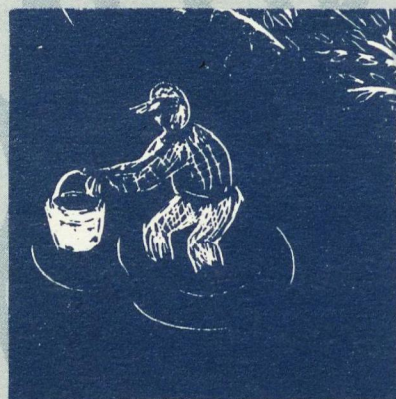
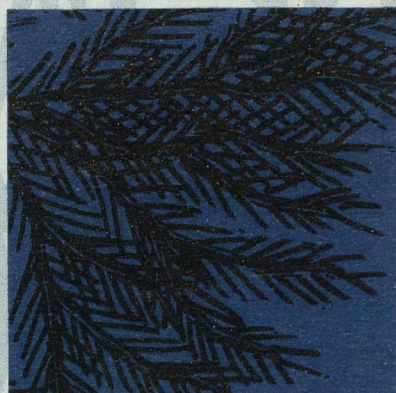


Land Manager's Guide to Water Quality Monitoring





WHAT IS WATER QUALITY MONITORING?

IT'S GOOD BUSINESS.

Land managers are often caught in a crossfire of conflicting interests. On one side are the laws that require safe, environmentally sound management practices to protect fish, wildlife and water quality. On the other side are the fundamental laws of supply and demand— and increased competition among interest groups for forest products and other natural resources.

To succeed, land managers must implement cost-effective and efficient operations that are environmentally sound. Land managers in the Pacific Northwest and Alaska are now expected and, in some cases, *required by law* to fully integrate **monitoring and evaluation** into their resource management programs.

Through monitoring and evaluation, land managers can determine how well an activity is meeting resource management objectives— for example, the protection of fisheries, drinking water or other beneficial uses. Information from monitoring can provide insights about the effectiveness of planning and implementation efforts, trigger corrective action on current activities and dictate adjustments to

future projects. Monitoring information can help land managers set priorities, define the full range of management options and determine the most cost-effective prescriptions. In short, monitoring and evaluation are good business.

By evaluating information from monitoring, managers can determine:

If land management activities **comply** with state and tribal water quality standards, forest practice rules or other regulations.

If best management practices (BMPs) have been **implemented** as planned.

If existing BMPs are **effective**, if they need to be modified, or if new BMPs should be developed in order to meet management goals.

If **trends** indicate that water quality or other resource conditions are improving or being degraded over time.

If assumptions about direct, indirect and cumulative effects of management activities on resources are **valid**.

Note: Monitoring is not mitigation. Monitoring is a tool to measure your success and make adjustments to your mitigation practices.



WHO BENEFITS FROM MONITORING AND EVALUATION?

EVERYONE.

Rivers, streams and other aquatic resources are shared by everyone who works, lives in or visits the Pacific Northwest and Alaska. To protect and restore these important resources, Congress has amended the federal Clean Water Act to emphasize control of nonpoint source pollution. With this new focus, management activities with the potential to produce nonpoint source pollution are coming under increased scrutiny. States are receiving guidance and financial assistance from the U.S. Environ-

mental Protection Agency to develop standards, management techniques and enforcement mechanisms for management activities that protect public resources. Included in these improved standards and mechanisms are requirements for water quality and aquatic habitat monitoring. It's likely that future amendments of the Clean Water Act will call for even more aggressive steps to control nonpoint source pollution.

OUR WATERSHEDS.

The fate of our forests and other natural resources is linked to the health of our rivers, lakes and streams. Water quality monitoring is the best way to measure the effects

of land management activities on these aquatic resources. With information from monitoring, land managers can take action to better protect and improve our watersheds and their beneficial uses.

OURSELVES.

When many of us chose careers in resource management, we made a commitment to scientifically manage and conserve the land. Guided by information from well-directed monitoring efforts, land managers can make resource decisions that further this commitment to land stewardship. Everybody benefits— especially ourselves.

Who's in Charge?

State water quality agencies are responsible for implementing the Clean Water Act. These agencies have designated land management agencies (such as the USDA-Forest Service or state departments of lands) to assist in the Act's implementation. With water quality issues, the designated agencies are directly accountable to the state for their performance. The U.S. Environmental Protection Agency offers assistance and oversees each state's implementation of the Clean Water Act.



HOW DOES IT WORK?

START WITH A PLAN.

Monitoring, like any other management activity, should begin with a plan. The first step in developing a monitoring plan is to formulate a set of **clearly defined objectives**. Cast from the questions that you want to answer, these objectives should be identified by land managers in consultation with technical staff.

For instance, a manager may want to determine the effects of forest practices on fish habitat in a watershed. From this rather broad objective, a series of specific objectives can be drafted by technical staff in consultation with the land manager. Technical staff can then decide which monitoring techniques will provide data to answer the

manager's questions. Often these techniques will include monitoring up on the slopes as well as in streams— giving managers a more complete picture of land-based activities and their effects on aquatic resources. Monitoring techniques can involve a wide range of chemical, physical or biological parameters. In-stream techniques could range from traditional water column chemistry to the evaluation of physical features of aquatic habitat. Monitoring on the slope might range from photo points to the measurement of erosion rates from a disturbed area.

A monitoring plan should clearly identify the staff responsible for each task. The plan should also

define the milestones and products (such as progress reports) for various phases of the monitoring project. To support all of these activities, include monitoring as a regular part of the project cost when you prepare program budgets.

A WELL-CRAFTED MONITORING PLAN IS...

Understandable

Don't hesitate to ask questions. If you are unsure about part of the monitoring plan, then it's a good bet the confusion is shared by others. Have technical staff clarify the plan before work begins. Otherwise the monitoring effort could fail to address your management needs.

Efficient

Avoid monitoring for monitoring's sake— it's a waste of your time and money. A water quality monitoring project should be focused toward the specific management issues you are facing. Each monitoring activity should relate directly to one of the objectives you've established. Don't take a "shotgun" approach to monitoring. Instead, choose a few key monitoring parameters and focus on them.

Affordable

Answering some questions or obtaining certain levels of accuracy



in monitoring results may be time-consuming and costly. However, an appropriate monitoring project doesn't have to be expensive. Often, monitoring costs can be held down by clearly defining water quality questions and choosing techniques and parameters that are appropriate to those questions. Avoid selecting "cheap" measurements and monitoring designs that provide inconclusive results. Coordinate monitoring projects with other agencies and groups to avoid any duplication of effort.

Accessible

Demand that your technical staff develop a system (based on watersheds) to store and retrieve data, reports and other information. This will ensure that monitoring information can be put to good use, that new information can be added, and that information can be shared with other agencies and groups.

STAY INVOLVED.

Don't leave monitoring and evaluation solely to the technical staff. A land manager's input will make monitoring a more focused, efficient and worthwhile activity. Make periodic checks on progress—just like you would any other project. Sometimes these checks on progress may inform managers and staff that adjustments are needed to meet monitoring objectives.

Identify Management Questions



Develop Monitoring Objectives



Define Monitoring Parameters & Procedures



Collect Data



Analyze and Evaluate Data Relative to Monitoring Objectives



Report on Results



Management Recommendations and Follow-up

By following each step of the monitoring planning process, land managers can recognize problems and take action to control nonpoint source pollution.



DEMAND A REPORT.

Too many water quality monitoring projects are abandoned before the job is done. That is, data may have been collected and summarized, but rarely is this information evaluated and presented to management with recommendations in a final report.

Without the final monitoring report, your questions about management activities and their effects on aquatic resources are likely to remain unanswered. As a result, you may not have information for making subsequent resource decisions. You may even need to repeat a similar monitoring effort at a later date.

For these reasons, it should be made clear at the start of each project that the end product of the monitoring effort is the final report. Make sure that technical staff understand that their work will be judged by the quality of this document—not by the data they collect. Require that interim or annual reports be produced for monitoring efforts that need progress checks, especially for long-term trend monitoring projects.

The final report should do more than present the data. It should clearly explain what was learned by interpreting the data from the monitoring project. The report should also contain specific recommendations on actions to be taken in response to the monitoring results. Occasionally, monitoring results may indicate that no actions need to be taken—or that activities other than yours are contributing to the nonpoint source pollution problem in the watershed.

The final report should focus on recommendations to management. It should include:

Summary of primary results and their importance to management.

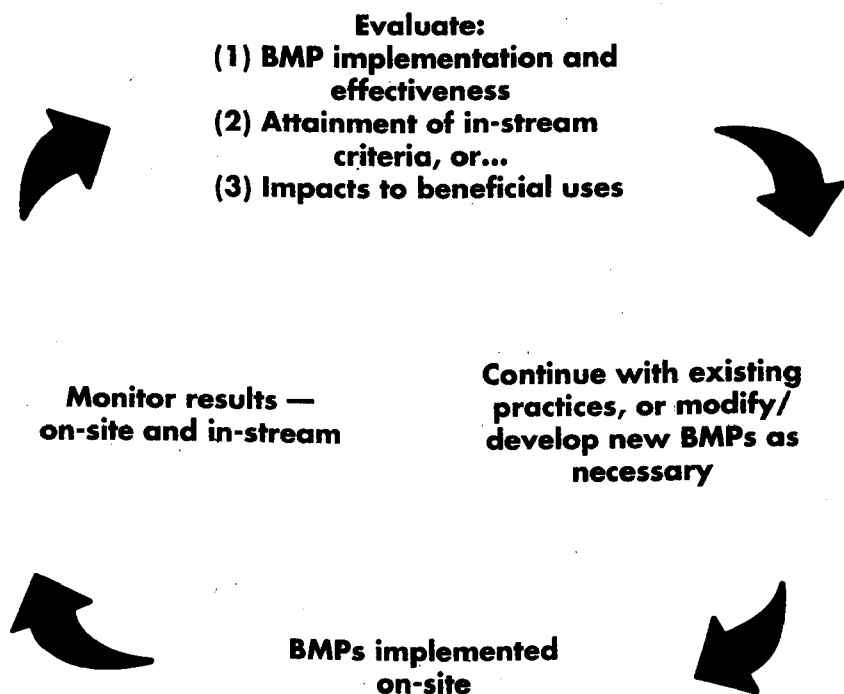
Management questions and corresponding **monitoring objectives**.

Methods used to collect, interpret and store data.

Summary and interpretation of

data, focusing on their significance and relationship to the monitoring objectives.

Recommendations for management, identifying needed changes in management practices, adjustments to monitoring and new management questions that should be addressed by monitoring.



Incorporated into the monitoring plan, a feedback loop can help managers evaluate and improve management activities.

PUT THE REPORT TO GOOD USE.

You've received the final monitoring report — now it's time to make this new information work for you. Use the report's conclusions to make or confirm management decisions, to improve existing management activities or to congratulate workers for a job well done. But don't stop there — use what you've learned to make improvements to future projects.

Share what you've learned with other land managers, who will use your findings to fine tune their own management practices. Share this information with the staff of state and tribal water-quality agencies, who need your assistance to assess the condition of aquatic resources and gauge compliance with water quality standards.

Be creative in your use of the findings of the report. Be satisfied only if the feedback and follow-up based on the monitoring results demonstrate your commitment to quality resource management.

Feedback in Action:

Management Question - "Can sediment delivery to Deer Creek from a segment of new road be reduced to an acceptable level?"

Monitoring Objective - "To evaluate the effectiveness of proposed BMPs in reducing sediment delivery from this new road segment."

Monitoring Results - "BMPs effectively reduced sediment delivery to within the identified

level, with slash filter windrow providing the greatest benefit; however, efforts to reestablish vegetation on the fill slopes were not successful, due to poor survival of the grass seed mix."

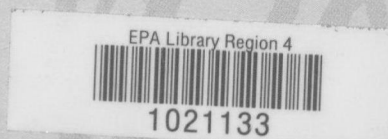
Management Improvement - "Use similar BMP package at future sites, with emphasis on slash filter windrows. Modify grass seed mix to favor hardier species."



For more information on water quality monitoring and evaluation, contact the NPS Program Coordinator...

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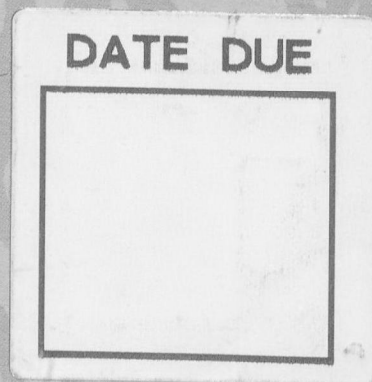
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Specific guidance on designing monitoring projects and selecting monitoring parameters can be found in the following free publication, available from the U. S. Environmental Protection Agency's Region 10 office in Seattle:

MacDonald, Lee H, A.W. Smart and R.C. Wissmar, 1991. *Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska*. (EPA/910/9-91-001) Environmental Protection Agency, Region 10, in cooperation with the Center for Streamside Studies, University of Washington, Seattle, WA. 176 pp.