Program to Improve the Adoption Rates and Efficiency of Best Management Practices to Protect Oklahoma Waters from Nonpoint Source Pollution

CA # C9-996100-14, FY 2008, §319(h), Project 16

Oklahoma Conservation Commission

Task 2: Proper Application of Forestry Best Management Practices Final Report

Oklahoma Forestry Services
Department of Agriculture, Food, and Forestry

June 30, 2011

Introduction

The following summary constitutes the final report of activities performed by Oklahoma Forestry Services (OFS), a division of the Department of Agriculture, Food, & Forestry, under Task 2 of the Oklahoma Conservation Commission's FY 2008 Section 319(h) Nonpoint Source Project 16. The project's overall goal was to increase the use of forestry best management practices and thereby help protect water quality in Oklahoma. The project is in direct support of Forestry Services' water quality management program. The financial support provided by EPA and administered through the Conservation Commission is gratefully acknowledged.

The overall Task included a variety of forest water quality related activities that were carried out from July 2008 through June 2011. Actual accomplishments under each of the numbered subtasks are described below.

16.2.a QAPP

The Quality Assurance Project Plan covering measurement of BMP compliance was completed on September 30, 2008. Final EPA Region VI approval was obtained on December 18, 2008 with Q-Trak #09-026.

16.2.1.1 In cooperation with the Arkansas Timber Producers Association, conduct BMP training for loggers, foresters and landowners (3 workshops targeted).

BMP workshops are one of many methods used by state foresters to raise awareness within the forestry community about water quality issues and the importance of protecting water quality during implementation of forestry practices. According to Oklahoma's 2010 BMP compliance monitoring (page 5), BMP implementation rates are significantly higher on tracts where contractors have been exposed to BMPs. On those sites, the overall implementation rate was 93%, compared to a 69% rate on sites where loggers were not very familiar with these practices. Loggers that had attended a BMP workshop achieved an implementation rate of 94%, compared to a rate of 81% when they had not.

Forest certification programs, including the Sustainable Forestry Initiative (SFI), have also created an economic incentive for logging contractors to attend BMP training. In order for SFI member forest product companies to meet the requirements of these 'green certification' programs, logging contractors are mandated to attend BMP training, obtain Master Logger Certification and maintain their credentials through continuing education in many cases. BMP workshops not only raise general awareness of water issues, but also provide the tools necessary for loggers to reduce their impacts on the state's water resources. The proof of the effectiveness of these workshops is documented in follow-up compliance monitoring results.

In Oklahoma and Arkansas, BMP workshops are organized primarily by the Arkansas Timber Producers Association (ATPA). The workshops included in the Task were developed and presented jointly by Darryl Hunkapillar, OFS Water Quality Forester, and George Lease of ATPA, with some also involving OSU Extension Forester Dr. Craig McKinley. Workshops include a basic orientation to Oklahoma's Forestry BMP Guidelines and many of them include on-site exposure to these practices during a field trip. An agenda from one of these workshops is included below. Although workshops are targeted for loggers, both landowners as well as foresters are invited to attend. During the project period, ten (10) workshops were presented, as listed in Table 1.

Table 1. BMP Workshops

Workshop Location	Date	Number of Attendees
Stilwell	7/24/08	18
McAlester	10/2/08	5
Idabel	10/9/08	28
Tahlequah	12/4/08	9
Antlers	3/26/09	80
Eagletown	6/11/09	35
Idabel	10/8/09	35
Smithville	10/20/09	33
Eagletown	2/27/2010	9
Idabel	10/7/2010	30
Total	**10 Workshops**	**282**

A sample agenda for the BMP Workshop held in Idabel on October 8, 2009 is shown below:

AGENDA
BEST MANAGEMENT PRACTICES WORKSHOP
MUSEUM OF THE RED RIVER - IDABEL, OKLAHOMA
Thursday, October 8, 2009
3:00 p.m. to 6:00 p.m.

Welcome and Introductions
George Lease, Director of Logger Training, Arkansas Timber Producers Association

Incorporating BMPs in Your Management Plan
Dr. Craig McKinley, Professor and Extension Forestry Specialist, OSU

BMPs and Environmental Concerns
Roger Griffin, Environmental Manager, Weyerhaeuser Company

Break

BMPs and Cost-Share Programs
David Litterst, District Forester, Oklahoma Forestry Services

Water Quality Issues
George Lease, ATPA

Video – Water Quality and BMPs for Logging in Oklahoma

Break

Examples of Best Management Practices
Darryl Hunkapillar, Water Quality Forester, Oklahoma Forestry Services

Distribute Certificates

16.2.1.2 Forestry Services will conduct "tailgate" sessions in the woods with loggers and landowners to discuss BMPs on-site (5 tailgate sessions targeted).

Logger tailgate sessions offer an opportunity to discuss BMPs and water quality issues on a logging site in a non-threatening manner to make contractors more aware of the impacts of their activities on the landscape and how to minimize their impacts on water quality. Five (5) on-site tailgate sessions for loggers were conducted. The first was on September 22, 2008 in Lincoln County. A logger tailgate session held in Cherokee County on December 8, 2009 included discussion of timber bridge mats. Three tailgate sessions were held in McCurtain County (photo at right). The sessions held on March 12 and March 25, 2010 involved 26 Weyerhaeuser Company site preparation contractors. In addition, we conducted five (5) tailgate discussions with landowners or their representatives as part of the BMP compliance monitoring project, in each case to help them address a water quality related issue on their property.

16.2.1.3 Forestry Services will use BMP demonstration areas to showcase best management practices to landowners, loggers and foresters. Hold at least one meeting on the BMP demonstration road near Daisy.

In June 2009, we completed repairs of several BMPs on the Caney Mountain Trail demonstration road near Daisy, Oklahoma. These practices were installed on this road in the 1990s using an EPA grant. On June 13, in cooperation with the OSU Extension Forester, we held a BMP workshop for members of the Oklahoma Woodland Owners Association (OWOA) on this site with 20 landowners attending (photo at right). The group also visited the property of Ed Hurliman, a forestry consultant and landowner near Daisy, who discussed the forest management practices and road BMPs he uses on his own lands.

Water quality issues and BMPs were also briefly incorporated into a second OWOA landowner workshop, held in Broken Bow on May 20, 2011.

The water quality benefits of forest site preparation practices, including ripping on the contour after harvesting, were included in discussions during an Environmental Quality Incentives Program Field Day for 32 NRCS personnel held on June 14, 2011 at Talihina (photo at left).

16.2.1.4 Forestry Services will provide one-on-one technical assistance to landowners in priority watersheds to address water quality issues (provide assistance to at least 100 landowners).

Agency foresters prepared Forest Stewardship plans for **146** landowners through March 2010. Each Stewardship plan contains recommendations on the use of forestry BMPs to protect water quality. We provided follow-up technical assistance to many of these landowners as they implemented recommended practices. We assisted one additional landowner in the Honey Creek Watershed in Delaware County on August 20, 2009, in support of OCC representative Marti Mefford. This discussion included using BMPs on a woods road and at two stream crossings.

16.2.1.5 Print and distribute existing "Fact Sheets" and BMP Guidelines that support BMP implementation.

Forestry Services relies on current and relevant publications to provide to landowners, loggers and others to continue to raise awareness of water issues and the forestry BMPs.

Forestry Notes: We completed a series of water quality "fact sheets" (sample at right) and distributed copies to OFS foresters and Conservation Districts (copies included in the Appendix). We posted these on the agency's website (www.forestry.ok.gov/waterpublications) and provided individual copies on request. Five *Forestry Notes* cover roads and stream crossings associated with eastern Oklahoma's commercial forests:

- Introduction to Road Stream Crossings
- How to Install a Forest Road Culvert
- A Handy Gauge for Forest and Farm Road Construction Measurements
- Constructing Small Rocked Fords on Forest and Farm Roads
- Designing and Constructing Large Rocked Fords on Forest Streams

Forestry Note:

INTRODUCTION TO ROAD STREAM CROSSINGS

This Forestry Note presents guidelines and tips on the factors to consider in planning forest and farm road stream crossings and sources for information on design and construction.

Landowners often need to cross streams on their property. Crossing streams may adversely impact water quality. Crossings may add sediment, destabilize stream banks or cause channel erosion. Using these stream crossing guidelines will minimize these impacts. They are useful on large and small streams, including ephemeral streams (channels that may carry water only during rainstorms). Temporary crossings can be used for short-term access for logging or other management work.

Common stream crossings for both permanent and temporary use include rocked or concrete fords, culverts and bridges. Fords are natural or constructed "hard bottoms" and vehicles may run through the water. Culverts are commonly used to cross small streams. They are usually corrugated steel, aluminum or plastic pipe or heavy-walled steel pipe. Proper size and placement are critical. Bridges vary in expense and design. Temporary crossings consist of all the above as well as portable bridges, log structures, timber mats or even steel flat cars.

Crossing Tips

- Plan roads to minimize the need to cross streams.
- Cross streams at right angles with straight approaches and gentle grades.
- Minimize bank and channel disturbance during construction.
- Avoid construction during periods of high water flow.
- Stabilize disturbed areas as needed.

Choosing the Type of Crossing Structure

- How large and how steep is the stream?
- How large an area is drained?
- Is the channel deep and narrow or broad and shallow?
- Is the area rocky or does it have fine soils?
- How much and what kind of traffic will use the crossing?
- How much money is available?
- What kind of contractors and equipment are available in the area?

Example of well-designed rocked ford crossing

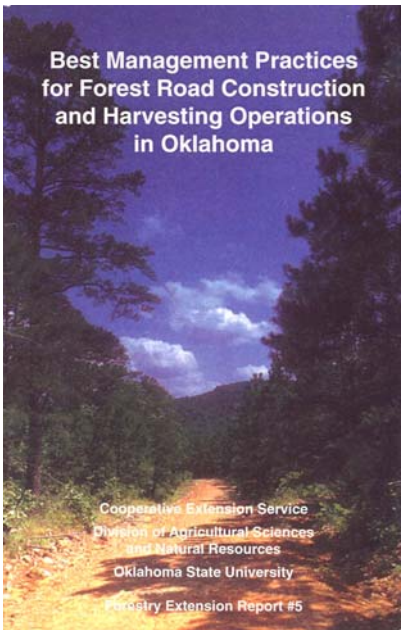
Choosing the type of structure often depends on site conditions at the crossing.

- More rock means less erosion and thus less protection is needed.
- Low wet crossings need local drainage.
- Where culverts and bridges would need a lot of fill, a ford may be preferable.

The remaining three *Forestry Notes* describe methods for stabilizing gullies in central and western Oklahoma using trees in combination with other low-cost practices:

- Stabilizing Gully Walls and Bottoms with Deflectors and Trees
- Low-Cost Gully Control Using Fiber Mat and Trees
- Side-Gully Control

OSU Forest Road Booklet: We updated and reprinted the BMP Booklet on forest roads (shown at right) in cooperation with the OSU Extension Forester and the Oklahoma Forestry Association in June 2009. Copies of these booklets are provided to attendees of BMP workshops and are included in forest management plans for landowners as applicable (copy included in the Appendix).



Forestry BMP Guidelines: We continued a revision of Oklahoma's Forestry BMP Guidelines in cooperation with members of the BMP Committee. The Committee last met on July 16, 2009 to discuss the revision and their comments were incorporated. We met with Dr. Don Turton, OSU Forest Hydrologist, in August 2010 and again in June 2011 to discuss his interest in helping finalize the BMP revision and with future educational program efforts.

A preliminary draft of the revised BMP Guidelines is included as an Appendix to this report. Forestry Services will continue to coordinate the revision with the BMP Committee and will collaborate with OSU on final publication during calendar year 2011 using financial support from other state and private sources.

Forestry BMP Compliance Monitoring - Introduction

To determine the effectiveness of the State's BMP education and training efforts, Oklahoma Forestry Services conducts BMP compliance monitoring every two to three years following a protocol developed by the Southern Group of State Foresters. Tracts to be evaluated are selected at random and visited by a trained forester using a standard checklist to determine the extent to which BMPs were used. This system is not a Pass-Fail method, but instead evaluates whether the operator employed BMPs effectively on the site when and where they were called for. This system is not meant to be punitive, but instead is used for educational purposes with a goal to improve overall forestry BMP implementation in Oklahoma.

Each monitored tract is evaluated individually, and the results are reported to the logging contractor and landowner. Where shortcomings are found or problems noted, the Water Quality Forester takes advantage of this 'teachable moment' and makes the parties aware of how to improve implementation as well as how to correct any problems noted, especially those that might result in a water quality impact. We also offer follow-up assistance to the logger and the landowner as needed.

The results from all completed evaluations are compiled and analyzed to identify recurring problems and opportunities for improvement. We incorporate this information into ongoing BMP workshops, targeted educational efforts and BMP revisions in an iterative process.

The BMP compliance monitoring project included three subtasks, each of which is listed below. Completion of this project represented the third round of BMP compliance monitoring conducted in Oklahoma. More detail is included in the final report described below in subtask 16.2.2.3.

16.2.2.1 Develop a pool of potential monitoring sites that meet suitability criteria, randomly select the sites to be monitored and conduct BMP implementation evaluations on approximately 50 sites so the data is statistically reliable.

On-site BMP evaluations using a standard checklist were conducted on 50 sites during the grant period. These were combined with data from an additional 50 sites to facilitate statistical analysis. These 100 monitored sites were randomly selected from a pool of 1,042 tracts gathered from industry reports, forester contacts and field reconnaissance.

16.2.2.2 Compile collected data in computerized database format for storage, retrieval and analysis based upon watersheds, practices, ownership categories and other criteria.

In April 2010, we entered the compliance monitoring data from the 100 sites into two Excel spreadsheets and used them for analysis and preparation of the final monitoring report.

16.2.2.3 Prepare and distribute to cooperators and other interested entities a report documenting the information gathered during BMP evaluations.

The final report of the BMP compliance monitoring project was completed in April 2010, along with a summary brochure of the report's highlights (copies included in the Appendix). The report was distributed to a small group of stakeholders and was posted on our website (www.forestry.ok.gov/h2o-compliance-monitoring).

In summary, the Forestry Best Management Practices Compliance Monitoring Project is a tool used by Forestry Services to measure the implementation of BMPs across eastern Oklahoma's 5.1 million acre commercial forest area. The monitoring project provides an estimate of BMP implementation, and identifies activities where improvement is needed and where more focused training would be beneficial. The information is derived from field inspection of timber harvesting and site preparation activities randomly selected across all ownerships. Forestry Services monitored a total of 100 sites. On these tracts, there were a total of 2,218 'opportunities' where BMPs should have been applied, based upon Oklahoma's Forestry BMP Guidelines. The overall BMP compliance rate was **92.1%.** This rate represents a slight improvement over the 2007 compliance rate of 91.6%.

16.2.2.4 Work with landowners having poor BMP compliance evaluations to implement acceptable BMPs - assist twelve (12) landowners with specific BMP recommendations.

Forestry Services provides technical assistance to private landowners to help them conserve, enhance and protect their forests and related natural resources. According to 2008 forest inventory data, 57% of the timberland in eastern Oklahoma is owned by private individuals, whereas forest industry owns 11% and corporate entities own 18%. BMP compliance rates for industry and corporate owners were found to be considerably higher than the rate for individuals and family forest owners. To address low BMP performance or specific problems found during the monitoring project, we completed **36** water-quality related landowner assists during the grant period. These involved OFS' Water Quality Forester and the local field forester. The purposes of these assists were to provide additional information and specific recommendations to the landowner to address findings of the evaluation, or to help landowners work with logging contractors to remediate problem areas.

On four (4) occasions, we provided recommendations for remediation of a "significant risk" identified during a BMP compliance check. A "significant risk" is defined as an on-site condition where an actual water quality impact could result from a forestry activity if the problem is not corrected. Each of these involved excessive bare soil exposure and lack of BMPs at a stream crossing. In all four cases, the landowner and the responsible contractor fixed the problem voluntarily. As a result, BMPs were properly applied and potentially significant water quality impacts were averted. This response highlights the importance placed on BMPs by the forest industry, especially those involved in certification programs.

16.2.3.1 Develop and provide educational information on forest water quality issues to forest landowners using news releases and newsletters of organizations, including Oklahoma Forestry Association, Oklahoma Woodland Owners Association, OSU and others. Contribute BMP related articles to publications quarterly.

Forestry Services coordinates closely with organizations and other agencies involved with landowners and the industry, and attempts to keep these groups informed of pertinent programs and issues. During the grant period, the following organizations, media outlets and other sources were provided forest water quality and BMP-related information. Copies of published articles are included in the Appendix.

- Article for Oklahoma Forestry Association (OFA) Newsletter, August 2008
- Article for OFA and OWOA Newsletters, February 2009
- In October 2009, we submitted items to the OFA and OWOA for their newsletters. Topics included the water quality "Forestry Notes" publications, the timber bridge mat loan program and availability of BMP cost-share assistance.
- In January and March 2010, we submitted BMP articles for the OFA newsletter.
- Water quality issues were included in quarterly reports to the OFA Board of Directors throughout the grant period.
- Newspaper articles were periodically submitted to media outlets throughout the region.

16.2.3.2 Make general BMP presentations to landowners, civic groups and others as appropriate (target 3 presentations per year).

We completed presentations on water quality and the forestry BMPs to several groups, as shown in Table 2. Four of these presentations were primarily for agency personnel, as a means of raising awareness about the Forestry BMPs and to provide additional training in their application.

Table 2. BMP Presentations to Groups

Group	Location	Date	Attendees
Lions Club	Clayton	9/4/2008	18
State Fair of Oklahoma	OKC	9/17/2008	32
OSU Cooperative Extension Directors	Wilburton	11/13/2008	8
Forestry Services staff meeting	Goldsby	12/15/2008	11
Field training for Forestry employees	Idabel	4/21/2009	3
Forestry Services staff meeting	Goldsby	4/30/2009	8
Forestry and ODAFF employees	Broken Bow	7/30/2009	7
Total	**7 Presentations**		**87**

We also maintain relationships with forest industry and corporate owners in support of their internal efforts in BMP compliance. We met with or provided BMP information and materials to the following owner and industry groups:

- The Campbell Group (new corporate owners of the Plum Creek property) in December 2008
- International Paper Co. following their purchase of Valliant paper mill from Weyerhaeuser
- Foresters employed by John Hancock Forest Management Group in Texarkana, June 2009
- Meeting with Weyerhaeuser officials in December 2009 to discuss site preparation issues and the need for BMP training of their contractors (subsequently conducted in March 2010)

16.2.4.1 Estimate sediment load reduction from the use of forestry BMPs using an applicable model or predictive tool.

Initially, subtask 16.2.4.1 was designed to offer cost-share assistance to landowners for BMP implementation and remediation of problem areas. The economic downturn, coupled with tenuous forest product markets, created an uncertain environment for forest owners and the industry as a whole. Landowners currently are reluctant to invest in property improvements, especially those that do not yield future income. Because there was little landowner interest in federal cost-share assistance to address forest water quality problems on their lands, this subtask was modified to instead provide an opportunity for Forestry Services to estimate the sediment load reduction attributable to the use of forestry BMPs in Oklahoma.

Using an approach developed initially by the Texas Forest Service in the 1990s, Oklahoma's report on estimated sediment load reductions was completed on June 30, 2011 and is included in the Appendix. The method used for this estimate is not based upon a particular predictive model, but instead relies on several data sources to characterize the extent of forestry practices conducted annually, and uses watershed and BMP research in the Ouachita Mountains and broad averages to calculate the possible sedimentation from these activities if they were carried out either with or without BMPs. Using this method, we concluded that sedimentation from temporary roads and skid trails was reduced by an estimated **21.8%**, and overall sedimentation by **73,642 tons** or **59.6%**, due to the use of BMPs.

16.2.5.1 Develop a timber bridge mat loan program, construct four sets of mats and initiate a loan program so that loggers who plan to operate on sensitive stream crossings may borrow them in order to protect the stream channel. Develop program guidelines, construct mats and initiate the loan program.

Bridge mats have been used successfully in a few other states in the south to facilitate forest access while significantly reducing impacts at stream crossings. These wooden or steel panels allow logging trucks and skidders to cross stream channels with minimal soil or bank disturbance (sample application in photo at left). This "BMP" has been used very rarely in Oklahoma, primarily due to lack of awareness among logging contractors and lack of availability of bridge panels that are suitable for logging purposes and that can be handled by contractor equipment. To expand the use of this technique in Oklahoma, we researched bridge mat programs used in other southern states, and developed bid specifications for the

purchase of wooden bridge mats based upon those used in North Carolina. The contract was awarded to Dixie Mat, a Mississippi company, which constructed the panels and delivered four sets of bridge mats to Forestry Services' Broken Bow office on July 30, 2009 (photo at right).

In August, we prepared guidelines and a loan agreement so that our foresters understood the purpose of these mats and how they could assist interested loggers. We also developed a Forestry Note titled *Using Bridgemats for Stream Crossings in Forestry Operations* (copies included in Appendix). Our Water Quality Forester contacted logging contractors and mills to let them know about the mats. He met with a sawmill near Tahlequah, obtained an agreement with a local logger to use a mat and delivered a set of panels on August 28, 2009. We moved one set to Forestry's East Central Area office at Wilburton, and retained two sets at our Broken Bow office. The severe slowdown in timber harvesting activity due to the collapsed housing market and depressed economy created very low interest in the use of the bridge mats during the grant period.

Summary

Oklahoma's non-regulatory forest water quality management program has made considerable progress since development of the State's first forestry BMPs in 1976. The forest industry, including wood processing plants and the logging community, corporate owners, government agencies and most private individual and family forest owners, have generally accepted the use of BMPs as a routine way of conducting their business. BMP implementation rates are high and continue to increase. The BMPs themselves are effective and continue to be refined based upon research and improved application techniques. The awareness level of timber harvesting contractors, professional foresters and landowners continues to expand due to ongoing BMP educational programs that are well supported by the industry as a whole. The overall water quality impact of forestry practices in Oklahoma is relatively small, primarily as a result of an effective BMP program that emphasizes preventive actions.

This EPA 319-funded project has helped Forestry Services considerably to improve its capabilities in addressing forest water quality needs in Oklahoma and increasing the effectiveness of the State's Forestry BMP program. Even though budget challenges have prevented us from filling the Water Quality Forester position since April 2010, Forestry Services is committed to maintaining a viable and effective water quality program for the benefit of the citizens of Oklahoma.

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