Protecting Water Quality through State Forestry Best Management Practices

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Activities for which BMPs have been developed include:

- *Harvest Planning*
- *Skid Trails*
- *Log Landings*
- *Log Roads*
- *Wetland Harvesting*
- *Site Preparation*
- *Prescribed Fire*
- *Reforestation*
- *Stream Crossings*
- *Streamside Management Zones*

Overview

In order to provide a national-level evaluation of the effectiveness of best management practices (BMPs), NASF conducts periodic surveys of all state programs. This report, which incorporates data collected during 2013, is the sixth survey of its kind. This report aims to provide justification for increased investments of public funding and resources in these state-led programs.

The National Association of State Foresters (NASF) represents the directors of all 50 state forestry agencies in the United States, the District of Columbia and eight territories. These agencies are responsible for directly protecting and managing, or assisting in the protection and management of, the nation's state, local government and privately owned forestland. These ownerships account for 67 percent of the forestland in the United States, more than 500 million acres.[1]

The lands under state forester jurisdictions produce myriad public benefits—clean air and water, beauty and recreation, wildlife habitat and wood products. Significantly, these forests filter over 50 percent of the nation's drinking water.[2]

[1] USDA Forest Service, *Future of America's Forest and Rangelands* – 2010 RPA Assessment
[2] USDA Forest Service, *Future of America's Forest and Rangelands*

Trees and Forestry Positively Influence Water Quality

The United States Environmental Protection Agency's (EPA) National Assessment Database summarizes sources of water quality impairment from around the country. These sources of impairment are the activities, facilities, or conditions that generate pollutants that keep waters from meeting the criteria adopted by the states or the EPA under the federal Clean Water Act (CWA) to protect designated uses.

Of all of the sources listed (physical changes, crop production, animal production, forestry, resource extraction, municipal/industrial, natural and unspecified/unknown), forestry accounts for significantly less impairment than any other source. On rivers and streams, for example, forestry practices account for only 2.9 percent of all impairment. The next lowest category of impact is "all natural sources combined", which is responsible for five percent of all impairment. Municipal/industrial activities account for one quarter of all water quality impairment.[3]

Many water supply districts around the country have acknowledged that when properly managed, forested watersheds effectively reduce the cost of water purification. The cities of New York and Portland, Oregon are two well-known examples.

Reflecting the water quality benefits associated with forest cover on the landscape and the relatively low impact of forest management activities to our nation's water quality, normal silvicultural activities have been exempt from permitting requirements under the CWA since the 1970s. EPA regulations provide exemptions for certain silviculture activities under the CWA Section 404, covering the discharge of dredge or fill material in to waters of the United States, and Section 402, covering the discharge of a pollutant in to waters of the United States.

More recently, the Agricultural Act of 2014 (Farm Bill) codified silvicultural exemptions in the CWA's Section 402 and clarified that a National Pollutant Discharge Elimination System (NPDES) permit is not required for any discharge associated with covered silviculture activities, including those associated with logging roads.

Forestry Best Management Practices (BMPs)

State forestry agencies developed best management practices (BMPs) starting in the 1970s. BMPs are effective, affordable, and practical measures implemented to protect water quality when undertaking silvicultural activities. Forestry BMPs have been evaluated, tested, revised, and adapted over time by each state.

Forestry BMPs are inherently linked to water quality. The CWA recognizes BMPs as the most viable pathway to address nonpoint source pollution that originates from various land management activities. Each state implements BMP programs according to the nature of its forest industry, landowner characteristics, ecological conditions and accepted socio-political approaches.

The overall success of a forestry BMP program depends on having a proactive approach. The aim of state forestry agencies and our partners is to prevent water quality problems before they arise, rather than rely solely on correcting problems once they occur. This approach has resulted in high BMP implementation rates as described below.

2013 BMP Program Survey

This project was conducted by a team of researchers from Virginia Polytechnic Institute and State University (Virginia Tech). The Department of Forest Resources and Environmental Conservation team was led by Dr. W. Mike Aust and included Dr. Chad Bolding, Dr. Scott Barrett and graduate student Richie Cristan.

A comprehensive survey was developed in consultation with NASF and completed by all 50 states. The original questionnaire and an interactive survey map with research findings will be made available on the NASF website at www.stateforesters.org.

[3] USDA Forest Service, *National Report on Sustainable Forests* – 2010

For more than 35 years, Florida has been monitoring forestry operations to determine voluntary BMP implementation rates.

During the last 15 years of monitoring, Florida has exceeded 95 percent implementation across all BMP categories, statewide.

In 2004 Florida landowners were offered an option to voluntarily enroll their lands under a Notice of Intent, which provides them with a "presumption of compliance" with the state's water quality standards – if they implement BMPs.

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Over five million acres have been enrolled since the inception of this new program.

In 2014, Florida was the first state in the South to develop specific, forestry-related BMPs to protect state imperiled wildlife species.

These wildlife BMPs are voluntary, and other government agencies are legislatively prohibited from adopting or enforcing rules or regulations that would impose these practices on landowners.

Primary survey goals include:

- Identify which silvicultural activities are covered by BMPs
- Catalogue the approaches to BMP implementation adopted by each state and the agencies responsible
- Determine to what extent effectiveness monitoring is being carried out
- Summarize BMP implementation rates; and
- Determine the current level of budget and staffing dedicated to forest-related water quality protection

In addition, there is growing recognition of the positive interactions between levels of forest certification in a state and the use of BMPs, so the questionnaire attempts to explore this interaction further.

The research team also prepared a comprehensive literature review of the latest research on BMP effectiveness.

Key Findings

- State forestry agencies play a key leadership role in assuring that silvicultural practices adequately protect water quality and quantity;
- Even though approaches to BMP implementation differ widely from state to state they are effectively providing protection. Monitoring shows that implementation rates average 91 percent nationwide. Acknowledging the appropriateness of diversity in BMP approaches has been one of the keys to success;
- Forest certification programs such as the Sustainable Forestry Initiative (SFI) have made important contributions to improved BMP implementation through logger training, landowner outreach, and water quality requirements;
- BMP monitoring is recognized by agencies, researchers and the public as an important information source about the interaction between forest management and water quality. This has increased the demand for robust monitoring and data analysis by states. Unfortunately, the availability of federal resources to support state BMP programs has not kept pace with the increased demands on these programs.

State Forestry Agencies Lead in the Application of Forest-related Water Protection Programs

All 50 states indicated that there is a state BMP manual in which the state forestry agency either led its development or was heavily involved in its development. Forty-four states indicated that the state agency is the lead organization for the general development and administration of BMP programs.

Kentucky and Minnesota indicated that other agencies in their states serve as the designated lead for forestry BMP programs.

Tennessee, Nebraska, Mississippi, and Hawaii indicated that there is no designated lead for BMP programs, though all four reported having at least some staffing and budget available in this area.

Thirty-nine agencies have conducted BMP monitoring within the last three years, but seven of those did not report results for this survey. Thirty-three have conducted or fund BMP effectiveness research and 18 have ongoing studies.

Updating BMP recommendations to reflect the best available science is an important aspect of state forestry responsibilities. As a result of this ongoing study of effectiveness and the science behind BMPs, 36 states indicated that BMPs had been revised within the last 10 years.

Diverse Programs Yield Successful Results

Nationwide, BMP implementation rates are good. Thirty-two states reported on implementation surveys conducted between 2005 and 2013. Thirteen of those reported overall implementation at 95 percent or better. Eight states had rates that ranged from 90 percent to 94 percent and the remaining 11 were at 80 percent and above.

Not every state conducts implementation monitoring, but most have at least some anecdotal sense as to whether forest management activities pose a risk to water quality and an understanding of how that risk can be mitigated. For example, the Missouri Department of Conservation's Forestry Division does not have the authority to conduct logging site inspections; rather it finances a robust logger training and Missouri Master Logger Certification program in which Certified Master Loggers are subject to field audits for implementation of BMPs.

Further analysis of the data reveals high implementation rates for such practices as logging roads, streamside management zones, skid trails and log landings. The mean implementation rates for all of these, regardless of whether a program was regulatory, quasi-regulatory or voluntary, was more than 87 percent. An area showing room for improvement is stream crossings where only 14 states had implementation at greater than 90 percent, nine were from 80 percent to 89 percent in implementation and six ranged from 67 percent to 78 percent, while three had no report on stream crossings.

Eleven additional states indicated ongoing BMP monitoring but they do not produce statistics from these assessments. Seven other states conduct no forestry BMP monitoring. In most of those instances a relatively minor amount of forested acres and low levels of silvicultural management might cause a state to focus its resources on monitoring land management activities with a higher risk to water resource protection.

These implementation results were produced using a variety of approaches. Eleven states have some form of a forest practices law or silvicultural BMP legislation. Twenty states are strictly voluntary and promote the use of BMPs through training and education. Nineteen programs are quasi-regulatory, in that state law specifies a desired outcome (for example, no degradation of water quality), but does not prescribe the BMPs to be used. When comparing implementation rates among these three different approaches the differences are not predictable.

In all scenarios, state forestry agencies report that logger training/certification programs have proven to be a key element in strengthening the acceptance, adoption, and use of forestry BMPs. Much of the logger training in the last 10 years is directly tied to the increased adoption of independent forest certification programs, to which many of the large forest products manufacturing companies subscribe. The SFI Standards in particular require the use of trained logging professionals and require Program Participants to support logger training programs. In fact, through the end of 2013, more than 150,000 loggers have completed training programs offered through SFI Implementation Committees.[4] Based on the results of the SFI annual progress report survey conducted in 2013, data which is third-party audited, over 92 percent of raw material used by SFI Certified Program Participants was delivered by trained logging professionals.

These tables compare states that are "quasi-regulatory", "non-regulatory", and "regulatory" showing the percent of implementation results generated for some of the most common BMPs.[5] All states that provided data are shown in the table and the states that were unable to contribute are listed at the bottom of each subsection:

BMP implementation is highly successful nationwide, due in large part to states managing their forestry BMP programs in a way that is tailored to meet their needs in protecting water resources and supporting sustainable forestry.

Non-Regulatory

State	State Average	Timber Harvest	Forest Roads	Skid Trails	Log Landings	Stream Crossings	SMZs	Wetlands	Reforestation	Mech Site Prep	Chem Site Prep	Pesticide	Fertilizer	Prescibed Burn	Wildfire Supp	Wildfire Rehab	Public Lands
Arkansas	87	95	85	-	-	84	86	-	95	74	100	-	-	80	-	-	-
Colorado	87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Georgia	97	98	94	95	99	93	95	97	100	95	100	100	100	84	100	-	98
Indiana	84	86	95	78	91	74	82	82	-	-	-	-	-	-	-	-	87
Louisiana	96	96	96	96	96	96	96	96	96	96	-	-	-	-	-	-	-
Minnesota	83	-	86	-	90	91	71	87	-	92	75	75	-	78	-	-	-
Mississippi	91	-	84	84	94	92	94	95	-	-	-	-	-	-	-	-	-
Oklahoma	95	92	94	75	96	93	96	100	97	97	100	100	-	93	-	-	97
South Dakota	96	91	94	94	100	98	90	-	-	-	-	100	-	100	-	-	97
Tennessee	84	-	88	85	92	82	88	70	-	-	-	-	-	-	-	-	-
Texas	95	-	95	98	99	85	90	98	96	98	98	98	-	94	-	-	-
Utah	84	89	85	89	87	86	70	51	87	100	-	-	-	76	-	-	100
Wyoming	94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	90.2	92.4	90.5	88.2	94.4	88.5	87.1	86.2	95.2	93.1	94.6	94.6	100.0	86.4	100.0	-	95.8
n	13	7	11	9	10	11	11	9	6	7	5	5	1	7	1	-	5

[4] http://www.sfiprogram.org/files/pdf/2014-sfi-progress-report-spreads/
[5] Table provided by Richie Cristan, Virginia Polytechnic Institute and State University graduate student who collected and analyzed the data

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Quasi-Regulatory

State	State Average	Timber Harvest	Forest Roads	Skid Trails	Log Landings	Stream Crossings	SMZs	Wetlands	Reforestation	Mech Site Prep	Chem Site Prep	Pesticide	Fertilizer	Prescibed Burn	Wildfire Supp	Wildfire Rehab	Public Lands
Alabama	97	98	93	-	-	96	97	-	-	98	98	-	-	98	-	-	-
Florida	99	99	99	100	100	98	98	99	99	99	100	100	100	100	100	100	100
Maine	90	90	89	89	97	81	93	93	-	-	-	-	-	-	-	-	-
Michigan	91	-	91	87	99	86	94	91	-	-	-	-	-	-	-	-	-
Montana	98	99	97	99	100	94	97	100	100	-	-	-	-	97	-	-	99
North Carolina	85	-	84	82	-	72	91	-	-	-	-	-	-	-	-	-	94
Ohio	80	85	83	73	81	78	81	81	-	-	-	-	-	-	-	-	-
South Carolina	91	94	98	-	-	81	92	-	100	93	93	100	-	60	-	-	100
Vermont	82	-	94	84	70	68	86	91	-	-	-	-	-	-	-	-	-
Virginia	90	-	85	90	94	92	92	92	-	74	100	-	-	90	-	-	-
Wisconsin	90.8	98	84	84	-	-	93	95	-	-	-	-	-	-	-	-	-
Average	90.3	94.7	90.6	87.6	91.6	84.6	92.2	92.8	99.7	91.0	97.8	100.0	100.0	89.0	100.0	100.0	98.3
n	11	7	11	9	7	10	11	8	3	4	4	2	1	5	1	1	4

Regulatory

State	State Average	Timber Harvest	Forest Roads	Skid Trails	Log Landings	Stream Crossings	SMZs	Wetlands	Reforestation	Mech Site Prep	Chem Site Prep	Pesticide	Fertilizer	Prescibed Burn	Wildfire Supp	Wildfire Rehab	Public Lands
Alaska	98	98	95	-	99	97	99	-	-	-	-	-	-	-	-	-	-
California	93	-	96	95	93	83	98	-	-	-	-	-	-	-	-	-	-
Idaho	99	99	98.5	99	99	100	90	100	-	98	100	100	100	-	-	-	99
Kentucky	94	88	92	92	92	96	96	100	-	-	-	-	-	-	-	-	-
Maryland	86	81	93	78	98	67	82	93	-	-	-	-	-	-	-	-	99
Oregon	95	98	98	96	99	71	96	88	100	98	98	98	98	100	-	-	96
Washington	88	-	85	-	85	85	-	95	-	-	-	-	-	-	-	-	-
West Virginia	94	85	94	96	98	96	96	96	-	-	-	-	-	-	-	-	-
Average	93.4	91.5	93.9	92.7	95.4	86.9	93.9	95.3	100.0	98.0	99.0	99.0	99.0	100.0	-	-	98.0
n	8	6	8	6	8	8	7	6	1	2	2	2	2	1	-	-	3

National

State Average	Timber Harvest	Forest Roads	Skid Trails	Log Landings	Stream Crossings	SMZs	Wetlands	Reforestation	Mech Site Prep	Chem Site Prep	Pesticide	Fertilizer	Prescibed Burn	Wildfire Supp	Wildfire Rehab	Public Lands
91.1	93.0	91.5	89.1	93.9	86.7	90.7	90.9	97.0	93.2	96.5	96.8	99.5	88.5	100.0	100.0	97.2
32	20	30	24	25	29	29	23	10	13	11	9	4	13	2	1	12

The Missouri Department of Conservation's Division of Forestry began funding logger training through the Missouri Forest Products Association in the early 1990's.

Early on they recognized that properly trained loggers can be a key to implementing water quality best management practices during tree harvest.

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The level of forest industry activity, ownership patterns, ecological conditions and the cultural background that shapes each state's preferred approaches to governance vary widely across the country. For example, Oregon's comprehensive Forest Practices Act requires notification of harvest and the use of prescribed BMPs, but not the approval of harvest plans which California's Forest Practice Act does require. West Virginia's law requires notification. Tennessee's does not, but it identifies harvest areas and has conducted implementation monitoring four times since 1996.

The Link Between Forest Certification and State Programs

The National Association of State Foresters recognizes forest certification as making positive contributions to sustainable forestry, as noted in a resolution passed by the full membership in 2013.[6]

In states with a significant forest industry presence, the interaction between forest certification and the implementation and continued development of BMPs has been positive. Forest certification requires BMPs to be followed and businesses be third-party audited to verify their conformance to the standard.

The SFI Fiber Sourcing Program specifically requires a primary producer, such as a sawmill or pulpmill, to verify that the sawlogs or pulpwood utilized by their facility have been harvested with use of state adopted BMPs, regardless of whether they come from certified lands, and regardless of whether those BMPs would otherwise be voluntary in that state. This has been an important driver in the growth of logger training and landowner outreach efforts that have improved BMP implementation, which ultimately contributes to improved water quality.

[6] http://www.stateforesters.org/sites/default/files/publication-documents/2013-2%20NASF%20Resolution%20Forest%20Certification.pdf

The Interaction Between Federal Lands and State Programs

In 2012 the USDA Forest Service published the technical guide "National Best Management Practices for Water Quality Management on National Forest System Lands."[7] The Forest Service has a long history of working with states and other partners to use and monitor BMPs. Local agency practice is to generally adopt the BMPs for the state in which the National Forest System land is located. However, with the reduction of timber harvests from National Forests, the greatest risk to water resources is from a lack of funding for ongoing road or trail closure and maintenance, and risks from effects of uncharacteristically severe wildfires that expose wide expanses of bare soil which can become hydrophobic and accelerate erosion thereby negatively impacting water quality.[8]

Baseline Funding for State Programs Is Not Keeping Pace with Needs, Expectations and Opportunities

Many state forestry BMP programs were initiated and continue to be sustained through the use of federal funds provided by the EPA as authorized under Clean Water Act Section 319. For example, in the 13-state Southern Region, there are eight states that rely upon the 319 Grant Program to sustain forestry BMP program delivery.[9] In 2003, Title III of the Healthy Forest Restoration Act authorized a Watershed Forestry Assistance Program that would have been available to state forestry agencies. Unfortunately the authority was never funded as a result of redirecting funds to support wildfire control efforts, and the program was deauthorized in the 2014 Farm Bill.

Beyond the declining availability of 319 Grant funds, and lack of a direct funding pathway from the USDA Forest Service to support water-related programs, the individual states must bear the costs for delivering BMP programs. USDA Forest Service funds for landowner assistance are provided under the Forest Stewardship Program. Assistance can include technical information about BMPs, but usually covers other forest management activities.

Funding of the Forest Stewardship Program has been reduced by more than 30 percent over the past four years from $32.5M in fiscal year (FY) 2011 to $22.4M in FY 2014. Likewise, the Urban and Community Forestry Program could have positive impacts on protecting water quality through the promotion of green infrastructure in urban and suburban landscapes. That program also struggles to maintain an adequate federal appropriation.

The availability of state forestry agency personnel devoted to BMP programs is also concerning, as states continue to be challenged to "do more with less" when it comes to delivering forestry services to landowners. As an example, in the 13-state Southern Region, the state forestry agencies reported 53 full-time equivalents (FTEs) devoted exclusively to BMPs or water quality program delivery.

These states also reported that an additional 29 FTEs would be needed to more effectively deliver BMP and water quality services to customers. Considering that the Southern Region contains more than 200 million acres of the nation's forests, a strong case could be made that a higher level of personnel who are engaged solely with BMP and water resource protection programs would prove beneficial, not only in the Southern Region, but across the major forested areas of the United States.

As with federal budgets, state budgets have seen consistent recent declines making it difficult for states to maintain the core elements of water resources programs capable of addressing the interests of stakeholders across the spectrum. Stakeholders want assurance that BMP programs achieve outcomes that best serve beneficial uses whether they are:

- Aquatic biological resources;
- Recreational resources; or
- Drinking water quality and quantity

Participants in forest certification programs rely on up-to-date implementation monitoring to validate that their promotion of BMPs is successful. The EPA continues to grapple with legal questions that need sound scientific input as well as a clear picture of the extent and efficacy of state forestry water resource programs.

[7] USDA Forest Service Publication Number FS-990a, *National Best Management Practices for Water Quality Management on National Forest System Lands. Volume 1: National Core BMP Technical Guidance, April 2012.*

[8] Washington Department of Ecology, *Washington State and USDA Forest Service's Forest Management Agreement*, Focus Number 00-10-048, November, 2000

[9] Southern Group of State Foresters, Water Resources Committee, *Water Quality Staff Funding Survey Report*, 2010

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Since that time nearly 100 five-day "Professional Timber Harvester" courses have trained nearly 1000 loggers. This commitment to professionalism led to the creation of the Missouri Logging Council and Master Logger Certification. To be certified loggers agree to random field audits where the implementation of best management practices is verified, giving the goal of water quality protection an extra set of eyes in the woods.

Credits

Written by the National Association of State Foresters (NASF) in collaboration with Virginia Polytechnic Institute and State University

Funded by NASF, the USDA Forest Service and the Sustainable Forestry Initiative, Inc.'s Conservation and Community Partnerships Grant Program

Photography by NASF Foundation fellow Leslie Robertson

Recommendations

There is a clear need and significant justification for increasing federal dollars in support of state forestry water resources programs.

Key elements of a forest water resources program include:

- A lead watershed specialist;
- Up-to-date BMP implementation monitoring covering the states' comprehensive set of forest operations and conditions;
- Ongoing BMP effectiveness research;
- Periodic assessments of the health and condition of riparian forests;
- A program component dealing with urban forests and water;
- Functional Institutions for coordination between the various agencies and stakeholder groups with an interest in forest-related water resource issues;
- Formalized education and training for landowners, loggers and resource managers;
- A process for receiving and responding to complaints and resolving conflicts.

Many states have a BMP program in place that includes most of these elements, and all states need additional resources to ensure that they adequately address the full range of key elements.

In addition, there is a compelling case for more support of national level cooperative efforts among the 50 states to work on such needs as:

- More regular implementation of the national BMP survey
- Establishment of principles that can be used in the development of monitoring protocols.

The most logical programs for providing these funds are Section 319 of the Clean Water Act and/or through a dedicated funding pathway from the State & Private Forestry/Cooperative Forestry Programs of the USDA Forest Service. However, states must remain vigilant in seeking state-allocated funds and other non-traditional funding opportunities to support forestry BMP programs, monitoring, studies, training, and overall program services.

Actions

The National Association of State Foresters calls on partners, stakeholders, and decision-makers to:

- Recognize the importance of forests to the nation's supply of clean water and the critical role of sustainable forest management in ensuring the continued delivery of all benefits derived from forests;
- Understand that state forestry agency BMP programs are vital to the continued ability of forests to serve as the nation's source of clean water, and that these programs are tailored to meet society's needs for sustainable sources of fiber, wood and renewable energy fuels;
- Acknowledge that substantial federal investments are warranted to address the ongoing interests of stakeholders and water users, and to deliver the best possible set of protection measures; and
- Help states achieve an adequate federal commitment and investment that will ensure the quality and quantity of the nation's water supply now and for all future generations.

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