



Silviculture Best Management Practices 2019 Implementation Survey Report



Results of Florida's 2019 Silviculture BMP Implementation Survey

Conducted by:

Florida Department of Agriculture and Consumer Services
Florida Forest Service

In Cooperation with
Florida Forest Landowners and Forest Land Managers

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Jarek Nowak, Ph.D., Utilization & Hydrology Supervisor
William McCarthy, Watershed Forester
Robin Holland, BMP Forester

For more information contact:
Florida Forest Service
3125 Conner Boulevard
Tallahassee, Florida 32399-1650
(850) 681-5942

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EXECUTIVE SUMMARY

In 2019, the Florida Department of Agriculture and Consumer Services Florida Forest Service (FFS) completed the twentieth survey on Silviculture Best Management Practices (BMPs) implementation in Florida. By delegation from the Florida Department of Environmental Protection, FFS is the lead agency for statewide development, implementation, and monitoring of Silviculture BMPs. This survey fulfills the implementation monitoring element of the FFS's responsibility for controlling silviculture related sources of nonpoint pollution.

The Silviculture BMP implementation survey program was initiated in 1981 and has since been conducted biennially. The principal purpose of this survey is to determine the level of implementation of Florida's Silviculture BMPs. The survey is conducted throughout Florida from a random sample of recent forestry operations. Both public and private forest lands that meet the selection criteria are eligible for the survey.

The 2019 Silviculture BMP Implementation Survey process was consistent with the Southern Group of State Foresters' *Silviculture Best Management Practices Implementation Monitoring – A Framework for State Forestry Agencies (June 2007)*. Florida's Silviculture BMP program, and the biennial Silviculture BMP implementation surveys endeavor to uphold the overall objective of the Federal Clean Water Act, which is to preserve the biological, chemical, and physical integrity of our Nation's waters. The Florida Department of Environmental Protection has acknowledged the effectiveness of Florida's Silviculture BMPs in April 2007 and March 2018 based on the finalized effectiveness studies. Those studies demonstrated that properly applied BMPs mitigate nonpoint source pollution resulting from forestry operations, which could otherwise adversely affect surface and/or groundwater. Furthermore, BMP effectiveness studies continue to be a significant part of the BMP program ensuring sound scientific underpinning and ongoing relevance.

The 2019 Silviculture BMP Implementation Survey evaluated 4,052 practices on 185 individual forestry operations (sites). This cooperative effort involved 83 individual public and private landowners and covered 29,450 acres in 37 Florida counties. Of the visited sites, 143 were located on private non-industrial, 14 on industrial, and 28 on public forest lands.

For the 2019 survey, no significant risks to water quality were detected, and no site scored below 94% for its overall BMP implementation rate. Ninety-four percent of the sites surveyed were 100% compliant with all applicable Silviculture BMPs, a decrease of 2% from the 2017 Silviculture BMP Implementation Survey. The average overall Silviculture BMP compliance rate for all sites was 99.7%, a slight increase from 99.6% in 2017.

INTRODUCTION

Florida's Silviculture Best Management Practices (BMP) program was established as a result of the 1972 Federal Water Pollution Control Act (a.k.a. Federal Clean Water Act) [1]. This program is directed at controlling nonpoint source (NPS) pollution associated with forestry operations, through the use of Best Management Practices (BMPs). Under delegation by the Florida Department of Environmental Protection's State Water Quality Program, the Florida Forest Service (FFS) is responsible for the development, implementation, and monitoring of Silviculture BMPs in Florida. The purpose of this report is to present the results of the most recent implementation monitoring survey conducted in 2019.

BMP Development

Florida's first *Silviculture BMP Manual* [2] was published in 1979 and has been revised multiple times over the years, most recently in 2008. The 2008 *Silviculture BMP Manual* [3] contains 150 individual practices within fourteen BMP categories that protect water quality as well as overall ecosystem integrity and specific wildlife habitat features. The review and revision of Florida's Silviculture BMPs is an ongoing process and is conducted by a 22-member Technical Advisory Council.

The BMP Technical Advisory Council is appointed by the Commissioner of Agriculture and is composed of representatives from state and federal government, forest industry, private non-industrial forest landowners, conservation/environmental groups, and academia [4]. The Technical Advisory Council meets every other year to consider revisions to the *Silviculture BMP Manual* and to provide input and guidance for the Florida Forest Service's BMP program. The most recent Technical Advisory Council meeting was held in Tallahassee on May 24, 2019.

BMP Implementation

The FFS meets its responsibility for Silviculture BMP implementation by means of a two-prong approach via a formal BMP training program and by providing one-on-one technical advice. The goal of both approaches is to educate forestry practitioners and landowners about the importance of implementing Silviculture BMPs to prevent nonpoint source pollution. Both approaches are ongoing, with BMP training provided during routine public workshops and training organized by request. Florida BMP Foresters conduct twenty to twenty-five BMP training sessions each year, involving over 800 participants. A large portion of these participants are loggers enrolled in the Florida Forestry Association's Master Logger Program [5]. One-on-one technical advice is delivered via BMP courtesy checks for ongoing forestry operations, and BMP site assessments for planned operations.

Since 1981, the Florida Forest Service has monitored forestry operations for compliance with Silviculture BMPs by conducting a biennial Silviculture BMP implementation survey. The 2019 Silviculture BMP Implementation Survey, the 20th such effort, was consistent with the Southern Group of State Foresters (SGSF) document titled *Silviculture Best Management Practices Implementation Monitoring – A Framework for State Forestry Agencies (June 2007)*. The 2019 survey evaluated a random sample of all ongoing forestry operations for compliance with all applicable Silviculture BMPs. Forestry operations that meet specific criteria on both public and

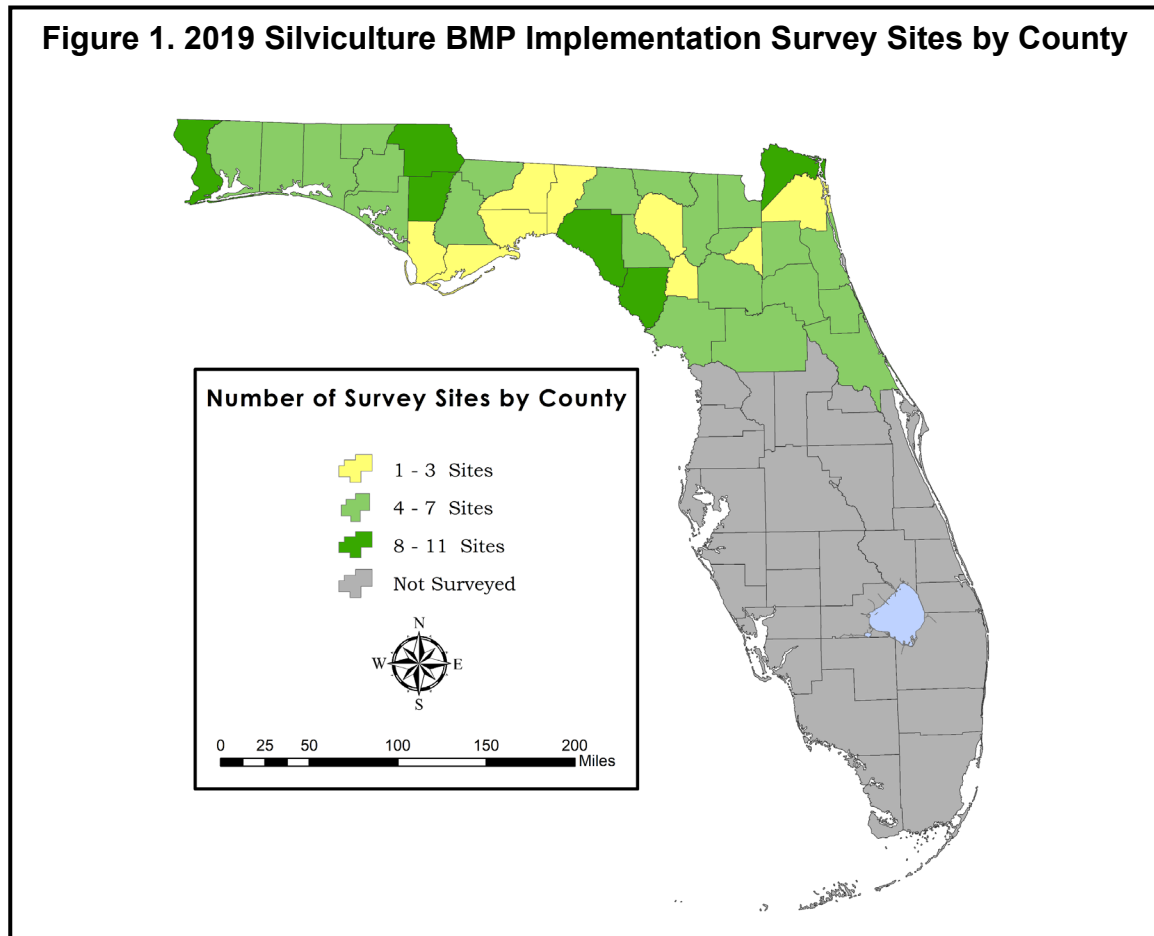
private lands are eligible for the survey. For the period of record (1981 to 2019), the FFS has evaluated over 6,000 individual forestry operations and recorded statewide Silviculture BMP compliance rates ranging from 84% (1985) to 99.7% (2019). For the same period, the cumulative statewide average for overall compliance with Silviculture BMPs is 95%.

To ensure Florida's Silvicultural BMPs achieve the objectives of the Federal Clean Water Act and prevent nonpoint source pollution from forestry operations entering surface and ground water, effectiveness studies have been conducted since 1996 and are currently ongoing with the latest started in 2019. The studies consistently concluded that Florida's Silviculture BMPs were effective in preventing surface and ground water pollution resulting from silviculture operations, such as clearcut harvesting, intensive mechanical site preparation, machine planting [6]; herbicide and fertilizer applications [7, 8, 9, 10, 11]; and wetland harvesting [12, 13]. In general, these studies found that Florida's Silviculture BMPs are effective or very effective in achieving the Federal Clean Water Act objectives of preserving the biological, chemical, and physical integrity of our Nation's waters [1]. These effectiveness studies bolster the point that when Silvicultural BMPs are properly applied, nonpoint source pollution is mitigated during forestry operations. Furthermore, BMP effectiveness studies continue to be a significant component of the Silviculture BMP program ensuring sound scientific underpinning and ongoing relevance. The Florida Department of Environmental Protection has acknowledged the effectiveness of Florida's Silviculture BMPs in two letters to the Florida Forest Service in April 2007, and March 2018 [Appendix 3,4].

SURVEY PROCEDURE

Sampling Intensity and Site Selection

The 2019 Silviculture BMP Implementation Survey was limited to 37 counties located in North Florida (Figure 1). Recent surveys had shown a significantly diminishing number of qualifying sites in Central and South Florida. Therefore, a survey procedure was established to only include the area south of Levy, Marion, and Volusia counties every four years. This procedure will change in the future with the implementation of a new site selection methodology in 2021.



As in previous Silviculture BMP Implementation Surveys, each county located within the 2019 sample area was assigned a sampling goal (number of survey sites) proportionate to that county's historic average annual timber removals [14]. Thus, the more timber removed, the higher the goal assigned to the county. For example, the high level of timber removals in Taylor County resulted in a goal of 11 sites; whereas Bradford County's relatively low timber removals resulted in a goal of one site. This resulted in a total goal of 185 sites for the 2019 Silviculture BMP Implementation Survey [Appendix 1].

Candidate sites for the 2019 Silviculture BMP Implementation Survey were selected using the following criteria: (1) the operation must be bona-fide ongoing silviculture, (2) the silviculture

treatment being evaluated must have occurred within the past two years, and (3) some part of the treatment must have occurred within 300 feet of a stream, sinkhole, lake (2 acres or larger), or wetland as defined in the 2008 *Silviculture BMP Manual*. These criteria provide for survey sites where the greatest potential for forestry related nonpoint source (NPS) pollution exists, and where any such impacts are still discernible and measurable at the time of the site evaluation.

Sites for the 2019 Silviculture BMP Implementation Survey were selected by FFS personnel, from fixed-wing aircraft, at altitudes ranging from 1500-1800 feet. Flights attempted to minimize sample bias and to maximize the diversity of ownerships and physiographic areas within the sample. The majority of candidate sites were identified between February and June of 2019. Following selection of a candidate site, the landowner of record was identified, and FFS personnel attempted to contact the landowner or land manager to confirm if the site met the survey criteria and if the landowner was willing to participate in the survey.

Site Evaluation

After obtaining the landowner or land manager's voluntary participation in the survey, each qualifying site was evaluated for compliance with all applicable Silviculture BMPs. Field evaluations were conducted by FFS BMP Foresters who were usually accompanied by the landowner or land manager.

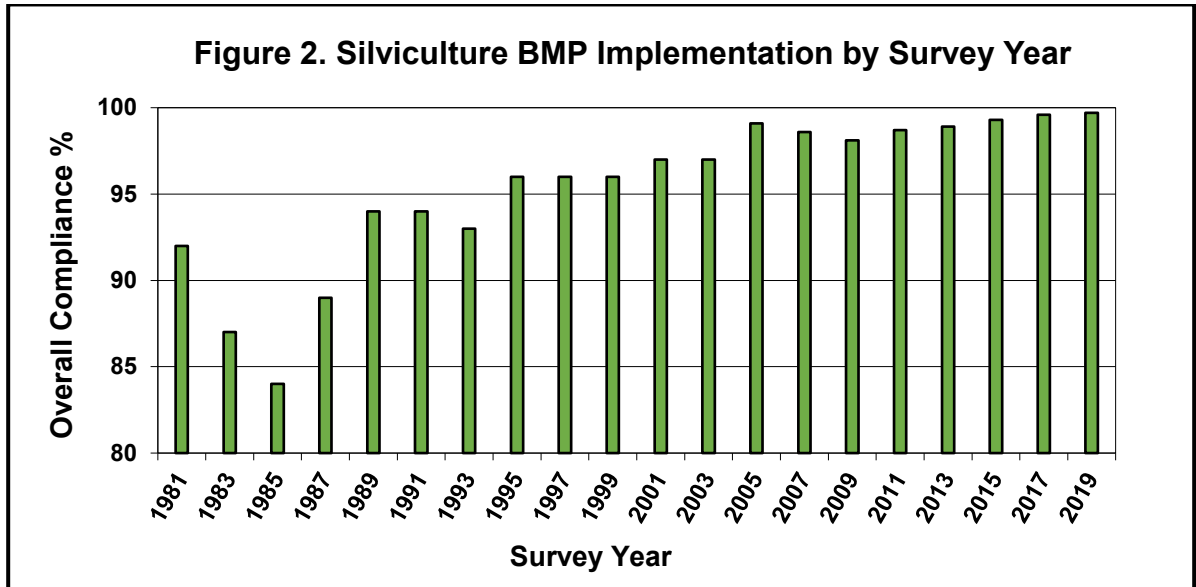
Field evaluations were only conducted on those sites that met the selection criteria and where silviculture activities were determined to be *bona-fide* and ongoing i.e., normal and customary with forestry use continuing on the site. Timber harvesting associated with land clearing operations intended for development or other non-forestry land uses were not included in the survey. The process of evaluating each site involved observing as much of the treated area as possible and completing a field questionnaire [Appendix 2]. The questionnaire consisted of 150 specific, "YES or NO" questions directly related to Silviculture BMP implementation. Question answers were based upon physical evidence or when an operation was not readily observable i.e., fertilization rates, landowner records were used.

Silviculture BMP implementation was evaluated and scored at three levels on each site: (1) individual practice(s); (2) categories of practices; and (3) overall. For an individual practice, implementation was recorded as either a Yes, No, or Not Applicable. For categories of practices, such as Forest Roads or Stream Crossings, and for the overall score, implementation was expressed as a percent of all applicable BMPs in that category. Hence, each survey site was given a compliance score between 0% and 100% for each applicable Silviculture BMP category and for the overall site.

In addition, each incidence of noncompliance at the practice level was further evaluated in terms of "significant risk" to water quality. Significant risk is a situation or set of conditions where noncompliance with BMPs has resulted, or may result, in the measurable and significant degradation of physical, chemical, or biological integrity of water quality, to the extent that it presents an imminent and substantial danger to the designated beneficial use. Whenever a significant risk is identified, the BMP Forester makes recommendations to the landowner, land manager, or contractor for corrective measures. After a reasonable period of time, a follow-up site evaluation is requested to assess compliance with these recommendations. Willful noncompliance with recommendations could initiate referral to the appropriate regulatory agency for enforcement action.

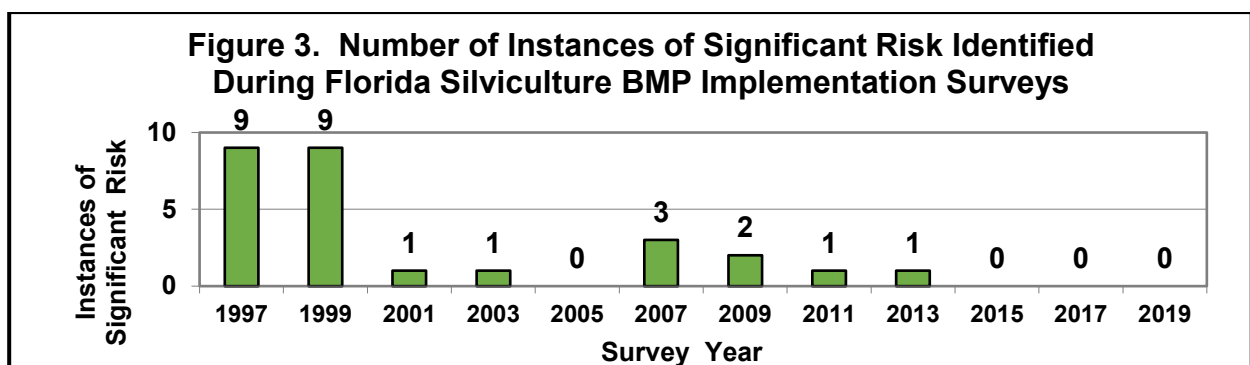
DISCUSSION OF RESULTS

For the 2019 Silviculture BMP Implementation Survey, FFS BMP Foresters evaluated 4,052 practices, on 185 individual forestry operations in 37 Florida counties. Of the individual practices evaluated, 4,041 (99.7%) were found to be in 100% compliance with Silviculture BMPs. This level of implementation is an increase of 0.1% from the 2017 survey results (Figure 2).



Significant Risk

As a standard procedure during Silviculture BMP compliance evaluations, each instance of BMP noncompliance is also assessed for its potential to represent a “significant risk” to water quality. Identifying instances of Significant Risk is very important as this provides an opportunity to correct the underlying BMP issue and thus prevent a violation of Florida’s water quality standards. Of the 4,052 individual BMP practices evaluated during the 2019 survey, there were 11 instances of BMP noncompliance identified and none of them resulted in a significant risk to water quality. Over the years, there was a substantial decrease in number of recorded instances of significant risk to water resources from 9, both in the 1997 and 1999 surveys, to zero in the last three surveys including the 2019 survey (Figure 3).



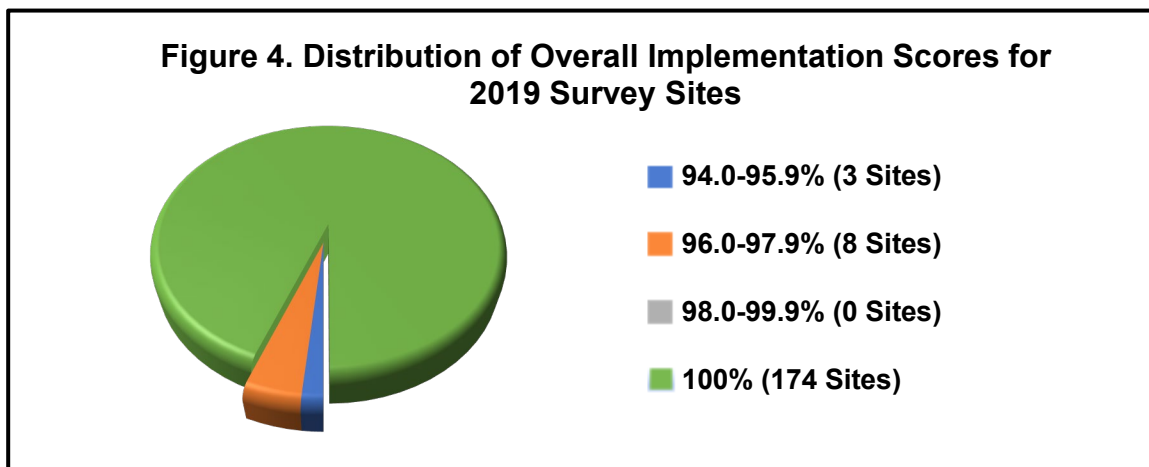
Statistical Analysis

As in previous Silviculture BMP implementation surveys, the practices evaluated represent only a sample of all forestry operations that met the qualifying criteria for 2019. In that regard, the survey represents an estimate of the actual compliance with Silviculture BMPs across Florida. Based on the sampling procedure employed [15], the statistical properties below are attributable to the survey data and express the quality of the estimate:

Proportion of Implementation (P)	Standard Error (SE)	95% Confidence Interval (CI)
P = BMPs in Compliance/BMPs Evaluated (n)	$SE = \sqrt{[P(1-P)/n]}$	$CI = P \pm 1.96(SE)$
P = 4041/4052	$SE = \sqrt{[0.9973(1-0.9973)/4052]}$	$CI = 0.9973 \pm 1.96(0.0008)$
P = 0.9973	SE = 0.0008	CI = 99.57% to 99.89%

For 2019, the estimate of average overall Silviculture BMP implementation (P) for the sampled area was 99.73%, with an estimated standard error (SE) of 0.0008. Using a 95% confidence interval (CI), the data indicates that it is reasonable to expect the compliance to average between 99.57% and 99.89% for overall Silviculture BMP implementation for any sample of the same size drawn from the same pool of evaluation sites.

The overall implementation scores for the individual sites evaluated during the 2019 survey ranged from a low of 94.4% to a high of 100%. The majority of the sites (94.1%) had an overall implementation score of 100% (Figure 4).



Site Characteristics

General site information collected as part of the 2019 Silviculture BMP Implementation Survey included known property certifications. Of the 185 surveyed sites, 58 were reported to be enrolled in the Sustainable Forestry Initiative, 32 in the American Tree Farm System, 8 in the Florida Forest Stewardship Program, and 6 in the Forest Stewardship Council forest certification programs. Two of the sites were reported to be enrolled in multiple forest certification programs.

A total of 29,450 acres were evaluated for Silviculture BMP compliance during the 2019 Silviculture BMP Implementation Survey. As in all previous surveys, pine flatwoods, the most extensive terrestrial ecosystem in Florida, was the dominant terrain type evaluated in 2019 (58.4% of sites). Pine flatwoods are characterized by low, flat topography and relatively poorly drained, acidic, sandy soils. The remaining sites were predominately characterized as either uplands (30.8%), sandhills (7.6%) or wetlands (3.2%). Similarly, 91.9% of the sites evaluated were identified as having intensively managed pine plantations as their predominant land use prior to treatment, while 4.9% were composed of a natural pine/hardwood mix and 3.2% were managed as forested wetlands.

Typically, the data collected for a site's soils and slopes were associated with the site's nearby waterbodies and was used to determine Site Sensitivity Class (SSC). As such, discussion of this information will be located in the Special Management Zones section of this report.

One hundred and thirty-eight of the 2019 survey sites had harvesting operations evaluated on them. Note that all surveyed harvesting operations, including clearcut sites, were part of an ongoing forestry operation. This means the sites will be reforested either by planting, seeding, or natural regeneration following the clearcut operation. Most of the harvesting operations evaluated included clearcut harvesting (87.7%). Other harvesting techniques evaluated included selective harvesting (11.6%), fuel wood chipping (10.9%), row thinning (9.4%) and salvage harvesting (9.4%).

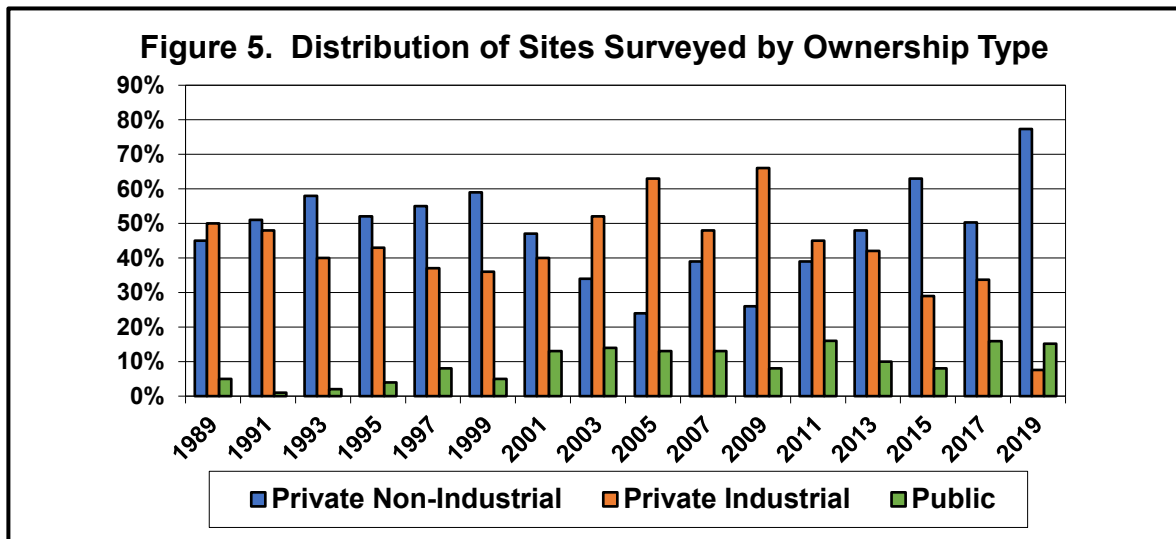
One hundred and thirteen of the 2019 survey sites had site preparation operations evaluated on them. Site preparation techniques evaluated on these operations included herbicide applications, mechanical treatments, prescribed burning, and a few fertilization treatments. Almost all site preparation operations will use multiple site preparation treatments on each site. Sixty-four of the 2019 survey sites also had tree planting operations evaluated on them. While all sites surveyed will be reforested, the remaining forty-nine site preparation sites had not been planted at the time the Silviculture BMP evaluation was conducted.

Forest Land Ownership

The 2019 Silviculture BMP Implementation Survey evaluated 185 sites on 83 different forest landowners. These landowners were divided into three ownership categories: private non-industrial forest landowners (PNIF), private forest industry landowners (Industry), and publicly owned (Public). Please note that only those properties which were either directly owned by a company in the forest products industry (operating a primary wood-processing plant), or by a subsidiary of such a company were classified as Industry landowners. As a result, several landowners who were categorized as Industry during previous Florida Silviculture BMP Implementation surveys were reclassified as PNIF in 2019.

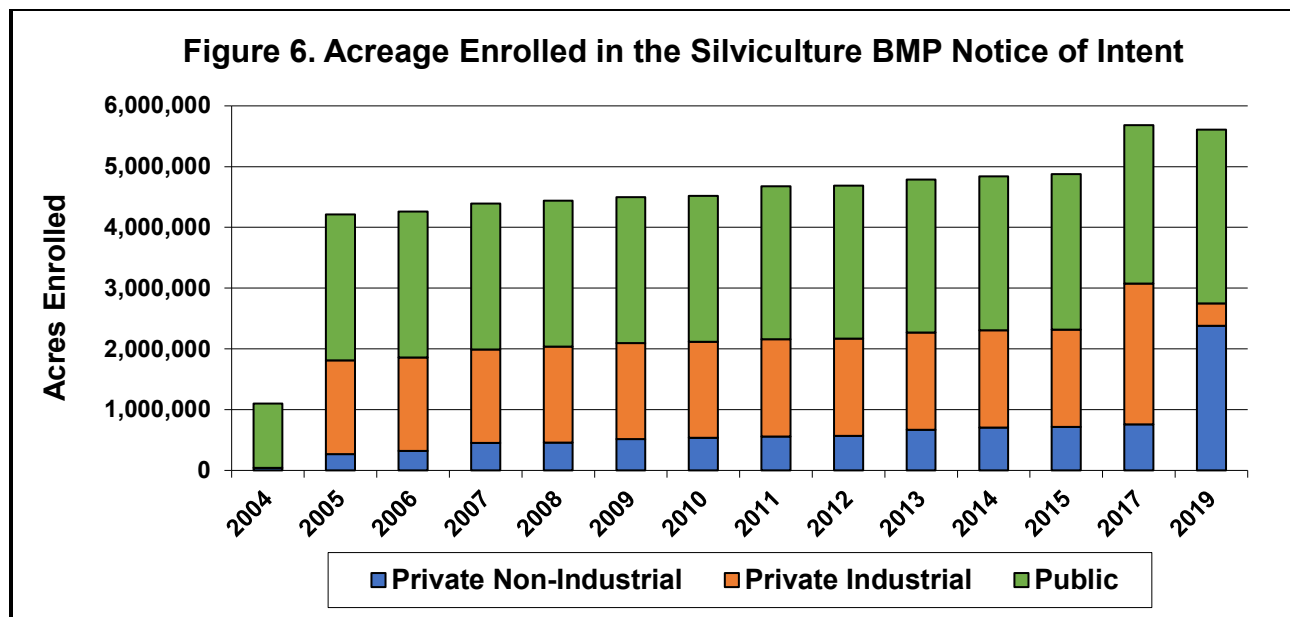
For the 2019 survey, 77.3% of the survey sites were located on private non-industrial forest lands (PNIF), 7.6% on private forest industry lands (Industry), and 15.1% were publicly owned (Public). As in previous year's surveys, there was virtually no difference in the average overall Silviculture BMP implementation scores for the different ownership types observed in 2019 (PNIF = 99.79%, Industry = 99.71%, and Public = 99.73%). There has been a significant increase in the distribution of sites owned by PNIF landowners and an associated decrease in sites owned by Industry landowners over the course of Florida's Silviculture BMP monitoring program (Figure 5). Besides stricter application of the forest industry ownership definition, this shift is primarily the result of a forest land

ownership restructuring, whereby former forest product industry forest lands became Timber Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs), and as such, are now classified as private non-industrial forests (PNIF).

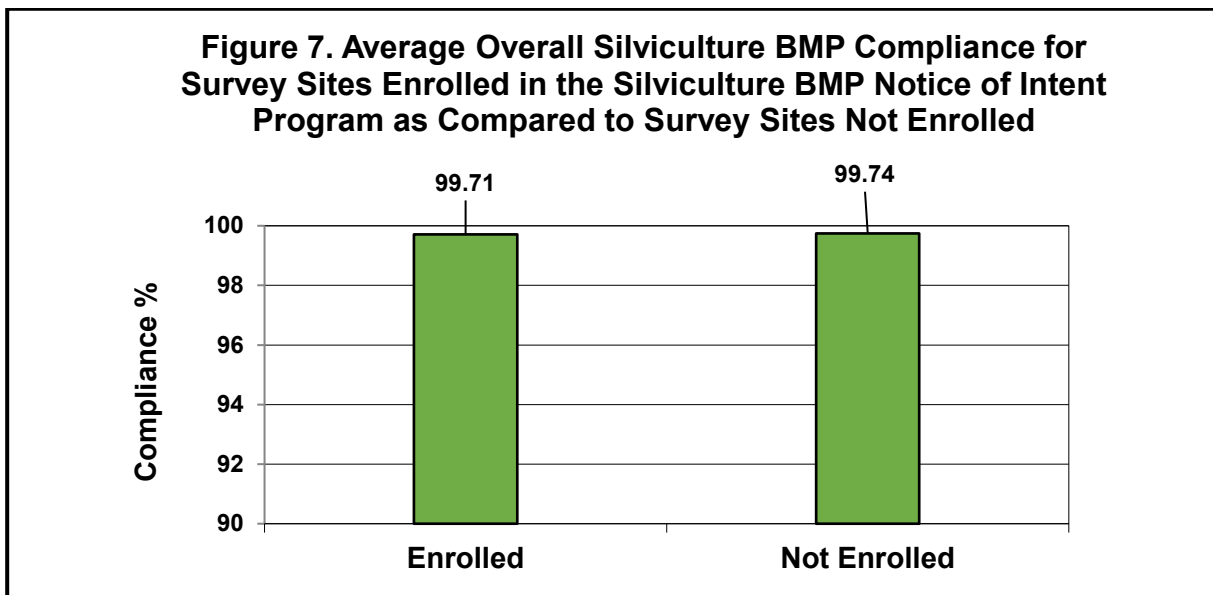


Silviculture BMP Notice of Intent

Chapter 5I-6 of Florida Administrative Code was originally adopted on February 11, 2004. Both the *Silviculture BMP Manual* and a one-time Notice of Intent to Implement Silviculture BMPs (Silviculture BMP Notice of Intent) are incorporated into this rule. In addition, the rule provides forest landowners who have submitted the Silviculture BMP Notice of Intent (NOI) on their property **and** have correctly implemented Silviculture BMPs on their forestry operations with a presumption of compliance with state water quality standards and release from the provisions of Florida Statute Chapter 376.307(5). As of May 2020, there were 5.6 million acres enrolled in the Silviculture BMP Notice of Intent program (Figure 6).



Enrollment in the Silviculture BMP Notice of Intent Program is not one of the selection criteria used for Florida’s Silviculture BMP implementation surveys. All *bona-fide* ongoing forestry operations, regardless of their NOI enrollment status, are eligible assuming all other survey selection criteria have been met. For the 2019 survey, 80 sites (43.2%) were enrolled in the Silviculture BMP Notice of Intent and 105 sites (56.8%) were not enrolled in the NOI program. There was no significant difference between the overall Silviculture BMP compliance score for those sites enrolled in the Silviculture BMP Notice of Intent Program as compared to those sites which were not enrolled (Figure 7).



Special Management Zones

Research has shown that the area immediately adjacent to streams, lakes and other waterbodies is especially important in the overall strategy to protect water quality during silviculture operations. For example, one Florida study reported that increased suspended sediment levels in runoff water during the treatment year was mostly due to the absence of a protective buffer zone along the drainage [16]. Other Silviculture BMP effectiveness studies show the importance of these streamside zones for protecting water quality and providing important habitat features necessary for aquatic organisms [6, 7, 9].

In Florida's *Silviculture BMP Manual*, a Special Management Zone (SMZ) is defined as “*an area of varying width adjacent to a watercourse in which special precautions are necessary to protect water quality and other natural resources.*” A Special Management Zone is applicable to all well-defined streams, lakes two acres and larger, and many sinkholes. An SMZ consists of one of three different component combinations: a Primary Zone only, a Primary Zone plus a Secondary Zone, or a Stringer plus a Secondary Zone.

A Primary Zone is required on all perennial waterbodies and on those waterbodies (perennial or intermittent) which have been designated as a Special Waterbody (Class I Waters, Outstanding Florida Waters, and Outstanding National Resource Waters). A Primary Zone is one of three

designated widths: 35 feet, 75 feet, or 200 feet wide. The required width is determined by the waterbody's size and type as well as its classification as a Special Waterbody. Whether or not a Secondary Zone is added to the Primary Zone is determined by the erodibility of the site. Intermittent waterbodies, which have not been designated as a Special Waterbody, require a Stringer and a Secondary Zone.

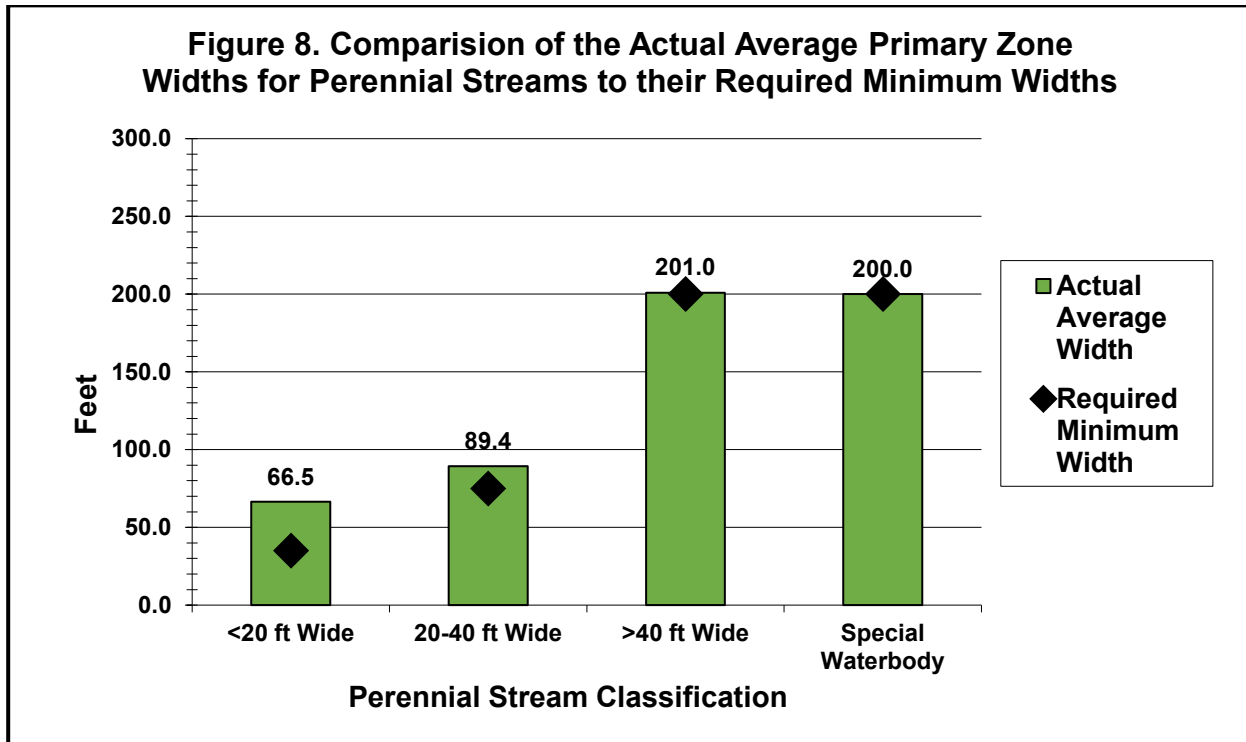
The width of a required Secondary Zone is determined by a waterbody's Site Sensitivity Class (SSC). Site Sensitivity Class is an index of a site's potential for erodibility and is based upon the site's soil types and slope. To determine a waterbody's SSC, data was collected on the soil types and slopes for each survey site and the most erodible combination was used to calculate the SSC. For the 2019 survey, 88.1% of the survey sites had sand as their principal soil type, 10.3% had loamy soils, and 1.6% had organic soils. There were no sites with clay as the principal soil type surveyed in 2019.

The k-factor of a soil type represents both the susceptibility of the soil to erosion and its standard rate of runoff. Based upon soil k-factors, 93% of the sites surveyed were classified as having low soil erodibility, 3.2% were classified as having moderate erodibility, and 3.8% were classified as having high erodibility. Data was also collected on the site's slope where it could potentially impact a nearby water feature. For the 2019 survey, 63.8% of sites had little to no slope (0 to 2%), 31.3% of sites had minor slopes (3 to 7%), 2.7% of sites had moderate slopes (8-12%) and 2.2% of sites had steep slopes (13% or more). More erodible soils and steeper slopes require wider Special Management Zones. Total required SMZ width in Florida ranges from a minimum of 35 feet to a maximum of 300 feet wide.

For the 2019 Silviculture BMP Implementation Survey, 90 of the 185 survey sites had at least one waterbody which required a Special Management Zone. In total, 146 waterbodies were evaluated for BMP compliance in 2019. Fifty-two of the waterbodies were classified as perennial streams (35.6%), 69 as intermittent streams (47.3%), 15 as perennial lakes (10.3%), 3 as intermittent lakes (2.1%), 1 as a perennial sinkhole (0.7%), and 6 as intermittent sinkholes (4.1%). Four of the perennial streams were designated Outstanding Florida Waters (OFWs). The average compliance for Special Management Zone BMPs observed in 2019 was 99.9%. This score was consistent with BMP surveys conducted in recent years (Table 1).

Table 1. Special Management Zone Average BMP Compliance (2007-2019)							
SMZ Component	Survey Year						
	2007	2009	2011	2013	2015	2017	2019
Primary Zone	98%	97%	97%	98%	99%	100%	99.7%
Secondary Zone	98%	98%	100%	97%	100%	98%	100%
Stringer	99%	98%	98%	98%	100%	98%	100%
Overall SMZ Compliance	98%	98%	98%	98%	99%	99%	99.9%

As in past Silviculture BMP implementation surveys, the perennial stream category was dominated by streams less than 20 feet wide. There were 34 perennial streams evaluated which were less than 20 feet wide (65.4%), 9 perennial streams 20 to 40 feet wide (17.3%), 5 perennial streams greater than 40 feet wide (9.6%), and the 4 perennial streams which were classified as OFWs (7.7%). The width of the area under Primary Zone treatment is always measured at its most narrow point to determine an actual Primary Zone width. The average of these actual widths was 66.5 feet for perennial streams classified as less than 20 feet wide, 89.4 feet for perennial streams classified as 20 to 40 feet wide, 201.0 feet for perennial streams classified as greater than 40 feet wide, and 200.0 feet for the four perennial streams classified as OFWs (Figure 8).



For all perennial waterbodies, the 2019 survey evaluated 46.6 miles of shoreline/stream length and 435.4 acres under Primary Zone management. Since 1997, there have been a total of 380 miles of shoreline/stream length and 4,838 acres evaluated for BMP compliance that were under Primary Zone management.

Wetland Forestry Operations

Wetland BMPs address forestry operations both within forested wetlands and those operations conducted on sites adjacent to wetlands. During the 2019 Silviculture BMP Implementation Survey, operations conducted within forested wetlands were evaluated on 14 of the 185 survey sites. Evaluated operations included wetland harvesting operations, wetland forest roads, and wetland crossings for forestry equipment. The overall average BMP compliance for operations within forested wetlands was 99.3%.

Eight of the 14 wetland sites had conducted a wetland harvesting operation. Of the sites with wetland harvesting operations, two occurred within cypress dominated wetlands and three were matt logging operations. In order to know what BMPs are applicable on a wetland harvest, it is necessary to determine the size of the wetland area in which the harvest is occurring. The *Silviculture BMP Manual* defines a wetland area as “*the acres of each contiguous wetland within a contiguous ownership*” and divides wetlands into three wetland area “size” categories: ≥ 200 acres, < 200 acres, or small isolated wetlands less than 2 acres in size. Four of the operations (on 4 sites) were conducted within the ≥ 200 acres wetland area category, 3 operations (on 3 sites) were conducted within the < 200 acres wetland area category, and 1 site had harvesting within all three wetland size categories, for the total of 8 wetland sites with wetland harvesting operations.

Canals

Three sites were evaluated for the 2019 survey which had one or more canals adjacent to the forestry operation. No sites were evaluated which had conducted recent canal maintenance operations such as re-dredging. The average compliance for all 15 evaluated Canal BMP practices was 100%.

Sinkholes

Eight of the 2019 survey sites had sinkholes located on or adjacent to them. The average compliance for all 24 evaluated Sinkhole BMP practices was 95.8% which was the lowest average compliance score of all the BMP categories in 2019. However, it should be noted that this comparatively low average was primarily a result of the small number of individual BMP practices applicable to sinkholes, as only one Sinkhole BMP was noted as being out of compliance.

Forest Roads

Historically, the most chronic and long-term sediment problems associated with silviculture have been directly attributable to forest roads. Consequently, the proper planning, construction, drainage, and maintenance of forest roads through the application of Forest Road BMPs goes a long way in helping to prevent water quality problems from developing as a result of nearby forestry operations.

For the 2019 survey, Forest Road BMPs were evaluated on 176 sites with an average compliance of 99.3%. Most of the Forest Road BMPs evaluated involved the maintenance of existing forest roads. Only two of the survey sites had newly established forest roads evaluated on them and both of the sites were 100% compliant with all applicable forest road planning and construction BMPs. Forest road drainage structures were evaluated on 117 sites and had an average compliance rate of 98.7% for the individual BMP practices applicable to them. The only instances of BMP noncompliance observed in the Forest Roads category were associated with forest road drainage structures.

Stream Crossings

Stream Crossings were evaluated on 36 of the 2019 survey sites and had an average BMP compliance of 99.6%. Evaluated crossings included new stream crossings and existing stream crossings which

were used to access the forestry operations. Crossings were either permanent and located on a forest road or were temporary crossings used by forestry equipment. Of the stream crossings evaluated, 71.4% were culverted and 28.6% were hard-surfaced crossings. The average compliance for BMP practices specific to culverted stream crossings was 98.7%. The average compliance for BMP practices specific to hard-surfaced stream crossings, including temporary log crossings for skid trails, was 100%.

Timber Harvesting

A total of 138 sites had harvesting operations evaluated on them for the 2019 survey. There were 130 sites with only non-wetland timber harvesting operations, 5 sites with only wetland harvesting operations, and 3 sites had both non-wetland and wetland harvesting operations evaluated on them. Note that the BMPs for wetland harvesting operations are evaluated under the Wetlands category, and the BMPs for non-wetland harvesting operations are evaluated under the Timber Harvesting category.

The 133 sites with non-wetland timber harvesting operations had a total of 519 individual Timber Harvesting BMP practices applicable on them with an average compliance of 100%. Timber Harvesting BMPs evaluated on the sites focused on proper skid trail location and appropriate slash disposal practices.

Most of the harvesting operations (wetland and non-wetland) evaluated included at least some level of clearcut harvesting (87.7%). Since all surveyed operations must be part of an ongoing forestry operation, the clearcut sites will be reforested either by planting, seeding or natural regeneration in the near future. Other harvesting techniques evaluated included selective harvesting (11.6%), fuel wood chipping (10.9%), row thinning (9.4%) and salvage harvesting (9.4%). The primary tree species which were harvested included slash pine (68.8%), loblolly pine (25.4%), various hardwood species (18.8%), sand pine (7.2%), longleaf pine (6.5%), cypress (3.6%), and various other pine species (0.7%). Note that multiple species and harvesting techniques were sometimes evaluated on the same survey site.

Information was also collected concerning the mill types where harvested wood was delivered. Of the 138 harvesting sites, 99.3% delivered wood to pulp/mulch mills, 77.5% delivered wood to sawmills, 12.3% delivered wood to pole processing facilities, and 2.9% to veneer plants. Note that sites usually delivered wood to more than one type of mill during the harvesting operation.

In addition, information pertaining to logger training was collected. On sites where harvesting operations were evaluated, 92.8% of the sites were harvested by a logger known to have participated in a formal logger training program. Of these 128 sites, 87.5% were harvested by a known Florida Master Logger, 7.8% by a known Alabama Pro Logger, and 4.7% by a known Georgia Master Timber Harvester.

Site Preparation and Planting

Second only to timber harvesting, site preparation is the most common and recognizable silviculture operation in forestry. Mechanical site preparation, such as chopping, raking/piling, and bedding, routinely follows harvesting operations in pine management and often results in a significant amount

of bare soil exposure. For that reason, the orientation of mechanical site preparation activities with respect to slope and local surface waters is the focus of most of the BMPs in the Site Preparation category. The intensity and timing of site preparation largely determines the extent of soil exposure, while slope and soil type determines the site's erosion potential.

Florida's *Silviculture BMP Manual* uses a Site Sensitivity Classification system to describe the susceptibility of a site to erosion and sedimentation. Generally, sites with slopes exceeding 12% are considered the most susceptible to erosion and thus require wider Special Management Zones with restrictions on mechanical site preparation activities. Similar to previous surveys, only 2.2% of the 2019 sites had slopes greater than 12%.

One hundred and thirteen of the 2019 survey sites had site preparation operations evaluated on them. These sites had a total of 430 individual Site Preparation and Planting BMP practices applicable on them with an average compliance of 99.8%. Site preparation techniques evaluated on these operations included both chemical and mechanical treatments. Mechanical site preparation treatments evaluated included intensive mechanical operations like raking/piling, windrowing, scalping, and bedding (70.8%) and non-intensive mechanical operations like mowing and chopping (39.8%). Chemical site preparation treatments evaluated included both pesticide (herbicide) treatments (88.5%) and fertilization treatments (8.0%). In addition, 15.9% of the site preparation sites evaluated had a prescribed burn conducted on them. Note that in almost all site preparation operations, sites use multiple site preparation treatments.

Sixty-four of the 2019 survey sites had tree planting operations evaluated on them. Tree planting techniques evaluated on these sites included hand planting (53.1%), conventional machine planting (46.9%), and v-blade planting (9.4%). Tree species planted included slash pine (57.8%), loblolly pine (32.8%), longleaf pine (20.3%), and various hardwood species (3.1%). Note that it was possible for a planting site to have multiple tree species planted on it or to have used multiple planting techniques.

Fireline Construction

Nine sites were evaluated for Fireline Construction BMP compliance during the 2019 survey. Plowed firelines were evaluated on five of the sites. Firelines which were construed by an alternative to plowing (harrowed, bladed, re-worked plow lines, etc.) were also evaluated on five of the sites. One site had both plowed firelines and bladed firelines present on it. The average compliance for the 33 evaluated Fireline Construction BMP practices was 100%. This was the same compliance score observed in both the 2015 and 2017 surveys.

Pesticide and Fertilizer Application

Pesticide and Fertilizer Application BMPs were evaluated on 100 of the 2019 survey sites. Each site evaluated had an herbicide treatment conducted on it and had an average compliance of 100% for the Pesticide BMPs. The herbicide treatments consisted of either a pre-planting herbicide treatment (85.0%), a post-planting herbicide treatment (1.0%), or both a pre- and post-planting herbicide treatment (14.0%).

Fertilizer BMPs were also evaluated on nine of the Pesticide and Fertilizer Application sites and had an average compliance of 100%. All of the fertilizer treatments were post-planting treatments on recently planted pine stands. Forestry fertilizers that were applied included diammonium phosphate aka DAP (22.2%) and a custom liquid mix of 10-34-00 (77.8%).

Waste Disposal

Waste Disposal BMPs were evaluated on all of the 185 sites assessed during the 2019 survey. The average compliance for the 724 individual Waste Disposal BMP practices that were evaluated was 99.7%. All instances of BMP noncompliance for the Waste Disposal category were from two sites and were due to trash (bar oil containers, hydraulic fluid containers, etc.) being left on the site, usually on a log loading deck.

Wet Weather Operations

Wet Weather Operations were considered a factor on 108 (58.4%) of the sites surveyed in 2019 and had an average compliance of 100%. All of the operations surveyed were able to time their activities to avoid flooded site conditions. Three of the operations also utilized low ground pressure equipment and/or matt logging techniques to further limit the impact of skidding on the sites.

Emergency Operations

Emergency Operations BMPs are applicable to sites which have suffered from a recent or ongoing wildfire, insect or disease outbreak, exotic/invasive tree infestation, or other natural disaster like a hurricane. In these instances, certain BMPs may be relaxed to aid in fire suppression, conduct appropriate salvage harvesting, and/or to promote rapid site recovery. For the 2019 survey, there were 19 sites which had forestry operations conducted on them that qualified for Emergency Operations BMPs. The majority of these operations (17 sites) were salvage harvests in the Florida Panhandle following Hurricane Michael while the remaining two sites had suffered from a wildfire. The average compliance for the 23 Emergency Operations BMP practices that were evaluated was 100%.

Public Lands

There were 28 sites surveyed in 2019 which were classified as public lands ownership. Twenty-two of these publicly owned sites had a Special Management Zone applicable on them with a required Primary Zone. As public lands, these sites had additional harvesting restrictions required for their Primary Zones which are evaluated in the Public Lands BMP category. The average Public Lands BMP compliance for the 22 sites with a required Primary Zone was 100%.

CONCLUSIONS

The 2019 Silviculture BMP Implementation Survey was the twentieth conducted in Florida since the initial survey in 1981. Similar to the 2015 and 2017 surveys, the 2019 survey found no instances of significant risk to water quality resulting from forestry operations. The 2019 survey evaluated 4,052 individual BMP practices on 185 forestry operations (sites) and had an overall Silviculture BMP compliance of 99.7%. All of Florida's biennial BMP implementation surveys conducted since 2005 have averaged above 98% with the three most recent surveys (2015, 2017, and 2019) averaging above 99%. Enrollment in Silviculture BMP Notice of Intent program affords forest landowners additional legal protections. However, the 2019 survey showed virtually no difference in the average overall compliance for properties enrolled (99.71%) versus not enrolled (99.74%) in the Notice of Intent program. This can be attributed to the high level of professionalism of loggers and other forestry practitioners conducting forestry operations in Florida.

Exactly half of the BMP categories averaged a BMP compliance score of 100% (Canals, Timber Harvesting, Fireline Construction, Pesticide and Fertilizer Use, Wet Weather Operations, Emergency Operations, and Public Lands). Of the remaining BMP categories, all but one (Sinkholes) averaged a BMP compliance score over 99% (Special Management Zones = 99.9%, Wetlands = 99.3%, Forest Roads = 99.3%, Stream Crossings = 99.6%, Site Preparation and Planting = 99.8%, Waste Disposal = 99.7%). While the Sinkholes category's average BMP compliance score was 95.8%, it still only had one instance of noncompliance noted for the 24 applicable sinkhole practices evaluated. This data supports the conclusion that all categories of Silviculture BMPs are nearly universally implemented by forest landowners and forestry professionals across the state.

While determining the implementation rate of Florida's Silviculture BMPs was the overall goal of this survey, it is equally important to know that the practices being implemented are effective in protecting the water quality. Over the last 20 years, numerous research projects have been conducted in Florida, which support the conclusion that Florida's Silviculture BMPs are effective in protecting water quality as well as providing many other benefits, including wildlife habitat. Pursuant to Florida Statute 403.067(7)(c)3, the effectiveness of the Florida Silviculture BMP Program was recognized by the Florida Department of Environmental Protection, which provided confirmatory verification letters in 2007 and 2018 for practices contained in the *Florida Silviculture BMP Manual*.

ACKNOWLEDGMENTS

The Florida Forest Service would like to thank all of the forest landowners, land managers, consulting foresters, loggers, and other forestry professionals who participated in the 2019 Silviculture BMP Implementation Survey. It is their dedication to protecting Florida's forests and other natural resources that makes the Florida Silviculture BMP Program such a success.

REFERENCES

- [1] Federal Water Pollution Control Act of 1948, 33 U.S.C. §§1251-1387 (1972).
- [2] Division of Forestry. (1979). *Best Management Practices Manual*. Tallahassee, FL: Florida Department of Agriculture and Consumer Services.
- [3] Florida Forest Service. (2008). *Silviculture Best Management Practices* (DACS-P-01284). Tallahassee, FL: Florida Department of Agriculture and Consumer Services.
- [4] Vowell, J. L. (1996). Revising Florida's Best Management Practices: A Partnership Process. In TAPPI press (ed.), *Partners in Global Stewardship : Proceedings / 1996 International Environmental Conference, Sheraton Dolphin, Orlando, FL, May 5 - 8. TAPPI ; Book 1* (pp.261-266). Atlanta, GA: TAPPI Press. <https://www.tib.eu/en/search/id/TIBKAT%3A218976100/Partners-in-global-stewardship-proceedings-1996/>
- [5] Florida Forestry Association, (2019). Master Logger, Master Logger Search Tool. <http://www.flforestry.org/programs/master-logger/master-logger-search-tool/>
- [6] Vowell, J. L. (2001). Using Stream Bioassessment to Monitor Best Management Practice Effectiveness. *Forest Ecology and Management*, 143, 237-244.
- [7] Vowell, J. L., Frydenborg, R. B. (2004). A Biological Assessment of Best Management Practice Effectiveness during Intensive Silviculture and Forest Chemical Application. *Journal of Water, Air, and Soil Pollution: Focus* 4 (1), 297-307.
- [8] Minogue, P. J., Osiecka, A., Lauer, K. L., Miwa, M. (2013). Effectiveness of Silviculture Best Management Practices for Forest Fertilization in Pine Straw Production to Protect Water Quality in Florida: Four Year Monitoring Results and Interpretation. *Section 319 Nonpoint Source Pollution Control Program Education/Training/Demonstration Project Final Report for DEP Contract G0332*. Quincy, FL: University of Florida, Institute of Food and Agricultural Sciences, North Florida Research and Education Center.
- [9] Cohen, M. (2016). Monitoring the Effectiveness of Forest Fertilization and Special Management Zone Best Management Practices for Preventing Nutrient Loading. *Section 319 Nonpoint Source Pollution Control Program Final Report for DEP Contract G4027*. Gainesville, FL: University of Florida, School of Forest Resources and Conservation.
- [10] Chevasco, E. D., Minogue, P. J., Mackowiak, C., Comerford, N. B. (2016). Fertilization and pine straw raking in slash pine plantations: P removals and effects on total and mobile soil, foliage and litter P pools. *Forest Ecology and Management*, 376, 310-320. Elsevier, <https://doi.org/10.1016/j.foreco.2016.06.009>
- [11] Hensley, R. T., McLaughlin, D. L., Cohen, M. J., Decker P. H. (2017) Stream phosphorus dynamics of minimally impacted coastal plain watersheds. *Hydrological Processes*, 31, 1636-1649. Wiley, <https://doi.org/10.1002/hyp.11132>

- [12] Randall, C. K., Duryea, M. L., Vince, S. W., English, R. J. (2005) Factors influencing stump sprouting by pondcypress (*Taxodium distichum* var. *nutans* (Ait.) Sweet). *New Forest*, 29 (3), 245-260. Springer, <https://doi.org/10.1007/s11056-005-5652-4>.
- [13] Bohn, K., Cohen, M. (2011). Recovery and regeneration of forested wetlands following timber harvest: evaluation of best management practices in Florida. *U.S. Environmental Protection Agency, Region 4. Final Report to EPA Region 4*. Milton, FL: University of Florida, West Florida Research & Education Center.
- [14] Brown, M. J. (1996). *Forest Statistics for Florida, 1995* (RB SRS-6). Asheville, NC: USDA Forest Service, Southern Research Station.
- [15] Mcnew, R. W. (1990, January 23-25). Sampling and Estimating Compliance with BMPs. In Workshop G. Dissmeyer (ed.), *Implementation Monitoring of Forestry Best Management Practices* (pp.86-105). Atlanta, GA: Southern Group of State Foresters, USDA Forest Service.
- [16] Riekerk, H. (1989). Silviculture, Hydrology and Water Quality in the Lower Coastal Plain of the U.S.A. In, *The Forest Hydrological Resources in China Workshop Proceedings*. Harbin, China.

APPENDICES

Appendix 1: County Goals and Results

Appendix 2: Detailed Survey Results

Appendix 3: April 2007 FDEP Silviculture BMP Initial Verification Letter

Appendix 4: March 2018 FDEP Silviculture BMP Confirmatory Verification Letter

Appendix 1: County Goals and Results

Florida Forest Service 2019 Silviculture BMP Implementation Survey

COUNTY	Survey Site Selection		Overall Silviculture BMP Compliance Percent (%)	Number of Significant Risks	COUNTY	Survey Site Selection		Overall Silviculture BMP Compliance Percent (%)	Number of Significant Risks
	Goal	Actual				Goal	Actual		
Alachua	6	7	100	0	Lafayette	6	6	98.6	0
Baker	7	7	100	0	Leon	4	1	100	0
Bay	7	4	100	0	Levy	6	6	99.4	0
Bradford	1	1	96.2	0	Liberty	4	5	99.2	0
Calhoun	6	8	100	0	Madison	6	6	100	0
Clay	5	5	100	0	Marion	6	4	100	0
Columbia	5	5	98.4	0	Nassau	7	8	100	0
Dixie	9	9	100	0	Okaloosa	5	5	100	0
Duval	3	3	100	0	Putnam	5	5	100	0
Escambia	5	8	100	0	Santa Rosa	7	4	99.3	0
Flagler	6	6	100	0	St. Johns	6	6	100	0
Franklin	3	2	97.6	0	Suwannee	3	2	100	0
Gadsden	4	4	100	0	Taylor	11	11	100	0
Gilchrist	3	3	100	0	Union	3	4	100	0
Gulf	2	2	100	0	Volusia	4	4	100	0
Hamilton	5	5	100	0	Wakulla	3	3	100	0
Holmes	3	4	100	0	Walton	4	5	100	0
Jackson	8	9	99.6	0	Washington	3	5	99.5	0
Jefferson	4	3	100	0		185	185	99.7	0

**FLORIDA'S
SILVICULTURE BEST MANAGEMENT PRACTICES**

Implementation Survey Form



Conducted by the

**Florida Forest Service
Erin Albury, Director**

**Department of Agriculture and Consumer Services
Nicole “Nikki” Fried
Commissioner of Agriculture**

Appendix 2: Detailed Survey Results

Florida Forest Service 2019 Silviculture BMP Implementation Survey Overall Implementation Summary

BMP Category (Check Box if Evaluated on this Site)		Compliance by Category				Number of Significant Risks
Category Count	Category Name	# "Yes"	# "No"	Total (Y+N)	% "Yes"	
146	A. Special Management Zones	799	1	800	99.9%	0
14	B. Wetlands	138	1	139	99.3%	0
3	C. Canals	15	0	15	100%	0
8	D. Sinkholes	23	1	24	95.8%	0
176	E. Forest Roads	598	4	602	99.3%	0
36	F. Stream Crossings	281	1	282	99.6%	0
133	G. Timber Harvesting (non-wetlands)	519	0	519	100%	0
113	H. Site Preparation & Planting	429	1	430	99.8%	0
9	I. Fireline Construction	33	0	33	100%	0
100	J. Pesticide &/or Fertilizer Use	317	0	317	100%	0
185	K. Waste Disposal	722	2	724	99.7%	0
108	L. Wet Weather Operations	122	0	122	100%	0
19	M. Emergency Operations	23	0	23	100%	0
28	N. Public Lands	22	0	22	100%	0
TOTALS		4041	11	4052		0
OVERALL COMPLIANCE (%)					99.7%	

Property Certifications (check all that apply):

Tree Farm- 32 SFI- 58 FSC- 6 Forest Stewardship- 8

Silviculture BMP Notice of Intent on File: Yes- 80 No- 105

Appendix 2: Detailed Survey Results

Part I: General Site Information and Characteristics

- 1) Owner Name: _____
Landowner Phone: _____ Landowner Email: _____
Mailing Address: _____ City, State, Zip: _____
- 2) Ownership Type: Public- 28 Industry- 14 PNIF- 143
- 3) Contact Name: _____
Company Name: _____
Contact Phone: _____ Contact Email: _____
- 4) Approximate Acreage of Treated Area: 29,449.8
- 5) If PNIF, technical/professional forestry assistance was provided by (select one):
FFS Forester- 1 Consultant Forester- 65 Industry Forester- 13 Other- 61 None- 3
- 6) Predominant Land Use Prior to Treatment:
Intensive Forest Management (Planted Pine)- 170 Row Crop- 0
Passive Forest Management (Natural Pine/Hardwood)- 9 Pasture- 0
Forested Wetland Management (Hardwood/Cypress)- 6 Other- 0
- 7) Dominant Terrain:
Wetlands- 6 Uplands- 57 Flatwoods- 108 Sandhills- 14 Pasture/Cropland- 0
- 8) Principle Soil Texture: Clay- 0 Loam- 19 Sand- 163 Organic (Muck)- 3
- 9) Name of Soil Type or Series: _____
- 10) Estimated Slope Class:
0-2%- 118 3-7%- 58 8-12%- 5 13-17%- 2 18-22%- 0 >22%- 2
- 11) Soil Erodibility Class: A (Low/Organic)- 172 B (Moderate)- 6 C (High)- 7
- 12) Site Sensitivity Class (SSC) – based on the information above:
- | | | | | | |
|----------------|---------------|--------------|--------------|--------------|--------------|
| A1- <u>117</u> | A2- <u>48</u> | A3- <u>4</u> | A4- <u>2</u> | A5- <u>0</u> | A6- <u>1</u> |
| B1- <u>1</u> | B2- <u>3</u> | B3- <u>1</u> | B4- <u>0</u> | B5- <u>0</u> | B6- <u>1</u> |
| C1- <u>0</u> | C2- <u>7</u> | C3- <u>0</u> | C4- <u>0</u> | C5- <u>0</u> | C6- <u>0</u> |

Appendix 2: Detailed Survey Results

Part II: Forestry Operations:

13) **Timber Harvesting** – Approx. Month/Year of Treatment: 138 sites

Name & City of Logger(s): _____

Logger Certification (check all that apply):

FL Master Logger- 112 AL Pro Logger- 10 GA Master Timber Harvester- 6

Harvest System (check all that apply):

Clearcut- 121 Select Cut- 16 Row Thin- 13 Seed Tree- 0 Salvage- 13 Fuel Chip- 15

Receiving Mills:

Pulp- 137 Sawmill- 107 Veneer- 4 Poles- 17

14) **Site Preparation** – Approx. Month/Year of Treatment: 113 sites

Name & City of Contractor(s): _____

Site Prep System (check all that apply):

Non-Intensive Mechanical- 45 Intensive Mechanical- 80 Prescribed Burn- 18

Pre-Plant Chemical Treatment- 85 Post-Plant Chemical Treatment- 1

Pre- AND Post- Plant Chemical Treatment- 14 Timber Stand Improvement- 0

15) **Regeneration** – Approx. Month/Year of Treatment: 64 sites

Name & City of Contractor(s): _____

Regeneration System (check all that apply):

Conventional Machine Planting- 30 V-Blade Planting- 6 Hand Planting- 34

Aerial/Ground Seeding- 0 Natural Regeneration- 0

16) **Primary Merchantable Timber Species Harvested** (check all that apply):

Loblolly Pine- 35 Slash Pine- 95 Longleaf Pine- 9 Sand Pine- 10

Other Pine Species- 1 Hardwood- 26 Cypress- 5 Eucalyptus- 0

17) **Forest Species Planted** (check all that apply):

Loblolly Pine- 21 Slash Pine- 37 Longleaf Pine- 13 Sand Pine- 0

Other Pine Species- 0 Hardwood- 2 Cypress- 0 Eucalyptus- 0

18) Are Forested Wetland Roads &/or Stream Crossings to be evaluated on this site?

Yes- 43 No- 142

19) Emergency Operations? Yes- 19 No- 166 ➔ If yes, check all that apply:

Wildfire- 2 Natural Disaster- 17 Insects- 0 Disease- 0 Other- 0

Are all evaluated forestry operations completed? Yes- 156 No- 29

Appendix 2: Detailed Survey Results

Part III: Waterbody Characteristics – 146 waterbodies

(Attach an additional copy of Part III and Part IV, Section A for each waterbody adjacent to the operation evaluated on this site.)

Site Sensitivity Class (SSC) of Waterbody:

A1- 50 A2- 69 A3- 7 A4- 2 A5- 0 A6- 1
 B1- 1 B2- 3 B3- 0 B4- 0 B5- 0 B6- 1
 C1- 0 C2- 12 C3- 0 C4- 0 C5- 0 C6- 0

20) Name of Waterbody, if known:

Named- 63 Unnamed or Unknown- 83

21) If Stream, indicate Stream Order:

1st Order- 78 2nd Order- 26 3rd Order- 8 4th Order- 1 5th or Higher- 8

22) Indicate type and size of waterbody and its SMZ requirement:

(Refer to pages 7-14 and Appendix 1 of the 2008 Silviculture BMP Manual)

Waterbody Type	Count	Required SMZ Width (Feet)		Average Actual SMZ Width (Feet)	
		Primary Zone	Secondary Zone	Primary Zone	Secondary Zone
Perennial Stream < 20 ft Wide	34	35	Required Secondary Zone Width Depends Upon the Site Sensitivity Class	66.5	38.8
Perennial Stream 20-40 ft Wide	9	75		89.4	37.8
Perennial Stream ≥ 40 ft Wide	5	200		201.0	0
Perennial Stream: OFW, ONRW, Class I	4	200		200.0	0
Perennial Lake (1)	15	35		49.3	28.7
Perennial Lake (1): OFW, ONRW, Class I	0	200		N/A	N/A
Perennial Sinkhole	1	35		35.0	0
Perennial Sinkhole: OFW, ONRW, Class I	0	200		N/A	N/A
Intermittent Lake (1)	3	Stringer		Stringer	51.7
Intermittent Lake (1): OFW, ONRW, Class I	0	200		N/A	N/A
Intermittent Stream	69	Stringer		Stringer	52.3
Intermittent Stream: OFW, ONRW, Class I	0	200		N/A	N/A
Intermittent Sinkhole	6	Stringer		Stringer	40.0
Intermittent Sinkhole: OFW, ONRW, Class I	0	200		N/A	N/A
Measure or estimate total linear water "frontage" under "Primary Zone" treatment: 245,775 ft. (46.55 miles)					

(1) Lakes 2 acres or larger only.

23) Are any Exceptions to the Primary Zone Management Criteria from the BMP Manual Appendix 11 being applied for perennial waterbodies on this site?

(Evaluate compliance in Part IV, Section A)

Yes- 5 No- 63

24) Total SMZ area designated as "Primary Zone":

435.36 Acres

(Linear Water Frontage x Primary Zone Width ÷ 43,560)

Appendix 2: Detailed Survey Results

PART IV: BMP Applications

A. Special Management Zones (SMZs) – 90 sites (Refer to pages 3-14 of the 2008 BMP Manual – Attach additional copies of Part III and Part IV, Section A of the Implementation Survey for each waterbody evaluated on this site.)				
Primary Zone ☐ N/A Applies to Perennial Streams, Lakes, and Sinkholes (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Width of the Primary Zone meets the minimum required for waterbody size and type?	N/A	68	0	0
Was Timber Harvesting Conducted <u>Within</u> the Primary Zone? (If “No” Skip Questions 2-6.)				
2. Timber harvesting limited to selective cutting only? (N/A if clearcut exception applied.)	N/A	9	0	0
3. Selective harvesting maintained at least 50% of the fully stocked stand?	N/A	9	0	0
4. Residual stand “mirrored” previous stand or was at least 10% pine?	N/A	9	0	0
5. Avoided re-entering a previously harvested Primary Zone to conduct additional harvesting?	N/A	3	0	0
6. Left all trees uncut in stream channel and on immediate stream banks?	N/A	18	0	0
7. Kept mechanical site preparation out of the Primary Zone?	N/A	18	1	0
8. Limited pesticide application within Primary Zone to approved methods?	N/A	11	0	0
9. Limited fertilizer application within Primary Zone to approved methods?	N/A	0	0	0
10. Kept log loading decks, landings, and log bunching points out of the Primary Zone?	N/A	54	0	0
11. Avoided new road construction within the Primary Zone, except for designated stream crossings?	N/A	0	0	0
12. Restricted site preparation burns to slopes with less than 18%?	N/A	10	0	0
13. Kept main skid trails out of Primary Zone, except for designated stream crossings?	N/A	52	0	0
14. Kept pre-suppression plowed firelines out of the Primary Zone?	N/A	3	0	0
15. Located fertilizer transfer/loading areas outside of the Primary Zone?	N/A	0	0	0
16. Cleaned spray equipment from pesticide and fertilizer applications outside of Primary Zone?	N/A	34	0	0

Appendix 2: Detailed Survey Results

A. Special Management Zones (SMZs) - Continued				
Primary Zone Exceptions ☐ N/A (If N/A, check box and move on to the next practice.) Refer to Appendix 11, pages 105-107 of the 2008 BMP Manual for explanation of Exceptions.	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
17. Exception # 1, "SMZ Greater Than 10% of Tract Area", correctly applied?	N/A	0	0	0
18. Exception # 2 "Managed Pine Timber", correctly applied?	N/A	5	0	0
19. Exception # 3a "Add-On", correctly applied?	N/A	0	0	0
20. Exception # 3b "Stand Quality Improvement", correctly applied?	N/A	0	0	0
Secondary Zone ☐ N/A (If N/A, check box and move on to the next practice.)				
21. Kept mechanical site preparation out of the Secondary Zone?	N/A	32	0	0
22. Kept log loading decks and landings out of the Secondary Zone?	N/A	83	0	0
23. Avoided new road construction within the Secondary Zone, except for designated stream crossings?	N/A	0	0	0
24. Restricted site preparation burns to less than 18% slopes?	N/A	21	0	0
25. Kept main skid trails out of the Secondary Zone, except for designated stream crossings?	N/A	83	0	0
26. When possible, avoided pre-suppression plowed firelines within the Secondary Zone?	N/A	7	0	0
27. Cleaned spray equipment from pesticide and fertilizer applications outside of the Secondary Zone?	N/A	55	0	0
Stringer ☐ N/A Applies to Intermittent Streams, Lakes ≥ 2 ac, & Sinkholes (If N/A, check box and move on to the next practice.)				
28. Provided a continuous and connected canopy?	N/A	73	0	0
29. Left all trees in stream channel/banks?	N/A	72	0	0
30. Minimized disturbance to stream banks?	N/A	70	0	0
Totals for Category		799	1	0
Compliance for Category		99.9%		

Appendix 2: Detailed Survey Results

B. Operations Occurring Within Forested Wetlands – 14 sites (Refer to pages 17-21 of the 2008 BMP Manual.)				
General Wetland BMPs ☐ N/A (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Maintained hydrologic conditions/drainage of wetlands?	N/A	14	0	0
2. Kept waterbodies located within the wetland free of logging debris?	N/A	1	0	0
Wetland Roads and Crossings ☐ N/A (If N/A, check box and move on to the next practice.)				
3. Minimized number of wetland crossings?	N/A	7	0	0
4. Permanent roads only for purposes allowed in the BMP Manual (Page 18)?	N/A	6	0	0
5. Avoided constructing above-grade fill roads?	N/A	3	0	0
6. Fill road properly culverted to allow adequate stormflow, normal sheetflow, etc.?	N/A	4	0	0
Harvesting in Wetlands where Cypress is Predominant ☐ N/A (If N/A, check box and move on to the next practice.)				
7. Left cypress as leave trees?	N/A	2	0	0
8. Leave trees represent the upper limit of the range for wetland harvest units? (i.e. < 200 ac. or ≥ 200 ac.)	N/A	2	0	0
9. Pond cypress trees cut at the approximate average high water mark?	N/A	2	0	0
Harvesting Occurring Within a Wetland Area Less Than 200 Acres in Size ☐ N/A (If N/A, check box and move on to the next practice.)				
10. If leave tree option applied, left 3-5 “leave trees” per acre?	N/A	3	0	0
11. If 10% harvesting option applied, left 10% of the harvest area as selectively cut?	N/A	2	0	0
12. Retained all snags that safety and harvesting operations allowed?	N/A	4	0	0

Appendix 2: Detailed Survey Results

B. Operations Occurring Within Forested Wetlands – Continued				
Harvesting Occurring Within a Wetland Area Greater Than or Equal To 200 Acres in Size (If N/A, check box and move on to the next practice.) ☐ N/A	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
13. Left 1-2 “leave trees” per acre in the older age class?	N/A	5	0	0
14. Retained all snags that safety and harvesting operations allowed?	N/A	5	0	0
15. Limited clearcut size to 160 acres or less?	N/A	4	0	0
16. Left a 200 ft. selectively cut buffer with an average tree height of at least 20 ft. between clearcut areas?	N/A	2	1	0
17. Are multiple clearcuts within any 160 ac. block separated by a 100 ft. buffer? (Buffer may be selectively cut. No additional leave trees are required.)	N/A	0	0	0
Harvesting Occurring Within Small Isolated Wetlands (< 2 Ac.) (If N/A, check box and move on to the next practice.) ☐ N/A				
18. Left at least 20% unharvested where 5 or more isolated wetlands <2 acres each exist within a harvest unit?	N/A	1	0	0
19. Have previously harvested isolated wetlands reached an average tree height of at least 20 feet prior to re-entry to harvest remaining isolated wetlands in harvest unit?	N/A	0	0	0
Harvesting Occurring Within a Flowing Wetland (If N/A, check box and move on to the next practice.) ☐ N/A				
20. Extended SMZ 50 feet into the flowing wetland?	N/A	2	0	0
21. Clustered “leave trees” along centerline of flow-way?	N/A	2	0	0
Skidding (If N/A, check box and move on to the next practice.) ☐ N/A				
22. Minimized number of MAIN skid trails within wetland area?	N/A	12	0	0
23. Avoided widespread and excessive rutting?	N/A	12	0	0
24. Concentrated skid trails in organic wetland soils?	N/A	12	0	0
25. Used low ground pressure equipment or specialized harvesting techniques when wet harvesting conditions were unavoidable?	N/A	5	0	0
26. When possible, limited forestry operations in wetlands to dry conditions or low-water conditions?	N/A	11	0	0

Appendix 2: Detailed Survey Results

B. Operations Occurring Within Forested Wetlands – Continued (Refer to pages 17-21 of the 2008 BMP Manual.)				
Mat (Shovel) Logging (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
27. Width of skid trail mats minimized to no more than 20 feet (on the average)? Exceptions apply to equipment passage.	N/A	3	0	0
28. Skid trail mats are no closer than 200 feet apart (on the average)? (If tracked machines used under excessively wet conditions: spacing reduced to 50 feet; and area of mats does not exceed 25% of harvest area.)	N/A	3	0	0
29. Timber for mats laid down in direction of the trail?	N/A	3	0	0
30. Was the appropriate number of layers of timber used to prevent site disturbance?	N/A	3	0	0
31. Merchantable timber used in skid trail mats removed after logging operation?	N/A	3	0	0
32. Were skid trail mats used for stream crossings consistent with Stream Crossing Section? (See Stream Crossing Section of BMP Manual)	N/A	0	0	0
Totals for Category		138	1	0
Compliance for Category		99.3%		

Appendix 2: Detailed Survey Results

C. Operations Adjacent to Canals – 3 sites (Refer to pages 22-23 of the 2008 BMP Manual.)				
General BMPs (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. During normal silvicultural operations, avoided heavy equipment operation within canal?	N/A	3	0	0
2. Established canal crossing(s) only when necessary?	N/A	1	0	0
3. Installed canal crossing(s) properly? (See Stream Crossing Section)	N/A	1	0	0
4. Left canal free of excessive logging slash?	N/A	2	0	0
5. Avoided direct surface water discharge into a canal as the result of site preparation activities?	N/A	2	0	0
6. Avoided damage to the canal bank?	N/A	3	0	0
7. Avoided discharging pesticides (not approved for aquatic use), fertilizer, or other pollutants into canal?	N/A	2	0	0
Canal Maintenance (If N/A, check box and move on to the next practice.)				
8. Minimized canal maintenance activities?	N/A	0	0	0
9. Canal re-dredging conducted during periods of low flow?	N/A	0	0	0
10. Minimized disturbance to canal banks to retain as much “streamside” vegetation as possible?	N/A	0	0	0
11. Applied proper erosion/sediment control practices where necessary?	N/A	0	0	0
12. Road maintenance adjacent to canal conducted properly? (i.e. Road spoil discharged away from canal-side of road.)	N/A	1	0	0
Totals for Category		15	0	0
Compliance for Category		100%		

Appendix 2: Detailed Survey Results

D. Operations Adjacent to Sinkholes – 8 sites (Refer to page 24 of the 2008 BMP Manual.)				
General Sinkhole BMPs (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Avoided placing logging debris, trash or waste into sinkhole or in drainage feature flowing into sinkholes?	N/A	7	1	0
2. Avoided mechanical operations (harvest or site preparation), fertilization, and pesticide use within sinkholes?	N/A	8	0	0
3. Avoided altering adjacent land surface to discharge into sinkholes?	N/A	8	0	0
Totals for Category		23	1	0
Compliance for Category	95.8%			

Appendix 2: Detailed Survey Results

E. Forest Roads – 176 sites (Refer to pages 25-27 of the 2008 BMP Manual.)				
New Road Planning & Construction BMPs (If N/A, check box and move on to the next practice.) ☐ N/A	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Carefully planned location and desired drainage features before construction?	N/A	2	0	0
2. Avoided construction operations during wet conditions?	N/A	2	0	0
3. Road properly designed for traffic load and use?	N/A	2	0	0
4. Properly balanced cut/fill ratio?	N/A	0	0	0
5. Fill road shoulders properly sloped?	N/A	0	0	0
6. Road banks properly stabilized?	N/A	0	0	0
7. Critical segments of road stabilized?	N/A	2	0	0
Road Drainage ☐ N/A (If N/A, check box and move on to the next practice.)				
Drainage Structures Evaluated (check all that apply): Cross-Drain Culverts- <u>40</u> Cross Ditches- <u>6</u> Road Ditches- <u>84</u> Water Bars- <u>15</u> Ditch Plugs- <u>0</u> Water Turnouts- <u>26</u> Hard Surface Crossings- <u>14</u>				
8. Drainage structure installed properly?	N/A	117	0	0
9. Road surface drainage directed away from waterbodies/wetlands?	N/A	100	2	0
Road Maintenance ☐ N/A (If N/A, check box and move on to the next practice.)				
10. Drainage structures free of major obstructions?	N/A	95	2	0
11. Closed or restricted traffic on roads whenever possible?	N/A	171	0	0
12. Stabilized critical segments?	N/A	107	0	0
Totals for Category		598	4	0
Compliance for Category		99.3%		

Appendix 2: Detailed Survey Results

F. Stream Crossings – 36 sites (Refer to pages 28-30 of the 2008 BMP Manual.)					
General Stream Crossing BMPs (If N/A, check box and move on to the next practice.)	☐ N/A	In compliance? (Check One)			Sig. Risk
		N/A	Y	N	
1. Minimized number of stream crossings on site?		N/A	35	0	0
2. Crossed the stream perpendicular to the flow?		N/A	35	0	0
3. Located stream crossing(s) on narrow section of stream?		N/A	35	0	0
4. Located crossing(s) on a straight segment(s) of stream?		N/A	35	0	0
5. Stabilized erodible fill material and other areas normally exposed to flowing water?		N/A	28	0	0
6. Avoided construction during high water conditions?		N/A	2	0	0
Culverts (If N/A, check box and move on to the next practice.)	☐ N/A				
7. Culvert properly installed?		N/A	25	0	0
8. Culvert size adequate to accommodate normal flow?		N/A	25	0	0
9. Repaired or replaced damaged culverts?		N/A	5	1	0
10. Kept culvert openings free of debris and/or obstructions?		N/A	22	0	0
11. Temporary culvert size sufficient for expected seasonal flow conditions?		N/A	0	0	0
12. Temporary culvert removed immediately after operation?		N/A	0	0	0

Appendix 2: Detailed Survey Results

F. Stream Crossings - Continued (Refer to pages 28-30 of the 2008 BMP Manual.)					
Hard Surface Crossings (If N/A, check box and move on to the next practice.)	☐ N/A	In compliance? (Check One)			Sig. Risk
		N/A	Y	N	
Type of Armoring Material(s) Used for Hard Surface Crossings (check all that apply): None- <u>4</u> Limerock- <u>7</u> Gravel- <u>0</u> Concrete- <u>0</u> Slag- <u>0</u> Logs- <u>0</u> Other- <u>2 (stones)</u>					
13. Used non-petroleum based material for armoring?	N/A	7	0	0	
14. Stream bottom/banks appropriate for this type of crossing?	N/A	10	0	0	
15. Used clean material with size, weight, and texture of armoring material suitable to stream flow?	N/A	7	0	0	
16. Avoided stream impoundment with crossing installation?	N/A	9	0	0	
17. Removed temporary materials after completion of operation?	N/A	1	0	0	
Totals for Category		281	1	0	
Compliance for Category		99.6%			

Appendix 2: Detailed Survey Results

G. Timber Harvesting Operations (Non-Wetlands) – 133 sites (Refer to page 31 of the 2008 BMP Manual.)				
Skidding & Skid Trail BMPs (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
☐ N/A	N/A	Y	N	
1. To the extent possible , located skid trails along the contour?	N/A	128	0	0
2. When contour skidding was not possible, skid wood uphill instead of down?	N/A	46	0	0
3. When skidding up slopes, avoided long continuous skid trails?	N/A	46	0	0
4. Installed appropriate drainage structures properly?	N/A	1	0	0
5. Stabilized critical segments as needed?	N/A	6	0	0
6. Concentrated skid trails in organic soils ?	N/A	5	0	0
7. Dispersed skid trails in mineral soils ?	N/A	133	0	0
Slash Disposal (If N/A, check box and move on to the next practice.)	☐ N/A			
8. Removed logging slash from intermittent and perennial streams and lakes?	N/A	22	0	0
9. Avoided pushing and piling logging slash into cypress ponds or strands, swamps, marshes, grassy ponds or waterbodies such as streams, lakes, sinkholes, or similar water resource features?	N/A	132	0	0
Totals for Category		519	0	0
Compliance for Category		100%		

Appendix 2: Detailed Survey Results

H. Site Preparation & Tree Planting Operations – 113 sites (Refer to page 32 of the 2008 BMP Manual.)				
General Site Preparation BMPs (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Applied appropriate site preparation techniques for the site?	N/A	113	0	0
2. Kept intensive mechanical site preparation out of wetlands?	N/A	77	1	0
3. To the extent possible , drum chopping conducted perpendicular to waterbody?	N/A	19	0	0
4. Windrows and soil beds arranged parallel to waterbodies and/or wetlands in order to provide a barrier to overland flow, prevent concentration of runoff, and reduce erosion?	N/A	65	0	0
5. Kept equipment blade above the soil surface when shearing or pushing and piling debris?	N/A	73	0	0
6. Avoided pushing and piling logging debris into cypress ponds, strands, marshes, streams, lakes, or similar water resource features?	N/A	82	0	0
Totals for Category		429	1	0
Compliance for Category		99.8%		

Appendix 2: Detailed Survey Results

I. Fireline Construction – 9 sites (Refer to page 33 of the 2008 BMP Manual.)					
General BMPs (If N/A, check box and move on to the next practice.)	☐ N/A			In compliance? (Check One)	Sig. Risk
	N/A	Y	N		
1. Used existing barriers (roads, waterbodies, etc.) as firelines where practical?	N/A	9	0	0	
2. Used alternatives to plowed lines such as foam, harrowing, wet lines, permanent grass, when feasible?	N/A	5	0	0	
3. Avoided plowing lines through wetlands, marshes, and savannas?	N/A	3	0	0	
4. Minimized plow depth?	N/A	5	0	0	
5. When crossing waterbodies, raised the equipment and avoided connecting the line directly to the waterbody?	N/A	0	0	0	
6. Avoided firelines which act as drainage systems, particularly those that might connect or drain isolated wetlands?	N/A	5	0	0	
7. To the extent possible , constructed firelines on land contours?	N/A	6	0	0	
8. Stabilized critical segments of firelines with appropriate drainage structure when necessary?	N/A	0	0	0	
Structures Evaluated (check all that apply): None- <u>9</u> Cross Ditches- <u>0</u> Water Turnouts- <u>0</u> Water Bars- <u>0</u> Vegetation- <u>0</u> Other- <u>0</u>					
Totals for Category		33	0	0	
Compliance for Category		100%			

Appendix 2: Detailed Survey Results

J. Pesticide & Fertilizer Applications – 100 sites (Refer to pages 34-35 of the 2008 BMP Manual.)				
Pesticide Use BMPs ☐ N/A (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
Pesticide(s) Used (check all that apply): Arsenal- <u>22</u> Chopper- <u>75</u> Garlon- <u>49</u> Oust- <u>17</u> Velpar- <u>0</u> Accord- <u>8</u> Polaris- <u>8</u> Escort- <u>36</u> Oustar- <u>1</u> Roundup- <u>11</u> Milestone VM Plus- <u>0</u> Razor Pro- <u>0</u> Tahoe- <u>0</u> Other- <u>4 (Unknown)</u> This is a (check all that apply): Pre-Planting Treatment- <u>85</u> Post-Planting Treatment- <u>1</u> Pre- AND Post- Planting Treatment- <u>14</u> Timber Stand Improvement- <u>0</u>				
1. Directed pesticide only to the targeted area?	N/A	100	0	0
2. Pesticide containers removed from site?	N/A	100	0	0
3. Cleaned spray equipment away from waterbodies and wetlands?	N/A	99	0	0
Fertilizer Use BMPs ☐ N/A (If N/A, check box and move on to the next practice.)				
Fertilizer(s) Applied (check all that apply): Diammonium Phosphate (DAP)- <u>2</u> Urea- <u>0</u> Triple Super Phosphate (TSP)- <u>0</u> Other- <u>7 (Liquid 10-34-00)</u> This is a (check all that apply): Pre-Planting Treatment- <u>0</u> Post-Planting Treatment- <u>9</u>				
4. Timing of fertilizer application conducive to maximizing effectiveness of nutrient uptake?	N/A	9	0	0
5. Fertilization does not exceed application limits given on page 35 of BMP Manual?	N/A	9	0	0
Totals for Category		317	0	0
Compliance for Category		100%		

Appendix 2: Detailed Survey Results

K. Waste Disposal Activities – 185 sites (Refer to page 36 of the 2008 BMP Manual.)				
Used Oil Disposal BMPs (If N/A, check box and move on to the next practice.) ☐ N/A	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Used oil properly collected and stored temporarily on-site during equipment maintenance and removed after operation?	N/A	180	0	0
2. Avoided discharging used oil or pollutants on the ground, in sinkholes, wetlands, or waterbodies (including canals)?	N/A	183	0	0
Solid Waste Disposal BMPs (If N/A, check box and move on to the next practice.) ☐ N/A				
3. Kept solid waste out of streams, waterways and wetlands?	N/A	182	0	0
4. Removed trash, litter, solid waste, chemical containers, fluids, hoses, batteries, and tires from site upon completion of operation?	N/A	177	2	0
Totals for Category		722	2	0
Compliance for Category		99.7%		

Appendix 2: Detailed Survey Results

L. Wet Weather Operations – 108 sites (Refer to page 37 of the 2008 BMP Manual.)					
General BMPs (If N/A, check box and move on to the next practice.)	☐ N/A			In compliance? (Check One)	Sig. Risk
	N/A	Y	N		
1. When possible, avoided heavy equipment operation during flooded or wet soil conditions?	N/A	108	0	0	
2. When wet conditions are unavoidable, used low ground pressure equipment or alternatives to conventional skidding?	N/A	3	0	0	
3. Avoided operating heavy equipment in floodplains with standing or flowing floodwater?	N/A	11	0	0	
Totals for Category		122	0	0	
Compliance for Category		100%			

Appendix 2: Detailed Survey Results

M. Emergency Operations – 19 sites (Including hurricanes, tornadoes, etc. - Refer to page 38 of the 2008 BMP Manual.)				
Wildfire / Natural Disasters / Insect & Disease Outbreaks (If N/A, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
☐ N/A				
1. Sensitive segments of firelines stabilized as necessary after emergency operation?	N/A	1	0	0
2. Sensitive segments of skid trails stabilized as necessary after emergency operation?	N/A	0	0	0
3. Stream crossings stabilized as necessary after emergency operation?	N/A	2	0	0
4. Pesticide use within the SMZ conducted according to the label and limited to the extent necessary to protect and maintain forest health?	N/A	2	0	0
5. Sensitive segments of access roads stabilized as necessary after emergency operation?	N/A	16	0	0
6. Mechanical site prep within the SMZ limited to only those techniques which are necessary to return the site to a productive, protective condition?	N/A	0	0	0
7. Salvage harvesting within the SMZ limited to the extent necessary to protect and maintain forest health?	N/A	2	0	0
8. Were exceptions to the Wetland and SMZ leave tree criteria properly implemented for areas with an exotic/invasive tree infestation?	N/A	0	0	0
Totals for Category	23	0	0	
Compliance for Category	100%			

Appendix 2: Detailed Survey Results

N. Public Lands – 28 sites (Refer to page 16 of the 2008 BMP Manual.)				
Were any Waterbodies with a Required Primary Zone Present? Yes- <u>22</u> No- <u>6</u> (If No, check box and move on to the next practice.)	In compliance? (Check One)			Sig. Risk
	N/A	Y	N	
1. Areas within SMZ designated as Primary Zone managed as no cut unless for ecological restoration or habitat enhancement?	N/A	22	0	0
Totals for Category		22	0	0
Compliance for Category		100%		

Appendix 3: April 2007 FDEP Silviculture BMP Initial Verification Letter



**Florida Department of
Environmental Protection**

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Charlie Crist
Governor

Jeff Kottkamp
Lt. Governor

Michael W. Sole
Secretary

April 10, 2007

Mr. Rich Buddell, Director
Office of Agricultural Water Policy
Florida Department of Agriculture and Consumer Services
1203 Governors Square Blvd., Suite 200
Mail Stop GS-50
Tallahassee, FL 32301-2960

Dear Rich:

In accordance with ss. 403.067(7)(c)3, F.S., the Department has reviewed the requirements in Chapter 5I-6, F.A.C., entitled "Best Management Practices (BMPs) for Silviculture" along with the referenced BMP manual. We are providing an initial verification of these BMPs, except for fertilization BMPs, based on best professional judgment. We are able to provide this initial verification based on numerous factors. These factors include our active participation in the development of the BMP manual and rule, our long history of BMP implementation and compliance monitoring, and the biological assessments of the effectiveness of forestry BMPs. It is the consensus of the agency staff and of the Silviculture TAC, which is comprised of stakeholders from silviculture, environmental and regional government interest groups throughout the state, that the BMPs in this rule comprise the most practical and cost effective way to achieve the desired pollutant load reduction from silviculture lands around the state. In addition, all parties recognize that additional verification monitoring at representative sites or the development of new information or technologies may lead to the future revision of this rule.

In summary, pursuant to ss. 403.067(7)(c)3, F.S., the Department is providing initially verification of the effectiveness of the BMPs within Chapter 5I-6, F.A.C, based on Best Professional Judgment. We look forward to working with your staff and the growers to monitor the water quality improvements associated with the implementation of these BMP treatment trains. If you have any questions, please do not hesitate to let me know.

Sincerely,

A handwritten signature in black ink that reads "Jerry Brooks".

Jerry E. Brooks
Deputy Director
Division of Water Resource Management

JEB/el/h

"More Protection, Less Process"
www.dep.state.fl.us

Appendix 4: March 2018 FDEP Silviculture BMP Confirmatory Verification Letter



Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

March 7, 2018

Mr. Jeffrey Vowell, Assistant Director
Florida Forest Service
Florida Department of Agriculture and Consumer Services
The Conner Building
3125 Conner Boulevard
Tallahassee, Florida 32399

Dear Mr. Vowell,

In April 2007, The Department of Environmental Protection (DEP) provided initial verification of the silviculture BMPs 403.067(7)(c)3.F.S. and requirements Chapter 51-6, F.A.C. entitled, "*Best Management Practices for Silviculture*" except for fertilization BMPs, based on best professional judgement.

The DEP has completed ground water verification monitoring of the fertilization BMPs listed in the manual. A silvicultural fertilization BMP effectiveness monitoring project was conducted for four and a half years (October 2008 to March 2013), at two study locations having contrasting leaching potential, to observe the environmental fate of nitrogen applied at various amounts relative to BMP guidelines. The purpose of this monitoring was to determine if the adopted fertilization practices, as implemented on an industry-wide basis, are effective in keeping average nitrate concentrations in ground water below 10 mg/L.

Nitrate concentrations were greater than the reference well concentrations by 1.2 mg/L following the first fertilization and by 1.4 mg/L at the time of the second fertilization. However, the maximum nitrate concentration during the 52-month monitoring period was 1.6 mg/L, not excessive in terms of water quality, and did not exceed state drinking water quality standards.

Given the results of this monitoring effort, the Department believes that the verification monitoring results demonstrate that fertilizer BMPs, as presented in the Silviculture BMP Manual, are effective in keeping nitrate-N concentrations in ground water to acceptable levels, for silviculture practices presented in the BMP manual.

Appendix 4: March 2018 FDEP Silviculture BMP Confirmatory Verification Letter

It should be noted that the current Silviculture BMP Manual does not specifically address BMPs for fertilizer applications for pine straw production. Based on the results of a recent study described in the attached document, it appears that fertilization for pine straw production may have adverse impacts on groundwater quality. The Department has concluded that additional water-quality research is needed to determine any detrimental impacts to water quality, should pine straw production practices be included in future revisions of the "*Best Management Practices for Silviculture*" Manual.

In summary, pursuant to ss.403.067(7)(c)3., the DEP is providing confirmatory verification effectiveness of the fertilization BMPs described in the "*Best Management Practices for Silviculture*", 2008 Manual, based on verification monitoring results in the attached document. All parties recognize that additional verification monitoring at representative sites or the development of new information or technologies may lead to the future revision of this rule. We look forward to working with your staff and the silviculture producers to continue to monitor any water quality effects associated with the implementation of this BMP. If you have any questions, please do not hesitate to let us know.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Tom Frick', is positioned above the typed name.

Tom Frick
Director
Division of Environmental Assessment and Restoration