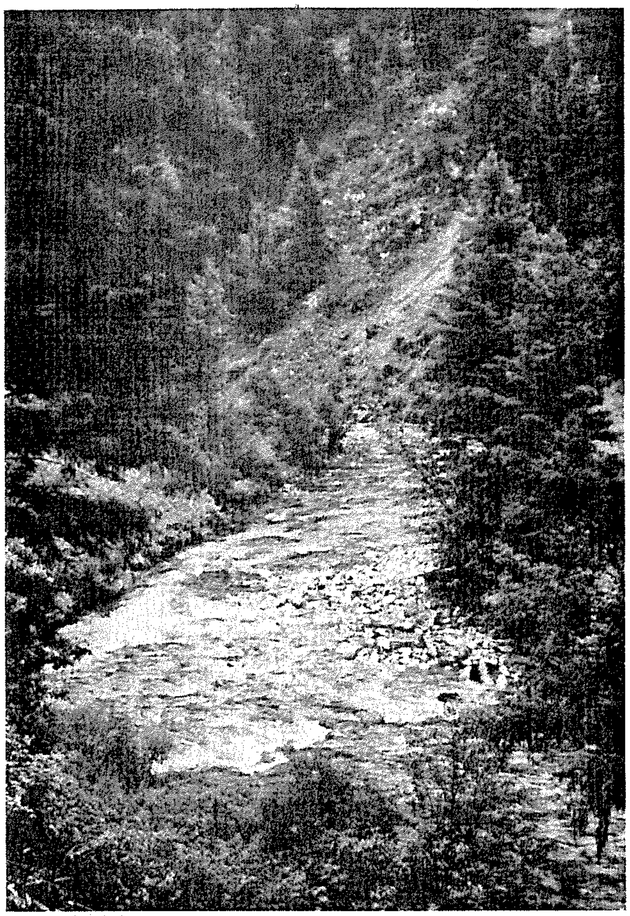

# Coordinated Nonpoint Source Water Quality Monitoring Program For Idaho

William H. Clark

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Health & Welfare
Division of
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450 West State Street
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In cooperation with the Nonpoint
Source Monitoring Technical
Advisory Committee

January 31, 1990

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## ABSTRACT

In August 1988 an Antidegradation Agreement for Idaho was finalized after months of negotiations between agricultural, timber, and mining interests, Indian tribes, sportsmen, and the conservation community. The key provisions of this landmark agreement are Basin Area Meetings will be held biennially across the state to discuss water quality and to allow citizens to nominate stream segments of concern; establishment of a coordinated monitoring program; and a process for designating outstanding resource waters.

This document was developed by an eight member technical advisory committee to meet the second provision of the agreement, establishment of a coordinated monitoring program. Its broad objective is to maximize water quality data collection efforts in Idaho by providing a standard monitoring format that all can follow, by eliminating duplication of monitoring effort and development of a shared common surface water quality database. The program will require cooperation by all involved with water quality monitoring in Idaho.

This document describes Basin and Watershed Trend Monitoring; Beneficial Use Monitoring; and Best Management Practice (BMP) Effectiveness Monitoring. The program addresses the three main nonpoint source activities in Idaho: agriculture, forestry, and mining. For each of these activities an introduction and objectives section is included, as well as a description of the current program and a description of the recommended program. The monitoring program described here addresses trends in major river basins and watersheds, beneficial use support status, and best management practice effectiveness. A listing of appropriate parameters and protocols is included for reference. A checklist of major items to be included in a nonpoint source water quality monitoring plan is included as a practical guide to plan preparation.

# INTRODUCTION

Nonpoint source (NPS) pollution is caused by diffuse sources that are not regulated as point sources and normally is associated with agricultural, silvicultural and urban runoff, and runoff from construction activities.

Such pollution results in human-induced alteration of the chemical, physical, biological, and radiological integrity of water. In practical terms, nonpoint source pollution does not result from a discharge at a specific, single location (such as a single pipe) but generally results from land runoff, precipitation, atmospheric deposition, or percolation. Pollution from nonpoint sources occurs when the rate at which pollutant materials entering waterbodies or groundwater exceeds natural levels (U.S. Environmental Protection Agency 1987).

The Idaho Antidegradation Policy signed by Governor Cecil D. Andrus on November 14, 1988 (Office of the Governor 1988) directs the development of a coordinated water quality monitoring plan. This plan was developed to direct such monitoring for the state and provide a means to coordinate existing water quality monitoring.

There are three other provisions in the Antidegradation Agreement: 1) A process for nomination, approval, and listing of outstanding resource waters. 2) Establish lead agencies to implement the antidegradation policy were established for mining, timber, and agriculture. Best management practices would remain the primary method to protect water quality from NPS pollution and their effectiveness would be documented by monitoring. 3) Conduct biennial Basin Area Meetings (BAMs) in six hydrologic regions of Idaho to discuss the current status of water quality, fish habitat and trends in their conditions.

The public will have the opportunity to nominate stream segments of concern at these meetings. The stream segments of concern will help management agencies set priorities for their water quality monitoring resources.

The literature concerning nonpoint source pollution monitoring is growing (see Dressing 1987 and U.S. Environmental Protection Agency 1988a for recent examples) but no monitoring plan was available for Idaho. This monitoring plan is intended to be used by agencies, industry, and any other entities in the state of Idaho planning to monitor nonpoint source pollution. This document is intended to provide general guidance for planning water quality monitoring activities in the state of Idaho. IDHW will revise this document, as needed, every two years during the years that the Basin Area Meetings are held and Stream Segments of Concern are chosen. Any suggestions for improvement of this document should be sent in writing to IDHW-DEQ, Boise, Idaho.

## CLEAN WATER ACT AND FEDERAL REQUIREMENTS REGARDING ANTIDEGRADATION

The recent (1948-1987) Federal "Clean Water Pollution Control Legislation" consists of 21 public laws (Water Pollution Control Federation 1987). Probably the dominant legislation concerning water quality in the United States was the Federal Water Pollution Control Act Amendments of 1972. This is often termed the "Clean Water Act". The major sections of the act and subsequent amendments pertaining to nonpoint source pollution and the various sections are listed below:

Section 208: This section created areawide waste treatment programs to address point and nonpoint source pollution within areas delineated by a state or group of communities. This was an active area of work from 1972 until 1980.

Section 313: The Federal Facilities Pollution Control section states that all parts of the Federal Government shall comply with all federal, state, interstate, and local requirements.

Section 314: The Federal Clean Lakes Program has been the major source of funding for lake management activities in Idaho. It requires states to identify and classify the trophic condition of lakes, describe the control of sources of pollution to such lakes, and to describe methods for lake restoration.

Section 319: This is the most recent section of significance to nonpoint source pollution and is one of the 1987 amendments to the Act. This section required each state to assess nonpoint sources of pollution within its boundaries. It combines much of what has been learned about nonpoint sources and their control in the last 17 years.

States are directed to inventory waters within their jurisdiction that fail to meet water quality standards because of nonpoint source pollution. Then they must present EPA with a plan (Nonpoint Source Management Program Plan) for controlling nonpoint sources and a schedule for implementation. Idaho's plan was approved by EPA in December 1989. Application for funding to implement the plan has been made to EPA.

## DEVELOPMENT OF ANTIDEGRADATION POLICY FOR IDAHO - AGREEMENT DETAILS

The main provisions of the policy (as described in U.S. Environmental Protection Agency 1985) are listed below:

1. "Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected."

2. "Where the quality of the waters exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water, that quality shall be maintained and protected unless the state finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the state's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the state shall assure water quality adequate to protect existing uses fully. Further, the state shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for nonpoint source control."

3. "Where high quality waters constitute an outstanding national resource, such as waters of national and state parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected."

Central to the state's Antidegradation policy and the application of monitoring programs is the identification of stream segments of concern; that is, stream segments in which the public has expressed a significant interest, and a concern for protection and management. Idaho's regulations define a "stream segment of concern" as a specific stream segment or body of water that has been published in a final basin area report, and subsequently listed every two years as an addendum to the state's water quality standards.

The Idaho Antidegradation Policy incorporates the concept of lead agencies as one of its provisions. The designated lead agency is responsible for coordinating activities and developing the programs necessary to manage those areas under its jurisdiction. The intent of this provision is to improve coordination between the various state and federal agencies involved with resource management and thereby minimize duplication of effort to the greatest degree practicable and improve program efficiency.

Three lead agencies are named in the policy:

- The **Idaho Department of Health and Welfare** is named as the lead state agency for developing a state-wide water quality monitoring program. IDHW is responsible for the coordination of monitoring (instream sampling and data evaluation) programs, development of instream criteria, evaluation of impacts to beneficial uses (Feedback Loop), and administration of the state water quality standards. IDHW was also directed to hold Basin Area Meetings and establish procedures for recommending Outstanding Resource Waters to the Legislature.

- The **Idaho Department of Lands** is named as the lead state agency in implementing the antidegradation policy for surface mining, dredge and placer mining, and forestry practices. IDL approves mining BMPs, conducts onsite audits at mine sites and operations (implementation and compliance monitoring), and requires improvements or changes in BMPs by operators if found necessary by audit or instream sampling results (Feedback Loop).

- The **Idaho Soil Conservation Commission** (SCC) is named as the lead state agency for agricultural practices through the soil conservation districts (SCDs). The SCC and Soil Conservation Districts will design BMPs that meet Idaho's water quality standards and protect beneficial uses. If water quality standards are not met, changes in the BMPs can be made (Feedback Loop) so that beneficial uses are protected.

The lead agency (IDHW) has the responsibility to enter into Memoranda Of Understanding describing how interagency activities will be coordinated and tasks assigned concerning monitoring. This will include federal consistency provisions where federal agencies are involved. The lead agency is obligated to consult with all the agencies cooperating in its designated program including those where a memorandum of understanding is not required. After appropriate input is received and considered, the lead agency has the authority to make the final decision, subject to applicable administrative procedures, so conflicting requirements are avoided and to assure that a consistent, balanced approach is implemented.

The state water quality standards (Idaho Department of Health and Welfare 1985a) are published pursuant to Section 39-105 of the Idaho Code. The Director of the Department of Health and Welfare is directed to formulate and recommend to the Board of Health and Welfare such rules and regulations and standards as may be necessary to deal with the problems related to personal health and water pollution.

The director is further charged with the supervision and administration of a system to safeguard the quality of the waters of the state including the enforcement of standards relating to the discharge of effluent into the waters of the state. Authority to adopt rules, regulations and standards as are necessary and feasible to protect the environment and health of the citizens of the state is vested in the Board of Health and Welfare pursuant to Section 39-107, Idaho Code. Federal Consistency (Section 313 Federal Clean Water Act) requires compliance with all federal, state, interstate, and local requirements.

### *Feedback loop*

The feedback loop is a process defined in the state water quality standards for managing nonpoint source pollution through implementation of best management practices. The premise of the feedback loop contained in Idaho's water quality standards is that nonpoint source control is achieved through implementation of best management practices and evaluation of effectiveness. An integrated system of BMPs are approved by the state, implemented on the ground on a site-specific basis, evaluated through monitoring, and modified as needed to achieve instream water quality standards (Figure 1).

Implementing the feedback loop process itself constitutes use of this tool or method for attempting to comply with state standards and thus protect beneficial uses. Instream criteria, which are developed to protect the beneficial uses of water, or where there are presently no criteria-impairment to beneficial uses, shich is the basis for development and modification of the best management practices. The BMPs are voluntary for some nonpoint source activities and manditory for others. The BMPs are implemented on-site. The effectiveness of the BMPs in protecting water quality is evaluated through instream water quality monitoring (step 4 (Fig. 1) in the feedback loop). This is done to evaluate the effectiveness of BMPs in protecting water quality and is integral to demonstrating compliance with nonpoint source standards. BMPs are merely a means to achieve state standards, and not standards themselves. Standards compliance requires closing the entire feedback loop, by including monitoring to ensure that water quality standards are met.

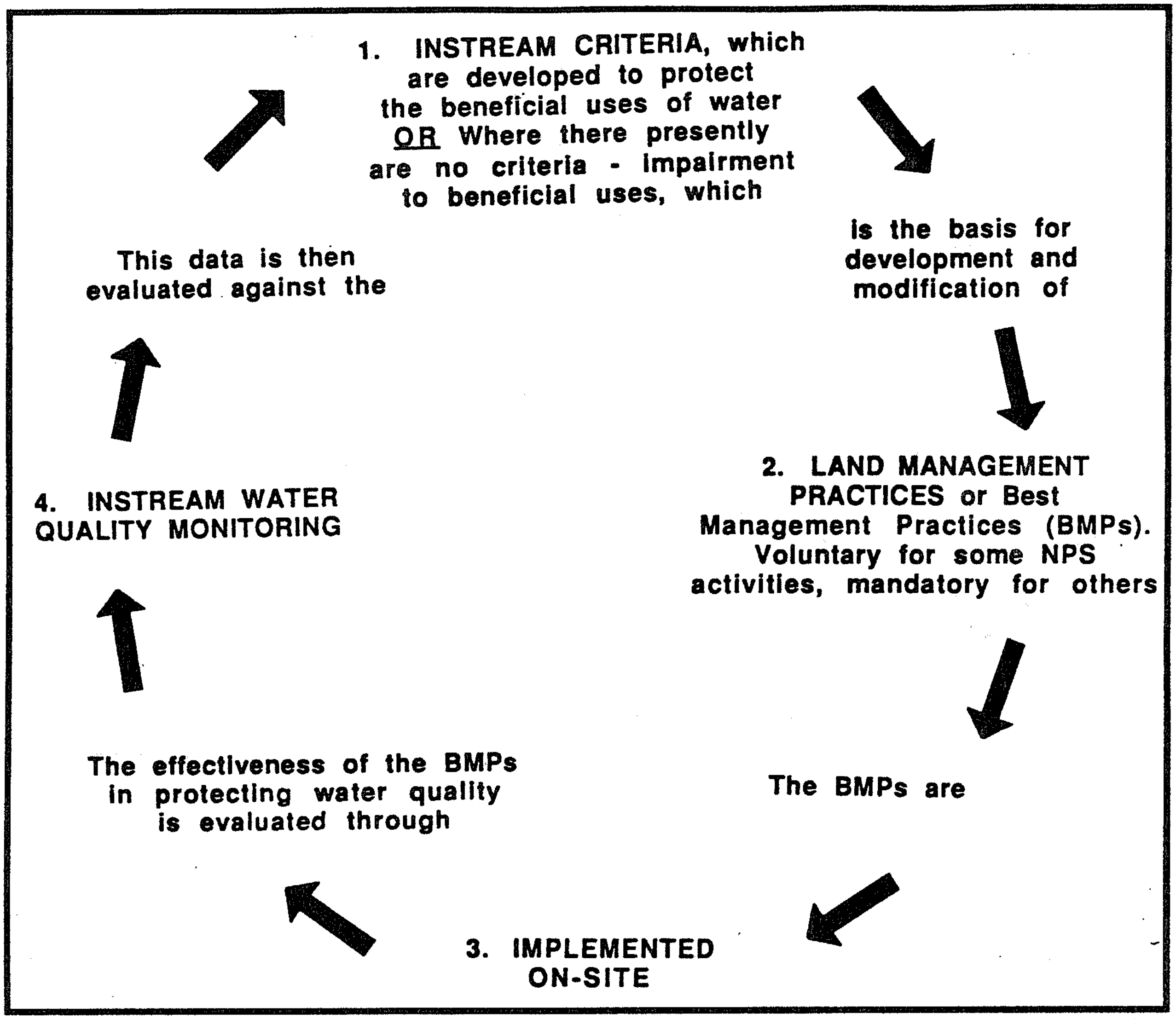


Figure 1: The feedback loop process for nonpoint source control.

### *Beneficial uses*

Beneficial uses include 1) agricultural water supply; 2) industrial water supply; 3) domestic water supply; 4) cold water biota; 5) primary contact recreational use; 6) secondary contact recreational use; 7) salmonid spawning, overwintering, emergence, and rearing; and 8) warm water biota.

These beneficial uses are intimately related to the land types associated with the segments of concern. Land management activities also are intimately linked to land type and capability. General categories of land uses are 1) mining, 2) forestry, 3) irrigated agriculture, 4) dryland agriculture, 5) range, and 6) urban.

STATE NPS MONITORING PLAN DEVELOPMENT

The general goals of the coordinated water quality monitoring plan are to provide an organized approach to the collection of data on trends, status of beneficial uses, and BMP effectiveness in meeting water quality standards and protecting existing beneficial uses. Additional goals include statewide water quality monitoring coordination and common database management.

Full implementation of the antidegradation policy requires that monitoring efforts by state, federal, tribal and private interests be compatible and be utilized in the creation of a complete statewide water quality data system.

As stated in the antidegradation agreement, monitoring in stream segments of concern shall be "significantly more intensive" than normal programs of monitoring and the monitoring program shall seek to collect activity-specific data to assure that the beneficial uses of water are fully protected, and state water quality standards are met.

Generally it is agreed that a technically sound state monitoring plan should be designed using the following criteria: a) be site-specific but also designed towards representing regional characteristics which may allow intra-regional comparison; b) include monitoring in undisturbed (or as minimally impacted as is possible) areas (either in separate watersheds or at stations above land-use activities) which are comparable to segments which have been impacted by land-use activities; c) include segments that are likely to be sensitive to impacts; d) have clearly defined goals which drive the monitoring plan process; e) be undertaken within the context of land types which include watershed, climate, ecosystems, land use, geology, and geomorphology; f) measure parameters relevant to land-use, land type, and protection of the specific downstream beneficial uses; and g) provide early warning signals prior to significant degradation to beneficial uses.

Some method for detecting an early warning signal for degradation to water quality is necessary to provide timely, objective input to the "feedback loop". This allows action to be taken (curtailment or modification of land-use activities or BMP use) to protect specific beneficial uses prior to degradation. Protection of beneficial uses is typically easier and cheaper than rehabilitation measures; further, once done, many detrimental impacts result in long recovery periods.

The Nonpoint Source Monitoring Technical Advisory Committee (or Core Group) was formed in February 1989 by the Water Quality Bureau, Division of Environmental Quality, Idaho Department of Health and Welfare. The committee consists of representatives from IDHW; Idaho Department of Fish & Game; U.S. Geological Survey; Idaho Forest Industries Council (Plum Creek Timber Co., Inc. and Potlatch Corp.); Coeur d'Alene Mines; and the Columbia River Inter-Tribal Fish Commission.

The TAC met five times during 1989 to prepare the state NPS Water Quality Monitoring Plan. Once the plan is completed and in use the TAC will meet on an irregular basis to assess progress and consider any suggested changes in the monitoring plan, changes in activities in watersheds, or planned changes in the nonpoint source monitoring of any of the involved entities.

## INTENT OF NPS MONITORING PLAN AND RELATIONSHIP OF PLAN TO OTHER WATER QUALITY PROGRAMS

### *"319" NPS Management*

The "319" program will complement and build upon the Idaho Statewide Nonpoint Source Water Quality Monitoring Program. Although many activities that will occur under 319 are similar the focus will be in areas different than antidegradation.

The "319" program has several monitoring projects identified as high priority needs: coordinate existing water quality monitoring programs; identify priority watersheds and focus monitoring efforts in those areas; develop baseline water quality monitoring network for the surface waters of Idaho; institute on-site feedback loop monitoring by IDHW staff or other company/agency staff and conduct field reviews to confirm BMP implementation; as well as groundwater concerns listed below.

### *Groundwater monitoring*

Groundwater protection and monitoring is taking on new importance. Nonpoint source "319" has set a variety of tasks for groundwater monitoring. Surface water quality monitoring conducted under this plan will be coordinated with the groundwater program. A groundwater council is being developed elsewhere to coordinate groundwater monitoring.

The Ground Water Quality Protection Act of 1989 (State Affairs Committee 1989) states that "The goal of the legislature in enacting the groundwater quality protection act of 1989 shall be to maintain the existing high quality of the state's groundwater and to satisfy existing and projected future beneficial uses including drinking water, agricultural, industrial and aquacultural water supplies. All groundwater shall be protected as a valuable public resource against unreasonable contamination or deterioration. In enacting this law, the legislature intends to prevent contamination of groundwater from point and nonpoint sources of contamination to the maximum extent practical". A groundwater quality monitoring network has been proposed for Idaho (Whitehead and Parliman 1979) and a directory of groundwater information has been prepared for Idaho (Parliman and Brower 1985).

### *Lake Management*

The Federal Clean Lakes Program (Section 314 of the Clean Water Act) funds lake restoration in two phases: 1) diagnostic/feasibility studies; and 2) implementation projects. There are currently six Clean Lakes Projects in Idaho. The lake management program will be coordinated with antidegradation monitoring to avoid duplication of effort and maximize monitoring resources. Many water quality problems in lakes are the result of nonpoint source pollution problems and can be addressed by the antidegradation process. In addition, the Basin Area Meetings may identify some lakes as "stream segments of concern" requiring additional monitoring. This monitoring will be coordinated with any ongoing study.

### *Other nonpoint source activities*

Road construction and maintenance, especially of unpaved secondary roads can be a major source of NPS pollution. This subject is covered in the section concerning forestry (pages 39-43). Best management practices are available for roads (Levinski 1982a; 1982b).

Other nonpoint source pollution types include, but are not restricted to, urban runoff and hydrologic/habitat modification including rangeland and riparian areas which are covered in detail later in the this document. Urban runoff is considered a minor nonpoint source in Idaho with less than 3% of the stream miles reported as impacted by nonpoint source activities primarily attributed to urban runoff (IDHW 1989a). Both regulatory and nonregulatory programs are needed to minimize adverse impacts to water quality from urban runoff, but at this time, there is no formal monitoring program for these nonpoint sources with the exception of rangeland/riparian.

# PROGRAM DEVELOPMENT

## EXISTING WATER QUALITY STATUS

The nonpoint source assessment for Idaho (Idaho Department of Health and Welfare 1989a) concluded that nonpoint sources have, by far, the major impact on Idaho waters. Though overall water quality remains good, 57% of these waters are impacted to some degree by nonpoint sources. Approximately 17% of the streams do not support one or more of the beneficial uses designated in the Idaho Water Quality Standards. About half of the streams only partially support one or more beneficial uses. Appendix A of the Nonpoint Source Assessment (Idaho Department of Health and Welfare 1989a) lists the stream segments, lakes, and reservoirs in Idaho which were assessed as not fully supporting a beneficial use.

## NONPOINT SOURCE IMPACT ASSESSMENT

The major activity impacting water quality in Idaho streams is agriculture, particularly grazing as it affects stream channel and riparian habitat modification. Upland agriculture, forest practices, and mining also have major impacts (Idaho Department of Health and Welfare 1989a).

Agriculture and grazing are associated with increased water temperature, sediment, nutrients, organic enrichment, pesticides, and bacterial pollution. Timber harvest, forest road development, and related activities have caused increased water temperature and stream sedimentation. Mineral extraction and smelting are related to sedimentation, heavy metals, and pH problems.

## EXISTING MONITORING PROGRAMS AND SAMPLING PARAMETERS

A statewide monitoring survey was conducted (Idaho Department of Health and Welfare 1989b) in December 1989 (see Appendix D). A number of agencies and private entities are monitoring surface water quality in Idaho, but parameters and techniques vary widely. Nineteen federal agencies, six state agencies, four local agencies, and eight private entities responded to the request for surface water quality monitoring data (Appendix D).

Statewide, most surface water monitoring of nonpoint sources has concentrated on standard chemical/physical parameters, fish habitat, fish populations, and suspended sediment/turbidity/bedload monitoring, with fewer stations monitored for nutrients, macroinvertebrates, trace metals, pesticides, radio chemicals, riparian vegetation, and coliform bacteria.

The monitoring survey is useful because it gives a cross section of monitoring being conducted in Idaho. Of special value are the sections on publications or information sources and a contact person and phone number. Appendix D should be useful to anyone planning on monitoring but needing additional information on parameters or monitoring methods.

## INTEGRATING MONITORING PROGRAMS

This aspect of the Statewide Nonpoint Source Water Quality Monitoring Program Plan is critical to its success. IDHW will store the information and coordinate with statewide surface water monitoring (see Appendix D). The section on data management (pages 17-19) describes how IDHW will act as a clearinghouse for information on water quality monitoring (including existing and new information such as site locations, parameters, and sample data), and will make that information available to all interested. This will help eliminate duplication of effort and should also provide for more cooperative monitoring between different monitoring entities. A common database will help with the coordination effort.

A system design document will cover the following: the roles of implementing agencies and memoranda of understanding content to facilitate coordination; monitoring plan review provisions; development for specific field, laboratory, and data handling protocols; development of protocols for statistical analysis of data; procedures for assembling an annual water quality resource data summary; and development of protocols for modification of the system design document is currently being drafted by IDHW.

Quality assurance is an essential component of the monitoring program. For the monitoring data to be useful and compatible, quality assurance procedures must be followed for field sampling, laboratory analyses, and data handling (refer to Data Management section, pages 17-19, for additional discussion).

## INTERAGENCY MONITORING RESPONSIBILITIES

### RESPONSIBILITIES OF IMPLEMENTING AGENCIES

All agencies collecting water quality data in the state of Idaho will coordinate such collection to avoid duplication and to maximize the monitoring efforts. Coordinated Resource Management (CRM) is a tool for coordinating resource planning, management and educational activities with local agencies, private landowners and others. CRM cooperating agencies in Idaho include the following agencies: Idaho Department of Health and Welfare; Idaho Department of Fish and Game; Idaho Department of Lands; Idaho Soil Conservation Commission; U.S. Department of Agriculture (Cooperative Extension Service, Forest Service, and Soil Conservation Service) and U.S. Department of Interior, Bureau of Land Management. A list of some of the responsibilities of those agencies is included here.

***State***

Idaho Department of Health and Welfare

- Lead agency for developing the statewide monitoring program. Develop memoranda of understanding as needed to adequately coordinate the program.
- Manage all water quality related data generated in the state.
- Conduct Basin Area Meetings.
- Institute cooperative agreement with USGS for statewide trend monitoring.
- Cooperate with IDFG to objectively assess biological/habitat conditions.
- Formally determine/designate existing beneficial uses.
- Conduct beneficial use and BMP effectiveness in-stream monitoring on stream segments of concern and other waters and audit trend monitoring.
- Cooperate with lead land management agency to provide input in development of water quality based BMPs, assess BMP effectiveness and implement feed-back loop process.
- Primary contact with EPA.
- Manage research and parameter demonstration projects for nutrients, sediment watershed inventory, and optimize sampling parameters/criteria/protocols.
- Identify and track unregulated activities of state agencies and local authorities with potential NPS impacts.
- Conduct forest practice BMP compliance audits per memoranda of understanding with Idaho Department of Lands and the U.S. Forest Service as well as for agricultural and mining once MOUs are developed. The MOUs may need to be amended.
- Final arbiter of federal consistency with state water quality standards, beneficial use protection, and the coordinated monitoring program.

Idaho Department of Lands

- Responsible for implementation of forest practice BMPs on non-federal land.
- Cooperate with lead federal land management agency to assess BMP effectiveness and implement feed-back loop process.

- Responsible for implementation of mining BMPs and for coordination with IDHW on water quality monitoring and compliance audits, including dredge and placer operations. Provide IDHW with audit results and monitoring data submitted by the operator.
- Cooperate on research and demonstration projects.
- Include BMPs and monitoring requirements in approved mine plan in addition to final reclamation elements, with due consideration of comments from Idaho Department of Fish and Game and IDHW (Water Quality Bureau, and Hazardous Materials Bureau) or other appropriate agency. Require baseline monitoring data when there is reasonable potential for nonpoint source pollution.
- Responsible for consulting with affected Indian tribes when developing BMPs, monitoring, dredge and place mining permits, and reclamation requirements for surface mine reclamation plans.

Idaho Department of Water Resources

- Responsible for implementation monitoring of BMPs and for coordination with IDHW on BMP effectiveness monitoring (feedback loop) and compliance audits for recreational dredge and placer mining.
- Responsible for administration of the Idaho Stream Protection Act.
- Contracts with USGS for discharge gauging stations; will provide this information to IDHW.

Idaho Department of Fish and Game

- Quantify baseline conditions of fisheries habitat and provide information to IDHW.
- Perform periodic/priority area fishery habitat trend monitoring. Perform or assist with fish population/community analyses to assess beneficial use support. Provide technical expertise on the habitat requirements of fish and review of mitigation measures or BMP improvements for suitability in maintaining fish habitat.

Soil Conservation Commission

- Cooperate with lead federal land management agency and IDHW to assess BMP effectiveness and implement feed-back loop process.
- Provide any water quality monitoring data collected to IDHW.
- Cooperate with IDHW to develop MOU for audits of agricultural conservation plans.

Soil Conservation Districts

- Assists in developing agricultural conservation plans and audits.
- Cooperate with lead federal land management agency to assess BMP effectiveness and implement feed-back loop process.
- Provide any water quality monitoring data collected to IDHW.

*Federal*

U.S. Geological Survey

- Conduct trend monitoring in cooperation with and provide the data to IDHW.
- Conduct discharge monitoring per agreement with IDWR.
- Provide technical support to IDHW for data base management and statistical analysis.

U.S. Forest Service

U.S.Forest Service responsibilities are outlined in the Memorandum of Understanding signed by the regional foresters of the USFS regions represented in Idaho and the Director of the Idaho Department of Health and Welfare.

- Implement the feedback loop concept including monitoring and comparison of the resulting data to criteria.
- Annually reviews a representative sample of timber-related projects and write evaluation reports which are distributed to IDHW.
- Annually provide information to IDHW on instream monitoring and evaluation efforts, research results, and evaluation of BMP effectiveness.
- Participate in the statewide Forest Practices Audit.

Bureau of Land Management

- Lead agency responsible for implementation, BMP effectiveness monitoring, and coordination of BMP effectiveness audits with IDHW on public lands for mining and grazing.
- Cooperate on research and demonstration projects. Participate in beneficial use and BMP effectiveness monitoring programs and provide data to IDHW.
- Responsible for implementing the feedback loop, with state oversight, on the lands they manage.

U.S. Environmental Protection Agency

- Provide guidance and technical support in general.
- Provide, maintain, and upgrade STORET and BIOS databases.
- Assure federal requirements met, including consistency.
- Responsible for NPDES compliance and provide data to IDHW.

Soil Conservation Service

- Provide any monitor data that becomes available to IDHW.
- Cooperate with IDHW to develop MOU for audits of agricultural conservation plans.

Bureau of Reclamation

- Conduct water quality monitoring at BOR project sites.
- Provide data to IDHW.

Tribes

- The Indian tribes represented in Idaho will conduct water quality monitoring at their project sites.
- Provide data to IDHW

## DATA MANAGEMENT

Currently federal, state and local agencies and private organizations collect chemical, physical and biological data from numerous surface and groundwater studies throughout Idaho. This data often resides in files, written reports, and customized computer data files suited for the individual agency's needs. This leads to duplication of effort and poor data exchange resulting in management decisions being made with little or no information about the resource of concern.

All agencies identified in the nonpoint water quality monitoring program which collect data from state waters must commit to a better exchange of data to reduce duplication of effort and expedite sound management decisions. To date, agencies have not optimized this essential component to be effective at monitoring nonpoint impacts. In order to achieve an interagency level of data exchange there must be some basic requirements of all data providers. These include quality assurance/quality control of data, proper methods of collection and analysis, data entered on a system compatible with all users, data must be timely, and data related to some common identifiers (i.e., latitude/longitude., river basin or station numbers). These basic requirements have recently been recommended for groundwater monitoring (U.S. Environmental Protection Agency 1988d).

In order to evaluate water quality trends, determine status of beneficial use support and assess best management practice effectiveness, it is essential that a common water data bank be created and maintained. An interagency statewide monitoring effort will be ineffective without a data management system.

Two major database systems currently being used include WATSTORE maintained by the U.S. Geological Survey and STORET which is a product of U.S. Environmental Protection Agency (EPA). WATSTORE and STORET are compatible and data can be easily exchanged. STORET, which is a national data base, provides the user with the largest selection of parameter coverage. In addition to storing water chemistry information for both surface and groundwater quality and quantity, it also will store biological and habitat data (BIOS). New parameters can also be requested to store data currently not recognized by the system. This system is compatible with the IBM and data can be downloaded to a personal computer for specific uses. This system also can consolidate data for a specific water body of interest using a unique river reach number or hydrologic unit code. For example, all data can be retrieved from BIOS, STORET and WBS (water body system) at one time for interpretation (see Appendix E). This system is also interfaced with SAS (Statistical Analysis System) to facilitate statistical and graphical data analysis.

Cataloged subroutines or "canned" programs can also be written to calculate population metrics, indices, exceedances, etc. It is recommended that STORET be utilized as the data system to manage the data generated since EPA maintains the system for users. Also, it currently has the only capabilities to provide users with the necessary parameter coverage.

### Quality Assurance

Effective quality assurance and quality control (QA/QC) procedures and a clear delineation of QA/QC responsibilities are essential to ensure the utility of environmental monitoring. These procedures must be applied throughout the study design, collection, laboratory analysis, data review (including data editing and storage), data evaluation and data reporting.

Protocols and approved methods for the field and laboratory aspects of the parameters included in this document are listed in Appendix H. A monitoring plan checklist is included in Appendix J in an attempt to standardize the basic aspects of developing individual monitoring plans. Some of the field aspects of quality assurance are discussed in Bauer (1986), Bauer et al. (1986), and Canter (1985). Chemical laboratory quality assurance is discussed in Taylor (1987). IDHW Bureau of Laboratories has recently updated its quality assurance plan (Idaho Department of Health and Welfare 1987). The U.S. Geological Survey follows Schroder et al. (1980), Janzer (1985), and Lucey and Peart (1989) for quality assurance procedures.

Quality assurance includes the quality control functions and involves a totally integrated program for ensuring the reliability of the monitoring data. Quality control refers to the routine application of procedures to achieve a level of performance standards acceptable in the monitoring process.

Probably no single component is more important to the success of a monitoring program than ensuring data integrity. This will require a screening of the data before it is input into the system. This can be accomplished by rigorous QA/QC protocol including data review by the collector, double entry of data and review of data using canned programs to detect outliers which are then flagged for the user to investigate. For example, values reported below predetermined detection limits or beyond significant figures could be flagged as suspect. The use of existing remark codes recognized by STORET with reported values must be required to insure data is accurately described.

### Documentation

To insure these basic requirements of QA/QC are met by all participating agencies there will be a need to develop agreements (MOUs) covering data entry and user support needs. MOUs currently in use are listed in Appendix I. Modification of existing MOUs and development of new ones may be necessary to completely satisfy this requirement. Interagency data management committees to serve ground and surface water interests will need to be formed to develop these agreements, draft protocols and formulate policies on QA/QC. To coordinate this effort will require someone with expertise in computers, data base management and statistics and a support staff to handle data entry, quality assurance and user assistance. IDHW as lead agency in this effort will take the necessary steps to insure that data management is given high priority in this plan and that adequate staff with proper expertise are hired.

"Paper work" errors are commonly found in the calculations, reductions and transfer of data to various forms and reports and transmittal of data into data storage systems. Documentation should be available describing calculations, procedures and handling of data. Each participating agency should have their methods documented and parameter codes assigned to each value before data is entered into STORET. Standardizing data report forms as much as possible would enhance data entry and reduce errors.

A document covering all aspects of data management including reporting formats, entry, QA/QC, user support information must be written to give consistency and direction. Assistance from EPA Region X will be needed to assist in the development of this document and the actual design and setup of the system including hardware and software needs. Requesting an EPA review of current deficiencies and remedial action should be the first step in realizing what it will require to handle a large interagency data base. Training and workshops will also be required for staff and users of this system.

In order to better exchange data from this "water quality data bank" it is suggested an annual report containing data summaries from the various agencies be published and available to the public. This would give all agencies a common goal of producing a product worthy of public distribution and make data available to a wider audience. Initially a prototype publication could be developed containing current data collected on stream segments of concern. This publication could then be expanded to a statewide coverage of all state waters.

Many statistical references are available to aid in data analysis. A few are listed here to serve as examples. Sokal and Rohlf (1973) is a good basic statistical reference for those without a strong background in mathematics. Dressing (1987) gives a good overview of statistical methods for nonpoint source evaluation. Other recent statistical works relating to water quality and hydrology include Crawford et al. (1983), Loftis et al. (1989), NCASI (1985), Ponce (1980), Riggs (1968), Spooner et al. (1987). Guides to STORET and BIOS use are found in Eichin (1983) and U.S. Environmental Protection Agency (1982; 1988b).

# SURFACE WATER QUALITY PROGRAM

There are several frequently cited reasons for collecting surface water quality data: 1) to provide a system-wide synopsis of water quality; 2) to monitor long-term trends in selected water-quality constituents; 3a) to detect actual or potential water-quality problems, and if such problems exist; 3b) to determine specific causes and/or 3c) to assess the effect of corrective action; and 4) to enforce water quality standards. Monitoring should concentrate during the spring runoff period or during the periods of summer or winter storms since streams usually carry an average of 70-90% of their annual sediment load (and presumably other pollutants) during these times (Guy and Norman 1970). The section below describes ambient trend, beneficial use, and best management effectiveness monitoring.

## AMBIENT TREND MONITORING

There are two objectives of this perennial statewide water quality trend monitoring program: 1) Establish a coordinated perennial, statewide, surface water quality network for trend detection such that water quality changes may be related to changes in basin land and water uses;. 2) report statewide water quality trends to IDHW annually.

### *Introduction*

A coordinated statewide water quality trend monitoring program will provide current and ongoing data and interpretations on trends and, in part, the overall status of beneficial uses. These data can provide information on broad cumulative effects and can show general improvements or declines in the water quality of a large scale basin.

The purpose of a trend monitoring network is to provide water quality managers with appropriate data in which to evaluate the progress and effectiveness of the Idaho Water Pollution Control Program, the Antidegradation Policy, Idaho Nonpoint Source Management Program Plan (Bauer 1989), and to coordinate with and supplement existing water-quality data collection efforts by other state and federal agencies. The program will monitor the outflow of selected major tributaries of the Bear, Snake, Salmon, Clearwater, Spokane, Pend Oreille, and Kootenai Rivers, annually, biennially, and triennially. Each active monitoring site will be sampled six times each year. In a cooperative agreement between IDHW and USGS, trend monitoring began in October 1989.

### *Approach*

Using the existing Idaho surface water gaging network, this trend monitoring network consists of three levels to achieve national, regional, and local goals. The basin trend network includes sampling sites which are part of existing national monitoring programs. One national monitoring program is the U.S. Geological Survey's National Stream Quality Accounting Network (NASQAN) program. The basins are shown in Figure 2.

Briggs and Ficke (1977) describe the NASQAN program and present data for the major rivers of the United States. NASQAN data is published by USGS on an irregular basis (Briggs and Ficke 1977). The NASQAN program for Idaho currently (1989) samples seven stream sites located either near the outflow of major rivers or located where broad water quality trends related to upstream land and water uses can be detected (Appendix A). Basin trend sites generally include broad coverages of a variety of water-quality constituents, including nutrients, major and trace ions, and bacteria (Appendix C).

The watershed trend network is a regional monitoring program which samples 56 sites located at or near the outflow of selected major tributaries to the major rivers (Appendix B, Figures 3-8). These sites are located at existing U.S. Geological Survey surface water gaging stations. Some sampling sites will be located at previous (1983) IDHW sampling sites (Burr 1986). Parameters sampled and frequency of sampling are shown in Appendix C). Additional sites, depending on their proximity to discharge gaging stations, may be added as a result of the implementation of Idaho's water quality antidegradation policy in which "stream segments of concern" are identified through basin area public meeting process. Data will be published annually in the USGS water resources data format (see: Harenberg, et al. 1988 for a recent example).

The watershed trend monitoring network consists of three classes of sampling sites based on such factors as spatial distribution of sites, upstream land and water uses, and point sources (Hirsh 1988). Class A sites (Appendix B) will be perennial sites sampled six times per year. These Class A sites would be located where long-term, active water quality management occurs within a basin.

Class B sites (Appendix B) would be biennial (every two years) sites sampled six times per year every other year. Class B sites would be located in basins where land and water uses change slowly, so that the length of record and number of samples may be reduced.

Class C sites (Appendix B) would be triennial (every three years) sites sampled six times per year every three years. Class C sites would be located where future specific development proposals may occur which might affect future water quality. Classification of all sites would be periodically evaluated based on future program directions identified in the State's Water Pollution Control Program (see Burr 1986, p. 66-104) or basin area meetings.

The annual watershed trend sampling protocol samples all Class A sites, 1/2 of the Class B sites, and 1/3 of the Class C sites.

First year: All Class A sites, 1/2 Class B sites, and 1/3 Class C sites
Second year: All Class A sites, 1/2 Class B sites, and 1/3 Class C sites
Third year: All Class A sites, 1/2 Class B sites, and 1/3 Class C sites.

Subsequent years: Repeat years 1 to 3.

A major goal of surface water quality trend monitoring is to detect long-term trends and to assess the magnitude of trends in various constituent concentrations. In order to detect and assess trends, it is necessary that the data be collected at a given location, by using consistent collection and measurement techniques on a regular schedule and over a substantial number of years.

Water quality trend analyses may include the use of various parametric and non-parametric statistical techniques. One common parametric technique is the two-sample Student t-test which test differences between the means of two samples. Non-parametric techniques are the seasonal Kendall test which is used as a test for trend and the seasonal Kendall slope estimator which estimates the trend magnitude. Both non-parametric tests are rank-sum tests. Other non-parametric techniques are the Spearman's rho and Sen statistic which are rank-order tests.

## BENEFICIAL USE ASSESSMENT MONITORING

Beneficial use and BMP effectiveness monitoring (see page 25) is intended to respond to site-specific surface water quality concerns arising from nonpoint sources. Whereas trend monitoring sites are relatively fixed (or are at least maintained for several years in a row and are generally tied to fixed USGS gaging sites) beneficial use and BMP effectiveness sites need not be associated with existing trend monitoring sites. Beneficial use and BMP effectiveness monitoring sites might be selected to 1) provide information on short or long-term effects of an activity limited in spatial extent, 2) document effectiveness of a BMP, a set of BMPs, or to validate a model used in selecting the set of BMPs that is expected to maintain water quality, 3) provide baseline water quality data on small watersheds, and 4) indicate changes from reach to reach or above and below tributaries on a mainstream.

### *Use attainability assessments*

Beneficial uses serve to define water quality management goals for a water body. The attainment of assigned beneficial uses is a primary objective of water quality management actions. It is important that the beneficial uses assigned to a water body accurately define attainable uses. Use attainability assessments are used to identify or confirm that the proper beneficial uses, and therefore water quality goals, are assigned to a water body.

Use attainability assessments consist of a structured scientific evaluation of the factors affecting beneficial use attainment. These factors may include physical, chemical and biological conditions of the water body such as historic or naturally occurring pollutant concentrations, flow regime, past hydrologic modifications and habitat characteristics related to the natural features of the water body. Use attainability assessments are of key importance on water bodies where water quality management actions are being contemplated and the designated beneficial uses are inappropriate or undefined.

### *Beneficial use monitoring site selection*

Clearly defined goals are necessary to drive the monitoring process so that useful information will be provided to the public and other decision-making entities. It will not be possible to monitor all reaches in the state. As such, a method for the selection of monitored reaches is needed. A method for reach selection based on technical considerations is presented.

The selection of water bodies to be monitored for beneficial uses may be a function of 1) the uniqueness of a segment and its ability to represent other segments under managed and unmanaged conditions; 2) the determination that beneficial uses have been impaired as indicated by past assessments or professional judgement; 3) the prediction that beneficial uses will potentially be impaired; or 4) designation of the water as a "stream segment of concern", or "water quality limited segment."

To facilitate proper reach comparisons (i.e., impacted to reference conditions), candidate reaches for beneficial use monitoring can be categorized and prioritized by considering factors associated with the broad categories of land uses, beneficial uses, and the stream/land description. Specific factors to be considered under these headings are as follows:

Land Use

1. The nonpoint source activities (pollutant categories) present on the lands contributing runoff to the segment.
2. Proposed and existing combination of present, past, and foreseeable future activities.
3. The BMPs associated with the activities, the effectiveness of each BMP, and the degree of uncertainty associated with BMPs, both individually and in combination.
4. The proximity and relative significance of activities to a stream reach, e.g., noncontributing to the stream, upslope but draining directly into the reach, or immediately adjacent to the stream.

Beneficial uses

1. The beneficial uses present, or those designated in the state standards.
2. The value of the use to the locale, region, and nation.
3. The sensitivity of the use to nonpoint source pollutants.
4. The scope or extent of the use relative to the reach as a whole.
5. The rate of recovery of the impaired use after disturbance.
6. The use attainability or potential condition.

Stream/Land Description

1. Land systems inventory, e.g., landtypes, or soil survey map units. For purposes of statewide consistency, the cooperating agencies should use the SCS Soil Surveys, or correlated inventories if available.
2. Stream type. For purposes of statewide consistency, the cooperating agencies should use the Rosgen stream type classification (Rosgen, 1985).
3. Riparian complexes. For purposes of statewide consistency, the cooperating agencies should use the USFS, Region 4 riparian classification system (USFS, 1989).
4. Other land descriptors, i.e., the magnitude, frequency and intensity of natural perturbations such as catastrophic rain-on-snow events and fire.

In many instances data are lacking on the beneficial uses available in segments or on the condition of the resources. We must often assume that protection of one beneficial use will ensure the protection of other beneficial uses in a given segment or in linked segments.

Uses are often in some degree of conflict. For example, agricultural uses of water can detract from recreational uses as agricultural uses increase in a drainage. Maintenance of recreational uses in the face of increasing agricultural uses is apt to be more difficult than similar maintenance of the agricultural program. The various beneficial uses have different sensitivities to worsening trends in key parameters. Therefore, water quality criteria are used to set the upper and lower bounds adequate to support the use.

Monitoring data might indicate the potential for trends adverse to recreational uses. Turbidity, coliform counts, and primary nutrients (associated with algal blooms) are useful parameters for this purpose. Additional parameters would be necessary in assessing maintenance of recreational uses. Examples of other significant factors: maintenance of normal water flow regimes; protection of in-channel physical habitat diversity (riffle-pool-glide-quality and distribution, large woody debris, etc.); and protection of the size, tree density, tree species composition, ground cover; and bank stability of riparian areas. Successful stream channel management is dependent upon successful floodplain management and those parameters used to monitor stream channel and floodplain condition are related to maintenance of recreational uses and use by indigenous biota.

Not all stream segments are covered by beneficial use designations in the water quality standards. Also, the beneficial uses of a given waterbody can change through time. The Basin Area Meetings might be helpful in confirming the types of uses present on stream segments where such changes occur, or where knowledge is lacking. The Northwest Rivers Study will also be a useful basis for sorting segments by some uses. Regardless of the status of knowledge on beneficial use presence in any waterbody, it will be useful to inventory those uses on all waters selected for instream monitoring.

Parameters and protocols suggested for beneficial use monitoring are shown in Appendix H.

## BMP EFFECTIVENESS MONITORING

BMP effectiveness monitoring is of great importance because it has the potential of delivering the most useful information and "feedback" needed to meet state water quality standards. The results of BMP effectiveness monitoring will be used to evaluate present water quality conditions and water quality trends and act as an early warning indicator of environmental degradation. BMP effectiveness monitoring will seek to determine the following: present water quality and baseline conditions in both small unimpacted and impacted watersheds; BMP effectiveness in controlling nonpoint pollution from land use activities; and the short-term and long-term effects of various land uses and activities on water quality, especially the beneficial use of water.

BMPs or Best Management Practices have been applied to agriculture (including rangeland), forestry, mining, and construction, and are often interpreted to be the most effective nonpoint source control for a given set of circumstances. The term "best" could then mean 1) the most effective practice among a set of practices evaluated quantitatively for short-term and long-term impacts given specific land types, environmental processes (e.g., flow regimes and climate), and beneficial use sensitivity; 2) that practice judged by management professionals to provide acceptable results for given stream and land conditions; or 3) that practice that has been shown to be acceptable on average for a wide variety of stream and land conditions. Many BMPs are based on the results of research or other documentation of management effects and appropriate control.

Parameters that measure changes in the condition of the beneficial uses of water are generally taken as the most direct indicators of effectiveness and these kinds of parameters are important components of monitoring programs. Biotic responses instream, directly linked to physical and chemical responses of the aquatic system, are the "bottom-line" in monitoring effectiveness of BMPs designed to protect cold and warm water biota and salmonid spawning. It would be ideal for effectiveness monitoring to include physical and chemical, biologic and habitat monitoring of streams.

To link these beneficial use "changes" in the stream to BMP effects on the land, assessments at the site of the nonpoint source activity, combined with evaluations of pollutant sources, transport, and delivery must be made. For example, if beneficial use impairment was documented on a particular stream, there would be no way to trace the cause of impairment to a practice on the land without "isolating" the pollutant source from other sources of potential impact to the use. For this reason, it is important to design BMP effectiveness monitoring to include observations close to the pollutant activity, and documentation of delivery to the waterbody. Measurements made in the receiving waters must be compared with like measurements in non-receiving waters to document an effect or impact on the beneficial uses.

Many BMPs are instituted as measures to speed resource recovery from impacts. Hence, recovery of instream characteristics from NPS impacts under various treatments and controls needs to be documented.

BMP effectiveness monitoring is defined in the glossary. Although it is cited in the Antidegradation Agreement as a type of "monitoring", in reality, it is an assessment based on several types of monitoring. The water quality standards require monitoring, "...adequate to determine the effectiveness of the approved or specialized best management practices in protecting the beneficial uses of water" (Idaho Department of Health and Welfare 1985a). Thus, BMP effectiveness assessments necessarily include beneficial use monitoring. As stated above, on-site BMP effectiveness and pollutant source and transport (PST) types of monitoring are required to complete the cause and effect evaluation needed to link water quality trends to actual best management practices.

The process for establishing priorities for conducting BMP effectiveness monitoring is recommended to include 1) best management practices that have not been adequately evaluated, 2) land types, especially sensitive land types, that have not been adequately evaluated, 3) watersheds delivering nonpoint source pollutants to designated stream segments of concern, 4) water bodies experiencing or anticipated to experience impairments to beneficial use, and 5) areas subject to significantly increasing development.

## PARAMETER SELECTION FOR BENEFICIAL USE/BMP EFFECTIVENESS MONITORING

To adequately monitor nonpoint sources of pollution, the monitoring team should approach the NPS problem from three broad and interrelated points:

1) the geomorphic and climatologic (land type) description for the watershed;
2) the beneficial uses present or designated in the water quality standards; and
3) the nonpoint source activities present on the land.

These three factors will play important roles in determining what physical, chemical, and biological parameters to monitor. The parameters and state-of-the-art protocols listed in Appendix H have been suggested to provide consistency between monitoring programs across the state.

Recommended sampling frequencies are also included in Appendix H. Minimum and optimum frequencies have been provided to serve as a guide in monitoring plan preparation. For many of the monitoring parameters listed in Appendix H sample frequencies could not be found in the references for the parameter/protocol. Sample frequencies are often not mentioned in the literature because of the variety of objectives for conducting water quality studies. The user must keep in mind the fact that sampling frequencies are site specific and project specific. In some cases it may be possible and desirable to exceed the optimum frequency.

## LAND TYPE DESCRIPTION

Ideally, the best "land type description" should outline the geology, the riparian and upland vegetative cover, stream types, soil types, morphology of the drainage, and the climate. The ability of the land type description to integrate components is of utmost importance. Integration will bring together climate, geomorphology, and biology. In the immediate future the land type description will provide a means of comparing similar ecological units and provide information to help select appropriate sampling parameters. In the long term, the land type description may provide a descriptive tool which will help predict the outcome of a land use activity.

## BENEFICIAL USES

Parameter selection for instream monitoring is keyed to the protected beneficial uses of the stream segment. Protocols have been designed around parameters that relate to an effect on the use. It is important to consider parameters which are considered limiting to the beneficial use. The beneficial uses are as designated in the state water quality standards (Idaho Department of Health and Welfare 1985a).

## LAND USE ACTIVITY

The land use activity forms the third leg of the triad which will determine the parameters to select for a stream or stream segment. On-site and pollutant source and transport (PST) monitoring parameters are selected, almost entirely on the basis of land use activity. The Forest Practices audit protocols and associated stream quality assessment, for example are designed specifically around forestry land uses. Some land use activity parameters can, however, be integrated with the land type and beneficial uses. For example, any silvicultural practices on Idaho Batholith geology with anadromous fish would monitor for sediment accumulation in the substrate, i.e., spawning and rearing areas.

Monitoring parameters can be divided into physical, chemical, and biological constituents. Those parameters are included in Appendix H.

## BMP EFFECTIVENESS - ASSESSMENT STRATEGIES

The design of specific nonpoint source water quality assessments can be quite complex and involve a variety of methods (Dressing 1987 and U.S. Environmental Protection Agency

1988a). Recent emphasis has been placed on the proper design of surface water quality monitoring surveys and networks (Canter 1985; Sanders et al. 1987; Hirsh 1988).

As stated above, a complete assessment of BMP effectiveness involves three types of monitoring: implementation of on-site audits of BMP design and adequacy, pollutant source and transport monitoring (PST), and instream beneficial use impact monitoring. The following is a brief description of each:

## IMPLEMENTATION AUDITS

The objectives of implementation audits are to evaluate whether or not project plans and BMPs are designed and implemented in accordance with approved BMPs, and as appropriate, in accordance with any environmental or planning documents that support the decision to pursue the specific activity. This aspect answers the question: "Did we do what we said we were going to do?" Implementation audits feed back into contract modifications or administrative procedures to assure that BMPs are implemented properly. Such audits are a key component of BMP effectiveness monitoring and could be considered the first step in it.

There are two types of implementation audits: 1) as part of project administration to assure that what is in the designs actually gets implemented on the project. This is conducted primarily by the project administrator, contracting officer, or whoever is responsible for on-the-ground actions; and 2) as post project field reviews by those qualified to determine if designed practices were correctly applied. Implementation audit results will be documented. For example, a BMP checklist form (Appendix F) is prepared by the interdisciplinary team during project planning and design. The monitoring results will also be summarized in an annual report with an assessment of on-site BMP effectiveness, discussion of any problems encountered, and recommendations for BMP modification or improvements.

Land management agencies will apply contract and project permit administration audits on all projects. They will conduct post-project implementation audits, as a minimum, on a representative sample of land management activities. Special emphasis will be given to segments of concern.

## POLLUTANT SOURCE AND TRANSPORT (PST) MONITORING

The objective of pollutant source and transport (PST) monitoring is to determine if BMPs were effective in preventing significant amounts of nonpoint source pollution from entering the waters or channel systems which directly access the waters. The purpose is to focus on cause and effect relationships. It answers the basic question: "Did the BMPs prevent the delivery of pollutants in significant quantities?" Before potential pollutants enter the stream, indicators of their movement in that direction can usually be identified on-site or in tributaries.

One type of PST monitoring, tributary monitoring, quantifies amounts of sediment deposited in first and second order stream channels. Channel storage methods are based upon techniques developed by Megahan and Nowlin (1976) and Megahan (1982). This can quantitatively measure BMP effectiveness and provide a linkage between on-site erosion and mainstream beneficial use impacts. It can provide an "early warning" of sediments accelerating in the channel system. Megahan (1985) has noted that failure to measure any of the following can result in serious errors in predicting the effects of land use on sediment delivery to a critical stream reach: erosion at the point of disturbance; changes in sediment storage between reference point and point of disturbance, and changes in sediment delivery at the reference point.

Tributary monitoring before and after, as well as above and below, management activities provides a good strategy to assess loading.

This type of monitoring will be encouraged where it is desired to demonstrate the effectiveness of individual BMPs in controlling delivery of sediment, and to evaluate and validate model predictions.

## INSTREAM BENEFICIAL USE IMPACT MONITORING

This type of monitoring occurs within the active channels of streams to assess the condition of the beneficial uses. Thus, parameters selected for instream monitoring evaluate whether or not water quality criteria in the standards are being met. In the absence of specific numeric criteria, impact assessment is based on whether or not the beneficial uses are being impaired as determined by Idaho Department of Health and Welfare (1985). According to U.S. Environmental Protection Agency (1989) fully supported beneficial uses are ones in which "no sources (point or nonpoint) are present that could interfere with the use, or sources present but information indicates uses fully attained". Beneficial use impairment would occur when the uses are not fully supported.

Instream effectiveness monitoring will occur where beneficial uses could potentially be impacted, where cumulative effects are an issue of concern, and/or where BMP effectiveness is questioned. Instream data collection must be extensive enough to be representative of the effectiveness of BMPs at meeting water quality standards and protecting beneficial uses. Such monitoring will be emphasized in segments of concern.

Instream effectiveness automatically implies comparison with some point of reference, desired condition, or baseline (trend) condition. Baseline or reference monitoring will provide information for interpretations of potential conditions and facilitate judgements of impairment. There are several strategies for accomplishing this type of comparison monitoring.

- Paired watershed strategy: Under this strategy, the monitored stream is compared with a baseline station located in a nearby watershed of similar geomorphology, aspect, flow regime, and channel type which is either unimpacted or minimally impacted. The design requires concurrent collection of water quality parameters in both watersheds. Natural perturbations should be monitored equally at both sites, thus indicating differences due to management activities at the primary site. The "before/after strategy" is an absolutely essential element of the paired watershed strategy.

- Upstream/downstream strategy: This monitoring strategy requires locating stations both above and below a pollutant activity, usually at the mouth of tributary streams reflecting delivery of pollutants from the management activity. As in the paired watershed strategy, upstream stations must be reflective of the same geology, geomorphology, aspect, flow regime, and channel type as the downstream stations.

- Before/after strategy: Under this strategy, the baseline station is established, and water quality conditions calibrated prior to management activity. Such calibration normally requires from 5 to 10 years to establish meaningful average conditions for the stream. Before/after strategies are often combined with above/below and paired watershed strategies to optimize effectiveness evaluations.

Evaluating the effectiveness of BMPs in protecting instream beneficial uses requires monitoring over time. Some activities such as road construction often take years before pollutants are finally delivered to the mainstream. Once there, sediments may persist for many years before they are flushed from the system. For these reasons, instream effectiveness monitoring programs related to sediment should be planned over a period of at least 5 years.

Limited BMP effectiveness monitoring is currently being conducted in Idaho. See Appendix D for a listing of current surface water quality monitoring being conducted in the state. Some of this monitoring may be considered BMP effectiveness monitoring.

## MONITORING PROGRAMS

The nonpoint source water quality monitoring programs in the state of Idaho consider mainly three activities: agriculture, forest practices, and mining. Each of these activities is treated in a separate section consisting of an introduction, a description of the current program and a description of the proposed program.

The agricultural section below is divided into irrigated cropland, dryland, and rangeland/riparian sections. The agriculture section is discussed in greater detail than the others because the agricultural pollution abatement program has a longer history in the state (Idaho Department of Health and Welfare 1983; Clark 1989) and there is an extensive ongoing monitoring program currently in use in Idaho. The forest practices section relies heavily upon information in the Forest Practices Act, the Idaho Forest Practices Water Quality Management Plan (Bauer et al. 1988), and the results of forest practices audits. The monitoring associated with each of these three different nonpoint source activities has thus evolved somewhat differently. One of the objectives of the present plan will be to bring consistency to these monitoring efforts.

# AGRICULTURE

## INTRODUCTION

Agriculture is the major nonpoint source activity impacting the water quality of lakes and streams in Idaho (Idaho Department of Health and Welfare 1989a). Runoff from irrigated and non-irrigated cropland contributes sediment, nutrients, organic material, bacteria, and pesticides to surface waters thereby impacting beneficial uses. Grazing activities frequently result in increased stream bank damage and erosion, and riparian habitat modifications.

The state Agricultural Water Quality Program began in 1979 and is based on the Idaho Agricultural Pollution Abatement Plan (Idaho Department of Health and Welfare 1983). Grants funded by the IDHW-DEQ, which are jointly administered by the state Soil Conservation Commission (SCC) with technical assistance from the federal Soil Conservation Service (SCS), are made to local soil conservation districts (SCDs). Planning grants are used to identify agricultural lands contributing pollutants to surface waters, and to identify BMP systems to be applied to these critical areas to reduce erosion. Implementation grants may then be awarded which provide cost-share funding for voluntary installation of agricultural BMPs on individual farms.

Water quality monitoring has been conducted throughout Idaho for many years in support of this program. The information to be provided by this ongoing monitoring effort includes the following items:

- documentation of segment-specific beneficial use status and sources of impact;
- identify major agricultural pollutant sources and critical subbasins within a given watershed;
- documentation that BMPs were correctly installed and are being properly maintained to ensure effectiveness (implementation monitoring);
- establish baseline suspended sediment, cobble embeddedness, intergravel sediment or dissolved oxygen, or other appropriate data to evaluate BMP effectiveness (effectiveness monitoring); and
- validate instream improvement, and support of all designated beneficial uses.

Historically, monitoring has focused on chemical parameters including suspended sediment and nutrients. The limited biological monitoring that has been conducted has focused primarily on coliform bacteria densities. The data generated were compared to criteria in the state water quality standards (Idaho Department of Health and Welfare 1985a) to evaluate support of designated beneficial uses.

Through this research effort it has become apparent that biological monitoring including habitat assessment (instream and riparian) should be incorporated into the agricultural water quality monitoring program to better assess beneficial use status and support. Because resident aquatic communities (fish or invertebrates) integrate aquatic conditions through time, they are good indicators of diverse and complex pollutant impacts on aquatic life. These impacts are often interrelated and include nutrient enrichment, acute and chronic chemical toxicity, physical habitat degradation, and flow alteration. Only a portion of these impacts are assessable using chemical specific methods. Also, depending on the sampling frequency and parameters included in a water quality monitoring program, chemical monitoring alone may fail to detect pollution events or activities that degrade water quality and impact designated beneficial uses.

For these reasons, this section includes a discussion of both the current and proposed agricultural water quality monitoring programs for irrigated and dryland agriculture. The proposed program integrates chemical specific monitoring with biological monitoring and habitat (instream and riparian) assessments. It is believed that an integrated monitoring approach will provide a more accurate assessment of beneficial use status. These data will be used to validate the effectiveness of management efforts to reduce nonpoint source pollutant impacts from agriculture through implementation of BMPs on agricultural lands.

The monitoring programs outlined below should be viewed as guidelines to follow in developing a site-specific water quality monitoring program. The sampling frequencies, parameter packages, and data analysis methods listed are those that have been developed and useful in various projects statewide. Data should be collected during peak flows from snowmelt and/or storm runoff. New methods currently being tested and validated for use in Idaho streams are also referenced (e.g., Skille and King 1989; Plafkin et. al. 1989).

## CURRENT PROGRAM

***Current Objective***: Assess beneficial use status and impacts from agricultural activities.

This is done by establishing sample sites located along a stream to divide the major land use areas and at the mouth of major tributaries. The sampling frequency is variable depending upon parameters of interest. Minimum monthly sampling is or one water year. Currently standard water quality index parameters include temperature, dissolved oxygen, pH, flow, total phosphorus as P, nitrate nitrogen, total Kjeldahl nitrogen, suspended sediment, bedload, fecal coliform, fecal strep, turbidity, and conductivity. Biological and aquatic habitat parameters may include fish populations, macroinvertebrates, habitat evaluation procedures (HEP), cobble embeddedness, substrate composition, riparian vegetation, etc. Data analysis includes descriptive statistics and graphics, comparison to water quality criteria, calculation of water quality index and comparison to nearby waters, comparison of sediment and phosphorus loading between stations.

This type of survey indicates the severity of a water quality problem, and may identify major tributaries in which water quality is degraded. It may support or reject the need for a water quality improvement project. However, it does not adequately address critical areas that should be treated.

***Current Objective***: Identify major pollutant sources and prioritize critical subbasins that should be treated in a cost-share program.

The data needs include a number of flow-sediment data pairs collected during peak flows from snowmelt and/or storm runoff. Peak flows occur during a very short period, but account for the majority (probably over 90%) of the pollutant load. Therefore, sampling should be more intense during the peak flow period. In comparison to data collected during the rest of the year.

Since agricultural BMPs are primarily designed to control erosion, suspended sediment has been the target parameter of the survey. The treatment of the other pollutants is dependent on their relationship to sediment transport. For example, total phosphorus is highly correlated to sediment and will be reduced by BMPs to the same extent as sediment. However, nitrate concentrations are not correlated to sediment, and BMPs can be expected to have little impact on nitrate reductions. Therefore, survey design has been based primarily on monitoring the differences in sediment loads.

Sample stations have been located to adequately isolate major land uses or contributing sources from each other. Ideally the smaller and more homogeneous (i.e., land type and land use) a watershed that the station represents the better. This requires many more stations than needed to meet the first objective; however, these stations need be sampled only for a brief period of the year, and for a limited parameter set. "Above and below," "before and after," and "paired watershed" sample designs are appropriate depending upon the individual situation.

The sampling frequency for dryland agriculture has been planned to sample the major runoff event intensely, or sample several runoff events until a statistically adequate data base is established. In irrigated agriculture weekly sampling of agricultural drains and bimonthly sampling of receiving waters has been recommended.

The main parameters have been flow and sediment for the study of irrigation runoff. Total phosphorus as P, nitrate nitrogen, total Kjeldahl nitrogen, fecal coliform and fecal strep bacteria, and turbidity have also been useful depending on the survey and situation. Agricultural BMPs are designed to reduce sediment. Benefits to reduction of other pollutants is dependent on their association with sediment. For this objective, therefore, sampling only flow and sediment is sufficient. Additional parameters such as biological and aquatic habitat parameters (fish populations, macroinvertebrates, HEP, cobble embeddedness, substrate composition, riparian vegetation, etc.) have been useful in the receiving water.

Data analysis includes comparison of event sediment load (tons per event or average tons per day) at each station, calculation of percent contribution to the receiving stream by sub-watersheds, sediment delivery, tons per acre in a sub-watershed. The sediment-contributing acres need to be mapped and calculated, otherwise this figure may not be accurate (e.g., if pasture and haylands were included in the watershed acres.) Data from several events can be pooled, but this increases the variance attributable to factors other than station differences, and the required sample size also increases. Differences between events include changes in soil condition (saturated, unsaturated, frozen, thawed to various depths), vegetative cover, precipitation intensity, and stage of the hydrograph.

***Current Objective***: Establish water quality (sediment) baseline so that future monitoring can determine the success of the cost-share project.

The data record required for this objective is larger than for the pollutant identification objective. To meet that objective, a good data base for only one storm event is needed; differences between stations (i.e. spatial differences) identifies the critical area. The magnitude of the hydrologic events is very important. There is no way to assure similar hydrologic conditions before and after the project. The sample station selection is the same as with the previous objective.

Sampling frequency: The sampling goal has been to obtain a database that represents the full range of hydrologic and climatic variation. Therefore, a number of storm events representing various intensities was sampled. Since it is unlikely that sampling will be conducted in an 'average' year, monitoring for several years has been needed. The parameters are the same as with the pollutant identification objective. Data analysis includes the sediment rating curve, time-trend regression analysis, and frequency distribution of sediment loading.

## GENERAL RECOMMENDED PROGRAM FOR AGRICULTURE

The proposed monitoring plan will focus on bioassessment and habitat assessment protocols supported by traditional physical and chemical monitoring. The biological integrity of Idaho surface waters impacted by agricultural activities will be assessed. This will be done by comparing biosurvey data from impacted streams to control segments (e.g., upstream segment, paired watersheds, or ecoregion reference streams (Omernick and Gallant 1986). Properly stratified ecoregional reference stream segments will permit description of the expected natural stream fauna (plus variability) in a given region. These ecoregion benchmark monitoring segments need to be established on unimpacted, pristine streams where available. In some locations this reference segment may be a "minimally impacted" reach in a watershed. This community data would then be used as a benchmark to assess the biotic integrity of a given stream segment, where biotic integrity is the ability of the stream to support and maintain a balanced, integrated, adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of the natural habitat of the region (Karr and Dudley, 1981). These data would provide information regarding the potential use attainable for given impacted stream segments.

This system of reference streams would be used to assess the biological health of agriculturally impacted streams, provide a regional benchmark fauna to guide planning and management decisions, permit assessment of use support, provide trend information over the long term, and permit assessment of impacts of other nonpoint source activities (e.g., mining, logging) on the biotic integrity of Idaho streams.

In addition to biosurvey data, chemical data will be collected to assess compliance with the state water quality standards (Idaho Department of Health and Welfare 1985a). Where appropriate (i.e., mixed land ownerships or multiple land use activities, in a watershed), Coordinated Resource Management (CRM) planning will be implemented to address all potential activities and pollutant sources impacting water quality in a drainage (see Anderson and Baum 1987; 1988). The state cost-share program will address agricultural problems on private land ownerships, while other nonpoint source impacts identified by CRM planning will be addressed and funded by alternative sources (e.g., habitat improvement funds through Idaho Fish and Game, ASCS funding, etc.). This would therefore be an integrated basin-wide approach to solving nonpoint source impacts on surface waters.

## RECOMMENDED MONITORING PROGRAM FOR IRRIGATED AGRICULTURE

The following information needs are required for each agricultural cost-share project.

***Recommended Objective:*** Assess beneficial use status and impacts from agricultural activities.

A project specific watershed CRM planning effort will identify all nonpoint pollution sources, impacts, areas to be treated, responsibilities, possible funding sources, and priorities. Concomitant assessment of biotic integrity will validate beneficial use support and determine if a cost-share program is warranted. In addition to a biosurvey including analysis of fish and macroinvertebrate communities, additional parameters to be evaluated would include physical parameters such as flow, channel characteristics, substrate; riparian condition factors such as cover, bank stability, soils; and an analysis of surrounding watershed factors such as land use, topography, soils, and vegetation. Water column chemical monitoring (e.g., dissolved oxygen, suspended sediment, nutrients, etc.) would be conducted to assess compliance with water quality criteria specified in the state water quality standards (Idaho Department of Health and Welfare 1985a) for the protected beneficial uses (see Appendix H for recommended sampling frequencies).

***Recommended Objective:*** Identify major pollutant sources and prioritize critical subbasins that should be treated in a cost-share program.

The chemical quality of the irrigation return flows will be monitored. Stations should be located to isolate major subbasins and contributing sources. It is assumed that nutrients (nitrogen and phosphorus) in various forms are in irrigation tailwater. Many nutrient parameters are correlated with suspended sediment (e.g., total phosphorus and total Kjeldahl nitrogen), while some are not (e.g., nitrate). Agricultural BMPs are designed to reduce erosion and suspended sediment loads in irrigation tailwater. The monitoring focus will be on flow and suspended sediment pairs at each station. Appendix H contains recommended sampling frequencies.

Given that strong correlations can be developed between turbidity and suspended sediment levels in irrigation drains, suspended sediment monitoring may be replaced by turbidity monitoring. All monitoring work could therefore be performed in the field and the data available for immediate use. Sampling should be at weekly intervals in order to calculate loads. This effort may require more than one year of data depending upon crop rotation patterns. In drainages where confined animal feeding operations are a major concern, the parameter package should include fecal coliform and fecal streptococcus bacteria to assess their impacts on water quality and potential public health impacts. Data analysis includes the calculation of drain sediment and nutrient loads and percent contributions to receiving streams by subbasin, and prioritizing subbasins within a project area for BMP treatment.

***Recommended Objective:*** Validate proper implementation of agricultural BMPs.

An interdisciplinary team including IDHW representatives will perform annual audits of each type of BMP applied to an irrigation tract. The team will assess construction, maintenance, and apparent effectiveness. The team will also perform annual audits on select BMPs to assess BMP-specific operation and maintenance activities. The purpose of this effort is to ensure that BMPs are properly installed, maintained and, therefore, maximally effective. The number of BMPs examined will be adequate to provide a statistically significant data base on which to make these determinations.

***Recommended Objective:*** Evaluation of BMP effectiveness

BMP effectiveness will be assessed by comparing post-BMP implementation sediment loads to baseline values in the irrigation drains of a project watershed. This may require more than one year's baseline data to be able to characterize an irrigation tract with complex crop rotations. Several years' data would be used to develop frequency distributions of suspended sediment loadings for each drain. BMP effectiveness would be evaluated for more than one year to assess percent reduction from the mean. Where suspended sediment load reductions are not satisfactory, BMPs should be reevaluated; i.e., implement the feedback loop. Suspended sediment load reductions would be considered "not satisfactory" if they do not meet the sediment reduction coefficients established for a particular BMP or if instream monitoring shows no improvement. If instream monitoring shows no improvement it must also be demonstrated that other factors or activities in the watershed are not causing the decrease in water quality.

***Recommended Objective:*** Perform an annual evaluation of other CRM efforts in the watershed that were implemented to improve water quality.

Examine riparian protection and grazing programs, stream bank stabilization efforts, fisheries enhancement projects, groundwater protection projects, pesticides management programs, fertilizer management, irrigation water management, and flow regulation.

Where appropriate, assess construction and implementation efforts, relative effectiveness, and modify BMPs if needed. Review available monitoring data generated by these efforts to assess effectiveness. Review management programs and refine if needed.

***Recommended Objective:*** Assess overall project effectiveness in protecting and supporting designated beneficial uses.

Reevaluate biotic integrity within the project stream segments. Stream biota should show less deviation from the "regional fauna" than before the project. The degree to which the post-project fauna is similar to the regional fauna (or desired condition) by using bioassessment measures (see Barbour et al. 1989), is a direct measure of program effectiveness. Biosurvey data should be used to assess support of beneficial uses such as coldwater biota and salmonid spawning, while bacteriological data may be used to assess support of primary and secondary contact recreation uses and protection of public health.

## RECOMMENDED MONITORING PROGRAM FOR DRYLAND AGRICULTURE

The following information needs are required for each agricultural cost-share project.

***Recommended Objective:*** Assess beneficial use status and impacts from agricultural activities.

A basin-wide CRM planning effort should be used to identify all NPS impacts, pollutant sources, areas that need treatment under the project, possible sources of funding in addition to state cost-share, responsibilities, and priorities. Concomitant assessment of biotic integrity in project area stream segments will validate beneficial use support and determine if a cost-share program is warranted. Parameters to be monitored are similar to those listed under irrigated agriculture for this type of assessment.

***Recommended Objective:*** Identify major pollutant sources and prioritize critical subbasins that should be treated in a cost-share program.

With irrigated agriculture, tributary segments of major subbasin drainages are canals. Chemical specific monitoring of these artificial conveyances is appropriate to identify critical subbasins and to calculate loadings. In dryland agricultural drainages, tributary segments are perennial streams. Because a significant portion of transported sediment loads (possibly > 90%) may occur during a few high intensity-low probability storm events, chemical specific monitoring is often a hit-or-miss proposition. Because of these complexities, the data generated by such studies are often difficult to interpret and translate into an effective management program. It is the impact of such events on the biotic community (beneficial uses) of project stream segments that needs to be assessed.

It is proposed that segment-specific biosurveys be conducted in a project drainage to assess deviations from the expected "regional fauna." The degree of deviation of observed communities from that expected in each sub-watershed may be used, in conjunction with CRM planning watershed assessment land use data, to prioritize subbasins for treatment. Such assessments will account for water quality, substrate, and riparian condition impacts on stream community structure and resultant deviations from the expected "regional fauna."

***Recommended Objective:*** Validate proper implementation of agricultural BMPs.

An interdisciplinary (ID) team including IDHW representatives will perform annual audits of each type of BMP applied to a tract. The team will assess construction, maintenance, and apparent effectiveness. The team will also perform annual audits on select BMPs to assess BMP-specific operation and maintenance activities. The purpose of this effort is to ensure that BMPs are properly installed, maintained, and therefore, maximally effective. The number of BMPs examined will be adequate to provide a statistically significant data base on which to make these determinations. In addition to visual audits, reliable, quantitative data on upslope and instream characteristics need to be collected when possible.

***Recommended Objective:*** Evaluation of BMP effectiveness.

An interdisciplinary (ID) team including IDHW representatives will perform audits of installed BMPs at a frequency as needed after spring runoff or high intensity storm events to assess site-specific BMP effectiveness. The team will focus on BMPs treating the most critical or sensitive areas, and evaluate apparent effectiveness. The purpose of this monitoring will be to ensure that the installed BMPs functioned as designed during snow melt or short-term high-intensity runoff events. The information gathered will permit modification of the specific BMP or group of BMPs, provide direction regarding BMP maintenance activities, and provide direction regarding application of additional BMPs in a given area to achieve maximum effectiveness.

***Recommended Objective:*** Perform an annual evaluation of other CRM efforts in the watershed that were implemented to improve water quality. The following should be examined: riparian protection programs; stream bank stabilization efforts; fisheries enhancement projects; groundwater protection projects; pesticides management programs; fertilizer management; and flow regulation (see Appendix H for recommended sampling frequencies).

Where appropriate, assess construction and implementation efforts, relative effectiveness, and modify BMPs as needed. Review available monitoring data collected by these management programs to assess effectiveness. Review management programs and refine if needed.

***Recommended Objective:*** Assess overall project effectiveness in protecting and supporting designated beneficial uses.

Re-evaluate the biotic integrity of project watershed segments. Stream biota should show less deviation from the "regional fauna" than before the project. The degree to which the post-project fauna is similar to the regional fauna (or desired condition) by using bioassessment measures, is a direct measure of program effectiveness. Assess beneficial use support and segment compliance with state water quality standards (Idaho Department of Health and Welfare 1985a).

RECOMMENDED MONITORING PROGRAM FOR GRAZING AND RIPARIAN ZONE IMPACTS

Information desired includes status of riparian-dependent beneficial uses: are the BMPs implemented, effective, and no substantial hydrologic or habitat modification taking place; are the hydric riparian plants stable and not significantly altered; is the ecological status maintained or improved; is the overstory recruitment of large organic debris maintained or improved; is streambank erosion accelerated and are banks subject to destabilization?

The following monitoring and audit efforts are suggested for each grazing/riparian management project.

***Recommended Objective:*** Assess beneficial use status and impacts from grazing activities

Beneficial use status is directly influenced by the condition of the streamside vegetation, and streambanks. Riparian over-grazing impairs primarily cold and warm water biota, and salmonid spawning by altering stream channel structure and destabilizing the bank. These effects aggravate the beneficial uses directly by physically altering critical habitats and by increasing sediment recruitment to the channel thereby filling living spaces and clogging spawning gravels. Condition assessment will be made by evaluating the seral status of riparian vegetation located immediately adjacent to the stream and by rating streambank stability relative to potential or undisturbed conditions. The U.S. Forest Service's Riparian Evaluation Procedure (Region 4) (U.S. Forest Service 1989) is an excellent example of a system that can be used to identify riparian conditions.

***Recommended Objective:*** Identify and prioritize critical riparian sites.

Critical, priority riparian sites will be identified on the basis of beneficial use status from the beneficial use status survey above, combined with input from the public via the Basin Area Meetings. Areas identified for site specific BMP applications will receive priority.

***Recommended Objective:*** Validate proper implementation of BMPs

Site specific BMPs, allotment plan prescriptions, and other management programs at priority riparian sites will be monitored for implementation and compliance to specifications. Results will be documented with reasons for non-compliance as well as recommendations for BMP modification.

Monitoring parameters include (see Appendix H for recommended sampling frequencies):

- Actual grazing intensity versus planned grazing in the riparian area
- Actual versus planned seasons of use within the riparian zone
- Post-grazing (residual) riparian vegetation stubble heights
- Percent of utilization on hydric species important to streambank stability
- Determinations of the health or vigor of the riparian community complex
- Streambank stability
- Others as related to the goals and objectives of the grazing/riparian plan

***Recommended Objective:*** Evaluation of BMP effectiveness

Effectiveness of riparian BMPs will be monitored to assure that beneficial uses are adequately protected. Parameters to evaluate effectiveness include (see Appendix H for recommended sampling frequencies):

- Embeddedness
- Spawning redd percent fines/bioassay
- Fish populations
- Intergravel dissolved oxygen
- Turbidity for salmonid site feeding
- Thalweg profile surveys
- General aquatic habitat surveys for limiting factors analysis
- Water temperature
- Others as appropriate to the identified beneficial uses

# FORESTRY

## INTRODUCTION

In Idaho, the water quality impacts of silviculturally generated pollutants can be mitigated through the application of Best Management Practices (BMPs). Silvicultural BMPs, as contained in the Idaho Forest Practices Act (FPA) (Idaho Code 1977), are cited as "approved" in the state water quality standards (Idaho Department of Health and Welfare 1985a) and are therefore the minimum standards by which all practices should be evaluated. Forest practices must meet or exceed the intent of the FPA best management practices to comply with the state water quality standards. However, instream monitoring is necessary to determine compliance with water quality standards.

Evaluation of BMP effectiveness is required by state water quality standards. If in-stream monitoring determines that beneficial uses have been impaired, then BMPs must be modified, or more effectively implemented, to better protect aquatic resources. Information on the in-stream effectiveness of many of the BMPs is lacking, and there is a need to focus more effort on the issue of sediment effects on beneficial uses. The ultimate determination of a degraded stream is when protected beneficial uses are impaired. Such impacts are best determined through detailed quantitative field monitoring. Data must be collected during peak flows from snowmelt and/or storm runoff. Peak flows occur during a very short period, but account for the majority (probably over 90%) of the pollutant load. Therefore, sampling should be more intense during the peak flow period.

The Idaho Forest Practices Water Quality Management Plan (Bauer et al. 1988) indicates that the impact on fisheries from sediment is the most critical and widespread problem which needs to be addressed. Objectives for this monitoring program will therefore focus on the impact of sediment on cold water biota, and salmonid spawning.

The objectives of Forest Practices Program monitoring are to demonstrate the relative effectiveness of the BMPs and assure that beneficial uses are protected. The monitoring provides information to the agencies and the FPA advisory committee, as a basis for modification or improvement of the BMPs. The objectives of Forest Practices monitoring are listed below:

- Implementation monitoring by IDL, USFS, and BLM.
- An interagency audit every four years to quality assure implementation monitoring.
- Monitoring BMP effectiveness by IDHW, USFS, and BLM.
- Monitoring in-stream beneficial use status by IDHW, IDF&G, USFS and BLM.
- Assessment of all data by IDL, IDHW, IDF&G, USFS, and BLM for BMP effectiveness, modification, and improvement.

## CURRENT PROGRAM

The current Forest Practices program includes components of BMP effectiveness, i.e. implementation monitoring, pollutant source and transport monitoring, and beneficial use monitoring. Few previous projects by the cooperating agencies have applied all three components. Portions of each, however have been applied by the agencies.

### *BMP Effectiveness Assessment*

Assessment of BMP effectiveness is only achieved with an integrated program of BMP implementation monitoring, pollutant source and transport monitoring and beneficial use monitoring. The following section summarizes the current monitoring situation for the various components of BMP effectiveness assessment.

### *Implementation monitoring*

Monitoring compliance with BMPs on state and private lands is a task assigned to IDL. Ten Forest Practices Advisors in the field statewide complete this monitoring. The advisors inspect nearly all forest projects near class I (beneficial use sustaining) streams (Rickerd 1989). Advisors have enforcement capabilities.

The USFS and BLM enforce compliance with the BMPs through timber sale contracts with the buyers. Standard contract clauses contain the BMPs. Some standard contract clauses vary from the state approved BMPs. IDHW is working with the agencies to get these contracts in line with the state BMPs. An implementation quality assurance audit is conducted by an interagency task force every four years, (Bauer 1985; Harvey et al.1989; Harvey et al.1989). The lead agency for the audit is IDHW, based on the present MOU with IDL. The interagency audits have assessed compliance with BMPs on Forest Service, BLM, state, and private lands. These audits have attempted to gage qualitatively the relative effectiveness of the BMPs (see Pollutant Source and Transport Monitoring).

Results and recommendations from IDL, IDHW, and Forest Service implementation monitoring have been compiled by IDHW in the Forest Practices Water Quality Management Plan steering committee report. These recommendations have been provided to the FPA Advisory Committee for potential improvement of the BMPs.

### *Pollutant source and transport monitoring (PST)*

Only a few IDHW studies are in progress which use pollutant source/transport monitoring. The Twin Lakes Creek study has employed a tributary monitoring approach (Megahan 1982). Sediment stored behind channel obstructions in the first and second order drainage features has been monitored prior to and after road construction. Pollution source monitoring has also been undertaken by measuring nutrients from slash piles burned in first order drainages. A greater emphasis by IDHW on pollutant source and transport monitoring is required to assess BMP effectiveness.

The interagency Forest Practices audit team has made qualitative assessments of BMP effectiveness. Although qualitative in nature, these observations are a form of pollutant source and transport monitoring.

National forest monitoring plans have put a greater emphasis on pollutant source and transport monitoring. Some techniques, i.e., cross-sections and turbidity, are often not sensitive enough on some Idaho geologies. Other approaches, such as bedload and suspended sediments have been useful indicators of management effects on increasing sediment loads. In the Idaho Batholith, for example, bedload sediment comprises about 70% of the total sediment load (Megahan et al. 1986).

Forest Service research (Intermountain Station) has completed some valuable pollutant source and transport monitoring. Work on the Horse-Creek Watershed (Burroughs et. al. 1983) and the Silver Creek Watershed (Megahan 1982) have demonstrated the relative effectiveness of several road BMPs. Additional research of this type is required because it is often critical to assessing the effectiveness of BMPs in keeping soils in place. This research also provides methodologies for more generalized field monitoring.

The BLM has not participated in this form of monitoring to date.

***Beneficial use monitoring***

Three forest practices Water Quality Specialists are employed by IDHW. In most cases, monitoring has emphasized assessment of the status of beneficial uses in-stream. Monitoring has been based on three of the seven beneficial uses recognized in state standards. Turbidity and nutrients have been measured to assess impacts to domestic water supply. Sediment impact on intergravel dissolved oxygen and egg survival or alevin escapement have been measured to assess impacts to salmonid spawning. Sediment filling of interstitial space and turbidity have been used to assess impacts on cold water biota.

These monitoring data have been used for comparison of beneficial use status in relation to development in the watershed. They have not been compared to pollutant source and transport (PST) monitoring results, and thereby linked directly to specific practices on the watershed. This "linkage" is a vital need of the program.

Forest Service monitoring has included some beneficial use indicator monitoring. Cobble embeddedness (interstitial space filling) has been employed as a measure of the salmonid rearing component of cold water biota. Percent depth of fines has been used as a measure of salmonid spawning.

The BLM manages very little commercial forest land, and for this reason has not submitted or been asked to submit area monitoring plans, or engage in beneficial use monitoring as it relates to forest practices.

## RECOMMENDED PROGRAM

***BMP Effectiveness Assessment***

The antidegradation agreement alters the reporting of monitoring results in forest practices, but does not affect the types of monitoring currently required by the state standards. While implementing monitoring in antidegradation, the Forest Practices program will emphasize BMP effectiveness monitoring through combinations of implementation, pollutant source and transport, and beneficial use monitoring results.

For a given project, BMP effectiveness will be evaluated on-site as part of each Forest Practices Audit, by evaluations of pollutant source and transport, and by instream monitoring near the location of BMP application, (or mouths of tributaries transporting the pollutants).

## Implementation monitoring

Implementation monitoring will continue with significantly more intensive monitoring emphasis placed on designated stream segments of concern than currently required by federal monitoring plans. Monitoring will continue by IDL, USFS and the interagency audit teams, while BLM is encouraged to conduct quality assurance audits on a percentage of their sales yearly for implementation of BMPs.

On-site audits will be more formalized and occur on a representative percentage of Forest Practices projects state wide. A minimum of 10% is currently specified in the rules and regulations pertaining to the Idaho Forest Practices Act (Idaho Department of Lands 1988), however a higher percentage may be needed depending on the sensitivity of the beneficial use. Each Forest Practices Audit will be summarized in written form and supported with photo-documentation. Annual reports will be prepared and submitted to IDHW and IDL for cooperative evaluation of overall compliance and effectiveness state-wide.

## Pollutant source and transport

The monitoring agencies, especially IDHW, will need to place more emphasis on pollutant source/transport monitoring. Tributary monitoring (Megahan and Nowlin, 1976; Megahan 1982) in the drainage ways closest to the installed BMPs should be heavily relied upon by the forest practices program. The Department should encourage the national forests and BLM areas to incorporate this monitoring strategy into their forest and area management plans. The U.S. Forest Service Intermountain Station should be encouraged to develop additional pollutant source and transport monitoring techniques.

Parameters appropriate to this type of monitoring (see Appendix H for recommended sampling frequencies):

- Sediment accumulations in tributaries
- Sediment movement in tributaries
- Suspended sediment in streams
- Bedload sediment in streams
- Stream channel stability
- Streambank stability/erosion
- Sediment yield rated to discharge
- Floodplain/Riparian vegetation (potential input of large woody debris, percent cover, vegetative composition and condition)

## Beneficial use monitoring

Beneficial use monitoring will focus on designated stream segments of concern. Monitoring will emphasize the status of beneficial uses. IDHW will encourage the Forest Service and BLM to adopt methodologies which measure water quality parameters directly affecting beneficial uses. IDHW is studying potential sediment criteria which aim to more directly indicate sediment effects on beneficial uses.

Parameters appropriate for this kind of monitoring (see Appendix H for recommended sampling frequencies):

- Cobble embeddedness
- Percent surface fines
- Percent fines by depth
- Spawning redd % fines/bioassay
- Intergravel dissolved oxygen
- Turbidity for site feeding and domestic water supply
- Temperature
- Surface dissolved oxygen
- Thalweg profile surveys
- Physical habitat
- Fish populations
- Macroinvertebrates

Each agency will be encouraged to coordinate implementation, pollutant source and transport and beneficial use monitoring in-house. These monitoring efforts should emphasize stream segments of concern. Results will be combined and integrated to judge BMP effectiveness. Each agency will transfer its monitoring results and BMP effectiveness evaluation to IDHW data management and coordination system. The department will apply quality assurance and quality control protocols on the results as needed.

Results of BMP effectiveness analysis and the substantiating monitoring data will be transmitted to Local Working Committee and the FPA Advisory Committee for their consideration in regards to modification of BMPs.

# MINING

## INTRODUCTION

The goal of the monitoring program for mining is to protect and maintain designated and existing beneficial uses, and determine the status of compliance with state water quality standards. The purpose of monitoring is to provide sufficient quantitative information for making a reasonable determination regarding the impacts, if any, from mining activities to nearby surface waters and for evaluating BMP effectiveness. Monitoring is a vital component of the nonpoint source feedback loop provisions of the Water Quality Standards (IDHW 1985).

The types of mining operations that could potentially be required to have instream monitoring performed include surface mining, surface manifestations of underground mining, and dredge and placer mining. Monitoring at mining operations is conducted on a project by project, site-specific basis. The current emphasis is on trend and compliance monitoring. New programs such as the nonpoint source (319) program and antidegradation are expected to broaden the approach to include BMP effectiveness and beneficial use monitoring to better determine water quality status and detect possible impairment. The link between monitoring and beneficial use impairment is an important component of the feedback loop. BMP effectiveness monitoring is also a requirement of the feedback loop.

## CURRENT MONITORING PROGRAM FOR MINING

### *Description*

Management is carried out primarily by the Idaho Department of Lands (IDL), acting in the lead agency role for mining related programs. Its authority is through provisions of the Idaho Surface Mining Act (Idaho Code 1972), the Rules and Regulations Governing Exploration and Surface Mining Operations in Idaho (IDL 1989), the Idaho Dredge Mining Act (Idaho Code 1982), and the Rules and Regulations Governing Dredge and Placer Mining Operations in Idaho (IDL 1986). IDL's responsibilities include formulating and approving BMPs, confirming that they have been installed properly and in a manner consistent with agreements, permits, or approvals.

To obtain additional expertise on specific resource issues or because of statutory requirements, IDL works with a variety of other agencies (refer to section 3.A, notably IDHW, IDWR, and IDFG. The roles of cooperating agencies for mine nonpoint source monitoring activities, are listed below:

1. Idaho Department of Health and Welfare: The Water Quality Bureau is lead agency for all surface and groundwater quality monitoring and conducts monitoring surveys statewide; administers the state Water Quality Standards and Wastewater Treatment Requirements (IDHW 1985) and associated feedback loop, and the Rules and Regulations for Ore Processing by Cyanidation (IDHW 1988c) which requires monitoring.

2. Idaho Department of Water Resources: Authorities to permit stream channel alterations, including recreational dredge and placer mining, and tailing impoundment structures. No associated instream monitoring.

3. Idaho Department of Fish and Game: Provides fishery expertise relating to the designated beneficial uses of cold and warm water biota and salmonid spawning. Conducts fish population and habitat monitoring.

4. U.S. Forest Service: Conducts instream monitoring and on-site audits on lands under its jurisdiction.

5. Bureau of Land Management: Similar to USFS, although very little monitoring has been conducted to date.

6. U.S. Environmental Protection Agency: Lead agency for the National Pollutant Discharge Elimination System (NPDES), a point source permit program. Permits require routine monitoring of the discharge by the operator, with instream monitoring required in some cases. Data is forwarded to both EPA and IDHW.

Existing water quality monitoring programs commonly associated with mining activities include surface, subsurface, and NPDES sampling done by the operators, as well as agency trend and compliance monitoring.

Surface mining

The purpose of the current monitoring approach at existing surface mining operations is to detect long-term changes in specific parameters as a result of the operation. Therefore, the focus is on trend monitoring supplemented with compliance monitoring during site inspections. Monitoring at major operations is primarily the responsibility of the operator, and is supplemented by IDHW and USFS in some cases. Small, relatively short-term operations (less than 3 years) have generally had no associated monitoring. Exceptions to this are samples taken during compliance inspections.

The current program emphasizes sampling for physical and chemical constituents such as suspended sediment, turbidity, trace metals, cyanide, and pH, though monitoring of macroinvertebrate and fish populations is occurring at some locations.

On-site implementation audits are conducted by IDL, USFS or BLM, often using the interagency team approach, at the larger operations. IDL also coordinates their inspections with IDHW. In addition, BMP audits are independently conducted by IDL and inspections during runoff for compliance monitoring are independently conducted by IDHW. The audits, along with trend monitoring, have been the primary means of determining BMP effectiveness and identifying possible items needing improvement to meet water quality goals.

Cyanidation operations

Cyanidation operations are a sub-category of mines that come under the authority of specific water quality regulations with IDHW as lead agency (IDHW 1988c). The rules provide specific authority to require surface and groundwater monitoring data that describe baseline water quality and ongoing operational monitoring.

The purpose of operational monitoring at cyanidation operations is the early detection of a release of process water. Operational monitoring includes monitoring for leak detection under process ponds and testing the heap leachate solution for cyanide levels prior to off loading. The mining operation is primarily responsible for the monitoring program which is approved through the permit process by IDHW.

The scope of these rules limit the ability to address sediment or other impacts outside of the cyanide processing and waste disposal area. Therefore, monitoring associated with potential runoff from the mine or other disturbed areas not directly associated with the cyanidation facility is addressed under the water quality standards feedback loop and IDL's permit.

Dredge and placer operations

Monitoring conducted at dredge and placer mining operations consists primarily of turbidity or suspended sediment sampling for compliance with water quality standards. This monitoring is conducted during inspections by IDHW. Currently, these operations are approved based on total containment of wastewater in settling ponds. No NPDES permits have been issued by EPA for dredge or placer mining operations.

On-site BMP audits are routinely conducted by IDL, often in coordination with other agencies. These inspections have been the primary means of determining BMP effectiveness and identifying possible items needing improvement to meet water quality goals.

Underground mines

IDL has no statutory authority to regulate the surface effects of underground mining. Monitoring conducted at underground operations is for the purpose of compliance with EPA administered NPDES permits. BMPs may be incorporated in a permit, if applicable.

The emphasis is on sampling for physical and chemical constituents such as suspended sediment, turbidity, trace metals, and pH. Sampling is the responsibility of the operator and is primarily conducted at or near the discharge point. Instream monitoring is required in some permits.

## RECOMMENDED MONITORING PROGRAM FOR MINING

### *Description*

The antidegradation agreement is having a significant influence on the future direction of all nonpoint source programs, including mining. Language specifically intended to meet the requirements of the antidegradation agreement for the mining industry were incorporated into the Rules and Regulations Governing Exploration and Surface Mining Operations in Idaho, which were adopted by the state Board of Land Commissioners on November 1, 1989. The rules include generic BMPs, a requirement for monitoring where there is reasonable potential for nonpoint source impacts to surface water, and provide for modification of BMPs where necessary to protect beneficial uses of the water. Similar provisions are currently being added to the dredge and placer mining rules. Sections of the "319" Nonpoint Source Management Program (IDHW 1989) provide additional guidance and direction for nonpoint source management.

Significant monitoring responsibility lies with the operator. All surface, dredge, and placer mines are now subject to monitoring requirements for antidegradation as part of the permit from IDL. In their application to IDL, operators must identify foreseeable site-specific nonpoint sources and the measures to control them. When IDL, in consultation with IDHW determines that there is reasonable potential for nonpoint pollution, the operator must provide baseline pre-project monitoring data and ongoing data during the life of the project. Data will be forwarded by IDL to IDHW for integration with other data pertaining to a given watershed or stream segment. Operations may also be required to prepare annual data summaries and perform data analyses after two years of data are collected. IDHW will also perform routine data analysis to determine BMP effectiveness and beneficial use support.

Should monitoring data reveal undesirable trends in water quality, that criteria are not being met, or beneficial uses are being impaired, IDHW and IDL will consult the mine operator to determine which remedies are most appropriate for the situation. The IDFG, USFS, or BLM may also be involved in the consultation process, as appropriate. The IDL will then work with the mining company to implement the necessary program changes in a timely manner. Changes may include better use of approved BMPs, modification of BMPs, or expanded monitoring requirements such as additional parameters, frequency, or sampling points.

The monitoring program for mining will place more emphasis on BMP effectiveness and beneficial use monitoring to implement feedback loop (see Appendix G) regulations and antidegradation. Monitoring needs to provide a more direct link to beneficial uses such as cold water biota, salmonid spawning, and drinking water supply. This will be IDHW's focus. In a watershed of mixed land ownership a coordinated approach will require federal agencies (USFS and BLM), and mining operations to assume more responsibility for monitoring. Data collected by these agencies and industries will also be submitted to IDHW in a usable format. IDHW will conduct some beneficial use monitoring at mining operations. IDHW will also be involved in quality assurance and verification of monitoring conducted in relation to mines.

Trend and operational monitoring will continue. Data collected in accordance with the nonpoint source monitoring program will be submitted to the IDHW central data base. IDHW oversight and quality assurance requirements will be integrated into mine monitoring plans. Agency beneficial use monitoring efforts should give priority to stream segments of concern identified under antidegradation. Validation of new BMP methods or monitoring approaches would be conducted through cooperative demonstration projects.

There are three components of BMP effectiveness monitoring: BMP implementation audits, pollution source and transport monitoring (which includes both a land and instream monitoring component), and beneficial use monitoring to detect impairment or improvement. The current program does not adequately address pollution source and transport monitoring and beneficial use monitoring. Each type of extraction activity has its own set of unique circumstances, therefore audit criteria and sampling parameters are expected to vary somewhat between operations, depending on the types of potential impacts. On some projects instream sampling may prove to be unnecessary due to the operation being of limited scope or duration, or the absence of live waters in the vicinity. However, no project would be exempt from using appropriate BMP measures.

BMP implementation audits

Interagency on-site BMP audits will continue as in the past. The objective of these audits is to confirm proper installation, use and maintenance of BMPs. Potential problems would be identified and recommendations from the audit team for improvements would be conveyed to the operator by IDL. Typical deficiencies an audit could be expected to reveal include inadequate implementation of BMPs that were agreed upon, or a lower level of nonpoint source control than anticipated from a particular BMP method. For instance, indications of erosion or sediment pathways which the BMP program may not be fully addressing would be noted and brought to the attention of the operator for remedy. Improvements and corrective action before instream water quality is affected is a priority goal of the nonpoint source program and consistent with the purpose of this plan.

It is recommended that a quality assurance (QA) audit be conducted statewide on a cross section of mining operations by a single interdisciplinary, independent team every three or four years. Such an audit would provide a quality assurance check on the general audit program and promote consistency within the program. The QA audit would be based on a pre-determined set of criteria. Although supplemental to the routine audits, for practical purposes the statewide audit could be conducted in lieu of a routine audit at the operations selected. Results would be published and made available to agencies, industry, and the public. This report would provide documentation of how well the program and the BMPs are working from a statewide perspective.

Pollutant source and transport monitoring

This aspect of BMP effectiveness monitoring needs more emphasis. It may involve either or both an evaluation of the potential pollutant sources, which is typically a part of the BMP audit, and instream monitoring to assess the pollutant transport component. Source monitoring may include visual assessments of sediment accumulations near streams and movement into streams, source characterization, and photo documentation. The transport component may involve monitoring in the tributaries at locations upstream and downstream from the installed BMPs.

For in-stream monitoring close to the source and source characterizations, a monitoring program in most situations (with site-specific modification where needed) should generally include the following chemical parameters:

pH
conductivity
trace metals (iron, cadmium, copper, lead, zinc, arsenic, mercury)
<u>In addition, at cyanidation facilities:</u>
cyanide, weak acid dissociable (WAD)
cyanide, total (for drinking water supply)
cyanide, free
salts (chloride, sulfate, nitrate)
other reagents associated with a facility

In addition, the following physical parameters may be appropriate:

suspended sediment
sediment load
bedload sediment
turbidity
stream bank stability/erosion
stream channel stability

Beneficial use monitoring

The monitoring program should also provide a more direct link to beneficial uses of the stream. The objective is to evaluate the support status of the designated or existing beneficial uses and to determine if the mining activity is adversely affecting them. It will involve more biological monitoring and potentially the use of methodologies for assessing sediment impacts on beneficial uses which are currently being validated by the IDHW. Mining operators are expected to assume responsibility for the water quality monitoring (chemical or physical "grab" sampling, and the biological, in certain cases). IDHW will conduct beneficial use monitoring in the mine areas as well as quality assurance and verification monitoring.

Water quality parameters directly related to the beneficial uses of cold water biota and salmonid spawning, include the following:

turbidity (for site feeding)
surface dissolved oxygen
temperature
pH
trace metals
cyanide, WAD
<u>biological assessment-</u>
macroinvertebrates
fish populations

IDHW would be primarily responsible for monitoring the following parameters, where appropriate:

cobble embeddedness
intergravel dissolved oxygen
percent surface fines
percent fines by depth
thalweg profile surveys
physical habitat (cross section, percent riffle/pool/glide, etc.)

For protection of waters designated for domestic water supplies, parameters that need to be monitored would correspond to the domestic water supply standards (IDHW 1985).

Biological monitoring may involve the use of rapid bioassessment techniques (Plafkin et. al. 1989) and resulting data should be compared with control segments or ecoregion reference streams (Omernick and Gallant 1986). The degree to which the post-operation fauna is similar to the regional fauna or baseline condition by using bioassessment measures is a direct measure of program effectiveness.

Implementation schedule

Recommended Monitoring Actions

1. New mining operations will provide pre-operational baseline water quality data prior to construction. This is required unless IDL and IDHW determine that there is no reasonable potential for nonpoint source pollution.

2. BMP implementation and effectiveness audits will be conducted by the lead land management agency at all operating mines.

3. All instream monitoring data and reports of data analyses are submitted, through appropriate channels, to IDHW for review, analysis, and, if necessary, for purposes of initiating corrective action via the feedback loop process.

4. Validation of new BMP methods or monitoring approaches is performed through research along with cooperative demonstration projects.

5. Although currently IDHW routinely reviews all mining monitoring data collected, every two to three years, beginning in the fourth quarter of 1992, IDHW will conduct a special review of all mining monitoring data to determine if water quality goals are being met. A report summarizing and analyzing the data will be provided to IDL, other agencies, the mining industry, and the public.

6. Every three years, beginning in 1991, a statewide quality assurance audit of a cross section of mining operations will be conducted by an interdisciplinary, independent team. Results will be published, potentially in conjunction with the monitoring data review.

7. Based on the monitoring and audit summary reports, IDL will implement appropriate changes in the BMPs or the monitoring program, with the recommendation of IDHW, and input from the public as well as the Mining Advisory Committee (MAC).

## MONITORING PROGRAM IMPLEMENTATION

### TECHNOLOGY TRANSFER AND TRAINING

IDHW is currently testing a number of new and innovative water quality and habitat monitoring techniques. These include rapid bioassessment of macroinvertebrates, cobble embeddedness, use of artificial fish egg pockets, study of intergravel dissolved oxygen and sediment, streambank erosion measurements and stabilization, thalweg profiles, economic analysis of fish populations, etc. Training will be provided to all cooperating agencies and groups involved with the antidegradation monitoring as the technology is available.

### CITIZEN PARTICIPATION

#### *Basin area meetings*

The Basin Area Meetings are meetings held around the state to solicit public input on stream segments of concern. The meetings are coordinated by IDHW. During July 1989 a total of eight meetings were held in the six major hydrologic basins in the state. Citizens also supplied information on stream segments of concern via mail in forms. Basin Area Meetings will be held every other year (on odd years) and the locations will rotate.

#### *Citizen monitoring*

Citizen monitoring has been used on several stream and lake (Bellatty 1989) surveys in Idaho. The Citizen Lake Monitoring Program is in its fourth year in the state with 12 lakes participating. Citizen monitoring is an important part of the water quality monitoring programs of several states and Idaho's program is nationally recognized. Adequate resources have to be allocated for the training, supervision, and quality assurance of persons involved in any citizen monitoring program.

### FUNDING

#### *Federal sources*

State funds to implement the antidegradation agreement were first appropriated in 1989. IDHW does receive some funding from EPA for special project monitoring. USGS is matching IDHW funds on the Trend Monitoring network and funds the NASQAN stations. The U.S. Forest Service contributes much in the way of monitoring. SCS and other agencies may become more involved in the future. Continued funding from these sources is essential to the success of the coordinating monitoring program.

### *State sources*

The Idaho State legislature provided initial funding for monitoring under the antidegradation agreement. This level of funding is not adequate to address all the needs or expectations identified in the Basin Area Meetings. After the first year of antidegradation monitoring is completed, more realistic budget projections with justification can be presented to the legislature.

### *Other sources*

Other sources of funding will be explored as the need arises and as these sources become known.

## PLAN AMENDMENTS AND FEEDBACK MECHANISMS

In order for this monitoring plan to work it must be dynamic. Various aspects of nonpoint source pollution including water quality monitoring are seeing rapid change and improvement. The hope is to have this monitoring plan be "state-of-the-art."

### *Monitoring Program Reports*

Progress made as a result of this coordinated nonpoint source monitoring effort will be reported to the governor and the Water Quality Working Advisory Committee on an annual basis.

## BMP FEEDBACK

The Feedback Loop is discussed in detail above. The loop allows for improvements to be made in best management practices so that water quality goals can be met. This type of evaluation will occur on an ongoing basis. The results of the evaluations will be forwarded to the responsible regulatory or land management agency. Changes to best management practices will be made by the responsible entity to comply with Idaho water quality standards.

## MONITORING TECHNIQUES IMPROVEMENT

The Division of Environmental Quality and others are in the process of developing and testing improvements in water quality monitoring techniques. As new techniques become available they will be used in future revisions of this monitoring plan.

## ANNUAL WATER QUALITY MONITORING PLAN REVIEW AND AMENDMENTS

Progress made as a result of this coordinated nonpoint source monitoring effort will be reviewed by the Technical Advisory Committee on an annual basis. Suggestions for improvement of the plan will also be reviewed and implemented at that time. IDHW will revise this document, as needed, every two years during the years that the Basin Area Meetings are held and Stream Segments of Concern are chosen. Any suggestions for improvement of this document should be sent in writing to IDHW-DEQ, Boise, Idaho.

# SUMMARY

An Antidegradation Agreement for Idaho has been finalized after months of negotiations between agricultural, timber, and mining interests, Indian tribes, sportsmen, and the conservation community. The key provisions of this landmark agreement are; Basin Area Meetings will be held biennially across the state to discuss water quality and to allow citizens to nominate stream segments of concern, establishment of a coordinated monitoring program, and a establishment of a process for designating outstanding resource waters.

The water quality monitoring program plan was developed by an eight member technical advisory committee. Its broad objective is to maximize water quality data collection efforts in Idaho by providing a standard monitoring format that all can follow, by eliminating duplication of monitoring effort and development of a shared common surface water quality database. The program will require cooperation by all involved with water quality monitoring in Idaho.

This document describes Basin and Watershed Trend Monitoring; Beneficial Use Monitoring; and Best Management Practice (BMP) Effectiveness Monitoring. Basin trend monitoring is conducted on seven large basins by the U.S. Geological survey. Monitoring on an additional 56 watershed trend monitoring sites began by the U.S. Geological Survey in October 1989 under a joint funding agreement with Idaho Department of Health and Welfare.

Beneficial use monitoring will address the current status, any change, and use attainability of existing beneficial uses. Site selection will be based upon a combination of land uses, stream and land types, and the existing uses of water. Parameter selection is oriented to the most sensitive beneficial use.

Best management practice effectiveness monitoring applies on-site, pollutant source and transport, and in-stream beneficial use assessments in combination to determine the effects of nonpoint source activities on water quality. Prioritization for BMP effectiveness monitoring is based on the most sensitive land types, the significant nonpoint source activities, BMPs that have not been adequately evaluated, stream segments of concern, waters with beneficial use impairment, or areas of increasing development. In-stream water quality monitoring parameter selection is based on the most sensitive beneficial use or pollutant source and transport parameters appropriate to the BMPs being addressed. Reference sample sites are to be used to assess in-stream effects relative to baseline conditions.

The monitoring program addresses the three main nonpoint source activities in Idaho: agriculture, forestry, and mining. For each of these activities an introduction and objectives section is included, as well as a description of the current program and a description of the program recommended by this document.

The coordinated resource management planning approach will identify sources, impacts, responsibilities, funding sources, and priorities for Agriculture. For dryland agriculture the monitoring focus will be on bioassessment and habitat assessment. Monitoring for irrigated agriculture will focus on nutrients, suspended sediment and bacteria. The grazing and riparian aspects of agriculture will be monitored by a focus on streamside vegetation, streambank condition, instream habitat, grazing intensity, bioassessment, nutrients, and temperature.

Monitoring in forestry will focus on biological beneficial use impacts from sediment, temperature, and large organic debris. Best management practice effectiveness monitoring will include on-site implementation audits, pollutant source and transport, and beneficial use

attainment assessments, fully coordinated between Idaho Department of Health and Welfare, U.S. Forest Service, Bureau of Land Management, and Idaho Department of Lands.

In mining the monitoring focus is on heavy metals, toxics, sediment, channel stability, biological beneficial use impacts, dissolved constituents, temperature, and pH. Best management practice effectiveness monitoring will include on-site implementation, pollutant source and transport, and beneficial use assessments, coordinated between operators, Idaho Department of Lands, Idaho Department of Health and Welfare, Idaho Department of Fish and Game, U.S. Forest Service, and Bureau of Land Management.

A listing of appropriate water quality monitoring parameters and protocols is included for reference. A checklist of major items to be included in a nonpoint source water quality monitoring plan is included as a practical guide to plan preparation.

Users are encouraged to contact Idaho Department of Health and Welfare, Division of Environmental quality, Statehouse, Boise Idaho 83720, with any comments, corrections, or suggestions for improvement of this document. It will be revised every two years or as necessary.

## GLOSSARY

**accuracy** - degree of conformity of a measure to a standard or true value.

**agriculture** - an activity which may be a category of nonpoint source pollution including but not limited to irrigated or non-irrigated crop production, specialty crop production (truck farming, orchards, etc.), pastureland, rangeland, feedlots, aquaculture, and animal holding areas.

**agricultural water supply** - waters which are suitable or intended to be made suitable for the irrigation of crops or as drinking water for livestock.

**alevin** - newly hatched, incompletely developed fishes (usually salmonids) still in nest or inactive on bottom, living off stored food (yolk).

**anadromous**- pertaining to those fishes which spend their adult lives in marine water and migrate to fresh water to spawn.

**antidegradation** - a policy established by EPA which sets minimum requirements for states to conserve, maintain, and protect existing uses and water quality. The antidegradation policy consists of three tiers: 1) requires that existing uses of a water segment and the level of quality necessary to protect the use must be maintained, 2) requires protection of actual water quality (unless certain conditions are met) in segments where water quality exceeds levels necessary to support propagation of fish, shellfish, and wildlife, and recreation in and on the water, and 3) requires special protection of waters for which typical use classifications may not be sufficient to protect outstanding national resource waters (U.S. Environmental Protection Agency 1988c).

**ASCS** - the Agricultural Stabilization and Conservation Service, a branch of the U.S. Department of Agriculture responsible for funding of projects related to agriculture.

**aquatic** - growing in, living in, or frequenting water.

**aquifer** - a sand, gravel, or rock formation capable of storing or conveying water below the surface of the land and yielding it in useful quantities.

**audit** - to examine with intent to verify. A formal or official examination and verification of an action (such as BMP implementation) compared to a set of standards (for such BMP implementation). An audit is a means of determining compliance with rules or standards.

**bank erosion** - the wearing away of the bank of a stream by the flowing water, usually along the concave bank at a bend at the time of accelerated flow (spring runoff).

**Basin Area Meetings (BAMs)** - one of the three key provisions of the Idaho Antidegradation Agreement which provides for biennial public meetings to be the principal process for public review and input on decisions affecting water quality. The meetings are held in each of the six river basins of Idaho. The meetings are chaired by the governor or his designee and are sponsored jointly by state and federal agencies, Indian tribes, industry, and user groups. The purposes of the BAMs are to discuss the current status of water quality, fish habitat and trends and their conditions, and to allow citizens to nominate stream segments of concern.

**basin trend monitoring** - ambient trend monitoring conducted by U.S. Geological Survey in the six hydrologic basins in Idaho. These stations are part of the U.S. G. S. National Stream Quality Accounting Network (NASQAN) program.

**bedload** - sand, silt, gravel, or soil and rock detritus (fragments) carried by a stream on or immediately above (3") its bed.

**beneficial uses** - any of the various uses which may be made of the water of an area, including, but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics.

**beneficial use monitoring** - in-stream monitoring adequate to determine current status (condition), change (impairment or improvement), and/or use attainability (potential condition) of existing beneficial uses of water or those designated in the Idaho water quality standards.

**benthic** - pertaining to or living on the bottom or at the greatest depths of a body of water.

**best management practice (BMP)** - a measure determined to be the most effective, practical means of preventing or reducing pollution inputs from nonpoint sources in order to achieve water quality goals.

A variety of definitions exist for best management practices. The definition used in the Idaho Department of Health and Welfare (1985) water quality standards is as follows: "Best Management Practice. A practice or combination of practices determined by the Department to be the most effective and practicable means of preventing or reducing the amount of pollution generated by nonpoint sources".

**best management practice effectiveness monitoring** - assessment of on-site BMP adequacy, pollutant source and transport (PST), and in-stream beneficial use status which, in combination, is sufficient to determine the effect of the nonpoint source activity on existing beneficial uses of water or those designated in the Idaho water quality standards.

**biota** - all life (plants and animals) of a region.

**coliform bacteria** - a group of bacteria predominantly inhabiting the intestines of man and animal but also found in soil. While harmless themselves, coliform bacteria are commonly used as indicators of the possible presence of pathogenic organisms.

**conductivity** - a measure of the conducting power of a solution. Expressed in micromhos per centimeter at 25°C.

**construction** - an activity which may be a category of nonpoint source pollution including but not limited to highway, road, or bridge building, and land development.

**Coordinated Monitoring Program** - one of the three key provisions of the Idaho Antidegradation Agreement to assure the highest protection of Idaho's water resources by developing a coordinated monitoring program. This program is designed by the agencies and industries responsible for water quality monitoring to maximize time spent collecting water quality data and assure compatibility in the information that is collected. Monitoring in areas of special concern will be significantly more intensive than the normal water quality monitoring activities.

**CRM (Coordinated Resource Management)** - a tool for coordinating resource planning, management and educational activities with local agencies, private landowners, and others. Until recently termed CRMP, (Coordinated Resource Management Planning). CRM cooperating agencies in Idaho include: Idaho Department of Fish and Game; Idaho Department of Lands; Idaho Soil Conservation Commission; U.S. Department of Agriculture (Cooperative Extension Service, Forest Service, and Soil Conservation Service); and U.S. Department of Interior, Bureau of Land Management.

**cubic feet per second (cfs)** - a measure of discharge or flow. The amount of water passing a given point, expressed as number of cubic feet in each second of time.

**cubitainer** - disposable one quart (one liter) sample containers made of polyethlene.

**DEQ** - Division of Environmental Quality, State of Idaho, Department of Health and Welfare, 1988-present.

**dissolved oxygen** - commonly abbreviated DO it is the amount of oxygen dispersed in water and is usually expressed as milligrams per liter (parts per million). The amount of oxygen dissolved in water is affected by temperature, elevation, and total dissolved solids.

**domestic water supply** - waters which are suitable or intended to be made suitable for drinking water supplies.

**ecoregion** - areas of relative homogeneity in ecological systems or in relationships between organisms and their environments. Idaho has been divided into nine ecoregions (Omernick and Gallant 1986).

**effluent** - any wastewater discharged from a treatment facility.

**electrofishing** - the use of electricity to capture fish. A direct current field is introduced into the water and the fish typically turn toward the anode and exhibit positive galvanotaxis (forced swimming with orientation towards the positive probe). The fish tend to move toward the anode where they roll over and are easily captured with nets.

**embeddedness (cobble embeddedness)** - the amount of fine sediment that is deposited in the interstices (spaces) between larger stream substrate particles.

**environment** - all the external conditions (both living and nonliving) surrounding a living organism.

**erosion** - the wearing away of areas of the earth's surface by water, wind, ice, and other forces. Culturally-induced erosion is that caused by increased runoff or wind action due to the work of man in deforestation, cultivation of the land, overgrazing, and disturbance of the natural drainage; the excess of erosion over that normal for the area.

**eutrophic** - nutrient rich or fertile body of water.

**evaluated** - a stream segment (or aquifer) water quality assessment based on information other than site-specific data. Examples include data on land use, location of nonpoint sources, predictive modeling, citizen complaints, and surveys by fisheries personnel. Perception and best professional judgement are also methods for "evaluated" conditions. Assessments based on chemical or biological data that is older than five years is also considered "evaluated," not monitored information.

**feedback loop** - a process of nonpoint source management based on implementation of best management practices (BMPs). BMPs are identified through a planning process and applied by land managers for site-specific conditions. The effectiveness of the BMPs in protecting water quality is evaluated through instream water quality monitoring. The data is then evaluated against instream criteria developed to protect the beneficial uses of the water.

**forestry** - an activity which may be a category of nonpoint source pollution including but not limited to harvesting, reforestation, residue management, forest management, road construction, and maintenance.

**fully supported (beneficial use)** - there are no sources (point or nonpoint) present that could interfere with the use. If sources are present information indicates that the uses are fully attained.

**geomorphology** - the study of the landforms of the earth and the processes that shape them.

**groundwater** - the water occupying the pores, fissures, cracks, or cavities below the land surface.

**habitat** - a specific type of place that is occupied by an organism, a population or a community.

**HEP** - habitat evaluation procedures. The aquatic habitat evaluation procedures model developed by the U.S. Department of Interior, Fish and Wildlife Service. The model uses a cluster of aquatic habitat descriptors in a predictive model to quantify the effects of change in streamflow on fish survival, for example.

**herbicide** - A chemical used to control, suppress, or kill plants, or to severely interrupt their normal growth processes (Beste 1983); a type of pesticide.

**hydrologic/habitat modification** - a category of nonpoint source pollution including but not limited to channelization, dredging, dam construction, flow regulation or modification, bridge construction, removal of riparian vegetation, and streambank modification or destabilization.

**ID (interdisciplinary)** - a group of two or more scientific disciplines which form a team for audit or inspection purposes.

**impact** - when an activity has caused pollutants to enter surface or ground waters.

**impair (beneficial use impairment)** - when a pollutant impacting surface waters affects a beneficial use so that the use is no longer fully supported.

**inorganic** - materials not derived from hydrocarbons.

**insecticides** - chemicals used to kill insects.

**irrigation return flow** - surface and subsurface water which leaves the field following the application of irrigation water.

**land disposal** - a category of nonpoint source pollution including but not limited to sludge, wastewater, landfills, industrial land, on-site wastewater systems (septic systems, etc), and hazardous wastes.

**loading** - the quantity of a substance entering a receiving stream, usually expressed in pounds (kilograms) per day or tons per month. Loading is calculated with flow (discharge) and concentration data.

**LOD** - large organic debris, mainly trees and stumps.

**MAC** - Mining Advisory Committee; recommended in the NPS Management Plan (Idaho Department of Health and Welfare 1988a) as a group to advise IDL on mining-related issues.

**macroinvertebrate** - aquatic animals large enough to be seen without magnification (usually greater than 30 mesh in size) and without a spinal column. In streams and lakes these are usually insects but also include worms, snails, clams, crustaceans, etc.

**mean** - the arithmetic mean is calculated by summing all the individual observations or items of a sample and dividing this sum by the number of items in the sample. The geometric mean is used to calculate bacterial numbers.

**meter** - the basic metric unit of length; 1 meter = 39.37 inches or 3.28 feet.

**milligrams per liter (mg/L)** - see parts per million.

**mining** - an activity which may be a category of nonpoint source pollution including but not limited to surface mining, subsurface mining, placer mining, dredge mining, petroleum activities, mill tailings, and mine tailings.

**monitoring** - the process of watching, observing, or checking (in this case water). The entire process of a water quality study including: planning, sampling, sample analysis, data analysis, and report writing and distribution. Instream water quality sampling. See **Audit, Evaluation.**

**monitored** - a stream segment (or aquifer) water quality assessment based on site-specific data no more than five years old. Sources of data may include chemical analyses of water, sediment, or biota in published reports, computer data bases, or office files.

**MOU** - memoranda of understanding.

**nonpoint source pollution (NPS)** - a decrease in water quality or impairment of beneficial uses caused by sediment, nutrients, organic and toxic substances, and bacteria originating from land-use activities and/or from the atmosphere, which are carried to lakes and streams by runoff. Nonpoint source pollution occurs when the rate at which these materials entering water bodies exceeds natural levels. Nonpoint source pollution cannot be traced to a specific, identifiable point of entrance to water. Nonpoint source pollution is usually considered the opposite of point source pollution.

**not supported (beneficial use)** - waters where a beneficial use cannot be sustained by the water. For any one pollutant where EPA criteria or state standards are exceeded by more than 25%, or criteria or standards are exceeded by 11-15% and the mean of measurements is greater than the criteria or standards. Generally, pollutants not found at levels of concern (Idaho Department of Health and Welfare 1989a).

**partially supported (beneficial use)** - water where there is some uncertainty about beneficial use support. For any one pollutant that has been "monitored," EPA criteria or state standards are exceeded by 11-25% and the mean of measurements is less than the criteria; or criteria or standards are exceeded by less than 10% and the mean is greater than the criteria. On the basis of evaluated data (nor monitored), nonpoint sources are present but may not affect the beneficial use(s), or no sources are present but there are complaints on record (Idaho Department of Health and Welfare 1989a).

**PPM (parts per million)** - the most common measure of constituents in water. It is equivalent to "milligrams per liter, mg/L" and "milligrams per kilogram." Equivalent to one drop of water in 12 gallons. Some pollutants, especially toxic materials are measured in parts per billion (ppb) or micrograms per liter (equivalent to 1 drop in 10,000 gallons).

**pathogen** - disease-causing organism.

**periphyton** - attached, submerged, microscopic organisms growing on the bottom or other submersed substrates in a waterway.

**pesticide** - a broad term that includes all chemical agents used to kill animal and vegetable life (Hampel and Hawley 1976). Included are algicides, insecticides, herbicides, and fungicides.

**pH** - the symbol for the logarithm of the reciprocal (a numerical measure) of hydrogen ion concentration, used to indicate an acid or alkaline condition. A pH of 7 indicates neutrality, less than 7 is acid and greater than 7 is alkaline.

**point source pollution** - the type of water quality contamination resulting from the discharges into receiving waters from sewers and other identifiable "points". Common point sources of pollution are the discharges from industrial and municipal sewage plants.

**pollution** - whatever makes land, water and air contaminated and unhealthy for many forms of life.

**pollutant source and transport (PST)** - monitoring that directly ties the impacts instream to nonpoint source pollution activities where the BMPs are located. Conducted on tributaries or land adjacent to the source activities. Examples include streambank condition assessments, sediment accumulation or discharge measurements, acid discharges, etc.

**potentially at risk** - those waters that fully support their designated uses but that may not fully support uses in the future because of anticipated sources or adverse trends of pollution (Idaho Department of Health and Welfare 1989a).

**precision** - the degree to which two values agree. In water quality monitoring the precision estimate is the average relative range between a given parameter in a split sample.

**quality assurance (QA)** - the total integrated program for assuring the reliability of monitoring and measurement data. A system for integrating the quality planning, quality assessment, and quality improvements to meet user requirements.

**rapid bioassessment** - refers to several protocols that the U.S. EPA and several states have developed to enable scientists to examine the biological community of a stream taking less time than conventional methods of analysis.

**redd** - a type of fish spawning area associated with flowing water and clean gravel. Fishes that utilize this type of spawning area include trout, salmon, and some minnows.

**riparian habitat** - relating to or living or located on the bank of a natural watercourse. The zone of streamside vegetation between the water's edge and the start of upland plants such as sagebrush, grass or forest. Typical riparian vegetation includes willows, cottonwoods, and wild rose at lower elevations and aspen and alder at higher elevations.

**runoff** - the portion of rainfall, melted snow, or irrigation water that flows across the surface or through underground zones and eventually runs into streams.

**salmonid spawning** - waters which provide or could provide a habitat for active self-propagating populations of salmonid fish species.

**secondary contact recreation** - surface waters which are suitable or are intended to be made suitable for recreational activities on or about the water and which are not included in the primary contact category. These waters may be used for fishing, boating, wading, and other activities where ingestion of raw water is not probable.

**Section 319** - the most recent section of the Clean Water Act with nonpoint source pollution significance. The section requires states to inventory waters that fail to meet water quality standards because of nonpoint source pollution, to present a plan for controlling nonpoint sources, and a schedule for implementation.

**sediment** - solid material that originates mostly from disintegrated rocks and is transformed by, suspended in, or deposited from water; it includes chemical and biochemical precipitates and decomposed organic material such as humus. The quantity, characteristics, and cause of the occurrence of sediment in streams are influenced by environmental factors. Some major factors are degree of slope, length of slope, soil characteristics, land usage, and quantity and intensity of precipitation.

**seral** - pertaining to a succession of plant communities in a given habitat leading to a particular climax association; a stage in a community succession

**SCS** - Soil Conservation Service (U.S. Department of Agriculture).

**soil erodibility** - an indicator of a soil's susceptibility to raindrop impact, runoff, and other erosional processes.

**soil erosion** - the detachment and movement of soil from the land surface by wind or running water, including normal soil erosion and accelerated erosion.

**specific conductance** - also known as specific conductivity. It is a numerical expression of the ability of an aqueous solution to carry electric current, expressed in micro ohms per cm at 25°C. Conductivity is defined as the reciprocal of the resistivity normalized to a 1 cm cube of liquid at a specific temperature.

**split sample** - a collected sample that is divided in half in such a manner that each half represents a representation of the water quality conditions at a sample station at a given time. This gives an estimate of precision.

**storm event** - a precipitation occurrence of great enough magnitude to be described as greater than normal for a specific area and time of year. Usually precipitation amount exceeds the ability of the soil to assimilate the water and runoff occurs.

**stream segment of concern** - one of the three key provisions of the Idaho Antidegradation Agreement which states that the public will nominate stream segments of concern at the biennially held Basin Area Meetings. These are stream segments which are felt to need heightened levels of water quality protection beyond current regulations. A Stream Segment of Concern will become the highest priority for agency resources and will be the focus for water quality monitoring projects.

Best Management Practices in Stream Segments of Concern may exceed those required by the regulations. The sponsoring agencies and organizations will attempt to reach consensus on areas to be designated Stream Segments of Concern. If they cannot reach consensus, the Governor will make the decision. The stream segment of concern is a stream segment or body of water that has been published in a final basin area report and subsequently published every two years as an addendum to the state of Idaho water quality standards.

**substrate** - the material making up the bed or bottom of a stream or other body of water.

**tailwater** - the runoff of irrigation water from the lower end of an irrigated field.

**taxon** - singular for taxa. The name applied to a taxonomic group in a formal system of nomenclature.

**TDS** - total dissolved solids.

**thalweg** - the deepest or main portion of a stream channel.

**transect** - a sample area, usually in the form of a long continuous line.

**turbidity** - condition of water resulting from suspended matter; water is turbid when suspended material is conspicuous.

**urban runoff** - a category of nonpoint source pollution including but not limited to storm sewers, combined sewers, and surface runoff.

**use attainability** - this is a type of beneficial use analysis that is a multi-faceted assessment of the physical, chemical, biological, and economic factors which affect the attainment of a use.

**WAD** - weak acid dissociable cyanide, the sum of free cyanide and all but the most refractory metal-cyanide complexes, such as the iron, gold, cobalt, and platinum cyanides.

**warm water biota** - waters which are suitable or intended to be made suitable for protection and maintenance of viable communities of aquatic organisms and populations of significant aquatic species which have optimal growing temperatures above 18°C.

**water pollution** - water made unsafe to use because of sewage, industrial waste, and other wastes that have found a way into it.

**water quality** - the characteristics or properties of water. A term used to describe the chemical, physical, and biological characteristics of water in respect to its suitability for a beneficial use.

**water quality standard** - the legally allowed concentration of a constituent in natural waters or effluent discharges. Generally expressed as the maximum (minimum for dissolved oxygen) allowable concentration and addressed to a particular use.

**watershed** - the geographic region contributing to a water body. The area contained within a divide above a specified point on a stream. It may also be termed drainage area or drainage basin.

**watershed trend monitoring** - ambient trend monitoring conducted by U.S. Geological Survey in the major watersheds in Idaho.

**water table** - the upper level of saturated zone below the soil surface.

**water year** - October 1st to September 30th.

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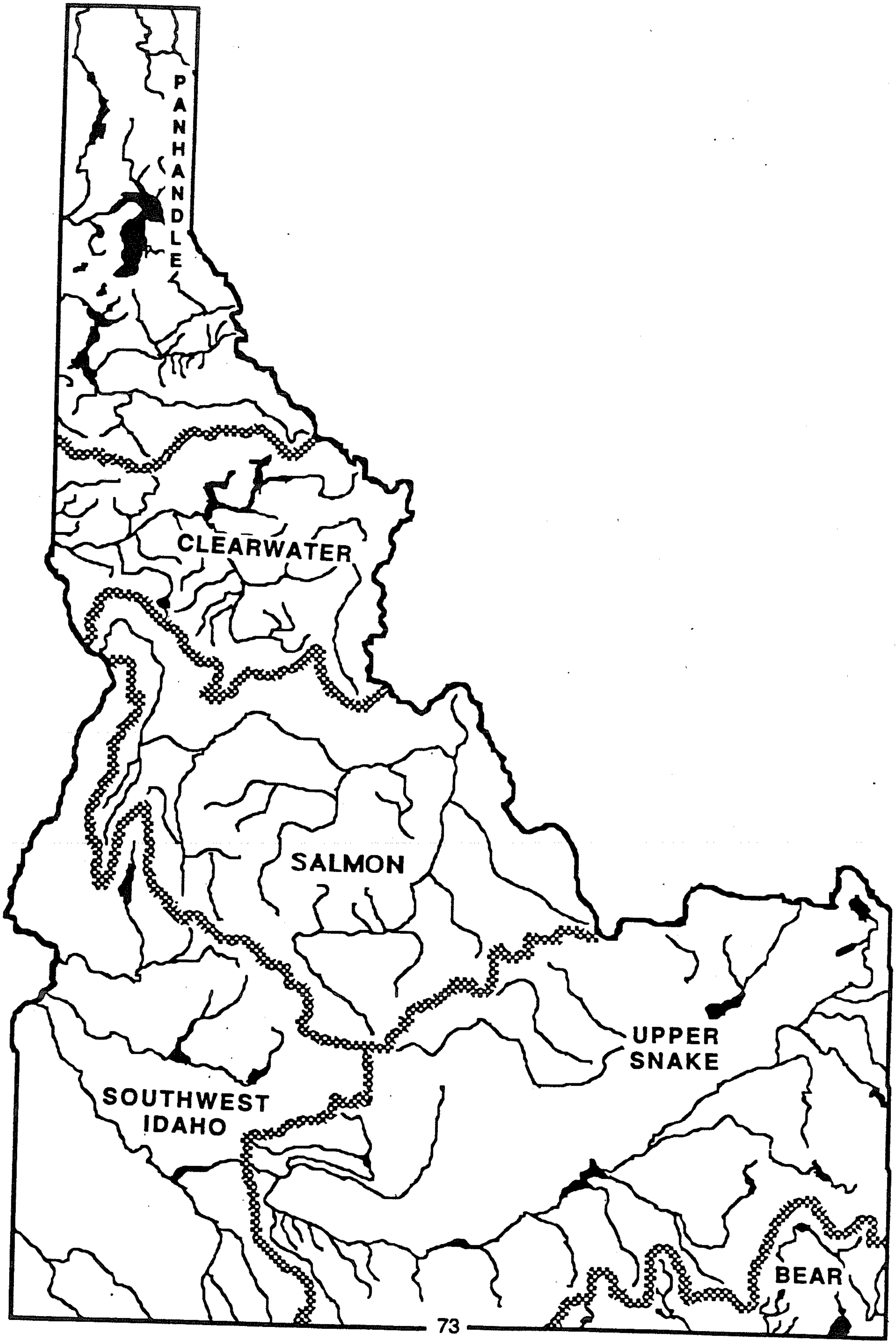
FIGURE 1

HYDROLIGIC BASINS IN IDAHO


PANHANDLE
CLEARWATER
SALMON
UPPER SNAKE
SOUTHWEST IDAHO
BEAR

## FIGURES 3-8

## BASIN ANDWATERSHED TREND MONITORING SITES IN IDAHO

Figure 3. Bear River Basin

Figure 4. Clearwater River Basin

Figure 5. Panhandle Basin

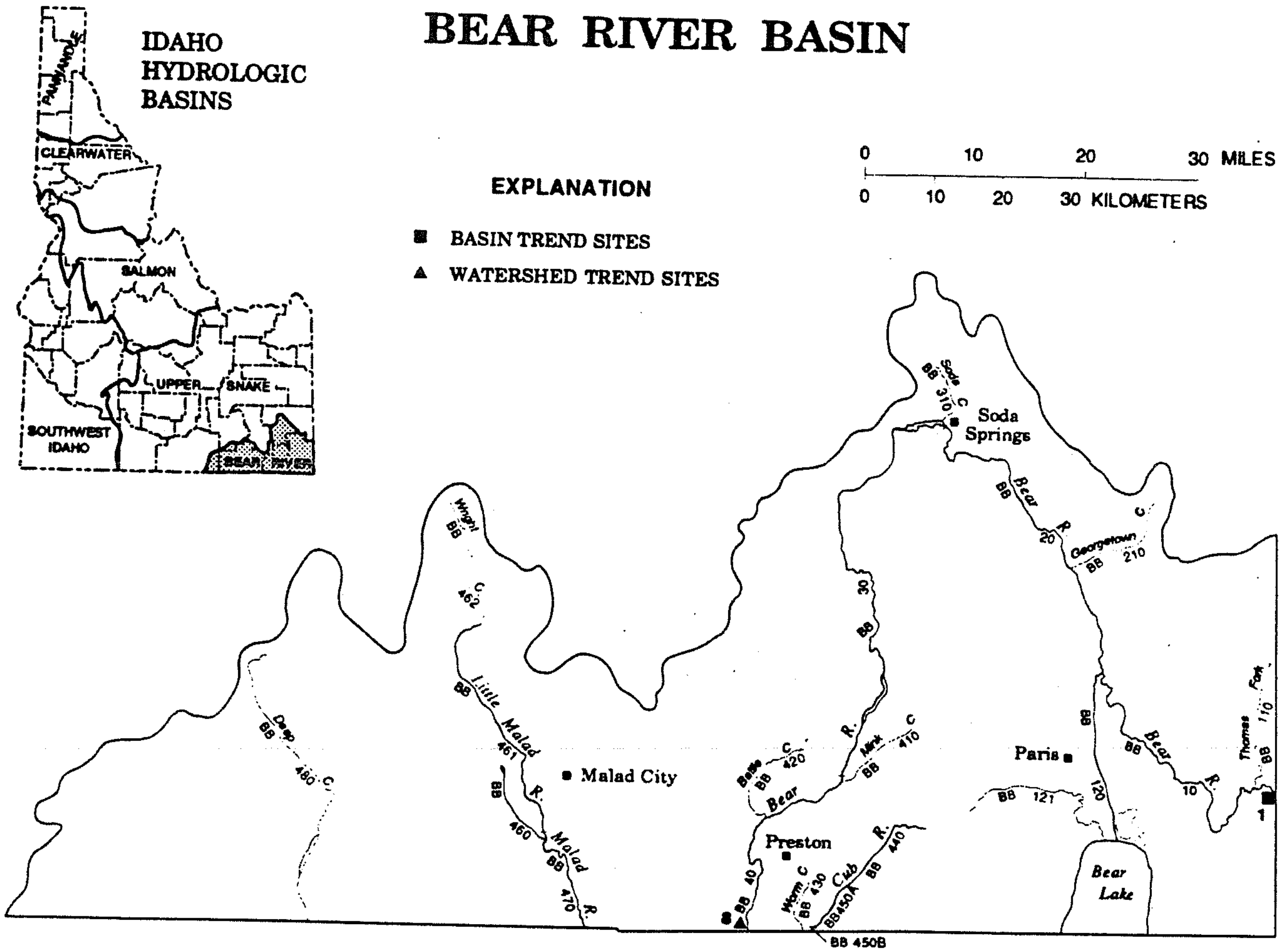
Figure 6. Salmon River Basin

Figure 7. Southwest River Basin

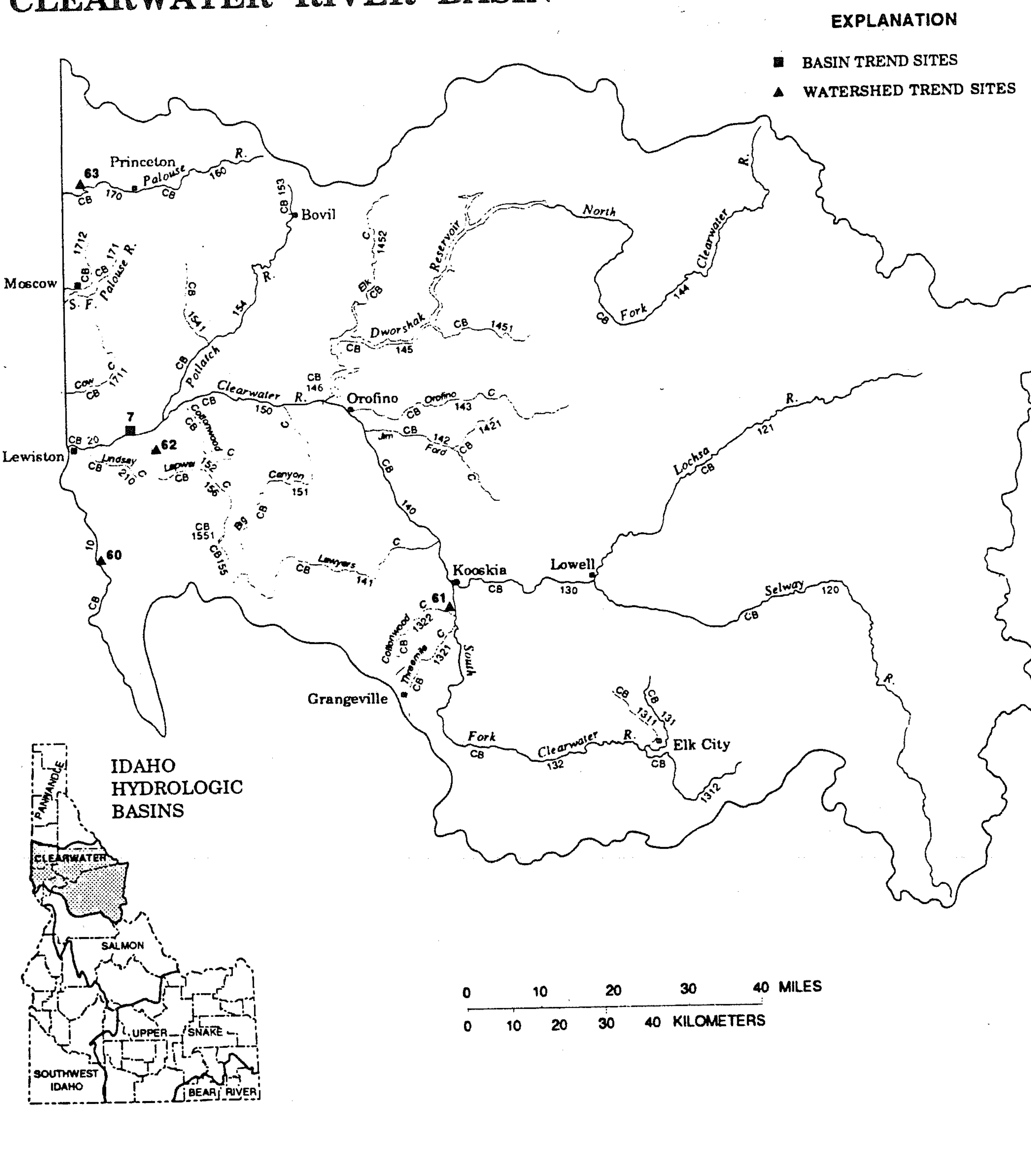
Figure 8. Upper Snake River Basin

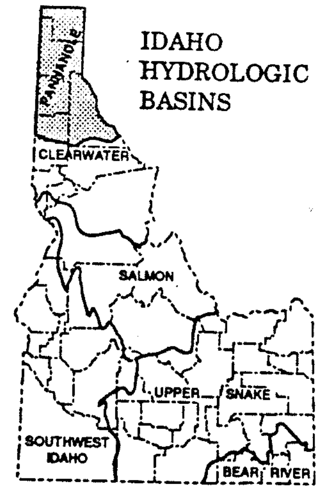
See Appendix A for the key to the Basin Trend Sites and Appendix B for the key to the Watershed Trend Sites.

# BEAR RIVER BASIN

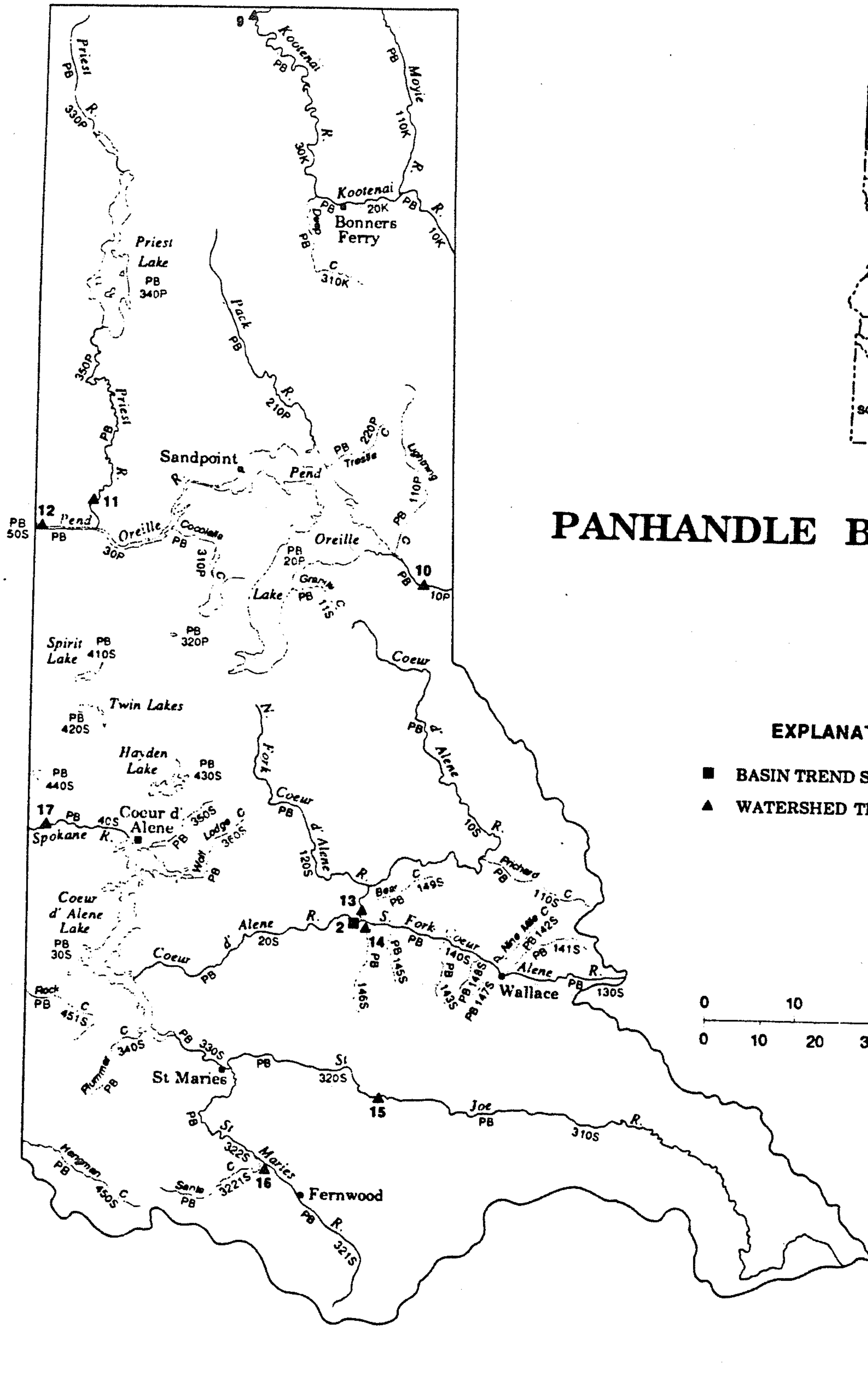


# CLEARWATER RIVER BASIN






# PANHANDLE BASIN




**EXPLANATION**

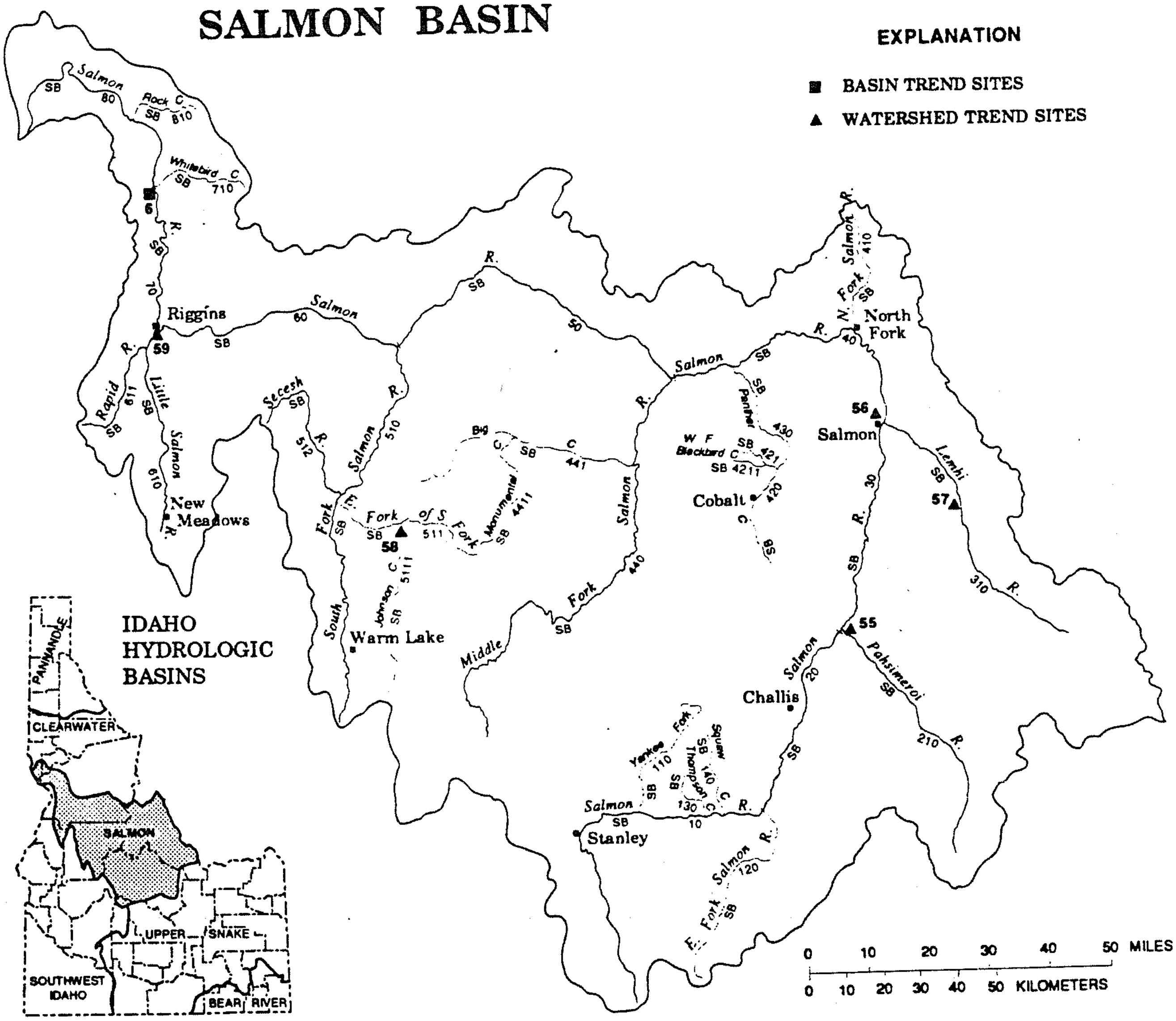
■ BASIN TREND SITES

▲ WATERSHED TREND SITES

0 10 20 30 40 MILES

0 10 20 30 40 KILOMETERS

# SALMON BASIN

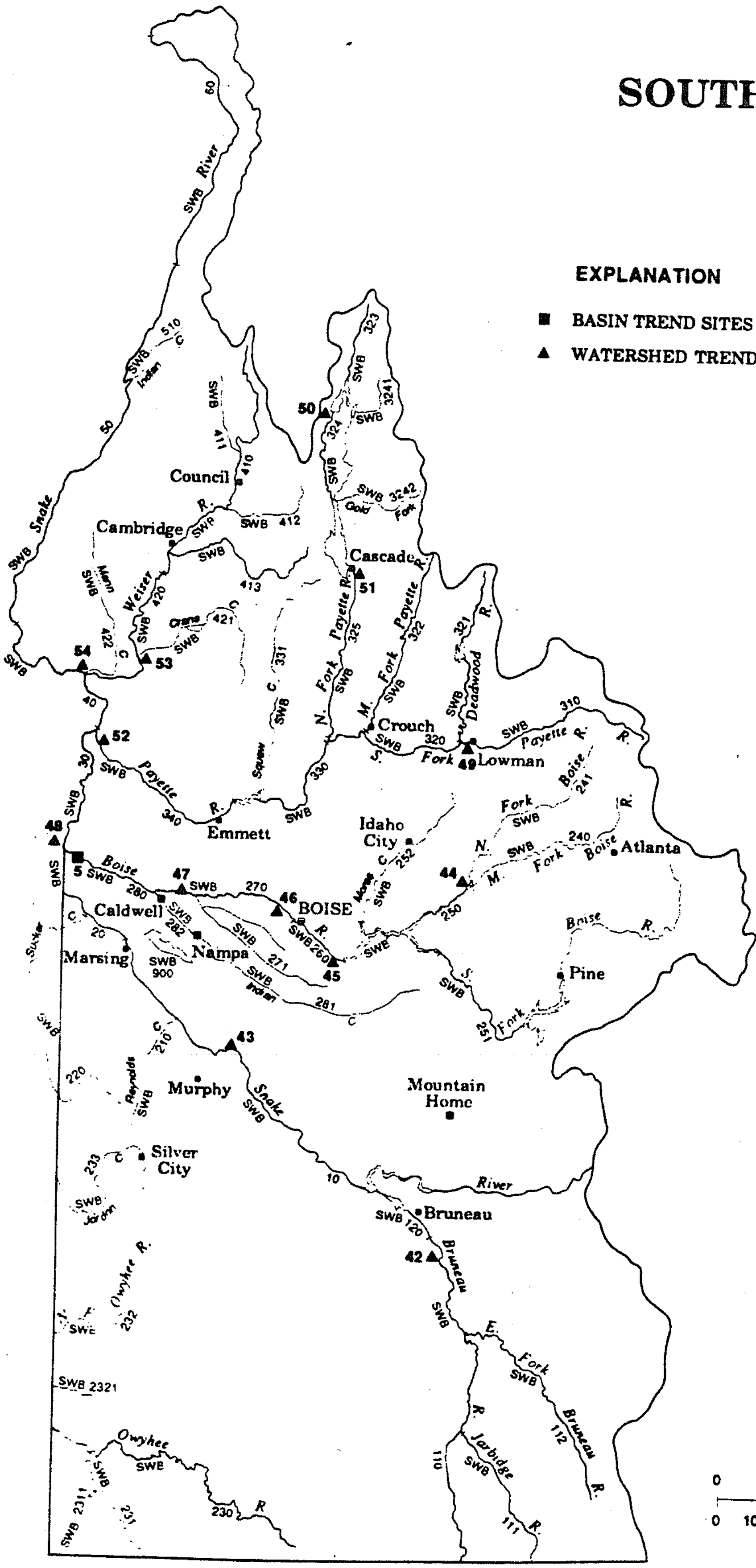


# SOUTHWEST BASIN

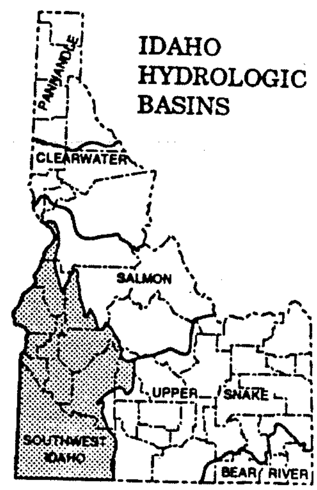
**EXPLANATION**

■ BASIN TREND SITES

▲ WATERSHED TREND SITES



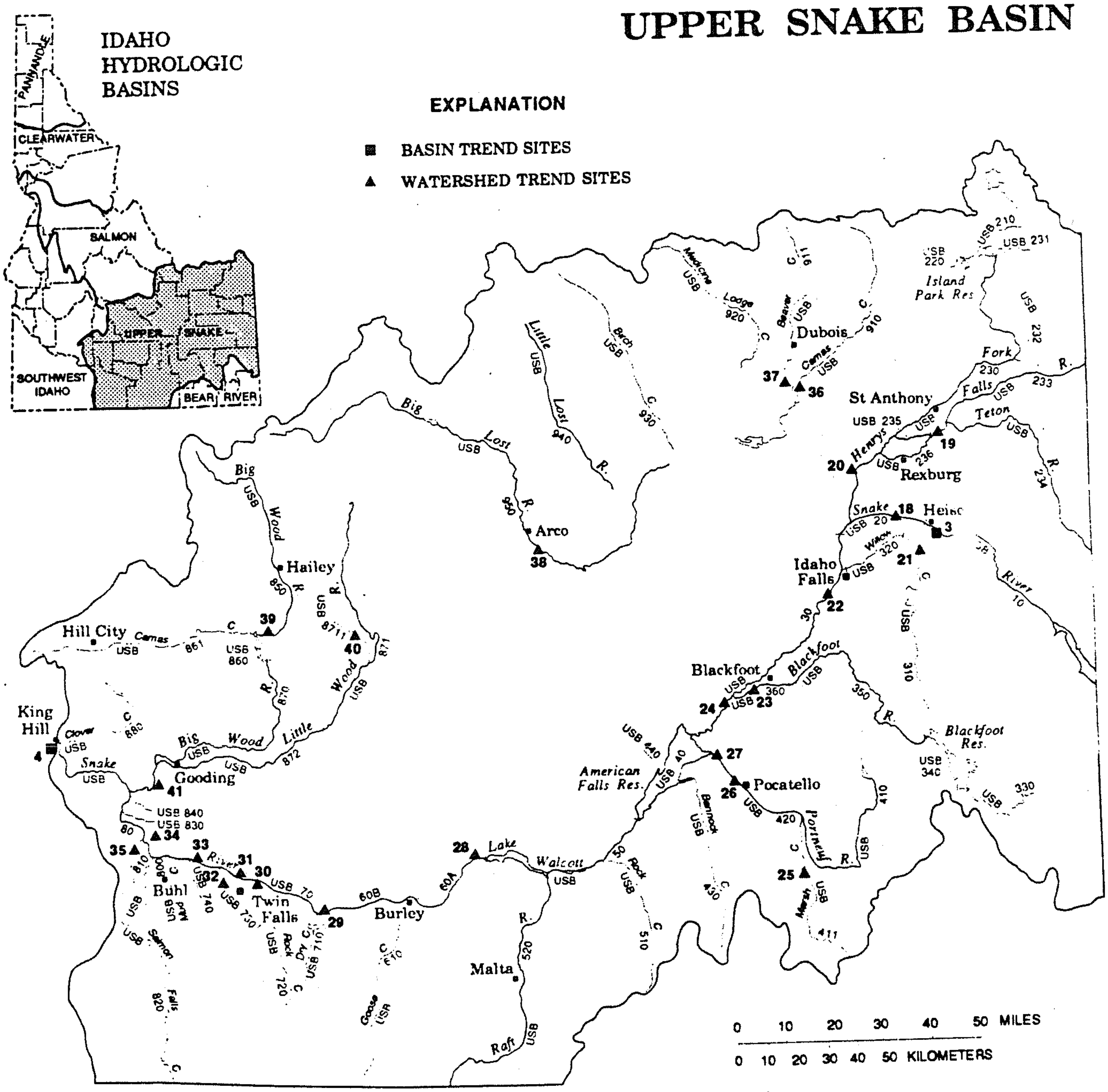

IDAHO HYDROLOGIC BASINS




0 10 20 30 40 50 MILES

0 10 20 30 40 50 KILOMETERS

# UPPER SNAKE BASIN



## APPENDICES

A. Basin trend surface water quality sampling sites
B. Watershed trend surface water quality sampling sites
C. Parameters for trend monitoring
D. Current statewide surface water quality monitoring activities
E. Hydrological databases available in Idaho
F. Idaho Forest Practice Evaluation worksheet
G. BMP feedback loop example: mining
H. Suggested monitoring parameters and protocols
I. Existing MOUs with IDHW
J. Monitoring plan checklist

## APPENDIX A

## BASIN TREND SURFACE WATER QUALITY SAMPLING SITES

| Map No.[1] | Station No. | Name | Constituents Sampled |
|---|---|---|---|
| 1 | 1003950 | Bear River at Border, Wyoming | c,n,t,b,s |
| 2 | 12413500 | Coeur d'Alene River at Cataldo | c,n,t,b,s |
| 3 | 13037500 | Snake River near Heise | c,n,t,b,s |
| 4 | 13154500 | Snake River near King Hill | c,n,t,b,s |
| 5 | 13213000 | Boise River near Parma | c,n,t,b,s |
| 6 | 13317000 | Salmon River at Whitebird | c,n,t,b,s |
| 7 | 13342500 | Clearwater River near Spalding | c,n,t,b,s |

[1] Refer to basin maps, Figures 3-8.

[c--common ions; n--nutrients; t--trace ions;
b--biological; s--suspended sediment]

## APPENDIX B

### WATERSHED TREND SURFACE WATER QUALITY SAMPLING SITES

| Map No.[1] | Station No. | Name | Constituents Sampled |
|---|---|---|---|
| 8 | 10092700 | Bear River at Idaho-Utah state line | C |
| 9 | 12322000 | Kootenai River at Porthill | C |
| 10 | 12392000 | Clark Fork River near Cabinet | A |
| 11 | 12395000 | Priest River near Priest River | B |
| 12 | 12395500 | Pend Oreille River at Newport, WA | B |
| 13 | 12413000 | Coeur d'Alene River at Enaville | C |
| 14 | 12413470 | S.F. Coeur d'Alene River nr Pinehurst | A |
| 15 | 12414500 | St. Joe River at Calder | C |
| 16 | 12414900 | St. Maries River near Santa | C |
| 17 | 12419000 | Spokane River near Post Falls | A |
| 18 | 13038500 | Snake River at Lorenzo | B |
| 19 | 13055000 | Teton River near St. Anthony | C |
| 20 | 13056500 | Henrys Fork near Rexburg | B |
| 21 | 13058000 | Willow Creek near Ririe | C |
| 22 | 13060000 | Snake River near Shelley | B |
| 23 | 13068500 | Blackfoot River near Blackfoot | A |
| 24 | 13069500 | Snake River near Blackfoot | B |
| 25 | 13075000 | Marsh Creek near McCammon | B |
| 26 | 13075500 | Portneuf River at Pocatello | B |
| 27 | 13075910 | Portneuf River near Tyhee | B |
| 28 | 13081500 | Snake River near Minidoka | B |
| 29 | 13088000 | Snake River at Milner | B |
| 30 | 13090000 | Snake River near Kimberly | B |
| 31 | 13091000 | Blue Lakes Spring near Twin Falls | C |
| 32 | 13093000 | Rock Creek near Twin Falls | B |
| 33 | 13094000 | Snake River near Buhl | B |
| 34 | 13095500 | Box Canyon Spring near Wendell | C |
| 35 | 13108150 | Salmon Falls Creek near Hagerman | B |
| 36 | 13112000 | Camas Creek at Camas | C |
| 37 | 13114000 | Beaver Creek at Camas | C |
| 38 | 13132500 | Big Lost River near Arco | C |
| 39 | 13141000 | Big Wood River near Bellevue | B |
| 40 | 13150430 | Silver Creek near Picabo | C |
| 41 | 13152500 | Malad River near Gooding | C |
| 42 | 13168500 | Bruneau River near Hot Springs | C |
| 43 | 13172500 | Snake River near Murphy | C |
| 44 | 13185000 | Boise River near Twin Springs | C |
| 45 | 13202000 | Boise River at Lucky Peak Reservoir | C |
| 46 | 13206000 | Boise River at Glenwood Bridge | A |
| 47 | 13210050 | Boise River near Middleton | C |

[1] Refer to basin maps, Figures 3-8

[A=annually; B=biennially; C=triennially]

## APPENDIX B (continued)

### WATERSHED TREND SURFACE WATER QUALITY SAMPLING SITES

| Map No.[1] | Station No. | Name | Constituents Sampled |
|---|---|---|---|
| 48 | 13213100 | Snake River at Nyssa, OR | C |
| 49 | 13235000 | South Fork Payette River at Lowman | C |
| 50 | 13239000 | North Fork Payette River at McCall | C |
| 51 | 13245000 | North Fork Payette River at Cascade | B |
| 52 | 13251000 | Payette River near Payette | C |
| 53 | 13266000 | Weiser River near Weiser | C |
| 54 | 13269000 | Snake River near Weiser | C |
| 55 | 13302005 | Pahsimeroi River at Ellis | C |
| 56 | 13302500 | Salmon River at Salmon | C |
| 57 | 13305000 | Lemhi River near Lemhi | C |
| 58 | 13313000 | Johnson Creek at Yellow Pine | C |
| 59 | 13316500 | Little Salmon River at Riggins | C |
| 60 | 13334300 | Snake River near Anatone, WA | C |
| 61 | 13338500 | S.F. Clearwater River at Stites | C |
| 62 | 13342450 | Lapwai Creek near Lapwai | B |
| 63 | 13345000 | Palouse River near Potlatch | B |

[1]Refer to basin maps, Figures 3-8

[A=annually; B=biennially; C=triennially]

## APPENDIX C

## TREND MONITORING CONSTITUENTS AND SAMPLING FREQUENCY

NUTRIENTS (Nov, Jan, Mar, May, Jul, Sep)

(00631) NO2+NO3 as N, diss
(00610) NH4 as N, total
(00671) Ortho P as P, diss
(00625) NH4+Org N as N, total
(00665) P, total

COMMON IONS (Nov, Mar, May, Sep)

(00915) Ca, diss
(00925) Mg, diss
(00930) Na, diss
(00935) K, diss
(00940) Cl, diss
(80154) Suspended sediment
(00945) SO4, diss
(00950) F, diss
(00955) SiO2, diss
(70300) Solids, diss
(00076) Turbidity, NTU

TRACE IONS (Nov, Mar, May, Sep)

(01000) Arsenic, diss
(01025) Cadmium, diss
(01030) Chromium, diss
(01040) Copper, diss
(01046) Iron, diss
(01049) Lead, diss
(01056) Manganese, diss
(71890) Mercury, diss
(01145) Selenium, diss
(01075) Silver, diss
(01090) Zinc, diss

[diss=dissolved]

FIELD CONSTITUENTS (Nov, Jan, Mar, May, Jul, Sep)

(00060) Water discharge
(00410) Alkalinity, total
(00010) Water temperature
(00300) Oxygen, diss
(00400) pH
(00095) Specific conductance
(00025) Barometric pressure
(31625) Fecal coliform
(31673) Fecal streptococci

# APPENDIX D

## CURRENT STATEWIDE WATER QUALITY MONITORING ACTIVITIES

Federal agencies

State agencies

Local agencies

Private entities

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **FEDERAL AGENCIES** | | | | | | | | | | | |
| USDA-ARS | Northwest Watershed Research Center | 1967<br>1963 | Sediment & Stormflow | approx. 12, some temp., some discon-tinued | year-long | 2 | $40,000 | $15,000 | ARS/BLM Comprehens. Reports, Journal Publications, Hydrologic data for Exper. Watersheds, Misc. Publ. | Will Blackburn 334-1363 | Intensive studies conducted since early 1960's on 90 sq. mi. Reynolds Creek Watershed located in Owyhee Mountains, about 50 miles southwest of Boise |
| USDA-SCS | RCWP-Rock Creek | 1981 | S.Sediment, nutrients, bact. pH, D.O., conduct. Metals | 9 (+21 drains) | Monthly<br>Quarterly | <1 | $100,000 | TOTAL | Ann.reports by DEQ | Mike Somerville 334-1053 | Rural Clean Water Program -SCS contracted w/DEQ. Ends '89, DEQ does monitor. Since 1980, 13 watersheds were monitored. |
| | PL-566 Small Watershed Program | 1980 | S.Sediment yield, streambank eros. Modelling NO INSTREAM MONITORING | N/A | N/A | | | | | | |
| | Accelerated WQ Planning & Appl. | Start 1988 | Nut., pesticide S.Sediment | 4 | | | $120,000 | TOTAL | | | Total $150,000 contracted Hangman, LakeCr., Cascade Reservoir |
| BLM | High-use watersheds | 1981 | Cation/anion | <50 | Annual | <2 (shared among 15) | $18,000 | $12,000 | No pub. since 1984 Dist.Files Ann.Reports-have summs. | K.Gebhardt 334-1892 | Now in startup phase to develop a program-BMP effectiveness. Most monitoring focuses on streamside veg., habitat & grazing BMPs Dists. meet meet own mon. needs. |
| | | | Macroinverte-brates | <50 | Quarterly | | | | | | |
| | | | Fish pop/hab. | <50 | Annual | | | | | | |
| | Watershed & Fisheries | Var. ('76-'89) | Flow, temp, pH, DO, conductivity, $CO_2$, TDS, TSS, bedload, alkalin-ity, macroinvert. | 29 | Various (monthly to annually) | 10 | $820 | $150 | District files | Dan Kotansky (208)529-1020 | The following creeks are sampled at var. fre-quencies for different groups of parameters: Middle, Irving, Deep, Eddie, Birch, WarmSprings, Big Spring, Squaw, Deer, Wet, Summit, Badger, Sawmill, and North Creeks. |
| | | 1984 | Temp, Flow, pH, TDS, conductivity, heavy metals | 4 | 2/year | 0.2 | $800 | $100 | 4 reports (1986-1989) | Same as above | Champagne Creek |

## STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BLM (CONT'D) | | 1984 | Vegetation, temp, DO, pH, flow, turbidity | 15 | Variable | 0.23 | $1,500 | $1,500 | District files | Lyle Lewis (208)756-5400 | The following creeks have one sample station each: Burnt, Ellis, Herd, Little, Morgan, Sevenmile, Pattee, Morgan, Road, Sage, Squaw, Summit, Trail, Hawley, Henry, and McDevitt Creeks |
| | Watershed and Fisheries | 1987 | Macroinverte., temp, DO, alkalinity, ph, sulfates | 2 | Annual | 0.1 | $400 | $100 | District files | Steve Langen-stein (208) | Box Canyon Creek |
| | | Various 1982-1989 | Macroinverte., SS, fecal coliform, DO, pH, conductivity, temp, alkalinity, sulfate, flow, vegetation, fish populations, cyanide | 19 | Various (1-2/yr) | 0.66 | $1,100 | $1,220 | District files | Kirk Koch (208)678-5514 | The following creeks are monitored: Shoshone, Dru, McMullen, Trapper, Cold, Blue Hill, Little Birch, Beaverdam, Goose, Howell & Cassia Creeks, and Raft River |
| | Watershed and Fisheries | Var. (1977-1978) | Flow, temp, pH, alkalinity, hardness, chloride, conductivity, nitrate, turbidity, SS, total coliform | 20 | Variable | 1.12 | $1,100 | $800 | District files | David Fortier (208)765-1511 | The following creeks are monitored: Little Sand, Robinson, West Fork Pine, Baldy, Latour, Butler, Gilbert, Middle Fork Pine, East Fork Pine, Tiger, Ophir, Flewsie, Gramps, GoldCenter, Falls, Agatha, and Black Prince Creeks |
| | Watershed and Fisheries | 1986 | Fish habitat, stream channel characteristics, fish sampling, core sampling, embeddedness, macroinverte., flow, water chemistry | 52 | Variable | | $1,300 | $750 | District files | Craig Johnson 962-3245 | Salmon River Drainage Much data on Dbase and Lotus 1-2-3 |
| | Watershed and Fisheries | 1987 | Flow, macro-invertebrates, vegetation | 3 | Variable | .05 | -0- | $50 | District files | Mike Mathis 334-1852 | Rabbit Creek |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BLM (CONT'D) | | | | | | | | | | | |
| | | 1985 | Vegetation, macroinvertebrates | 1 | Variable | .02 | -0- | $50 | District files | Jim Clark 334-1582 | Dive Creek |
| | | Var. 1983-1986 | Macroinverte., DO, pH, temp, conductivity, heavy metals, alkalinity | 6 | Variable | 0.12 | $600 | $150 | District files | Pat Olmstead 334-1582 | North Fork Castle, Juniper, and Louse Creeks |
| | Watershed and Fisheries | 1985 | Embeddedness, core sampling, macroinverte., fish inventory, flow, water chemistry | 16 | Variable | .4 | $800 | $300 | District files | Craig Johnson 962-3245 | Little Salmon River Drainage |
| | | 1985 | Same as above | 9 | Variable | .1 | $100 | $50 | " | " | Variable studies: Snake River drainage between Salmon R. & Lewiston |
| | | 1985 | Same as above | 20 | Variable | .4 | $400 | $100 | " | " | Clearwater Drainage |
| | | 1985 | Same as above | 30 | Variable | | $1,600 | $300 | " | " | South Fork Clearwater R. |
| Bureau of Reclam. | Trend Network Boise Project | 1986 | Nutrients pH, conductivity, BOD, COD, Bacteria TCC, DO, TDS, trace metals | 5 | monthly<br>quarterly | <1 | $25,000 | | STORET | Dave Zimmer 334-9035 | Sites related to Boise Project Operation in Boise and Payette River Basins |
| | Cascade | 1984 | Nutrients, chlorophylls, temperatures, dissolved oxygen | 3 | 2/year | | | | | | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Corps of Eng. | Dworshak Reservoir | 1978 | Temp, D.O., pH, Spec. cond., turb., phosphorus, nitrate (chlorophyll, phytoplankton, occasionally) | 5 | 3/year | less than 1 | $3,000 | | Data avail. on request | Sarah Wik 509-522-6629 | |
| | Lucky Peak Reservoir | 1975 | Same as Dworshak Res. | 6 | 1-2/yr. | less than 1 | $500 | | Data avail. | Sarah Wik (above) | |
| | Compliance monitoring of dredging activities | 1982 | S.sed., turb., D.O., temp., (sometimes ammonia, phosphorous, pesticides, trace metals) | 2-5 | varies annually | less than 1 | $20,000 (incl. sediment sampling) | $1,000 | Data avail. on request | Sarah Wik (above) | Dredging has occurred about every other year. |
| | Pend Oreille swim areas | 1973 | fecal coliforms | 5 | monthly to weekly, May to October | less than 1 | state lab | | Data avail. on request | Dave Lescaleet 437-3133 | |
| EPA | NPDES Ambient Monitoring | | | | | | | | | B.Cleland (206) 442-1685 | Related to point source impacts |
| | S.F. Coeur d'Alene | 1972-1986 | Metals, hardness, nutrients, flouride '86-fish tissue analysis, bottom sed. for metals, some bioassays, bethic macroinv. | 15 | 2-3 yr. sequence | <1 | $4,000 | | Regional report | | |
| FWS | Swan Falls Studies w/ Idaho Power Company | Spring 1990 | $H_2O$, temperature dissolved oxygen (others?) | Undes-ignated between ID/OR border & C.J. Strike Dam | Continu-ous likely | 1/3 - 1/2 | ? | ? | FWS Report | Don Anglin FWS Vancouver, WA (princi-pal) 206-696-7605 Roy Heberger FWS, Boise (backup) 334-1931 | Data will be used to develop $H_2O$ quality model as part of instream flow studies |

## STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| USGS | Nasqan | 1974 | Cations/anions, nutrients, trace metals, S.Sediment bacteria, Alk., DO, Temp, pH, conductivity | 6 | bimonthly | | $12,000 | | Water Resources Data Ann. | Robert Harper 334-1387 Jerry Lindholm 334-1833 Ivalou O'Dell 334-9072 | |
| | Benchmark | 1967 | Same as above, + radiochemical | 2 | quarterly | | $5,000 | | | Walton Low 334-1685 | |
| | State surf. WQ network | 1989 | Cations/anions, nutrients, trace metals, S.Sed. bacteria, DO, pH, Alk., Temp, conductivity | *56 | bimonthly | | $54,000 | | | | *Rotational network - 25 sites sampled per year |
| | Pend Oreille Lake Study | 1988 | Nutrients, chlorophyll, DO, Temp, pH, conductivity, cadmium, zinc, lead | 5 lake sites<br>7 stream sites | 12/year<br>24/year | | $40,000 | | | Paul Woods 334-1592 | |
| | Stream Gaging Stations | 1968 | Conductivity, temperature | 187 | bimonthly | | | | | | |
| USGS-INEL | Surface Water Program--off site | 1970 | Tritium, conductivity, chloride (gamma emitters, grass alpha & beta) | 6 | Semi-annual | <1 | $18,000 | | INEL Summary report | Larry Mann 526-2438 (USGS at INEL) | Big Lost R., Little Lost R., Birch Creek, Mud Lake |
| | Thousand Springs | 1988 | Tritium | 17 spgs. | semi-annual | | $8,000 | | | | |
| | Thousand Springs | 1988 | Organics, trace metals, radionuclide | 5 | annual | | $15,000 | | | | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Boise NF | Forest-wide trend | 1986 | Cobble embeddedness, particle size distribution | 30 | annually | <1 | N/A | $3,000 | Annual Monitoring Data Summary beginning in 1988, and Forest files | John Potyondy 364-4153 | Long-term trend monitoring established by Forest Plan |
| | Project implementa- | 1988 | Field reviews | 6 | annually | <1 | N/A | $9,000 | Annual Monitoring Data Summary | John Potyondy 364-4153 | Determine if BMPs are implemented as planned |
| | South Fork Salmon River | 1977 | % fines, cross sections, photos, fish no. & species | 3 | annually | <1 | N/A | $5,500 | Annual Mon. Data Summ., reports to SFSR Monitor. Committee, District files | Don Newberry 382-4271 | Determine long-term trend of spawning areas in SFSR |
| | South Fork Salmon River | 1986 | Cobble embeddedness, particle size distribution | 18 | annually | <1 | N/A | $1,500 | Annual Mon. Data Sum., reports to SFSR Mon. Committee, Forest files | John Potyondy 364-4153 | Determine long-term trend of rearing areas in SFSR |
| | Rice Creek | 1988 | Cross sections, photos points | 10 | 2/year | <1 | N/A | $1,100 | Annual Mon. Data Sum., reports to SFSR Mon. Committee, Dist. files | Margaret Hillhouse 382-4271 | Quantify sediment movement through stream reach |
| | Middle Fork Payette R. | 1980 | Cross sections, photo points | 10<br>3 | annually | <1 | N/A | $500 | Annual Mon. Data Sum., Dist. files | Lyn Reinig 365-4382 | Evaluate long-term sediment movement |
| | South Fork Payette R. | 1980 | Photo points | 7 | annually | <1 | N/A | $200 | Same as above | Lyn Reinig 365-4382 | Evaluate long-term sediment movement |
| | South Fork Boise River | 1989 | Riparian vegetation, streamside habitat | 1 | annually | <1 | N/A | $500 | Same as above | Don Corley 343-2527 | Evaluate effectiveness of livestock exclosure |
| | Smith Creek | 1988 | Fish numbers & size | 1 | annually | <1 | N/A | $500 | Same as above | Don Corley 343-2527 | Evaluate effectiveness of fish structures |
| | Warm Lake | 1988 | Secchi disk, nitrate, chlorphyl, phosphate, T.&F. coliform | 1 | monthly (June-Sept.) | <1 | N/A | $2,000 | Same as above | Margaret Hillhouse 382-4271 | Establish baseline data & resolve questions about bacteriological contamination |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BOISE N.F. (CONT'D) | | | | | | | | | | | |
| | Dollar Canyon Burn | 1987 | Cross sections, photo points | 2 | annually | <1 | N/A | $200 | Annual Mon. Data Sum., Dist. files | Margaret Hillhouse 382-4271 | Evaluate fire effects |
| | Deadwood Summit Fire | 1988 | Cobble embedded-ness, particle size dist. | 3 | annually | <1 | N/A | $1,000 | Annual Mon. Data Sum., Forest files | John Potyondy 364-4153 | Evaluate fire effects on fish habitat from "let burn" policy |
| | Lowman Complex Fire | 1989 | Cobble embedded-ness, particle size dist., chemicals | 4 | annually | <1 | N/A | $3,000 | Annual Mon. Data Sum., Forest files | John Potyondy 364-4153 | Evaluate fire effects on stream & fish habitat |
| | Filter Windrow Effectiveness | 1990 | Site measurements of sediment move-ment, photos & observation | ? | One time | <1 | N/A | $5,000 | Annual Mon. Data Sum., Forest files | John Potyondy 364-4153 | Evaluate effectiveness of filter windrows to trap sediment below roads |
| Caribou N.F. | Upper Blackfoot River | 1985 | Aquatic habitat Fish populations Spawning/Redds | 4 | yearly | 4 | | $1,000 | | T.Burton 334-5867 | Coordinated with Idaho Fish & Game |
| | Bonneville Basin | 1981 | Fish habitat Fish populations | 5 | yearly | 2 | | $500 | | T.Burton | Bonneville Cutthroat Trout (sensitive species) |
| | Salt River Basin | 1986 | Fish habitat Fish populations | 8 | Every 3 yrs. | 3 | | $1,000 | | T.Burton | Fine-spotted Cutthroat Trout (sensitive species) |
| Challis N.F. | Monitoring of Mineral & Range Activities | 1978 | Macroinverte-brates;(metals CN) | 6 varies annually | 3/yr at least | 1.5 | $5,000 | | Data files, STORET, separate ann.reports | Janice Staats 879-2285 | Based on where activities are occurring-primarily mining. |
| | Baseline Monitoring | 1985 | Varies with project | 10 | Varies w/project | | | | Same as | Same as above | Both "above treatment" and paired watersheds are used. |
| | Timber | 1981 | Streamflow, s.sediment | 2 | 3/year | | | | 1989 | Same as above | N. Fork Big Lost River |
| | Effective-ness | 1976 | Nutrients,SS, conductivity, temp, fecal coliform bact. | 28 | Varies w/ station & parameter (1/week-1/year) | 0.2 | | [$1,600] | Report to files | Same as above | Middle Fork Salmon River and its tributaries |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CHALLIS N.F. (CONT'D) | Effective-ness | 1989 | Varies with project. Stream channel Geometry/ morphology,temp, vege.,sed.,turb., embeddedness,dis-charge,pH,macro-, inverte.,fecal coliform bact., conductivity, nutrients,photo points,precip. | 41 | Varies w/ project | 4 | | [$6,200] | Annual & final reports | Same as above | Var. locations: Halloween, Bruno,Squaw,Thompson, Garden,Herd,Smithie,Cherry & Richardson Creeks. Burnt Hollow,Firebow Meadows, Montana Gulch,Yankee Fork, East Fork Big Lost River, and the Lost River |
| | Noxious Weed | 1982 | Picioran, 2-4D in past | 4 | 4/yr. (field season) | | | | | Same as above | |
| Clear-water N.F. | N.F. of Clearwater | 1981 | Discharge, Temp,Cond stage, bedload Sus.Sed. Turbidity | 14 | 12-14 visits/ yr/mon. plan | .76 of 260 days | Coop w/ another federal agency $600 | Annual Procure-ment $4,800 | Watershed file report | Lawrence Clark 476-4541 | Osier Cr.*<br>Swamp *# 10 Recorders<br>S.F. Beaver*# 3 Samplers<br>Quartz*#<br>Isabella* Meadow R.<br>Up.Salmon# Elk Cr.R.<br>Wolf Cold Sprgs*<br>Lw Salmon# Toboggan*<br>Hem<br>Hemlock* |
| | Clearwater River (Lolo Creek Tributaries) | 1984 | Same as above | 4 | Same as above | | | Same as above | Same as above | | Eldorado Cr.<br>Cedar 1 Recorder<br>Dollar<br>Lolo*#<br>Palouse R.*# |
| | Palouse R. | 1981 | Same as above | 4 | Same as above | | | Same as above | Same as above | | N.F. Palouse 1 Recorder<br>Little Sand 1 Sampler<br>Blakes Fork<br>Glade |
| | Lochsa R. Tributaries | 1981 | Same as above | 16 | Same as above | | | Same as above | Same as above | | Lower Deadman* 8 Recorders<br>S.F. Canyon 6 Samplers<br>Little Smith<br>Pete King*# DOE<br>LW Fish* Gravey<br>Lowell Cougar# Martin*#<br>Bullock A# Squaw*#<br>Crooked Fk*# WhiteSands*<br>Crooked BF W.Fk.Deadman*<br>ABOVE STATIONS INCLUDE:<br>* = Stage Recorder<br># = Automatic Water Sampler |

# STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nez Perce N. F. | Fixed W.Q. stations | 1980 | Streamflow, Sus. sed., bedload sed., conduct. water temp. | 8 | 80/ station | 0.6 | $2,600 | $1,000 | Annual report | Nick Gerhardt Don Ruark 983-1950 | Water level recorders & automated sed. samplers Representative Forest streams |
| | Fire Effects | 1988 | Embeddedness cross-sections | 4 | annual | <0.1 | $200 | | Forest files | Nick Gerhardt 983-1950 | Moose Creek, Benjamin Cr. wilderness fire effects monitoring |
| | Municipal Watershed | 1981 | Streamflow, sus. sed, bedload sed, conduct. water temp. | 1 | 10/year | <0.1 | $200 | $100 | Forest files | Gerhardt Ruark 983-1950 | Wall Creek |
| | Coordinated Resource Mgt. Plan | 1988 | Water temp. | 6 | Continu-ous in summer | <0.1 | $500 | $200 | Forest files | Wayne Paradis 983-1963 | Clear Creek--coop w/USFWS, DEQ & Nez Perce Tribe |
| | Permanent Fish-habitat monitoring stations | 1982 (maj. in '88 | Fish pop. habitat measures | 23 | annual | .75 | $2,300 | $500 | Annual report, Forest files | Steve Lanigan 983-1950 | Forest Plan monitoring stations, not all stations done every year |
| | Basinwide Stream Surveys | 1988 | Fish pop. habitat measures | 67 streams in 1989 | Variable-occur prior to a timber sale | 2.0 | $11,500 | $9,000 | Environ. assessments of Timber sales; Dist. project files | Lanigan 983-1950 | Done on all streams within a timber sale area to establish existing condition |
| Idaho Pan-handle Nat. Forest | Barometer Watersheds | Varies by station | Streamflow sus.sed., bedload sed, temp, specific conductance | 11 | Streamflow continuous sus.sed. 4 times/day during snow melt runoff. Other params 7-10 times during peak runoff | 3 | $12,000 | $8,000 | EPA STORET computer, monitoring reports, Forest files | Gary Kappesser 765-7493 | |
| | Intergravel fines embed-dedness | 1988 | Intergravel fines embed-dedness | 11 | Once every 3 years | 1 | | $3,000 | Forest files | | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| IDAHO PANHANDLE NF (CONT'D) | | | | | | | | | | | |
| | Fish Habitat Inventory | 1984 | Pool-riffle ratio;channel geometry; riparian vegetation channel substrate | | Yearly | 2 | | $30,000 | Forest files | | |
| | Hayden Cr. Nutrients | 1988 | Streamflow sus.sed., Kjeldahl nit, oxidized nit, tot.phosphorus, ortho-phosph, turbidity | 3 | Bimonthly March-May | 1 | | $400 | IDEQ files | | Cooperative study w/EPA |
| | Priest Lake Macroinvertebrates | 1989 | Macroinvertebrate species abundance & variety | 15 | 3 times /year | 1 | $6,500 | | Forest files | | |
| | Channel Geometry | 1989 | Channel cross-section particle size distribution | 6 | every 3 years | 1 | | $3,000 | Forest files | | |
| Payette N.F. | Fishery S.Fk. Salmon R. Drainage | | particle size distribution | 30 | annually | 3 | | $43,000 1st yr. | Files | John Lund 634-8151 | |
| | Fishery New Meadows Ranger Dist. | | same as above | 17 | annually | 2 | | $18,000 1st yr. | Files | D. Burns 634-8151 | |
| | Fishery S.Fk.Salmon Monitoring | Est. 1987 | Cross-sections surveys, photographs | - | Cross-sec. every 4th year | 1 | | $2,000 every 4th yr. | Files | D.Kennell 634-8151 | Report to SFSR Steering Committee |
| | Riparian Lick Creek | | Channel cross-sections & photo prints | | Yrs. 1, 5 10 | 1 | | $1,500 | Annual progress reports | D.Kennell 634-8151 | |
| | Soil&Water Timber Sale Each Dist. | 1989 | Visual inspect. of timber sales | | Once/yr. | .1 (2-3 days/ project) | | $10,000 /project | Written report to files w/ annual sum. | D.Kennell 634-8151 | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| PAYETTE N.F. (CONT'D) | | | | | | | | | | | |
| | Water Stibnite Thunder Mtn. | | Metals, SS, conductivity, nutrients, cyanide,etc. | 11 12 | 2/year | .1 | | $500/yr. | Summary | D.Kennell 634-8151 | |
| | Little French Cr.Watershed* | 1989 | Photos & phys. measurements of vegetation & streamside hab. | | Biannually | .1 | | $1,000/yr. | Report in 1994 & 1999 | D.Kennell 634-8151 | *Improvement and Riparian Demonstration Project |
| | Tribs.of S. Fork Salmon R. | 1989 | Channel cross-sections | | Annually before & after | .1 | | | Annual rpt. after seas.mon. | J. Lea 634-8151 | |
| | South Fork Salmon R. | 1989 | Turbidity | | Monthly May-Sept.* | 1 | | | Annual writ. report after seas.mon. | J. Lea 634-8151 | *More frequently during construction |
| | Flossie Lake Silver Cr. Steep/Cabin Fires | 1989* | Photo-points | | One time shot | .1 | | $500/yr. | Annual sum. Final rpt. FY90 | D.Kennell 634-8151 | *Estab. 1989, project may extend into 1990. |
| | USGS Gages on or near Payette NF | 1989 | Stage/disch. relationship, cross-sec. discharge measurement | 13 | Spring runoff | *see comments | | $1,000 | Ann.summ. &final rpt due summer FY90 | D.Kennell 634-8151 | *Instreamflow crew |
| Salmon N.F. | Baseline Sediment Studies | April 1990 | Suspended & Bedload Sed. | 4 | 10/yr. | 1 | $4,000 | $6,000 | Input to STORET Annual Monitoring report | Betsy Rieffen-berger 756-2215 | Squaw Creek, Jesse Cr., Cabin Cr. (trib. to Panther Cr.), Hawley Creek |
| | | | Discharge | 4 | Apr-Oct Contin. recorder | | | | | | |
| Sawtooth N.F. | Level III Riparian Monitoring | 1986 | Aquatic hab. Riparian vegetation | 6-7 | Every 5 yrs. | 4 | | N/A | | B.Webster 737-3200 | |
| | S.F.Boise R. -Herbicides | 1984 | Tordon | Several | 1/year | 2 | $12,500 | ? | | B.Webster | On-going to monitor effects of Herb. treatments of noxious weeds on stream |

## STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Targhee N.F. | Camas Creek Headwaters | 1989 | aquatic habitat | 2 | yearly | <1 | $0 | $100 | Dubois RD files | Teresa Wagner 624-3151 | |
| | Duck Creek | 1987 | aquatic habitat | 1 | yearly | <1 | $0 | $50 | Island Park RD files | Tom Contreras 558-7301 | Within Exclosure |
| | Pine Creek | 1987 | aquatic habitat | 1 | yearly | <1 | $0 | $50 | Palisades RD files | T.Wagner 624-3151 | |
| | Jedediah Smith Wilderness | 1989 | Macroinverte-brate | 9 | every 5 years | <1 | $700 | $150 | Teton Basin RD files | Jack Haddox 354-2431 | |

Other surface water monitoring activities will be implemented during 1990 after the water quality monitoring plan is revised during the winter of 1989.

**STATE AGENCIES**

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| BSU Biol. Dept. | Master's Thesis | Summer 1990 | Macroinverte., inorganic chem, sus. sediment | 6 | 2/year | 0.25 | | | Master's Thesis | Dr.Charles W. Baker 385-3499 | Jordan Creek, China Gulch, Henrietta Cr. |
| DEQ-W.Q. Bureau | Special surveys | N/A change annual. | S.Sediment, nutrients,(s.t. trace metals depending on objectives) | 5-15 per study | Monthly or 2/mo. for one water year | ~5 | | | DEQ-W.Q. status reports | Irene Nautch 334-5867 | 10 Agric. surveys/yr. 6 others; lakes 3; Forest Practice Studies 16 |
| | Stibnite | 1979 | S.Sed,metals, cond,turb, pH,nutrients, minerals | 12 | Semi-annual | | | | | | Coop. w/Payette N.Forest. Mines also have baseline data. |
| | Coeur-Thunder Mtn. | 1985 | S.Sed,metals | 12 | Spring runoff | | | | | | |
| | DeLamar | 1988 | pH,metals, sulfate | 4 | Spring runoff | | | | | | |
| | Citizen Lake Monitoring Program | 1987 | Nutrients, chlorophyll, cond,temp, DO,Secchi disk transpar. | 10 Lakes 18 stns. total | Bimonthly | | | | | | Monitoring done by citizens for trend. |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| DEQ-WQB (CONT'D) | Clean Lakes Projects-5 | | Nutrients, chlorophyll, temp, DO | | | Primarily contracted cut | | | | | |
| | | | Fish tissue-pesticides, metal | 23 | Annual | | | | | | |
| | Trend | | S.Sed, nutrients, metals, turb, cond, DO, bacter. | 17 stn in WY 1989 | Monthly | (USGS contract in 1990) | | | Biennial 305(b) report | | |
| S.E. Dist. Health Dept. | Public Bathing Beaches | 1985 | Fecal coliform fecal strep clarity | 22 | Annually | <1 | $440 | | District files | Tom Hepworth 547-4375 | Includes sanitary facilities, garbage collection systems & safety equipment |
| IDFG | Fisheries Mgmt. | 1970 | Fish pop.status habitat quality measures | 40 reaches | Annually | 2 (data collection by 15-20 staff in regions equates to 2 FTEs) | | | IDFG reports & files | Al Van-Vooren 334-3791 | As of 1987 any stream work will incl. collection of 6 core parameters--section length, gradient, mean width, mean depth, % pool-riffe ratio, % sand-gravel-rubble-boulder |
| | Fisheries Research | 1970 | Fish pop.status habitat quality measures | 4-5 proj. | Year by year | 5 | | | IDFG reports & files | Virgil Moore 334-3791 | Same as above. |
| | Antidegrad. Agreement/ NPS Moni. Plan | 1990 | Fish pop.status macroinvertebr. habitat qual. measures | To be determined | Annually | 1 | | | | Will Reid 334-3180 | Specific data collection protocol to be determined. Will be compatible with statewide NPS monitoring. |
| | Power Plan. Council Enhancemnt Program | 1983 | Juvenile anad. fish densities monit. yearly habitat qual. measures every 5th yr. | 200 stream sects. in Salmon, Clearwtr & Snake R.basins | Annually | 2 (BPA funded) (add'l data collected by 15-20 reg.staff would = 2 add'l FTEs) | | | IDFG files & BPA ann. reports | Charles Petrosky 334-3791 | Same as comments for #1 & #2. |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Univ. of Idaho | Lapwai Cr. & Tributaries | 1987 | DO, pH, Cond, susp. sed., orthophosphate, total P, $NO_2$ + $NO_3$, ammonia, selected pesticides (chlorinated hydre, organophosphates) 1 degree production, (*see comments) | 8 | 4-6/yr. | <1 | $18,000 | $1,000 | Annual reports | Merlyn Brusven 885-7540 | Nonpoint Source Agricultural Pollution--includes aquat. biotic assessments, testing erosion models in conjunction with GIS techniques<br>*macroinvertebrates, leaf processing rates, riparian zone classification. |
| IDWR | UIC | 1974 | Temp, pH, Sp. Cond, Turb, bacteria, sometimes others | Varies, approx. 100 per year | annual | .25-.5 | | | Available on request | John Mitchell 327-7964 | |
| | Cooperative stream gaging program with USGS | 1965 | Four | 1 (Snake River at Nyssa) | monthly | | | | From USGS | Jerry Hughes, USGS 334-1750 | |
| **LOCAL AGENCIES** | | | | | | | | | | | |
| City of Boise | Receiving water | 1980 ? | Al, As, Cd, $Cr^{+6}$, Ca, Fe, Ni, Ag, Zn, Pb, D.O., pH, Fecal, $NH_4$-N, Total $CL_2$, Flouride, Total Phosphate $NO_3$-N, $NO_2$-N | 5 | Quarterly | 1 | $4,000 | $200 | DMR | Brian Wright 384-4335 | All metals are performed as total recoverable. |
| | Biomonitoring | May 1986 | $NH_3$-N, pH | 4 | * | | | | DMR | Robbin Finch 384-4292 | *Currently being conducted monthly (Oct 89-Jan 90); qtly thereafter. Nine tests were conducted during the period 5/86 -12/88. |
| | | | Chronic Toxicity tests for 2 species** | 2 | * | 0.5 | $21,600 | Contracted out | DMR | R. Finch 384-4292 | **Fathead minnow larval survival & growth test. Ceriodaphnia survival & reproduction test. Residual chlorine. |
| | Biomonitoring | 5/86 | CN, $NH_4$-N, Al, As, Cd, $Cr^{+6}$, Cu, Fe, Pb, Ni, Ag, Zn, Flouride | 1 | W/each biomon. sequence *see comments | | $1,600 | Contracted out | DMR | R. Finch 384-4292 | *for day 1 split of W. Boise effluent. |

## STATEWIDE SURFACE WATER MONITORING SURVEY

| MONITORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CITY OF BOISE (CONT'D) | W.Boise WWTP Effluent | 1976 | $NH_4$-N, $NO_3$-N, Fecal colif., TSS, D.O., B.O.D.$_5$, $Cl_2$-Total, pH | 1 | Daily | 1 | $40,000 | $300 | DMR | B.Wright 384-4335 | |
| | W. Boise WWTP Pretrtmt | 1980 (?) | AS, Cd, Cr, $Cr+^6$, CU, Ag, Zn, CN | 1 | Quarterly | 1 | $1,000 | Con-tracted out | DMR | B.Wright 384-4335 | |
| | Lander St. WWTP Effluent | 1950 (?) | $NH_4$-N, $NO_3$-N, Fecal colif., TSS, D.O., B.O.D$_5$, $Cl_2$-Total, pH | 1 | Daily | 1 | $40,000 | $300 | DMR | B.Wright 384-4335 | |
| | Lander St. Pretrtmt | 1980 (?) | Cd, Cr, CU, Fe, Ni, Pb, Zn, $Cr+^6$ | 1 | 3-day compos-ite)2/yr. | 1 | $500 | Con-tracted out | DMR | B.Wright 384-4335 | Metals are all run as total recoverable. |
| | Priority Pollutant Scan & Forward Library Search | 1986 | Priority Pollutants listed in Table II 40 CFR; Part 122 Appendix D | 3 | Bi-annual | | $1,000 | Con-tracted out | DMR | B.Wright 384-4335 | Public Works staff is recommending increased frequency for priority pollutant monitoring to annual at both facilities for influent, effluent & sludge. Estimated annual cost $5,000. |
| | Boise R. Water Body Assessment | 1987 | Metals, nutri-ents, benthic macroinverte-brates & fish | 6 | 1-time effort | 4 | $160,000 inc. field, lab, equip. & report | | USGS Water Resources Investiga. Report 88-4206 | R.Finch 384-4292 | Public Works staff would like to followup the USGS Water body assessment by using EPA Rapid Bioassess. Protocols (EPA/444/4-89/001) in cooperation w/State DEQ, BSU & U of I. |
| | Treatment Plant Heavy Metals Source Study | 1988 | Al, As, Cd, Cr, $Cr+^6$, Cu, CN, Fe, Pb, Ni, Ag, Zn | 10 | 1-time effort | 1 | $20,000 | $5,000 | Staff rpt. in process & 1989 Pre-trtmt report | Victor Kollock 384-4292 | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NezPerce Tribe | M. Fork Clearwater | 1985 | S.Sed,bedload, temp,conduct-ivity | 12 | Monthly-quarterly | | | | W.Q.Reports | Pat Murphy 843-2253 Lapwai | All fisheries have been inventories on all streams of Reservation 1982-1985 |
| | Lapwai to Clear Cr. (ag.impacts) | | Nutrients, pH | | Annual | <1 | $200 | | | | |
| | Clear Creek SCS-F.S. coord. plan | 1987 | Temp. | 2 | Continuous (thermo-graph) | | | | | | |
| City of Post Falls | Spokane River | 1987 | Coliform C12 residual Phosphorus Ammonia | Plant Outfall | Aug, Sept, Oct. | 1 | $200 | | | Jim Taccogna 773-1438 | |
| | | | Coliform | #1 | | | | | | | |
| | | | Coliform C12 residual | #2 | | | | | | | |
| | | | Coliform C12 residual Phosphorus | #2A | | | | | | | |
| | | | Coliform C12 residual | #3 | | | | | | | |
| | | | Coliform | #4 | | | | | | | |
| | | | Coliform | #5 | | | | | | | |
| Shoshone Bannock Tribe | Bear Valley Creek Project | | Nutrients, metals, coliform Fish Habitat | 3-4 49 | | | | | | Mike Rowe 238-3748 | Old mine site rehabilitation |
| | Yankee Fork | 1984 | Nutrients,metals, cut back to pH, turbidity Fish Habitat | 4 49 | 2-3/yr. | 3.5 | $10,000 | $15,000 | BPA Annual Reports | | |
| | East Fork Salmon River | | Fish Habitat only | 49 | | | | | | | |
| | Fort Hall Bottoms-Spring Streams | 1987 | Fish pop,growth, migration,hab., cobble embedded. | 7 | Quarterly, more in-tensive in summer | | | | | | |
| | | | Macroinvert. | | | 4 | | $35,000 | Annual Rpt. Bur.Indian Affairs,Ptld. | Dan Dailey 238-3748 | |
| | | | D.O.,Temp,TDS | | Bi-annual | | | | | | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI- TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **SHOSHONE BANNOCK TRIBE (CONT'D)** | | | | | | | | | | | |
| | Upper Portneuf | 1987 | Fish pop/hab. | 2 | Annual | | | | | | |
| | Snake, Blackfoot, Portneuf R. | 2-yr study 86-87 | Fish biomass, hab.suitabil-ity,hydrology, | Snake-3 Blackfoot-5 Portneuf-4 | 3x during study | 4 | $50,000 | | BioWest Logan-UT | | Instream Flow-Incremental Methodology, Intensive & Comprehensive Study |
| | Phosphate Mines-Ross Fork Creek | 1985 | Macroinvert. D.O.,temp., turbidity, hab.evals. Fish pop.est. | 3 | 2-3 ann. | <1 | $16,000 (inc.FTEs) | | | | Simplot does monitoring |
| **PRIVATE ENTITIES** | | | | | | | | | | | |
| Centen-nial Mine | Base Line Surface Water Mon. for Mine site | 4/89 | Cation Anions Nutrients Solids CN (total) CNWad TR Metals | 8 | Variable | ? | $8,000 | $2,500 | N/A | Andrew Silva 343-4208 | Some of these reponses will change after permit is issued. |
| Coeur-Thunder Mountain | Trend (Amended) | 1989 | S.Sediments, pH, turbidity, specific conduct-ance, nitrate, chloride, cyanide | 16 | 5/year | 1 | $15,000 | $1,200 | Annual report to | Rick Richins 385-0373 | Marble Creek & Monumental Creek drainages |
| | Compliance | 1985 | Cyanide, chlorides, turbidity | 2 | Weekly before start-up & at shutdown | | | | | | Marble Creek & Monumental Creek drainages |
| | Macroinver-tebrate & Aquatic Habitat Survey | 1989 | Macroinverte-brate inventory, cobble embed., channel stability, assess stream habitat condition | 10 | Annual | <1 | $7,000 | $1,500 | Consult-ant's report | | Marble Creek & Monumental Creek drainages |

## STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Cyprus Thompson Creek | Surface water monitoring program for mine site | 1983 | SS,pH,turb., temperature, specific conductivity | 14 | monthly, weekly during runoff on Squaw Cr. | | $30,000 total includ. ground water | $1,000 | Quarterly report to EPA & DEQ | Bert Doughty 838-2200 | Squaw, Thompson & Bruno Creeks in Salmon River Basin |
| | | | All parameters | 14 | annual | | | | | | |
| | | | Macroinverte-brates<br>Fish shocking | 4<br>4 | semi-annual<br>annual | | | | | | Above & below mine site on both Squaw & Thompson Creeks |
| | | | SS, pH, Turb., temp, SC | 2 | weekly | | | | | | Pat Hughes & Buckskin Creeks |
| | | | HS, Cd, Cu, Pb, Hg, Zn | 2 | monthly | | | | | | Pat Hughes & Buckskin Creeks |
| | | 1989 | All | 3 | semi-annual | | | | | | Salmon River, above Thompson Creek, below T. Creek and above Squaw Creek, below Squaw Creek |
| Hecla Star/ Morning Mine | Treated waste water dis-charges to SF Coeur d'Alene River | 1972 | pH, flow, suspended solids, Cu, Zn, Pb, Hg, Cd | 1 | Daily, weekly when dis-charging | .25 | $3,500 approx. | $6,000 approx. | Monthly reports to EPA Reg. X & ID DEQ | Bryan Johnson 769-4100 | |
| | Treated waste water dis-charges to Canyon Cr. | 1972 | Same as above | 1 | Daily, weekly when dis-charging | .25 | $3,500 approx. | $6,000 approx. | Same as above | Same as above | |
| Hecla/ Yellow Pine Mine | Trend moni-toring in upper reaches of Salmon R. drainage | 1988 | pH, turbidity, metals, cyanide | 5 | quarterly, snowmelt, storm events | 1 | $5,000 approx. | $3,000 approx. | Annual rpt. to Dept. of Lands & DEQ | Darin Worden 634-3848 | |
| Hecla/ Lucky Friday Mine | Treated waste water dis-charges to S.F. Coeur d'Alene R. | 1972 | pH, suspended solids, flow, total metals | 1 | daily, weekly | .5 | $15,000 approx. | $15,000 approx. | Monthly reports to EPA Reg. X & ID DEQ | Art Barrett 744-1751 | |

STATEWIDE SURFACE WATER MONITORING SURVEY

| MONI-TORING ENTITY | PROGRAM | BEGIN DATE | PARAMETERS | # STATIONS | FREQUENCY | FTE's (FIELD) | ANNUAL LAB COST | ANNUAL EQUIP/COST COST | PUBLICATIONS INF. SOURCE | CONTACT PERSON PHONE | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Idaho Power | Compliance under license article | 1985 | DO, temp. | 1 | Recorder every 10 min.(4/15 -10/15) | 1mm | N/A | $1,000 /year | Monthly summaries sent to IDFG,IDHW, FERC,etc. | Ralph Myers 383-2358 | +3 records in penstalks in American Falls Dam |
| | Same as above | 1987 | Same as above | 1 | Same as above | 1mm | N/A | $1,000 /year | Same as above | Same as above | Cascade Dam (1 recorder in penstalk) |
| NERCO DeLamar Silver Mine | WQ Trends in Jordan & Louse Creek drainages | 1984 | S.Sediment, metals, cyanide, alk., ammonia, pH, temp., cations/anions, turb., conduct., flow | 10<br>2 | quarterly<br>annually | <1 | $9,000 | $5,000 | quarterly reports to DEQ | Bart Richards 583-2511 | Sporadic data prior to 1984 |
| | Heap Leach operation | 1988 | pH, W.A.D. cyanide | 1 | monthly | <1 | $500 | | quarterly reports to DEQ | | |
| Plum Cr. Timber Co. | | 1987 | Macroinverte-brates; % fines sediment, Water chemistry (nutrients) | 1 (5 samples) | 4/yr. quarterly | | | | 1988 Progress Report | Loren Hicks (206) 467-3629 | Prospector Creek |
| Simplot | Smokey Canyon | 1979 | Cations/anions, metals,nutrients, S.Sediment,alk., conductivity, Macroinvert. | 10 | Semi-annual | <1 | $15,000 (inc. FTE costs) | | Reports to F.S.&BLM | E.Mapes 235-4459 | Mariah Association Salt River Drainage |
| | | 1981-1984 | Macroinvert. | 2 | Semi-annual | | | | | | Diamond & Slug Cr. 2 yrs before constr. of pipeline & 2 yrs after |

## APPENDIX E

### HYDROLOGIC DATABASES FOR IDAHO

| NAME | CONTENTS | CONTACT(S) |
|---|---|---|
| BIOS (Biological data system) | For biological and habitat data. Three components: field survey, tissue storage, & toxicity testing. | U.S. EPA, Robert King, 202-475-7119 |
| HISARS (Hydrologic Information Storage & Retrieval System) | Climate & hydrology data for Idaho; data from National Climatic Center NOAA & USGS | Univ. Idaho, Moscow, Dr. Myron Molnau, 208-885-6182 |
| STORET (Storage and Retrieval) | | |
| Water Quality File | IDHW-DEQ generated WQ data and that of selected other agencies (USGS, BOR) | IDHW-DEQ, RaNae Hardy 208-334-5855; or Phillip Taylor, U.S. EPA, 800-424-9067 |
| Non-Point Source Stream Station File | Provides a means for extracting information from STORET for stations impacted by non-point source pollution. | U.S. EPA, Steve Dressing, 202-382-7110 |
| SNOTEL (Snow telemetry) | Snow depth & water content | USDA, SCS, 208-334-1614 |
| WATSTORE (Water Storage) | U.S. Geological Survey, discharge and WQ data | U.S.G.S., Walton Low 208-334-1750 |
| WBS (Waterbody system) | Waterbody ID, designated use, causes & sources of use impairment | U.S. EPA, Meg Kerr, 202-382-7056 |

# APPENDIX F

## IDAHO FOREST PRACTICE EVALUATION WORKSHEET

5/18/88

# IDAHO FOREST PRACTICE EVALUATION WORKSHEET

DATE: ____________________

## LOCATION

SITE (Describe): ______________________________________________
________________________________________________________________

COUNTY ________________________ DESCRIPTION (Sec, T.,R, P.M. ________
OWNER ________________________ ______________________________
OPERATOR ____________________ ______________________________

FPA FOREST REGION ( ): North _____ South _____

USFS ________ State _________ Private Industrial ________
Private Non-industrial _______

## PHYSICAL ENVIRONMENT

ELEVATION: Mean ______________ Range ______________________
SLOPE: Mean ______________ Range ______________________

CLIMATE: Annual Precipitation (in.) __________________________
Antecedent Conditions _____________________________

GEOLOGY & SOILS: ______________________________________________
(describe) ______________________________________________
______________________________________________

Hazard Rating (see attachment) __________________________________

VEGETATION: Forest Stand ___________________________________
(describe with Riparian Vegetation ______________________________
H.T. & sere) ______________________________________________

## PRACTICES

STAGE ( ): Road Construction ____ Harvest ____
Slash Management ____ Reforestation ____

ROADS: New Road Construction _____

Road Reconstruction: Heavy _____ Light _____

(describe) ______________________________________________

______________________________________________

______________________________________________

______________________________________________

______________________________________________

include, if possible road drainage template, culvert spacing, road gradient (0-5%, 5-10%, 10%+), prism width, sideslope %, aspect, road age, erosion practices

MILES OF NEW ROAD CONSTRUCTION _____ RECONSTRUCTION _____

| | | |
|---|---|---|
| HARVEST:<br>(Acres & Yarding System, # of Landings | Clearcut _________<br>Ind. Selection _____<br>OSR ______<br>______________________________<br>______________________________ | Seed Tree ____________<br>Shelterwood ___________ |

SITE PREPARATION & REFORESTATION: (Describe) ______________________________________________

______________________________________________

______________________________________________

## OBSERVED PROTECTED USE IMPACTS
## STREAM REACH DESCRIPTION

NAME: ______________________________________________

REACH DESCRIPTION: ______________________________________

STREAM ORDER: ________________ STREAM STAGE: ________________

LENGTH OF REACH EVALUATED: _________________________________

## OBSERVED OR KNOWN BENEFICIAL USES

### FISH HABITAT

FPA STREAM CLASS: I ______ II ______

FISHERY TYPE*: ___________________________________________

IF&G STREAM CLASS*: ______________________________________

PRIMARY FISHERY USE**: ___________________________________

SPECIES PRESENT: ________________________________________

### DOMESTIC WATER SUPPLY

DISTANCE TO INTAKE: _____________________________________

*Fishery Type: 1. Warm Water Fish, 2. Hatchery Trout with no wild trout, 3. Wild trout (with or without hatchery supplement), 4.Kokanee 5.Steelhead and/or Chinook Salmon.

*IF&G Stream Class: 1. Extremely critical, 2. Highly critical, 3. Critical, 4. Moderate, 5. Low.

** Fishery Use: Spawning, Rearing, Fish Passage, Overwintering, etc.

## STREAM PROTECTION OBSERVATIONS

REACH: ____________________________________

| AS A RESULT OF: | PRE-EXISTING CONDITIONS | PROJECT RELATED IMPACTS |
|---|---|---|
| POOL FILLING(SEDIMENT): | ____________ (1-Severe;2 -moderate; 3-slight; 4-None Evident ) | ____________ (None; Minimal; Extensive; NA; NI) |
| COBBLE EMBEDDEDNESS: | ____________ (1- ≥46%; 2-31-45%; 3-16-30%; 4-0-15%) | ____________ (None, Minimal; Extensive; NA; NI) |
| SPAWNING GRAVELS SEDIMENTED: | ____________ (1-highly sedimented; 2-moderate; 3-slight; 4-no observed sedimentatiom) | ____________ (None, Minimal; Extensive; NA; NI) |

STREAMBANK CONDITION: ____________ ________________ (None; Minimal; Extensive; NA; NI)

1-<25% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks absent, streambanks are receiving severe mechanical alteration;
2-25-49% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks uncommon, streambanks are receiving moderate mechanical alteration;

3-50-79% streambank covered with vegetation or by gravel or larger material, undercut banks and overhanging vegetation moderate, streambanks receiving slight alteration;
4-over 80% of streambank covered with vegetation in good condition or by boulder/rubble,little or no soil exposed, undercut banks and overhanging vegetation abundant, no mechanical streambank alteration.

## COMMENTS ON PROJECT IMPACTS

IMPACT TYPE: (Describe Intensity & Duration):

Sediment ________________________________
Temperature ________________________________
Loss of LOD ________________________________
Habitat Change ________________________________
Turbidity in DWS ________________________________

RECOMMENDATION: ________________________________

Recommend action to prevent or mitigate problem ________________________________

________________________________

________________________________

## PRACTICE SUMMARY

(Narrative to include the following points: were the BMPs applied?; were the BMPs effective in preventing soil erosion?; have pollutants been delivered to the stream(s) or potentially could they be?; are there any implimentation problems?; does this practice suggest any rule changes?; and what other nonpoint activities or natural factors are effecting the stream quality?)

## ADDITIONAL COMMENTS

WIDTH OF CLASS II SPZ(s) ______________

WAS THE SPZ WIDTH PROTECTIVE OF THE CLASS II STREAM? ________

REACH:________________________________

| AS A RESULT OF: | PRE-EXISTING CONDITIONS | PROJECT RELATED IMPACTS |
|---|---|---|
| POOL FILLING(SEDIMENT): | __________ (1-Severe;2 -moderate; 3-slight; 4-None Evident ) | __________ (None; Minimal; Extensive; NA; NI) |
| COBBLE EMBEDDEDNESS: | __________ (1- ≥46%; 2-31-45%; 3-16-30%; 4-0-15%) | __________ (None, Minimal; Extensive; NA; NI) |
| SPAWNING GRAVELS SEDIMENTED: | __________ (1-highly sedimented; 2-moderate; 3-slight; 4-no observed sedimentatiom) | __________ (None, Minimal; Extensive; NA; NI) |
| STREAMBANK CONDITION: | __________ | __________ (None; Minimal; Extensive; NA; NI) |

1-<25% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks absent, streambanks are receiving severe mechanical alteration;
2-25-49% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks uncommon, streambanks are receiving moderate mechanical alteration;
3-50-79% streambank covered with vegetation or by gravel or larger material, undercut banks and overhanging vegetation moderate, streambanks receiving slight alteration;
4-over 80% of streambank covered with vegetation in good condition or by boulder/rubble,little or no soil exposed, undercut banks and overhanging vegetation abundant, no mechanical streambank alteration.

REACH:________________________________

| AS A RESULT OF: | PRE-EXISTING CONDITIONS | PROJECT RELATED IMPACTS |
|---|---|---|
| POOL FILLING(SEDIMENT): | __________ (1-Severe;2 -moderate; 3-slight; 4-None Evident ) | __________ (None; Minimal; Extensive; NA; NI) |
| COBBLE EMBEDDEDNESS: | __________ (1- ≥46%; 2-31-45%; 3-16-30%; 4-0-15%) | __________ (None, Minimal; Extensive; NA; NI) |
| SPAWNING GRAVELS SEDIMENTED: | __________ (1-highly sedimented; 2-moderate; 3-slight; 4-no observed sedimentatiom) | __________ (None, Minimal; Extensive; NA; NI) |

## STREAMBANK CONDITION: ______________ ____________________
(None; Minimal; Extensive; NA; NI)

1-<25% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks absent, streambanks are receiving severe mechanical alteration;

2-25-49% of streambank covered with vegetation or by gravel or larger material, overhanging vegetation and undercut banks uncommon, streambanks are receiving moderate mechanical alteration;

3-50-79% streambank covered with vegetation or by gravel or larger material, undercut banks and overhanging vegetation moderate, streambanks receiving slight alteration;

4-over 80% of streambank covered with vegetation in good condition or by boulder/rubble,little or no soil exposed, undercut banks and overhanging vegetation abundant, no mechanical streambank alteration.

# BMP COMPLIANCE & EFFECTIVENESS

| | FOREST PRACTICES ACT RULE | COMPLIANCE | EFFECTIVENESS | RESPONSIBILITY | REMARKS |
|---|---|---|---|---|---|
| | **3C SOIL PROTECTION** | | | | |
| SCALE 1 | C-1 SKIDDING EROSION | | | | |
| | C-2 30% LIMITATION | | | | |
| | C-3a # OF SKID TRAILS | | | | |
| | C-3b TRACTOR SIZE APPROPRIATE | | | | |
| | C-4 CABLE YARDING | | | | |
| | **3D LOCATION OF LANDINGS** | | | | |
| SCALE 1 | D-1 LOCATE LANDINGS & SKID TRAILS OUT OF SPZ | | | | |
| | D-2 SIZE OF LANDINGS | | | | |
| | D-3 LANDING FILL STABILIZATION | | | | |
| | **3E DRAINAGE SYSTEMS** | | | | |
| SCALE 1 | E-1 DRAINAGE SKID TRAILS STABILIZATION | | | | |
| | E-2 DRAINAGE LANDINGS STABILIZATION | | | | |
| | **3F TREATMENT OF WASTE MATERIAL** | | | | |
| SCALE 2 | F-1 SLASH OUT CLASS I STREAM | | | | |
| | F-2 SLASH OUT CLASS II STREAM | | | | |
| | F-3 SOIL OUT OF SP ZONES | | | | |
| 3 | F-4 OIL, FUEL OUT SP ZONES | | | | |
| | **3G STREAM PROTECTION** | | | | |
| SCALE 1 | G-1 SKIDDING, STREAM XING SP ZONES | | | | |
| | G-2 CABLE STREAM XING SP ZONES | | | | |
| SCALE 4 | G-3 SHADING, STABIL., FILTER CLASS I | | | | |
| | G-4 SHADING, STABIL., FILTER CLASS II | | | | |
| | **3H SCENIC & WILDLIFE CONSIDERATION** | | | | |
| | H-3 WET AREAS CONSIDERATION | | | | |

**ADDITIONAL NOTES:**

# BMP COMPLIANCE & EFFECTIVENESS

SCALE 1

| FOREST PRACTICES ACT RULE | COMPLIANCE | EFFECTIVENESS | RESPONSIBILITY | REMARKS |
|---|---|---|---|---|
| **4 ROAD CONSTRUCTION RULES<br>4B PLANS & SPECIFICATIONS** | | | | |
| B-1a PLAN MIN. IN SP ZONES | | | | |
| B-1b PLAN VEGETATION BETWEEN ROAD & STREAM | | | | |
| B-2a PLAN MIN. WIDTH CUT & FILL | | | | |
| B-2b PLAN MINIMUM CUTS & FILLS NEAR STREAM CHANNALS | | | | |
| B-3 PLAN WASTE TO BE STABILIZED | | | | |
| B-4a PLAN ROAD DRAINAGE | | | | |
| B-4b PLAN ROAD DIPS, W-BARS & XING DRAINS | | | | |
| B-5a PLAN ROAD & CULVERT DITCHES | | | | |
| B-5b PLAN CULVERTS EROSION OF FILL | | | | |
| B-5c PLAN MIN. DISCHARGE OF SEDIMENT | | | | |
| B-6a PLAN MINIMUM STREAM XINGS | | | | |
| B-6b PLAN CULVERT FISH PASSAGE | | | | |
| B-7 PLAN REUSE OR VARIANCE ON OLD ROADS | | | | |

SCALE 1

| FOREST PRACTICES ACT RULE | COMPLIANCE | EFFECTIVENESS | RESPONSIBILITY | REMARKS |
|---|---|---|---|---|
| **4C ROAD CONSTRUCTION**<br>EXCESS MATERIAL, SLASH OUT SP ZONES | | | | |
| C-1 CONSTRUCTION FOLLOWED PLAN | | | | |
| C-2 DEBRIS CLEARED FROM DRAINAGEWAYS | | | | |
| C-3 STABILIZE EXPOSED AREAS | | | | |
| C-5 COMPACT & MINIMIZE SOFT MATERIAL IN FILLS | | | | |
| C-6a STREAM XING, OTHER LAW | | | | |
| C-6b ROAD CONSTRICTION OF STREAM CHANNELS | | | | |
| C-7 REMOVE BERMS & OUTSLOPE ROADS | | | | |

**ADDITIONAL NOTES:**

# BMP COMPLIANCE & EFFECTIVENESS

| | FOREST PRACTICES ACT RULE | COMPLIANCE | EFFECTIVENESS | RESPONSIBILITY | REMARKS |
|---|---|---|---|---|---|
| | C-8 QUARRY DRAINAGE | | | | |
| | C-9a X-DRAINS, CULVERTS- MIN. EROSION | | | | |
| SCALE 1 | C-9b INSTALL DRAINAGE PRIOR TO RUNOFF | | | | |
| | C-9c RELIEF CULVERT GRADIENT | | | | |
| | C-10 WET WEATHER CONSTRUCT-ION DELAYS | | | | |
| | C-11 OVERHANG CUTS & TREE HAZARDS | | | | |
| | **4D ROAD MAINTENANCE** | | | | |
| | D-1 SIDECAST OUT OF STREAMS | | | | |
| | D-2 REPAIR, STABILIZE SEDIMENT HAZARDS | | | | |
| SCALE 1 | D-3 ACTIVE ROADS | | | | |
| | 3a CULVERTS, DITCHES | | | | |
| | 3b CROWN, SLOPED BERM | | | | |
| | 3c MINIMIZE SUBGRADE DRAIN-AGE EROSION | | | | |
| 3 | 3d SURFACE OIL OUT OF STREAM | | | | |
| | D4 INACTIVE ROADS | | | | |
| | 4a CULVERTS, DITCHES, SLOPES DRAINAGE | | | | |
| | 4b ROAD CLOSURE | | | | |
| SCALE 1 | D-5 ABANDONED ROADS | | | | |
| | 5a SLOPED, DRAINAGE, VEGETATION | | | | |
| | 5b DITCHES CLEAN | | | | |
| | 5c ROAD CLOSED | | | | |
| | 5d BRIDGES, CULVERTS REMOVED | | | | |

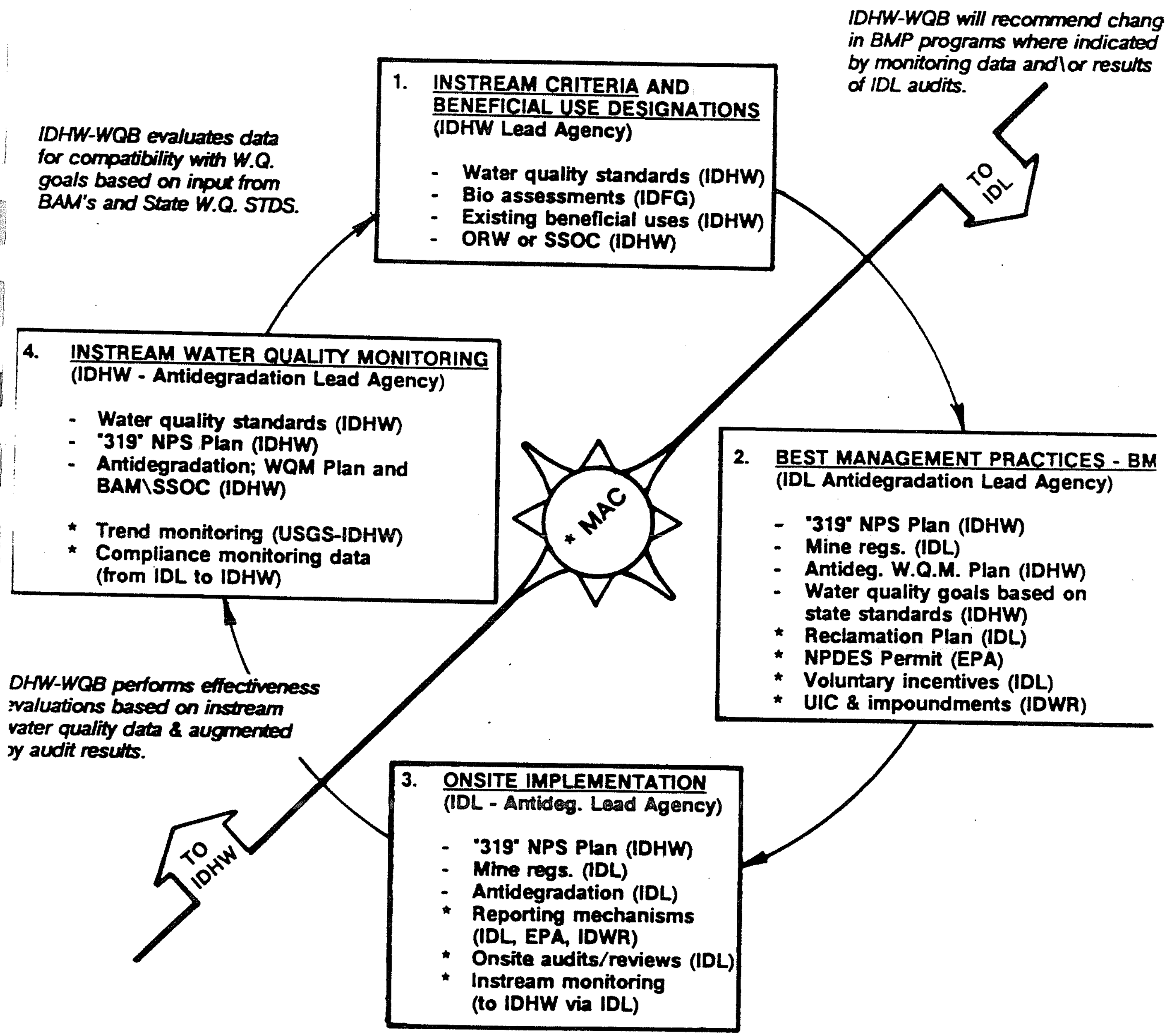
**ADDITIONAL NOTES:**

# APPENDIX G

## BMP FEEDBACK LOOP EXAMPLE: MINING

**STATE OF IDAHO**
**SURFACE WATER QUALITY PROGRAM**
**BMP FEEDBACK LOOP: MINING**

- source of authority or guidance
* action items




*MINING ADVISORY COMMITTEE - "319" NPS PROGRAM

Members: Chaired by IDL; IDHW-WQB, IDFG, BLM, USFS, ICL, IDWR, and one representative each from underground, surface & phosphate mining.

* Develop BMP selection guidelines for operators (using guidance from WQM Plan).
* Compile BMP manual reflecting current technology from "approved" sources.
* Produce a field handbook and workshops for technology transfer.
* Facilitate interagency coordination.
* Resolve issues using consensus approach.

# APPENDIX H

## WATER QUALITY PARAMETERS AND RECOMMENDED PROTOCOLS

## SUGGESTED WATER QUALITY MONITORING PARAMETERS AND PROTOCOLS

| PARAMETER (STORET # and constituent) | RECOMMENDED SAMPLING FREQUENCY* Minimum | Optimum | PROTOCOL | REFERENCES |
|---|---|---|---|---|
| **Parameters for Trend Monitoring** | | | | |
| NUTRIENTS | 6/Year | 12/Year | Standard Methods | Greenberg et al. 1985; Fishman & Friedman 1989 |
| (00631) NO2+NO3 as N, diss | | | | |
| (00610) NH4 as N, total | | | | |
| (00671) Ortho P as P, diss | | | | |
| (00625) NH4+Org N as N, total | | | | |
| (00665) P, total | | | | |
| COMMON IONS | 4/Year | 12/Year | Standard Methods | Greenberg et al. 1985; Fishman & Friedman 1989 |
| (00915) Ca, diss | | | | |
| (00935) K, diss | | | | |
| (00940) Cl, diss | | | | |
| (80154) Suspended sediment | | | Fluvial sediment techniques | Edwards & Glysson 1988; Guy & Norman 1970; Greenburg, et.al. 1985 |
| (00945) SO4, diss | | | | |
| (00925) Mg, diss | | | | |
| (00950) F, diss | | | | |
| (00930) Na, diss | | | | |
| (00955) SiO2, diss | | | | |
| (70300) Solids, diss | | | | |
| TRACE IONS | 4/Year | 12/Year | Standard Methods | Greenberg et al. 1985; Fishman & Friedman 1989 |
| (01000) Arsenic, diss | | | | |
| (01025) Cadmium, diss | | | | |
| (01030) Chromium, diss | | | | |
| (01040) Copper, diss | | | | |
| (01046) Iron, diss | | | | |

* Recommended as guidelines only, site and project specific

| PARAMETER (STORET # and constituent) | RECOMMENDED SAMPLING FREQUENCY* Minimum | Optimum | PROTOCOL | REFERENCES |
|---|---|---|---|---|
| **Parameters for Trend Monitoring (continued)** | | | | |
| TRACE IONS (continued) | 4/Year | 12/Year | Standard Methods | Greenberg et al. 1985; Fishman & Friedman 1989 |
| (01049) Lead, diss | | | | |
| (01056) Manganese, diss | | | | |
| (71890) Mercury, diss | | | | |
| (01145) Selenium, diss | | | | |
| (01075) Silver, diss | | | | |
| (01090) Zinc, diss | | | | |
| [diss=dissolved] | | | | |
| FIELD CONSTITUENTS | | | | Wood 1976 |
| (00060) Water discharge | 12/Year | Continuous | Stream gaging/recorder | Rantz 1982a; 1982b |
| (00410) Alkalinity, total | 6/Year | 12/Year | Standard Methods | Greenberg et al. 1985 |
| (00010) Water temperature | 6/Year | Continuous | Point sample/recorder | Refer to meter instructions |
| (00300) Oxygen, diss | 6/Year | Continuous | Winkler/meter/recorder | Greenberg el al. 1985 |
| (00400) pH | 6/Year | Continuous | Standard Methods/recorder | Greenberg et al. 1985 |
| (00095) Specific conductance | 6/Year | Continuous | Meter/recorder | Refer to meter instructions |
| (00025) Barometric pressure | 6/Year | Continuous | Meter/recorder | Refer to meter instructions |
| (31625) Fecal coliform | 6/Year | 1/Day | Standard Methods | Greenberg et al. 1985; Britton & Greeson 1987 |
| (31673) Fecal streptococci | 6/Year | 1/Day | Standard Methods | Greenberg el al. 1985; Britton & Greeson 1987 |
| (00076) Turbidity, NTU | 6/Year | Continuous | Standard Methods/recorder | Greenberg et al. 1985 |

* Recommended as guidelines only, site and project specific

## SUGGESTED WATER QUALITY MONITORING PARAMETERS AND PROTOCOLS

| PARAMETER | RECOMMENDED SAMPLING FREQUENCY* Mimimum | Optimum | PROTOCOL | REFERENCES |
|---|---|---|---|---|
| **Parameters for BMP effectiveness monitoring** | | | | |
| **A). On-site Implementation** | | | | |
| Forest practices BMP compliance evaluation | 1/Project | 1/Project | IDHW audit protocol | Harvey et al. 1988 |
| Livestock grazing intensity - riparian zone | 2/Year | 3/Year | Forage utilization-stubble hgts. | Platts et al. 1987 |
| Mining BMP compliance evaluation | 1/Year | 1/Month | *(Reserved-pending)* | *(Reserved-pending)* |
| Agriculture BMP compliance evaluation | 1/Year | 3/Year | Standards and Specifications | SCS 1988 |
| **B). Pollutant source and transport** | | | | |
| Forest Practices audit - stream quality assessment | 1/Project | 1/Project | IDHW audit protocol | Harvey et al. 1988 |
| Sediment accumulations in tributaries | 1/Year | 2/Year | Tributary monitoring technique | Megahan 1982 |
| Sediment movement in tributaries | 1/Year | 2/Year | Tributary monitoring technique | Megahan 1982 |
| Suspended sediment in streams | 1/Month | 1-2/Hr. thru runoff | Standard Methods | Greenberg et al. 1985 |
| Suspended sediment in irrigation drains | 2/month | 1/Day | IDHW monitoring protocol | Clark 1989; Maret 1990 |
| Stream channel stability | 1/Year | 1/After each runoff | Channel Stability Evaluation | Edwards & Glysson, 1988<br>Guy and Norman 1970<br>Pfankuch 1978 |
| Streambank stability | 1/Year | 1/After each runoff | Streambank rating system | U. S. Forest Service 1989 |
| Stream surface shading | 1/Year | 1/Season | Radiation intercept technique | Platts et al. 1987 |
| Large organic debris and recruitment | 1/Year | 1/After each runoff | Quantitative technique | Platts et al. 1987 |
| Stream width | 1/Year | 1/After each runoff | Transect method | Platts et al. 1983 |
| Stream depth | 1/Year | 1/After each runoff | Transect method | Platts et al. 1983 |
| Riparian vegetation (type and abundance, seral status) | 1/Year | 1/Season | Riparian evaluation guide | U. S. Forest Service 1989 |
| **Parameters for beneficial use monitoring - status/change/attainability** | | | | |
| Clean fine sediment | | | | |
| Embeddedness | 1/Year | 1/Ea. low flow period | Transect/hoop technique | Skille & King 1989 |
| Spawning redd % fines/bioassay | 1/Spawning Season | 1/Spawning season | Egg basket technique | Burton & Harvey 1989 |
| Intergravel dissolved oxygen | 4-5/Incubation Period | Continuous | Intergravel pipe/recorder | Burton & Harvey 1989 |
| Turbidity - salmonid site feeding, | 1/Month | Continuous | Standard Methods/recorder | Greenberg et al. 1985 |
| drinking water supply (depends on system size) | 4/Year, 1/Month, 1/Day | Continuous | Standard Methods/recorder | IDHW 1985b |
| Pool filling by sediment | 1/Year | 1/After runoff | Thalweg profile technique | Lisle 1982 |

* Recommended as guidelines only, site and project specific

| PARAMETER | RECOMMENDED SAMPLING FREQUENCY* Mimimum | Optimum | PROTOCOL | REFERENCES |
|---|---|---|---|---|
| **Parameters for beneficial use monitoring - status/change/attainability (continued)** | | | | |
| Toxic sediment | | | | |
| Benthic environmental tolerance | 1/Year | 1/Season | Rapid Bioassessment protocols | Plafkin et al. 1989 |
| Fish environmental tolerance | 1/Year | 1/Season | Rapid Bioassessment protocols | Plafkin et al. 1989 |
| Fish populations | 1/Year | 1/Season | Electrofishing or snorkling | Reynolds 1983; Helfman 1983 |
| Stream habitat inventory and evaluation | 1/Year | 2/Year | Fish habitat surveys method | U. S. Forest Service 1989 |
| Water temperature | 1/Month | Continuous | Standard Methods/recorder | Greenberg et al. 1985 |
| Percent surface fines | 1/Year | 1/After ea. runoff | Wolman pebble count | Wolman 1954 |
| Percent fines by depth | 1/Year | 1/After ea. runoff | Freeze core | Platts et al. 1983 |
| Surface dissolved oxygen | 1/Month | Continuous | Standard Methods/recorder | Greenberg et al. 1985 |
| Macroinvertebrates | 1/Year | 1/Season | Rapid Bioassessment | Plafkin et al. 1989 |
| Macroinvertebrates | 1/Year | 1/Season | Intensive community analysis | Platts et al. 1983 |
| Stream hydraulics and morphology | 1/Project | 2/Year | • Stream typing | Rosgen 1985 |
| **Other** | | | | |
| 1. Agriculture | | | | |
| a. Coliform | 6/Year | 1/Day | Standard Methods | Greenberg,1985; Britton; Greeson 1987 |
| b. Insecticides | 1/Year | 4/Year | Standard Methods | Greenberg et al. 1985; 1988 |
| c. Herbicides | 1/Year | 4/Year | Standard Methods | Greenberg et al. 1985; 1988 |
| d. Nutrients | 6/Year | 1/Day | See constituents under "trend" | Greenberg et al. 1985<br>Fishman & Friedman 1989 |
| 2. Forest Practices | | | | |
| a. Insecticides | 1/Year | 4/Year | Standard Methods | Greenberg et al. 1985; 1988 |
| b. Herbicides | 1/Year | 4/Year | Standard Methods | Greenberg et al. 1985; 1988 |
| 3. Mining | | | | |
| a. Toxic | | | | |
| 1) Cyanide | 2/Year | 1/Day | Standard Methods | Greenberg et al. 1985 |
| 2) Chlorine | 2/Year | 1/Day | Standard Methods | Greenberg et al. 1985 |
| 3) Salts | 2/Year | 1/Day | Standard Methods | Greenberg et al. 1985 |
| 4) Acids | 2/Year | 1/Day | Standard Methods | Greenberg et al. 1985 |
| b. Trace metals | 4/Year | 12/Year | See trace ions under "trend" | Greenberg et al. 1985<br>Fishman & Friedman 1989 |

* Recommended as guidelines only, site and project specific

# APPENDIX I

## EXISTING MOUs - BETWEEN IDHW AND OTHER AGENCIES

MEMORANDUM OF UNDERSTANDING FS-01-88-15
IMPLEMENTING THE WATER QUALITY PROGRAM ON
THE NATIONAL FORESTS IN THE STATE OF IDAHO

This Memorandum of Understanding has been entered into by and between the Idaho Department of Health and Welfare, Division of Environment hereafter referred to as the Department and the U.S. Department of Agriculture, Forest Service, Northern, Intermountain, and Pacific Northwest Regions hereafter referred to as the Forest Service. The Purpose of this agreement is to coordinate water pollution control activities on National Forest System lands in Idaho to protect, maintain, and restore the beneficial uses of the waters of the state.

Whereas, the Department has the authority to safeguard water quality of the State of Idaho through the Clean Water Act of 1972, as amended in 1977, 1980, and 1987; the Idaho Environmental Protection and Health Act of 1972, Idaho Code, Title 39, Chapter 1, as amended; and the Idaho Water Quality Standards and Wastewater Treatment Requirements, as amended, and

Whereas, the implementation arrangements and the Department approved Best Mañagement Practices to safeguard water quality of the State of Idaho are found in the State of Idaho Forest Practices Water Quality Management Plan (January 1988), the Rules and Regulations pertaining to the Idaho Forest Practices Act, Idaho Code, Title 38, Chapter 13, as amended November 7, 1986, and the Best Management Practices for Road Activities (August, 1982), and

Whereas, the Forest Service under the Organic Act of 1897 (16 U.S.C. 551), the Multiple Use Sustained Yield Act of 1960 (16 U.S.C. 528), as amended, and the National Forest Management Act of 1976, is directed to regulate the occupancy and use of National Forest System lands, and

Whereas, the Forest Service under the National Environmental Policy Act of 1969 (42 U.S.C. 4321) is directed to utilize a systematic interdisciplinary approach in planning and decision making, to evaluate and report environmental impacts of proposed actions, and to provide alternatives to those actions, and

Whereas, the National Forest Management Act of 1976 (16 U.S.C. 1601) provides for the interdisciplinary development, the content, use, review, revision and amendment of the National Forest System resource planning process, and also provides for the establishment of National, Regional, and local resource goals on the basis of the assessed capability of local and resource planning of State and local governments, including Indian tribes, and other Federal agencies, and

Whereas, the Forest Service under the Clean Water Act of 1972, as amended in 1977, 1980, and 1987; and Executive Orders 11752 (December 19, 1973), 11991 (May 24, 1977) and 12580 (January 23, 1987) is directed to meet State, interstate and local substantive as well as procedural requirements respecting control and abatement of pollution, and

Whereas, the Forest Service under the National Nonpoint Source Policy (December 12, 1984), the Forest Service Nonpoint Strategy (January 29, 1985), and the USDA Nonpoint Source Water Quality Policy (December 5, 1986) is directed to prevent or control pollution from nonpoint sources and to protect and maintain water quality and beneficial uses, and

Whereas, the Forest Service and the Department mutually desire:

1. To comply with the nonpoint source control sections of the Clean Water Act and applicable executive orders.

2. To implement the Idaho Water Quality Standards on National Forest System lands.

3. To implement the Forest Practices Water Quality Management Plan (FPWQMP).

4. To implement a procedure to review proposed projects for nonpoint source impacts (Idaho Water Quality Standards, Section 16.01.2300,04.c.).

5. To develop cooperative and/or complementary water quality monitoring systems, share technical expertise, and promote research on water quality management related to forest practices.

6. To develop procedures to minimize duplication of effort and facilitate complementary pollution control and abatement programs.

Now, therefore, the parties agree as follows:

The Forest Service agrees:

1. To implement the feedback loop concept (Idaho Water Quality Standards, Section 16.01.2050,06., Section 16.01.2300.04.) on National Forests. This will be accomplished by development of a system on each National Forest which includes monitoring, comparison to criteria, and modification of land management practices where needed to protect beneficial uses of water.

2. To meet or exceed the intent of the water quality protection elements of both the Idaho Forest Practices Act, Rules and Regulations, and the Best Management Practices for Road Activities by implementation of soil and water conservation practices as described in Forest Service handbook 2509.22.

3. To provide training to Forest Service staff regarding potential impacts to water quality, applicable state and federal law, and state-of-the-art techniques used to prevent water quality problems.

4. To conduct internal reviews of best management practices by annually examining a representative sample (target 10%) of timber-related projects and prepare written evaluation reports as described in FPWQMP. Summaries of these reports will be provided to the Department.

5. To annually provide information to the Department on in-stream monitoring and evaluation efforts, research results, and evaluation of BMP effectiveness.

6. To participate in the statewide Forest Practices Audit Team, provide necessary information for selection of timber sales, and provide technical expertise in audit procedures.

7. To provide technical support for development of a process to control cumulative effects of forest practices and participate in demonstration projects which include National Forest System lands.

8. To provide technical support for development of water quality criteria.

9. To provide an assessment of water quality conditions on the National Forest System lands as requested by the Department for inclusion in the Idaho Water Quality Status Report (Section 305-b, Clean Water Act).

10. To participate in development and implementation of Idaho's NPS Assessment and Management Program Plan (Section 319, Clean Water Act).

11. To annually provide, to the designated Department offices by April 30, a general schedule of proposed land-disturbing activities during the forthcoming year. Such activities include proposed timber sale areas, road and bridge construction and/or maintenance projects, stream channel restoration and fish habitat improvement projects, and activities authorized by special use permit. Projects and programs on which the National Forest specifically requests assistance will be identified.

12. To involve the Department at the appropriate time in the NEPA process for projects having significant potential to impact beneficial water uses. The National Forests will develop a screening procedure with the regional offices of the Department for the purpose of flagging projects which interest the Department. Emphasis should be placed on obtaining input from the Department during the early stages of project analysis and planning.

13. To notify the Department of all suspected violations of air, water quality, and solid waste standards or regulations, and spills of hazardous materials on National Forest System lands.

The Department agrees:

1. To coordinate water quality management planning and implementation efforts by the State with the Forest Service where National Forest land is involved and keep the Forest Service updated on any changes to State standards, regulations, or guidelines.

2. To invite Forest Service representation on policy or technical advisory committees that relate to forests or rangeland management such as cumulative effects and water quality criteria.

3. To participate in field reviews as requested by the Forest Service and to involve the Forest Service in the Forest Practices Audit Team.

4. To Review the Forest's listing of proposed projects and activities scheduled for NEPA process, participate in those affecting water quality, and provide timely review comments for finalizing the NEPA documents.

5. To provide the Forest Service Regions 1 and 4 with copies of State environmental quality laws and regulations during the review period and after adoption.

6. To notify the Forest Service of suspected violations of State environmental quality laws or regulations which may impact National Forest lands and to aid in the implementation of corrective or enforcement proceedings.

7. To provide instructors and resource expertise when requested for Forest Service training and education programs.

8. To provide assistance and training to the National Forests in the use of EPA's Water Quality Data Storage and Retrieval System (STORET).

It is mutually agreed:

1. That the Memorandum of Understanding of December 8, 1976, between the Forest Service and the Department is replaced upon approval of this agreement by both parties.

2. That the Forest Service is the Designated Management Agency for management of water quality on National Forest System lands in the State of Idaho.

3. That the Department is the lead agency for implementation of the Clean Water Act for control of nonpoint sources in the State of Idaho.

4. That in cases of conflict between agency missions, the agencies will provide an opportunity for informal conflict resolution prior to taking other actions provided by law.

5. To coordinate water quality monitoring activities and to cooperate in the collection, analysis, and processing of water quality samples when the results are mutually beneficial to the Forest Service and the Department. Cooperative monitoring programs between the Department and the National Forests will be described in detailed plans, and resource commitments will be made through project-specific memoranda of understanding.

6. To work jointly on the development of standard monitoring techniques for the assessment of forest practice impacts on water quality through establishment of a technical working team. The technical working team will be comprised of specialists with technical expertise and will also have representatives from other agencies.

7. That nothing in this agreement shall be construed as limiting or affecting in any way the legal authority of the Forest Service in connection with the proper administration and protection of National Forest System lands in accordance with federal laws and regulations.

8. That nothing in this agreement shall be construed as obligating the Forest Service or the Department to expend funds in any contract or other obligation for future payment of funds or services in any contract or other obligation for future payment of funds or services in excess of those available or authorized for expenditure.

9. To periodically (two-year interval) review this Memorandum of Understanding and make revisions and updates as necessary to meet the purpose of the agreement. Amendments shall become effective following written approval by both parties.

10. That this agreement shall become effective as soon as it is signed by the parties and shall continue in force unless terminated by mutual written consent or by either party upon thirty days notice in writing to the other of intention to terminate upon a date indicated.

11. That no member of or delegate to Congress, or Resident Commissioner of the United States, shall be admitted to any share or part of this agreement, or to any benefit that may arise therefrom.

12. That each provision of this agreement is subject to the laws of the State of Idaho, the laws of the United States, the regulations of the Secretary of Agriculture, and the Regulations of the Board of Health and Welfare.

IN WITNESS THEREOF, the parties hereto have caused this cooperative agreement to be executed.

IDAHO DEPARTMENT OF HEALTH AND WELFARE

Date 9/1/88

by: Richard P. Donovan
Richard P. Donovan
Director

UNITED STATES FOREST SERVICE

Date 8/23/88

by: for J. S. Tixier
Regional Forester,
Intermountain Region

Date 7/29/88

by: for John W. Mumma
Regional Forester
Northern Region

Date 8/3/88

by: for James F. Torrence
Regional Forester
Pacific Northwest Region

MEMORANDUM OF UNDERSTANDING
IMPLEMENTING THE WATER QUALITY PROGRAM ON
THE BLM PUBLIC LANDS IN THE STATE OF IDAHO

DATE

Effective on signature date.
Supersedes MOU dated September 21, 1979, and addendums.

PARTIES TO THE AGREEMENT

Idaho Department of Health and Welfare, Division of Environment
Hereinafter referred to as the Department.

Bureau of Land Management, Idaho State Office
Hereinafter referred to as the BLM

PURPOSE

The purpose of this agreement is to coordinate water pollution control activities on BLM public lands in Idaho to protect, maintain and restore the beneficial uses of the waters of the state. The mechanism for implementing pollution control for forest practices is described in the State of Idaho Forest Practices Water Quality Management Plan, 1987.

RELEVANT LEGISLATION, EXECUTIVE ORDERS, RULES AND REGULATIONS

The BLM authority to regulate the occupancy and use of the public lands and responsibility for environmental protection is based on:

Federal Land Policy and Management Act, October 21, 1976.

Wilderness Act, September 3, 1964.

National Environmental Policy Act, January 1, 1969.

Clean Water Act of 1972, as amended 1977, 1980, 1987.

Executive Order 11752, December 19, 1973.

Executive Order 11991, May 24, 1977.

Executive Order 12088, October 13, 1978.

The Department has authority to safeguard water quality of the State of Idaho through:

Clean Water Act of 1972, as amended 1977, 1980, 1987.

Environmental Protection and Health Act of 1972, Idaho Code, Title 39, Chapter 1, as amended.

Idaho Water Quality Standards and Wastewater Treatment Requirements, as amended.

Implementation arrangements and best management practices are found in:

State of Idaho Forest Practices Water Quality Management Plan, 1988.

Rules and Regulations Pertaining to the Idaho Forest Practices Act, Idaho Code, Title 38, Chapter 13, as amended.

Best Management Practices for Road Activities, August 1982.

OBJECTIVES

The BLM and the Department mutually desire:

1. To comply with the nonpoint source control sections of the Clean Water Act of 1987 and applicable executive orders.

2. To implement the Idaho Water Quality Standards on BLM public lands.

3. To implement a procedure for review of project plans for proposed nonpoint source activities (Idaho Water Quality Standards, Section 16.01.2300,04.c.) which are developed by the BLM in compliance with NEPA.

4. To develop cooperative and/or complementary water quality monitoring systems, share technical expertise and promote research on water quality management related to forest practices.

5. To develop procedures to minimize duplication of effort and facilitate complementary pollution control and abatement programs.

6. To implement the Idaho Forest Practices Water Quality Management Plan, 1988.

AGREEMENTS

Therefore, the parties agree as follows.

**The BLM agrees:**

1. To implement the feedback loop concept on BLM public lands by developing a system on each BLM district which includes monitoring, comparison to criteria, and modification of land management practices where needed to protect beneficial uses of water.

2. To meet or exceed the requirements of the Idaho Forest Practices Act, Rules and Regulations and the Best Management Practices for Road Activities.

3. To provide training to BLM staff regarding potential impacts to water quality, applicable state and federal law and state-of-the-art techniques used to prevent water quality problems.

4. To conduct internal reviews of best management practices (BMP) by annually examining a representative sample (target 10%) of timber-

related projects and prepare written BMP evaluation reports. Summaries of these reports will be provided to the Department for inclusion in the Forest Practices Water Quality Management Plan Report.

5. To provide information to the Department on in-stream monitoring and evaluation efforts, research results, and evaluation of BMP effectiveness, and to report problems and concerns with BMP implementation for the annual Forest Practices Water Quality Management Plan Report.

6. To participate in the statewide Forest Practices Audit Team, provide necessary information for selection of timber sales, and provide technical expertise in audit procedures.

7. To provide technical support to the Department for development of a process to control cumulative effects of nonpoint source activities and participate in demonstration projects that include BLM public lands.

8. To provide technical support to the Department for development of water quality criteria for sediment.

9. To provide an assessment of water quality conditions on the BLM public lands as requested by the Department for inclusion in the Idaho Water Quality Status Report (Section 305-b, Clean Water Act).

10. To annually provide, to the designated Department offices by April 30, a general schedule of proposed land-disturbing activities during the forthcoming year. Such activities include proposed timber sale areas, road and bridge construction and/or maintenance projects, stream channel restoration and fish habitat improvement projects and activities authorized by special use permit. Projects and programs on which BLM specifically requests water quality assistance will be identified.

11. To involve the Department at the appropriate time in review of environmental assessments and environmental impact statements as required by NEPA. The BLM will develop a screening procedure with the regional offices of the Department for the purpose of flagging projects in which the Department is interested. Emphasis should be placed on obtaining input from the Department prior to release of the Decision Notice to avoid any coordination problems.

12. To notify the Department of all suspected violations of air, water quality and solid waste standards or regulations and spills of hazardous materials on BLM public lands.

**The Department agrees:**

1. To coordinate water quality management planning and implementation efforts by the state with the BLM where public land is involved and keep the BLM updated on any changes to state standards, regulations or guidelines.

2. To invite BLM representation on policy or technical advisory committees that relate to forest or rangeland management such as cumulative effects and water quality criteria for sediment.

3. To participate in field reviews as requested by the BLM and to involve the BLM in the Forest Practices Audit Team.

4. To develop with the BLM a screening procedure for review of NEPA documents for the purposes of streamlining the review and to provide timely review of planning documents.

5. To provide the BLM with copies of state environmental quality laws and regulations during the review period and after adoption.

6. To notify the BLM of suspected violations of state and federal environmental quality laws or regulations which may impact BLM public lands and to aid in the implementation of corrective or enforcement proceedings.

It is mutually agreed:

1. That the BLM is the Designated Management Agency for management of water quality on BLM public lands in the State of Idaho.

2. That the Department is the lead agency for implementation of the Clean Water Act for control of nonpoint sources in the state of Idaho.

3. That in cases of potential conflict between agency missions, the parties will provide an opportunity for informal conflict resolution prior to taking other actions provided by law.

4. To coordinate all water quality monitoring activities and to cooperate in the collection, analysis and processing of water quality samples when the results are mutually beneficial to the BLM and the Department. Cooperative monitoring programs between the Department and the BLM will be described in detailed plans, and resource commitments will be made through project-specific memoranda of understanding.

5. To work jointly on the development of standard monitoring techniques for the assessment of forest practice impacts on water quality through establishment of a technical working team. The technical working team will be comprised of specialists with monitoring expertise and will also have representatives from other agencies.

6. That nothing in this agreement shall be construed as limiting or affecting in any way the legal authority of the BLM in connection with the proper administration and protection of public lands in accordance with federal laws and regulations.

7. That nothing in this agreement shall be construed as obligating the BLM or the Department to expend funds in any contract or other obligation for future payment of funds or services in excess of those

available or authorized for expenditure. However, the parties recognize that to make progress on this agreement, resource commitments are necessary and will be pursued as part of annual budget preparation.

8. To periodically (two-year interval) review this cooperative agreement and make revisions and updates as necessary to meet the purpose of the agreement. Amendments shall become effective following written approval by both parties.

9. That this agreement shall become effective as soon as it is signed by the parties and shall continue in force unless terminated by mutual written consent or by either party upon thirty days' notice in writing to the other of intention to terminate upon a date indicated.

10. That each provision of this agreement is subject to the laws of the State of Idaho, the laws of the United States, the regulations of the Secretary of Interior and the regulations of the Board of Health and Welfare.

IN WITNESS THEREOF, the parties hereto have caused this cooperative agreement to be executed.

IDAHO DEPARTMENT OF HEALTH AND WELFARE

By: ______________________ Date: ______________________

Richard P. Donovan
Director

BUREAU OF LAND MANAGEMENT

By: ______________________ Date: ______________________

Delmar D. Vail
State Director

SB/83-19

# APPENDIX J

## MONITORING PLAN CHECKLIST

Checklist can be photocopied and used in preparing nonpoint source water quality monitoring plans.

# MONITORING PLAN CHECKLIST

**Antidegradation policy**

- ☐ "The monitoring program shall seek to collect activity-specific data".
- ☐ "Monitoring in areas of special concern shall be significantly more intensive than the normal program of monitoring agency actions."

**State water quality standards**

- ☐ Fully incorporates the feedback loop process; i.e. monitoring to evaluate BMP effectiveness.
- ☐ A mechanism to modify BMPs that are found to be ineffective.
- ☐ Address criteria and beneficial uses in the state water quality standards.

**Integrating monitoring programs**

- ☐ Coordinate data collection with other entities to avoid duplication and maximize available resources.
- ☐ Provide for data storage that maximizes opportunities for data sharing with others.
- ☐ Outlines the mechanism for sharing the results of data analysis, i.e. reporting.
- ☐ Are monitoring sites representative across land ownership under study?

**Quality Assurance/Quality Control**

- ☐ Field and laboratory protocols are state-of-the-art as suggested in Appendix H.
- ☐ As a minimum, compatible data, is entered into a common database within one year of collection.
- ☐ As a minimum, data reports, are available within eighteen months of data collection.
- ☐ Data analysis methods are fully referenced.

**Trend monitoring**

- ☐ Is compatible with statewide trend monitoring network.
- ☐ Water quality trends are reported annually.

**Beneficial use monitoring**

- ☐ Site selection is based upon a combination of land uses, stream and land types, and the existing uses of water.
- ☐ Parameter selection is oriented to the most sensitive beneficial use.
- ☐ Addresses: current status, change, and use attainability of existing beneficial uses.

## BMP effectiveness monitoring

- ☐ Applies on-site, pollutant source and transport (PST), and in-stream beneficial use assessments in combination to determine the effects of nonpoint source activities on water quality.
- ☐ Prioritization for BMP effectiveness monitoring is based on the most sensitive land types, the significant NPS activities, BMPs that have not been adequately evaluated, stream segments of concern, waters with beneficial use impairment, or areas of increasing development.
- ☐ In-stream parameter selection is based on the most sensitive beneficial use or PST parameters appropriate to the BMPs being addressed.
- ☐ Reference sample sites are used to assess in-stream effects relative to baseline conditions.

## Agriculture

- ☐ A Coordinated Resource Management planning approach will identify sources, impacts, responsibilities, funding sources, and priorities.
- ☐ Dryland agriculture, focus is on bioassessment and habitat assessment protocols.
- ☐ Irrigated agriculture, focus is on nutrients, suspended sediment, and bacteria.
- ☐ Grazing/riparian agriculture, focus is on streamside vegetation, streambanks, instream habitat, grazing intensity, bioassessment, nutrients and temperature.

## Forestry

- ☐ Focus is on biological beneficial use impacts from sediment, temperature, & LOD.
- ☐ BMP effectiveness monitoring includes on-site implementation, PST, and beneficial use assessments, fully coordinated between IDHW, USFS, BLM, & IDL.

## Mining

- ☐ Focus is on heavy metals, toxics, sediment, channel stability, biological beneficial use impacts, dissolved constituents, temperature, and pH.
- ☐ BMP effectiveness monitoring includes on-site implementation, PST, and beneficial use assessments, coordinated between operators, IDL, IDHW, IDFG, USFS, and BLM.

## Plan revisions

- ☐ Please contact IDHW-DEQ, Statehouse, Boise, Idaho 83720 with any comments or corrections for future revisions of the NPS water quality monitoring plan.

## NOTICE TO USER

This document is intended to provide general guidance for planning water quality monitoring activities for agencies, industries, and other user groups in the State of Idaho. IDHW will revise this document, as needed, every two years during the years that the Basin Area Meetings are held and Stream Segments of Concern are chosen. Any suggestions for improvement of this document should be sent in writing to Idaho Department of Health and Welfare, Division of Environmental Quality, Statehouse, Boise, Idaho 83720.

**COVER PHOTOGRAPHS:** Examples of montane (Monumental Creek, Frank Church River of No Return Wilderness Area-upper photo) and desert (Owyhee River-lower photo) streams in Idaho. Photographs by William H. Clark.

***Text printed on recycled paper.***