

2018 South Dakota BMP Field Audit Report

Implementation, Monitoring, and Evaluation of South Dakota Forestry
Best Management Practices



Executive Summary

Best Management Practices (BMPs) for the protection of water and soil resources during forestry and timber harvest activities were established by the State of South Dakota in 1980. BMPs were revised by the State of South Dakota in 1993 and again in 2003. Both the 1993 and 2003 revisions were adopted in the South Dakota Nonpoint Source Pollution Management Plan and were approved by the U.S. Environmental Protection Agency (EPA) under a provision of the Clean Water Act. The Forest Service has a Memorandum of Understanding with the SD Department of Environment and Natural Resources (DENR) jointly acknowledging that their National Core BMPs/Rocky Mountain Regional Watershed Conservation Practices (WCPs) meet the intent of the State's Nonpoint Source Pollution Management Plan. Compliance with BMPs is not mandated by statute or regulation in South Dakota. Timber harvest operators, wood products companies and land management agencies have, nonetheless, made a commitment to implement BMPs on a voluntary basis.

In 2001, the Black Hills Forest Resource Association (BHFRA) began a financial and technical partnership with the South Dakota Department of Environment and Natural Resources (DENR) for voluntary monitoring and evaluation of BMP implementation. BMP field audits were conducted in 2001 and 2004 in accompaniment with training for foresters, logging professionals, and resource specialists. This commitment to continued monitoring and evaluation was renewed in 2009 when field audits were conducted by the BHFRA, in partnership with the Lawrence County Conservation District and the South Dakota Department of Agriculture, Resource Conservation and Forestry Division (SD RCF). Training for logging professionals, foresters and resource specialists was conducted for BMPs in the fall of 2009 under the Logger Education to Advance Professionalism program (LEAP). The commitment to success and education continued in 2014 with another series of Logger Education held in August. These educational events provide a unique opportunity to bring the results of the BMP audits into a critical learning experience. Beginning in 2018, SD RCF assumed the lead role in conducting the field audits and producing the report.

Field audits are conducted by a diverse team of private and public sector resource professionals. A consensus-based approach is used to evaluate BMP compliance under a well-established system of rating criteria. Five timber sales were audited in 2018: one on private land, two on state land or under state administration and two on federal land. In addition, one private sale (Sleep) was re-visited from the 2014 audit.

The audit results, averaged across all timber sales, revealed that the BMP standards for application were met or exceeded on 95 percent of the total rated items. Ratings for BMP effectiveness confirmed adequate or improved protection of soil and water resources on 96 percent of the total rated items. This reflects continued compliance in application and effectiveness of BMPs. For comparison, the 2001 field audits showed 82 and 84 percent compliance for application and effectiveness, respectively.

The 2018 field audit team recommends:

1. Continuing the system of audits and training on a four-five year cycle.
2. Modifying and where applicable simplifying the current audit rating criteria.
3. Including a future audit site that has a prescribed burn or other silvicultural treatment besides commercial timber harvest, within the timber sale.

ACKNOWLEDGEMENTS

This report presents the findings from the latest iteration in an ongoing program of implementation, monitoring and evaluation, and training through field audits for water quality protection guidelines during forestry and timber harvesting operations. The 2018 program is the product of a 319 I&E grant through the South Dakota Discovery Center and a financial partnership with SD RCF.

A larger partnership of professionals and volunteers is necessary to make this program a continuing success. Many individuals were willing to lend their time to a diversified interdisciplinary team. In order to complete the field audit portion of the program, the team included at least one wildlife biologist, fisheries biologist, hydrologist, forester, engineer, and logging professional, private landowner, and interest group. In addition to those listed below, there were several people that met the audit team at individual sites to provide additional site specific information. Many thanks are owed to the following people for their generous contribution of time and expertise:

2018 Audit Team Members:

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Anine Rosse	SD Dept. of Environmental Resources
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This document is the fifth in a series of BMP Field Audit Reports. This report was prepared by Parks Brigman with acknowledgement and appreciation to previous preparers for their prior written documentation and data analysis completed in 2001, 2004, 2009, and 2014.

1. INTRODUCTION

The forests of the U.S. cover about one-third of the nation's land-area and are precious resources in numerous respects. Importantly, forested land is essential in the maintenance of water quality. Forested watersheds collect precipitation, serving to filter and cleanse water as it traverses to underground aquifers and as surface runoff into streams, rivers, and lakes. About 80 percent of the nation's scarce freshwater resources originate on forests, and well over half the US population depends on water supplies that originate on or are protected, in part, by forestlands.¹

The Black Hills of South Dakota have a long history of active logging and forest management and to this day supports a vibrant infrastructure of forest products companies. The Black Hills' watersheds act as recharge areas for several large regional aquifers including the Deadwood, Madison, Minnelusa, and Inyan Kara formations. Many cities and communities throughout the state depend on these aquifers as well as surface water runoff for their municipal water supplies. The streams and lakes of the Black Hills support a number of excellent fisheries which are enjoyed by many local and visiting anglers alike.

Forestry and silviculture activities are classified as potential sources of nonpoint pollution under the Clean Water Act by the US EPA. The EPA defines nonpoint source pollution as follows:

“Nonpoint source pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. Nonpoint source (NPS) pollution, unlike pollution from industrial and sewage treatment plants, comes from many diffuse sources. NPS pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff moves, it picks up and carries away natural and human-made pollutants, finally depositing them into lakes, rivers, wetlands, coastal waters and ground waters.”²

Sediment transported through a watershed, where the origin cannot be easily traced to a single point or area, is referred to as “nonpoint” source pollution. An example of nonpoint source pollution from forestry activities might be improperly constructed stream crossings or structural failures in road drainage features, which can allow sediment to enter waterways during runoff events. Importantly, these and other potential sources of water pollution are preventable if sound forestry and logging practices are employed. Additionally, maintenance of the road infrastructure, as provided through timber sales, is an important component of reducing long-term sediment production and provides important access for emergency services and recreation opportunities.

Recognizing potential non-point source pollution from forestry activities, the State of South Dakota adopted specific Best Management Practices (BMP). BMPs are practices, actions, or activities that limit soil disturbance, prevent erosion, and protect sensitive areas. South Dakota's forestry BMPs were originally drafted in 1980 and were revised in 1993 and 2003.³ Both the 1993 and 2003 revisions were adopted in the South Dakota Nonpoint Source Pollution Management Plan⁴ and were approved by the EPA under a provision of the Clean Water Act.

¹ USDA Forest Service. 2000. Water and the Forest Service. FS-660. Washington, DC.

² US Environmental Protection Agency

<http://www.epa.gov/polluted-runoff-nonpoint-source-pollution/what-nonpoint-source>

Compliance with BMPs during forestry operations is not mandated by statute or regulation, either in South Dakota or federally. Therefore, implementation of BMP standards takes place on a voluntary basis among private companies and public agencies who share a commitment to careful stewardship of forest resources. Over the history of the SD BMP Field Audits, the BHFRA has partnered with the SD DENR and the SD Resource Conservation and Forestry Division (RC&F) through the EPA's Pollution Prevention grant program to conduct multiple series of BMP training sessions and timber sale field audits. Foresters, loggers, road construction operators and others involved with the development and oversight of timber harvest received training from professionals qualified in BMP principles, requirements, and implementation techniques. Audits were conducted to assess BMP implementation and identify common mistakes during timber sale operations on both public and private land ownerships. The audit results are, in turn, fed back into the next round of training in a system designed for continuous improvement.

Field audits were conducted for the first time in 2001, although BMP training for logging professionals had been offered in prior years through partnerships between BHFRA, SD RC&F, and Black Hills Women in Timber. The 2001 results illustrated the need for the field audits and also a strong commitment to success among both private enterprise and public agencies toward BMP implementation.⁵ Common mistakes arose with respect to proper culvert sizing and installation, road drainage and maintenance, and designation of Streamside Management Zones (SMZs). The 2001 audit team attributed many of these mistakes to unclear language or illustrations in the BMP manual and the need for further training.

Training was conducted in June, 2004 at two Black Hills locations. Drawing on monitoring and evaluation from the 2001 audits, the focus of these sessions was stream crossings, culverts, roads, and SMZs. Approximately 100 logging and forest management professionals attended the training workshops. Dr. John Garland, a Logging and Engineering Specialist at Oregon State University; Dr. John Ball, Forestry Specialist at South Dakota State University; and Stacy Reed, Storm Water Program Coordinator at SD DENR, addressed the various aspects of BMP importance and proper application of practices in the targeted respects.

Timber sale field audits were conducted during August and September 2004 by a multidisciplinary and interagency team of scientists, managers, natural resource professionals, and stakeholders. Seven timber sales were audited, evaluating both the application and effectiveness of nearly 100 separate elements of the BMP standards at each site. An equal representation of timber sales were audited from state, federal, and private land. In order to begin assessing the long-term effectiveness of the BMPs, one audit revisited a timber sale included in the 2001 audits.

In the fall of 2009, approximately 100 professional loggers and foresters once again took part in Logger Education to Advance Professionalism training (LEAP). Morning sessions took place in a classroom setting with afternoon training sessions conducted in the field. Annual meetings, including 2014, have occurred each year since 2009 to re-brief and update contractors and participants on the importance of BMP compliance and provide a unique learning experience.

³ South Dakota Department of Agriculture, Division of Resource Conservation and Forestry
<http://www.state.sd.us/doa/Forestry/publications/> (3/22/05)

⁴ South Dakota Department of Environment and Natural Resources.
<http://www.state.sd.us/denr/DFTA/WatershedProtection/WQInfo.htm> (3/30/04)

⁵ Lee, W.K., and Everett, A.M. 2001. Silviculture BMP Field Audit Report. Rapid City, SD.
Web: <http://www.state.sd.us/denr/DFTA/WatershedProtection/WQInfo.htm> (3/30/04)

The Black Hills of South Dakota represent one of the most time-honored success stories of forestry and forest management in the United States. For over 100 years, land managers have balanced environmental stewardship and sustainable harvests within this unique ponderosa pine ecosystem. Integral to the maintenance of this winning relationship is the protection of surface and ground water quality. The South Dakota Forestry BMPs are a proven-effective tool with which nonpoint source ground and surface water pollution is consistently prevented. The rivers and streams of the Black Hills support many municipal and industrial water needs, as well as prized fisheries and healthy aquatic ecosystems. Continuing and advancing BMP implementation helps sustain these uses, as well as ensuring conformance with Total Maximum Daily Load objectives set forth by the S.D. DENR.

1.1 OBJECTIVES AND GOALS FOR BMP TRAINING AND BMP FIELD AUDITS

- Provide continued and enhanced BMP training:
 - Develop new BMP education materials as needed
 - Facilitate better understanding of BMP requirements among the individuals, businesses, organizations, contractors, and agencies responsible for their implementation
 - Specifically address the opportunities for improving BMP application and effectiveness identified in the findings and recommendations from previous monitoring and evaluation audits
 - Familiarize participants with revisions to the SD BMP manual developed by RC&F, DENR, and EPA
 - Introduce concepts of state regulations on storm water discharge and permitting
 - Provide training session attendees an opportunity to supply feedback on improving BMP standards and application
- Continue the self-monitoring and evaluation process of on-the-ground BMP implementation:
 - Audit six timber sales from an equal representation of forestland ownerships
 - Administer audits to reflect recommendations made during prior audits
 - Involve a broad multidisciplinary and interagency team of scientists, resource professionals, and stakeholders in performing the audits
 - Evaluate and explore the use of commonly recognized scientific metrics to describe baseline and post-harvest water quality conditions

2. AUDIT PROCESS

2.1 AUDIT PROCEDURES

The audit process was developed by the 2001 steering committee. The steering committee used audit procedures from Montana, which had been in place for many years as a template, and adhered strictly to the text of the SD BMPs to establish the items to be rated at each site. Since 2001, the audit procedures have remained largely unchanged.

One charge of the 2014 audits was the recommendation from the 2009 audit team that making a less complicated audit procedure would yield more accurate results. Maintaining consistency between the audit procedure and the BMPs themselves is important. Therefore, the 2014 audit “scoresheets” were revised, simplified, and clarified, but kept the same information for the sake of continuity from previous audits. The 2018 audits used the same ranking system and criteria as the 2014 audits. Further refinement should be explored during future audits.

2.2 SITE SELECTION

Numerous timber sales were reviewed using maps and descriptions of hydrologic and timber sale harvest design features provided by landowners and sale administrators. Final site selection was guided by the following criteria:

- Harvest operations were completed within the last two years
- A minimum of 2,000 board-feet per acre was harvested at the site
- Harvest site contains live water or has other significant water resources
- One of the sites should be a re-audit of a site from 2014
- One of the sites should be a currently active timber sale
- The overall selection of sites should equally represent private, federal, and state ownerships



Members of the 2018 audit team examine a culvert for proper sizing, placement, and maintenance.

The Black Hills generally arid climate ensures the occurrence of live water or other sensitive hydrologic features within a timber sale are somewhat rare. A majority of timber sales that take place in the Black Hills have relatively little opportunity to directly affect surface water. Therefore, the audit selection criteria place some bias upon the audit results by including only those timber sales carrying the potential to directly affect water quality.

The names and ownerships of the selected sales are displayed in Table 1 and their general locations are displayed in Figure 1. It is important to note that only one private timber sale was selected. This is simply due to the fact that only one private sale meeting the criteria could be identified in the review process. The Sleep timber sale was examined during the 2014 audits and was selected to fulfill the criteria of revisiting a previously audited site in 2018, and with the intent of visiting an equal distribution of ownerships. The remaining sales best met the criteria for important hydrologic features, volume harvested, and desired ownership representation. Most harvest operations were conducted with ground-based harvesting and log yarding equipment typical of most timber sales in the Black Hills region.

Table 1. 2018 Forestry BMP field audit sites.

Timber Sale Name	Land Ownership	Completion Date
Storm	US Forest Service	June, 2018
Tanker	US Forest Service	May 2017
Spokane	Custer State Park	January, 2018
Robber's Roost	Custer State Park	June, 2018
Prairie Creek	Private	January, 2017
Sleep (re-visit)	Private	May, 2013

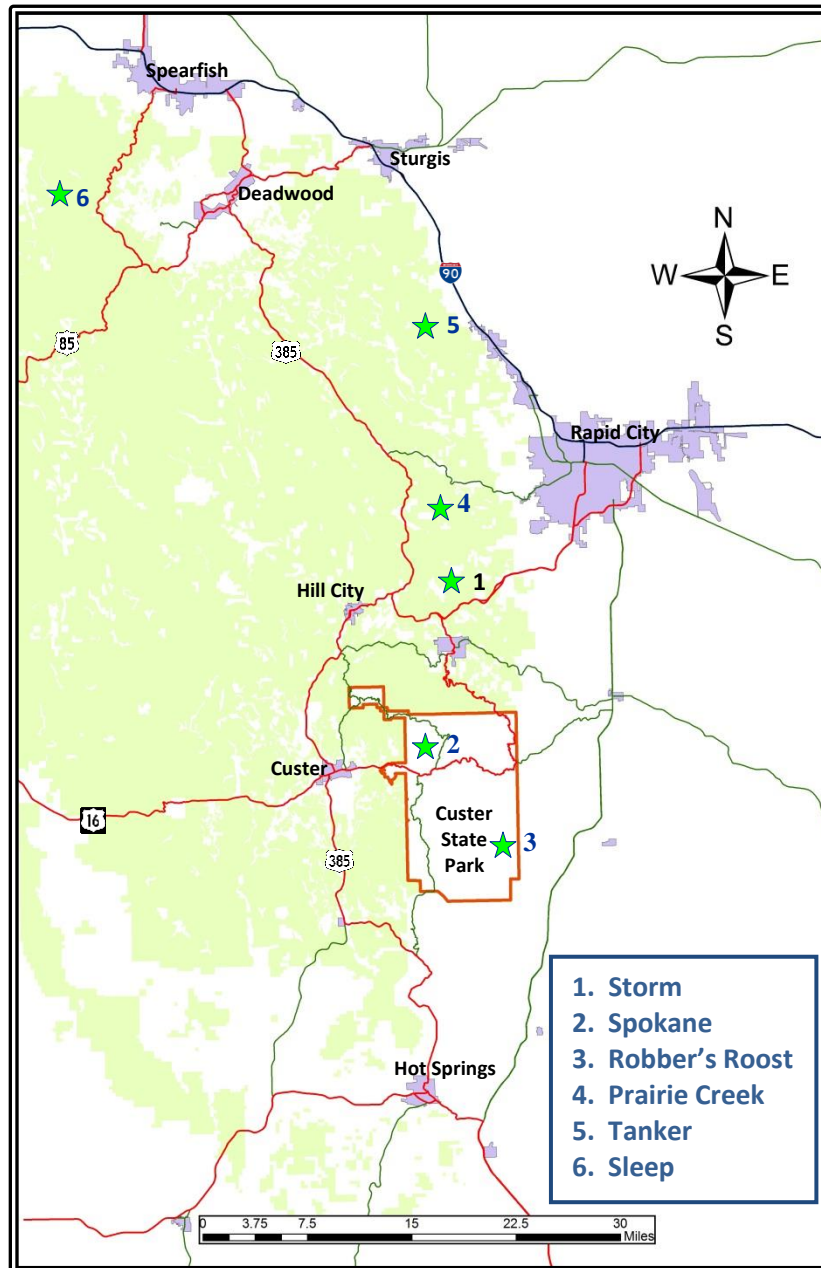


Figure 1. 2018 South Dakota Forestry BMP field audit sites.

2.3 RATING SYSTEM

The ratings and criteria employed in the scoring of audit sites are displayed in Table 2. At each site nearly 100 separate BMP practices are evaluated (see Appendix A for audit rating items.) Each practice is given a two-part rating based on 1) application and 2) effectiveness. Application is the assessment of whether or not an individual practice was applied and, if so, the degree to which the application meets with the standard of the BMP. Effectiveness is the assessment of whether the application of each practice was successful in protecting soil and water resources. The two-part rating system allows both an assessment of the harvest operators' skill in successfully applying BMPs, as well as whether the BMPs themselves are having the desired effect if properly applied.

Table 2. Ratings and criteria used in the South Dakota Forestry BMP field audit procedure.

Application

<u>Rating</u>	<u>Criteria</u>
5	Operation exceeds requirements of BMP.
4	Operation meets standard requirements of BMP.
3	Minor departure from BMP.
2	Major departure from BMP.
1	Gross neglect of BMP.

Effectiveness

<u>Rating</u>	<u>Criteria</u>
5	Improves protection of soil and water resources over pre-project condition.
4	Adequate protection of soil and water resources.
3	Minor and temporary impacts on soil and water resources.
2	Major and temporary, or minor and prolonged, impact on soil and water resources.
1	Major and prolonged impact on soil and water resources

Definitions

<i>Adequate</i>	Small amounts of material eroded. Material does not reach draws, channels or floodplains.
<i>Minor</i>	Some material erodes and is delivered into dry draws, but not into a stream.
<i>Major</i>	Material erodes and is delivered into stream or annual floodplain.
<i>Temporary</i>	Impacts last less than one season.
<i>Prolonged</i>	Impacts last more than one year.

Figure 2 displays the rating procedure used during the field audits. The procedure begins with establishing whether or not a given practice is applicable to the timber sale in question. For example, several BMPs relate to the construction and closure of temporary roads, but not all timber sales involve the use of temporary roads. In an instance where the BMP is determined not applicable the rating process stops. Where a BMPs applicability is established the rating process moves on to evaluating the application of the practice and its effectiveness.

The rating of each audit item for both application and effectiveness was established on a consensus basis among all members of the audit team. While the audit team members occasionally had differences of opinion on rating values, the discussion yielded consensus in all instances.

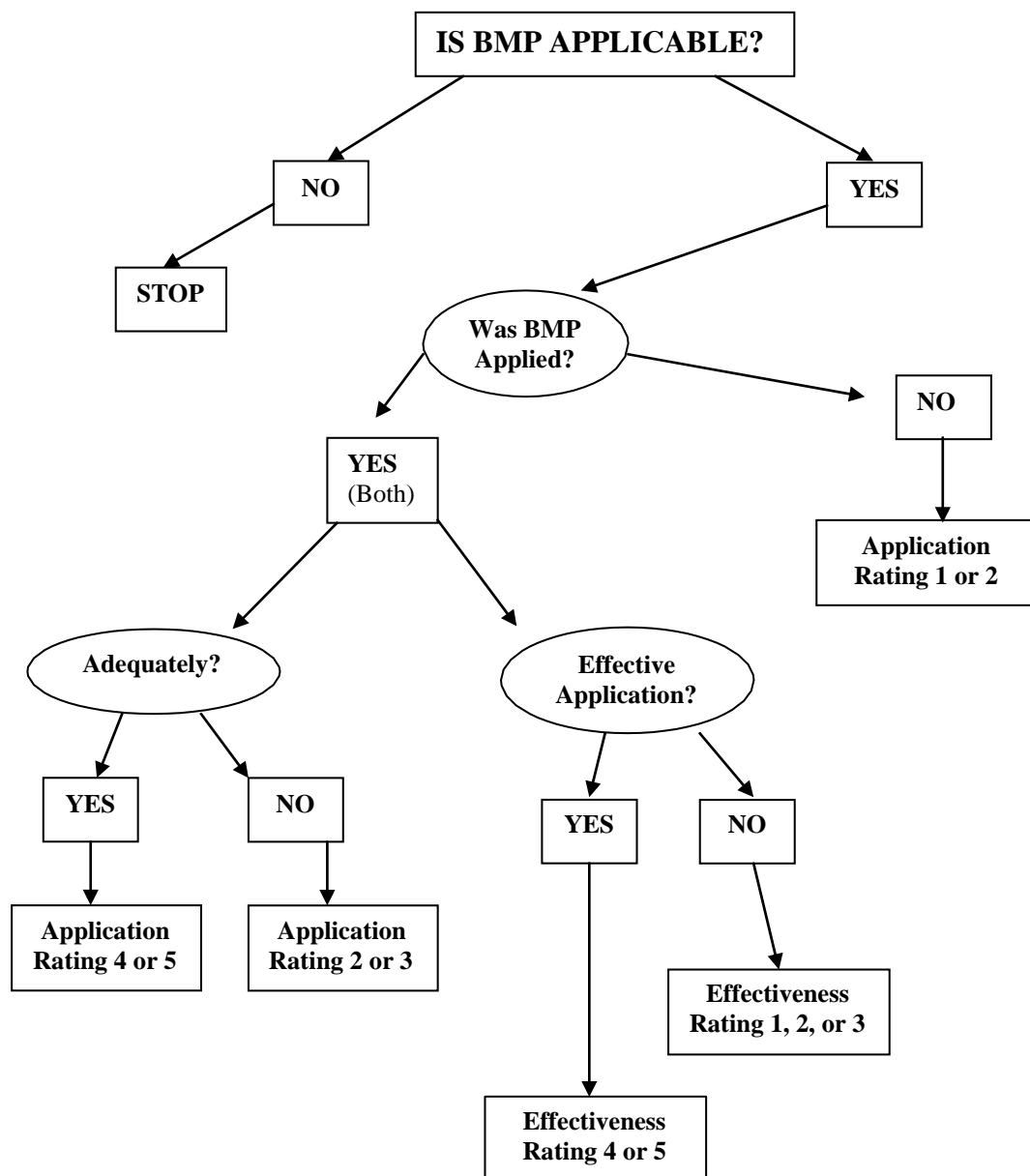


Figure 2. Forestry BMP field audit rating process.

2.4 LIMITATIONS OF THE AUDIT PROCESS

The audit process is thorough, objective, and faithful to the letter and intent of the BMPs. However, the reader should be aware of its limitations.

First, the limit of time and resources prohibit examining every acre of each timber sale audited. The audits are, rather, a spot-check of areas of particular interest. Audit team members identified key areas and features such as stream crossings, riparian areas, wetlands, log landings, roads, skid trails, and so forth, which were favored for inspection over areas where the potential for soil and water resource impacts are minimal.

Second, the audits are a visual review at a specific point in time. The audit team's evaluation can only reflect and record its direct observations. Ratings of BMP application and effectiveness are qualitative measures arrived upon by consensus among professionals and based upon the rating criteria. They are not based upon precise scientific measurements such as pH, turbidity, or dissolved oxygen, which one might collect as water quality monitoring parameters. Furthermore on active sales, only those practices applicable to ongoing activities were assessed; those practices relating to sale closure items such as grass seeding or other post-sale means of soil stabilization were not assessed because they were not observable at the time the audit took place. Conversely, on sales where harvest operations have been completed, BMPs relating to active harvest activities are not assessed.

Third, not all measures of effectiveness are within the control of the timber sale operator applying the BMPs. For instance, the establishment of ground cover vegetation on disturbed areas is an important practice, and was followed routinely. However, weather conditions can have a significant effect on seed germination. The effectiveness of certain practices can also be compromised by third-party damage outside the control of the timber sale operator. One example might be excessive recreational traffic over a road surface during periods of high moisture, which can damage road drainage structures and result in sediment erosion. The audit team did its best to rate these items when sufficient information was available to complete a fair evaluation.

Finally, nothing about the timber sale audit procedure with respect to site selection or audit ratings is intended to provide a statistically significant sample. No stratified or randomized sampling methodology was applied to site selection or individual sale audit processes. The timber sale site selection process carries intentional bias toward those sale areas with the greatest potential to affect water resources. Similarly, the audit data carries intentional bias toward areas and features within the timber sale where the potential for impacts is greatest. The likelihood, therefore, is that if ever a true random sample were collected, the audit results presented here would likely under-represent BMP application and effectiveness. Additionally, the 2018 audits visited one less site than previous audits for reasons discussed previously, therefore adding additional statistical significance each individual rating.

3. AUDIT RESULTS

The total number of rated items was tabulated for all timber sales audited excluding inapplicable items or those for which a rating could not be established. Among these, the incidence of each of the five individual ratings for application and effectiveness according to the definitions in Chapter 2.3 of this document was compiled. For example, among application scores across all timber sale ownerships, the score of "meets BMP" was recorded 140 times out of 163 total rated items. Appendix A of this report contains individual rating values on each timber sale.

Tables 3 and 4 summarize the audit results for BMP application and effectiveness

scores recorded in the 2018 timber sale field audits displayed both in a breakdown among land ownership categories and in aggregation. These values reflect the results from all operations categories among timber sales audited, whether operations were ongoing, recently completed, or long-complete. Percentages are rounded and may not total exactly 100 percent for each ownership. Refer to Chapter 2.2 of this document for further explanation of audit site selection.

The audited timber sales scored highly in both application and effectiveness across all ownerships. Audited timber sales on all ownerships met or exceeded BMP application standards on 95 percent each of the total rated points. No instances of gross neglect in BMP application were cited on any timber sale, and there was only one instance of a major departure from BMP application recorded. Across all ownerships, BMP application standards were met or exceeded on 155 of 163 total rated items, or 95 percent.

Table 3. 2018 South Dakota Forestry BMP field audit results for application of BMPs across land ownership categories.

Ownership Category	Gross Neglect	Major Departure	Minor Departure	Met BMP Standard	Exceeded BMP
Private	0%	3%	3%	95%	0%
State	0%	0%	9%	87%	4%
Federal	0%	0%	1%	80%	19%

Table 4. 2018 South Dakota Forestry BMP field audit results for effectiveness of BMPs across land ownership categories.

Ownership Category	Major & Prolonged Impacts	Minor/Prolonged Or Major/Temporary Impacts	Minor & Temporary Impacts	Adequate Protection	Improves Pre- project Conditions
Private	0%	0%	0%	97%	3%
State	0%	0%	11%	85%	4%
Federal	0%	0%	0%	97%	3%

Timber sales on federal and private lands were highest among BMP effectiveness, scoring adequate or improved protection of water and soil resources for 100 percent of the total rated items. No instance of major and prolonged impacts, minor and prolonged, or major and temporary impact was recorded among all timber sales audited. Across all land ownership categories, BMP effectiveness standards were met or exceeded on 157 out of 163 total rated items, or 96 percent.

Figures 3 and 4 display the audit results for BMP application and effectiveness, respectively, aggregated across all land ownership categories as a percentage of the total rated items. BMPs were found to have met or exceeded application standards in 95 percent and effectiveness standards in 96 percent of the rated instances. Effectiveness ratings exceeded BMP requirements and improved upon pre-project conditions across all ownerships. Departures from the BMPs made up five percent of the rated items for application and four percent of the rated items for effectiveness. One instance of a major departure was cited in BMP application (Table 3).

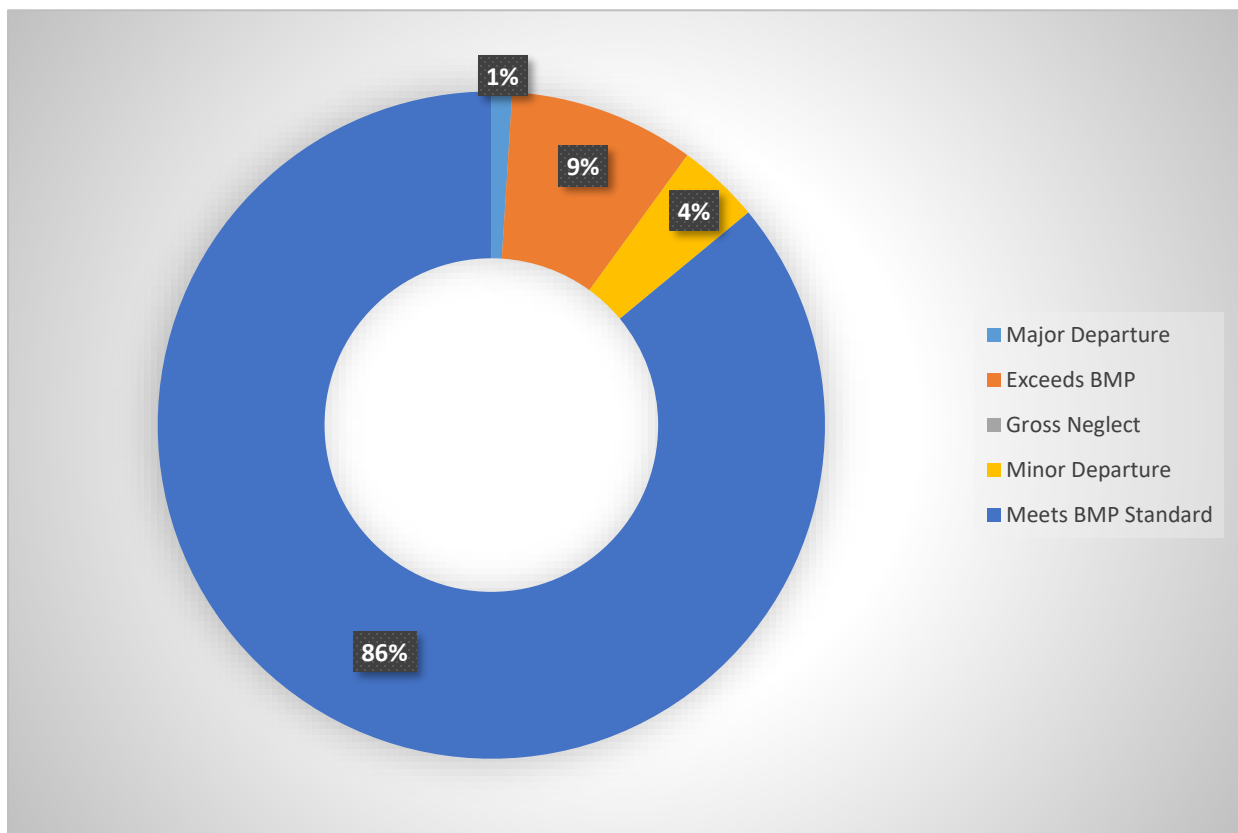


Figure 3. Results of application of appropriate BMP measures from the 2018 audit.

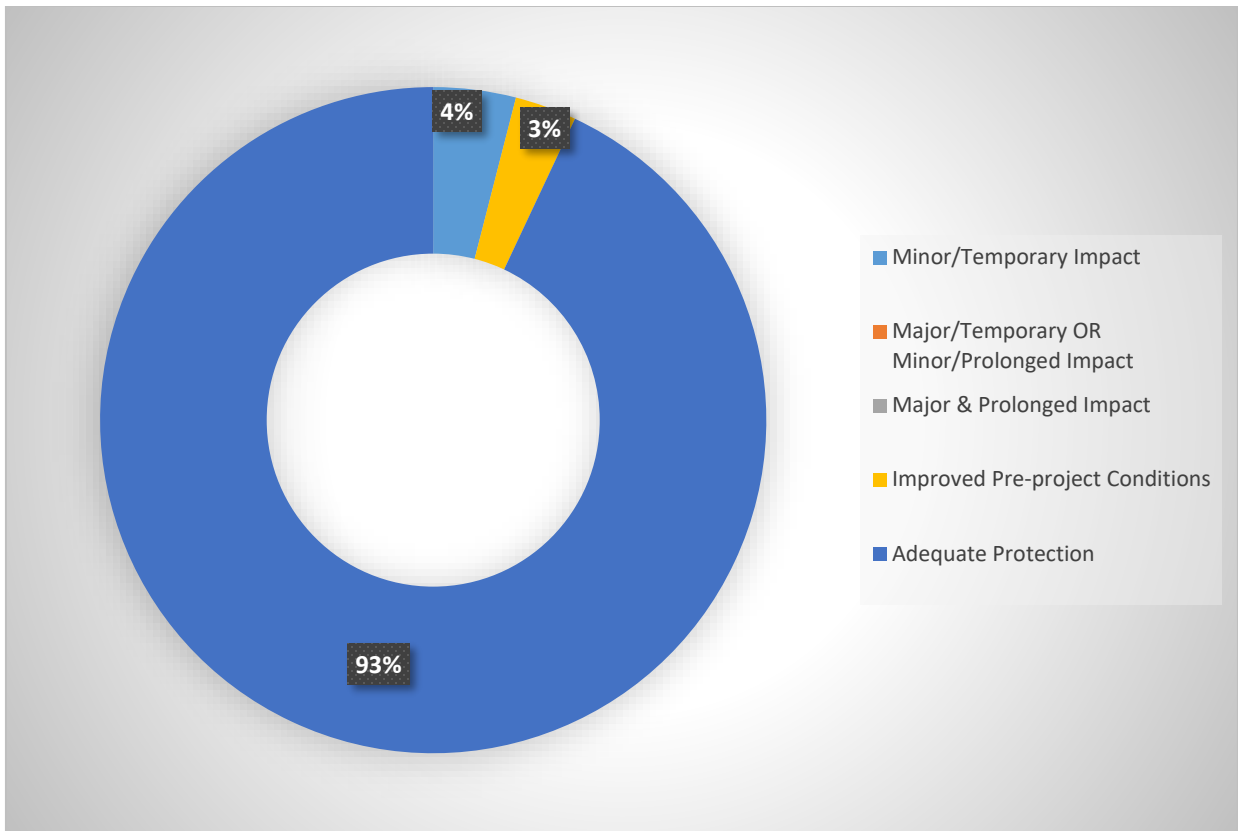


Figure 4. Results of effectiveness of applied BMP measures from the 2018 audit.

The 2018 audit examined one active timber sale, four recently completed (less than two years old) timber sales, and revisited one timber sale which had been audited in the 2014 field audits. See Table 1 and Figure 1. The selection of timber sales also represented varying stages of completion and was intended to begin building monitoring data which will help evaluate BMP application and effectiveness at varying temporal scales throughout the life of a timber sale. Tables 5 and 6 present the audit results for incidence of Application and Effectiveness scores, respectively, by sale completion category.

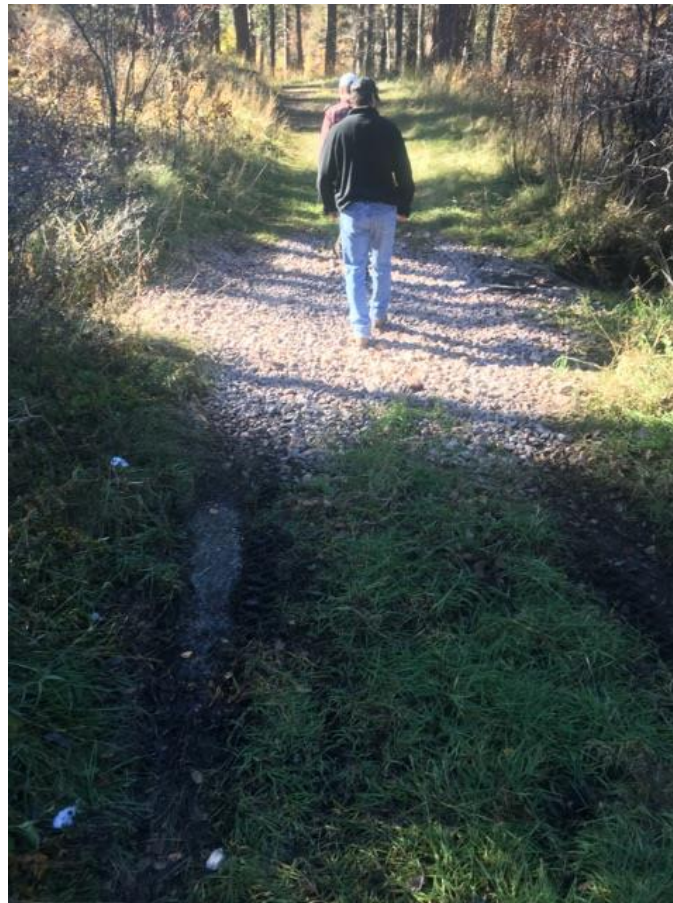
Table 5. 2018 Forestry BMP field audit results for application of BMPs across timber sale completion categories.

Timber Sale Completion	Gross Neglect	Major Departure	Minor Departure	Met BMP	Exceeded BMP
Active	0%	0%	3%	72%	25%
Recent	0%	1%	5%	90%	5%

Table 6. 2018 Forestry BMP field audit results for effectiveness of BMPs across timber sale completion categories.

Timber Sale Completion	Major & Prolonged Impacts	Minor/Prolonged or Major/Temporary Impacts	Minor & Temporary Impacts	Adequate Protection	Improves Pre-project Conditions
Active	0%	0%	0%	97%	3%
Recent	0%	0%	5%	92%	3%

Importantly, the 2018 audit illustrated instances where operators had gone above the recommended BMP application and achieved exemplary results. One such instance was on the Tanker Timber Sale. In that instance, the topography of the unit made it difficult to pinpoint the location where water would drain from the hillside to best locate a culvert, which had the potential for resource damage and road instability. Using an innovative engineering design, water was diverted in two separate directions into two separate culverts where BMP guidelines only required one culvert. Foresters and operators also, when presented the choice, used a cut to length with slash lopped and scattered as opposed to the whole tree logging method. This kept slash in place to help stabilize a higher moisture area.



Members of the 2018 audit team
examine a stream crossing

4. DISCUSSION

Application and effectiveness accomplishments meeting or exceeding BMP standards have shown steady improvement since the BMP field audits began in 2001. Figure 5, shown below, illustrates this positive trend and speaks well for BMP training and field work that has been completed by professional loggers and foresters.

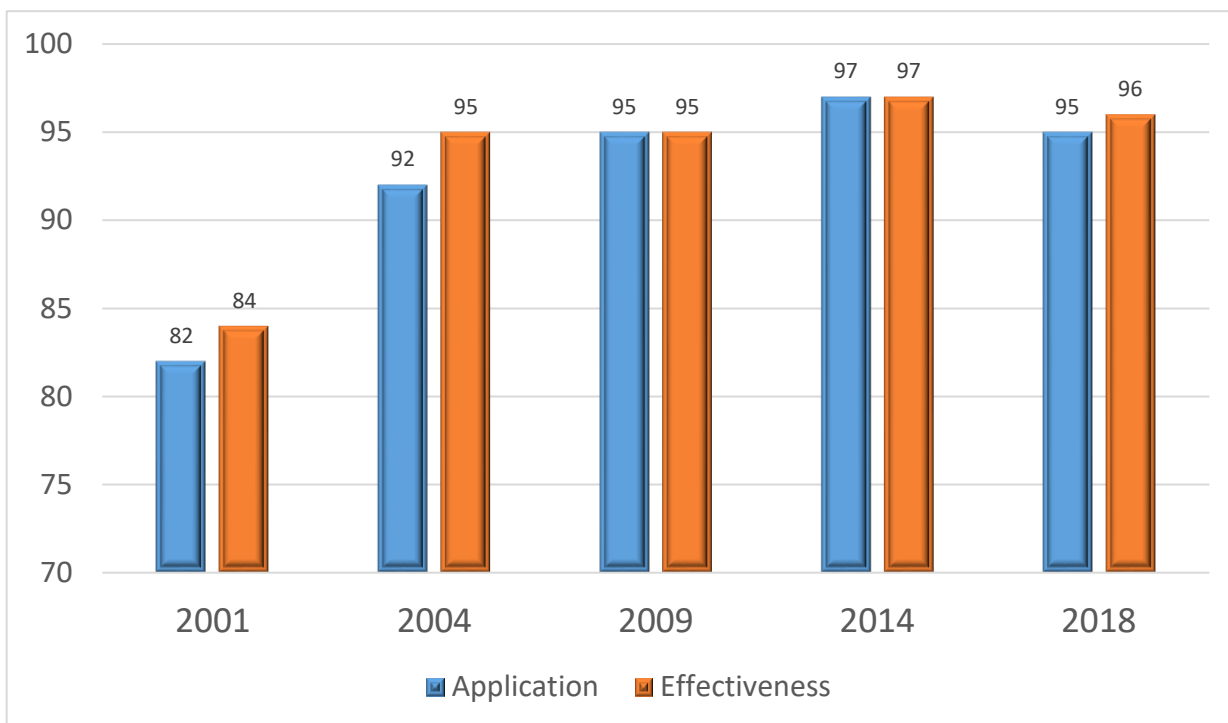


Figure 5. Percent of *total rated items* meeting or exceeding BMP standards for application and effectiveness since field audits began in 2001.

4.1 NATIONAL FOREST SERVICE TIMBER SALES REVIEW

The Storm Sale, northeast of Sheridan Lake utilized a previously existing road with multiple stream crossings. SMZ designations exceeded the requirements of the BMPs. The main stream in the unit was ‘over classified,’ meaning there were additional protections put in place exceeding the minimum requirements. Armored crossings were put in place where they had not been prior, improving the condition. A log forwarder was used to minimized disturbance both in the SMZ and of a cultural resource. Insufficient slash placed on a skid trail was rated a minor departure from the BMP, but had not caused any negative effects.

The Tanker Sale, just south of Dalton Lake, was previously discussed. There were multiple designated ‘areas to protect’ (ATPs) which were avoided during operations and similar protective measures were taken as they would have with SMZs. The area is also a high traffic recreation area, and the road work and protective measures during the harvest operation helped to improve the pre-project condition.

CUSTER STATE PARK TIMBER SALES REVIEW

The Spokane-Norbeck Sale, in the northwest corner of the park, was limited by topography and logs were brought downhill to landing areas. Existing roads were used for hauling. Previously installed culverts were utilized and were in some instances poorly located or improperly sized. Minor departures from BMP guidelines were also noted for insufficient slash on skid trails and stabilization of excess material from road maintenance. For all minor departure ratings, effects were rated as minor and temporary.

The Robber's Roost Sale was a salvage sale from the Legion Lake fire in December of 2017. Slash piles were burned immediately following the sale, and all reseeded work exceeded minimum recommendations. Existing roads were used, and in one instance, a stream crossing was not used due to potential negative effects on the resource. In some instances, it was difficult for the audit team to distinguish between harvest operations or wildfire effects, so no rating was given. Consensus among the team however, was that the salvage sale and associated practices were very beneficial in helping to rehabilitate the area.

4.2 PRIVATE TIMBER SALES REVIEW

The Prairie Creek Sale is located southeast of Pactola Reservoir along a portion of Brush creek. This sale was conventionally logged in the winter and existing roads utilized. All SMZ's were designated by flagging. One 'major departure' application rating was given for the lack of a hazardous spill contingency plan. An existing stream crossing was reinforced in preparation for harvest operations, resulting in improved conditions.

4.3 RE-AUDIT SALE

The Sleep Sale, by Iron Creek Lake south of Spearfish, was chosen for re-audit based on notes from the 2014 audit team and with the intent of visiting an equal distribution of ownerships as mentioned in section 2.2. An area of a temporary stream crossing showed no effects of the previous harvest operations. The 2014 team noted that a culvert near the east end, provided by landowner, was too short and rip rap around downstream end had collapsed. The condition of the crossing was not remedied by the landowner and had slightly worsened since the 2014 audit. The 2018 audit team recommends extending the culvert while it is still a relatively simple task and before there is more significant impact to the crossing and the water resource.

4.4 DISCUSSION SUMMARY

This BMP field audit illustrates the continued commitment to implementing effective forestry BMPs in the Black Hills and identified areas of emphasis for future improvement. On average, 95 percent of the timber sales visited met or exceeded implementation standards of BMPs and the BMPs themselves are proving effective at mitigating non-point source effects from forestry activities. A common theme of the audits were operational decisions to avoid areas within units that had a higher risk of negative impact on water resources, even though those operations would have been within the guidelines of the BMPs. Care was taken to avoid or operate carefully within SMZs. SMZs were consistently formally designated both on the ground and on sale area maps. However, drainage structure installation and maintenance continue to be a recurring source of deviation from BMPs, due primarily to administrative decisions and landowner choices.

In addition to identifying departures for future training emphasis, the 2018 audits revealed that managers and operators are excelling in several elements of BMP implementation. Another recurring theme of the 2018 audits was the ‘over classification’ of water resources resulting in, for example, intermittent or ephemeral streams being classified as perennial streams and protected accordingly. This led to additional measure being taken exceeding the BMP standards and in multiple instances, improving pre-project conditions. The 2018 audits showed significant increases from previous audits in exceeding the BMPs in application and improving pre-project conditions in effectiveness. Although results varied somewhat by sale ownership, managers and operators are also doing well to use the minimum number of roads and minimum road standards necessary to access timber to be harvested. Overall, a great majority of the rated items went without deviation from the BMPs across all five audited timber sales. Most important practices are routinely followed and in only rare instances do significant negative impacts on soil and water resources actually result. Operators have been trained to identify situations wherein the potential for water quality impacts are greatest and are taking care to implement preventive measures in these situations.

5. RECOMMENDATION

5.1 RESPONSE TO PRIOR RECOMMENDATIONS

Performing field audits every three years was recommended in 2001 and 2004. From previous audit reports, the three-year time period does not appear to be critical considering the continued effective BMP implementation. The 2014 audit team recommended audits in the 2018-2020 time frame.

The 2014 audit team recommended inviting appropriate Forest Service personnel to participate on each federal timber sale to provide site specific background information as well as answer any potential questions the audit team may have about the site. The 2018 audits engaged those personnel in the planning phase and there were multiple forest service personnel at each federal timber sale including foresters, sale administrators, and hydrologists and were an asset in providing information to the audit team.

Private landowners were invited to participate when reviewing their property. Although they were unable to participate in this instance, their consulting forester was a member of the audit team and was able to provide background information on the sale.

5.2 AUDIT TEAM RECOMMENDATIONS

- Perform audits and training in 2022-2024 time frame.
- Continue the voluntary BMP audit and training program on a three-five year cycle.
- Continue to invite the appropriate Forest Service District Ranger or Timber Sale Administrator and additional support staff to participate on each federal timber sale being audited. Those individuals can be vital in helping the audit team gather information and answer sale design questions related to the background/history of the timber sale being reviewed.
- Evaluate and further streamline the audit rating criteria for efficiency and clarity as well as consistency with industry practice. A recurring example of a term that caused confusion was ‘constructed skid trails.’
- Evaluate and update the BMP manual for clarity and consistency with industry practice. An example is water bars on skid trails. After multiple field audits, standard practice appears to be using slash on skid trails, but there are no clear guidelines for this practice for audit team members to use for their evaluations.
- Develop BMPs for other industry practices with specific recommendations and guidelines. An example cited by the audit team where these could be beneficial was slash pile burning.
- There was significant discussion on the evaluation and applicability of different logging methods (whole tree, cut to length with lop and scatter) and future management considerations. While it is not the charge of the BMP audit team or this report to evaluate, it is nonetheless an important point of discussion for stakeholders and decision makers in forest management.
- Provide information regarding pesticides and/or fertilizer that, if any, were actually used on a harvest unit noted on the audit team site information sheet. If none was used, then the site information sheet should also note this information.
- A harvested timber sale unit followed by a pre-commercial thin is suggested for review. (This recommendation carried over from previous audits)
- Continue to invite private landowners and/or their consulting foresters to attend and participate when reviewing their property. Participation by the private landowner helps the audit team to learn firsthand about the landowners’ objectives, gather background information and helps in answering audit team questions. Additionally, the private landowner has the opportunity to participate and learn from the audit experience.
- An effective and practical BMP audit team includes a soil scientist and/or geologist, hydrologist, forester, engineer, a fish or wildlife biologist, the timber sale landowner or agency representative, the timber sale administrating forester where applicable, an independent non-industry forest landowner, forest products company representative(s), and a representative from a conservation or wildlife organization.

The timber harvest unit design maintains or improves hydrology by maintaining water quality and soil productivity and reducing soil erosion and sedimentation.	5	4	4	4	4	4	4	4	5	4
7. Skidding Design										
Design in the location of skid trails provides for adequate drainage and minimizes soil compaction and displacement.	4	4	4	4	4	4	4	4	4	4
Design and locate skid trails and skidding operations to minimize soil disturbance.	4	4	4	4	4	4	4	4	4	4
Locate skid trails to avoid concentrating runoff and provide breaks in grade. Locate skid trails and landings away from natural drainage systems and divert runoff to stable areas.	4	4	4	4	4	4	4	4	4	4
8. Suspended Log Yarding										
Suspended log yarding was used where appropriate to protect riparian areas or other sensitive watershed areas.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
HARVEST OPERATIONS										
10. Equipment Limitations in Wetlands, Bogs and Wet Meadows										
Designate SMZs to provide stream shading, soil stabilization, sediment and water filtering effects, and wildlife habitat	NA	NA	NA	NA	NA	NA	4	4	NA	NA
Avoid soil damage, turbidity and sediment production resulting from compaction, rutting, runoff concentration and subsequent erosion.	NA	NA	NA	NA	NA	NA	4	5	NA	NA

Examples: Treatment and retention of slash above expected high water may be necessary to trap sediment. Minimize operation of wheeled or tracked equipment within SMZ											
11. Log Landing Location and Design											
Landings are located to minimize soil disturbance while meeting safety and efficiency requirements.	5	4	4	4	4	4	4	4	4	4	4
Landings are located to provide appropriate drainage that minimizes erosion and avoids sediment delivery to streams.	4	4	4	4	4	4	4	4	4	4	4
Landings are located to minimize the number of tractor roads.	4	4	4	4	4	4	4	4	4	4	4
12. Log Landing Erosion Protection and Control											
Landings are maintained to allow for proper drainage to permit the dispersion of water and minimize erosion.	4	4	4	4	5	5	4	4	4	4	4
Care is taken to prevent debris and sediment from entering streams where landings were placed within the SMZ.	NA	NA	NA	NA	NA	NA	4	4	NA	NA	NA
13. Revegetation of Areas Disturbed by Harvest Activities											
Practices have been completed, where needed, to ensure adequate revegetation cover to prevent accelerated erosion in areas disturbed by harvest.	NA	NA	4	4	5	5	NA	NA	4	4	4
14. Erosion Control on Skid Trails											
Skid trails are constructed to minimize erosion and avoid sediment delivery to streams.	NA	NA	4	4	4	4	NA	NA	NA	NA	NA

[illegible]

Road design minimizes soil movement and sedimentation as well as undue disruption of water flow.	4	4	NA	NA	NA	NA	4	4	4	4
Road locations avoid long, sustained, steep grades.	4	4	NA	NA	NA	NA	4	4	4	4
Road and trail drainage are designed to keep sediment from being deposited within bank full flow.	4	4	NA	NA	NA	NA	4	4	NA	NA
19. Road and Trail Erosion Control Plan										
Erosion control measures are in place prior to seasonal precipitation and runoff.	4	4	4	4	4	4	4	4	4	4
Exposed soil is protected from detachment, and erosion is minimized through vegetative or physical practices.	4	4	4	4	4	4	4	4	4	4
Adequate road surface drainage and drainage dispersal associated with roads is provided.	4	4	4	3	4	4	4	4	4	4
Culverts and drainage devices are adequately maintained.	4	4	3	3	NA	NA	4	4	4	4
Ditch/relief culverts are protected, stabilized and placed appropriately.	4	4	NA	NA	NA	NA	4	4	4	4
Energy dissipaters are placed at drainage structure outlets where needed.	4	4	NA	NA	NA	NA	NA	NA	4	4
20. Timing of Construction Activities										
In-stream construction activities are completed with consideration to critical fish spawning and incubation periods.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Erosion is minimized by restricting operations during excessive moisture periods.	5	4	4	4	NA	NA	4	4	4	4
21. Slope Stabilization and Prevention of Mass Failures										

There is no evidence of mass failures, landslides and embankment slumps due to road construction or maintenance.	NA	NA	NA	NA	NA	NA	4	4	4	4
22. Stabilization of Slopes										
Road cut &/or fill slopes and travelways are stabilized.	NA	NA	NA	NA	NA	NA	4	4	4	4
23. Permanent Road Drainage										
Road drainage systems and drainage control structures are adequate and working.	4	4	3	3	4	4	4	4	5	5
26. Control of Road Construction Excavation and Sidecast Material										
Excess material is stabilized.	NA	NA	3	3	NA	NA	4	4	4	4
27. Control In-Channel Excavation										
Stream channel disturbance is minimized.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Culverts conform to natural streambed and slope.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Material excavated from the stream channel is to be removed to a suitable upland disposal and disturbed streambanks are stabilized.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28. Diversion of Flows Around Construction Sites										
Diversions that are necessary to avoid excessive sediment for in-stream operations are properly constructed.	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
29. Stream Crossings on Temporary Roads										
Stream crossing by temporary roads are minimized.	5	4	NA	NA	NA	NA	4	4	NA	NA
Temporary roads do not unduly damage streams, disturb channels or obstruct fish passage.	4	4	NA	NA	NA	NA	4	4	NA	NA

[illegible]

[illegible]

39. Servicing and Refueling of Equipment	4	4	4	4	NA	NA	NA	NA	NA	NA
Refueling and servicing activities are performed outside of any SMZ or wetland area.										
Mitigating measures are immediately applied following a spill.										
FIRE MANAGEMENT										
40. Protection of Soil and Water from Prescribed Burning Effects										
Appropriate techniques are used to maintain soil productivity, minimize erosion and prevent ash, sediment, nutrients and debris from entering surface water.	NA	NA	NA	NA	4	4	NA	NA	4	4
41. Stabilization of Fire Suppression Related Watershed Damage										
Appropriate mitigation treatments are applied to activities completed for fire suppression.	NA	NA	NA	NA	4	4	NA	NA	NA	NA
42. Emergency Rehabilitation of Watersheds Following Wildfires.										
Appropriate treatments are utilized to rehabilitate watershed following wildfires.	NA	NA	NA	NA	4	4	NA	NA	NA	NA