

# STATUS OF STATE FORESTRY BEST MANAGEMENT PRACTICES FOR THE SOUTHEASTERN UNITED STATES

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**Abstract**—Forestry Best Management Practices (BMPs) are important measures for protecting the waters of the U.S., but few studies have compared monitoring strategies and implementation success of forestry BMPs across states. In order to assess the status of state forestry BMPs, a survey was sent to the state forestry agency in each U.S. state regarding their forestry BMP program. The survey included questions pertaining to agency involvement in developing BMP guidelines, rates of BMP implementation, monitoring methods, and the nature of state BMP guidelines (whether non-regulatory, quasi-regulatory, or regulatory). Surveys were completed by all 50 states and results allowed evaluation of the status and implementation of forestry BMPs by state and region. This paper will focus on survey responses from the thirteen southern states represented by the Southern Group of State Foresters. All thirteen southeastern states have conducted BMP monitoring and have future monitoring of BMPs planned. Eleven states have conducted or are currently conducting BMP effectiveness studies. All the southeastern states have conducted BMP implementation studies and the mean implementation rate is 92 percent which is above the mean national implementation rate of 91 percent. Seven states have non-regulatory BMP guidelines, five states have quasi-regulatory guidelines, and one state has regulatory guidelines. This study indicated that some states reported BMP deficiencies for some individual BMP categories, yet these states' average BMP implementation levels appear to be satisfactory.

## INTRODUCTION

Forestry best management practices (BMPs) were formulated from the passage of the Federal Water Pollution Control Act (FWPCA) of 1972 and have evolved overtime as the states develop new BMP guidelines and revising existing guidelines (Edwards and Stuart 2002, Archey 2004, Phillips and Blinn 2004). The EPA required states to develop either regulatory or non-regulatory BMP programs in 1977 (Ice and others 2004). Section 319 of the reauthorization of the FWPCA of 1987 required states to report to the U.S. Congress on the status and impacts of non-point source pollution (Novotny 2003).

Forestry BMP regulations in the southeastern U.S. are generally non-regulatory; however, some states have quasi-regulatory BMPs (Aust and Blinn 2004). Quasi-regulatory BMPs normally consist of non-regulatory BMP guidelines, but fines may be associated with water quality issues from forest operations. Forestry BMP monitoring and implementation may vary by region or state. However, in the southeastern U.S., the Southern Group of State Foresters (SGSF) developed an approach for monitoring and implementation (Ice and others 2010). The SGSFs main goal for their forestry BMP approach in the south is to provide leadership and support to state forestry agencies to protect water quality (Southern Group of State Foresters 2012).

There are few studies evaluating forestry BMP implementation on a national or regional level. The SGSF publishes reports on BMP implementation of their 13 states with their last report in 2012. The overall BMP implementation rate was 87 percent in 2008 and 92 percent in 2012 (Southern Group of State Foresters 2012). The National Association of State Foresters (NASF) also conducts BMP surveys that evaluate the status of state developed and implemented forestry BMPs on a national scale. The NASF conducted five BMP surveys from 1992 to 2004 (Edwards and Stuart 2002, Archey 2004). Their surveys evaluated implementation rates, monitoring, policies, agency involvement, regulations, legislation, effectiveness studies, and other topics. The 2004 report conducted by Archey (2004) found that the mean implementation rate for twenty-seven states that reported data was 91 percent. The objective of this project is to redo the 2004 NASF survey to get an updated perspective on the status of state forestry BMPs nationwide. The survey results from the thirteen southeastern states are reported in this paper.

## MATERIALS AND METHODS

An online survey was used to obtain the status and implementation of state forestry BMPs in the United States. The initial survey was developed in March 2012 by the National Association of State Foresters (NASF)

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and was based on a previous survey conducted by the NASF in 2004 (Archev 2004). The developed survey was altered so that it could be converted to an online survey using Survey Monkey in February 2013. The survey had to be approved by the Virginia Tech Institutional Review Board (VT IRB) before sending out the survey. The VT IRB also had to approve pre-notice and follow-up e-mails. The survey was approved in March 2013 and pre-notice letters were e-mailed on April 15<sup>th</sup>, 2013 to the lead state forester in each state. The pre-notice letters described the upcoming survey and included directions to pass the survey to the appropriate forest water quality personnel in their state. The survey was then e-mailed to the lead state forester on April 17<sup>th</sup>, 2013. The survey was closed out in December of 2013. Responses to the survey were downloaded into Microsoft Excel and Microsoft Access for formatting and presenting the results.

## RESULTS AND DISCUSSION

Forestry BMP regulation in the southeastern states consisted of seven non-regulatory states, five quasi-regulatory states, and one regulatory state (table 1). All 13 states reported that they have BMP manuals and that they conduct forestry BMP implementation studies. Most recent BMP implementation study years ranged from 2010 to 2012 and the overall state BMP implementation rates ranged from 84 percent to 99 percent (table 1). Although state BMP implementation rates were high, some states reported lower (below state BMP implementation rate range) BMP

implementation rates for individual BMP categories such as skid trails, stream crossings, wetlands, mechanical site preparation, and prescribed burning (table 2). Average implementation rates for forest roads, skid trails, stream crossings, and prescribed burning were all below the overall southeastern average of 92 percent. These categories of BMPs are of particular concern because they are forest operations that have been found to have relatively high potential erosion rates (roads, skid trails, site preparation, and firelines) or because of their close proximity to bodies of water (stream crossings, wetlands). Although the BMP implementation scores are higher than in previous years, these finding indicate the continuous need for attention to BMP implementation, particularly are these critical areas.

State forestry agencies are the lead agency in monitoring forest operations for BMP implementation in the southeastern U.S. (table 3). States reported that most recent BMP monitoring year ranged from 2008 to 2013 and the next planned monitoring year range was from 2013 to 2015. All of the southeastern states monitor sites post-forest operation; however, some states also reported that they monitor sites pre-forest operation, and during-forest operations. The post operation visits have the advantage of allowing the inspection personnel to monitor the sites after BMPs have been implemented. However, if the inspector detects some issue that needs modification it becomes more difficult to task logging contractors with return site

**Table 1—Southeastern survey results for forestry BMP regulation, BMP manual year, implementation rate (%), and implementation year**

State	State regulation	BMP manual	Implementation rate (%)	Implementation year
Alabama	Quasi-regulatory	2007	97	2010
Arkansas	Non-regulatory	2002	87	2011
Florida	Quasi-regulatory	2008	99	2011
Georgia	Non-regulatory	2009	97	2011
Kentucky	Regulatory	2008	94	2012
Louisiana	Non-regulatory	2000	96	2012
Mississippi	Non-regulatory	2008	91	2010
North Carolina	Quasi-regulatory	2006	85	2011
Oklahoma	Non-regulatory	1991	95	2010
South Carolina	Quasi-regulatory	2012	91	2012
Tennessee	Non-regulatory	2003	84	2010
Texas	Non-regulatory	2010	95	2011
Virginia	Quasi-regulatory	2011	90	2012

**Table 2—Forestry BMP implementation rate results by individual BMP categories. Minimum, maximum, average, and number of states that reported data for that specific BMP category**

BMP category	Minimum (%)	Maximum (%)	Average (%)	Number of states
Timber harvest	88	99	95.0	8
Forest roads	84	99	91.3	13
Skid trails	75	100	89.7	10
Log landings	92	100	95.8	9
Stream crossings	72	98	89.2	13
SMZs	86	98	93.2	13
Wetlands	70	100	94.1	9
Reforestation	95	100	97.6	7
Mechanical site preparation	74	99	91.6	9
Chemical site preparation	93	100	98.6	8
Pesticide	98	100	99.6	5
Fertilizer	100	100	100.0	2
Prescribed burning	60	100	87.4	8
Wildfire suppression	100	100	100.0	2
Wildfire rehabilitation	100	100	100.0	1
Public lands	94	100	97.8	5

**Table 3—States that reported when they monitor BMPs, next planned monitoring, agencies that are involved in monitoring, and phase of forest operations that sites are monitored**

State	Most recent year	Next planned year	Agencies involved	When sites monitored
Alabama	2012	2014	Forestry	PR, D, PO
Arkansas	2011	2015	Forestry	PO
Florida	2011	2013	Forestry	D, PO
Georgia	2013	2013	Forestry	D, PO
Kentucky	2012	2013	Forestry	D, PO
Louisiana	2012	2015	Forestry	PO
Mississippi	2010	2014	Forestry	PO
North Carolina	2008	2014	Forestry	D
Oklahoma	2010	2014	Forestry	PO
South Carolina	2012	2015	Forestry	PO
Tennessee	2010	2015	Forestry	PO
Texas	2011	2014	Forestry	PO
Virginia	2012	2013	Forestry	PO

PR, pre-forest operation; D, during-forest operation; PO, post-forest operation

visits, therefore there are some advantages to both pre and post closure site visits.

Eleven of the southeastern states reported that they have conducted BMP effectiveness studies (table 4). Majority of the eleven states completed these effectiveness studies between 2012 and 2013. Five states reported that they have ongoing BMP effectiveness studies and four states have effectiveness studies planned for the future. The effectiveness studies are conducted mostly by the state forestry agencies and academia. These finding indicate that research personnel are clearly involved in BMP research and that it could be advantageous for additional coordination between state forestry personnel, academics, and loggers. BMP workshops have been used commonly for logger and forester continuing education programs and we recommend that state forestry agencies continue to involve academic researchers in these programs.

## CONCLUSION

The mean BMP implementation rate is 92 percent for the southeastern states and the mean national implementation rate is 91 percent. The implementation rates for the southeastern states are similar to what the SGSFs reported in their 2012 report which was also 92 percent (Southern Group of State Foresters 2012). However, the national and southeastern survey results indicate that there may be potential deficiencies in some individual BMP categories for some state BMP programs. Mean state implementation rate is an

average over all the individual guidelines evaluated by each state and potential deficiencies are not noticeable until the implementation results are broken down by individual BMP categories. Some of the individual BMP categories with low BMP implementation rates would be forest roads, skid trails, wetlands, stream crossings, mechanical site preparation, and prescribed burning. Overall, state forestry BMP programs in the southeastern U.S. are effectively protecting forest water quality by having high implementation rates, updated BMP guidelines and manuals, monitoring BMPs every couple of years, and conducting BMP effectiveness studies.

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**Table 4—States that reported that they have conducted BMP effectiveness studies in the past, the year of the most recent completed effectiveness study, if the state has any current effectiveness studies, the next planned effectiveness study, and agencies that are or have conducted effectiveness studies**

State	Previous study	Most recent study	Current study	Next planned study	Agency
Alabama	Yes	2012	No	NR	NR
Arkansas	Yes	2006	No	NR	A
Florida	Yes	2013	Yes	2013	F,A
Georgia	Yes	2012	Yes	NR	A, NGO
Kentucky	Yes	2013	No	NR	A,O
Mississippi	Yes	2013	No	2014	F
North Carolina	Yes	2012	Yes	2013	F
Oklahoma	Yes	2012	Yes	NR	A
South Carolina	Yes	NR	No	NR	NR
Texas	Yes	2007	No	2015	F
Virginia	Yes	2012	Yes	NR	F, A

NR, none reported; A, academia; F, forestry; E, environmental; O, other; NGO, non-government organization

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