



Results of the 2023-2025 BMP Implementation Survey

Voluntary Implementation of Forestry Best Management Practices for Water Quality Protection in Arkansas

Arkansas Department of Agriculture

1 Natural Resources Drive

Little Rock, AR 72205

(501) 225-1598

agriculture.arkansas.gov

Voluntary Implementation of Forestry Best Management Practices for Water Quality Protection in Arkansas

Results of the 2023-2025 BMP Implementation Survey

Authors

Chandler Barton, Forester Manager
John Beasley, Forester, BMP Coordinator
Kyle Cunningham, State Forester

Acknowledgements

The Arkansas Department of Agriculture gratefully acknowledges the following individuals and groups for their contributions to this survey:

- The Environmental Protection Agency (EPA) and the Arkansas Department of Agriculture's Natural Resources Division for participation in and funding of the project through a Federal Clean Water Act Section 319(h) grant.
- Mr. John Greis, former Environmental Specialist for the United States Forest Service in Tallahassee, Florida, for his assistance with development of the survey questionnaire.
- The personnel who participated in the gathering of field data and preparation of this report.
- The landowners, who through granting access to their land, made this survey possible.

Arkansas Department of Agriculture
1 Natural Resources Drive
Little Rock, Arkansas 72205
Phone: (501) 225-1598
Website: agriculture.arkansas.gov

Executive Summary

The Arkansas Department of Agriculture (Department) surveyed the implementation of voluntary forestry best management practices (BMPs) on 229 sites that included approximately 17,504 acres of forest harvesting. These sites were randomly selected from a pool of 364 candidate sites representing silvicultural operations that occurred from 2022 through 2023.

The overall BMP implementation rate on all sites monitored was 92.47 percent. In general, implementation was highest on public and forest industry sites and lowest on private non-industrial sites. Statistically, there was no difference between public and industry scores. However, the private non-industrial forest landowner (PNIFLO) site scores were significantly lower than the scores of public and industry scores.

Implementation rate by ownership category:

- Public tracts averaged 97.78 percent
- Industrial sites averaged 94.77 percent
- Corporate sites averaged 91.75 percent
- PNIFLO averaged 87.73 percent

Implementation rate by BMP category:

- Harvesting – 95.31 percent
- Regeneration – 95.93 percent
- Roads – 90.97 percent
- Streamside Management Zones (SMZs) – 90.29 percent

For lower scoring sites, the common deficiencies in BMP implementation were absence of effective stream protections and lack of water bars on skid trails, fire lanes, and inactive roads.

Background

The 1972 Clean Water Act required states to establish a program to encourage implementation of forestry BMPs to control non-point sources of pollution. In the state of Arkansas, the Department is the lead agency responsible for this BMP implementation survey.

The Arkansas Forestry BMP Program relies on voluntary implementation of BMPs by forest landowners, foresters, and loggers. When the BMP guidelines were first developed in the early 1970s, initial education and training efforts were based on data obtained from soil loss monitoring, and from information gathered while investigating complaints related to silvicultural activity.

The reauthorization of the Clean Water Act in 1987 required states to develop methods for determining the effectiveness of their forestry BMP guidelines. In 1996, Arkansas adopted BMP implementation survey procedures developed by the Southern Group of State Foresters to address this requirement. Titled *Silviculture Best Management Practices Implementation Monitoring, a Framework for State Forestry Agencies*, this document provided a framework for BMP implementation survey that is statistically sound, objective, technically feasible, and consistent across all 13 southern states. Using this framework, the Department completed and published its first report in 1998.

The Department is aided by the Arkansas Timber Producers Association, formed in 1995 to train loggers and land managers on how to use BMPs for protecting water quality. This partnership conducts multiple training sessions annually.

In 2002, the Department developed the *Arkansas Forestry Best Management Practices for Water Quality Protection*, a pocket guide for forest landowners and forestry professionals. This publication is available upon request in hardcopy and digitally on the Department's website. It was most recently revised in 2023. If the guidelines in this pocket guide are followed correctly, then a harvest site should subsequently score a 100 percent implementation rate in the survey. All survey questions directly reference this guide (see Appendix A for the complete list of survey questions).

The effectiveness of voluntary BMPs was assessed by Richard S. Grippo and Samuel B. McCord from Arkansas State University. They conducted a research project to determine if BMPs prevented environmental impacts. In their 2006 publication titled *Bioassessment of Silviculture Best Management Practices in Arkansas*, they concluded "that the BMPs implemented after timber harvest are effective in protecting the water quality and biological integrity of Arkansas's streams." Similar conclusions regarding nationwide forestry BMP use were stated by Richard Cristan et al. in their 2016 publication titled *Effectiveness of Forestry Best Management Practices in the United States: Literature Review*.

Objectives of this BMP implementation survey include:

- Measuring, documenting, and reporting the statewide extent of implementation of forestry BMPs
- Evaluating the general effectiveness of BMPs as applied operationally in the field
- Determining the need and direction of forestry BMP education and outreach programs

This report documents findings of the ninth survey, which was conducted from 2023 through 2025.

Survey Methods

The ninth survey began in 2023. The last site for this survey was evaluated in August 2025.

A sample of 364 sites with timber harvesting activity was identified using the HiForm Timber Harvest BMP Tool. This tool is a cloud-based, satellite image processing application designed to detect changes in forest cover (see Figure 1 for an example of how HiForm identifies harvests). It was developed by the U.S. Forest Service Southern Research Station and it is publicly available through HiForm.org. Changes in forest cover selected for the sample were at least 10 acres in size and changes that were less than one-year-old were preferred.

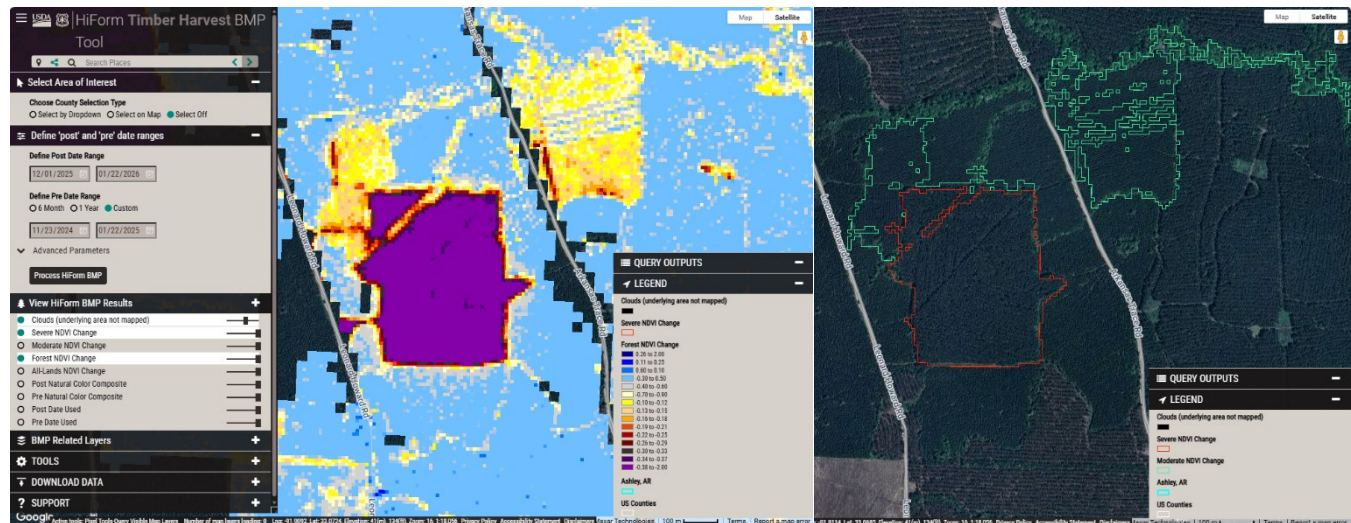


Figure 1: HiForm Timber Harvest BMP Tool. The purple area is an area detected with extreme reduction of vegetation that indicates a clearcut harvest, and the yellow/orange area is a moderate reduction that likely indicates a thinning harvest. These areas are digitized as polygons as seen the satellite image on the right.

Statistical analysis from previous surveys indicated that a statewide sample size of 200 sites would yield results within a 95 percent confidence level. This minimum of 200 sites was repeated in the ninth survey.

Next, the number of sites that must be surveyed within each county was identified based on the timber removed from that county compared to the statewide total. The percentage of that county's timber tonnage to the statewide timber tonnage was determined, and this percentage was used to identify a minimum number of sample sites per county. The Arkansas Department of Finance and Administration's Timber Tonnage Report from 2022 was used. For example, the timber tonnage in Ashley County was 1,338,732 tons or 5.17 percent of the total statewide tonnage, so at least 11 of the 200 sites needed to be surveyed in Ashley County.

The Department identified several more sites than the minimum to allow for any sites to be disregarded if found not suitable for the study, i.e., harvest occurred several years prior to survey or access to the property was not possible. Department personnel contacted the landowners to gain access and determine the suitability of the site for the survey. Of the 364 sites identified in HiForm, 229 tracts were evaluated in this survey (Figure 2).

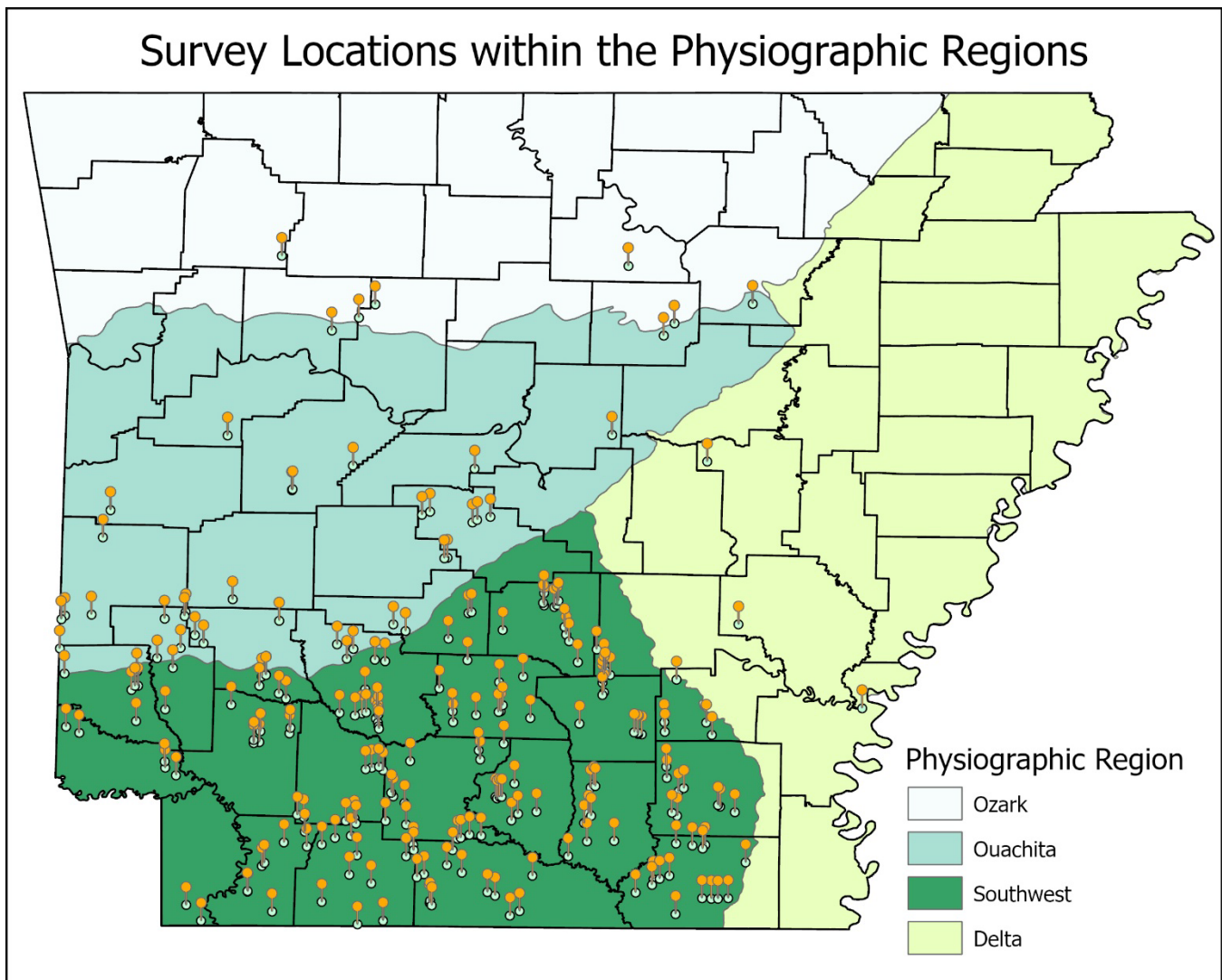


Figure 2: Map of all 229 survey locations.

All site evaluations were completed by John Beasley, the Department's BMP Program Coordinator. John is a registered forester in Arkansas, and 39-year employee of the Department as of this report. His experience and knowledge were invaluable to this survey.

The survey form used during each site evaluation was revised prior to the sixth BMP implementation survey so that it directly references the *Arkansas Forestry Best Management Practices for Water Quality Protection*. This form consists of 67 questions based on four BMP categories: SMZs, roads, harvesting, and regeneration (see all questions in Appendix A). Each question was worded so that a positive answer was recorded with a "Yes," while a departure from BMP recommendations received a "No" response.

Answers for questions that did not apply to the site were indicated by "NA." Each question also included a determination of significant risk. A significant risk is a situation or set of conditions that has resulted in, or very likely will result in, the significant and measurable degradation of water quality.

Based on the results of the site evaluation, a final score was given to each tract. The score identifies the percentage of BMPs that are in place and effective compared to all the BMPs recommended for a

particular site by the approved guidelines. Averaging this data from all tracts allowed analysis of statewide BMP implementation. Analysis of BMP implementation based on BMP category, tract ownership, and state physiographic region was also conducted.

In addition to the site evaluation, a separate survey was offered to landowners of corporate and PNIFLO categories to gauge their familiarity with basic timber sale practices and recommendations.



Figure 3: Log landing at a typical sawtimber pine harvest.

Overall Results

The overall statewide rate of forestry BMP implementation was 92 percent (Table 1). Statewide, implementation of forestry BMPs related to harvesting and regeneration practices scored highest with rates of 95 and 96 percent, respectively. Implementation of forestry BMPs related to roads scored 91 percent, while SMZ BMP implementation scored 90 percent.

Table 1: Overall BMP implementation summary

BMP Category	Number of Tracts	Implementation Percentage	Margin of Error
SMZs	152	90	2.84
Roads	168	91	2.72
Harvesting	229	95	1.15
Regeneration	75	96	2.30
Overall Implementation Rate	229	92	1.50

Streamside Management Zones

SMZs are areas of forestland adjacent to non-ephemeral streams and lakes where forest management activities are limited to ensure water quality protection. While some harvesting within a SMZ is permissible, its primary function is to serve as a buffer between a stream channel and the more intensive forest management activities occurring outside the SMZ. Harvesting activities that do take place within the SMZ should be conducted in such a manner that minimizes the disturbance.

In this survey, the proper implementation of BMPs for SMZs was the lowest scoring category in the state.

Historically, SMZs have been the lowest-scoring category overall. Given the direct protection that SMZs provide for streams and prevalence of forestry activities where streams are present on site (SMZ protection was applicable on 66 percent of all sites monitored), it is important to identify deficiencies in SMZ implementation.

The state BMP recommendations for SMZs focus on two main areas: 1) they characterize the forest structure that should be retained during a harvest to ensure a properly functioning SMZ, and 2) they identify and discourage activities that could compromise one or more of the protective qualities of the SMZ. Therefore, in the survey there are questions that address the appropriate width and structure of the SMZ, and questions concerning poor practices occurring in the SMZ, such as the removal of bank trees or excessive woody debris being left in the stream channel. Field experience seems to indicate that those tracts with an appropriate SMZ in terms of width and structure typically have fewer problems.



Figure 4: An example of a stream with logging debris where guidelines for an SMZ were not followed.



Figure 5: Low water crossing with a well-maintained streamside management zone. This SMZ is located within a clearcut harvest tract, demonstrating a meaningful effort to maintain the stream's water quality.

Roads

As indicated previously, approximately 91 percent of the BMPs for roads were implemented properly on the 168 tracts where applicable. There was one site with significant water quality concerns that related to road construction and closeout issues, including a lack of water bars and turnouts.

The road network used in forestry operations has the greatest potential of negatively impacting water quality if proper BMPs are not employed. This potential for impairment exists because the gravel roads commonly used to access timber serve as a constant source of sediment, which can be transported directly into a stream channel, most notably at stream crossings. To diminish the risk of impairment due to forest roads, the applicable BMPs focus on three broad areas: 1) proper planning, 2) practices to be followed during the harvest, and 3) close out procedures used to minimize the long-term effects on the road on water quality.

The areas of greatest concern are:

- Seeding and vegetative cover not employed in a timely manner to stabilize erodible soil
- Water and sediment diversion structures not implemented or ineffective
- Poor stream crossings
- Failure to follow all closeout procedures upon completion of the harvest
- Failure to properly install water bars when applicable
- Failure to re-shape the roadbed and open drainage systems following a harvest

The failure to properly close out forest roads and the failure to install water bars as needed is likely due in large part to the cost and accessibility of the proper equipment and the lack of expertise required to implement these BMPs. Besides the cost associated with road work, and the lack of technical ability, there may also be a failure to recognize that these devices can be effectively designed without hindering future use and access.



Figures 6 (left) and 7 (right): Haul roads in Arkansas.

Harvesting

The process of skidding cut logs to a log landing, and the high-traffic volume on and around the landing itself, are two major sources of soil exposure that occur during a harvest operation. Understandably, a potential threat to water quality exists when these activities take place near a stream channel. BMPs developed to address the harvest operation, therefore, stress the importance of planning when deciding the location of log landings and skid trails.

As with roads, the greatest potential threat to water quality during the harvest operation occurs at stream crossings on skid trails. Whenever possible, skid trail stream crossings should be avoided, and the number of log landings minimized.

This survey indicates that overall, as in the past, logging contractors do a good job adhering to the BMP recommendations for harvesting; statewide, the implementation rate for harvesting BMPs was 95 percent.

While most BMPs were followed, there are areas that need to be addressed. The main issue identified pertains to inadequate stabilization of skid trails after harvesting operations. Either the stream banks were not adequately stabilized, or water bars were not constructed on skid trails.



Figures 8 (left) and 9 (right): Two skid trails with BMPs. Logging slash was used to minimize equipment rutting and erosion concerns (left). During closeout, the skid trail was seeded and revegetated to stop soil erosion (right).

Regeneration

Regeneration BMPs address potential threats to water quality that arise from intensive site preparation and reforestation activities. Where intensive management is recommended, typically a combination of prescribed fire, herbicide applications, mechanical site preparation, and reforestation practices are used to establish a new stand.

Besides possible chemical contamination from herbicide applications, the use of heavy equipment and fire to prepare and reforest a tract can create a situation where sediment is introduced into a water body. Thus, the BMP recommendations for regeneration activities address the application of herbicides, proper fire management and fire lane construction, and the operation of heavy equipment. In this survey, the implementation rate for regeneration BMPs was 96 percent.

Implementation by Physiographic Region

Implementation rate for the four regions (refer to Figure 2):

- Delta – 100 percent
- Ozark – 97.34 percent
- Ouachita – 93.91 percent
- Southwest – 91.92 percent

The Ozark Highlands, found in the northern portion of the state, is characterized by its moderate-to-steep terrain, and an oak-hickory, upland hardwood, forest type. While heavily forested, the region is not a major timber producer. However, logging activities in this region could directly impact water quality at surface drinking water intakes. Fortunately, implementation rates are high in these regions with a few surveyed tracts having minor road BMP concerns. Roads in this region, as well as the Ouachita region, require increased measures to reduce water volume and velocity on slopes.

The dominate timber-producing region in the state is in the Southwest. Consequently, this is where most of the tracts examined in the survey (80 percent) were found. Because it is the most productive timber region, there is a sizable presence of forest industry and corporate ownership categories.

Implementation by Ownership Category

Ownership was divided into four categories for the survey: public (both federal and state owned), industry, corporate, and PNIFLOs. The 2011 survey was the first Arkansas survey that differentiated between corporate and industrial ownership. With the increased presence of non-traditional forestland owners purchasing lands formerly held by industry, the industrial category was split to allow for corporate ownership analysis. Industrial ownership was classified as those entities that owned forestland and had some kind of processing facility in the state. The corporate category included timber investment management organizations (TIMOs) and other similar entities. Of the 229 tracts evaluated for this survey, 50 (22 percent) were owned by PNIFLOs, 101 (44 percent) were owned by industry, 68 (30 percent) were corporately owned, and 10 (4 percent) were publicly owned (Table 2).

Public

Public ownership consisted of tracts on National Forests and state-owned public land. As in previous surveys, public land scored the highest for BMP implementation, followed by industry and corporate ownerships.

Industry

One hundred and one tracts were industrial ownership and consisted of 8,369 acres. Industrial ownership implemented BMPs at a rate of 95 percent. In a two-sample t-test, there was no significant difference between industry and corporate ownership category ($P=0.054$), however, the implementation rates between industry and PNIFLO were significantly different ($P=.0069$). As for the implementation rates for each of the four BMP categories, regeneration scored highest with 96 percent, harvesting scored 96 percent, roads scored 95 percent, and SMZs scored 94 percent.

Corporate

Sixty-eight tracts, comprising approximately 4,993 acres, were evaluated within the corporate ownership class. The BMP implementation rate for this ownership class was 92 percent. As for the implementation rates for each of the four BMP categories, regeneration scored highest with 96 percent, harvesting scored 95 percent, SMZs scored 91 percent, and roads scored 86 percent. The roads category for the corporate ownership category scored substantially lower than the rate observed on industry ownership.

PNIFLO

Fifty tracts comprising 3,571 acres were in the PNIFLO category. The overall BMP implementation rate for the class was 88 percent. This implementation score was meaningfully lower than the rate of BMP implementation witnessed on federal, industry, and corporate tracts. As for the implementation rates for each of the four BMP categories, harvesting scored highest with 95 percent, regeneration scored 94 percent, roads scored 87 percent, and SMZs scored 77 percent. SMZs remain a concern on private land and continue to be a challenging area for improvement.

Table 2: Implementation by ownership class

Ownership	Number of Tracts	Acres	Implementation Percent	Margin of Error
Public	10	571	97.78	2.98
Industry	101	8,369	94.77	1.22
Corporate	68	4,993	91.75	2.88
PNIFLO	50	3,571	87.73	4.79

Questionnaire Results

Historically, PNIFLOs have had the lowest BMP implementation rates. Given that PNIFLOs own approximately 46 percent of the forestland in the state, poor BMP implementation by this ownership increases the potential for impaired water quality due to forestry activity.

To improve BMP implementation rates on private ownership (both PNIFLO and corporate), and to shape future educational efforts for private landowners, previous surveys polled landowners to gauge their understanding of BMPs and basic timber sale practices. This questionnaire was included in this survey, but only 19 landowners responded to the survey questions. An emphasis on landowner feedback needs to be prioritized in future surveys.

Results of each survey question are listed below.

Question 1: Was landowner familiar with Arkansas Forestry BMP Guidelines?

Yes: 18; No: 1

All, but one reported being familiar with Arkansas Forestry BMPs, and this is a meaningful increase from the last survey where about half (39 of 76 responses) reported being familiar with BMPs.

Question 2: Did the landowner require a written contract for the sale or activity?

Yes: 11; No: 4

Question 3: If a written contract was required, were BMPs required?

Yes: 11; No: 1

Question 4: Was a Registered Forester involved in the sale or activity?

Yes: 15; No: 4

Question 5: Was the landowner a member of a professional forestry organization?

Yes: 7; No: 2

Question 6: Was the logging contractor an Arkansas Pro Logger?

Yes: 14; No: 1

All, but one reported that their logging contractor is an Arkansas Pro Logger, which is a program hosted by the Arkansas Timber Producers Association (ATPA) that educates loggers on forestry BMPs. We believe, as this evidence suggests, that ATPA is successfully reaching loggers with BMP guidelines and therefore reducing water quality impairments.

Historical Context

Between the sixth and eighth BMP implementation surveys, the overall rates gradually improved to 93 percent. This ninth survey's overall rate did not increase. However, the PNIFLO category did see an increase in implementation rates, a trend that has continued since 2000. This may indicate a success in training programs and logger education.

Particularly for industry and corporate ownership categories, a key requirement to obtain forest certification status is to follow state BMP recommendations. As certification continues to be a driving force in the industry, the expectation is that BMP implementation rates will maintain current levels or improve. The trends for ownership categories were comparable with past surveys: public ownership had the highest rates of BMP implementation followed by industry, corporate, and PNIFLO in that order (Table 3). However, since the eighth survey, slight declines in implementation rates occurred for the public, industry, and corporate categories. Encouragingly, the implementation rate on PNIFLO has continued to increase dating back to the third survey, 2000-2001.

Table 3: Implementation Rate by Ownership and All Survey Years

Survey Year	Public	Industrial	Corporate	NPFL	Overall
2023-2025	98 percent	95 percent	92 percent	88 percent	92 percent
2017-2018	99 percent	97 percent	96 percent	86 percent	93 percent
2010-2011	92 percent	95 percent	90 percent	83 percent	89 percent
2007-2008	96 percent	89 percent	--	81 percent	86 percent
2005-2006	96 percent	90 percent	--	81 percent	88 percent
2002-2003	98 percent	93 percent	--	80 percent	88 percent
2000-2001	89 percent	88 percent	--	74 percent	--
1998-1999	89 percent	87 percent	--	75 percent	--
1996-1997	94 percent	89 percent	--	81 percent	--

For implementation by BMP category, this survey reflects the same trends as previous surveys: BMPs for harvesting and regeneration activities had higher implementation rates than those for SMZs and roads, with SMZs having the lowest average implementation rate of 90.29 percent (Figure 10).

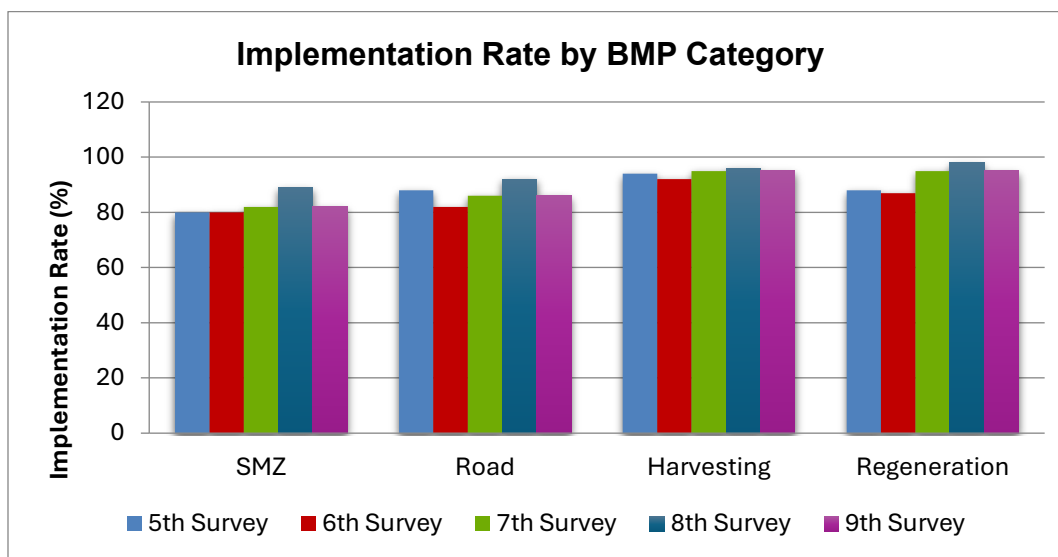


Figure 10: Implementation rate by BMP category for recent surveys

Conclusions

The use of BMPs is an effective means of reducing water quality that may be caused by forestry practices. Tasked with the objective of decreasing the impact of forestry-related, non-point source pollution, the Forestry BMP Program uses this periodic BMP implementation survey to identify trends in BMP use statewide. More importantly, the survey gives the Department the ability to spot deficiencies in BMP implementation and address problem areas with targeted education and training.

The results of this survey indicate that, on average, 92 percent of all BMPs recommended by the Arkansas BMP guidelines are implemented on timber sales in the state. This average is nearly the same as the average reported in the eighth survey.

Twenty-two sites implemented BMPs less than 80 percent of the time. Eighteen of the 22 were in either the corporate or PNIFLO categories. For these sites, the following BMPs were frequently not implemented (included are the number and page where each practice is found in the Department publication):

SMZs

- Minimum SMZ width (35') present for SMZs bordered by land with less than 7 percent slope (2.11, pg. 9)
- Basal area of residual trees in SMZ meet guidelines (2.14a, pg. 10)
- Spacing of overstory trees meet guidelines (2.14b, pg. 10)
- Trees growing directly on the bank or overhanging a waterbody were not cut (2.51, pg. 11)

Roads

- Roadbed, if needed, reshaped and all drainage systems opened when all forestry activities were completed (3.48, pg. 16)
- Wing ditches present where needed (3.83, pg. 20)
- Water bars present as specified (13.10, pg. 46)
- Water bars constructed on skid trails as per specifications (5.17, pg. 25)

Discussion and Future Survey Notes

Two significant risk findings were present on one site, which was in the PNIFLO category. A significant risk is defined as an existing condition resulting from failure to correctly implement BMPs, that if left unmitigated will likely result in an adverse change in the chemical, physical, or biological condition of the waterbody. In these cases, the Department works with the landowner and contractor to mitigate the risk. As this is the only site out of 229 surveyed, this is evidence of continued success with voluntary best management practices.

The survey does highlight important deficiencies in BMP implementation. Many, if not most, of these points of concern have been stressed in prior surveys, yet they remain problematic. There continues to be situations where streams are not being adequately protected with a forested buffer or SMZ. In cases where a buffer is left, its effectiveness is sometimes compromised by poor harvest practices within the SMZ, such as removal of trees along a stream bank. Where no SMZ is left at all, the error is due to the improper stream classification. Many contractors understand the need to buffer a constantly flowing stream, but some may erroneously identify non-ephemeral streams as ephemeral streams.

Stream crossings were generally well protected by BMPs. Logging contractors are encouraged to limit crossing streams and avoid skidding trees across streams. The use of temporary bridges would effectively reduce sediment loads in streams. In 2026, the Department is facilitating a program to provide contractors with temporary bridge equipment and mats to reduce erosion concerns. Participation in this program will reduce impairments to water quality.

As was indicated in the last survey, there are some areas of concern in the remaining categories (roads, harvesting, and regeneration). These areas could be improved by placing greater emphasis on BMPs used to close out a tract upon completion of silvicultural practices. For example, common problems cited in these categories include failing to close out roads, skid trails, and fire lanes without water bars, wing ditches, or other sediment control devices.

This survey did not distinguish between clearcut final harvests and mid-rotation thinnings. Often, thinning harvests do not substantially affect water quality unless the stream is directly disturbed. So thinning harvests may tend to score higher in this survey than clearcuts. In subsequent surveys, the differences in BMP implementation between these types of harvests should be investigated.

Lastly, a primary goal should be improving the BMP implementation rate in the PNIFLO category. It appears from the PNIFLO Questionnaire that the general level of knowledge of BMPs and their importance needs to be improved. As indicated in this survey, improving landowners' familiarity with BMPs alone appears to improve the rate of BMP implementation. There is also a significant difference in the implementation score if the landowner is a member of a professional forestry organization or requires BMPs in a written contract. There should be a multifaceted approach of improving landowners' general knowledge, while at the same time, continuing to encourage them to seek membership in a forestry organization that may offer assistance when conducting a timber sale.

Appendix A:

The following are all the questions used in the 2023-2025 BMP implementation survey. The number of each question references the practice as it is labeled in the text, “Arkansas Forestry Best Management Practices for Water Quality Protection” (2023 revision).

Streamside Management Zones

- 2.11 Minimum SMZ width (35') present for SMZs bordered by land with less than 7 percent slope?
- 2.12 Minimum SMZ width (50') present for SMZs bordered by land with slopes 7-20 percent?
- 2.13 Minimum SMZ width (80') present for SMZs bordered by land with slopes >20 percent?
- 2.14a Basal Area of residual trees in SMZ meet guidelines?
- 2.14b Spacing of SMZ overstory trees meet guidelines?
- 2.16 SMZ trees removed in a manner that minimizes disturbance to the forest floor, exposure of mineral soil, or reduction of stream bank stability?
- 2.18 Absence of significant logging debris in stream channel?
- 2.19 Absence of toxic and hazardous materials such as fuels, lubricants, and solvents in SMZs?
- 2.23 Mechanical site preparation did not disrupt the ephemeral stream channel?
- 2.31 SMZ provided between braided stream channels as well as the prescribed SMZ width adjacent to the most exterior channels?
- 2.41 Appropriate SMZ provided for lakes or ponds?
- 2.51 Trees growing directly on the bank or overhanging a water body were not cut?
- 2.52 Mineral soil not exposed by prescribed fire?
- 2.53 SMZ is free of log decks?
- 2.55 Cave entrances and sinkholes free of logging debris?
- 6.12 Boundaries of all SMZs defined where site preparation occurred?

Roads

- 3.12 Roads located to avoid or minimize stream crossings?
- 3.13 Streams were crossed at right angle?

- 3.14 Where topography permitted, roads were located along the contour and along the crest of long ridges?
- 3.25 Side cast or fill material placed above the ordinary high-water mark of any stream, except where necessary to stabilize stream crossings?
- 3.27 Seeding and mulching were employed in a timely manner to reduce erosion?
- 3.36a Water turnouts, broad-based dips or rolling dips installed before a stream crossing to direct road runoff water into undisturbed areas of the SMZ?
- 3.36b Roads, with the exception of stream crossings, located outside the SMZ?
- 3.42 Erodible areas, where natural vegetation is not sufficient to stabilize the soil, revegetated or stabilized?
- 3.48 Where needed, roadbed reshaped and all drainage systems opened when all forestry activities were completed?
- 3.52 On roads, temporary crossing structures removed and stream banks stabilized and restored after use?
- 3.53 Permanent stream crossings used bridges, culverts, shelf rock fords, geoweb, concrete slabs, or other materials?
- 3.54 Low water ford banks are stable and stream bottoms are hard?
- 3.55 Except at stream crossings, equipment kept out of streambeds?
- 3.56 Are concrete slabs installed and functioning properly?
- 3.61 Broad-based dips present where needed?
- 12.10 Broad-based dips properly constructed?
- 3.71 Rolling dips present where needed?
- 12.20 Rolling dips properly constructed?
- 3.83 Wing ditches present where needed?
- 12.30 Wing ditches constructed and functioning properly?
- 3.85 Wing ditches not feeding directly into adjacent drainage, gullies, or channels?
- 3.90 Culverts present where needed?

- 3.92 Culverts installed properly?
- 12.40 Appropriate culvert size used?
- 3.97 Where needed, aggregate or other suitable material used on approaches to fords, bridges, and culvert crossings?
- 13.10 Water bars present as specified on inactive roads?
- 4.13 Water bars installed and functioning properly?
- 4.14 Sufficient distance left between outflow discharge of water bar and stream to allow “sediment fallout”?

Harvesting

- 5.17 Are water bars constructed on skid trails per specifications in Table 13.1, Figure 13.1, page 46?
- 5.23 Are the size and number of log landings minimized?
- 5.24 Are landings located away from SMZs on firm, level ground?
- 5.25 Are landings located on dry sites so natural drainage disperses water onto the forest floor but not into a stream?
- 5.41 When skidding, were contours followed to the greatest extent possible?
- 5.43 Skid trails on slopes have occasional breaks in grade or logging slash that disperses water?
- 5.44 At skid trail stream crossings, soil not used as a temporary fill material when water was in the stream?
- 5.47 On skid-trails temporary fill material removed from stream beds and stream banks stabilized?
- 5.48 No skid trails in stream channels?
- 5.52 Was skid trail construction minimized at grades greater than 30 percent?
- 5.53 On grades greater than 30 percent, were frequent rolling dips installed?
- 5.62 Litter, such as oil cans, grease containers, crankcase oil filters, old tires, and used fluids absent from the site?

Regeneration

- 6.15 Has intensive site preparation been avoided on soils the NRCS has identified as highly erodible?

- 6.16 Existing water control devices (i.e. culverts, wing ditches) not damaged?
- 6.17 Heavy equipment operations avoided in wet soil conditions?
- 6.18 Did Intensive site preparation follow the contours of the land?
- 7.11 Forest chemicals apparently excluded from SMZs?
- 8.11 Machine planting follow the contour of the land?
- 8.13 No evidence of machine planting equipment crossing or turning around in roads, road ditches, and wing ditches?
- 10.12a Fire lines installed parallel to streams and not plowed through the SMZ?
- 10.12b Fire lines within the SMZ constructed by hand?
- 10.13 On final harvest cuts, when slopes of the site exceed 20 percent, individual fire strips do not exceed 300 feet in width between ignition and burnout?
- 10.34 On slopes exceeding 5 percent, and at approaches to streams and roads were water bars installed in fire lines according?



Arkansas Department of Agriculture
1 Natural Resources Drive
Little Rock, AR 72205
(501) 225-1598
agriculture.arkansas.gov