



United States Department of Agriculture

# National Best Management Practices Monitoring Summary Report

## Program Phase-In Period Fiscal Years 2013–2014



Forest Service

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## **Program Phase-In Period Fiscal Years 2013–2014**

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Washington, DC



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**Cover photo:** *Uinta-Wasatch-Cache National Forest in Utah.*

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Member of an interdisciplinary team helps conduct Best Management Practices monitoring on the Mammoth Creek reroute project, Inyo National Forest, California.

# Executive Summary

The Forest Service, an agency of the U.S. Department of Agriculture (USDA), uses Best Management Practices (BMPs) to increase accountability and to protect and maintain water resources on National Forest System (NFS) lands. BMPs are to be applied using an adaptive management strategy of implementation, monitoring, and adjustment of practices based on monitoring results (USDA Forest Service 2012).

The National BMP Program provides National Core BMPs, standardized monitoring protocols to evaluate implementation and effectiveness of the National Core BMPs, and a data management system to store and analyze the resulting monitoring data. BMP evaluations are completed by interdisciplinary teams of resource specialists and include assessments of whether BMP prescriptions were planned, implemented, and effective at meeting water resource objectives. BMP implementation and BMP effectiveness are rated separately according to a standardized rating system. A composite BMP performance rating based on the implementation and effectiveness ratings is given to evaluations in which both implementation and effectiveness assessments have been completed at the same site. Assigning a rating outcome to each BMP evaluation enables tracking of patterns and trends in BMP performance over time at multiple scales within the agency. In addition, during the field evaluations, information is gathered on site-specific actions or changes in procedures that would improve BMP implementation or effectiveness. This information can be used to adjust management practices to better protect water resources on NFS lands.

BMP monitoring has been conducted on NFS lands for many years, but there has been little consistency across regions or administrative units in how BMPs were monitored or how the data were summarized. The National BMP Program has addressed these shortcomings by providing a nationally consistent, systematic, and objective approach to BMP monitoring.

Fiscal year (FY) 2014 was the second year of a 2-year phase-in period of the National BMP Program. The purpose of the 2-year phase-in period was to familiarize Forest Service administrative units with the National BMP Program tools and procedures and to test and refine the National BMP monitoring protocols and associated rating rulesets. This report identifies the successes and results of the second year of BMP monitoring and demonstrates the capability of a consistent nationwide monitoring program to document BMP performance. With completion of the phase-in period, the National BMP Program is now in full implementation.

In FY 2014, 97 Forest Service administrative units completed a total of 600 BMP evaluations. The percentage of administrative units that completed at least one BMP evaluation increased from 74 percent in FY 2013 to 87 percent in FY 2014. While most of the completed BMP evaluations used monitoring protocols in the Road Management Activities, Recreation Management Activities, and Mechanical Vegetation Management Activities resource categories, each of the 10 resource categories had at least 28 completed BMP evaluations.

Of the 600 total evaluations, 94 percent (566) included implementation assessments, 90 percent (539) included effectiveness assessments, and 85 percent (509) included both implementation and effectiveness assessments. In all, 61 percent of the BMP implementation evaluations were rated as “Fully Implemented” or “Mostly Implemented,” 65 percent of the BMP effectiveness evaluations were rated as “Effective” or “Mostly Effective,” and 56 percent of the sites where BMP implementation and effectiveness were both monitored had composite ratings of “Excellent” or “Good.” While these data show room for improvement in BMP implementation and effectiveness across the agency, prior to development of the National BMP Program, it was impossible to report on BMP implementation and effectiveness on a national scale in a coherent, understandable, and useful way.

The best overall performance of BMP implementation and BMP effectiveness, as indicated by the percentage of evaluations rated as “Excellent” or “Good,” was in the Mechanical Vegetation Management Activities, Chemical Use Management Activities, and Wildland Fire Management Activities resource categories. Mechanical Vegetation Management Activities and Chemical Use Management Activities also had the lowest percentages of evaluations in which corrective actions or adaptive management actions to improve BMP implementation or effectiveness were identified. The resource categories with the poorest overall BMP performance were Rangeland Management Activities, Water Uses Management Activities, and Minerals Management Activities. Recreation Management Activities and Road Management Activities had the highest percentages of evaluations rated as “No Plan,” meaning no BMPs were prescribed. These latter five resource categories had high percentages of evaluations in which corrective actions or adaptive management actions were identified.

As the agency moves from the phase-in period into full implementation of the program in FY 2015, finalization of the protocols and rating system will allow trends in BMP implementation and

effectiveness to be determined at local, regional, and national scales. As regions and administrative units analyze BMP monitoring results, improvement in BMP implementation and effectiveness is anticipated through (1) improved consistency

in field monitoring, (2) the identification of BMP deficiencies and recommendations for corrective and adaptive management actions, and (3) improved BMP planning during project development and operation and maintenance of sites.



Rock apron below a culvert outfall to dissipate energy and disperse concentrated flow, Medicine Bow-Rout National Forests, Colorado.

# Introduction

This report reviews the monitoring results of the Forest Service National Best Management Practice (BMP) Program conducted across National Forest System (NFS) lands in fiscal year (FY) 2014. FY 2014 marked the second year of the 2-year phase-in process for the National BMP Program. The purpose of the 2-year phase-in period was to familiarize Forest Service administrative units with the National BMP Program tools and procedures and to test and refine the National BMP monitoring protocols and associated rating rulesets. This report will identify the successes of this second year of BMP monitoring and demonstrate the capability of a consistent nationwide monitoring program to document BMP performance. With completion of the phase-in period, the National BMP Program is now in full implementation.

With the introduction of the National BMP Program in 2012, the Forest Service reinforced its commitment to protecting and maintaining water quality and aquatic resources on NFS lands. The Forest Service manages 193 million acres of national forests and grasslands, containing approximately 400,000 miles of streams, 3 million acres of lakes, and numerous aquifer systems that provide drinking water for approximately 124 million people (USDA Forest Service 2010). These waters also provide recreational opportunities and habitat for aquatic and riparian wildlife. Water is a vital resource to the productivity and enjoyment of our national forests and grasslands. Maintaining water quality is a critical component of the Forest Service mission to sustain the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future

generations. The National BMP Program is a critical component of all land-disturbing activities that have potential to affect water quality and aquatic health.

The National BMP Program allows the Forest Service to protect the chemical, physical, and biological integrity of all water bodies on NFS lands. The National BMP Program was developed to improve management of water quality on NFS lands in a manner consistent with the Federal Clean Water Act (CWA) and State and tribal water quality programs. Current Forest Service policy directs compliance with required CWA permits and State regulations. It also requires the use of BMPs to control nonpoint source pollution to meet applicable water quality standards and other CWA requirements (USDA Forest Service 2012). The National Core BMP Technical Guide, Volume 1 (USDA Forest Service 2012) is the defining document used to incorporate the National Core BMPs into planning efforts and evaluations of all proposed land and resource management activities. BMPs are specific practices or actions used to reduce or control adverse effects to water bodies from nonpoint sources of pollution, most commonly by reducing the loading of pollutants from such sources into stormwater and waterways. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants to receiving waters. The National Core BMP Technical Guide, Volume 2 (USDA Forest Service in prep.) provides standardized protocols for monitoring BMP implementation and effectiveness across all NFS lands. Monitoring and tracking BMPs using a consistent method improves the agency's accountability and ability to use adaptive management principles to improve BMP performance.





Interdisciplinary review team discusses possible corrective actions during Best Management Practices monitoring on a poorly drained road segment, Allegheny National Forest, Pennsylvania.

# Background

The Forest Service developed the National BMP Program to improve efficiency and accountability in management of water quality and aquatic resources on NFS lands. BMPs are used to control nonpoint source pollution consistent with the requirements of the CWA, the U.S. Environmental Protection Agency, and State, tribal, and local water quality programs. Under the CWA, States and tribes are required to develop a process to identify categories of nonpoint sources of pollution and establish procedures and methods to control such sources. Every State has a Nonpoint Source Management Program and Plan that describes how to use BMPs to control levels of nonpoint source pollution. BMPs are often the primary tool for State water quality management, although their implementation may be voluntary or required, depending on State law. All national forests and grasslands have adopted BMP prescriptions consistent with or approved by State Nonpoint Source Management Programs (USDA Forest Service 2012). In States where use of BMPs is voluntary, Forest Service policy makes their use a requirement on NFS lands as outlined in Forest Service Manual (FSM) 2532 (USDA Forest Service 1990).

Development of the Forest Service National BMP Program began in 2004 and involved numerous Forest Service resource personnel at all levels of the agency and across deputy areas, including NFS, State and Private Forestry, and Research and Development. A new Forest Service land management planning rule in 2012 (36 CFR 219.8(a)(4)) required the Forest Service Chief to establish a national BMP program. In an April 2012

letter, the Deputy Chief for NFS initiated the implementation of the National BMP Program. The Forest Service strategy for controlling nonpoint source pollution on NFS lands involves identifying necessary BMPs, applying locally appropriate BMP prescriptions, monitoring and assessing their implementation and effectiveness, and utilizing results to improve future management activities and adaptive management strategies. By establishing a consistent, objective, and adaptive process for monitoring BMPs, the Forest Service aims to protect water quality at national, regional, forest, grassland, and watershed scales. Moreover, consistency will allow data to be aggregated and analyzed at any of these levels within any reporting cycle and over the long term.

The National BMP Program consists of four components: (1) a set of National Core BMPs, (2) a guide for monitoring BMP implementation and effectiveness, (3) a data management system, and (4) corresponding national direction. The National Core BMPs are grouped into 11 resource categories, including General Planning Activities (Table 1). The National Core BMPs are purposely general and nonprescriptive so that BMP prescriptions can be tailored to meet site-specific needs for water quality protection consistent with State, tribal, and local requirements. The National Core BMPs are not intended to replace preexisting State and tribal BMPs, but rather to support States and tribes by enhancing compliance with CWA requirements on NFS lands (USDA Forest Service 2012).

**Table 1.** National Core BMP resource categories and the corresponding number of monitoring protocols.

BMP resource category	Number of National Core BMPs <sup>a</sup>	Number of monitoring protocols <sup>b</sup>
General Planning Activities <sup>c</sup>	3	0
Aquatic Ecosystems Management Activities	4	2
Chemical Use Management Activities	6	3
Facilities and Nonrecreation Special Uses Management Activities	10	4
Wildland Fire Management Activities	4	2
Minerals Management Activities	8	4
Rangeland Management Activities	3	1
Recreation Management Activities	12	9
Road Management Activities	11	9
Mechanical Vegetation Management Activities	8	3
Water Uses Management Activities	6	5

BMP = Best Management Practice.

<sup>a</sup> National Core BMPs are described in USDA Forest Service publication FS-990a (2012).

<sup>b</sup> Monitoring protocols are described in USDA Forest Service publication FS-990b (in prep.).

<sup>c</sup> Planning is evaluated in all of the monitoring protocols.

Interdisciplinary review teams (IDTs) conduct onsite BMP evaluations to assess BMP implementation and effectiveness. Implementation evaluations provide information on the extent to which water quality protection was considered in planning and project implementation or site operation and maintenance. BMP effectiveness monitoring evaluates the extent to which BMPs met water resource management objectives.

The National BMP Program does not include direct monitoring of beneficial or designated uses of waterbodies. Scoring a BMP

activity as “Not Effective” indicates the potential for adverse effects to water quality and do not necessarily indicate impairment of beneficial or designated uses by an activity.

In addition to the implementation and effectiveness questions, field evaluators qualitatively estimate the spatial extent and level of risk to water quality by recording whether potential pollutants are found outside of Aquatic Management Zones (AMZs), found inside AMZs, or delivered directly to waterbodies.



Interdisciplinary review team prepares to complete Best Management Practices monitoring for a commercial timber sale, Green Mountain National Forest, Vermont.

# Objectives

The primary objectives of this report are to provide the results of FY 2014 National BMP monitoring as well as an overview of the entire FY 2013–2014 phase-in period. The purpose of the 2-year phase-in period was twofold: (1) to familiarize Forest Service administrative units with the National BMP Program tools and procedures, and (2) to test and refine the National BMP monitoring protocols and associated rating rulesets. This report will identify the successes of this second year of BMP monitoring and demonstrate the capability of a consistent nationwide monitoring program to document BMP performance.

The heart of the National BMP Program is the project or site evaluations used to monitor and assess BMP implementation and effectiveness. Implementation evaluations assess the extent to which site-specific water resource protection measures were planned and implemented on projects or sites. Implementation monitoring is focused primarily on answering the question, “Were site-specific BMP prescriptions developed during project or activity planning implemented as designed or planned?” Effectiveness evaluations determine the extent to which BMPs achieved their water resource protection objectives. In general, effectiveness monitoring is focused on answering the question, “Were the site-specific BMP prescriptions, as implemented, effective at protecting water quality and aquatic health?” To provide a consistent BMP monitoring approach across the agency, 42 BMP monitoring protocols covering the most common management projects and activities occurring on NFS lands were developed (appendix A). Each protocol evaluates one or more of the National Core BMPs. A rating ruleset unique to each protocol is used to assign a rating outcome for BMP implementation, BMP effectiveness, and a composite rating for each evaluation.

During the 2-year phase-in period, the number of completed BMP evaluations required of each administrative unit was increased from two in FY 2013 to seven in FY 2014. The number of evaluations in each resource category to be completed each year was assigned to each administrative unit by the regional offices. The allocation was based on common or characteristic management activities on each national forest and grassland with the goal of obtaining a representative distribution of evaluations in each resource category across the region. Sites

to evaluate are selected either randomly from projects or activities that meet protocol-specific criteria, or nonrandomly from priority projects or activities that meet the needs of the local administrative unit. Once the National BMP Program becomes fully functioning, monitoring data from randomly selected sample sites will be used for statistical analysis of BMP evaluations at the national and regional scales.

In FY 2013, administrative units were asked to provide feedback on the protocols and rating outcomes to the National BMP Program development team so that the protocols and rulesets could be refined based on field experience. Using this feedback, in FY 2014, a small team revised the protocol questions and instructions to include clarifying language to improve execution of the protocols. The draft rulesets were changed to better reflect professional observations of BMP implementation and effectiveness at the evaluation sites.

Review of the FY 2013 BMP monitoring identified a need for more training of field resource specialists on the BMP monitoring protocols and data entry (USDA Forest Service 2015). In FY 2014, the Washington Office and the Northern Research Station partnered with the regions and forests to lead field-level National BMP monitoring training sessions. The objectives of these National BMP “train-the-trainer” sessions were to increase the understanding of the National BMP Program, continue to facilitate the use of the National Core BMPs during project planning and implementation, and to develop an interdisciplinary cadre of BMP trainers across the Forest Service regions. These training sessions were held at 12 national forests across the country between August and October 2014. Approximately 150 agency employees from 8 regional offices, 75 national forests, 3 national grasslands, and State and Private Forestry participated. Resource areas represented included hydrology, soil science, watershed management, engineering, recreation, timber management, silviculture, rangeland management, wildfire management, fish and wildlife biology, geology, minerals, and planning. In addition, over the course of FY 2014, the Washington Office and Northern Research Station provided 10 webinar-based training sessions on the data management system, including data entry, training about 170 employees.



Postfire stream crossing armoring, Inyo National Forest, California.

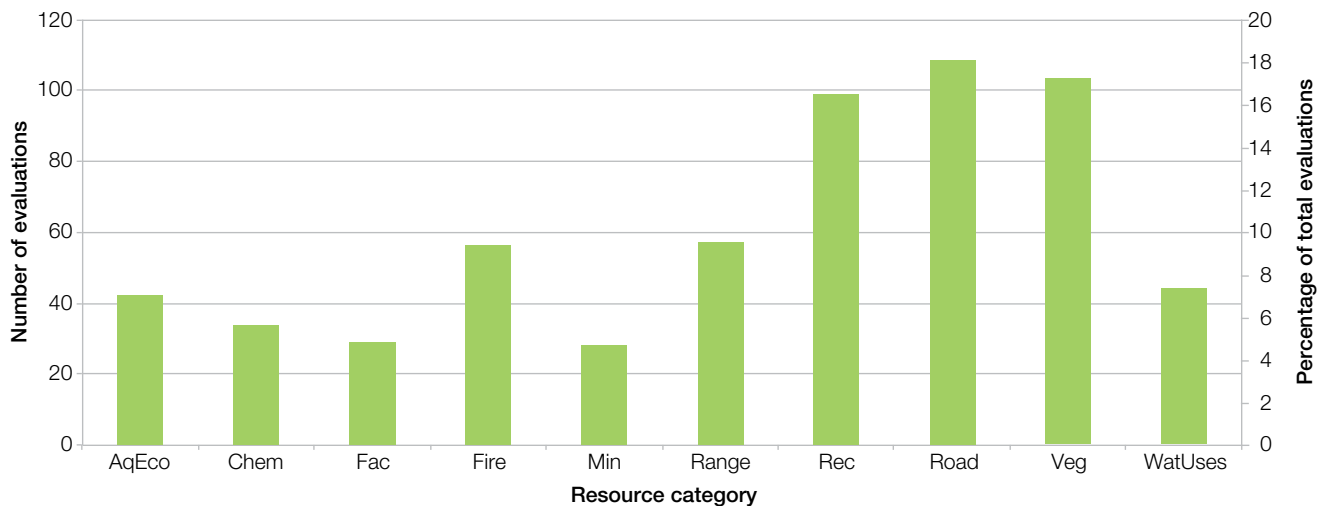
# Results

## BMP Evaluations Completed

A total of 600 BMP monitoring evaluations were completed during FY 2014. At least 1 BMP evaluation was completed on 87 percent (97 out of 111) of the Forest Service administrative units. The number of BMP evaluations completed for each of the 10 resource categories is shown in Figure 1. At least 28 BMP evaluations were completed for each resource category in FY 2014. Figure 1 also shows the percentages of BMP evaluations by resource category. The Road Management Activities, Recreation Management Activities, and Mechanical Vegetation Management Activities resource categories together represent more than one-half of the BMP evaluations completed in FY 2014.

Table 2 shows the number of BMP evaluations completed in FY 2014 for each of the 42 protocols by Forest Service region. Protocol Veg A, “Ground-Based Skidding and Harvesting,” had the highest number of evaluations completed (76), followed by Range A, “Grazing Management” (57), and Fire A, “Use of Prescribed Fire” (41). These three protocols account for 29 percent of all BMP evaluations completed in FY 2014. Only 2 of the 42 BMP monitoring protocols were not used during FY 2014: Road G, “Snow Removal and Snow Storage,” and Road I, “Equipment Refueling or Servicing Areas.”

**Figure 1.** Number and percentage of National BMP monitoring evaluations completed in FY 2014, by resource category.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).

**Table 2.** Number of BMP evaluations completed in FY 2014, by Region, for each of the 42 BMP monitoring protocols. (Refer to appendix A for full titles and applications of each of the 42 monitoring protocols.)

Region	AqEco A	AqEco B	Chem A	Chem B	Chem C	Fac A	Fac B	Fac C	Fac D	Fire A	Fire B	Min A	Min B	Min C	Min D	Range A	Rec A	Rec B	Rec C	Rec D	Rec E
R1	2	4	0	0	0	1	0	0	0	2	0	0	0	0	0	8	1	0	1	0	0
R2	1	2	3	0	0	1	1	0	0	2	0	0	0	1	0	6	3	3	0	0	0
R3	0	1	4	0	0	0	1	0	0	6	1	0	0	1	0	5	1	1	1	1	0
R4	1	0	2	0	0	0	0	0	1	2	2	1	1	0	1	13	1	1	2	0	0
R5	1	3	2	0	3	0	1	1	1	3	4	1	0	1	0	9	4	1	1	7	1
R6	5	4	9	0	0	1	3	1	1	8	3	0	4	1	0	8	4	2	2	3	1
R8	5	3	7	1	0	3	2	5	0	11	3	1	0	0	3	6	6	0	3	4	0
R9	3	6	1	1	0	1	0	1	1	7	2	3	0	1	6	2	4	6	4	6	1
R10	1	0	1	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	1	0	1
<b>Total</b>	<b>19</b>	<b>23</b>	<b>29</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>10</b>	<b>8</b>	<b>4</b>	<b>41</b>	<b>15</b>	<b>8</b>	<b>5</b>	<b>5</b>	<b>10</b>	<b>57</b>	<b>24</b>	<b>14</b>	<b>15</b>	<b>21</b>	<b>4</b>

Region	Rec F	Rec G	Rec H	Rec I	Road A	Road B	Road C	Road D	Road E	Road F	Road G	Road H	Road I	Veg A	Veg B	Veg C	WatUses A	WatUses B	WatUses C	WatUses D	WatUses E	Total
R1	0	4	1	0	2	1	0	0	1	1	0	1	0	1	0	0	0	0	0	0	1	32
R2	1	1	1	0	2	7	3	1	0	0	0	1	0	12	0	3	0	3	0	1	3	62
R3	0	0	0	0	0	2	1	0	1	1	0	0	0	6	0	4	1	0	0	0	0	39
R4	0	0	0	1	0	4	2	0	1	1	0	1	0	4	0	1	0	3	0	0	1	47
R5	2	2	0	3	0	1	5	0	1	2	0	0	0	5	1	5	2	3	2	0	2	80
R6	0	2	0	0	4	3	2	5	4	13	0	1	0	14	5	3	0	7	2	0	6	131
R8	0	1	0	0	1	5	2	0	0	0	0	1	0	18	0	2	2	1	2	0	0	98
R9	1	1	0	0	3	6	5	1	0	2	0	2	0	12	1	2	0	0	1	0	0	93
R10	0	0	0	0	0	2	2	1	0	0	0	0	0	4	0	0	0	0	0	1	0	18
<b>Total</b>	<b>4</b>	<b>11</b>	<b>2</b>	<b>4</b>	<b>12</b>	<b>31</b>	<b>22</b>	<b>8</b>	<b>8</b>	<b>20</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>76</b>	<b>7</b>	<b>20</b>	<b>5</b>	<b>17</b>	<b>7</b>	<b>2</b>	<b>13</b>	<b>600</b>

BMP = Best Management Practice. FY = fiscal year.

## Monitoring Results

### Evaluation Rating Outcomes

The purpose of the BMP monitoring rating system is to provide a method of measuring the performance of the Forest Service in applying BMPs and protecting water resources during land management activities on NFS lands. Assigning a rating outcome to each National Core BMP monitoring evaluation will enable tracking of BMP performance over time at multiple scales within the agency. In addition, patterns may emerge that will help to identify strengths and weaknesses in BMP implementation and effectiveness, as well as needed changes in processes or procedures to address identified weaknesses.

For each National Core BMP monitoring evaluation—that is, completion of a monitoring protocol at a selected site—BMP implementation and effectiveness are rated separately. At sites where BMP implementation and effectiveness have both been evaluated, these separate ratings are combined to provide an overall composite BMP performance rating for the site. In this way, BMP implementation and effectiveness can be tracked separately, as can overall BMP performance.

Procedures outlined in the monitoring protocols vary, but the overall approach for each field evaluation is consistent. For BMP implementation, the IDT answers questions to determine whether the activity was executed on the ground as planned in project documents. BMP effectiveness is determined through direct and indirect measures of water resource condition that include observations, measurements, and water quality monitoring data. Scores expressed as ratings for implementation, effectiveness, and composite results are calculated according to protocol-specific rulesets within the BMP database after the data are entered. Appendix B provides a summary of how the rating system is structured and how the rulesets were developed.

The rating categories for implementation are “Fully Implemented,” “Mostly Implemented,” “Marginally Implemented,” “Not Implemented,” and “No BMPs.” A rating of “No BMPs” is assigned to evaluations that found no evidence that BMPs were included in project planning or in documents that guide operation and maintenance of the site. The primary difference between “Fully Implemented” or “Mostly Implemented” and “Marginally Implemented” is that, in the former two, planned BMPs are implemented fully on the ground, whereas in “Marginally Implemented,” some, but not all, planned BMPs are implemented fully on the ground.

The rating categories for effectiveness are “Effective,” “Mostly Effective,” “Marginally Effective,” and “Not Effective.” “Effective” indicates no adverse impacts to water from project or activities were evident. “Mostly Effective” indicates impacts to water resources were minor and temporary. “Marginally Effective” indicates impacts to water resources were minor and prolonged, or major and temporary. Although some protocols incorporate use of existing water quality monitoring data, if available, the protocols do not include direct monitoring of beneficial or designated uses of waterbodies. BMP ratings of “Not Effective” indicate potential for major and prolonged adverse effects to water quality or waterbody condition, but they do not necessarily indicate impairment of beneficial or designated uses.

If a site is selected for BMP evaluation, it is to be assessed first for BMP implementation and then for BMP effectiveness. For most protocols, implementation and effectiveness assessments can be completed in the same day as long as implementation is evaluated first. For those sites where BMP implementation and BMP effectiveness evaluations have both been completed and ratings have been assigned, a composite rating for the evaluation is determined. Appendix B contains the matrix used to determine the composite rating. Composite rating categories are “Excellent,” “Good,” “Fair,” “Poor,” and “No Plan.” The effectiveness rating is given greater weight in the composite rating than the implementation rating, unless the implementation rating was “No BMPs.” If the implementation rating is “No BMPs,” the composite rating is “No Plan” by default because an implementation rating of “No BMPs” represents a failure to consider BMPs in the planning process.

The National BMP monitoring protocols were first used in FY 2013, so during that year, consistent BMP monitoring methodologies became the norm across the agency. The BMP monitoring completed in FY 2013 was used to test the protocols and scoring/rating system; and based on feedback from resource specialists, the protocols and scoring/rating system were significantly revised for FY 2014. Consequently, the FY 2014 BMP evaluations were the first for which scores were calculated and ratings reported.

Of the 600 BMP evaluations completed in FY 2014, 46 (approximately 8 percent) were incomplete; that is, the BMP monitoring database indicated that required information was missing and ratings for either BMP implementation or effectiveness and a composite BMP score could not be calculated. Most of these 46 evaluations were performed using the FY 2013 versions of the protocols, which are not compatible with the revised version of the database, so ratings could not be calculated. The other evaluations, approximately 4 percent of the total evaluations completed, may represent errors in using the monitoring protocol or data entry errors. The evaluations with incomplete data are not included in the rating summary statistics in this report.



Carry-in boat access to Coffee Lake, Chequamegon-Nicolet National Forest, Wisconsin.

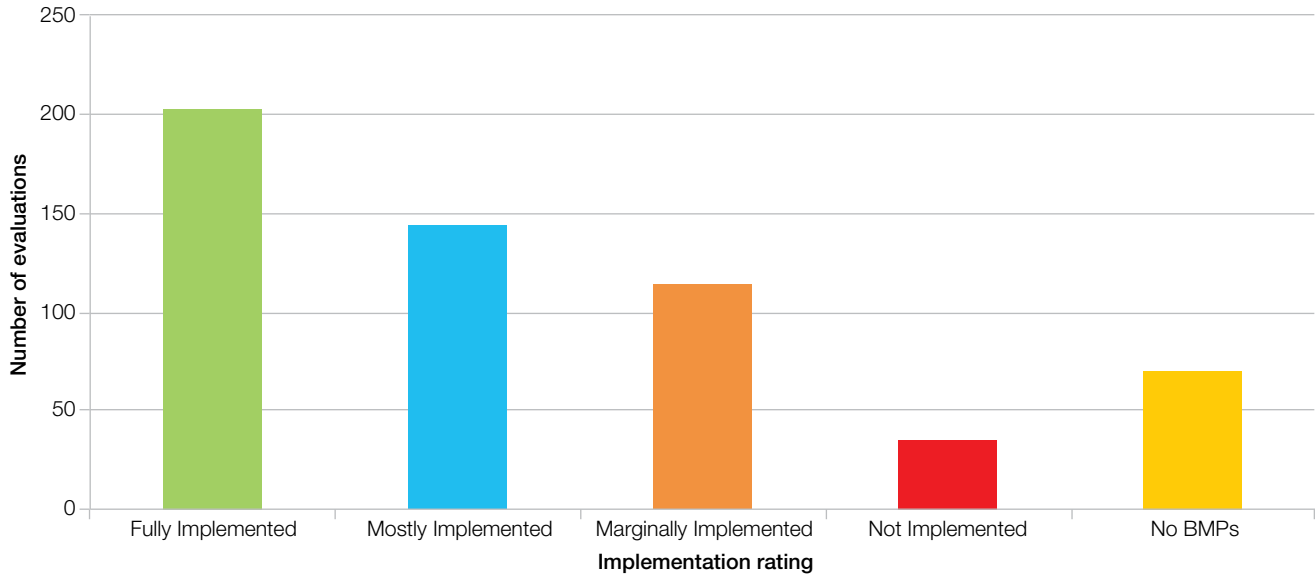
## Implementation Ratings

There were 566 evaluations of BMP implementation completed in FY 2014. Figure 2 provides a summary of the BMP implementation ratings for these evaluations. Approximately 35 percent of the evaluations were rated as “Fully Implemented,” 25 percent were rated as “Mostly Implemented,” 20 percent were rated as “Marginally Implemented,” 6 percent were rated “Not Implemented,” and the remaining 12 percent were rated as “No BMPs.”

The BMP implementation ratings varied considerably across resource categories (Figure 3). The largest percentage of evaluations rated as “Fully Implemented” was in Wildland Fire Management Activities, with almost 54 percent. Minerals Management Activities has the smallest percentage of evaluations rated as “Fully Implemented,” with slightly less than 18 percent. In 8 of the 10 resource categories, the percentage of evaluations with implementation ratings of “Fully Implemented” or “Mostly Implemented” exceeds 50 percent, led by Mechanical Vegetation Management Activities, with 81 percent. Only Minerals Management Activities and Water Uses Management Activities had less than 50 percent of the evaluations rated as “Fully Implemented” or “Mostly Implemented.” Recreation Management Activities had the largest percentage of evaluations rated as “No BMPs,” with 36 percent.

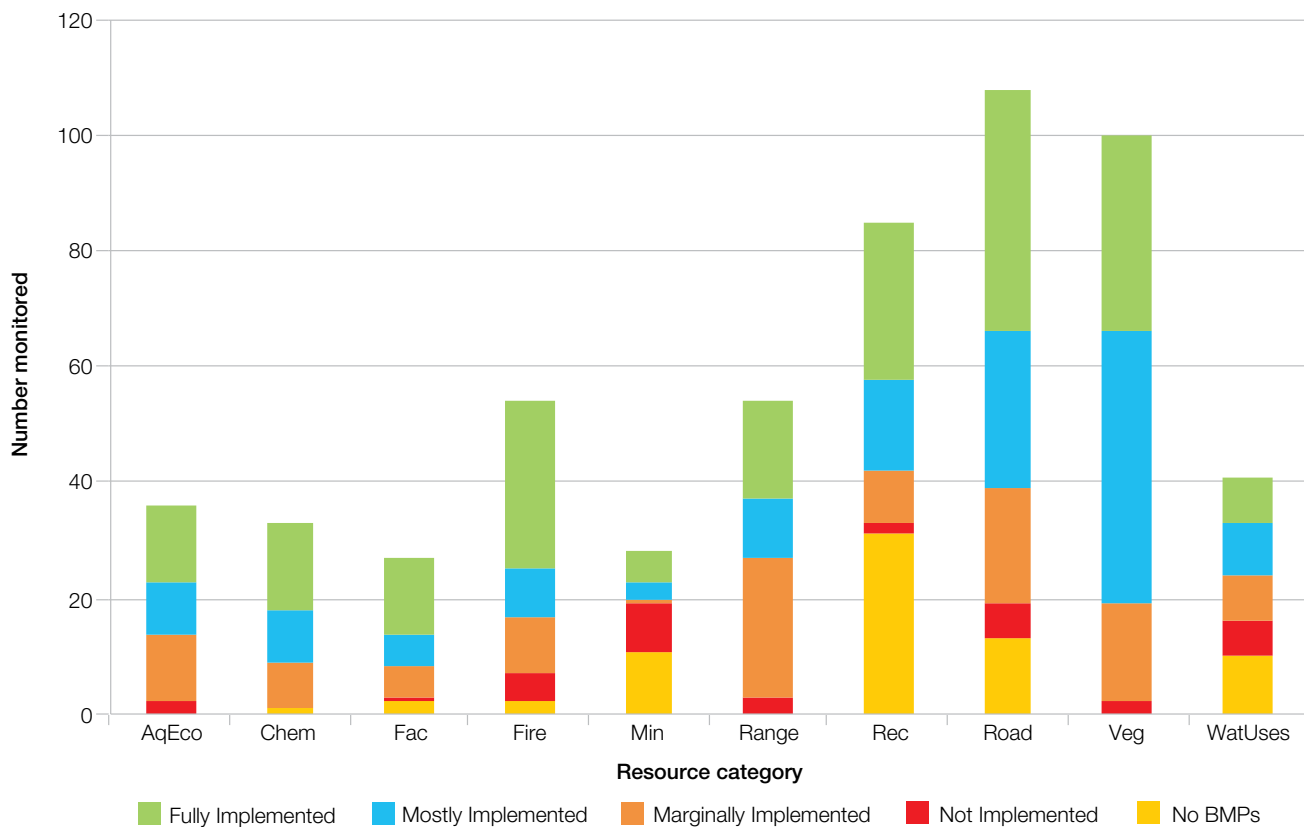


**Figure 2.** BMP implementation ratings across all BMP monitoring protocols for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

**Figure 3.** BMP implementation ratings, by resource category, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).

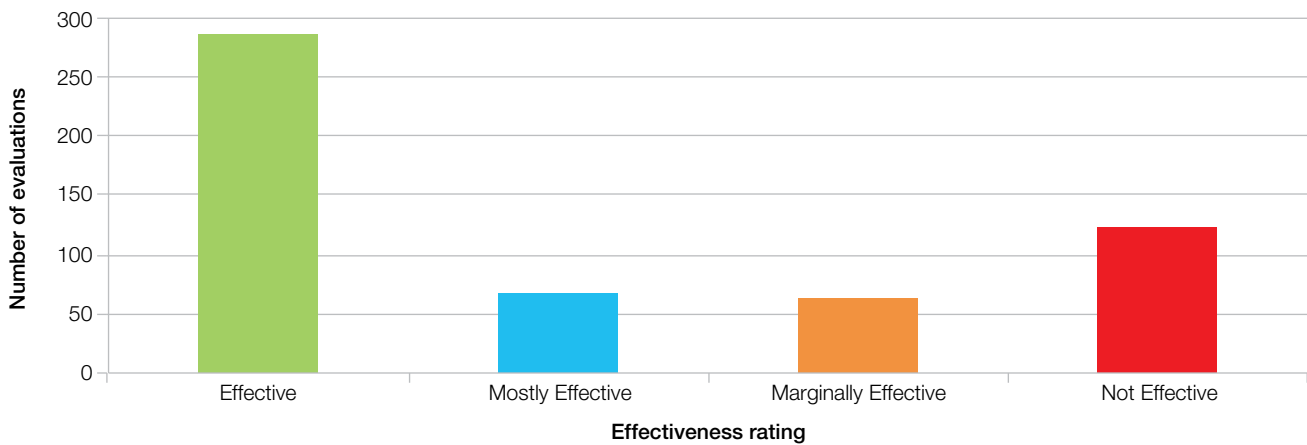
## Effectiveness Ratings

There were 539 evaluations of BMP effectiveness completed in FY 2014. Figure 4 provides a summary of the BMP effectiveness ratings for these evaluations. Approximately 53 percent of the evaluations were rated as “Effective,” 12 percent were rated as “Mostly Effective,” 12 percent were rated as “Marginally Effective,” and the remaining 23 percent were rated as “Not Effective.”

As with the BMP implementation ratings, the BMP effectiveness ratings varied considerably across resource categories (Figure 5). Chemical Use Management Activities had the highest BMP

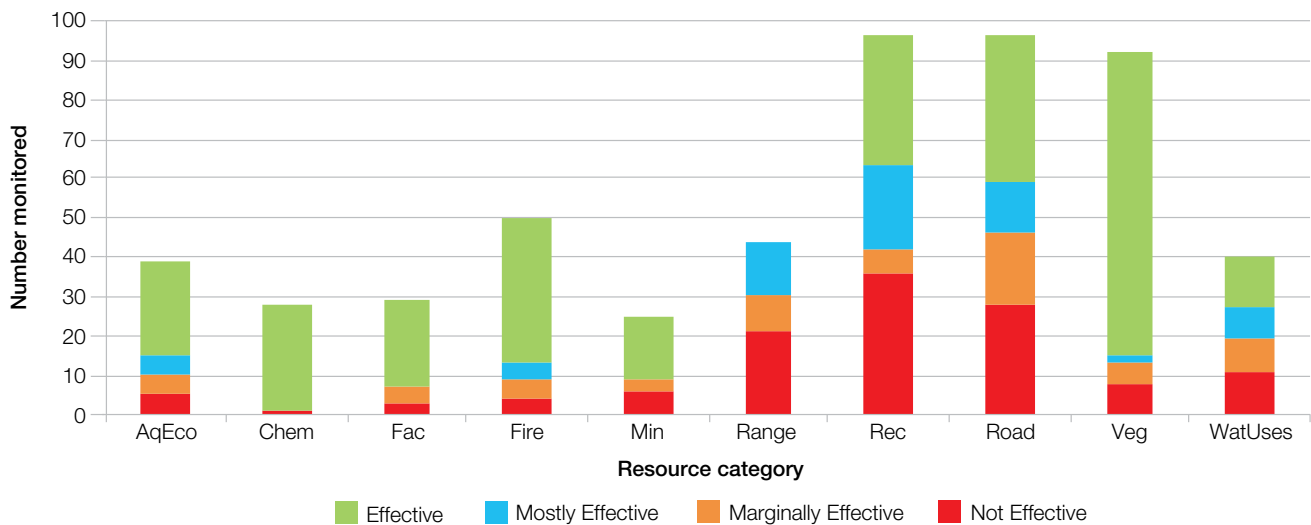
effectiveness rating, at 96 percent, followed by Mechanical Vegetation Management Activities, at almost 84 percent, and Facilities and Nonrecreation Special Uses Management Activities, at nearly 76 percent. The three resource categories with the lowest percentages of evaluations having BMP effectiveness ratings of “Effective” were Rangeland Management Activities, at 0 percent, Water Uses Management Activities, at almost 33 percent, and Recreation Management Activities, at 34 percent. Most of the resource categories, however, had more than 50 percent of the evaluations with BMP effectiveness ratings of “Effective” or “Mostly Effective.” Rangeland Management

**Figure 4.** BMP effectiveness ratings across all BMP monitoring protocols for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

**Figure 5.** BMP effectiveness ratings, by resource category, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).

Activities was the exception, with only about 32 percent of the evaluations rated as “Effective” or “Mostly Effective” and the remaining 68 percent rated as “Marginally Effective” or “Not Effective” at achieving water resource objectives.

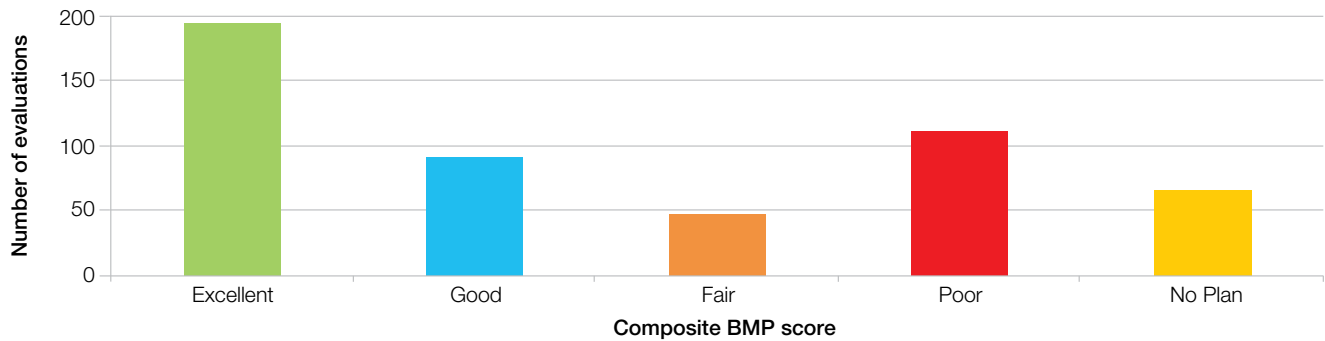
### Composite Ratings

There were 509 evaluations completed in FY 2014 for which a composite rating for BMP implementation and effectiveness could be determined (Figure 6). Composite ratings were “Excellent” for 38 percent of the evaluations, “Good” for 18 percent,

“Fair” for 9 percent, and “Poor” for 22 percent. The remaining 13 percent of the evaluations had BMP implementation ratings of “No BMPs” and, therefore, had a composite rating of “No Plan.”

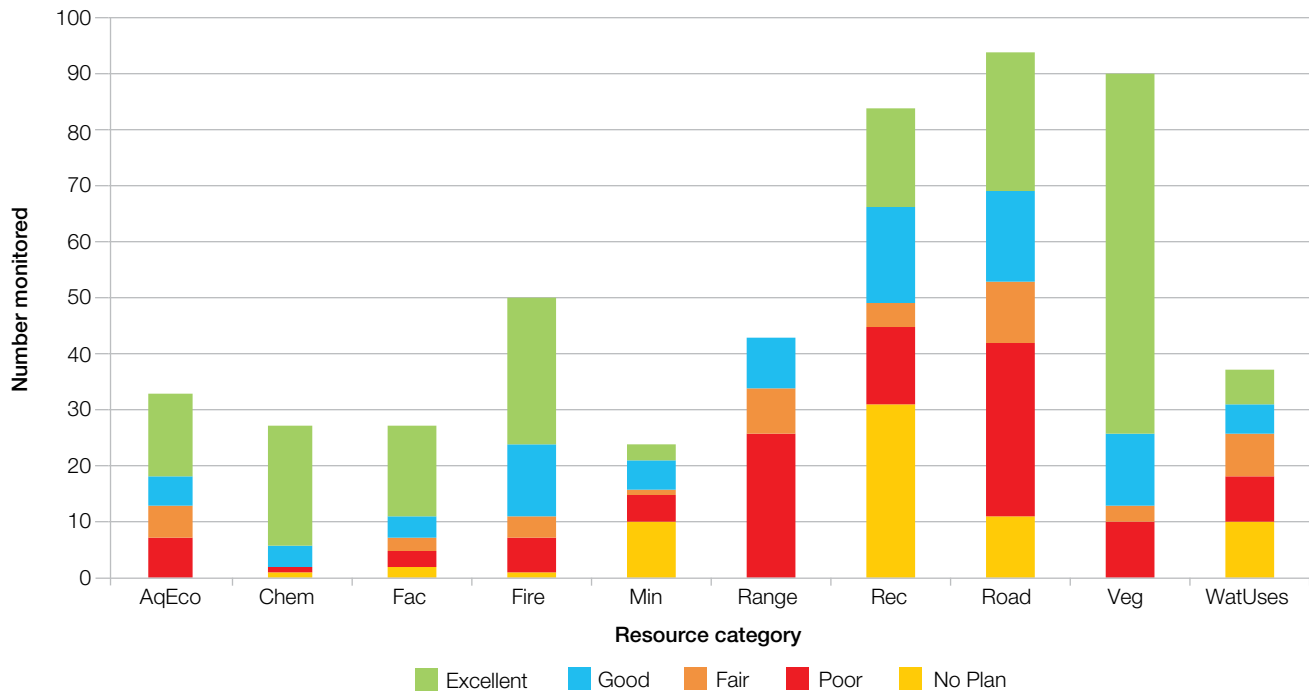
Not surprisingly, based on the implementation and effectiveness ratings, Chemical Use Management Activities and Mechanical Vegetation Management Activities had the highest percentages of evaluations with composite ratings of “Excellent” (Figure 7), with 78 and 71 percent, respectively. The percentage of evaluations with composite ratings of either “Excellent” or “Good” exceeded 70 percent for four resource categories: Chemical Use

**Figure 6.** Composite BMP evaluation ratings across all BMP monitoring protocols for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

**Figure 7.** Composite BMP evaluation ratings, by resource category, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).

Management Activities, at 93 percent, Mechanical Vegetation Management Activities, at 86 percent, Wildland Fire Management Activities, at 78 percent, and Facilities and Nonrecreation Special Uses Management Activities, at 74 percent. The percentage of evaluations with composite ratings of “Fair,” “Poor,” or “No Plan” exceeded 60 percent for three resource categories: Rangeland Management Activities, at 79 percent, Water Uses Management Activities, at 70 percent, and Minerals Management Activities, at 67 percent. Recreation Management Activities, Road Management Activities, Minerals Management Activities, and Water Uses Management Activities had the highest number of evaluations with composite ratings of “No Plan.”

Appendix C contains summary figures of BMP implementation, BMP effectiveness, and composite ratings by protocol for the BMP evaluations completed in FY 2014.

### **Corrective Actions and Adaptive Management**

BMP assessments provide the opportunity to determine if corrective actions or adaptive management actions are needed for

implementation and effectiveness of BMPs. The National BMP monitoring protocols differentiate between corrective actions and adaptive management actions. Corrective actions are typically actions applied to problems identified for or at the project or site being evaluated. Adaptive management actions are actions that typically would be applied broadly to management of all sites, projects, or activities like that one being evaluated.

Corrective actions for implementation are applicable when something that should have been implemented was not. No effectiveness problem needs to exist for an implementation corrective action to be identified or applied; corrective actions identified during the review of implementation simply note that something was supposed to be done but it was not, so there is an opportunity to correct that deficiency. By contrast, corrective actions identified during evaluations of BMP effectiveness generally are associated with an observed problem, because BMPs that were applied were not fully effective. Examples showing the differentiation between corrective actions for implementation and effectiveness are provided in Table 3.



Bottomless pipe-arch crossing on Case Camp Ridge Road, Pisgah National Forest, North Carolina.

**Table 3.** Examples of corrective actions and adaptive management actions for BMP implementation and BMP effectiveness.

Type of evaluation	Corrective actions	Adaptive management actions
BMP implementation	Return to site and install water control structures that were specified in the contract but were not constructed.	Ensure that expected or acceptable sediment inputs to streams during culvert replacements are described during planning so there is a threshold against which to compare actual inputs.  Have the NEPA coordinator review all contracts before release to ensure they include ALL of the BMPs from the decision notice.
BMP effectiveness	Fix undersized waterbars on skid roads that have failed or are overtopped by runoff during rain events.  Remove and treat soil contaminated by hydraulic fluids from equipment failure during this project.	Cease prescribing and using silt fence in all projects or where concentrated flow is present because they are consistently undercut, sidecut, or overtopped.  Change Forest Plan Standards and Guidelines for Aquatic Management Zone widths on side slopes greater than 45 percent to a minimum of 200 feet, as widths of less than that do not allow reinfiltration of emergent flow resulting from cut slope construction.

BMP = Best Management Practice. NEPA = National Environmental Policy Act.

Corrective actions for effectiveness can be characterized as either short- or long-term efforts. Short-term actions typically are those that require little or no additional planning to address water, aquatic, and riparian impacts associated with the project or site, such as fixing a waterbar on a skid trail that is contributing sediment to a stream. In some situations, more substantive actions will provide more sustainable long-term solutions to an observed problem. These actions often will lead to overall improvements in watershed condition or health. For example, rerouting a road adjacent to a stream channel that chronically contributes large sediment inputs to the stream could be a long-term corrective action identified to improve effectiveness. The size, scope, and cost of these more impactful types of corrective actions generally require additional planning. Administrative units also will consider these actions thoroughly to determine if they align with future watershed condition objectives. During BMP evaluations, short- and long-term corrective actions are identified for effectiveness when appropriate, and the corrections are categorized as a short- or long-term action.

Identification of adaptive management actions usually involves observations of recurring problems or common deficiencies over time. As a consequence, in many if not most cases, adaptive management actions are not applied to the current project or site being evaluated but rather to future projects or sites of that type or that have similar attributes, such as all mechanical harvesting operations.

Adaptive management actions for implementation often involve adjustments to processes during planning, such as ensuring plans are written for force account projects to ensure all involved parties have the same understanding and expectations. The lack of BMP effectiveness is still central to adaptive management actions identified for effectiveness, but the actions typically result either from consistently observing, or observing in certain situations, BMPs that work well or poorly. As a result, adaptive

management actions may involve a conscious change in how or where certain BMPs are applied in the future. Examples of adaptive management actions for implementation and effectiveness also are provided in Table 3.

The very act of performing implementation and effectiveness monitoring acknowledges uncertainty about the degree to which BMPs are planned and implemented within the agency and BMP efficacy. The feedback loop involved in identifying and applying both corrective and adaptive management actions provides the Forest Service with mechanisms to make adjustments if BMPs are not applied or they are less than fully effective, or to identify situations in which new BMP designs or prescriptions are needed. Undertaking identified corrective actions or adaptive management actions, however, is done at the discretion of the administrative unit's responsible official after considering the risk to water quality, unit work priorities, staffing, funding, and other resource limitations (USDA Forest Service in prep.).

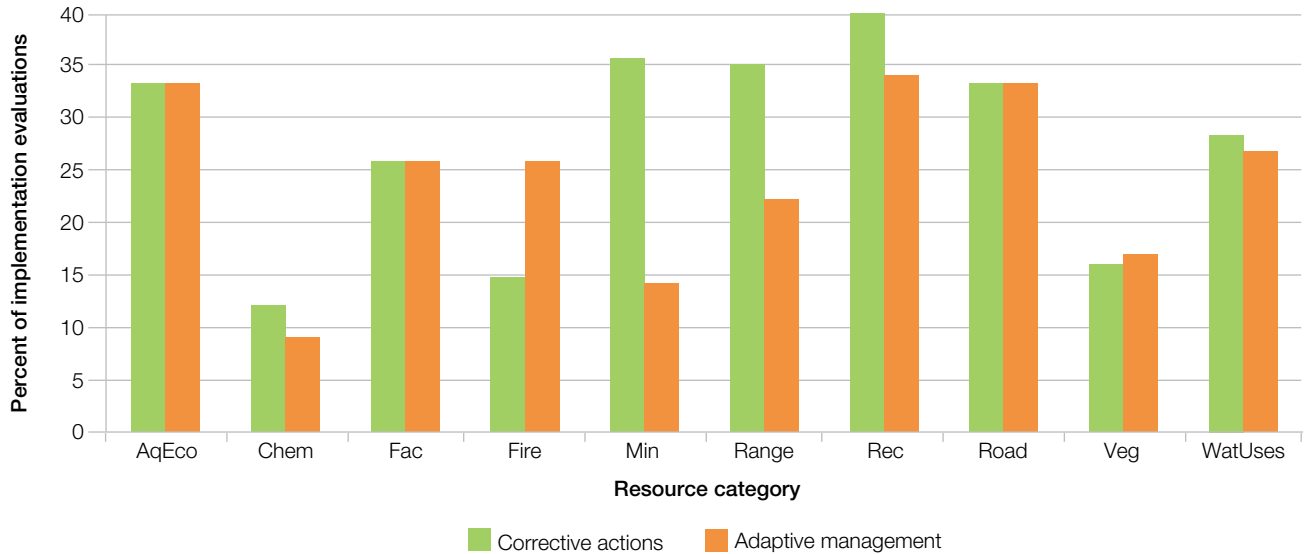
Corrective actions for BMP implementation were identified in approximately 28 percent (161) of the BMP implementation evaluations completed in FY 2014 (Figure 8). A similar number (26 percent; 145) of these evaluations identified adaptive management actions for BMP implementation. As a percentage of BMP implementation evaluations completed, corrective actions (40 percent) and adaptive management actions (34 percent) were identified most often in Recreation Management Activities BMP evaluations and least often in Chemical Use BMP evaluations (12 percent for corrective actions, 9 percent for adaptive management strategies).

Corrective actions for BMP effectiveness were identified in approximately 29 percent (155) of the BMP effectiveness evaluations completed in FY 2014 (Figure 9). As with implementation evaluations, corrective actions were identified most often in Recreation Management Activities effectiveness evaluations (44 percent) and least often in Chemical Use effectiveness

evaluations (7 percent). Adaptive management actions were identified in 20 percent (110) of the FY 2014 BMP effectiveness evaluations. Adaptive management actions were identified

most often in Road Management Activities effectiveness evaluations (29 percent) and least often in Chemical Use Management Activities effectiveness evaluations (7 percent).

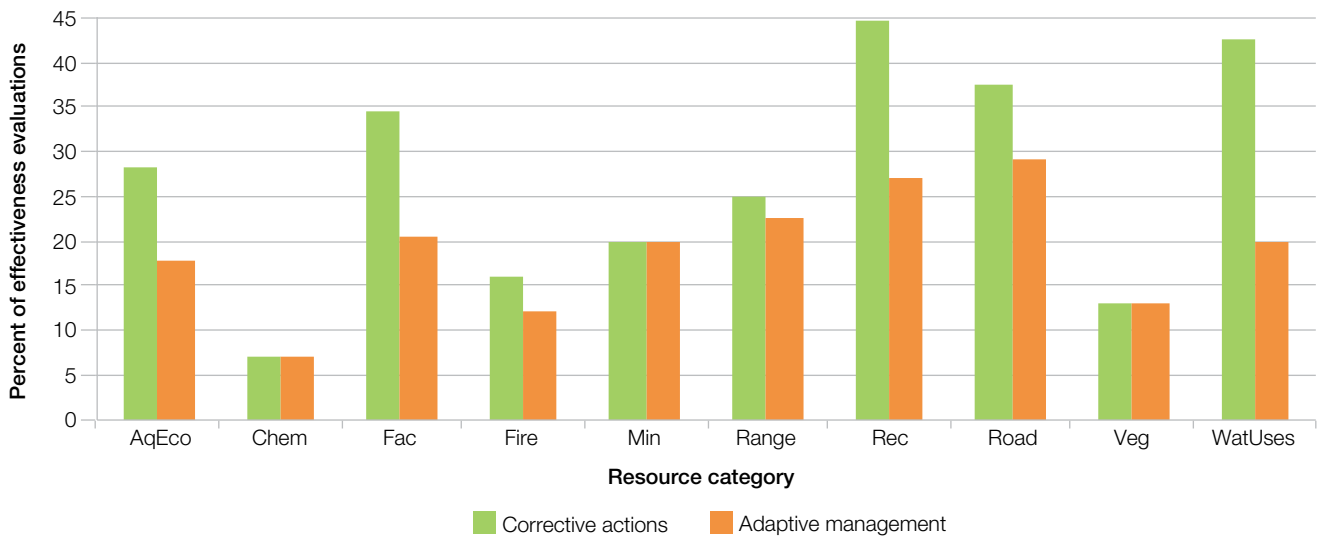
**Figure 8.** Percentage of BMP implementation evaluations with identified corrective actions and adaptive management actions, by resource category, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).

**Figure 9.** Percentage of BMP effectiveness evaluations with identified corrective actions and adaptive management actions, by resource category, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.

Note: The resource categories are Aquatic Ecosystems Management Activities (AqEco), Chemical Use Management Activities (Chem), Facilities and Nonrecreation Special Uses Management Activities (Fac), Wildland Fire Management Activities (Fire), Minerals Management Activities (Min), Rangeland Management Activities (Range), Recreation Management Activities (Rec), Road Management Activities (Road), Mechanical Vegetation Management Activities (Veg), Water Uses Management Activities (WatUses).



Interdisciplinary team checking postfire soil conditions, Umatilla National Forest, Oregon.

# Discussion

One purpose of the 2-year phase-in period to full implementation of the National BMP Program was to provide time for administrative units to become accustomed to using the National BMP Program tools and procedures. The phase-in approach has been successful in this regard.

By the end of FY 2014, nearly 90 percent of the administrative units had completed at least one BMP evaluation. This figure is an improvement from FY 2013, when 26 percent of the administrative units did not complete at least one BMP evaluation (USDA Forest Service 2015). Most of the BMP evaluations completed were assessments of the most common activities that occur on NFS lands. In FY 2014, over one-half of the BMP evaluations completed were in the Road Management Activities, Recreation Management Activities, and Mechanical Vegetation Management Activities resource categories. This percentage is similar to FY 2013 BMP monitoring, when 64 percent of the completed evaluations were in these three resource categories. In FY 2014, only two monitoring protocols (Road G and Road I) were not used at least once, also an improvement from FY 2013, when four of the protocols were not used: Chem B, “Chemical Use in Waterbodies,” Chem C, “Chemical Use for Dust Abatement,” Min A, “Active Construction of Mineral Exploration Sites and Predevelopment Activities (Nonplacer Mining),” and WatUses D, “Active Construction of Diversions and Conveyances.” Over the course of the 2-year period, all of the individual monitoring protocols were used somewhere on NFS lands at least once. In addition, in FY 2013, the percentage of completed BMP evaluations with missing data in the database was approximately 8 percent (USDA Forest Service 2015). In FY 2014, this percentage was cut in half, with only 4 percent of the completed evaluations having incomplete data in the database.

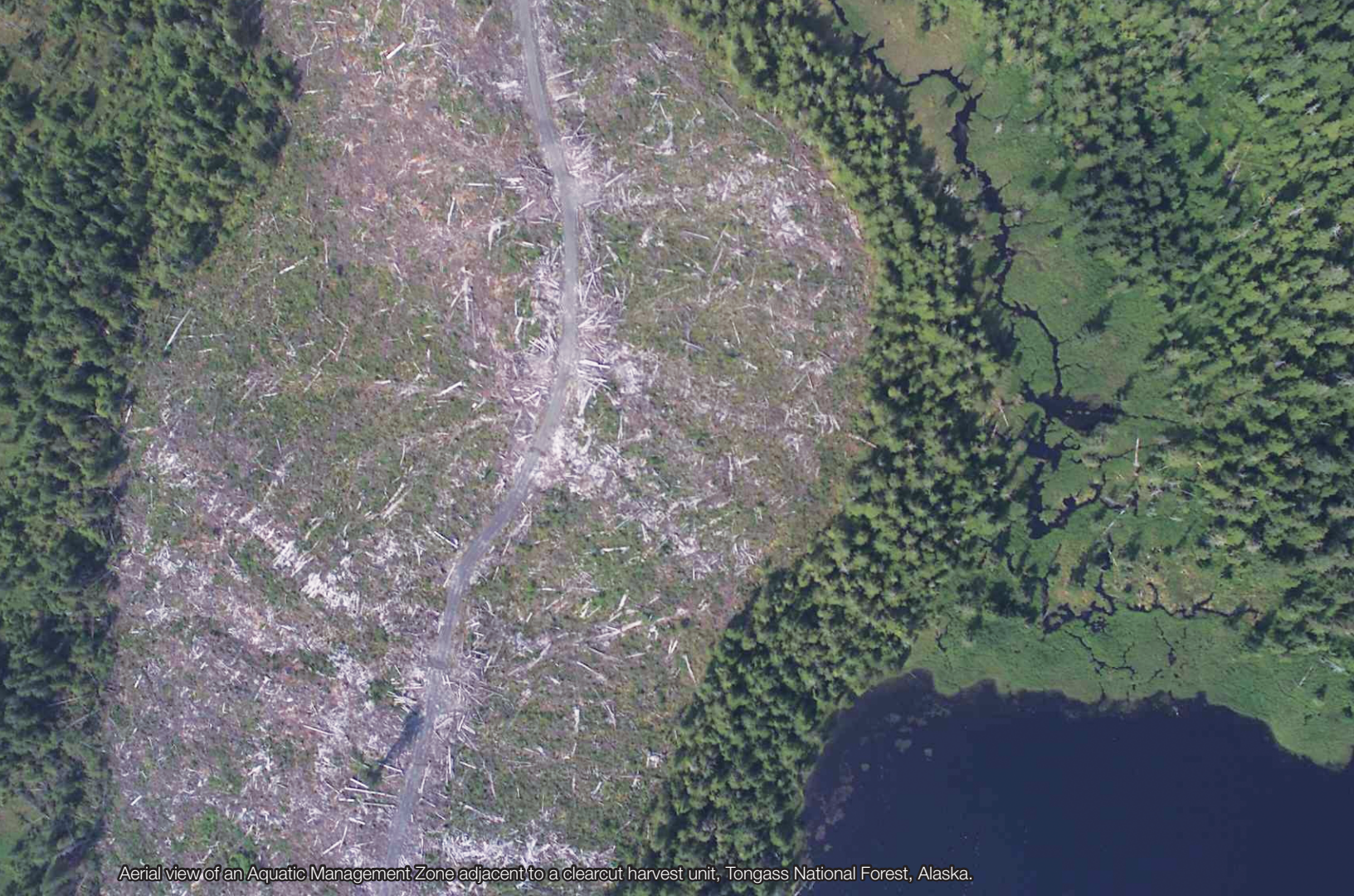
The other purpose of the phase-in period was to test and refine the National BMP monitoring protocols and associated rating rulesets. The phase-in approach has been successful in this regard as well. Feedback from resource specialists on FY 2013 monitoring results indicated that the ratings did not reflect their professional assessment of site conditions, BMP implementation, and BMP effectiveness. Feedback on the FY 2014 monitoring results indicates that, with the revisions to the protocols and rating system, the ratings are much closer to the professional judgment of the resource specialists. The only concerns that were expressed were related to the Range A effectiveness ratings, so this rating ruleset will be reviewed again before being finalized.

The phase-in period also demonstrates the potential power of having a National BMP Program. Each Forest Service administrative unit was asked to complete a small number of BMP evaluations in FY 2014, and the result is that the agency has over 500 BMP monitoring data points with which to document BMP implementation and effectiveness. The initial BMP monitoring shows that 61 percent of the BMP implementation evaluations were rated as “Fully Implemented” or “Mostly Implemented,” 65 percent of the BMP effectiveness evaluations were rated as “Effective” or “Mostly Effective,” and 56 percent of the sites where both BMP implementation and effectiveness were monitored had composite ratings of “Excellent” or “Good.” While these data show room for improvement in BMP implementation and effectiveness across the agency, prior to development of the National BMP Program, it was impossible to report on BMP implementation and effectiveness on a national scale in a coherent, understandable, and useful way.

Use of standardized monitoring protocols with rating outcomes also allows for identification of patterns and, eventually, trends in BMP implementation and effectiveness. The FY 2014 monitoring results show that the best overall performances of BMP implementation and BMP effectiveness, as indicated by the percentage of evaluations rated as “Excellent” or “Good,” were in the Mechanical Vegetation Management Activities, Chemical Use Management Activities, and Wildland Fire Management Activities resource categories. Mechanical Vegetation Management Activities and Chemical Use Management Activities also had the lowest percentage of evaluations that identified corrective actions or adaptive management actions to improve BMP implementation or effectiveness. These resources have a long history of emphasis on the use of BMPs to protect water quality.

Also not too surprising is the finding that the resource category with the highest number of composite ratings of “No Plan,” meaning no BMPs were prescribed, was Recreation Management Activities. Recreation Management Activities also had the highest percentage of evaluations that identified corrective actions or adaptive management actions to improve BMP implementation or effectiveness. Most of the protocols in this resource category assess ongoing operation and maintenance of existing facilities (campgrounds, trails, water launches, etc.), which are guided by operation and maintenance plans. The process for identifying and incorporating appropriate BMP prescriptions into operation and maintenance plans may not be as straightforward as it is





Aerial view of an Aquatic Management Zone adjacent to a clearcut harvest unit, Tongass National Forest, Alaska.

for construction projects or timber sale projects that go through the National Environmental Policy Act, or NEPA, analysis and documentation process and are implemented primarily through contracts.

The identification of corrective actions and adaptive management actions will be most useful at the local administrative unit and regional scales. The results of BMP monitoring, especially the scoring and rating, can be used at the national scale. For

example, in resource areas that struggle with low implementation and/or effectiveness outcomes, adaptive management may take the form of increased funding or training in an effort to improve the outcome of those resource activities. The FY 2014 results show that the administrative units are using the monitoring protocols to capture information on how to improve BMP implementation and effectiveness in the future as part of an adaptive management or continuous learning process.

# Conclusion

BMP monitoring has been conducted on NFS lands for many years, but there has been little consistency across regions or administrative units in how BMPs were monitored or the data were summarized. The National BMP Program has addressed these shortcomings by providing a nationally consistent, systematic, and objective approach to BMP monitoring, which serves as a foundation for water quality protection on NFS lands (USDA Forest Service 2012).

In FY 2014, some incomplete data reporting occurred on a small number of BMP evaluations, some administrative units used the incorrect versions of the protocols, and some administrative units did no BMP monitoring at all using the national protocols. Incomplete BMP monitoring results cannot be used for national reporting purposes because no ratings can be calculated for BMP implementation or effectiveness in the BMP database when data are missing. Incomplete monitoring efforts do not contribute to national objectives and goals and also do not provide the full set of information that would otherwise be available to the local unit. As a consequence, greater effort must be made to ensure all required information is collected during BMP evaluations and correctly entered into the BMP database. Additional “train-the-trainer” sessions and BMP database training webinars will be held in FY 2015 and beyond to address this issue. In addition, other training possibilities

involving a variety of media options are being considered to increase BMP monitoring training opportunities in the future.

During FY 2014, the Forest Service completed the 2-year phase-in period of the National BMP Program. The FY 2014 BMP monitoring results show that the agency is capable of implementing and monitoring BMPs using a national program. As the agency moves from the phase-in period into full implementation of the program in FY 2015, finalization of the protocols and rating system will allow the BMP monitoring results to be used to determine trends in BMP implementation and effectiveness at local, regional, and national scales. As regions and administrative units analyze BMP monitoring results, improvement in BMP implementation and effectiveness is anticipated through (1) improved consistency in field monitoring, (2) the identification of BMP deficiencies and recommendations for corrective and adaptive management actions, and (3) improved BMP planning during project development and operation and maintenance of sites.

The Forest Service is continually monitoring the implementation and effectiveness of BMPs as well as improving methodologies, data storage, management, and reporting. With sustained focus on improving every facet of the BMP program, the agency can ensure greater transparency and long-term protection of water quality and aquatic resources.



Low-flow stream crossing, Black Hills National Forest, South Dakota.

# References

U.S. Department of Agriculture (USDA), Forest Service. 1990. Forest Service manual 2523. Water Quality Management. Washington, DC: U.S. Department of Agriculture, Forest Service. 2 p.

U.S. Department of Agriculture (USDA), Forest Service. 2010. Water, climate change, and forests: watershed stewardship for a changing climate. Gen. Tech. Rep. PNW-GTR-812. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 75 p.

U.S. Department of Agriculture (USDA), Forest Service. 2012. National best management practices for water quality management on National Forest System lands. Vol. 1: National Core BMP technical guide. FS-990a. Washington, DC: U.S. Department of Agriculture, Forest Service. 175 p.

U.S. Department of Agriculture (USDA), Forest Service. 2015. National best management practices monitoring summary report: fiscal year 2013. FS-1042. Washington, DC: U.S. Department of Agriculture, Forest Service. 20 p.

U.S. Department of Agriculture (USDA), Forest Service. In prep. National best management practices for water quality management on National Forest System lands. Vol. 2: National Core BMP monitoring technical guide. FS-990b. Washington, DC: U.S. Department of Agriculture, Forest Service.



Spring box with protective fencing, Wallowa-Whitman National Forest, Oregon.

# Appendix A

## BMP Monitoring Protocols and Descriptions

Resource category	Protocol	Use to evaluate	Examples of appropriate project, activity, or site
General Planning Activities	Planning is addressed in the protocols of every resource category. Specific monitoring protocols do not exist for the General Planning Activities category.		
Aquatic Ecosystems Management Activities	AqEco A <i>Active Construction of Aquatic Ecosystem Improvements</i>	<ul style="list-style-type: none"> <li>• Aquatic ecosystem improvements during construction or reconstruction</li> <li>• Soil-disturbing improvements in waterbodies</li> <li>• Soil-disturbing improvements in the floodplain</li> </ul>	<ul style="list-style-type: none"> <li>• Fish habitat improvement (excluding road culvert removal for aquatic organism passage—use Road protocol)</li> <li>• Stream restoration</li> <li>• Bank stabilization</li> <li>• Wetland construction</li> </ul>
	AqEco B <i>Completed Aquatic Ecosystem Improvements</i>	<ul style="list-style-type: none"> <li>• Completed aquatic ecosystem improvement projects in the floodplain</li> <li>• Completed aquatic ecosystem projects applied to a waterbody</li> </ul>	<ul style="list-style-type: none"> <li>• Fish habitat improvement (excluding road culvert removal for aquatic organism passage—use Road protocol)</li> <li>• Stream restoration</li> <li>• Bank stabilization</li> <li>• Wetland construction</li> </ul>
Chemical Use Management Activities	Chem A <i>Chemical Use Near Waterbodies</i>	<ul style="list-style-type: none"> <li>• Chemical use near waterbodies where the target or objective was terrestrial</li> <li>• Aerial applications of chemicals with terrestrial targets, even if no attempt was made to discontinue application over waterbodies</li> </ul>	<ul style="list-style-type: none"> <li>• Control of terrestrial noxious weeds</li> <li>• Chemical silvicultural treatments</li> <li>• Fertilizer and lime applications to improve soil nutrition/chemistry</li> </ul>
	Chem B <i>Chemical Use in Waterbodies</i>	<ul style="list-style-type: none"> <li>• Chemicals applied to waterbodies where the target or objective was an aquatic species or water chemistry</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical control of aquatic invasive species</li> <li>• Stream liming</li> </ul>
	Chem C <i>Chemical Use for Dust Abatement</i>	<ul style="list-style-type: none"> <li>• Use of road dust abatement chemicals, excluding water-only applications</li> </ul>	<ul style="list-style-type: none"> <li>• Applications of any type of dust palliative</li> </ul>
Facilities and Nonrecreation Special Uses Management Activities	Fac A <i>Active Construction of Noncorridor Facilities or Nonrecreation Special Uses</i>	<ul style="list-style-type: none"> <li>• Completed construction of noncorridor types of facilities administered by the Forest Service</li> <li>• Completed construction of nonrecreation facilities administered by special use permits (SUP)</li> </ul>	<p>Construction and reconstruction of:</p> <ul style="list-style-type: none"> <li>• Campgrounds</li> <li>• Ski area base facilities</li> <li>• Concessions operated under special use authorization</li> <li>• Communications facilities</li> <li>• Water treatment facilities</li> <li>• Forest Service administrative facilities</li> <li>• Grazing units or pastures authorized under special use authorizations <i>other than</i> Grazing Permits with Term Status</li> </ul>
	Fac B <i>Operation and Maintenance of Noncorridor Facilities or Nonrecreation Special Uses</i>	<ul style="list-style-type: none"> <li>• Operation and maintenance of noncorridor types of facilities administered by the Forest Service</li> <li>• Operation and maintenance of nonrecreation facilities administered by special use permits (SUP)</li> </ul>	<p>Operation and maintenance of:</p> <ul style="list-style-type: none"> <li>• Ski area base facilities</li> <li>• Communications facilities</li> <li>• Water treatment facilities</li> <li>• Forest Service administrative facilities</li> <li>• Grazing units or pastures authorized under special use authorizations <i>other than</i> Grazing Permits with Term Status</li> </ul>

Resource category	Protocol	Use to evaluate	Examples of appropriate project, activity, or site
Facilities and Nonrecreation Special Uses Management Activities (continued)	Fac C Completed Construction or Operation and Maintenance of Pipelines, Transmission Lines, or Rights-of-Way	<ul style="list-style-type: none"> <li>Completed construction of pipelines, transmission lines, and nonroad rights-of-way</li> <li>Operation and maintenance of pipelines, transmission lines, and nonroad rights-of-way</li> </ul>	<ul style="list-style-type: none"> <li>Construction of energy pipelines or transmission lines</li> <li>Construction of water pipelines that are not associated with diversions</li> <li>Operation and maintenance of transmission lines, energy pipelines, and water pipelines that are not associated with diversions</li> </ul>
	Fac D Completed Facility Reclamation	<ul style="list-style-type: none"> <li>Completed reclamation of facilities, including recreation facilities, administrative sites, structures, and pipelines and transmission lines (i.e., nonroad corridors)</li> </ul>	<p>Reclamation of:</p> <ul style="list-style-type: none"> <li>Sites that held residences, historic structures, or other buildings</li> <li>Areas previously occupied by ski areas, campgrounds, or concentrated-use areas</li> <li>Transmission line and pipeline corridors</li> <li>Trails or trail segments that will no longer be used</li> </ul>
Wildland Fire Management Activities	Fire A Use of Prescribed Fire	<ul style="list-style-type: none"> <li>Planning and implementation of prescribed fires</li> </ul>	<ul style="list-style-type: none"> <li>Prescribed fire for any purpose</li> </ul>
	Fire B Wildfire Management Actions	<ul style="list-style-type: none"> <li>Management of monitored fires</li> <li>Management of suppressed fires</li> </ul>	<ul style="list-style-type: none"> <li>Wildfires for which the management action taken is not suppression</li> <li>Actively suppressed fires</li> <li>Fires that have locations or periods involving both suppression and nonsuppression (monitoring)</li> </ul>
Rangeland Management Activities	Range A Grazing Management	<ul style="list-style-type: none"> <li>Grazing and livestock management under a Grazing Permit with Term Status</li> </ul>	<ul style="list-style-type: none"> <li>Permitted grazing of livestock and any associated range improvements (e.g., stock pond construction and maintenance and fencing)</li> </ul>
Minerals Management Activities	Min A Active Construction of Mineral Exploration Sites and Predevelopment Activities (Non-placer Mining)	<ul style="list-style-type: none"> <li>Construction at nonplacer mineral sites to prepare for exploration</li> <li>Predevelopment activities at nonplacer minerals sites to prepare for production</li> </ul>	<ul style="list-style-type: none"> <li>Construction or predevelopment activities for minerals outside of waterbodies and alluvial deposits (i.e., in the AMZ)</li> <li>Includes hard rock, solid leasable minerals, coal mining, oil and gas sites, geothermal activities and other minerals</li> </ul>
	Min B Active Nonplacer Mineral Operations	<ul style="list-style-type: none"> <li>Exploration operations and active mineral operations that do not involve placer mining</li> </ul>	<ul style="list-style-type: none"> <li>Exploration and active mineral operations involving hard rock, metallic minerals, coal mining, phosphate mining, oil and gas sites, and other minerals, excluding extraction of minerals from waterbodies or alluvial deposits in the AMZ</li> </ul>
	Min C Placer Mining Operations	<ul style="list-style-type: none"> <li>Placer mining for any type of mineral; includes extraction from the waterbody or AMZ (i.e., in alluvium)</li> </ul>	<ul style="list-style-type: none"> <li>Placer mining operation authorized by an Approved Plan of Operations or negotiated terms</li> <li>Includes suction dredging, locatable minerals, or sand and gravel mining extracted from the waterbody or from alluvial deposits in the AMZ</li> </ul>
	Min D Reclamation of Mineral Operations	<ul style="list-style-type: none"> <li>Reclamation of construction and predevelopment disturbances</li> <li>Reclamation of exploration sites where no further development or extraction occurred</li> <li>Reclamation of all types of placer and nonplacer mineral operations</li> </ul>	<p>Reclamation activities of:</p> <ul style="list-style-type: none"> <li>Hard rock, metallic mineral, coal, and phosphate mines</li> <li>Oil and gas well pads</li> <li>Suction dredging sites, sand and gravel operations, gold mining, and other mining operations in a waterbody or in an AMZ</li> <li>Improvements and disturbances associated with the mining or extraction, as well as additional land disturbances created to complete reclamation</li> </ul>

Resource category	Protocol	Use to evaluate	Examples of appropriate project, activity, or site
Recreation Management Activities	Rec A Developed Recreation Sites	<ul style="list-style-type: none"> <li>• Operation and maintenance of developed recreation sites</li> </ul>	<p>Operation and maintenance of:</p> <ul style="list-style-type: none"> <li>• Campgrounds</li> <li>• Day-use areas, including picnicking, swimming, rock climbing, or fishing areas</li> </ul>
	Rec B Dispersed Recreation Areas	<ul style="list-style-type: none"> <li>• Dispersed-use recreation</li> </ul>	<ul style="list-style-type: none"> <li>• Undeveloped camping areas</li> <li>• Undeveloped picnicking, swimming, rock climbing, or fishing areas</li> <li>• High-use undeveloped areas that may or may not have sanitary facilities or trash facilities</li> </ul>
	Rec C Completed Construction or Rerouting of Motorized or Nonmotorized Trails	<ul style="list-style-type: none"> <li>• Construction or rerouting of Forest Service-authorized motorized trails</li> <li>• Construction or rerouting of Forest Service-authorized nonmotorized trails</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of new trails</li> <li>• Construction to extend existing trails</li> <li>• Rerouting of trail segments to move trails away from waterbodies or to overlooks</li> </ul>
	Rec D Motorized or Nonmotorized Trail Operation and Maintenance	<ul style="list-style-type: none"> <li>• Operation and maintenance of Forest Service-authorized motorized trails</li> <li>• Operation and maintenance of Forest Service-authorized nonmotorized trails</li> </ul>	<ul style="list-style-type: none"> <li>• Use of existing system trails</li> </ul> <p>Maintenance of existing system trails that may or may not involve soil disturbance, including:</p> <ul style="list-style-type: none"> <li>• Removal of downed trees on trails</li> <li>• Repair or reconstruction of handrails on high-use trails</li> <li>• Repair or replacement of water control features</li> <li>• Replacement of logs as crossing structures over streams</li> </ul>
	Rec E Motorized Vehicle Use Areas	<ul style="list-style-type: none"> <li>• Operation and maintenance of motor vehicle use areas designated for off-highway vehicles (OHVs, ATVs, 4-wheel drive trucks, dune buggies, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• OHV trails located within a motor vehicle use area</li> <li>• Motor vehicle use areas containing concentrated use areas such as mud holes, mud bogs, or hill climbs</li> </ul>
	Rec F Pack and Riding Stock Use Areas	<ul style="list-style-type: none"> <li>• Operation and maintenance of pack and riding stock use areas</li> </ul>	<ul style="list-style-type: none"> <li>• Corrals or similar holding areas, and stock watering areas</li> </ul>
	Rec G Active Construction or Operation and Maintenance of Watercraft Launches	<ul style="list-style-type: none"> <li>• Active construction of watercraft launches</li> <li>• Operation and maintenance of watercraft launches</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of boat ramps, launches, and marinas</li> <li>• Operation of boat ramps, launches, and marinas</li> <li>• Maintenance of existing watercraft launches</li> <li>• Use of backcountry canoe and kayak launches</li> </ul>
	Rec H Completed Ski Area Construction or Reconstruction	<ul style="list-style-type: none"> <li>• Ski area construction or reconstruction</li> </ul>	<ul style="list-style-type: none"> <li>• Construction of ski runs, lift lines, or snowmaking systems involving vegetation clearing or ground disturbance</li> <li>• Ground disturbance at on-hill ski facilities from construction of lift towers or other support structures and utilities</li> </ul>
	Rec I Ski Run Operation and Maintenance	<ul style="list-style-type: none"> <li>• Ski run operation and maintenance in which soil is not disturbed substantially</li> </ul>	<ul style="list-style-type: none"> <li>• Ski run use</li> <li>• Routine maintenance of ski runs, including mowing during the offseason and snow grooming during the ski season</li> </ul>
Road Management Activities	Road A Active Road or Waterbody Crossing Construction or Reconstruction	<ul style="list-style-type: none"> <li>• Active road or waterbody crossing construction or reconstruction</li> <li>• Includes work on Forest Service system roads, as well as work on nonsystem roads and crossings authorized by road use agreements, special use permits, or minerals plans of operation when Forest Service has significant input into planning, BMP implementation and project supervision</li> </ul>	<ul style="list-style-type: none"> <li>• Road construction or reconstruction</li> <li>• Construction or reconstruction of waterbody crossings even if other road work is not being performed</li> <li>• Removal or replacement of waterbody crossing structures on roads to improve aquatic organism passage</li> <li>• Active reconstruction treatments to prepare a road for storage</li> </ul>

Resource category	Protocol	Use to evaluate	Examples of appropriate project, activity, or site
Road Management Activities (continued)	Road B Completed Road or Waterbody Crossing Construction or Reconstruction	<ul style="list-style-type: none"> <li>Completed road or waterbody crossing construction or reconstruction</li> <li>Includes work on Forest Service system roads, as well as work on nonsystem roads authorized by road use agreements, special use permits, or minerals plans of operation when Forest Service had significant input into planning, BMP implementation and project supervision</li> </ul>	<ul style="list-style-type: none"> <li>Constructed or reconstructed roads</li> <li>Constructed or reconstructed waterbody crossings even if other road work was not performed</li> <li>Completed removal or replacement of waterbody crossing structures on roads to improve aquatic organism passage</li> </ul>
	Road C Road Operation and Maintenance	<ul style="list-style-type: none"> <li>Long-term management and maintenance of Forest Service maintenance level 2 through 5 system roads</li> </ul>	<ul style="list-style-type: none"> <li>Road use of both gated and open roads</li> <li>Routine road maintenance (e.g., road grading or resurfacing)</li> </ul>
	Road D Stored Roads	<ul style="list-style-type: none"> <li>Forest Service system roads that are currently designated as maintenance level 1 roads</li> </ul>	<ul style="list-style-type: none"> <li>Forest Service system roads or road segments that have been placed into storage because they are not needed for long periods</li> </ul>
	Road E Active Road Decommissioning	<ul style="list-style-type: none"> <li>Active road decommissioning projects</li> <li>Decommissioning of Forest Service system roads of any maintenance level, as well as nonsystem roads originally authorized by road use agreements, special use permits, or minerals plans of operation</li> <li>Includes off-forest roads as long as the Forest Service is responsible for implementing BMPs and project supervision</li> </ul>	<p>Activities employed during road decommissioning, including but not limited to:</p> <ul style="list-style-type: none"> <li>Removing waterbody crossing structures</li> <li>Restoring hillside drainage patterns</li> <li>Stabilizing slopes and restoring vegetation</li> <li>Spreading slash on road surface</li> <li>Road obliteration by restoring natural hillside slopes and contours</li> <li>Blocking road entrances</li> </ul>
	Road F Completed Road Decommissioning	<ul style="list-style-type: none"> <li>Completed road decommissioning activities</li> <li>Decommissioning of Forest Service system roads of any maintenance level, as well as nonsystem roads originally authorized by road use agreements, special use permits, or minerals plans of operation</li> <li>Includes off-forest roads as long as the Forest Service is responsible for implementing BMPs and project supervision</li> </ul>	<p>Roads decommissioned by a variety of practices, including but not limited to:</p> <ul style="list-style-type: none"> <li>Removing waterbody crossing structures</li> <li>Restoring hillside drainage patterns</li> <li>Stabilizing slopes and restoring vegetation</li> <li>Spreading slash on road surface</li> <li>Road obliteration by restoring natural hillside slopes and contours</li> <li>Blocking road entrances</li> </ul>
	Road G Snow Removal and Snow Storage	<ul style="list-style-type: none"> <li>Snow removal from Forest Service system roads of any maintenance level</li> <li>Snow removal from parking areas when associated with road snow removal</li> <li>Snow storage areas associated with snow removed from evaluated road</li> </ul>	<ul style="list-style-type: none"> <li>Snow removal by plowing, blowing, mechanically lifting and moving, or deicing</li> <li>Stored snow removed from parking areas</li> </ul>
	Road H Completed Construction/ Reconstruction or Operation and Maintenance of Parking Areas	<ul style="list-style-type: none"> <li>Construction/reconstruction of permanent parking areas</li> <li>Use of permanent parking areas</li> <li>Maintenance of permanent parking areas</li> </ul>	<ul style="list-style-type: none"> <li>Parking lot construction or reconstruction</li> <li>Use of parking areas</li> <li>Maintenance of parking area surfacing and drainage</li> <li>Maintenance of oil and grease containment or separator systems</li> <li>Includes parking areas for administrative areas, developed recreation sites, visitor centers, trail heads, roadside rests, and scenic overlooks</li> </ul>
	Road I Equipment Refueling or Servicing Areas	<ul style="list-style-type: none"> <li>Designated temporary equipment service at active project sites</li> <li>Temporary refueling areas designated to store at least 1,320 gallons of oil and fuels at active project sites</li> </ul>	<ul style="list-style-type: none"> <li>Areas designated for heavy equipment repair and maintenance within timber harvest units</li> <li>Refueling areas designated at road construction projects</li> </ul>

Resource category	Protocol	Use to evaluate	Examples of appropriate project, activity, or site
Mechanical Vegetation Management Activities	Veg A Ground-Based Skidding and Harvesting	<ul style="list-style-type: none"> <li>Completed ground-based skidding and harvesting operations</li> </ul>	<ul style="list-style-type: none"> <li>Typical timber harvesting operations involving log skidding and temporary storage of logs on landings</li> <li>Ground-based timber/vegetation removal for facility development including recreation sites, ski areas, campgrounds, administrative sites, or road construction</li> </ul>
	Veg B Cable and Aerial Yarding Operations	<ul style="list-style-type: none"> <li>Completed harvesting in which log transport was by cable or other aerial yarding system</li> </ul>	<ul style="list-style-type: none"> <li>Felling followed by cable transport of logs along corridors</li> <li>Helicopter logging</li> </ul>
	Veg C Mechanical Site Treatments	<ul style="list-style-type: none"> <li>Completed mechanical site treatments</li> </ul>	<ul style="list-style-type: none"> <li>Site preparation, such as chopping residual vegetation using heavy equipment</li> <li>Vegetation pile burning as part of other site preparation activities</li> <li>Timber stand improvement treatments using chainsaws or heavy equipment</li> <li>Mechanical control or removal of terrestrial invasive species</li> <li>Fuels reduction treatments using chainsaws or heavy equipment</li> </ul>
Water Uses Management Activities	WatUses A Completed Construction or Operation and Maintenance of Water Wells for Monitoring or Production	<ul style="list-style-type: none"> <li>Completed construction of water wells to produce water or monitor groundwater levels or condition</li> <li>Operation and maintenance of existing water wells used to provide water or monitor groundwater levels or condition</li> </ul>	<ul style="list-style-type: none"> <li>Nested wells at different depths or individual wells for groundwater monitoring studies</li> <li>Water wells for public use at developed campgrounds</li> <li>Water wells for administrative facilities</li> </ul>
	WatUses B Operation and Maintenance of Spring-Source Facilities	<ul style="list-style-type: none"> <li>Operation and maintenance of developed springs</li> </ul>	<ul style="list-style-type: none"> <li>Water sources fed by springs at campgrounds or roadside rests</li> <li>Spring sources for livestock watering</li> </ul>
	WatUses C Completed Reconstruction/ Repair or Operation and Maintenance of Water Sources (Drafting)	<ul style="list-style-type: none"> <li>Completed repair or reconstruction of water drafting sources</li> <li>Operation and maintenance of existing water drafting sources</li> </ul>	<ul style="list-style-type: none"> <li>Improvements made to water drafting sites</li> <li>Water drafting sites used for fire suppression, mineral operations, or road dust control</li> </ul>
	WatUses D Active Construction of Diversions and Conveyances	<ul style="list-style-type: none"> <li>Construction and reconstruction of permanent water diversion and/or water conveyance systems, including water storage facilities, temporary access roads or staging areas for the project, return flow</li> </ul>	<ul style="list-style-type: none"> <li>Diversion or conveyance systems for range management or irrigation</li> <li>Diversion or conveyance systems authorized by special use permit</li> </ul>
	WatUses E Operation and Maintenance of Diversions and Conveyances	<ul style="list-style-type: none"> <li>Operation and routine maintenance of existing permanent diversions, conveyances, and associated water storage and return flow</li> </ul>	<ul style="list-style-type: none"> <li>Operation of diversion and conveyance facilities used for range management or irrigation</li> <li>Operation of conveyance systems authorized by special use permit</li> <li>Routine maintenance of diversion and conveyance facilities, including sediment or debris removal from the system</li> </ul>

AMZ = Aquatic Management Zone. ATV = all-terrain vehicle. BMP = Best Management Practice. OHV = off-highway vehicle.





Best Management Practices training participants discuss possible corrective actions at a recently decommissioned day-use recreation site, Uinta-Wasatch-Cache National Forest, Utah.

# Appendix B

## BMP Evaluation Rating Rule Set Development

The purpose of the Best Management Practice (BMP) monitoring rating system is to provide a method of measuring the performance of the Forest Service in applying BMPs and protecting water quality during land management activities on National Forest System (NFS) lands. Assigning a rating outcome to each National Core BMP monitoring evaluation will enable tracking of BMP performance over time at multiple scales within the agency. In addition, patterns may emerge that will help to identify strengths and weaknesses in BMP implementation and effectiveness and needed changes in processes or procedures to address identified weaknesses.

In devising the rating system, the following statements of fact were considered:

- Each National Core BMP monitoring protocol evaluates more than one National Core BMP, typically a planning BMP and one or more resource-category BMPs.
- The National Core BMP monitoring protocols are written in general, nonspecific terms and are designed to evaluate BMP performance by assessing outcomes of BMP implementation regardless of the site-specific BMP prescription used.
- The protocol questions are structured so as to obtain objective information on BMP implementation and effectiveness at a site.
- The BMP evaluations will be completed by an interdisciplinary review team (IDT) of professional resource specialists.
- Water quality impacts are inferred from visual evidence of pollutant movement offsite and into nearby waterbodies, changes to waterbody morphology, and, where available, existing water quality or other relevant monitoring data.
- Water chemistry, habitat quality, and other water quality parameters are not measured directly. While some protocol questions concern water quality standards, there is no attempt to quantify attainment of water quality standards.
- A team of people from the Washington Office and regional offices decided the rating outcome categories and definitions.

Therefore, the National Core BMP monitoring protocols are designed to use a qualitative assessment by knowledgeable professionals to evaluate overall BMP implementation and effectiveness for an activity, such as developed recreation or

road construction, being monitored. They are not designed to be a quantitative evaluation of site-specific BMP prescriptions or individual National Core BMPs.

For each National Core BMP monitoring evaluation—that is, completion of a monitoring protocol at a selected site—BMP implementation and effectiveness are rated separately. These separate ratings are combined to provide an overall BMP performance rating for the site. In this way, BMP implementation and effectiveness can be tracked separately, as can overall BMP performance.

The ratings for BMP implementation and effectiveness are determined, based the combination of answer choices selected in the BMP evaluation, according to a ruleset developed individually for each National Core BMP monitoring protocol. Routines consistent with the ruleset within the BMP-monitoring-data management system will analyze the answers to the protocol questions and assign the ratings to each evaluation. The monitoring IDT will not assign the site ratings directly. In addition, the number of questions in the various protocols and weighting applied to the various protocol answer choices should make it difficult for the IDT to “rig” the answers to achieve a specific or better rating outcome.

### BMP Implementation Rating Outcomes

BMP implementation monitoring answers the question, “Were site-specific BMP prescriptions implemented as planned or designed?” This question has two parts: (1) “What site-specific BMP prescriptions were planned or designed?” and (2) “Were the site-specific BMP prescriptions implemented as intended?”

Planning establishes “What site-specific BMP prescriptions were planned or designed?” Monitoring of planning includes review of project planning documents, such as a project Environmental Impact Statement and associated Record of Decision, or other guidance documents, such as the land management plan or State BMPs, to identify site-specific BMP prescriptions. Monitoring of planning also includes review of project-implementing documents to determine if those planned BMP prescriptions were included in project contracts, permits, or other implementing documents.

Operational execution of planning addresses the question, “Were those site-specific BMP prescriptions implemented as intended?” Monitoring of operational execution involves a field review of the project area to determine if the specified BMP prescriptions were implemented and if corrective actions were taken if problems with those specified prescriptions or other water quality-related issues were identified during the course of the project or activity. Implementation questions in the National BMP monitoring protocols are designed to obtain information about BMP planning and operational execution. The implementation rating categories are shown in Table B-1.

Note the implementation rating is based solely on the BMP prescriptions included in the planning or guidance documents or project implementation documents. This evaluation does not answer the question of what BMPs should have been prescribed, which is often clearer in hindsight than in the planning phase. There is the opportunity, however, to provide comments on this issue if it is found that planning was inadequate or not appropriate. Also note, the rating category “No BMPs” represents a total failure of the BMP process in planning and is distinguished from “Not Implemented,” in which BMPs were identified in planning but not included in action documents or implemented fully.

To determine the implementation rating, selected implementation questions in each protocol are divided into three groups:

- BMPs were prescribed (BMPs Rx)
- BMPs were implemented (BMPs Imp)
- Corrective actions were implemented (C.A.)

Each group of implementation questions is given a rating of “All,” “Some,” or “None” based on the combination of their answer choices. The three group ratings are then combined into the implementation rating.

**BMPs were prescribed (BMPs Rx):** This grouping of implementation questions addresses planning, or “What site-specific BMP prescriptions were planned or designed?” In most protocols, the BMPs Rx rating is based on two types of implementation questions: (1) “What is the planning document or other BMP guidance document?” and (2) “Were the BMP provisions in the those documents included in the project implementation document?” Some protocols have additional implementation questions that address site-specific BMP prescriptions that are also factored into the BMPs Rx rating. For example, protocol Road C asks if Road Management Objectives (RMOs) were established for the road and if those RMOs reflect existing design and use.

**Table B-1.** Definitions of rating categories for BMP implementation.

Implementation rating	Interpretation
Fully Implemented	Prescriptions are identified in project planning documents, –and– <u>All</u> prescriptions are translated into action documents, –and– <u>All</u> specified prescriptions are implemented fully, –and– <u>All</u> necessary corrective actions identified during the project are implemented fully.
Mostly Implemented	Prescriptions are identified in project planning documents, –and– <u>All</u> or <u>Some</u> prescriptions are translated into action documents, –and– <u>All</u> specified prescriptions are implemented fully, –and– <u>All</u> or <u>Some</u> necessary corrective actions identified during the project are implemented fully.
Marginally Implemented	Prescriptions are identified in project planning documents, –and– <u>All</u> or <u>Some</u> prescriptions are translated into action documents, –and– <u>Some</u> specified prescriptions are implemented fully, –and– <u>All</u> or <u>Some</u> necessary corrective actions identified during the project are implemented fully.
Not Implemented	Prescriptions are identified in project planning documents, –and– <u>No</u> prescriptions are translated into action documents, –or– <u>No</u> specified prescriptions are implemented fully, –or– <u>No</u> necessary corrective actions identified during the project are implemented.
No BMPs	Site-specific BMP prescriptions were not developed or identified during project planning.

BMP = Best Management Practice.

The BMPs Rx rating is “All,” “Some,” or “None” depending on the degree to which BMP prescriptions were established for the project or activity and were included in the project implementing document. If there is no planning or other BMP guidance document, the BMPs Rx rating is “No BMPs.” If there is a planning or other BMP guidance document but it does not contain site-specific BMP prescriptions, the BMPs Rx rating is “No BMPs Rx.”

**BMPs were implemented (BMPs Imp):** This grouping of implementation questions addresses operational execution of planning, or “Were the site-specific BMP prescriptions implemented as intended?” In most protocols, the BMPs Imp rating is based on one comprehensive implementation question about which BMP provisions in the project implementing document were implemented fully on the ground. Some protocols have additional implementation questions that address implementation of site-specific BMP prescriptions, which are also factored into the BMPs Imp rating. For example, protocol WatUses A asks if the well apron or collar meets all State and local requirements for materials, size, and thickness.

The BMPs Imp rating is “All,” “Some,” or “None” depending on the degree to which BMP prescriptions were implemented fully at the site.

**Corrective actions were implemented (C.A.):** This grouping of implementation questions also addresses operational execution and looks at whether water quality problems are recognized and corrected during project implementation or ongoing activities. The types of implementation questions used for the C.A. rating include questions about whether inspections of the project site were made, if supplemental erosion control was needed, and if the site was closed or improvement treatments were applied. The C.A. rating is “All,” “Some,” or “None” depending on the degree to which water quality problems were identified and corrected during project implementation.

**Implementation rating:** The BMPs Rx, BMPs Imp, and C.A. ratings are combined into the implementation rating for an evaluation, as shown in Table B-2.

## BMP Effectiveness Rating Outcomes

BMP effectiveness monitoring answers the question, “Were the site-specific BMP prescriptions, as implemented, effective at protecting water quality?” Effectiveness monitoring assesses the prevention of pollutants from moving into a waterbody and prevention of adverse effects to a waterbody. Pollutant movement and potential threat are judged by how many occurrences and the type of visible evidence of pollutants attributable to the project or activity being evaluated are found in the Aquatic Management Zone (AMZ) or waterbody. “Adverse effects to a waterbody” refers to negative physical disturbance or other change to waterbody morphology from the project or activity being evaluated. Effectiveness questions in the monitoring protocols are designed to obtain information about the presence and movement of pollutants offsite and observable disturbances to a waterbody. The effectiveness rating categories are shown in Table B-3.

To determine the effectiveness rating, selected effectiveness questions are divided into groups of related questions, typically by pollutant type or location at the project site. For example, in a particular protocol, all questions about erosion and sedimentation may be grouped together in one group and questions about trash and sanitary waste are placed in a separate group. For another, in a different protocol, all erosion and sedimentation questions pertaining to the AMZ may be in one group and all erosion and sedimentation questions pertaining to the waterbody crossing may be placed in a separate group. The number of groups in each protocol depends on the number of effectiveness questions and how they are organized. Some protocols have as few as 2 effectiveness groups, and more complicated protocols may have as many as 12. A Group effectiveness rating is assigned to each grouping of effectiveness questions. Depending on the nature of the questions and the ability to distinguish effects from the questions asked, the group effectiveness rating is either a three-category scale or four-category scale. The three-category scale is “Effective,” “Moderately Effective,” and “Not Effective.” The four-category scale is

**Table B-2.** Matrix to determine the implementation rating.

Implementation rating	BMPs Rx	BMPs Imp	C.A.
Fully Implemented (all are true)	All	All	All
Mostly Implemented (all are true)	Some	All	All or some
	All	All	Some
Marginally Implemented (all are true)	All or some	Some	All or some
Not Implemented (any one is true)	None	None	None
No BMPs (either is true)	No BMPs or no BMPs Rx		

BMP = Best Management Practice.

**Table B-3.** Definitions of rating categories for BMP effectiveness.

Effectiveness rating	Interpretation	
Effective	<p><u>No</u> pollutants reached the waterbody and there is no potential threat evident,                      –and–  <u>Waterbody received no</u> adverse effects from the project or activity (e.g., physical disturbance).</p>	
Mostly Effective	<p><u>Minor</u> amounts of pollutants reached the waterbody or there is a <u>potential threat</u> evident,                      –and/or–                      Waterbody received <u>minor</u> adverse effects from the project or activity,                      –and/or–                      Impacts to water quality are <u>temporary</u>, lasting less than 1 year.</p>	
Marginally Effective	<p><u>Minor</u> amounts of pollutants reached the waterbody or there is a <u>potential threat</u> evident,                      –and/or–                      Waterbody received <u>minor</u> adverse effects from the project or activity,                      –and/or–                      Impacts to water quality are <u>prolonged</u>, lasting more than 1 year.</p>	<p><u>Major</u> amounts of pollutants reached the waterbody or there is a <u>potential threat</u> evident,                      –and/or–                      Waterbody received <u>major</u> adverse effects from the project or activity,                      –and/or–                      Impacts to water quality are <u>temporary</u>, lasting less than 1 year.</p>
Not Effective	<p><u>Major</u> amounts of pollutants reached the waterbody or are very close to entering the waterbody,                      –or–                      Waterbody received <u>major</u> adverse effects from the project or activity,                      –and–                      Impacts to water quality are <u>prolonged</u>, lasting more than 1 year.</p>	

BMP = Best Management Practice.

“Effective,” “Mostly Effective,” “Marginally Effective,” and “Not Effective.” The group ratings are then combined to determine the overall effectiveness rating for the evaluation.

To determine the Group effectiveness rating, the answer choices for each question within the group are rated as “Not Applicable,” “Effective,” “Mostly Effective,” “Moderately Effective,” “Marginally Effective,” “Not Effective,” “No Potential Threat,” “Potential Threat,” or “Major Potential Threat.” For example, the answer choice “no evidence of erosion or sedimentation” is rated as “Effective,” whereas the answer choice “flow was poorly controlled or uncontrolled” is rated as “Potential Threat.” Each group has at least one effectiveness question, and some can have five or more. The Group effectiveness rating is generally based on the worst rating of the answer choices selected within that grouping. That is, generally all

questions in the group need to be rated as “Effective” or “No Potential Threat” in order for the Group effectiveness rating to be “Effective.” If any of the questions within the group are rated as “Not Effective,” the Group effectiveness rating is also “Not Effective.”

The overall effectiveness rating for the evaluation is also based on the worst rating of the group ratings in that evaluation. In order for the overall effectiveness rating to be “Effective,” all the group ratings have to be “Effective.” If any of the group ratings are “Not Effective,” the overall effectiveness rating is “Not Effective” as well. An overall effectiveness rating of “Mostly Effective” results when at least one of the group ratings is “Mostly Effective” and none are “Marginally Effective” or “Not Effective.” For example, Table B-4 shows the criteria for the overall effectiveness rating for protocol Road E.

**Table B-4.** Matrix to determine the effectiveness rating for protocol Road E, active road decommissioning.

Road E effectiveness rating	ER[WBC] <sup>a</sup>	ER[RS] <sup>b</sup>	ER[CF] <sup>c</sup>
Effective (all are true)	Effective –or– no waterbody crossing	Effective	Effective
Mostly Effective	Any combination of <b>ER[WBC]</b> or <b>ER[RS]</b> is Mostly Effective or <b>ER[CF]</b> is Moderately Effective, –and– neither <b>ER[WBC]</b> or <b>ER[RS]</b> is Marginally Effective, –and– none of <b>ER[WBC]</b> , <b>ER[RS]</b> , or <b>ER[CF]</b> is Not Effective.		
Marginally Effective	Any combination of <b>ER[WBC]</b> or <b>ER[RS]</b> is Marginally Effective, –and– none of <b>ER[WBC]</b> , <b>ER[RS]</b> , or <b>ER[CF]</b> is Not Effective.		
Not Effective (any are true)	Not Effective	Not Effective	Not Effective

<sup>a</sup> ER[WBC] is effectiveness rating for waterbody crossing.

<sup>b</sup> ER[RS] is effectiveness rating for road segment.

<sup>c</sup> ER[CF] is effectiveness rating for chemicals and fuels.

## Overall BMP Performance Rating Outcomes

Once the evaluation ratings for BMP implementation and effectiveness have been decided, an overall BMP performance rating for that BMP evaluation will be determined according to the matrix in Table B-5. There are five possible overall BMP performance ratings: “Excellent,” “Good,” “Fair,” “Poor,” and “No Plan.” In determining the overall performance rating, greater weight is given to the effectiveness rating. For example,

an overall rating of “Excellent” can be achieved even if the implementation rating is not “Fully Implemented” as long as the effectiveness rating is “Effective.” The overall performance rating of “No Plan” is assigned to an evaluation for which the implementation rating is “No BMPs,” which means that no BMPs were prescribed for the project or activity during planning. This rating represents a total failure of the BMP process and is a negative outcome, even if the effectiveness rating is “Effective.”

**Table B-5.** Matrix for determining overall BMP performance rating for a site evaluation.

Combined scoring		Implementation rating (IR)				
		Fully Implemented	Mostly Implemented	Marginally Implemented	Not Implemented	No BMPs
Effectiveness rating (ER)	Effective	Excellent	Excellent	Good	Good	No Plan
	Mostly Effective	Good	Good	Fair	Fair	No Plan
	Marginally Effective	Fair	Fair	Poor	Poor	No Plan
	Not Effective	Poor	Poor	Poor	Poor	No Plan

BMP = Best Management Practice.

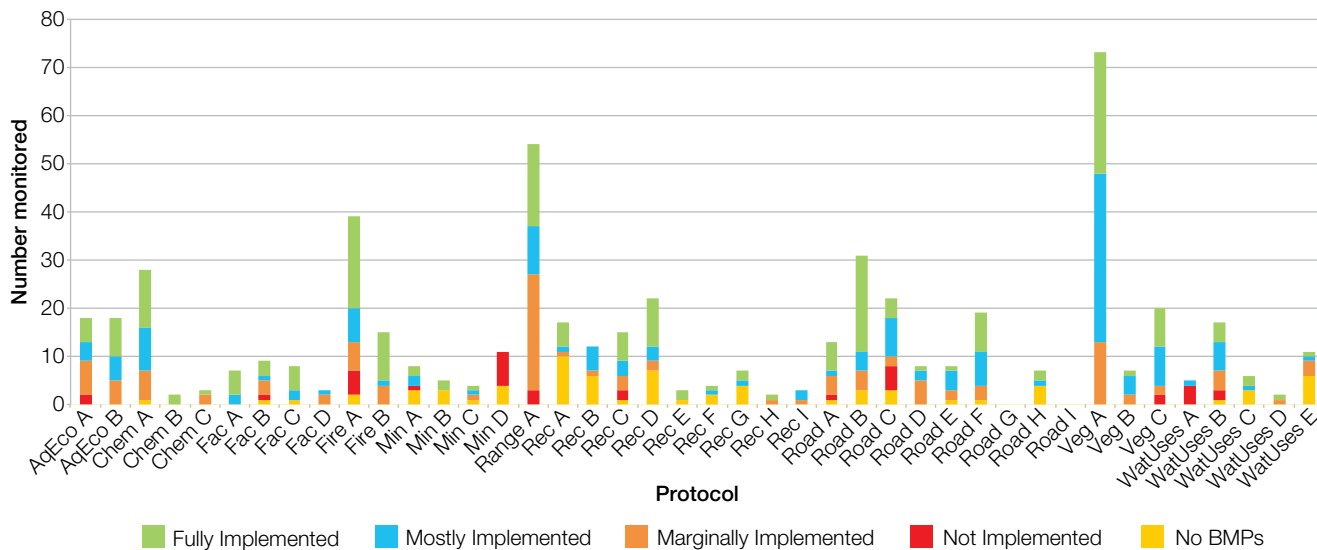


Best Management Practice (BMP) training participants discuss BMP effectiveness at a log landing in a commercial timber sale, Coconino National Forest, Arizona.

# Appendix C

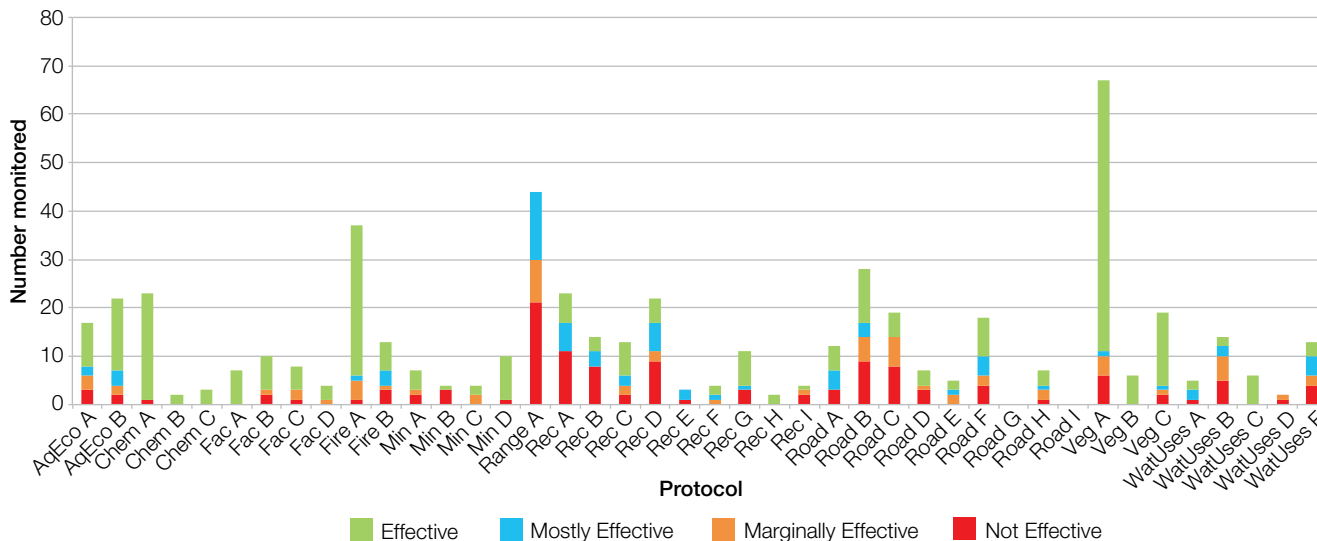
## BMP Evaluation Ratings by Protocol

**Figure C-1.** BMP implementation ratings, by protocol, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.  
 Note: Appendix A includes protocol explanations.

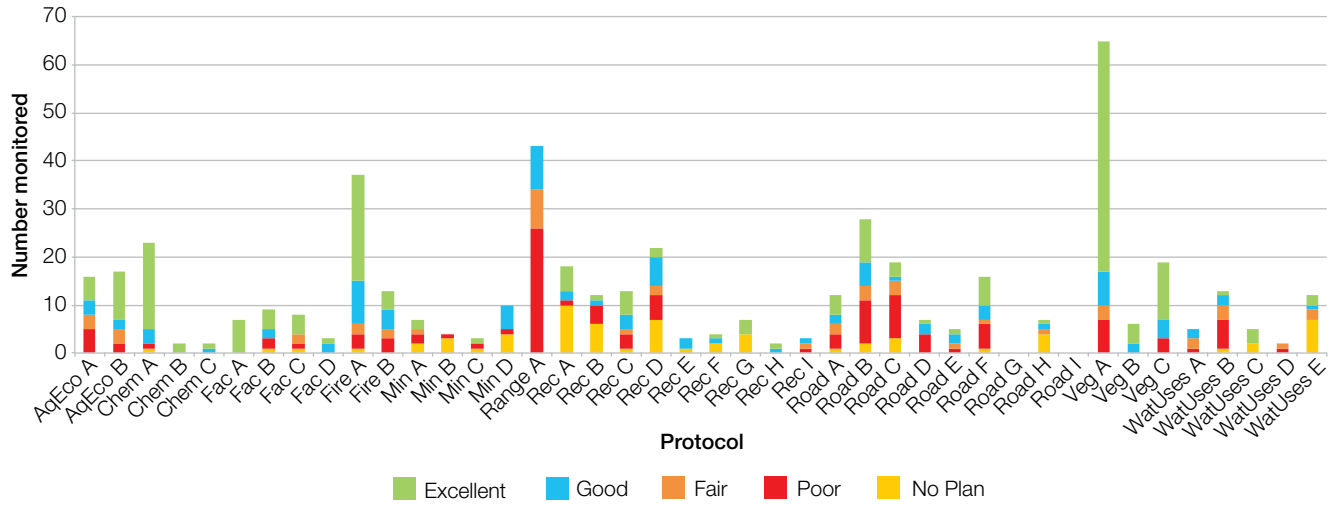
**Figure C-2.** BMP effectiveness ratings, by protocol, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.  
 Note: Appendix A includes protocol explanations.



**Figure C-3.** Composite BMP evaluation ratings, by protocol, for evaluations completed in FY 2014.



BMP = Best Management Practice. FY = fiscal year.  
 Note: Appendix A includes protocol explanations.

