The USDA Forest Service's National Best Management Practice Program

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ABSTRACT

Over the past several years, the USDA Forest Service has been developing a national best management practices (BMP) program. The BMP program is designed to meet Department and Agency requirements and policies for BMP implementation and monitoring, to ensure that nonpoint source pollutants are controlled and the objectives of the Clean Water Act are met. While 80 percent of National Forests do some type of BMP monitoring, there is no consistent approach to monitoring across Forests or Regions, and most monitoring is focused only on timber management and road management, which represent only a fraction of the agency's management activities. Additionally, there is no unified database for storing and reporting BMP monitoring data. Consequently, the national BMP effort is focused on remedying those deficiencies, which will also allow the Forest Service to meet both internal and external accountability commitments. The national BMP program contains two parts: a set of Forest Service National Core BMPs for each of 10 major land-management categories that can affect water quality, and a monitoring program to evaluate the implementation and effectiveness of those BMPs. Because of their national scope, the BMPs are non-prescriptive and are aligned with the U.S. EPA's nonpoint source pollution control guidance. By contrast, the monitoring program includes forms with specific implementation and effectiveness questions to evaluate individual BMPs or groups of BMPs within each land-management category. The National Core BMPs and monitoring forms have been developed by teams of resource specialists from across the country and at all levels of the agency. Within the next several years, the monitoring forms will be downloadable to data loggers for electronic capture of information, and data uploading to and storage at the national Forest Service data center also will be available. Once data are stored at a central location, reports summarizing BMP implementation and effectiveness can be generated locally, regionally, or nationally. In turn, National Forest resource specialists can apply the findings to improve adaptive management and better protect water quality.

INTRODUCTION

Best management practices (BMPs) are techniques applied to, or methods incorporated into management activities to control nonpoint source pollution. BMPs can include planning measures, physical or structural techniques, or operational or maintenance

procedures. As a result, various BMPs can be applied throughout the planning, operation, and maintenance periods, as well as into closure, reclamation, or recovery periods.

Use of BMPs for activities considered to be nonpoint sources of pollution traces its origins to the Clean Water Act and its amendments (PL 92-500, PL 95-217, PL 100-4). More specifically for the U.S. Forest Service, the Code of Federal Regulations (40CFR130) and Forest Service policy (FSM 2532.03) direct that BMPs be the primary tools for controlling nonpoint source (NPS) pollution for the agency. These same regulations and policies also direct that BMPs should be monitored to ensure that they are properly designed, applied, maintained, and where monitoring shows deficiencies, improvements or corrections should be made.

Approximately 80 percent of National Forests participate in some type of BMP monitoring; however, there is no consistent approach to monitoring across Forests or Regions. Except for Forests in the Pacific Southwest Region (i.e., California), most Forest Service BMP monitoring efforts focus on timber management and road management activities, but these represent only a small portion of the land disturbing management activities in which the Forest Service participates. Even the Pacific Southwest Region, which probably has the agency's most formal and complete BMP monitoring program, does not have protocols for evaluating some major land management activities (e.g., wildfire suppression). There also is no single database for storing BMP monitoring data and no formal process for summarizing data and compiling reports to evaluate BMP implementation or effectiveness on a national scale. Consequently, the National BMP program is focused on remedying monitoring deficiencies, bringing consistency and repeatability to monitoring procedures, and creating data management and reporting techniques that will allow the Forest Service to meet both internal and external commitments for accountability and adaptive management to better ensure that Clean Water Act objectives and Department and Agency regulations and policies are met.

THE NATIONAL BMP PROGRAM

The national BMP program includes two parts – a document describing a set of Forest Service core BMPs for each of 10 land-management categories (Table 1) and a monitoring program that could be applied nationally within the agency to evaluate the implementation and effectiveness of those BMPs.

The National Core BMPs

Each National Forest and Grassland currently has a set of BMPs used to control nonpoint source pollution. These BMPs were derived from state-approved BMP lists, Forest Service policy, other agencies' BMP lists, scientific literature, and professional judgment. As a result, there is no single, consistent, standard list of BMPs used throughout the

Table 1. Land-management categories (in bold) and associated core National BMPs for the Forest Service's National BMP Program. For the purposes of monitoring, the Project Planning and Analysis (General Planning BMP) are considered within each of the land-management categories.

General Planning
Project Planning and Analysis

Rangeland Management
Rangeland Management Planning
Rangeland Permit Administration
Range Improvements

Vegetation Harvest and Regeneration
Vegetation Management Planning
Erosion Prevention and Control
Streamside Management Zones
Ground-Based Skidding and Yarding Operations
Suspended Yarding Operations
Landings
Mechanical Site Treatment

Road Management
Travel Management Planning and Analysis
Road Location and Design
Road Construction and Reconstruction
Road Maintenance and Operations
Road Storage
Road Decommissioning
Stream Crossings
Snow Removal and Storage
Parking Sites and Staging Areas
Equipment Refueling and Servicing
Aggregate Borrow Areas

Minerals
Minerals Planning
Minerals Exploration
Minerals Production
Ore Stockpiles, Mine Waste Storage and Disposal, Reserve Pits, and Settling Ponds
Placer Mining and Sand & Gravel Operations
Produced Water
Minerals Extraction Site Reclamation

Chemical Use
Chemical Use Planning
Follow Label Directions
Chemical Use Near Water Bodies
Chemical Use In Water Bodies
Container and Equipment Cleaning and Disposal
Chemical Application Monitoring and Evaluation

Water Uses
Water Uses Planning
Water Wells for Production and Monitoring
Administrative Water Developments
Water Diversions and Conveyances
Dams and Impoundments

Aquatic Ecosystems
Aquatic Ecosystem Improvement and Restoration Planning
Ponds and Wetlands
Stream Channels and Floodplains

Recreation
Recreation Planning
Developed Recreation Sites
Dispersed Recreation
Off-Highway Vehicles
Pack and Riding Stock Use Areas
Motorized and Non-motorized Trails
Watercraft Launches
Recreation Special Use Authorizations
Ski Runs and Lifts
Ski Area Snowmaking
Ski Area Base Facilities
Recreation Site Restoration and Rehabilitation

Wildland Fire Management
Wildland Fire Management Planning
Use of Wildland Fire
Wildland Fire Control and Suppression
Wildland Fire Suppression Damage Rehabilitation

Facilities and Non-recreation Special Uses
Facilities and Non-recreation Special Uses Planning
Facility Construction
Public Water Systems
Sanitation Systems
Solid Waste Disposal
Hazardous Materials
Vehicle and Equipment Wash Water
Facility Reclamation
Non-recreation Special Use Authorizations
Pipelines, Transmission Facilities, and Rights-of-Way

Forest Service. The National Core BMPs were developed to provide a single, consistent, standard set of BMPs against which to monitor implementation and effectiveness throughout the National Forest System.

There has been some misconception within the agency that the national BMPs were being designed to define specific prescriptive measures that each Forest and Grassland must employ. Understandably, there was concern that inflexible standard prescriptions would create untenable problems because 1) they may conflict with Forest-level BMPs requirements, and 2) terrain, soils, geology, climate, and other factors affecting NPS pollution differ widely across the country and even within Forests. However, because of their national scope, the core BMPs are in fact non-prescriptive and are aligned with the U.S. EPA's nonpoint source pollution control guidance. Each core BMP identifies a primary feature or type of activity that must be considered within the corresponding land use to control nonpoint source pollution (Table 1).

Each core BMP carries with it descriptions of techniques that may be considered or applied to address NPS pollution. There is no expectation that all of these will be applied in any given situation; nor are the lists of techniques all inclusive – it is recognized that other techniques not listed could be appropriate. The techniques are more prescriptive than the core BMPs, but they remain less prescriptive than BMPs used at the Forest or project level. For example, the techniques in the core BMPs may provide information on a variety of methods to control erosion on trails, such as water bars, but they do not provide recommendations on their spacing. Prescriptions that include considerations, such as frequency or intensity of features, or vegetation or seed recommendations and rates, are developed on a location-specific basis by resource specialists or employ formalized Forest standards or guidelines, and/or state BMPs, where applicable.

The core BMPs were developed by teams of resource specialists across the country at the District, Forest, Regional, and National office levels. Revision and editing of the final draft version were completed in fall 2009. The draft document describing the national core BMPs and associated techniques is undergoing internal Forest Service review. Following revision, the revised draft document will be released for external review and comment through the Federal Register – this will probably occur in summer 2010. The final version of the national core BMPs then will be developed and become part of the Forest Service Handbook.

The National BMP Monitoring Program

The steering team that initiated the BMP monitoring program began their work by reviewing several different existing BMP monitoring programs, including the Pacific Southwest Region (Forest Service) program (http://www.fs.fed.us/r5/publications/water_resources/waterquality/index.html), the Northeastern State and Private Monitoring Program (http://www.na.fs.fed.us/watershed/bmp.shtm), and several state monitoring programs.

During the review, the team identified features they found useful and lacking in each approach, and based on that information they defined several attributes that were critical for establishing a successful national monitoring program. These were: evaluations of both BMP implementation and BMP effectiveness; objective questions that would yield repeatable answers if different people reviewed a site under the same conditions; questions that would allow the results to be sorted and examined for reporting purposes; questions that could capture information on corrective actions needed in the short term; and questions that could capture information to improve adaptive management. In addition, the decision was made to restrict monitoring questions to those that would be valuable at the Forest level, rather than focus only on questions tailored to meet national agency accountability goals. Local focus is expected to increase the probability that monitoring would be done, and done thoroughly. Furthermore, the team expected that answers to project-level questions also would be those that would be necessary to scale up results to address questions of Regional or national accountability, or to track temporal trends.

Development of the monitoring program began about 2.5 years ago. A different team was assembled for each land-management category to develop forms containing relevant questions to evaluate BMP implementation and effectiveness. Most teams were comprised of one or two steering team members and typically four to six District- or Forest-level resource specialists from across the country. In some instances there was also participation from Regional or National Office personnel. Each team worked 1-4 months, depending upon the breadth and complexity of the land-management category and core BMPs, usually by web conferencing, to develop and refine the monitoring questions.

For most land-management categories, a separate monitoring form was developed for each core BMP. However, the General Planning BMP and the individual planning core BMPs in each land-management category do not have separate forms because planning questions are incorporated within the other forms. In addition, for some land-management categories closely related BMPs were grouped for monitoring. For example, for Rangeland Management, which has three core BMPs (Table 1), there is only a single form, and for Minerals, all of the seven core BMPs (Table 1) are considered in only two forms: Exploration and Production, and Reclamation. However, regardless of the number of forms involved, the structure and the pattern of questions on each form are similar. Also consistent is the use of random samples in the selection of monitored sites. Though personnel can apply the protocols to any site to gain information about BMP performance, only samples that are randomly selected will be used in national data analysis and reporting.

Each evaluation form includes four sections presented in this order – header, implementation, effectiveness, and general comments. Header questions focus on providing basic information, such as who performed the evaluation, when was it performed, where was it performed, and the hydrologic and weather conditions present

prior to or at the time of the evaluation, respectively. Header questions also provide information about the type, extent, and timing of the land-management activity that can be used later for sorting and summarizing purposes.

In a broad sense, implementation is evaluated by determining whether 'we did what we said we were going to do', rather than focusing on whether specific prescriptions were implemented. For example, one Forest may require 100-ft spacings for certain road drainage structures and another might require 75-ft spacings; consequently, the related implementation question would focus on whether direction regarding drainage spacing was followed, which would apply to any Forest regardless of the applicable prescription. The implementation section of each form generally begins with questions about planning; i.e., were specific considerations or issues related to NPS pollution control and BMPs included in the environmental analysis and project decision. These are followed by parallel questions asking whether the considerations or issues included in the environmental analysis and project decision were included in the contract or plan. Subsequent questions focus on whether the NPS-related BMPs were implemented fully, and when full implementation was not achieved the reviewers are asked to provide details about the actions that were not implemented and corrective actions that should be taken to improve implementation.

Effectiveness questions tier back to the implementation questions to determine whether the BMPs were effective at controlling NPS pollution. Effectiveness is determined by on-site observations for evidence of erosion and sedimentation, fuel or chemical pollution, human or domestic animal waste, and trash. When evidence of pollution is found, the location of that evidence relative to water bodies (e.g., in the water body, in the riparian area, outside of the riparian area) must be identified, and the reviewers are directed to identify the causes, sources, and corrective actions that must be taken to rectify the situation.

Information about actions that should be taken to improve adaptive management also is sought at the end of both the implementation and effectiveness sections. Adaptive management is defined differently than corrective actions. The latter are specific actions applicable to the deficiencies encountered at the evaluated site (e.g., an undersized culvert at a stream crossing), whereas adaptive management applies more broadly to the type of project. Suggested actions to improve future adaptive management may result from repeatedly encountering similar deficiencies or problems over time during BMP monitoring or other monitoring (e.g., procedures used to estimate culvert capacity have consistently resulted in undersized culverts).

The final section of each monitoring form is general comments. Any type of information that a Forest may find useful can be included in this section; the information does not have to pertain to BMPs. This information will be used solely at the Forest or District level, and there is no expectation that it will become part of the BMP reporting effort.

Header questions involve some investigative work in the office, with the remainder of the questions answered in the field. By contrast, while some implementation questions can be answered only in the field, others may require thorough review of planning documents (e.g., project decision documents, Forest or Grassland Land and Resource Management Plans, daily diary reports, etc.) along with other pertinent regulatory documents. The effectiveness questions are almost entirely dependent upon field observations, though in some cases effectiveness responses also may include results from prior monitoring that was conducted to meet other Forest needs or requirements. For example, flow records kept to ensure water rights are met may be used to answer individual questions related to diversions in the Water Uses BMPs.

Supporting documentation also exists for each of the forms. This includes explanations on how to define populations for that form, how to select samples from that population, how to identify the area to be monitored for that sample (when the entire area is not evaluated), and the procedures to move through the area to complete monitoring. Other supporting documentation includes question-by-question instructions for each form, which clarify questions in greater detail when necessary, and explain the types of information that should be considered or the things that should be examined to answer each question.

To date, monitoring forms and supporting documentation for 8 of the 10 activities have been completed. Forms and other documentation for the remaining two land-management categories – Facilities and Non-recreation Special Uses, and Chemical Uses – will be developed in spring-summer 2010. Vegetation Management and Rangeland Management forms (and documentation) have been reviewed and field tested by approximately 15 Forests each, and revisions have been made based on comments from that pilot testing. The remaining forms are scheduled to be field tested during spring and summer 2010, with revisions following. After those revisions are completed, the forms and supporting documentation will be made available for agency-wide use. A glossary containing definitions of terms will be the final piece of supporting documentation that will be prepared for the monitoring portion of the program. It is expected to be completed in late 2010 or early 2011.

Data Management

Currently, the monitoring forms are available only in paper format. However, the Forest Service's San Dimas Technology and Development Center is working on software to make all of the forms downloadable to several types of common field data recorders for electronic capture of information. This work is expected to be completed in the next couple of years, though paper data collection will be permitted for Forests that prefer this method or for Forests that do not currently have and cannot afford compatible field data recorders.

Regardless of whether monitoring information is collected manually on paper or electronically, a database to store this information will be developed at the Forest Service's national data center. Funding for initiating database development was approved in 2010, and database completion is expected in fiscal year 2011. In addition to storing monitoring data, the database will be linked to GIS and will be capable of storing digital photographs taken during BMP monitoring. The final step in the database management will be the development of software programs that can generate reports summarizing BMP implementation and effectiveness locally, regionally, or nationally.

THE FUTURE OF NATIONAL BMP MONITORING

Water is one of the most important natural resources produced by National Forests and Grasslands. The Forest Service is emphasizing forest restoration to increase the resiliency of watersheds to climate change and other disturbances. Restoration means managing forests and grasslands first and foremost to protect water resources to provide sustainable flows of abundant clean water; the use of BMPs when implementing ground-disturbing management activities is central to restoring and maintaining healthy watersheds and diverse habitats. Once in place, the National BMP Program will help the agency apply BMPs more consistently and adjust management practices based on BMP implementation and effectiveness monitoring results.