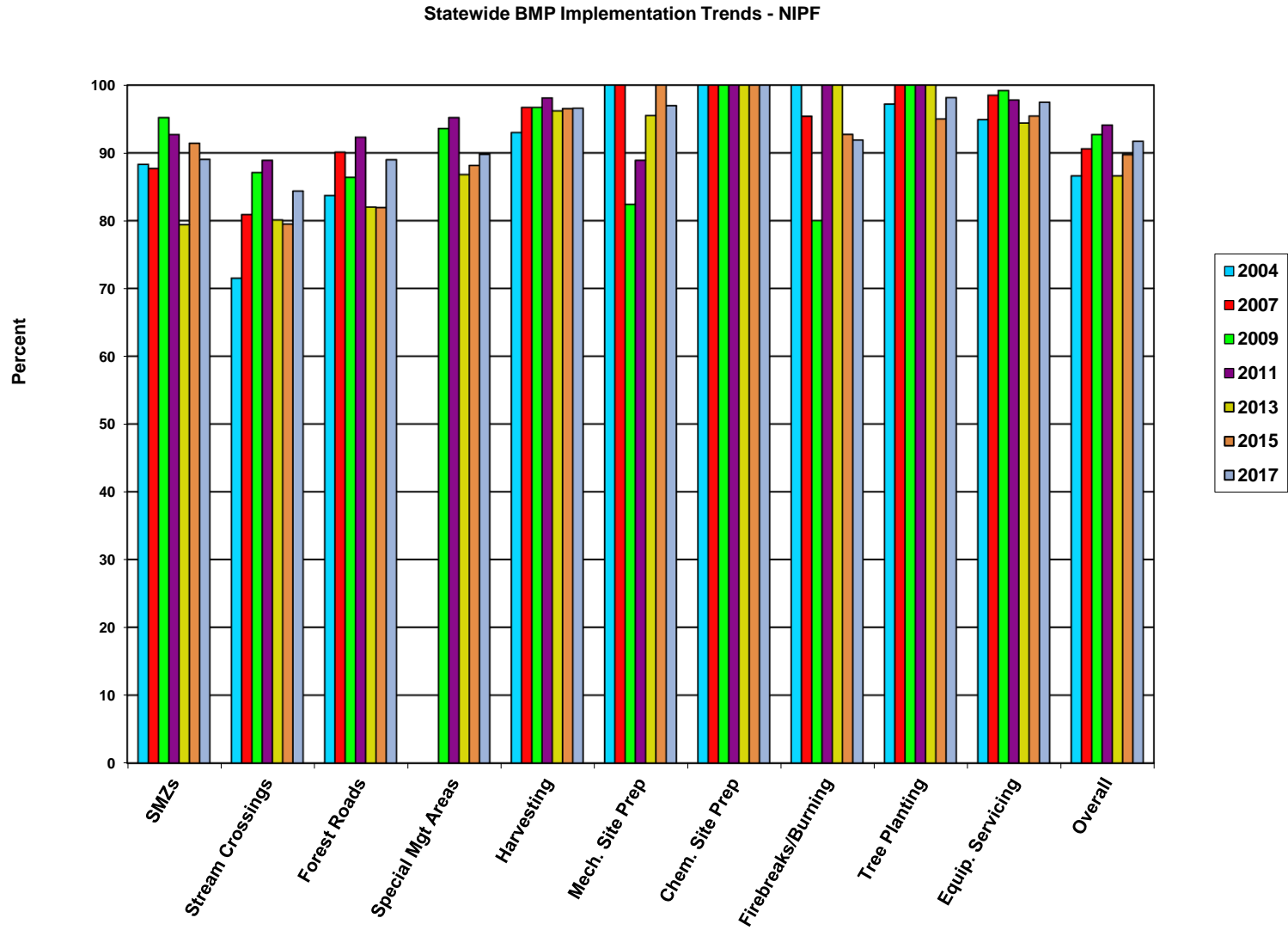


Chart 3: Statewide Trends in BMP Implementation on Corporate Sites

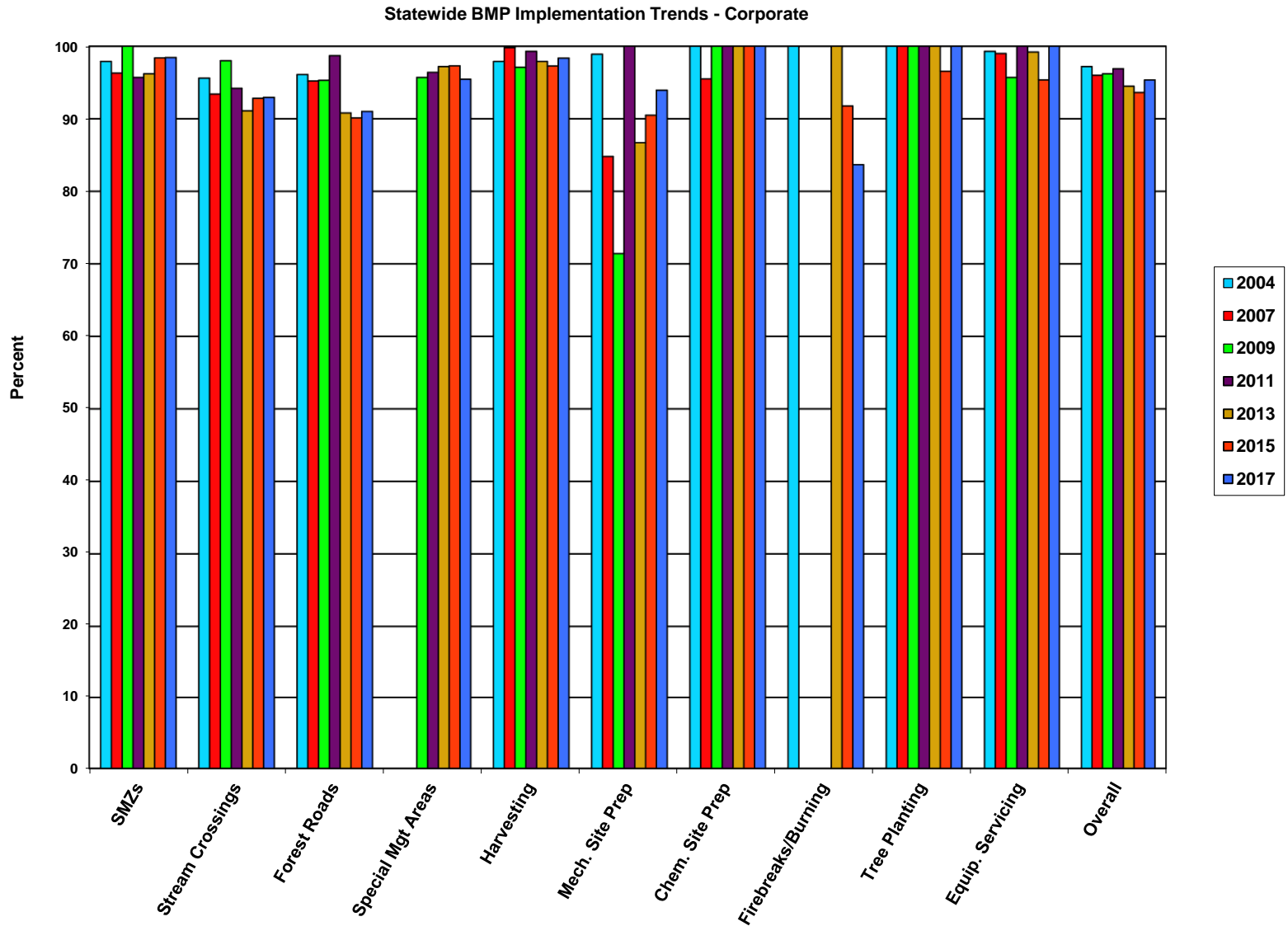


Chart 4: Statewide Trends in BMP Implementation on Public Sites

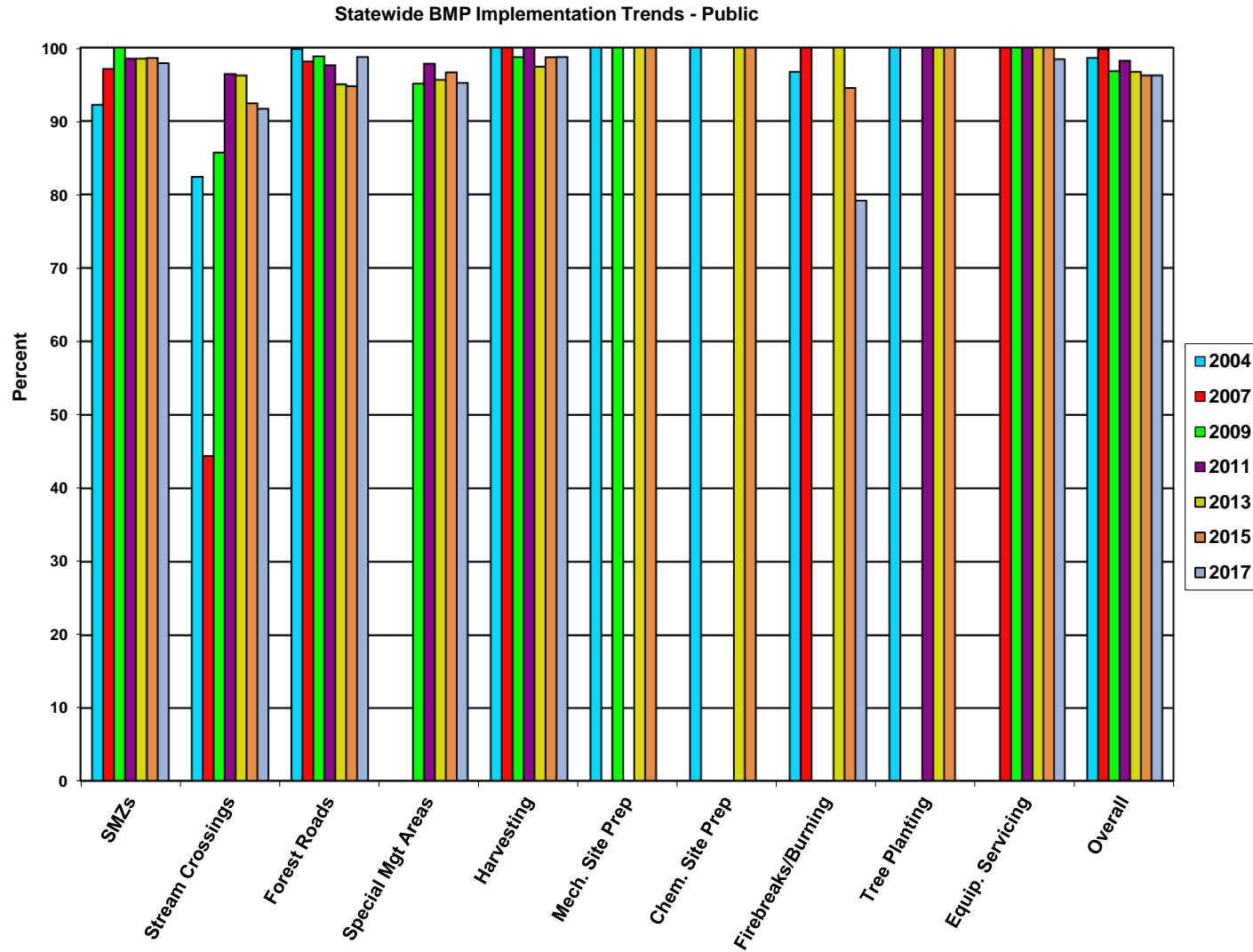
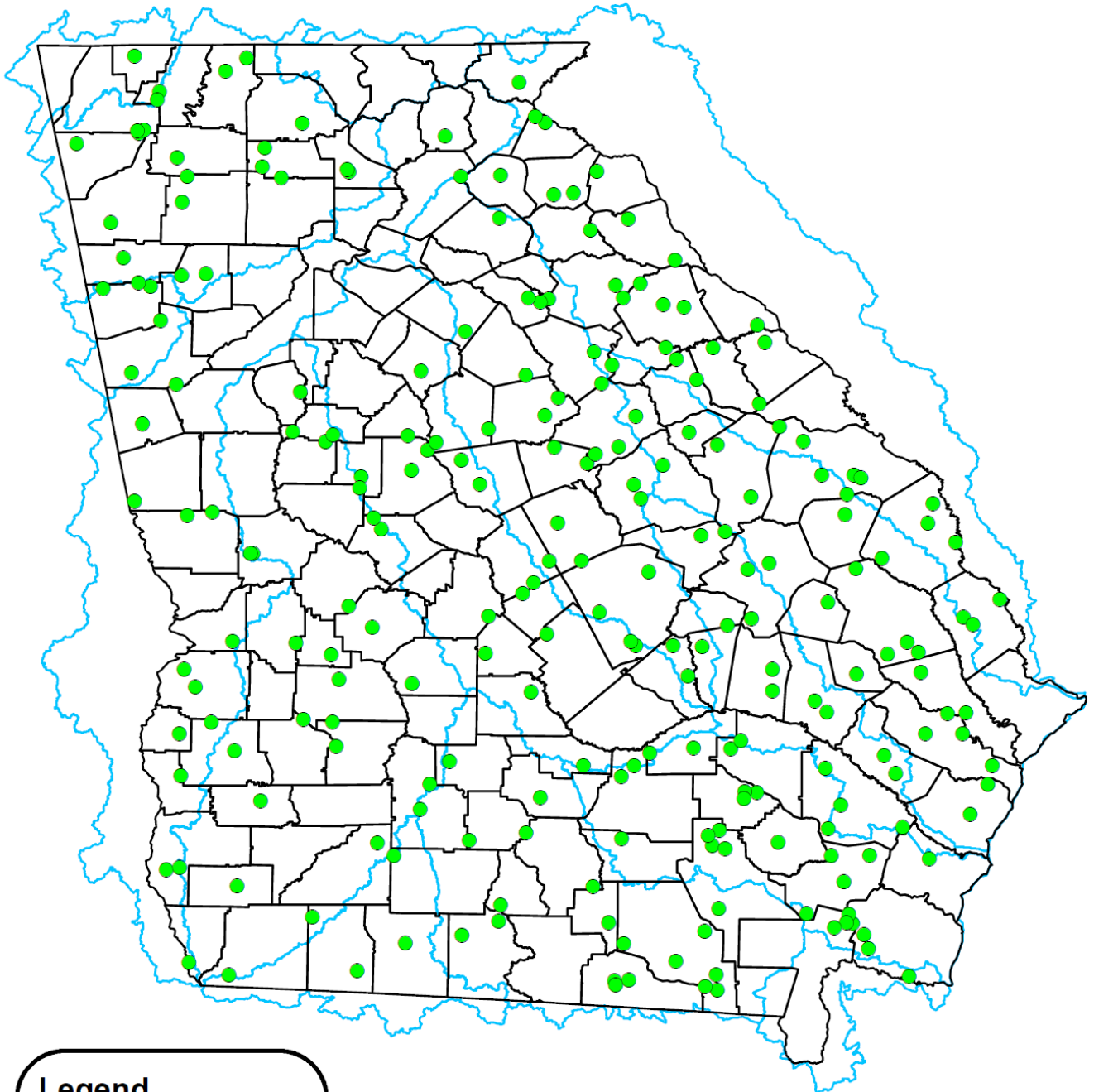
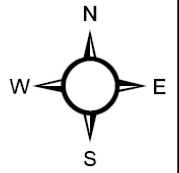




Figure 1: 2017 Forestry BMP Survey Site Distribution



Legend

- site locations
- GA Counties
- Major River Basins

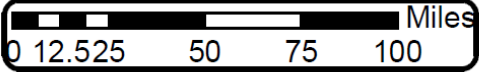


Figure 2

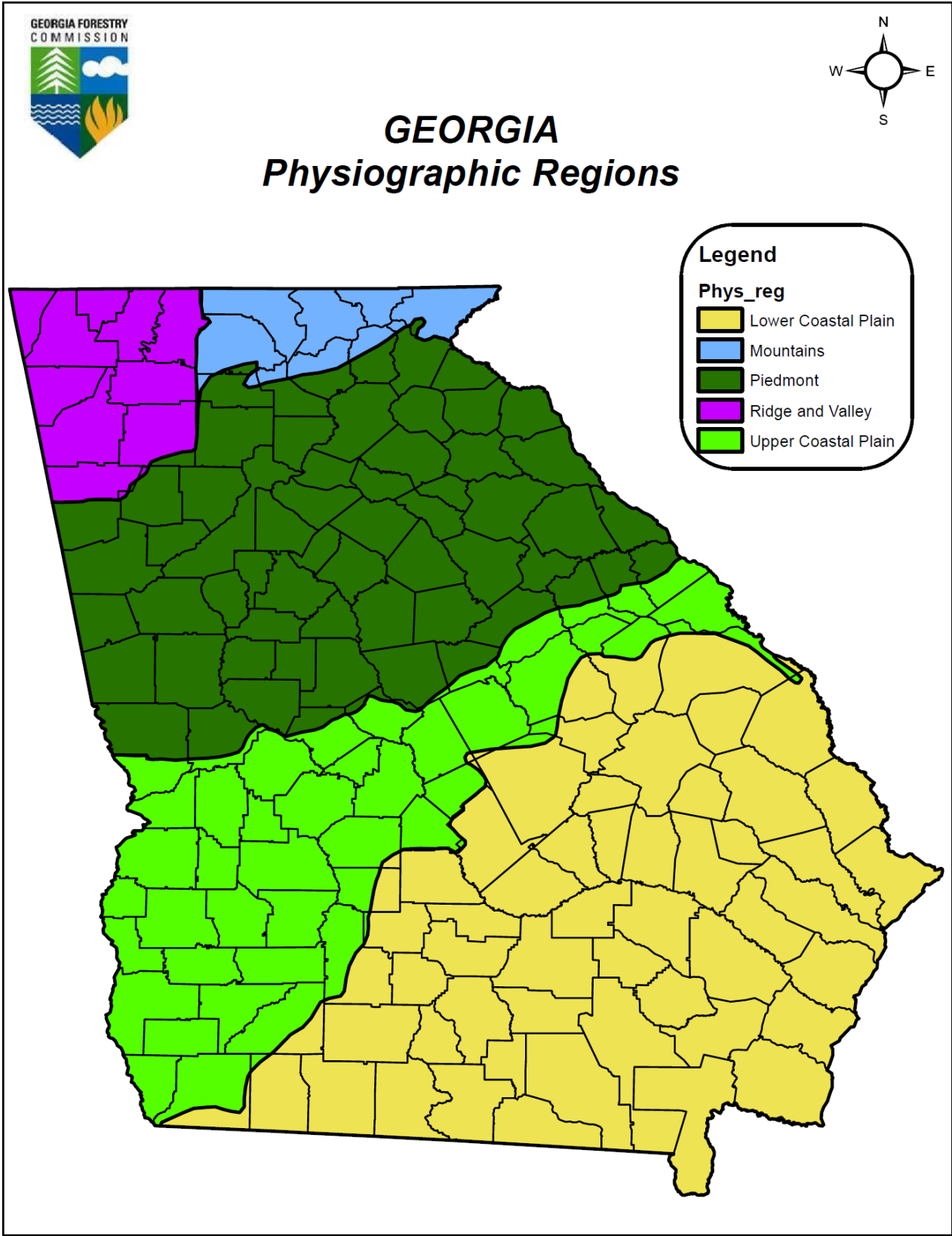


Chart 5: Statewide Trends in Reduction of Water Quality Risks from 1998 through 2017 Surveys

