
BEST MANAGEMENT PRACTICES

INTRODUCTION

The Forest Service water quality maintenance and improvement measures, called Best Management Practices (BMP), were developed in compliance with Section 208 of the Federal Clean Water Act, PL92-500, as amended. After a lengthy development and public review process from 1977 to 1979, the practices developed by the Forest Service were certified by the State Water Resources Control Board and approved by EPA. The signing of a 1981 Management Agency Agreement (MAA) resulted in the formal designation of the Forest Service as the water quality management agency for the public domain lands it administers. The BMPs are the measures both the State and Federal water quality regulatory agencies expect the Forest Service to implement to meet water quality objectives and to maintain and improve water quality.

There are currently 99 practices documented, 96 of which are certified and approved as BMPs. The three remaining practices are still being improved before referral to the State and EPA for certification and approval. In a like manner, work continues on developing new management practices and evaluating the effectiveness of the existing BMPs.

Due to the dynamic nature of management practice development and refinement, the original Forest Service publication documenting BMPs is continually being updated. The current publication reference is Water Quality Management for National Forest System Lands in California, U.S. Forest Service, Pacific Southwest Region publication, 1979. This publication is hereby incorporated by reference into this document. Work is underway to republish the updated version of this text as a Soil and Water Conservation Handbook.

Water quality management is administered on National Forest System lands through the continued implementation of BMPs and through the guidance of a 1981 Management Agency Agreement with the State of California Water Resources Control Board.

IMPLEMENTATION PROCESS

Forest Plans are broad-level planning documents that encompass the entire Forest and a multitude of different management activities. Due to the physical-biological diversity of any given National Forest (different soils, vegetation, slopes, presence of surface water, etc.) and the mixture of activities that can occur on various portions of the Forest, site specific methods and techniques for implementing BMP's are not identified at the Forest planning level.

For each individual project that is initiated to implement the Forest Plan, a separate site-specific environmental assessment is conducted. The appropriate BMPs necessary to protect or improve water quality and the methods and techniques of implementing the BMPs are identified at the time of this on-site, project-specific assessment. In this manner, the methods and techniques can be tailored to fit the specific physical/biological environment as well as the proposed project activities.

There are commonly many methods available for implementing a BMP, and not all are applicable to every site. An example is BMP 2.7, Control of Road Drainage. This BMP dictates that roads will be correctly drained to disperse water runoff to minimize the erosive effects of concentrated water. There are many ways to drain a road correctly: outslope the road surface, install water bars, install French drains, inslope the road surface, install culverts, etc. The appropriate method, or combination of methods, to correctly drain the road are identified during the on-site environmental assessment of a specific road construction project proposal.

After the methods and techniques of implementing the appropriate BMPs are identified, they are discussed by the project interdisciplinary team. As a result of discussions, the appropriate mix of implementation methods and techniques are selected and incorporated into the environmental document as required mitigation measures. These mitigation measures are then carried forward into project plans and implementation documents (such as contract language,

design specifications) to assure they are part of the project work accomplished.

Implementation on the ground is assured by the Forest Service official responsible for on-site administration of the project. Supervisory quality control of BMP implementation is attained through review of environmental assessments and contracts, field reviews of projects and monitoring the quality of the water in the project area when warranted.

BEST MANAGEMENT PRACTICES

The 99 current practices are identified in 8 different resource categories. Listed below are the section titles from these 99 practices. For a more complete discussion of the actual practices, refer to the [Water Quality Management for National Forest System Lands in California](#), 1979.

TIMBER

- 1.1 Timber Sale Planning Process
- 1.2 Timber Harvest Unit Design
- 1.3 Use of Erosion Hazard Rating for Timber Harvest Unit Design
- 1.4 Use of Sale Area Maps for Designating Water Quality Protection Needs
- 1.5 Limiting Operating Period for Timber Sale Activities
- 1.6 Protection of Unstable Areas
- 1.7 Prescribing the Size and Shape of Clearcuts
- 1.8 Streamside Management Zone Designation
- 1.9 Determining Tractor Loggable Ground
- 1.10 Tractor Skidding Design
- 1.11 Suspended Log Yarding in Timber Harvesting
- 1.12 Log Landing Location
- 1.13 Erosion Prevention and Control Measures During Timber Sale Operations
- 1.14 Special Erosion Prevention Measures on Disturbed Land
- 1.15 Revegetation of Areas Disturbed by Harvest Activities
- 1.16 Log Landing Erosion Prevention and Control
- 1.17 Erosion Control on Skid Trails
- 1.18 Meadow Protection During Timber Harvesting
- 1.19 Stream Course Protection
- 1.20 Erosion Control Structure Maintenance
- 1.21 Acceptance of Timber Sale Erosion Control Measures Before Sales Closure
- 1.22 Slash Treatment in Sensitive Areas
- 1.23 Five-Year Reforestation Requirement
- 1.24 Non-Recurring "C" Provisions That Can be Used for Water Quality Protection

- 1.25 Modification of the Timber Sale Contract

ROAD AND BUILDING SITE CONSTRUCTION

- 2.1 General Guidelines for the Location and Design of Roads
- 2.2 Erosion Control Plan
- 2.3 Timing of Construction Activities
- 2.4 Road Slope Stabilization (Prevention)
- 2.5 Road Slope Stabilization (Administrative)
- 2.6 Dispersion of Subsurface Drainage from Cut and Fill Slopes
- 2.7 Control of Road Drainage
- 2.8 Constraints Related to Pioneer Road Construction
- 2.9 Timely Erosion Control Measures to Incomplete Road and Stream Course Projects
- 2.10 Construction of Stable Embankments
- 2.11 Minimization of Sidecast Material
- 2.12 Servicing and Refueling Equipment
- 2.13 Control of Construction in Streamside Management Zone
- 2.14 Controlling In-Channel Excavation
- 2.15 Diversion of Flows Around Construction Sites
- 2.16 Stream Crossings on Temporary Roads
- 2.17 Bridge and Culvert Installation
- 2.18 Regulation of Streamside Gravel
- 2.19 Disposal of Right-Of-Way and Roadside Debris
- 2.20 Specifying Riprap Composition
- 2.21 Water Source Development Consistent with Water Quality Protection
- 2.22 Maintenance of Roads
- 2.23 Road Surface Treatment to Prevent Loss of Material
- 2.24 Traffic Control During Wet Periods
- 2.25 Snow Removal Controls to Avoid Resource Damage
- 2.26 Closure or Obliteration of Temporary Roads
- 2.27 Restoration of Borrow Pits and Quarries
- 2.28 Surface Erosion Control at Facility Sites

MINING

- 3.1* Administering Terms of the U.S. Mining Laws (Act of May 10, 1872) for Mineral Exploration and Extraction on National Forest System Lands
- 3.2 Administering Terms of BLM Issued Permits or Leases for Mineral Exploration and Extraction on National Forest System Lands

- 3.3 Administering Common Variety Mineral Removal Permits

- 5.13 Streamside and Wet Area Protection Zone During Pesticide Spraying
- 5.14 Controlling Pesticide Drift During Spray Application

RECREATION

- 4.1 Sampling and Surveillance of Designated Swimming Sites
- 4.2 On-Site Multi-Disciplinary Sanitary Surveys will be Conducted
- 4.3 Provide Safe Drinking Water Supplies
- 4.4 Documentation of Water Quality Data
- 4.5 Control of Sanitation Facilities
- 4.6 Control of Refuse Disposal
- 4.7 Assuring that Organizational Camps Have Proper Sanitation and Water Supply Facilities
- 4.8 Water Quality Monitoring of Off-Road Vehicle Use According to a Developed Plan
- 4.9 Sanitation at Hydrants and Water Faucets within Developed Recreation Sites
- 4.10 Protection of Water Quality Within Developed and Dispersed Recreation Areas
- 4.11 Location of Park and Riding Stock Facilities in Wilderness, Primitive, and Wilderness Study Areas

FIRE SUPPRESSION & FUELS MANAGEMENT

- 6.1 Fire and Fuel Management Activities
- 6.2 Consideration of Water Quality in Formulating Fire Prescriptions
- 6.3 Protection of Water Quality from Prescribed Burning Effects
- 6.4 Minimizing Watershed Damage from Fire Suppression Efforts
- 6.5 Repair or Stabilization of Fire Suppression Related Watershed Damage
- 6.6 Emergency Rehabilitation of Watersheds Following Wildlife

VEGETATIVE MANIPULATION

- 5.1 Seed Drilling on the Contour
- 5.2 Slope Limitations for Tractor Operations
- 5.3 Tractor Operation Excluded from Wetlands and Meadows
- 5.4 Revegetation of Surface Disturbed Areas
- 5.5* Tractor Windrowing on the Contour
- 5.6 Soil Moisture Limitations for Tractor Operations
- 5.7 Contour Disking
- 5.8 Pesticide Use Planning Process
- 5.9 Apply Pesticide According to Label Directions
- 5.10 Pesticide Application Monitoring and Evaluation
- 5.11 Pesticide Spill Contingency Plan
- 5.12 Cleaning and Disposal of Pesticide Containers and Equipment

WATERSHED MANAGEMENT

- 7.1 Watershed Restoration
- 7.2 Conduct Flood Plain Hazard Analysis and Evaluation
- 7.3 Protection of Wetlands
- 7.4 Oil and Hazardous Substance Spill Contingency Plan
- 7.5 Control of Activities under Special Use Permits
- 7.6 Water Quality Monitoring
- 7.7 Management by Closure to Use
- 7.8* Cumulative Off-site Watershed Effects

GRAZING

- 8.1 Range Analysis, Allotment Management Plans, Grazing Permit System, and Permittee Operating Plan
- 8.2 Controlling Livestock Numbers and Season of Use
- 8.3 Controlling Livestock Distribution within Allotments
- 8.4 Rangeland Improvements

Source: USDA. 1979. Water Quality Management for National Forest System Lands in California (Best Management Practices). Forest Service, Pacific Southwest Region, San Francisco, CA.

* These are the three practices that have not been recommended for certification and approval as BMPs at this time.

BMP EVALUATION PROGRAM

Best Management Practices are a continuous loop of implementation, monitoring, and refinement. The Clean Water Act requires that BMPs be an iterative process. After initial development and implementation, BMPs must be monitored for implementation and effectiveness, then modified to improve their efficacy, then monitored again. BMPs are a loop, and there is no endpoint.

A system for BMP evaluation was initiated in May of 1993 and is currently being implemented throughout Region 5. The system provides detailed information on both implementation of BMPs and BMP effectiveness.

The monitoring system is called the Region 5 Best Management Practices Evaluation Program (BMPEP). The Six Rivers National Forest is implementing this regional system as a means of monitoring both the implementation and effectiveness of BMPs. The number and kinds of evaluations done each year is established by the Forest and Regional Office, and this attempts to develop a sample of the types of activities conducted by the Six Rivers National Forest.

The objectives of the BMP Evaluation Program are to:

1. Assess the degree of implementation of BMPs.
2. Determine which BMPs are effective
Determine which BMPs need improvement or development.
3. Fulfill Forest Land and Resource Management Plan BMP monitoring commitments Provide a record of performance for management of nonpoint source pollution in Region 5

Many people were consulted in 1989 and 1990 to determine what the BMPEP should include. Contributing were representatives from many of the Forests in California, EPA, State and Regional Water Quality Control Boards, Universities, Industry and Environmental Groups. Proposals were field tested in 1989, and again in 1990 on nine Forests representing the wide range of environmental conditions and management emphasis that exist on California's National Forests.

The procedures went through many revisions, based on the results of field testing and comments from people who did the test evaluations. The procedures are

refined to the point where they produce reproducible results based on readily collected information.

The BMPEP has three primary components: Administrative Evaluations, On-Site Evaluations, and In-Channel Evaluations.

Administrative Evaluations are broad-scale subjective assessments of multiple BMPs at the project level. There are six different evaluations (Timber Sales and Roads, Grazing, Prescribed Fire, Mining, Activities Under Special Use Permit, and Watershed Restoration).

These evaluations are used to assess administrative or process BMPs such as the Timber Sale Planning Process as well as structural or physical practices. The evaluations are post-implementation assessments conducted by teams of reviewers to document observations on BMP implementation and effectiveness. They will usually be incorporated into general project or activity reviews. Though such reviews have long been a part of Forest operations, the evaluations provide a focus and documentation format to better capture and preserve information on BMPs.

On-Site Evaluations provide a means to gather objective data at the site of BMP implementation for specific practices. The evaluations are based on actual measurements of key criteria (groundcover, canopy closure, etc.) and ocular estimates (presence or absence of rills, presence or absence of debris at culvert inlets, etc.). Criteria were selected that related to the objective of the individual BMP, and field tested and refined to yield repeatable results by independent observers. There are 28 different On-Site Evaluation Procedures; each assesses an individual or closely related BMP. For instance, two BMPs govern water quality protection on timber skid trails; they are assessed in one procedure. On-Site Evaluations assess timber harvest, roads, recreation, minerals, fire, range and vegetation management practices. An detailed assessment of BMP implementation is also conducted. Rating implementation involves a review of project plans, environmental assessments and the actual practices on-the-ground to gauge how well the implemented practices match what was planned. Evaluations from randomly selected sites will be used to test effectiveness of BMPs. For this analysis, differences in effectiveness ratings between sites where practices were and were not implemented will be compared. Evaluations will also be conducted at additional sites pre-selected because of their sensitivity, public interest, or management interest.

All results are stored in a relational database, developed in ORACLE, for ready retrieval and query at both the Forest and Regional level (BMP-DB).

In-Channel Evaluations are measurements of selected parameters to assess the cumulative downstream result of project BMPs in protecting beneficial uses. These evaluations monitor condition or change in parameters indicative of the physical, chemical or biological nature of a stream channel. Parameters selected will be indicators of the beneficial use most sensitive to change as a result of upstream/upslope land management. If drinking water is the use of concern, then turbidity or microbiological sampling might be used. If fisheries are the use of concern, parameters might include changes in residual pool volume or substrate composition. Each In-Channel Evaluation is described in a Monitoring Plan that will detail the selected parameters and data collection requirements, analytical techniques, and the hypothesis to be tested. Each Monitoring Plan will be peer-reviewed. Comparisons will most frequently be between stream reaches above and below the project, though comparisons between watersheds will also be used. The Six Rivers National Forest is currently conducting

a paired watershed study for this component of the program, that is evaluating the effects of timber harvest and roading, using BMPs, on suspended sediment and turbidity for two small streams tributary to the Mad River.

Each BMPEP component outlines steps to be taken in the event that poor implementation or effectiveness are observed.

A Users Guide that details all procedures, provides blank evaluation forms, and documents the storage and retrieval system is available: Investigating Water Quality in the Pacific Southwest Region: Best Management Practices Evaluation Program: A Users Guide. May 1992. USDA-Forest Service, Pacific Southwest Region. 362 pages.