2009 Field Audit Report

Implementation Monitoring and Evaluation of South Dakota Forestry Best Management Practices

A Soil and Water Conservation Grant program sponsored by:

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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 SD 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. Compliance with BMPs is not mandated by statute or regulation in SD. Timber harvest operators, wood products companies and land management agencies have, nonetheless, made a commitment to successfully 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 for BMP implementation. Training for foresters, logging professionals and resource specialists was conducted under a grant agreement in 2001. Timber sale field audits, to evaluate BMP compliance, were also conducted under a grant agreement in 2001. This commitment to continued monitoring and evaluation was renewed in 2004 when field audits were again conducted through a partnership between BHFRA and DENR under a Pollution Prevention Act grant.

BHFRA, in partnership with the Lawrence County Conservation District and the South Dakota Department of Agriculture, Resource Conservation and Forestry Division, once again conducted timber sale field audits in 2009 to evaluate BMP compliance. 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).

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. Six timber sales were audited in 2009: two on private land, two on state land or under state administration and two on federal land.

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 95 percent of the total rated items. In comparison, the 2001 audit results showed 82 and 84 percent compliance for application and effectiveness, respectively. The 2004 audit results showed 92 percent and 95 percent, respectively. The audit results from 2001, 2004 and 2009 have established a positive trend of on the ground BMP improvement.

The 2009 field audit team recommends:
1. Continuing the system of audits and training on a three-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, utilization of training and field audits for water quality protection guidelines during forestry and timber harvesting operations. The 2009 program is the product of a financial partnership between the Black Hills Forest Resource Association (BHFRA), Lawrence County Conservation District, South Dakota Department of Agriculture, and the Resource Conservation and Forestry Divisoin (SD RC&F).

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 wildlife biologists, fisheries biologists, hydrologists, geologists, foresters, engineers, and logging professionals, as well as private landowners and interest groups that stand to benefit from a successful BMP program. Many thanks are owed to the following people for their generous contribution of time and expertise:

Audit Team Members:

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Tom Quinn	Natural Resource Conservation Service
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This document is the third in a series of BMP Field Audit Reports. This report was prepared in 2009 by Jim Hoxie and Carson Engelskirger with acknowledgement to W. Kenneth Lee and Aaron M. Everett for their prior written documentation and data analysis completed in 2001 and 2004.

1. INTRODUCTION

The forests of the U.S. cover about one-third of the nation's land-area and are precious resources in myriad respects. Among these is 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 support a vibrant infrastructure of forest industries. 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 (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 even our underground sources of drinking water.[2]

In other words, sediment transported through a watershed is referred to as "nonpoint" source pollution because its origin cannot easily be traced to a single point or area. 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. However, these and other potential sources of water pollution are preventable if sound forestry and logging practices are employed. In recognition of the need to protect water quality during forestry operations, the State of SD adopted BMPs.

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 were revised in 1993 and again in December, 2003.[3] Both the 1993 and 2003 revisions were adopted in the South Dakota Nonpoint Source Pollution Management Plan[4] and were approved by the EPA under a provision of the Clean Water Act.

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[1] USDA Forest Service. 2000. Water and the forest Service. FS-660. Washington, DC.
[2] US Environmental Protection Agency
http://www.epa.gov/OWOW/NPS/ (2/17/04)

Compliance with BMPs during forestry operations is not mandated by statute or regulation 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 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 showed a strong commitment and good 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 and steering committee attributed many of these mistakes to unclear language or illustrations in the BMP manual and the need for further training.

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.

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.

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[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)

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.

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 Silviculture Best Management Practices (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, 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.

One charge of the 2004 audits was to evaluate on the recommendation made by the 2001 audit team that making a less complicated audit procedure would yield more accurate results. After several different approaches were explored, it was decided that meaningful changes to the audit procedure could not be accomplished without significant work above and beyond the scope of this project. Maintaining consistency between the audit procedure and the BMPs themselves remains of paramount importance. Therefore, the 2004 and 2009 audits were conducted using the same procedures developed for the 2001 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 2000 board-feet per acre was harvested at the site
- Harvest site contains live water in the form of a stream or creek, or has other significant water resources
- One of the sites should be a re-audit of a site from 2004
- One of the sites should be a currently active timber sale
- The overall selection of sites should equally represent private, federal, and state ownerships

The Black Hills arid climate ensures that 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. The Sturgis Watershed timber sale was examined during the 2004 audits and was selected to fulfill the criteria of revisiting a previously audited site in 2009. The Thrall timber sale (USFS) had harvest operations ongoing at the time of the audit, thereby fulfilling the criteria of auditing one currently active sale. 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 as is typical of most timber sales in the Black Hills region. The Sturgis Community Watershed sale was administered by foresters with the State of South Dakota RC&F, although the property is owned by the City of Sturgis.

Table 1. **2009 Forestry BMP field audit sites.**

Timber Sale Name	Land Ownership	Completion Date
HES 65	Private	June, 2009
Jimmy	US Forest Service	October, 2007
Emery	Private	January, 2007
Robbers Roost	State of SD Custer State Park	October, 2008
Thrall	US Forest Service	Active
Sturgis Watershed	City of Sturgis	January, 2003

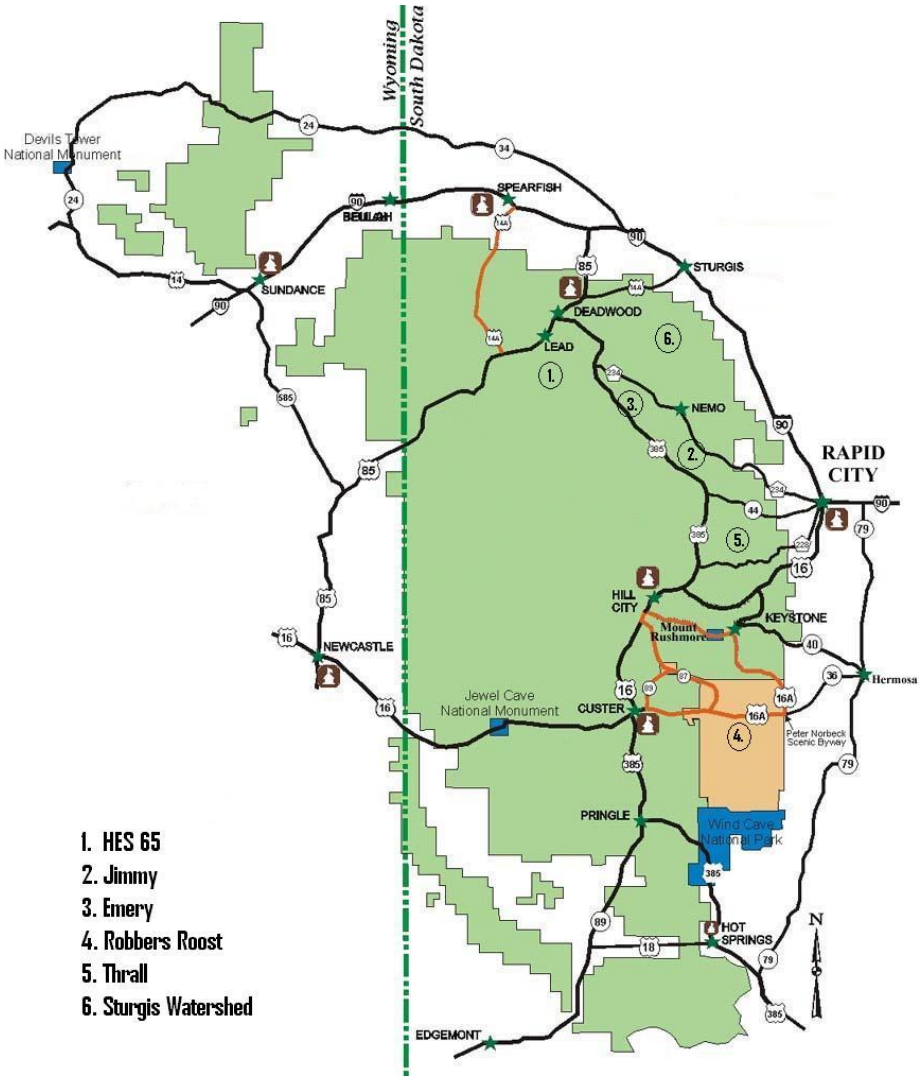

Figure 1. **2009 South Dakota Forestry BMP field audit sites.**

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 application and effectiveness. Application is simply 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

Rating	Criteria
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

Rating	Criteria
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

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

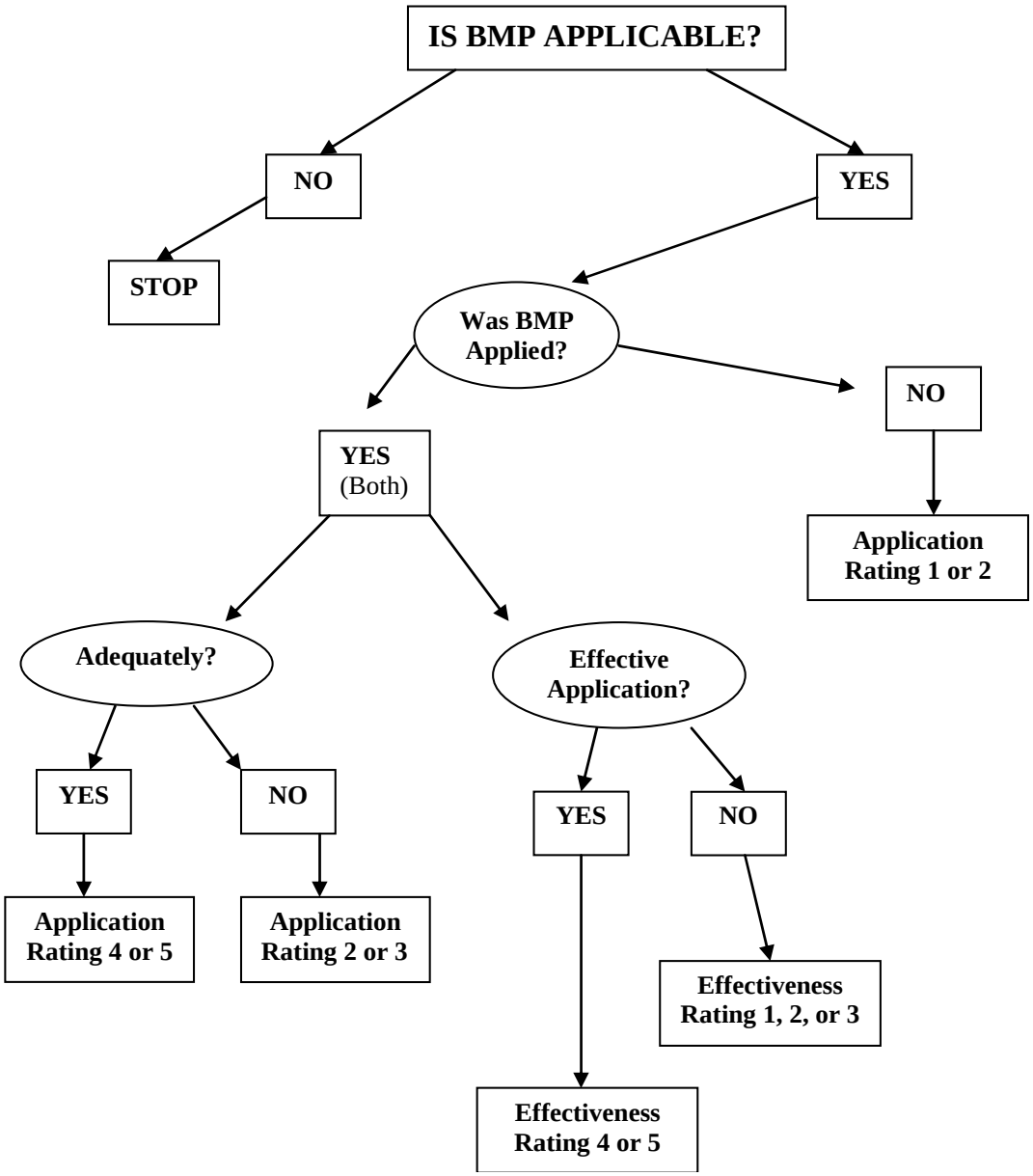

Figure 2. Forestry BMP field audit rating process.

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 ongoing harvest activities are not assessed and neither is assessments projected about long-term effectiveness.

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, dry climate conditions in recent years have inhibited 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, but in some instances was not able to do so.

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 either the timber sale 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 is therefore that, if ever a true random sample were collected, the audit results presented here would be shown to under-represent BMP application and effectiveness.

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 simple 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 333 times out of 352 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 2009 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. 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. Timber sales on private land and state land (or under state administration, as in the Sturgis Watershed Sale) scored highest among application scores. Private and state sales met or exceeded BMP application standards on 98 percent and 97 percent respectively of the total rated points. No instances of gross neglect in BMP application were cited on any timber sale. One instance of major departures from BMP application was recorded. Across all ownerships, BMP application standards were met or exceeded on 333 of 352 total rated items.

Table 3. 2009 South Dakota Forestry BMP field audit results for incidence of application scores across land ownership categories.

Ownership Category	Gross Neglect	Major Departure	Minor Departure	Met BMP Standard	Exceeded BMP	Total Rated
Private	0	0	3	115	0	**118**
(Percent)	(0%)	(0%)	(2%)	(98%)	(0%)	
State	0	0	4	118	0	**122**
(Percent)	(0%)	(0%)	(3%)	(97%)	(0%)	
Federal	0	1	11	100	0	**112**
(Percent)	(0%)	(1%)	(10%)	(90%)	(0%)	
Total	**0**	**1**	**18**	**333**	**0**	**352**

Table 4. 2009 South Dakota Forestry BMP field audit results for incidence of effectiveness scores across land ownership categories.

Ownership Category	Major & Prolonged Impacts	Minor/Prolonged Or Major/Temporary Impacts	Minor & Temporary Impacts	Adequate Protection	Improves Pre-project Conditions	Total Rated
Private	1	0	5	112	0	**118**
(Percent)	(1%)	(0%)	(4%)	(95%)	(0%)	
State	0	0	1	120	1	**122**
(Percent)	(0%)	(0%)	(1%)	(98%)	(0%)	
Federal	0	1	8	100	3	**112**
(Percent)	(0%)	(1%)	(7%)	(89%)	(3%)	
Total	**1**	**1**	**14**	**332**	**4**	**352**

Timber sales on state lands were highest among BMP effectiveness, scoring with adequate or improved protection of water and soil resources for 98 percent of the total rated items. One instance of major and prolonged impacts was recorded among all timber sales audited. One instance of 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 336 out of 352 total rated items.

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 and effectiveness standards in 95 percent of the rated instances. Effectiveness ratings exceeded BMP requirements and improved upon pre-project conditions on both state and federal lands. Departures from the BMPs made up five percent of the rated items for application and four percent of the rated items for effectiveness. Although one major departure was cited in BMP application (Table 3), this accounts for roughly one-quarter percent of the total rated items. Similarly, one instance of major and prolonged impacts was cited and one minor/prolonged was cited in BMP effectiveness. (Table 4) Combining these two impacts account for the one percent given to minor/prolonged impact in Figure 4.

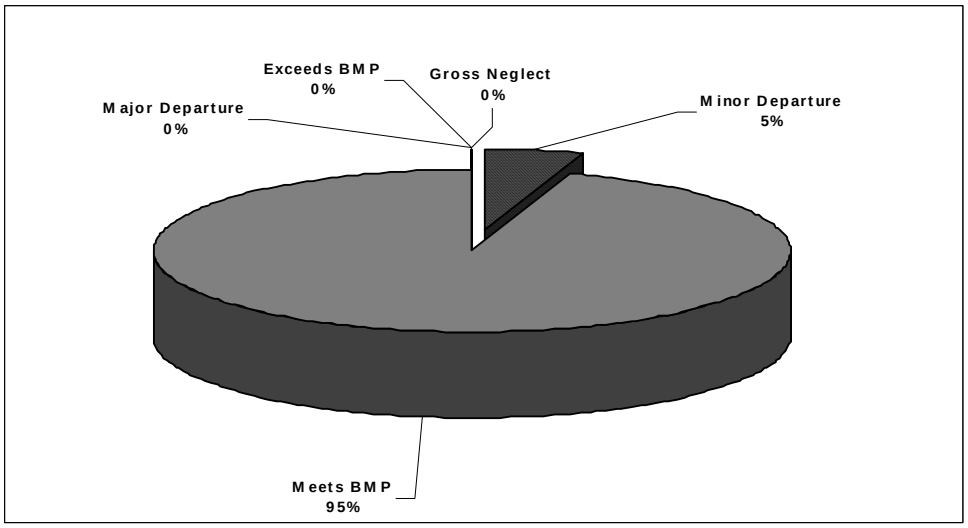

Figure 3. 2009 South Dakota Forestry BMP field audit results as aggregate incidence of application scores relative to total rated items across all land ownerships.

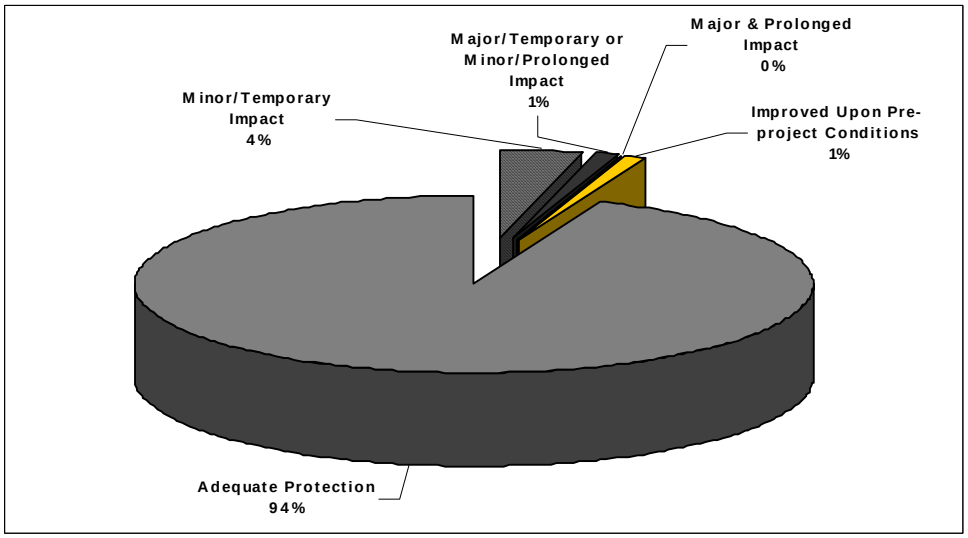

Figure 4. 2009 South Dakota Forestry BMP field audit results as aggregate incidence of effectiveness scores relative to total rated items across all land ownerships.

The 2009 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 2004 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. 2009 Forestry BMP field audit results for incidence of application scores across timber sale completion categories.

Timber Sale Completion	Gross Neglect	Major Departure	Minor Departure	Met BMP	Exceeded BMP	Total
Active (percent)	0 (0%)	1 (2%)	5 (8%)	54 (90%)	0 (0%)	**60**
Recent (percent)	0 (0%)	0 (0%)	11 (5%)	228 (95%)	0 (0%)	**239**
Revisited (percent)	0 (0%)	0 (0%)	2 (4%)	51 (96%)	0 (0%)	**53**

Table 6. 2009 Forestry BMP field audit results for incidence of effectiveness scores 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	Total
Active (percent)	0 (0%)	1 (2%)	5 (8%)	52 (87%)	2 (3%)	**60**
Recent (percent)	1 (0%)	0 (0%)	9 (4%)	228 (96%)	1 (0%)	**239**
Revisited (percent)	0 (0%)	0 (0%)	0 (0%)	52 (98%)	1 (2%)	**53**

The revisited timber sale scored highest in both application and effectiveness, BMP standards and improving upon pre-project conditions in some instances. Timber sales that had been recently completed (less than two years) ranked second in BMP application and effectiveness. The active timber sale ranked third in BMP application and effectiveness.

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.

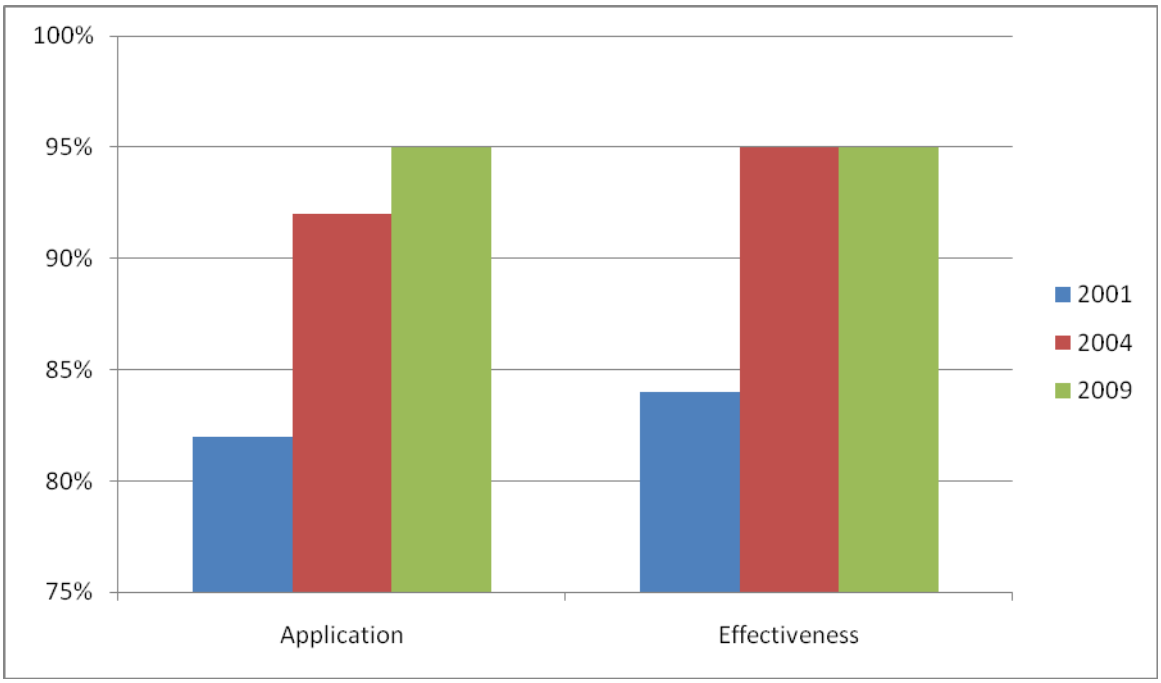

Figure 5. Percent of *total rated items* meeting or exceeding BMP standards for application and effectiveness in 2001, 2004 and 2009.

4.1 STATE OF SOUTH DAKOTA TIMBER SALE REVIEW

Robbers Roost, owned by the State of South Dakota in Custer State Park met BMP Standards 67 out of 69 rankings. Two minor departures noted by the audit team involved the need for more road drainage features above one culvert installation, and also that fish passage was limited at the site of the same culvert. A ranking of 97 percent for meeting BMP standards on Robbers Roost is commendable.

The Sturgis Watershed timber sale, owned by the City of Sturgis and administered by State of South Dakota forestry was selected as a re-visit candidate in 2009. Both the 2004 and 2009 audit teams recommended that the road systems are in need of routine road maintenance on an annual basis. In 2004 one culvert installation was given a major departure for application and a major & prolonged impact for effectiveness. One of our 2009 audit team members who also participated in the 2004 field audit was able to give the 2009 team background information on the subject of why this specific culvert installation rated poorly in 2004. Apparently the culvert installation on very steep terrain was placed with the downhill end elevated several feet above ground level. The 2009 audit team inspected the very same

culvert five years later and found that there had been no soil displacement. The riprap placed below the end of the culvert had protected the soil, and there was no observable evidence of resource damage. Since there was no evidence of resource damage the 2009 audit team rated the culvert installation as meeting BMPs. In another unrelated instance of culvert installation it was found that this culvert installation was rated as Met BMP for Application and Improved Pre-project Conditions for Effectiveness. (During the original timber sale the operators took out an old culvert and properly installed a new culvert).

4.2 PRIVATE TIMBER SALE REVIEW

In 2009, it was found that SMZs were not designated on one private timber sale (HES 65) prior to winter logging. The Sale Administrator and the Logging Contractor did discuss the location of the SMZ; however, the SMZ was not physically designated on the ground. One case of rubber tire skidder rutting was observed in an undesignated stream crossing on this timber sale. The audit team described this as a minor departure with no prolonged impacts on the land. Both the 2001 and 2004 field audits noted that SMZs need to be designated both on the sale administration map and on the ground. Continuing to stress the importance of locating the SMZs on the ground, prior to logging is necessary during BMP training sessions.

4.3 FEDERAL TIMBER SALE REVIEW

The audit team engaged in interesting discussions when reviewing Thrall, a federal timber sale located west of Rapid City. Thrall was still an active timber sale at the time of the audit team's review. It was found by the audit team that slash piles (boom de-limber type) had been placed within the SMZ in several locations. The Forest Service sale administrator explained that during sale design the harvest units were designated whole tree skid to mitigate fuel loading. He further explained that the only location to place slash piles was in the SMZ. The slash pile placement resulted in one application major departure and one effectiveness minor/prolonged impact. The audit committee noted that it will be interesting to see how the large slash piles will be handled after the sale harvest is completed (burned vs. chipped and hauled away). If the slash is chipped and hauled away, the audit team thought there would be little, if any impact. The audit team recommended these units as good candidates to review during the 2012 field audit. The same federal timber sale (Thrall) merited two effectiveness scores exceeding BMPs. One recognized the outstanding job performed in placing concrete mats in stream crossings and another recognized the excellent work performed in retaining hardwoods and sub merchantable trees adjacent to streams.

The Jimmy timber sale was the second federal timber sale selected for review. The Jimmy timber sale is located just south of Nemo. In the original sale design, temporary road construction was laid out with adverse skidding. Upon implementation the sale administrator and logging contractor were able to reduce the adverse skid by using existing temporary roads. The audit team questioned whether the original sale design minimized soil disturbance and properly fit the topography. On the same timber sale the audit team noted two instances where the requirements exceeded BMPs. These improvements cleaned up and stabilized the stream crossing on Jimmy Creek.

4.4 DISCUSSION SUMMARY

Several common mistakes were identified among the 2009 results for future training emphasis. Drainage structure installation was one recurring source of deviation from BMPs, the most notable was insufficient numbers of water bars on native surface roads. Another source of deviation was inadequate placement of drainage features up-slope from stream crossings to divert water flow through vegetative filters. Care was taken to avoid or operate carefully within SMZs, but these areas were not always formally designated either on the ground or on a sale area map.

In addition to identifying departures for future training emphasis, the 2004[6] and 2009 audits revealed that managers and operators are excelling in several elements of BMP implementation. Erosion control on skid trails using slash barriers, water bars and the reestablishment of vegetative cover was practiced consistently and in some cases exceeded standards. 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 six timber sales audited. 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. It is highly commendable that in 2009, 95% of application and effectiveness rankings met or exceeded BMP standards.

5. RECOMMENDATION

5.1 RESPONSE TO PRIOR RECOMMENDATIONS

Performing field audits every three years was recommended in 2001 and 2004. The three year time period, while not completed for a variety of reasons in 2007, does continue to be the preferred and recommended time period.

Several recommendations were offered in the 2004 field audit report regarding the make-up of the audit team and representation from applicable professional disciplines and interests. These recommendations included the addition of a conservation organization representative. During the 2009 field audit, conservation organizations were represented by the Black Hills Sportsmen.

Simplifying the audit rating criteria was recommended in the 2004 report. To date simplifying the audit rating criteria has not been accomplished. The 2009 field audit team did have several specific recommendations regarding rating criteria simplification which have been defined under section 5.2.

[6] Everett, A. M. 2004 Field Audit Report, Rapid City, SD
Web: http://www.state.sd.us.denr/DFTA/ Watershed Restriction/ WQ Index, htm (3/30/04)

5.2 AUDIT TEAM RECOMMENDATIONS

- Perform audits and training in 2012.
- Continue the voluntary BMP audit and training program on a three-year cycle.
- Invite the appropriate Forest Service District Ranger to participate on each federal timber sale being audited.
- Include the Forest Service ID Team Leader on the field audit for federal timber sales to observe and provide information to the audit team. The ID Team Leaders presence will help the audit team gather information and answer sale design questions related to the background/history of the timber sale being reviewed.
- Evaluate simplifying the audit rating criteria. The audit team suggests that specific areas of the audit form currently being used should be reviewed. Questions beginning with the word "Consider" need to be re-worded and/or re-written. The consensus of the group is that it is difficult to evaluate performance and answer questions that are "subjective" in nature.
- Provide background information to the 2012 audit team regarding Codified Laws referred to on the BMP audit form. (Example SDCL38 -19)
- The Thrall timber sale (federal) is recommended by the 2009 audit team as a good re-audit candidate for the 2012 audit.
- A site information sheet is prepared for the audit team's use for each site visited. When preparing the site information sheet the audit team leader meets with the designated sale administrator on the timber sale harvest unit and gathers information relating to harvest objectives, harvest design, and environmental information relating to harvest objectives. It would be helpful and informative if the Forest Service ID Team Leader could be involved in this phase of gathering information for each federal timber sale.
- The audit team members found it helpful to have the information regarding pesticides and/or fertilizer that 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.
- The 2009 audit team suggested including a harvested timber sale unit that meets all of the BMP audit criteria and has been followed by a prescribed burn in a future audit. If a prescribed burn unit is not available, then a harvested timber sale unit followed by a pre commercial thin is suggested for review.
- Continue to invite private landowners to attend and participate when reviewing their property. Participation by the private landowner helps the audit team to learn first hand 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 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, and a representative from a conservation or wildlife organization.

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