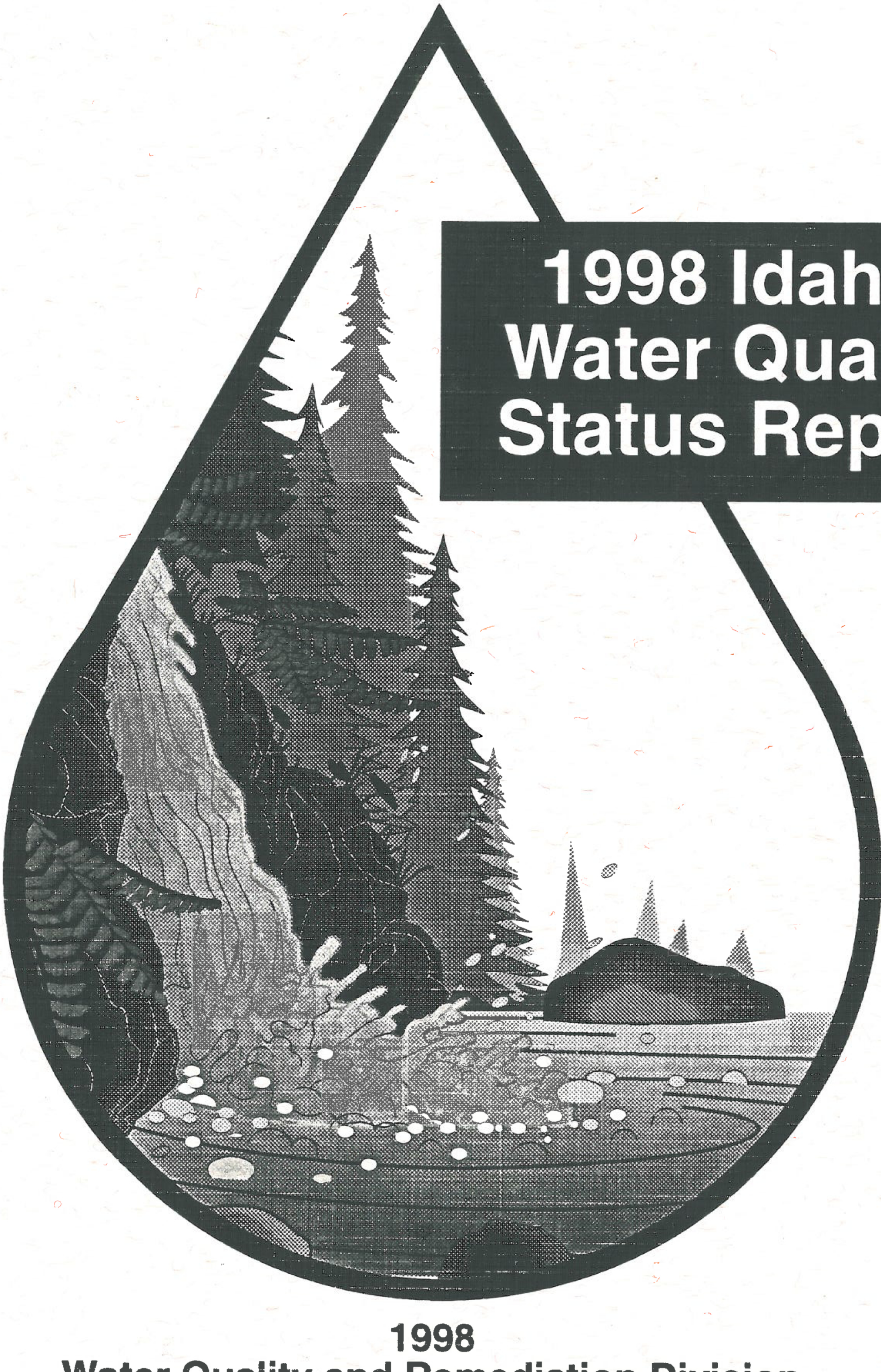
1998 Idaho Water Quality Status Report



1998

Water Quality and Remediation Division

State of Idaho
Division of Environmental Quality

1998 IDAHO WATER QUALITY

STATUS REPORT

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1998

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PART I
EXECUTIVE SUMMARY

BACKGROUND

The Idaho water pollution control program focuses on nonpoint source pollution using a watershed approach. Public participation is a major element of this program and is incorporated through community-based Basin Advisory Groups and Watershed Advisory Groups as required in the Idaho water quality statute, Idaho Code §39-3601 *et seq*. These groups make recommendations to the Idaho Division of Environmental quality on water quality monitoring, water quality standards revisions, §303(d) listings, total maximum daily load development, and other watershed priorities.

The foundation is being laid for two major revisions of the Idaho water quality standards. The first revision needed is an identification of Idaho water bodies at a finer scale. As this revision is accomplished, the second revision will designate appropriate beneficial uses for these water bodies. The new designations will be supported by data and assessments generate by beneficial use monitoring.

The Environmental Protection Agency has primacy in the permitting of point sources in Idaho. They do not have the staff to issue new permits or revise and reissue old permits. Major discharges are inspected annually but minor discharges do not receive this attention. As total maximum daily loads are developed, all point sources will need to be evaluated.

The nonpoint source pollution program in Idaho is administered on a watershed basis and includes provisions for public education and technical protocol development. Project emphasis is placed on management effectiveness, beneficial use monitoring, public awareness, antidegradation, and the endangered species issues. A program review has been initiated to evaluate how well tasks relate to the program goal, if they are being accomplished, and if they remain a priority. Each agency identified in the *1989 Idaho Nonpoint Source Management Program* (Bauer 1989) will have the opportunity to provide input in this review.

STATE SPECIAL CONCERNS

Special water quality concerns in Idaho include human health and the biotic integrity of our waters. In the Coeur d'Alene drainage, heavy metals, accelerated eutrophication, and severe bedload movement impair and threaten beneficial uses and have the potential to affect human health. The declining anadromous fish runs, bull trout, and westslope cutthroat trout populations indicate decreased biotic integrity in Idaho waters. The middle reaches of the Snake River, the Portneuf River and Cascade Reservoir all have impaired beneficial uses due to nutrient and sediment pollution.

SURFACE WATER MONITORING

Surface water monitoring activities in Idaho have focused on beneficial uses and ambient water quality trends. Data from our monitoring is used to document the existence of uses, the degree of use support, and reference conditions. This monitoring is made up of primarily the collection of biological and physical data. Our ambient trend monitoring network is designed to document water quality trends at the river basin and watershed scales through the collection of mainly water column constituent data. Biological parameters are being added to this network as well. Fifty-six monitoring stations are currently sampled on a rotating basis to provide data for water quality trend assessment.

WATER BODY ASSESSMENT

The Idaho Division of Environmental Quality has started a water body identification project to facilitate water quality assessments, reporting, and standards updating. This project was initiated through an Environmental Protection Agency grant. The funds are being passed through to the Idaho Department of Water Resources to develop a geo-referenced database and numbering protocol. This project is nearly complete.

The Division of Environmental Quality has published (Division of Environmental Quality 1996b) a water quality assessment guidance document. This document describes a water body assessment process that accounts for the beneficial uses and criteria currently required in the Idaho water quality standards. This assessment was used to prepare the Draft 1998 303(d) list.

IDAHO 1998 303(d) RESULTS AS OF 98 UPDATE

		%
Total number of segments on 1994 list	962	
Total number of segments removed from 1994 to 1998	335	-35
Total number of segments added on 1998	127	+17
Total number of segments for 1998 list	744	
% difference between 94/98		-23
Total number of miles on 1994 list	10,656	
Total number of miles removed from 1994 to 1998	3,542	-33
Total number of miles added for 1998 list	1,046	+13
Total number of miles on 1998 list	8,160	
% difference between 94/98		-23

TMDL's for those segments new to the 1998 list will be scheduled for 2006, after completion of the existing 8 year court agreed schedule.

GROUND WATER ASSESSMENT

More than 90% of Idaho's residents use ground water as their domestic water supply. The major sources of ground water contamination in Idaho are agricultural activities, waste storage and disposal, mining, and hazardous material transportation. Known and potential ground water contamination site summaries are presented in Part IV, Chapter 2. The ground water protection program and activities in Idaho are quite diverse. We have summarized 32 of these in this report.

Ground water quality data in Idaho comes primarily from the Statewide Ambient Ground Water Quality Monitoring Network and the Public Water Systems. Ground water sampling results are presented in appendix B. On a statewide basis, the ground water contaminants of greatest concern are nitrates, pesticides, and volatile organic compound. As more data is collected over time, an assessment of ground water trends will be made.

IDAHO SOURCE WATER ASSESSMENT

The Idaho Source Water Assessment Plan was developed in response to requirements set forth by the Safe Drinking Water Act Amendments passed by Congress in 1996. The Safe Drinking Water Act Amendments require states to assess the water (called source water) from which public water systems draw to provide drinking water. Once completed, the source water assessments will provide information on potential contaminant threats to public drinking water systems. The Idaho Division of Environmental Quality, in conjunction with its public advisory committee, has developed the Source Water Assessment Plan to describe the major components of, and the procedures for, conducting source water assessments. The Source Water Assessment Plan is a dynamic process; it provides a structure for planning and achieving consistent, rational assessments, while promoting public involvement.

Summary of the Source Water Assessment Process

The Idaho Division of Environment Quality is responsible for ensuring that source water assessments are conducted for all public water system. The assessments include: delineating the source water assessment area, inventorying potential contaminants within the delineated area, conducting a susceptibility analysis of the potential contaminants, and informing the public of the results. These steps are summarized below and detailed in the Source Water Assessment Plan.

The Idaho Division of Environment Quality encourages public water systems to take an active role in the assessment of their system. In fact, some public water systems may want to perform part or all of their own source water assessments. Reasons for doing so might include greater local control, better problem definition and delineation, and potentially better planning and protection decisions. For those public water systems, the Idaho Division of Environment Quality will also provide assistance to ensure that they meet minimum requirements set forth by the EPA. Other public water systems may have already developed wellhead or watershed protection plans.

The Idaho Division of Environment Quality will review those existing plans and determine what requirements of the Source Water Assessment Plan are met. If shortfalls are identified, the Idaho Division of Environment Quality will provide assistance or guidance to those public water systems to help them complete the source water assessment requirements.

The source water assessment process is detailed in ten (10) steps. Each of the major steps in the source water assessment process is summarized below with details available in the Source Water Assessment Plan.

Public Participation

Public participation is an important element of the Source Water Assessment Plan. Idaho employed the use of a citizen advisory committee, quarterly updates for all water systems on the development of the Source Water Assessment Plan, a point-to-multi point interactive audio/video workshop, targeted fact sheets, and an extensive formal comment period during the development and review of its plan. Participating in the planning and implementation phases of the assessment process will provide citizens and local officials with valuable information to use in local planning and decision making. Participating in the assessment process may provide communities with the incentive to develop locally sponsored source water protection efforts.

Collection, Analysis, and Management of Data

The efficient collection, analysis, and management of data are essential to the completion of the source water assessment process. To the maximum extent possible, all phases of the source water assessment will rely on the use of currently existing information and geographic information system (GIS) technology.

Notification

Each public drinking water system will be informed when the source water assessment process is to be initiated for their system. The systems will be requested to provide any information that may help in the delineation of their source water assessment area. This notice from Idaho Division of Environment Quality will also include an initial solicitation of interest from the drinking water system to participate in the potential contaminant inventory process or to act as the lead for its assessment.

Delineation Methods

The delineation process establishes the physical area around a well or surface water intake that will become the focal point of a source water assessment. The process includes mapping the boundaries of the zone of contribution (e.g., the surface and subsurface areas contributing water to the well, or surface water intake) into time of travel zones (e.g., zones indicating the number of years necessary for a particle of water to reach a well or surface water intake). The size and shape of the source water assessment area depend on the delineation method used, local hydrogeology, and volume of water pumped from the well or surface water intake.

The Idaho Division of Environment Quality will use three methods to delineate boundaries to ground water source areas. They are: fixed radius which corresponds to a one year time-of-travel boundary and used for transient systems; calculated fixed radius method used to determine a 3-, 6-, and 10-year times of travel boundaries when site specific data are not available; and a refined analytical method used to define the 3-, 6-, and 10-year time of travel boundaries. In the analytical process, the ground water source areas will be numerically modeled using ground water flow computer codes that are appropriate for the available hydrogeologic data and complexity of the aquifer systems being evaluated.

Surface water systems (including springs) represent about five (5) per cent of the total public water systems in Idaho. Methods that will be used to delineate these systems include a topographic boundary, streamflow time of travel, and buffer zone. The type of delineation to be performed will be specific to each source and may consist of a combination of methods. Large watershed areas will require a practical and cost-effective delineation dependent upon the type of water body. Springs and surface water sources influenced by ground water are addressed under the conjunctive delineation method.

Potential Contaminant Source Inventory Procedures

This process involves collecting, recording, and mapping existing data and GIS coverages to determine potential contaminant sources within the delineated source water assessment area. The potential contaminant source inventory is one of three factors used in the susceptibility analysis to evaluate the overall potential contaminant risk to the drinking water supply. The inventory process goal is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water or surface water contamination.

Susceptibility Analysis

This process determines the "susceptibility" or risk of each public water system well or surface water intake to potential contamination within the delineated source water assessment area. It considers hydrogeologic characteristics, land use characteristics, potentially significant contaminant sources, and the physical integrity of the well or surface water intake. The outcome of the process is a relative ranking of three susceptibility categories: high, moderate, and low. The rankings can then be used to set priorities for source water protection efforts.

Schedule, Report Format, and Availability of Results

The Idaho Division of Environment Quality has developed an implementation schedule for public water systems to have their assessments done. The agency may use one or any combination of three methods discussed in the plan.

For each public water system the source water assessment report will be provided in a public information package. The report will consist of a narrative and one or more maps illustrating the delineated source water area along with locations of potential contaminant sources. For each drinking water source, the report will describe the corresponding delineated area, the locations of potential contaminant sources, the susceptibility analysis, and guidance on interpreting results.

Copies of the final source water assessment report will be distributed and made available for public review. Public water system consumer confidence reports may be used to notify the community water system users that a source water assessment has been performed (for small systems, there are exceptions to this requirement). Assessments are recommended to be reviewed and updated by the public water systems and the served community at least every five years. When communities are experiencing rapid population growth and development, assessments may need to be updated more frequently.

Implementation of a Voluntary Source Water Protection Program

Local communities, working in cooperation with state agencies, can use the information gathered through the *assessment* process to create a broader source water *protection* program to address current problems and prevent future threats to the quality of their drinking water. One approach to protecting source water may be to limit certain types of land-based activities around the source. Local land use planning and related regulations are within the purview of local governments and not state or federal entities. Local citizens and governments are uniquely poised to decide what protection methods are best suited to address their source water protection needs.

Source water protection is the ultimate goal for Idaho. A local protection program should maximize the use of existing data and draw on local knowledge to develop more detailed information. Strategies for carrying out local voluntary source water protection programs may include technical assistance, land use planning, pollution prevention, financial assistance, implementation of best management practices or other preventive measures, education, training, demonstration projects and contingency plans. The Idaho Division of Environmental Quality's goal through the implementation of source water assessments is to develop information which enables public water system owners, consumers, and others to initiate and promote actions to protect drinking water sources. The agency moves toward the goal of protection by encouraging a proactive approach to protecting and restoring drinking water sources; continuing to improve methods of informing communities and drinking water systems about contaminants that may negatively impact drinking water quality, and continuing to refine and target requirements for drinking water sources with a link to source water protection.

For More Information

To find out more information about the Source Water Assessment Plan, please contact:

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The Idaho Division of Environmental Quality website at http://www2.state.id.us/deq/water.htm also contains information on the assessment process. The site includes advisory committee meeting agendas and minutes, source water assessment fact sheets, draft documents related to the project, and other material pertinent to the drinking water of Idaho.

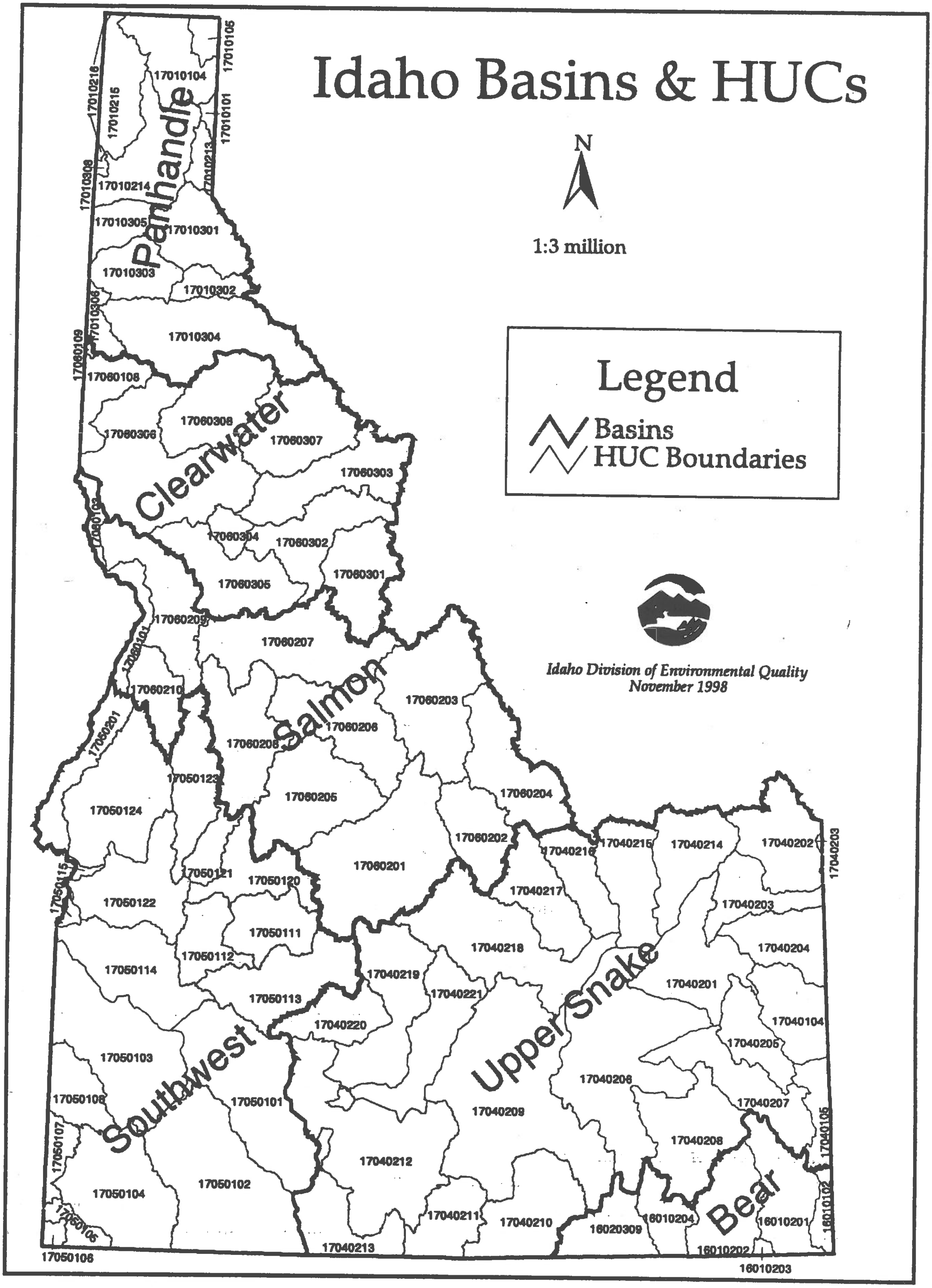

Figure I-1. Idaho hydrologic basins and hydrologic unit codes and boundaries.

PART II
BACKGROUND

CHAPTER 1. WATER POLLUTION CONTROL PROGRAM

Watershed Approach

The Idaho Division of Environmental Quality (DEQ) believes that pollution reduction from nonpoint and point source is best approached on a watershed basis, recognizing that activities throughout a watershed affect the quality of its water (Clark et al. 1993). The watershed approach also fosters public and agency partnerships in identifying and devising the best solutions to water quality problems. In 1995, the Idaho legislature recognized this fact by adopting Idaho Code §39-3601 *et seq.* to provide direction for local watershed planning and management.

Under this new law, community-based committees, appointed by the DEQ Director, advise the DEQ on the coordination of all water quality programs in each of the six major river basins in Idaho. These committees, called Basin Advisory Groups, include members representing the forest products industry, agriculture, mining, local government, livestock interests, recreational interests, environmental interests, non-municipal point source dischargers, Indian tribes and the general public. Basin Advisory Groups are tasked with making recommendations to DEQ concerning; priorities for monitoring, revisions in the beneficial uses designations, categorizing waters not meeting their beneficial uses as to severity of pollution, suggesting members for local Watershed Advisory Groups, and prioritizing efforts to improve water quality.

Beneficial use monitoring (Part III) will be conducted as needed to determine the appropriate uses and the status of these uses in a watershed. Methods to determine appropriate uses and their status include water quality standards in conjunction with biological and aquatic habitat measures.

States are required by §303(d) of the Clean Water Act to periodically identify all their waters not meeting water quality standards and prioritize them for development of a total maximum daily loads (TMDLs). In Idaho, watersheds not supporting their uses are ranked by the Basin Advisory Group, as high, medium, or low priority. Watersheds designated as "high" priority will be the first to be targeted for TMDLs.

These TMDLs describe the water quality problems and set a pollution budget for watersheds with water quality impaired streams. The DEQ will develop TMDLs with the assistance of other state and federal agencies and in consultation with the appropriate Basin and Watershed Advisory Groups. After public review and comment DEQ will submit them to the Environmental Protection Agency (EPA) for approval and adoption as part of the state's water quality management plan.

Watershed Advisory Groups consist of all parties with an interest in the water quality of a given watershed. this includes the development of TMDLs and implementation of a water quality improvement plan that follows approval of a TMDL. The groups may include: local and tribal governments, affected parties, interested residents, and appropriate federal and state agencies. Watershed Advisory Groups develop a plan on how best to improve water quality and restore appropriate uses to degraded streams and lakes. These plans include the pollution control strategies and specific actions needed, an implementation schedule, estimated costs and budgets, coordination with ongoing water quality planning and management programs within the watershed, provisions for public involvement, and a method of evaluating the effectiveness of the action plan in restoring the appropriate beneficial uses. By taking a watershed approach, these plans can be pro-active in identifying areas of declining water quality before they become a serious problem and laying out a course of action that can preempt future listing of Idaho waters under §303(d).

Water Quality Standards Program

Idaho Water Quality and Wastewater Treatment Requirements
Rulemaking Activities 1997-1998

Within the time frame of 1997 - 1998, four rulemaking activities have been initiated. Two of the rule packages are final rules passed by the Idaho Legislature, one package will go before the State Legislature in 1999, and the last rule package was rescinded by the Board of Health and Welfare.

The two 1997 dockets (referenced as 16-0102-9701 and 16-0102-9702) are final rules passed by the Idaho Legislature at the conclusion of the 1998 session. These two dockets address revisions resulting from EPA's disapproval of Idaho's Water Quality Standards in 1996. Rule language was revised for mixing zones and unclassified waters, additional aquatic life designations were made to 30 water body units, and temperature criteria for Kootenai River sturgeon and bull trout were developed. Lastly, Use Attainability Analysis studies were submitted for Blackbird Creek and West Fork Blackbird Creek supporting the non-attainment of an aquatic life use in each of these creeks within specified segments.

The 1998 docket, 16-0102-9801, setting a revised arsenic human health standard has received approval from the Idaho Board of Health and Welfare and will go before the Idaho Legislature during the 1999 session. The rule changes the current human health criteria for arsenic to 50 ug/l for both fish ingestion and water and fish ingestion.

The 1998 docket, 16-0102-9802, set Site Specific Criteria for the South Fork of the Coeur d'Alene River. This docket was rescinded by the Idaho Board of Health and Welfare because EPA has not yet withdrawn the National Toxics Rule (NTR) aquatic life criteria for the state of Idaho. Therefore, the state is still subject to the NTR for aquatic life and cannot, without federal action, adopt site-specific criteria for toxic pollutants. The proposed rule under this docket has been vacated.

Point Source Program

In 1995 the Idaho legislature passed §39-3601 et seq., thus creating a process for establishing TMDL's for stream segments of concern in Idaho. This legislation will be quite important to the existing point source control program in Idaho and will ultimately establish new direction with respect to treatment goals for point source discharges in the state of Idaho.

The DEQ maintains engineering staff in our regional and central offices to review engineering plans and specifications for collection and treatment of municipal and industrial wastewater. These reviews are an important first step in assuring effluent from these facilities will meet water quality standards and load allocations. The state revolving loan program is the primary source of funds for improving to publicly owned treatment works.

The DEQ is encouraging water conservation, recycling and non-surface water discharging treatment facilities. Water reuse and land treatment of wastewater are options being extended to municipal and industrial wastewater systems. To assure ground water and surface water are protected, DEQ issues land application permits for these facilities, at this time DEQ has issued over 100 land application permits.

Since 1988 all mining operations using cyanide to extract ore are required to have a DEQ cyanide permit. Prior to issuing a permit, an in-depth engineering review is conducted to assure ground and surface water are protected. Specific monitoring and leak detection requirements are in the permit. As well as detailed operation and maintenance procedures for each permitted facility. The need for Cyanide permits will fluctuate with gold prices.

Point source needs evolve around the issuance of National Pollutant Discharge Elimination System (NPDES) permits. The EPA is responsible for issuing all permits in Idaho; however, they do not have the staff to issue new permits or keep up with re-issuing old permits. Minor permits are not being re-issued or issued for new minor sources. Updated permits are going to be needed throughout the state as part of implementing and meeting TMDL's.

Another need is for routine inspections and permit updating of the minor NPDES discharges. Minor discharges make up the majority of the point sources in Idaho. At this time only major NPDES discharges are inspected annually. Routine inspections and permit upgrades would go a long way to attain proper facility operation and maintenance.

Nonpoint Source Pollution Control Program

The DEQ is responsible for the overall coordination and implementation of the state's nonpoint source program. This program is based on section 319 of the Federal Water Pollution Control Act, as amended (Clean Water Act). Implementation of the nonpoint source management program is accomplished through interagency coordination with local, state, tribal, and federal natural resource agencies. The nonpoint source program is implemented with assistance from public advisory committees which provide continuous feedback on the direction and acceptability of the nonpoint source program strategy.

The nonpoint source control program is based on the feedback loop concept shown in Figure II-1. Site specific management practices (BMPs) are applied, and monitoring is used to evaluate their effectiveness. When receiving waters do not support their beneficial uses after the application of these management practices, changes are implemented. Monitoring continues to ensure the revised practices are adequate to restore impaired beneficial uses.

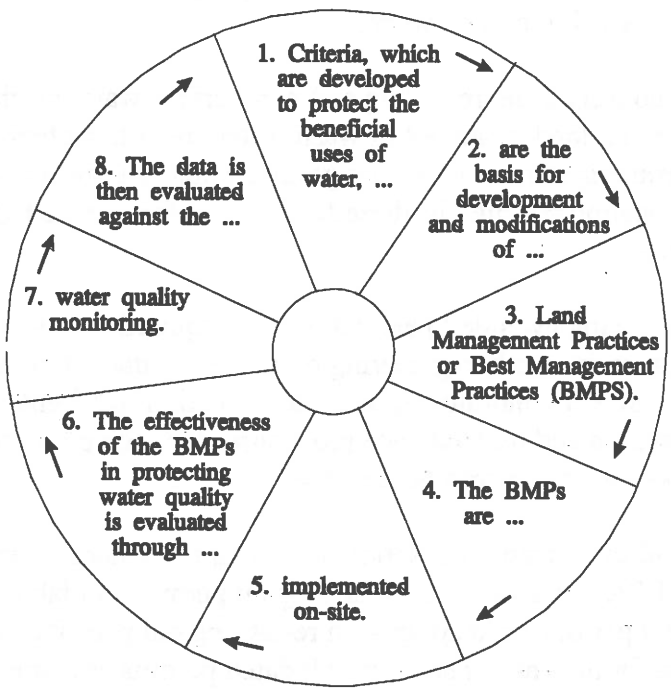

Figure II-1. Nonpoint Source Feedback Loop

The nonpoint source program places increased emphasis on the restoration of impaired waters through the following actions:

- Implementing management practices associated with approved Total Maximum Daily Loads (TMDLs);
- Implementing management practices associated with impaired (§303(d)) listed waters;
- Institutionalizing the feedback loop components into state and federal natural resource agency programs;

- ♦ Integrating the State §319 Nonpoint Source Management Program Plan as a tool to aid implementation of the Water Quality Law (Idaho Code §39-3601 et seq.) and other special program efforts such as the State of Idaho Bull Trout Conservation Plan (Batt 1996).

One of the ways that this is accomplished is through grants issued by the state of Idaho from the nonpoint source program. To date, a number of projects (Figure II-2) involving a wide variety of nonpoint source contaminants and categories have been funded. In many cases while beneficial uses are still impaired, improvements needed to restore beneficial uses have been documented. Idaho will continue to aggressively address nonpoint source pollution through the development and implementation of TMDLs and other water quality efforts.

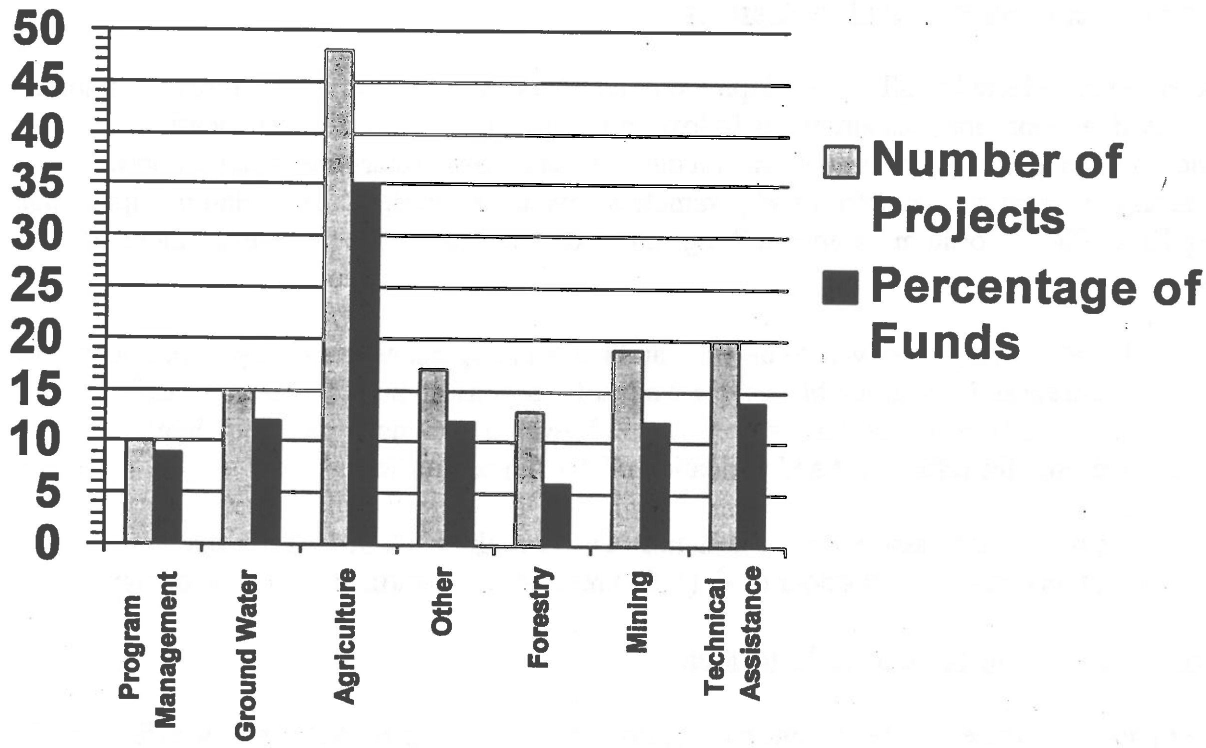

Figure II-2. Projects Types Funded Through the Nonpoint Source Program

Nonpoint Source Technical Assistance

The goal of this project is to develop the Division of Environmental Quality's fish community assessment capability. The project specifically provides technical assistance to the DEQ's regional offices and also other agencies, develops monitoring and data assessment methods and provides technical information to issues that cross regional boundaries (such as §303(d) and Endangered Species Act issues). This project also implements training and quality assurance activities to insure that the data collected meets the needs for the development of the state's §303(d) and §305(b) reports. To further this work a literature search was completed. Preliminary data sets of qualitative and quantitative data are being established of potential fish metrics indicators for assessing the impacts of nonpoint source pollution on beneficial uses. The project also reviewed the bull trout strategy that is being carried out on federal lands throughout the state.

Rapid Bioassessment Protocol Development

Data has been collected to allow development of aquatic community structure, function, tolerance and individual condition measurements following Plafkin et al. (1989). These measurements, or metrics, are being compared with physical habitat structure parameters and water column parameters to detect which metrics and parameters have the most significant relationships in the Snake River Plain, Northern Basin and Range and Northern Rocky Mountain ecoregions of Idaho.

The initial goal of this project was to develop and test a biological assessment program, based on macroinvertebrate and fish assemblages, for wadeable streams in these ecoregions. Efforts concentrated on upland and lowland stream types. Lowland streams impacted by livestock grazing were used for refinement and validation of developed metrics.

This process was used to assess Idaho's waters and prepare the 1998 303(d) list, discussed elsewhere in this document. Barbour et al. (1997) revised the Plafkin et al. (1989) document.

Sediment Monitoring Techniques Validation

Techniques are being evaluated for measuring flow velocity in egg pockets and the effects of fine sediment intrusion for spawning redds during the egg incubation period. In addition the relationship between spawning gravel quality and salmonid survival from time of egg deposition and the influence of substrate conditions on intrusion of fine sediments during incubation are being evaluated.

An ion adsorption technique was developed and evaluated as a potential method to estimate intragravel flow velocities in salmonid redds. Flume studies of ion adsorption by a monobed ion exchange resin showed that Na and Ca adsorption was significantly related to flow velocity over a range of flows from 0.04 to 1.9 cm sec $^{-1}$. This suggested that adsorption of cations by this resin when placed in redds may be a potential technique for estimating intragravel flow velocities.

Small bags of resin were placed in artificially constructed redds with different ranges of "fine" sediment at three spawning sites in Idaho: Payette River (kokanee salmon), Pine Creek (Yellowstone cutthroat trout), and Salmon River (steelhead). Intragravel flow velocities were predicted using the calibration curves developed in the laboratory studies. The mean estimated intragravel flow velocity for the artificial redds was substantially higher than others have reported in the literature using other techniques.

In four of the six field experiments there were significant increases in adsorption of Ca and Na with increasing percentages of fine sediment in the artificial redds. It is hypothesized that increasing percentages of fine sediment include larger proportions of silts and clays that provide exchangeable cations when directly in contact with the resin bags. These cations in the sediments negate the utility of ion adsorption technique for determining intragravel flow velocities in redds. A complete discussion of this work is available in "Evaluation of an ion adsorption method to estimate intragravel flow velocity" (Clayton et al. 1994).

The influence of initial substrate condition on intrusion of fine sediments during incubation was evaluated using artificial redds at the three spawning locations mentioned in the preceding paragraph. The three species spawning at the locations represent spring, summer and fall spawners which are subjected to different streamflow and sediment transport rates. The amount and size distribution of sediment over the incubation period was measured in egg baskets which initially had various known particle size distributions representing a range of conditions from low to high percentages of fine sediments. Intrusion of sediment was also measured in clean gravels placed in intrusion buckets at each spawning reach.

Intrusion amounts and size distributions were influenced by the spawning season and the geology of the watershed. Increases in fines in the egg baskets only occurred at the spring spawning site, where more sediment is transported during high spring streamflows. At this site there were significant differences in sediments, with the "low" fines category accumulating the most fines. A discussion of these studies is available in "The influence of initial substrate condition on intrusion of fine sediment during incubation" (King and Thurow 1994).

Additional field work conducted in 1994 included evaluation of sediment size distribution in Yellowstone cutthroat redds and surrounding substrate in the Yellowstone River at the Buffalo Ford spawning area. This was part of a cooperative study with the Gallatin National Forest and U.S. Fish and Wildlife Service to determine relationships between embryo survival and the composition of spawning substrate. Tri-tube freeze cores were taken from twenty redds in late June. The information from this site will be used along with similar data from other spawning reaches in Idaho representing different salmonids to address sampling considerations for characterizing spawning gravels and to develop techniques to predict fine sediment concentrations in egg pockets by sampling surrogate locations.

<u>Nonpoint Source Metals Contamination of Surface Waters in the Coeur d'Alene Basin</u>

Following completion of an interim nonpoint source metals water quality remediation plan or TMDL for the South Fork Coeur d'Alene River and its tributaries, DEQ began implementation of the provisions of this plan. The main focus of the plan is:

- implementation of demonstration projects which permit assessment of metals loads reductions;
- monitoring of both the metals loads and project effectiveness; and
- development of the site specific science necessary to develop site specific metals criteria.

A demonstration project to reduce metals loads through water management was implemented by DEQ at the Success Mill site. The agency cooperated with the EPA and Hecla Mining Company in completion of demonstration remedial projects at the Interstate and Success Mill sites.

The two water years of metals load monitoring required by the TMDL was completed by the end of September 1994. An additional year of data will be collected to accurately quantify the metals loading characteristics of the South Fork and its tributaries. Project effectiveness monitoring, developing information on metals load reduction and percent load reduction, has been completed for one year at the Interstate and Success Projects. Pre-project monitoring has been completed at the proposed sites of the Ninemile Creek Tailings Removal, Elizabeth Park and Canyon Creek Flats Tailings Removal projects. These data will be used to fashion a more comprehensive water quality remedial plan in the next year.

The interim plan identified the potential need for site-specific metals criteria to set a more accurate goal for the comprehensive TMDL. In cooperation with the EPA and Hecla Mining Company, DEQ helped develop a consensus and later the funding by the State to support the site-specific science necessary to assess and/or develop site-specific metals criteria. Implementation of the interim TMDL developed in federal fiscal year 1994 continued through this project year. The Ninemile Creek removal of 26,000 cubic yards of jig tailings was completed and the Canyon Creek mine tailings removal project begun. Effectiveness monitoring is being coordinated with Superfund activities to help reduce the long term cost and possible duplication of efforts by various state and federal resource agencies.

Work continued on the development of the site specific data necessary to set clean up standards that will protect the beneficial uses. Coordination with Superfund cleanup activities also continued. All the components necessary to develop the comprehensive TMDL are available or in development. Based on the updated metals loading information, the contributing sites were identified and metals and sediment load reduction estimates are being used to formulate a full scale TMDL. The final TMDL will be used to drive water quality remediation of the South Fork Coeur d'Alene River.

Upgrade of On-Site Wastewater Disposal Systems Affecting the Nutrient Balance of Lake Coeur d'Alene

The Panhandle Health District, the local partner in the project, completed an update of the on-site wastewater disposal systems currently operating around the lake. Based on these results and data developed on the periphyton growth of several bays of Lake Coeur d'Alene, Blue Creek Bay was selected as the site for application of the demonstration with Mica Bay chosen as an alternate.

More staff time was required than expected on the Lake Coeur d'Alene planning process. As a result, the project's time table has slipped behind schedule. An extension of the project for one year has been requested of EPA. A new time table will mesh closely with the implementation of the Lake Coeur d'Alene Plan action items to the benefit of both projects.

Agriculture Information and Education Program

The primary environmental stewardship activity during FY94 was to coordinate the program for Water Quality 2000, a state-level agricultural water quality conference held in Boise, Idaho, in January 1994. The purpose of the conference was to provide Idaho's farmers and ranchers with an up-to-date focus on critical issues regarding agricultural pollution and management. Over two hundred attended the conference which featured eighty-five speakers and was highly successful; three fourths of survey respondents (61) rated the overall conference as "excellent" or "very good."

The conference was sponsored by the Idaho Association of Soil Conservation Districts (IASCD), U.S. Environmental Protection Agency, Idaho Division of Environmental Quality, Cooperative Extension System-University of Idaho, Idaho Soil Conservation Commission and USDA Soil Conservation Service. Representatives from the Idaho Waters Users Association, Idaho Council on Industry and the Environment, and the Environment Group participated in program planning.

During the year, support was also provided on water quality issues through: publishing a quarterly newsletter in partnership with the IASCD; aiding the Lemhi, Pahsimeroi and East Fork of the Salmon River Model Watershed Project establish a quarterly newsletter, develop a slide presentation, fact sheets, etc.; facilitating the development of information and education standards for State Agricultural Water Quality Program projects; promoting the Resource Conservation and Rangeland Development Program and the new Idaho Agricultural Pollution Abatement Plan; and aiding dissemination of information regarding a proposed Watershed Improvement District.

A major effort has been to get the 51 soil conservation districts to incorporate the watershed approach into their five-year planning cycle. Efforts have focused on producing a semiannual newsletter distributed to all members of the soil conservation districts, conduct public tours of selected watersheds to observe problems and discuss how the watershed approach enhances water quality solutions. This effort will ultimately be molded into the Soil Conservation Commission's strategic plan and should further enhance and promote sensible water quality solutions.

Another aspect of this year's information and education efforts was the hosting of the 1995 National Envirothon. This meeting brought high school students from twenty states to compete in an environmental education program. All aspects of the competition went smoothly and the final Envirothon survey results are being tallied.

Forest Practices Implementation

The *Idaho Water Quality Status Report and Nonpoint Source Assessment* (Division of Environmental Quality 1989) identifies silviculture as one of the nonpoint source activities affecting Idaho's waters. The *Idaho Nonpoint Source Management Program* (Bauer 1989) and *Forest Practices Water Quality Management Plan* (Bauer et al. 1988) describe two major components of DEQ's forest practices program as reviewing management effectiveness and developing water quality standards or setting water quality criteria.

The objectives of the 1996 forest practices audit were to assess the extent to which the Idaho forest practice rules are being implemented and to assess whether the management practices function as intended when properly implemented and maintained. Based on these findings, the audit team made recommendations for rules and administrative revisions. The primary findings and recommendations deal with rule implementation, rule effectiveness and road maintenance. The Team also addressed a number of other issues having an impact on water quality that do not directly pertain to the Idaho forest practices rules.

Forest Practices Rule Implementation

The rate of forest practices rule implementation was evaluated by dividing the number of instances where a rule was implemented by the number of instances where it was applicable. The Team found that the forest practices rules were implemented at a rate of 97% statewide. This was a higher rate than found in the 1988 and 1992 audits. When an Idaho forest practices rule was not implemented or maintained, it was a road rule (Rule 040) 69% of the time.

The Team recommend more preoperational inspections be conducted, particularly on non-industrial timber sales. Additionally, the Team suggested a mandatory operator certification program for loggers with a history of non-compliance be implemented and existing educational materials be made readily available to the public.

Forest Practices Rule Effectiveness

The audit team evaluated rule effectiveness by assessing individual rule effectiveness and by pollutant delivery to streams or stream channels. On an individual rule basis, they found that when properly implemented and maintained, the practices described in the forest practices rules were effective 99% of the time. The team also found that half of the timber sales audited had sediment being delivered to streams or stream channels as a result of forest practices activity. This apparent inconsistency can be attributed to management practice design, construction, maintenance, rule interpretation and other factors. The impact of this sediment delivery on the beneficial uses of the streams within these sale areas was not assessed.

The team recommend the Idaho forest practices road rule (Rule 040) be modified to account for differences in geologic stability between the Belt Supergroup and the batholitic granites. Suggested changes for Rule 040 are provided in appendix G. In general, they found that one or two practices described in the rules may be adequate on stable ground but that multiple practices are required to reduce sediment delivery in unstable situations.

Miscellaneous Findings

The evaluation of rule implementation, rule effectiveness and pollutant delivery fulfills the first two objectives of the forest practices audit. However, an evaluation strictly focuses on a rule-by-rule assessment of forest practices does not address all of the issues encountered in the 1996 audit. The issues listed have been identified through discussions and observations of the audit team and timber sale representatives. These issues include: maintenance responsibility on mixed ownership (i.e. home sites, state, county, recreation) roads; grazing and mining water quality impacts; pre-FPA logging; road-closure breaching; water quality and fire management conflicts; culvert and road-fill compaction; variances; cumulative effects of timber sales and other land uses; and administration of the road planning rules.

Not all of these issues can be addressed by the Forest Practices Act. However, since the integrity of a stream is influenced by all of the activities in its watershed, these findings are pertinent from a water quality perspective. For the most part, these issues do not suggest the need for a rule change, but an increased application of current rules and programs.

Paradise Creek Watershed Restoration

This project deals with the installation of best management practices to improve water quality on Paradise Creek. Effluent from the University of Idaho's aquaculture laboratory, beef and dairy cattle operations, and urban storm water runoff constitute the major nonpoint source pollutants affecting Paradise Creek. The construction of an artificial wetland redirects the polluted runoff through the surface water system and naturally removes the organic matter, sediment and trace metals through microbial metabolism and plant tissue uptake. A subsurface system was also designed and incorporated into the wetlands to compare treatment efficiency of the two systems especially under the harsh freezing conditions of the northern Idaho winters.

Marsh Creek Riparian Restoration Project

This project, involves the riparian restoration of two miles of Marsh Creek, a major tributary to the Portneuf River that is a high priority §303(d) listed waterbody. Efforts by the Idaho Fish and Game, Natural Resources Conservation Service, local ranchers, the University of Idaho Agriculture Research Station, and DEQ should show dramatic improvements in water quality and restore the fish and wildlife to levels not seen in the area for years. By protecting the riparian areas of Marsh Creek from the long term damage done by range cattle the project hopes to demonstrate that the wise use of land and water management can be productive for both commodities.

The project also includes a strong information and education aspect that will demonstrate riparian management through local classroom tours and the establishment of 30 permanent photo point posts. The photo points will be used to document the anticipated changes in Marsh Creek and demonstrate that long term commitments are needed to accomplish the instream water quality goals involved with riparian restoration.

Hatwai Creek Watershed Project

The purpose of this project is to reduce or prevent nonpoint pollution within the Hatwai Creek watershed. The project provides a hands-on learning experience for the involved agencies and valuable practical application guidelines for future projects in the area. This watershed was chosen due to its impact on the lower Clearwater River and communities of Lewiston and Clarkston. A series of educational workshops and presentations on management practices have been made at the local elementary schools within the district during the 6th grade Environmental Awareness Days and to a local fly-casting society. The monitoring plan for Hatwai Creek has been finalized and sample site selection is underway.

Cocolalla Lake Watershed

The Cocolalla Lake Association initiated this one year project to address the problem of nonpoint source pollution in the watershed and its relationship to the water quality in Cocolalla Lake. This effort will focus on a drainage by drainage evaluation and a prioritization of those drainages so that specific management practices can be initiated on those basins deemed to be causing the greatest resource damage. To date, Fish Creek and Cocolalla Creek have been identified as the highest priority drainages and remediation efforts are currently being designed. The long term project goals are water clarity to three meters and conditions such that all state designated beneficial uses are supported.

The project includes a strong information and education component and the Cocolalla lake Association has seen strong public support for the project since its inception. The project is also being coordinated with the state's agricultural water quality program to insure that any duplication of effort is reduced by the separate projects. Representatives from the Cocolalla Lake Association reside on both planning teams to maintain communication between the projects. Additionally, strong volunteer monitoring efforts are underway utilizing residents of the Cocolalla Lake vicinity. The local high school is also currently researching available grant funds for the development of a permanent class room curriculum for water quality sampling of the lake waters.

Stormwater/ Riparian Buffer Regulations and Demonstration Project

This project is designed to demonstrate, and propose for adoption, a method of managing stormwater and riparian areas so future land development will not further impair lake water quality. The short term goals of this project are to increase awareness of how stormwater affects lake water quality and to propose more effective stormwater regulations for Kootenai and Bonner Counties. The long term goals are to maintain or improve the water quality and fisheries of Northern Idaho lakes and their tributaries. Due to dissatisfaction with the existing stormwater regulations in Kootenai County, and a mandate from the Kootenai County Commissioners, work on the Kootenai County ordinance began earlier than planned. The proposed regulations will require native vegetation buffers, peak stormwater flow design for a 25-year storm, and a no net increase in phosphorus performance standards for all new development.

Information on sediment and phosphorus export from roads and residential/commercial development, on phosphorus removal efficiencies of stormwater, and on road improvement methods has been identified and gathered. This data will be useful for quantifying stormwater impacts and treatment efficiencies for the new regulations. A demonstration project is also current being developed to demonstrate that those measures being proposed can, in fact, be achieved.

Magic Valley Confined Animal Feedlot Operations

The §319 Non Point Source (NPS) program grant has provided critical support and resources to the confined feeding operation (CFO) program in south central Idaho. Implementation of the §319 NPS program has provided resources to ensure that adequate design, construction, and operation of animal waste management facilities are being accomplished to protect surface and ground water quality in the Mid-Snake River watershed. The CFO program has addressed nonpoint source problems through an ongoing pollution prevention and control efforts. The CFO waste management program is and continues to be a high priority in south central Idaho.

Major project products include:

- development and implementation of the Idaho Guidelines for Confined Feeding Operations (Palmer 1993);
- coordination/cooperation with CFO industry and local, state, and federal agencies;
- review and approval of thirty-six animal waste management system plans;
- provided technical assistance on one hundred seventy-two CFO facilities;
- conducting inspections/site visits on one hundred twenty-three CFO facilities; and
- development of enforcement referrals for EPA on recalcitrant CFOs that are in violation of state and federal laws and rules.

The primary objective of this project is to protect ground and surface waters from the cumulative effects of waste products generated from confined animal feedlot operations in south central Idaho. The project is based on joint participation and cooperation with the DEQ, local county commissioners and county planning and zoning boards, Idaho Soil Conservation Commission, Natural Resources Conservation Service, Cooperative Extension Service and local cattle and dairy producers. This year, the program has accomplished 14 plan and specification reviews, 20 animal waste management system plan and specification reviews, 56 site and facility inspections, provided technical assistance to 94 confined animal operations operators, and responded to more than 125 complaints regarding existing confined animal feedlot operations. Additionally, the project has provided information and educational opportunities for both the confined animal operations industry, College of Southern Idaho students and the general public.

Coeur d'Alene Tribe's Sediment and Runoff Control

This project provides watershed resource restoration activities on priority watersheds on both state and tribal lands. The project focuses primarily on the use of structural and vegetative conservation practices to control excess surface water runoff from agricultural and road maintenance activities. To date, the project has installed 25 gully sediment/water basins and associated grassed waterways and riparian areas in the most critical project areas. Twenty-five additional structures are planned for 1996. Post implementation monitoring is built into the project and being coordinated with efforts from the State Agriculture Water Quality Project to avoid unnecessary duplication.

Informational and educational opportunities are being provided by both the city of Plummer Water Quality Forum, Lakeside Middle School and local businesses with a special emphasis being placed on carrying out Project WET at the Desnet Tribal School. Local meetings plus area field trips are planned for the spring of 1996 to visit construction/remediation sites from 1995.

Pend Oreille Lake Nutrient Load Allocation Strategy

This project is to identify the maximum allowable nutrient load to Pend Oreille Lake from controllable external sources that will be consistent with the Clark Fork - Pend Oreille Basin water quality study. This study is part of a three-state effort, including Idaho, Washington, and Montana, to demonstrate the feasibility of dealing with nonpoint nutrient sources on a voluntary basis while water quality is still acceptable. Data collected from past volunteer monitoring efforts is being analyzed to determine the current lake conditions in an area proposed for future development. This data will also be used for the development of a voluntary TMDL.

Idaho Homestead Assessment System

The ultimate goal of this project is to develop and start an interactive educational program that will help rural Idaho farm owners and non-farm owners protect surface and ground water quality. Specifically, the project has focused on the creation of a home assessment worksheet that can be completed by the owner. This assessment is then reviewed by a local environmental professional and the owner is instructed as to what subsequent changes might be made in common everyday practices to protect surface and ground water sources. The project has also developed a series of public information flyers regarding various management practices for rural Idaho residents. The home assessment worksheets and informational brochure are currently being tested in two Idaho communities with known surface or ground water problems. These results will be analyzed and final adjustments made to the home assessment worksheets. Additional work is planned for 1996 as the USDA Natural Resources Conservation Service has received an Ameri-Corp grant to help establish the program statewide.

Minidoka/Cassia Ground Water Monitoring

The §319 National Monitoring Program Ground Water Project Minidoka/Cassia Ground Water Monitoring, provides ground water quality monitoring support for the USDA Snake River Plain Water Quality Demonstration Project. The demonstration project covers over 1,946,000 acres in south central Idaho. It consists of two sets of paired, five acre plots located within the demonstration project's most vulnerable area for ground water contamination. Monitoring wells and vadose zone soil water sampling devices are being used to evaluate the effects of USDA recommended conservation practices on ground water nitrate concentrations. Results from the monitoring will be used to make management recommendations throughout the USDA project area.

The overall goal of the demonstration project is to decrease nitrate concentrations and pesticide detections in ground water through the adoption of conservation practices on agricultural lands. Conservation practices of primary interest include irrigation water management, nutrient management, crop rotation, and pesticide management. The main objective of the paired field network is to provide information to evaluate the effectiveness of the applied practices. Ground water, soil and soil moisture samples are being analyzed for nitrate and pesticides. We hope to determine if implementation of selected practices results in statistically significant changes in ground water nitrate levels and pesticide detections.

The conservation practice being evaluated at the "F" paired fields is crop rotation and its effect on nutrient leaching. A common crop rotation in the project area is from alfalfa to two years of beans. Beans, as with alfalfa, are a nitrogen fixing crop which will not use much of the nitrogen released to the soil from the previous year's alfalfa crop residue. The current practice has the potential to allow soil nitrogen levels to accumulate and be available to leach to ground water. The USDA Agricultural Research Service currently recommends following alfalfa with barley or oats. This practice allows the grain crop to utilize the residual nitrogen from the previous years alfalfa, thereby reducing the amount of nitrogen available for leaching.

The conservation practice being evaluated at the "M" paired field is irrigation water management and its effect on nutrient leaching. Petiole testing and soil sampling during the crop growing season typically dictates fertilizer application rate and timing. Restricting nitrogen inputs based on plant demands and soil content has been shown to reduce nitrogen leaching. However, if irrigation water applications are mismanaged, nitrogen will leach while plant tissue and soil analysis continue to suggest additional nitrogen is needed. The USDA Cooperative Extension System recommends sprinkler irrigation applications at 12 hour intervals rather than the common practice of sprinkler irrigation applications at 24 hour intervals. This practice allows nitrogen to remain in the crop root zone longer for plant uptake rather than leaching to ground water.

Installation of ground water monitoring wells and initial field instrumentation were completed in April 1992. Data collection from these stations has been performed monthly with additional work completed on an as-needed basis. During 1993, uncontrollable land owner complications required revision of the original implementation schedule. This delay has allowed additional baseline monitoring as recommended earlier by the National Monitoring Program guidance (EPA 1987a).

In 1994, efforts focused on evaluation of spatial variability within the two paired fields. A geo-statistically designed vadose zone sampling program including collection of soil and soil water samples is being implemented at both paired field sites. The vadose zone sampling program will be important in the interpretation of the ground water data. Soil samples were used to determine grain size distribution and spatial variability. A soil type probability map has been developed from this data to predict soil type locations within the fields. Additional soil samples were collected at the surface of the fields immediately following fertilizer applications. A nitrogen content probability map was developed to provide information on the spatial distribution of the nonpoint nitrate sources for each paired field site. A probability map to evaluate the spatial distribution of hydraulic conductivity also was developed for both sites from measured field values. This information has been used to statistically determine the location for installation of the soil water samplers at the paired field sites.

Monitoring continues to provide baseline ground water quality data in this project. The data is being compiled and stored in STORET and the demonstration project's central data base. Changes in ground water quality as a direct result of conservation practice implementation has not been recorded. Documented improvements in ground water quality as a result of changes in agricultural practices will likely take several more years of extensive monitoring to obtain.

Ground Water Vulnerability Mapping Project

Protecting Idaho's ground water by predicting it's vulnerability to contamination is the primary goal of the 319 Ground Water Vulnerability Mapping Project. Ground water vulnerability mapping is based on hydrogeologic susceptibility and contaminant loading potential. Ground water vulnerability categories are assigned to aquifers based on numerical ratings for variables such as depth to ground water, soil type, and recharge volume. This project continues work initiated in the late 1980s to assess the vulnerability of ground water of the Snake River Plain aquifer in southern Idaho. The remaining project task is to develop and publish a geographic information system (GIS) based, statewide ground water vulnerability map.

Project activities have included statistical verification of the vulnerability rating scheme applied to southern Idaho, development of a vulnerability map at the 1:24,000 scale to determine statistical differences between map scale, and completion of GIS vulnerability data layer components for creation of a statewide ground water vulnerability map in the future.

Project accomplishments can be divided into two distinct areas, products and information. The generation of GIS data layer coverage for the various hydrogeologic features and land use patterns applicable to ground water quality protection are products which are very valuable for future use in a wide array of applications. Information obtained through application of the vulnerability rating scheme to other areas in the state and the statistical evaluation of existing vulnerability determinations identifies factors with varying levels of importance. The verification process showed a statistically significant, weakly linear association with nitrate levels for the eastern Snake River Plain. The same relationship was not found in two other parts of the state where the system was evaluated at the regional level. Lack of data was a problem for the verification analyses. The dependent variable in the analysis was nitrate observations. The small number of nitrate samples and their uneven temporal and spatial distributions preclude making definitive conclusions about statistical relationships between the rating system and ground water contamination by nitrates. Whether total nitrate levels are the most appropriate dependent variable to assess is not known. Nitrate observations were chosen because of the relative availability of data compared to data on chlorides, bacteria, pesticides, or other water quality parameters. There may be relationships between independent variables and other water quality parameters which were not tested due to the lack of data.

State Agricultural Water Quality Program

In state fiscal year 1995, the DEQ funded five new implementation projects bringing the total State Agricultural Water Quality Program (SAWQP) projects funded to forty-eight implementation and eight planning projects. This represents approximately $40 million allocated by the State and more than $10 million in participant cost-share allocations for this program to address agricultural nonpoint source pollution. To date, more than 1,000 cooperators have treated nearly 400,000 critical acres with management practices to reduce pollution from nonpoint sources under SAWQP. Additionally, 44 implementation and four planning projects are in the development stages and will be implemented as funds become available.

In December 1995, the Director of the DEQ established an Agricultural Water Quality Team. The teams' goal is to review SAWQP and to outline its role under the new water quality statute (Idaho Code 39-3601 *et seq.*) The program has been an important and effective tool throughout the State for addressing nonpoint source pollution from agriculture. It is and will continue to be an important component of the State's arsenal to meet the water quality challenges posed throughout Idaho. Recommendations from the Agricultural Water Quality Team will be used to maintain the program as a leading component of the State's nonpoint source pollution planning and implementation efforts.

Clean Lakes

Nonpoint sources are the leading cause of degradation of water quality in Idaho lakes. The State has completed six diagnostic/feasibility studies; one project is ongoing; and one project was recently funded. All have implicated nonpoint sources as causing failure to fully support, or threaten, beneficial uses.

The federal §314 Clean Lakes Program was the primary source of funding to implement lake management plans and control nonpoint source pollution. However, the elimination of program funding has forced Idaho to review other funding mechanisms or set back implementation schedules until available funding can be found.

Significant events in this reporting period included the completion of the Cocolalla Lake, Henry's Lake, and the Williams Lake Phase I and Winchester Lake Phase II projects. Each of the Phase I projects is presently awaiting final review by EPA. Presently, DEQ is completing its contract obligations for all projects by entering all data into STORET and is moving to close out the §314 contracts. No further activities are anticipated with the federal §314 Clean Lakes program unless additional funds are allocated.

Tribal Coordination

According to the EPA *Guidelines for Preparation of the 1996 State Water Quality Assessments (305(b) Reports)* (Environmental Protection Agency 1995), tribal governments are encouraged to develop the capacity to access and report on the quality of their water resources. Each of the major tribes in Idaho has been developing surface and ground water quality programs, DEQ is not including tribal or reservation water quality narrative in its 1996 §305(b) report. The DEQ will continue to work closely with each of the tribes through its water quality programs to ensure that the goals of the Clean Water Act are met throughout the State.

Publications, Reports and Presentations

Following is a selected list of water quality publications, reports and presentations by Idaho Division of Environmental Quality staff during 1996 and 1997. The list shows the diversity of projects being worked on. The list also serves as a reference for anyone requiring more information or copies of the material. See Clark (1998) for a more complete listing of DEQ water quality related publications and presentations.

<u>Water Quality Status Reports</u>

116. Ingham, M.J. 1996. Lower Payette River agriculture irrigation water return study and ground water evaluation, Payette County, Idaho 1992-1993. Idaho Department of Health and Welfare, Division of Environmental Quality, Boise. 211 pp. [originally listed as WQS Report #115]

117. Schuld, B.A. 1996. WQSR, East Fork of the South Fork of the Salmon River (Valley County), 1979-1995. Idaho Department of Health and Welfare, Division of Environmental Quality, Boise. 94 pp.

118. Boyle, L. 1996. Ground Water Study of the Lower Boise River Valley, Ada and Canyon Counties, Idaho.

<u>Water Quality Summary Reports</u>

32. Stewart, D. 1996. Big and Little Creeks, Idaho County, Idaho 1991-1992.

Ground Water Quality Technical Reports

7. Howarth, R. 1996. An Evaluation of Bacteria in Ground Water near Mountain Home, Elmore County, Idaho. 36 pp.

8. Howarth, R. 1997. An Evaluation of Bacteria in Ground Water in Prairie, Elmore County, Idaho. Idaho Division of Environmental Quality, Boise Regional Office, Boise. 38 pp.

9. Not issued.

10. Boyle, L. 1997. Ground Water Investigation of Nitrate and Pesticides in Northwest Ada County, Idaho. Idaho Division of Environmental Quality, Boise Regional Office, Boise. 21 pp.

Misc. Water Quality Reports

Division of Environmental Quality. 1998. The Big Payette Lake Water Quality Council. Big Payette Lake Management Plan. Division of Environmental Quality, Boise, ID 46 pp.

Idaho Division of Environmental Quality Beneficial Use Reconnaissance Project Technical Advisory Committee. 1996. 1996 Beneficial Use Reconnaissance Project Workplan. Idaho Division of Environmental Quality, Boise. 52pp.

Idaho Department of Health and Welfare. 1996. 1996 water body assessment guidance: a stream to standards process. Idaho Department of Health and Welfare, Division of Environmental Quality, Boise. 109pp.

Idaho Division of Environmental Quality Beneficial Use Reconnaissance Project Technical Advisory Committee. 1997. 1997 Beneficial Use Reconnaissance Project Workplan. Idaho Division of Environmental Quality, Boise. 149pp.

Idaho Division of Environmental Quality. 1997. Forest practices water quality audit 1996. 1996 Forest Practices Audit Team, Idaho Division of Environmental Quality, Boise. 94pp.

Clark, W.H. 1997. List of water quality reports for distribution. Idaho Division of Environmental Quality, Boise. 26pp.

Clark, W.H. 1997. Index of published reports and articles. Idaho Division of Environmental Quality, Boise. 38pp.

Division of Environmental Quality. 1999 Preliminary Draft, Idaho source water assessment plan. Division of Environmental Quality, Boise.

Reports Resulting from DEQ Sponsored Projects

Royer, T.V. and G.W. Minshall. 1996. Development of biomonitoring protocols for large rivers in Idaho, Annual Report. Stream Ecology Center, Department of Biological Sciences, Idaho State University, Pocatello. 55 pp.

Stream Ecology Center. 1997. Field protocols for bioassessment of large rivers in Idaho. Stream Ecology Center, Idaho State University, Pocatello. 8 pp.

Abstracts of Presented Papers and Posters

Brandt, D. 1996. Water quality conditions in Billingsley Creek, Gooding County: Analysis of water chemistry data from 1972 to present [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 21.

Cardwell, J. 1996. Groundwater vulnerability mapping [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise.

Cardwell, J. 1996. Snake River plain water quality demonstration project regional groundwater monitoring program, preliminary findings [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 22.

Courtright, J. 1996. From GPS and GIS, an overview [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 18.

Hoelscher, B. 1996. Biocriteria development for the Northern Rockies Ecoregion [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 31.

Hoelscher, B. 1996. Waterbody Assessment Guidance: How to use biological assessment data to classify waterbodies [abstract]. In: Seventh Annual Biological Assessment Workgroup, November 5-7, Astoria, OR. EPA Region 10, Seattle, WA.

Ingham, M., D. Blew and E. Cowley. 1996. Vegetation and stream channel responses to modified livestock grazing on Boulder Creek, Idaho [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 20-21

Mebane, C. 1996. Aquatic ecosystem assessment: An example of a weight-of-evidence approach [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 9-10.

Mebane, C. 1996. Variability in dissolved and total metal concentrations in a mine-impacted stream: Implications for bioavailability [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 34.

Mebane, C. 1996. Variability in dissolved and total metal concentrations in a mine-impacted stream: Implications for water quality regulation [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise. p 33.

O'Dell, I., T.R. Maret, and W.H. Clark. 1996. An integrated monitoring approach to Idaho's statewide surface water quality network. Journal of the Idaho Academy of Science. 32(½):43.

Woodhead, Sean. 1996. BURP macroinvertebrates [abstract]. In: Sixth Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 9-11, Boise, ID. Idaho Division of Environmental Quality, Boise.

Zaroban, D.W. 1996. Biological assessment and water quality. In: Idaho Chapter of the American Fisheries Society 1996 Annual Meeting. February 29 - March 2. Coeur d'Alene, ID. Idaho Chapter American Fisheries Society, Coeur d'Alene.

Zaroban, D.W., and W.H. Clark. 1996. Fish ID workshop. In: Idaho Chapter of the American Fisheries Society 1996 Annual Meeting. February 29 - March 2. Coeur d'Alene, ID. Idaho Chapter American Fisheries Society, Coeur d'Alene.

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Zaroban, D.W. and W.H. Clark. 1996. Within habitat unit sampling variability for macroinvertebrates in the Boise River Basin, Idaho [abstract]. In: Seventh Annual Biological Assessment Workgroup, November 5-7, Astoria, OR. EPA Region 10, Seattle, WA. p 1-4.

Allen, M. 1997. Effectiveness and comparison of erosion BMPs in Southwest Idaho [abstract]. In: Seventh Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 7-9, Boise, ID. Idaho Division of Environmental Quality, Boise. p 26.

Clark, W.H. 1997. Basic ecological studies and planning of non-timber forest resources. Invited speaker for "1er. Simposium Internacional Sobre Recursos Forestales no Maderables y Combate a la Desertificacion, June 11-13, SEMARNAP, Ensenada, Baja California, Mexico.

Clark, W.H. 1997. Macroinvertebrate cold water indicators: preliminary findings [abstract]. In: Eighth Annual Biological Assessment Workgroup, November 4-6, McCall, ID. EPA Region 10, Seattle, WA.

Clark, W.H. 1997. Macroinvertebrates as indicators of temperature in Idaho Streams. Seminar presented at Centro de Investigacion Cientifica y de Educacion Superior de Ensenada, November 21, Ensenada, Baja California, Mexico.

Edmondson, M. 1997. Comparison of Wolman and zig-zag pebble count methods [abstract]. In: Seventh Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 7-9, Boise, ID. Idaho Division of Environmental Quality, Boise. p 32.

Harvey, G.W. 1997. Nonpoint source TMDLs, models and challenges [abstract]. In: Seventh Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 7-9, Boise, ID. Idaho Division of Environmental Quality, Boise. p 4.

Hoelscher, B. 1997. Waterbody assessment guidance - a stream to standards process [abstract]. In: Seventh Annual Nonpoint Source Water Quality Monitoring Results Workshop, January 7-9, Boise, ID. Idaho Division of Environmental Quality, Boise. p 4-5.

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Zaroban, D.W., and W.H. Clark. 1997. Fish ID workshop. In: Idaho Chapter of the American Fisheries Society 1997 Annual Meeting. February 26 - March 1. Boise, ID. Idaho Chapter American Fisheries Society, Boise.

Zaroban, D.W. 1997. Now that we have some fish data, what do we do with it? [abstract]. In: Eighth Annual Biological Assessment Workgroup, November 4-6, McCall, ID. EPA Region 10, Seattle, WA.

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CHAPTER 2. STATE SPECIAL CONCERNS

Lewiston Regional Office
See Chapter 8 for discussion of the Winchester Lake (TMDL Subbasin Assessment and Loading Analysis)

The Lewiston Regional Office encompasses the lower Salmon, lower Snake and Clearwater River basins. Water quality concerns in these basins include support of anadromous fish (steelhead trout, chinook salmon and sockeye salmon) runs, bull trout populations and surface water supplied drinking water systems. This region currently has 252 water quality limited water bodies on the 1994 EPA 303(d) list for Idaho. Four of these water bodies (Paradise Creek, Winchester Lake, Cottonwood Creek and Jim Ford Creek) are required to have TMDLs developed. Within this region, water quality impairments are typically caused by excessive nutrients, elevated water temperatures, and sediment from forest, mining, grazing, and agricultural activities. Anadromous fish are also affected by hydroelectric power facilities acting as migration barriers. The Nez Perce Tribal Reservation is located within the North Central Idaho Region and encompasses several water quality limited streams requiring TMDLs be established. This situation will require a mutually acceptable agreement be established between the State of Idaho, EPA and the Nez Perce Tribe to coordinate completion of TMDL development and implementation activities.

Coeur d'Alene Regional Office

Coeur d'Alene Basin

The Coeur d'Alene basin, located in the Spokane River drainage, covers approximately 3,700 square miles with land types varying from high prairie and Palouse hills to forested mountains. The basin includes: Coeur d'Alene Lake, the South and North Forks and main stem Coeur d'Alene River, lateral lakes along the Coeur d'Alene River, the St Joe and St Maries Rivers and their various tributaries and the Spokane River. The waters of the basin feed the Spokane River drainage and provide thirty three percent of the recharge to the region's sole source aquifer. This aquifer supplies drinking water to over 400,000 people in northern Idaho and eastern Washington.

Three significant environmental concerns exist. These are the accelerated eutrophication of Coeur d'Alene Lake, the presence of trace (heavy) metals throughout the watershed of the South Fork Coeur d'Alene, Coeur d'Alene River and Lake and severe bedload movement in the North and South Fork Coeur d'Alene Rivers and the Middle St Joe River as a result of watershed de-stabilization. The presence of these three conditions poses significant management problems. Metals, nutrients and sediments impair or threaten beneficial uses and metals can potentially affect human health.

The Coeur d'Alene Basin Restoration Project was created and started in the fall of 1991 under a Memorandum of Agreement between the Coeur d'Alene Tribe, State of Idaho and EPA. The project is addressing environmental concerns including water quality, hazardous waste, human health and fish and wildlife. A long term approach stretching into the 21st century is combined with short term actions designed to address specific problem areas and to demonstrate cost effective solutions. The State, USGS and Coeur d'Alene Tribe have lead the cooperative development of a plan to manage Lake Coeur d'Alene for nutrients. One goal of the plan is containment of metals contaminants deposited in the lake sediments by controlling the eutrophication through nutrient reductions. Priority areas of the lake and its tributaries have been identified based upon monitoring results. These locations are targeted for nutrient reduction measures.

The Silver Valley along the South Fork Coeur d'Alene River has been developed over the past 100 years for mineral extraction and processing. This mining has left a legacy of metal (cadmium, lead and zinc) contaminated wastes and tailings in the river and its tributaries and along their floodplains. Metals contamination has been transported downstream to the Coeur d'Alene River and Lake. Metal source control in the Silver Valley has been addressed through an interim mine waste remediation plan or TMDL which allocates a group of metals load reducing projects. Six projects to date have been initiated by industry, DEQ, EPA and the Silver Valley Natural Resource Trustees. A priority list of additional actions has been developed. Pre- and post-project water quality monitoring data used to determine project effectiveness will help design future metals load reducing projects.

Work is beginning to address sedimentation in the Coeur d'Alene and St. Joe River systems which has resulted from watershed de-stabilization. The problem has been defined by Forest Service hydrology and fisheries staff as resulting from hydrologic modification of the water yield as the result of forest harvest roads. A problem assessment effort is underway which should result in a model TMDL to address these water quality impacts.

Coeur d'Alene Basin Heavy Metals Contamination Study

Trace (heavy) metals loading diagrams have been developed based on two water years of data collected from the Coeur d'Alene Basin. These diagrams suggested a number of locations and cleanup problems which could be addressed with minimal remedial investigation. Sites for demonstration mine waste remedial projects were selected and a priority list developed by the participants in the Coeur d'Alene Basin Restoration Project. The South Fork Coeur d'Alene River Problem Assessment (Harvey 1993) was revised to include the newer loading information and an interim TMDL inclusive of mine waste remedial projects was fashioned by a work group. Remedial projects in Ninemile Creek (Interstate, Success and the Ninemile Tailings Removal), Canyon Creek (Canyon Creek Tailings Removal and Tamarack Removal) and the South Fork (Elizabeth Park) have been implemented. A project effectiveness monitoring plan has been implemented since 1994 to gather pre- and post-project water quality data.

A problem assessment has been developed for the Coeur d'Alene River and its associated lateral lakes and wetlands. The assessment indicates that wildlife habitat use is not fully supported. Additional information is required to fully assess the scope of the impact and develop remedial strategies. Information is expected to be forthcoming from a federal and tribal Natural Resource Damage Assessment effort. The final assessment will guide remedial actions and management of mine wastes affecting the Coeur d'Alene River and its associated lateral lakes and wetlands.

Twin Falls Regional Office
See Chapter 8 for discussion of the Lake Walcott and Upper Snake/Rock TMDL (Subbasin Assessment and Loading Analysis)

Middle Snake River

The middle reaches of the Snake River (Milner Dam to King Hill) have traditionally been called Idaho's working river. The Mid-Snake has a history of agricultural uses which have caused low flows and high nutrient levels. The Mid-Snake Nutrient Management Plan (NMP) process was initiated after many river valley residents expressed concern over the deteriorating water quality conditions in the river. The DEQ organized an effort with industry and community leaders in the Middle Snake Watershed Planning Area to draft a plan under Idaho's Nutrient Management Act which would comply with Clean Water Act requirements.

The plan participants are organized into four committees. These committees are the General Public Advisory Committee (over 100 members), the Executive Advisory Committee (20-30 members), the Technical Advisory Committee (20-30 members) and the Legal Advisory Committee made up of staff from the Idaho Attorney General's Office.

The six major industry groups drafted an NMP for their specific industry and addressed how their practices could be changed to improve and maintain water quality in the Mid-Snake. The majority of the industries have implemented management practices as soon as the Executive and Technical Advisory committees agreed that the practices were both feasible and effective in improving water quality. The NMP is currently in a negotiations phase. The DEQ is coordinating efforts between EPA and the industries to resolve the issue of a full TMDL for point and nonpoint pollution sources.

The overall goal of the NMP is to improve water quality in the Mid-Snake River under sustainable economic development. Three main sub-goals have been identified: 1) full implementation of industry NMPs within five years of NMP implementation; 2) attainment of state water quality standards for excessive nutrients (mainly phosphorus), nuisance vegetation, dissolved oxygen and water temperature that support cold water biota within 10 years of final NMP approval and 3) establishment of a working committee to determine flow requirements for water quality and water quantity improvements.

The Idaho Legislature has funded the Mid-Snake NMP process since 1995 for monitoring work under the Nutrient Management Act. The EPA has provided funding for a technical planner to work on the NMP. Industry participants have funded substantial monies to incorporate management practices for water quality improvements. Because of the success of the public's involvement in the NMP process, the Legislature has drafted and passed water quality bills that require public and private participation in a basin advisory process.

Pocatello Regional Office
See Chapter 8 for discussion of the Portneuf River TMDL (Subbasin Assessment and Loading Analysis)

Portneuf River

The Portneuf River remains a high priority watershed in the Pocatello Regional Office. There are currently four SAWQP projects and three 319 projects completed or in progress in the Portneuf watershed. Sediment, nutrients, bacteria, and Pocatello municipal storm water discharge are the major concerns regarding Portneuf River water quality. Erosion & agriculture related problems continue to influence water quality in key areas, including major tributaries Marsh Creek and Rapid Creek.

Bear River

Some segments of the Bear River exhibit both flow related and sediment/nutrient related problems. The flow regime is greatly influenced by both irrigation demands via the Bear Lake/Mud Lake storage complex and hydroelectric facilities on the main stem. According to recent water quality monitoring, at least one major tributary, Thomas Fork Creek, serves as a major nutrient source to the river. Many of the tributaries are influenced by agriculture and, to a lesser extent, forest practices. Four distinct segments of the river between the Wyoming and Utah borders exhibit stream bank erosion problems. Beneficial use reconnaissance monitoring continues in the watershed. A major SAWQP planning project was recently completed on Thomas Fork Creek.

Boise Regional Office
See Chapter 8 for discussion of the Cascade Reservoir Phase II Management Plan; Lower Boise River TMDL; Lower Payette River TMDL; and Middle Fork Payette River TMDL (Subbasin Assessment and Loading Analysis)

Cascade Reservoir

Historically, Cascade Reservoir supported a healthy aquatic community, and up until recently was the most popular fishery in the state according to the Idaho Department of Fish and Game (IDFG). Increasing development and a continued influx of nutrients from point and nonpoint sources have resulted in water quality degradation in the reservoir. These impacts are compounded by the reservoir's large size and relatively shallow depth (25 feet average depth). The most recent data indicates high phosphorus contributions from the surrounding watershed have caused and will continue to cause significant deterioration of water quality in the reservoir. Continued inputs of phosphorus and fluctuations in water level within the reservoir have led to eutrophic conditions. Water quality in Cascade Reservoir is a subject of public concern due to continuing occurrence of noxious algal blooms, increased growth of aquatic weeds and frequent fish kills. In the summer of 1993, a severe out break of toxic blue-green algae caused the death of 23 cattle after they drank water from the reservoir. A public health advisory was also issued advising the public to avoid contact with the reservoir. Ingestion of these algal toxins by humans causes gastroenteritis and can be fatal. Contact with the skin causes severe skin irritation. Even though phosphorus loads decreased in 1994 by almost two-thirds, the reservoir continued to experience poor water quality due to low flows, decreased dissolved oxygen, warm water temperatures and internal recycling of nutrients. These conditions placed tremendous stress on the reservoir's fish population. A substantial fish kill occurred and a fish salvage effort was initiated. These water quality indicators demonstrate that designated beneficial uses of the reservoir are not fully supported. Due to obvious degradation in the reservoir and increasing public concern, measures are necessary to address these problems.

Idaho Falls Regional Office

See Chapter 8 for discussions of the Lemhi TMDL and Upper Henry's Fork (Subbasin Assessment and Loading Analysis)

The Idaho Falls Regional Office includes portions of the upper Snake River basin and the upper Salmon River basin in eastern and central Idaho. Almost all municipal drinking water supplies in this area are from groundwater. Awareness of groundwater nitrate contamination is an area of increasing public and awareness and concern, particularly in the agricultural community of Ashton.

A trend of increasing nitrate concentrations in groundwater in the Ashton area has caused public concern. Following reports in 1996 of nitrates in wells exceeding drinking water maximum contaminant level (10 mg/l), the Division of Environmental Quality, U.S. Geological Survey, and other cooperators began a study to characterize regional groundwater nitrate concentrations. Results have shown that nitrate in municipal supply well has increased from less than 3 mg/l in 1964 to about 6.5 mg/l in 1976 to about 10 mg/l in June 1997, and nitrate concentrations in private wells ranged from <1 to 30 mg/l. Areas with elevated concentrations appear to be linked to fertilizer applications, rather than other potential sources such as potato waste, septic systems, or natural sources. The IDEQ, USGS, NRCS, Idaho Soil Conservation Commission, and the citizen Soil Conservation District are collaborating to expand the investigation, and to promote optimizing fertilizer management practices.

PART III
SURFACE WATER ASSESSMENT

CHAPTER 1. SURFACE WATER MONITORING PROGRAM

Surface water monitoring in Idaho is focused on providing data to assess the existence and status of beneficial uses designated in the water quality standards, assess water quality trends and assess the effectiveness of management practices. The intensity of the monitoring done for these purposes may be desk top surveys of existing data (basic or level one monitoring), qualitative surveys and surveys of limited scope and scale (reconnaissance or level two monitoring) and quantitative surveys and surveys of intense scope and scale (intensive or level three monitoring). These levels of monitoring intensity have been described more fully by Clark (1990).

On a statewide basis, the predominant water quality problems in Idaho are caused by nonpoint sources of pollution. Programs to control nonpoint source pollution tend to be largely unsuccessful because of the difficulties involved in applying point source approaches to diffuse nonpoint source problems (Karr 1991). Karr (1991) also noted that efforts to measure or gauge water quality improvement have not been successful because of an inability to associate water quality standards with biological integrity. Water quality standards are legally established rules consisting of two parts, designated uses and criteria. Designated uses are those beneficial use listed in the *Idaho Water Quality Standards and Wastewater Treatment Requirements*. Criteria are the conditions presumed to support or protect the designated uses (Karr 1991). This dual nature of water quality standards demands an assessment of the existence and status of beneficial uses in addition to classic evaluation of numeric criteria. Protocols were developed by DEQ for assessing use attainability (Maret and Jensen 1991). The realization that water quality standards do not always relate to biology and the complexities of reducing nonpoint source pollution has led us to initiate biological monitoring to directly assess water quality standards and biotic integrity.

Beneficial Use Monitoring

In 1993, the DEQ began a project aimed at integrating biological and chemical monitoring with physical habitat assessment as a way of characterizing stream integrity. This monitoring effort had two purposes: gather chemical, physical and biological data to assess water quality, ecological integrity and beneficial uses; and to complete the monitoring as economically and quickly as possible. The beneficial use monitoring was also initiated to aid the DEQ in developing biocriteria.

The 1993 effort relied heavily on protocols for monitoring physical habitat and macroinvertebrates developed by DEQ in the early 1990s. This effort closely followed the Rapid Bioassessment Protocols for Use In Streams and Rivers put together by EPA (Plafkin et al. 1989). The beneficial use monitoring project used the best science and understanding available to characterize aquatic biological communities and their attributes.

Because of the success of the 1993 pilot, the DEQ expanded the project statewide for 1994 (McIntyre 1994, Steed and Clark 1995). A technical advisory committee (TAC) was formed to evaluate the 1993 effort and arrive at a definitive work plan for 1994 (McIntyre 1994). The TAC consisted of technically orientated personnel from each DEQ regional office and the central office. The 1995 work plan was developed based on the experiences of the preceding two years. The overall program remains unchanged for 1996, however, some modification of procedures and protocol has occurred in an effort to minimize qualitative information. Figure III-1 shows the locations of 1874 sample sites from 1994-1996.

At the same time the DEQ was developing the beneficial use project, a legal challenge over Idaho's §303(d) Water Quality Limited List was making its way through the federal court system (*Idaho Sportsman's Coalition v Browner*, W.D. Wash. No. C96-807-WD).

This case has dramatically affected how the DEQ monitors and assesses water quality. In this case, the Idaho Sportsman's Coalition contended there were many more water bodies that should be on the §303(d) list for Idaho. The Judge ruled in the plaintiffs favor in 1994, finding EPA "arbitrary and capricious" in their review and approval of the Idaho 1992 §303(d) list. He further ordered EPA to develop a §303(d) list for Idaho, establish a process for dealing with TMDLs and submit a schedule to address the water bodies on the §303(d) list. On October 7, 1994, the EPA promulgated a §303(d) list for Idaho, listing over 960 water bodies as water quality limited. The Clean Water Act requires the development of a TMDL for each water body on the list. If the state fails to do so or is unable to do so, the EPA must develop the TMDLs for the state.

In response to this suit, the 1995 Idaho legislature created a new law §39:3601, commonly known as 1284, to address this situation on a proactive basis and reaffirm state control. The law designated the DEQ as the primary lead state agency, created citizen advisory groups to provide input to recovery plans and established a statewide monitoring effort of beneficial uses for the listed water bodies.

Beneficial uses of Idaho water bodies can be categorized as designated uses, existing uses and attainable uses. Designated uses are those listed in the Idaho *Water Quality Standards and Wastewater Treatment Requirements*. Existing beneficial uses are those attained in the water body on or after November 28, 1975. Attainable beneficial uses are those that can be achieved with water quality improvements to the water body. Only a small number of water bodies in Idaho currently have beneficial uses designated in the Idaho *Water Quality Standards and Wastewater Treatment Requirements*. These are generally the larger rivers and lakes. The beneficial uses for most water bodies in Idaho are unknown or undocumented.

Figure III-1. Locations of the 1874 stream sites sampled by the Beneficial Use Reconnaissance Project from 1994-1996 in the montane and lowland ecoregions of Idaho. Open dots show sample sites located in the montane ecoregions (gray shaped areas), solid dots show samples located in the semiarid ecoregions (unshaded areas).

The objective(s) of beneficial use monitoring is to document one or more of the following:

- beneficial use existence,
- beneficial use attainability,
- reference conditions, and
- degree of beneficial use support.

Ambient Trend Monitoring

The Idaho fixed station monitoring network is described in detail in the *Coordinated Nonpoint Source Water Quality Monitoring Program For Idaho* (Clark 1990) and *The 1994 Idaho Water Quality Status Report* (IDHW-DEQ 1994). It is a cooperative effort with the U.S. Geological Survey to gather water quality data for long-term trend assessment on river basin and watershed scales.

Basin Trend Network

Sampling of this network was begun in October 1989 at the mouths of major tributaries of the Bear, Snake, Salmon, Clearwater, Spokane, Pend Oreille, and Kootenai Rivers, annually, biennially, and triennially. Each monitoring site is sampled six times each year. These sites are located at existing U.S. Geological Survey surface water gaging stations (Table III-1). Water column constituents monitored include nutrients, common ions, trace ions and field constituents (Table III-2).

Table III-1. Idaho basin trend network monitoring stations.

U.S.G.S. Station Number	Stream Name	Location
1003950	Bear River	at the Wyoming border
12413500	Coeur d'Alene River	at Cataldo
13037500	Snake River	near Heise
13154500	Snake River	near King Hill
13213000	Boise River	near Parma
13317000	Salmon River	at Whitebird
13342500	Clearwater River	near Spaulding

Table III-2. Water column constituents monitored in the Idaho trend monitoring network.

Code	Constituent	Code	Constituent
Nutrients (sampled in Nov, Jan., Mar., May, Jul. and Sep.)			
00631	NO_2+NO_3 as N, dissolved	00610	NH_4 as N, total
00671	Ortho P as P, dissolved	00625	NH_4 + Organic N as N, total
00665	Phosphorus, total		
Common Ions (sampled in Nov., Mar., May and Sep.)			
Code	Constituent	Code	Constituent
00915	Calcium, dissolved	00925	Magnesium, dissolved
00930	Sodium, dissolved	00935	Potassium, dissolved
00940	Chloride, dissolved	00945	SO_4, dissolved
00950	Fluoride, dissolved	00955	SiO_2, dissolved
00076	Turbidity, NTU	70300	Solids, dissolved
80154	Suspended sediment		
Trace Ions (sampled in Nov., Mar., May and Sep.)			
01000	Arsenic, dissolved	01025	Cadmium, dissolved
01030	Chromium, dissolved	01040	Copper, dissolved
01046	Iron, dissolved	01049	Lead, dissolved
01056	Manganese, dissolved	71890	Mercury, dissolved
01145	Selenium, dissolved	01075	Silver, dissolved
01090	Zinc, dissolved		
Field Constituents (sampled in Nov., Jan., Mar., May, Jul., Sep.)			
00060	Water discharge	00095	Specific conductance
00410	Alkalinity, total	00025	Barometric pressure
00010	Water temperature	31625	Fecal coliform
00300	Oxygen, dissolved	31673	Fecal streptococci
00400	pH		

Watershed Trend Network

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. Constituents sampled are the same as the basin network (Table III-2). 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 are perennial sites sampled six times per year (Table III-3). Class A sites are located where long-term, active water quality management occurs within a basin. Class B sites are biennial sites sampled six times per year, every other year (Table III-4). Class B sites are located in basins where land and water uses change slowly, allowing the length of record and number of samples to be reduced. Class C sites are triennial sites sampled six times per year, every third year (Table III-5). Class C sites are located where future specific development proposals may occur which might affect water quality. Therefore, all of the Class A sites, ½ of the Class B sites and ⅓ of the Class C sites are sampled each year on a three year rotating cycle. In order to detect and assess trends, it is necessary that data be collected at a given location, using consistent techniques on a regular schedule and over a substantial number of years. Classification of all sites are periodically evaluated based on future program directions.

Beginning in 1996, the ambient trend monitoring network will be modified to include biological and tissue monitoring. The proposed biological monitoring includes algae, macroinvertebrates, fish, organic constituents of fish tissue and inorganic constituents of fish livers or insects. To augment the biological data, water depth, water velocity, substrate composition, continuous temperature and photographs will also be taken at the biological stations. This monitoring will be done during the April-September period.

Table III-3. Idaho watershed trend network Class A monitoring stations.

U.S.G.S. Station Number	Stream Name	Location
12392000	Clark Fork River	near Cabinet
12413470	S. Fk. Coeur d'Alene River	near Pinehurst
12419000	Spokane River	near Post Falls
13068500	Blackfoot River	near Blackfoot
13206000	Boise River	at Glenwood bridge

Table III-4. Idaho watershed trend network Class B monitoring stations.

U.S.G.S. Station Number	Stream Name	Location
12395000	Priest River	near Priest River
12395500	Pend Oreille River	at Newport, WA
13038500	Snake River	at Lorenzo
13056500	Henrys Fork	near Rexburg
13060000	Snake River	near Shelley
13069500	Snake River	near Blackfoot
13075000	Marsh Creek	near McCammon
13075500	Portneuf River	at Pocatello
13075910	Portneuf River	near Tyhee
13081500	Snake River	near Minidoka
13088000	Snake River	at Milner
13090000	Snake River	near Kimberly
13093000	Rock Creek	near Twin Falls
13094000	Snake River	near Buhl
13108150	Salmon Falls Creek	near Hagerman
13141000	Big Wood River	near Bellevue
13245000	N. Fk. Payette River	at Cascade
13342450	Lapwai Creek	near Lapwai
13345000	Palouse River	near Potlatch

Table III-5. Idaho watershed trend network Class C monitoring stations.

U.S.G.S. Station Number	Stream Name	Location
10092700	Bear River	at Utah border
12322000	Kootenai River	at Porthill
12413000	Coeur d'Alene River	at Enaville
12414500	St. Joe River	at Calder
12414900	St. Maries River	near Santa
13055000	Teton River	near St. Anthony
13058000	Willow Creek	near Ririe
13091000	Blue Lakes Spring	near Twin Falls
13095500	Box Canyon Spring	near Wendell
13112000	Camas Creek	at Camas
13114000	Beaver Creek	at Camas
13132500	Big Lost River	near Arco
13150430	Silver Creek	near Picabo
13152500	Malad River	near Gooding
13168500	Bruneau River	near Hot Springs
13172500	Snake River	near Murphy
13185000	Boise River	near Twin Springs
13202000	Boise River	at Lucky Peak Reservoir
13210050	Boise River	near Middleton
13213100	Snake River	at Nyssa, Or
13235000	S. Fk. Payette River	at Lowman
13239000	N. Fk. Payette River	at McCall
13251000	Payette River	near Payette
13266000	Weiser River	near Weiser
13269000	Snake River	near Weiser
13302005	Pahsimeroi River	at Ellis
13302500	Salmon River	at Salmon
13305000	Lemhi River	near Lemhi
13313000	Johnson Creek	at Yellow Pine
13316500	Little Salmon River	at Riggins
13334300	Snake River	at Anatone, WA
13338500	S. Fk. Clearwater River	at Stites

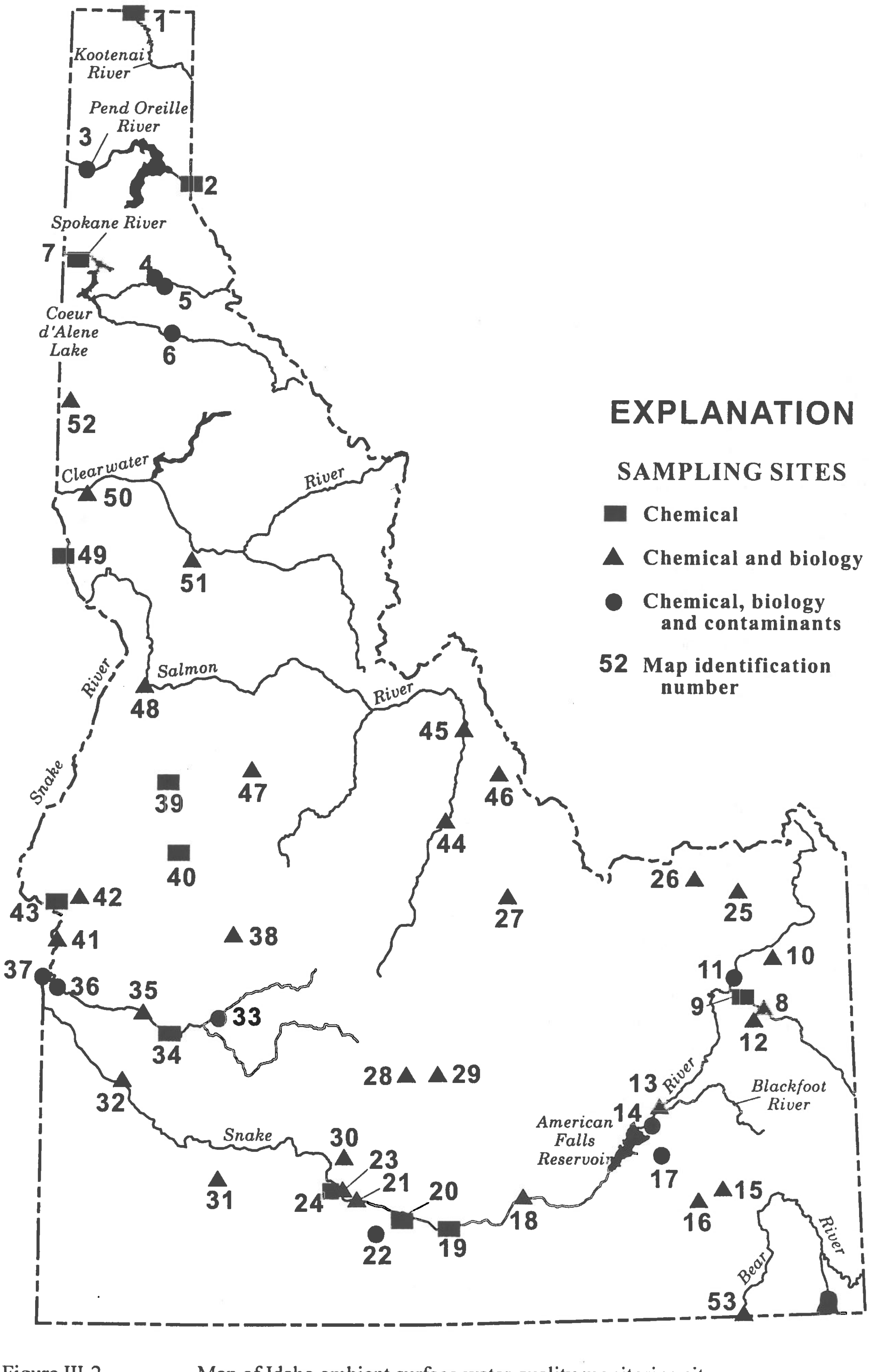

Figure III-2. Map of Idaho ambient surface water quality monitoring sites.

Sampling Sites

1 Kootenai River at Porthill
2 Clark Fork River below Cabinet Gorge Dam, near Cabinet
3 Priest River near Priest River
4 North Fork Coeur d'Alene River at Enaville
5 South Fork Coeur d'Alene River near Pinehurst
6 St Joe River at Calder
7 Spokane River near Post Falls
8 Snake River near Heise
9 Snake River at Lorenza
10 Teton River near St Anthony
11 Henrys Fork near Rexburg
12 Willow Creek near Ririe
13 Blackfoot River near Blackfoot
14 Snake River near Blackfoot
15 Portneuf River near Topaz
16 Marsh Creek near McCammon
17 Portneuf River near Pocatello
18 Snake River near Minidoka
19 Snake River at Milner
20 Snake River near Kimberly
21 Blue Lakes Spring
22 Rock Creek at Daydream Ranch
23 Box Canyon Springs
24 Salmon Falls Creek near Hagerman
25 Camas Creek at Red Road
26 Beaver Creek at Spencer
27 Big Lost River near Chilly
28 Big Wood River near Bellevue
29 Silver Creek Picabo
30 Malad River near Gooding
31 Bruneau River near Hot Springs
32 Snake River near Murphy
33 Boise River near Twin Springs
34 Boise River below Diversion Dam
35 Boise River at Glenwood
36 Boise River near Parma
37 Snake River at Nyssa
38 South Fork Payette River at Lowman
39 North Fork Payette River at McCall
40 North Fork Payette at Cascade

41 Payette River near Payette
42 Weiser River near Weiser
43 Snake River at Weiser
44 Pahsimeroi River at Ellis
45 Salmon River at Salmon
46 Lemhi River near Lemhi
47 Johnson Creek at Yellow Pine
48 Little Salmon River at Riggins
49 Snake River near Anatone
50 South Fork Clearwater River at Stites
51 Lapwai Creek near Lapwai
52 Palouse River near Potlatch
53 Bear River at Idaho-Utah border

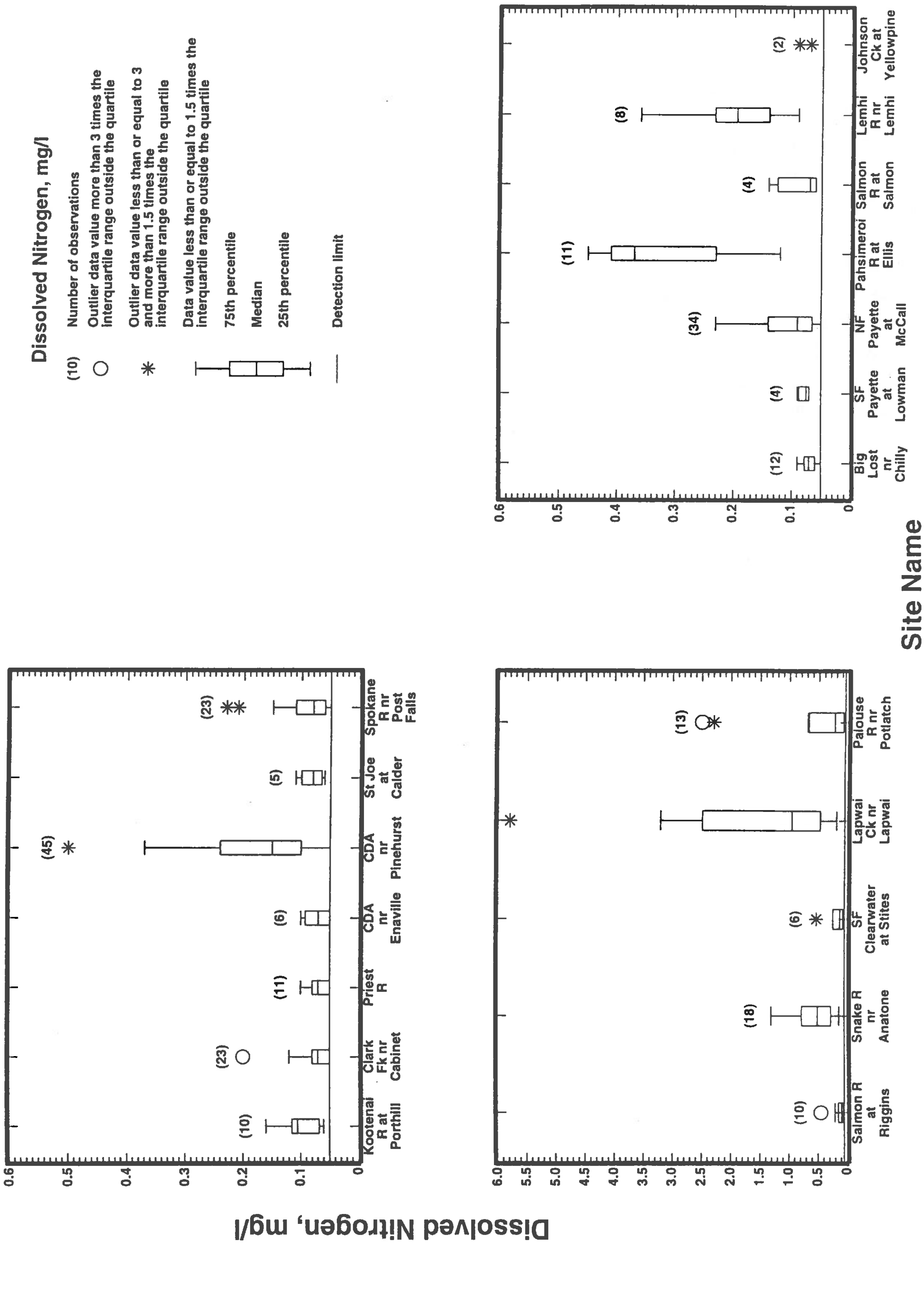

Figure III-3. Ambient surface water dissolved nitrogen concentration for selected sites (1989-1998).

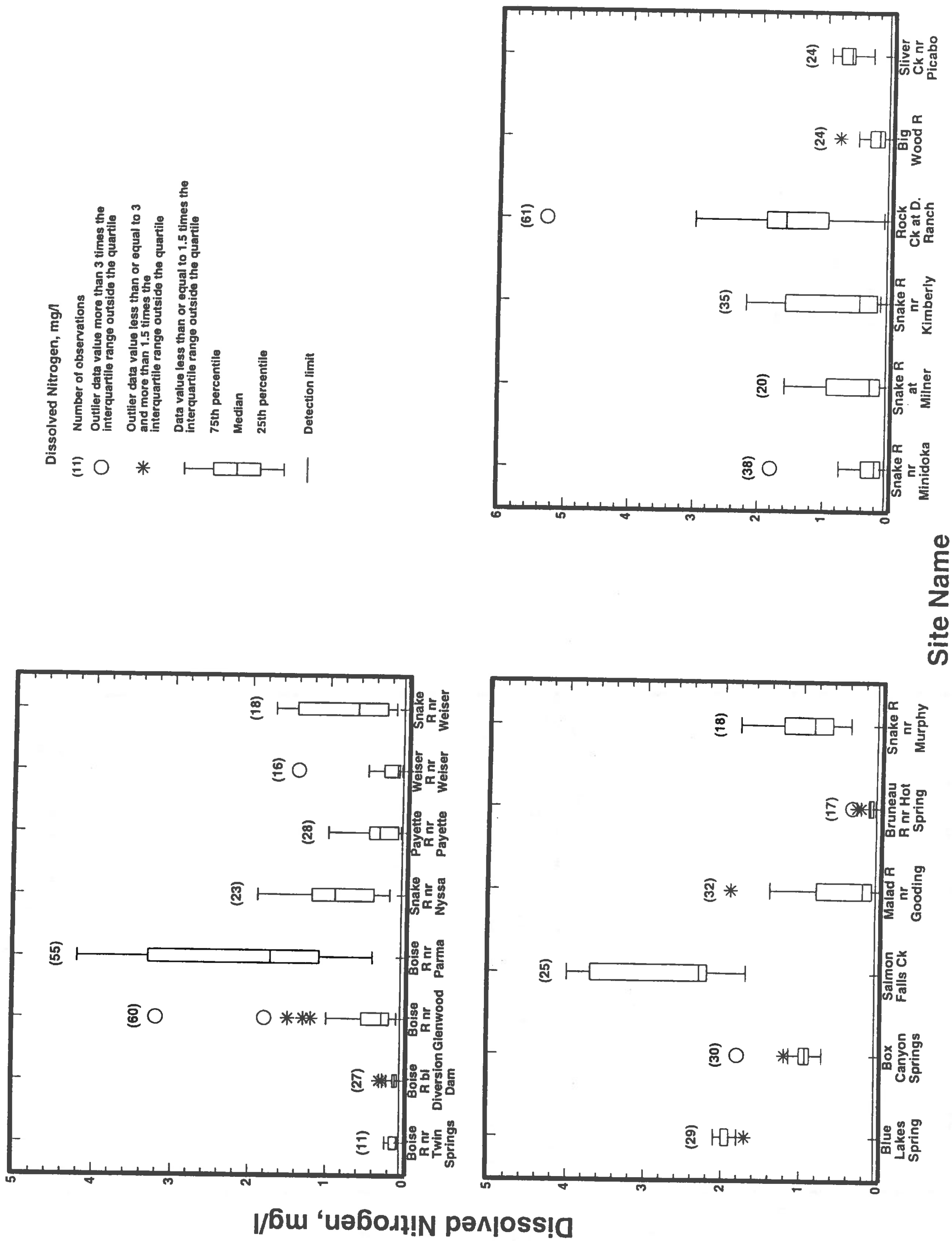

Figure III-4. Ambient surface water dissolved nitrogen concentration for selected sites (1989-1998).

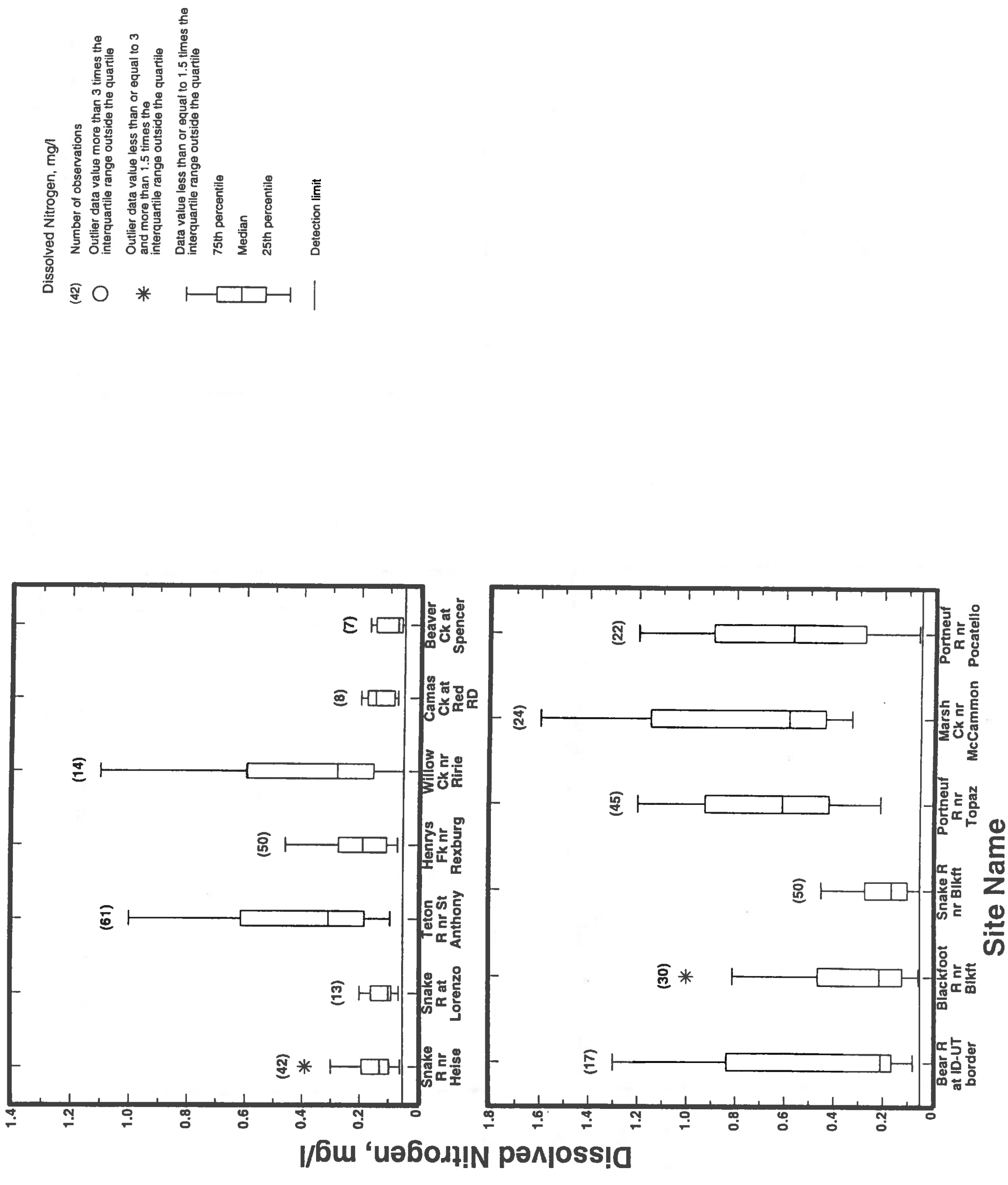

Figure III-5. Ambient surface water dissolved nitrogen concentration for selected sites (1989-1998).

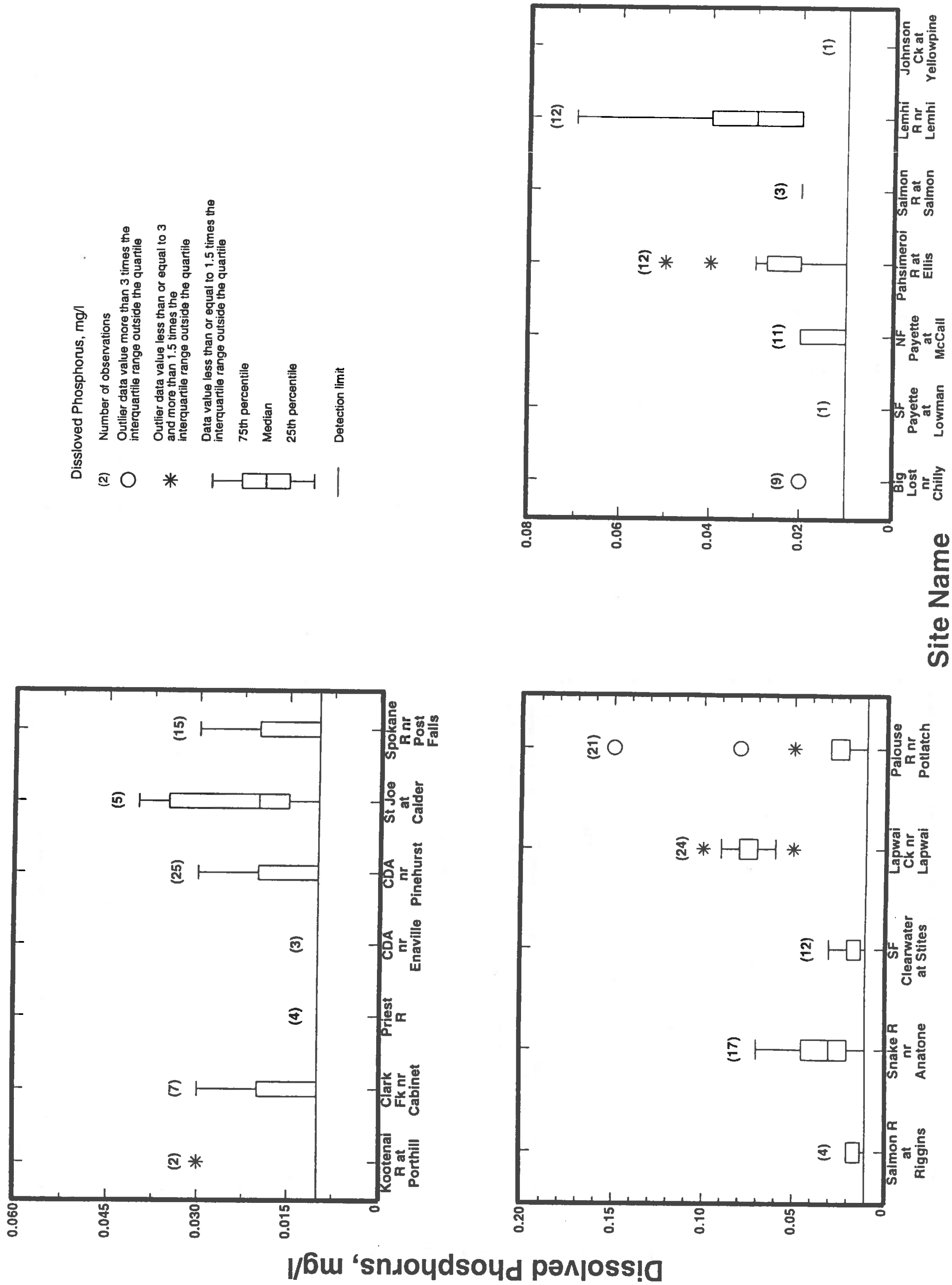

Figure III-6. Ambient surface water dissolved phosphorus concentration for selected sites (1989-1998).

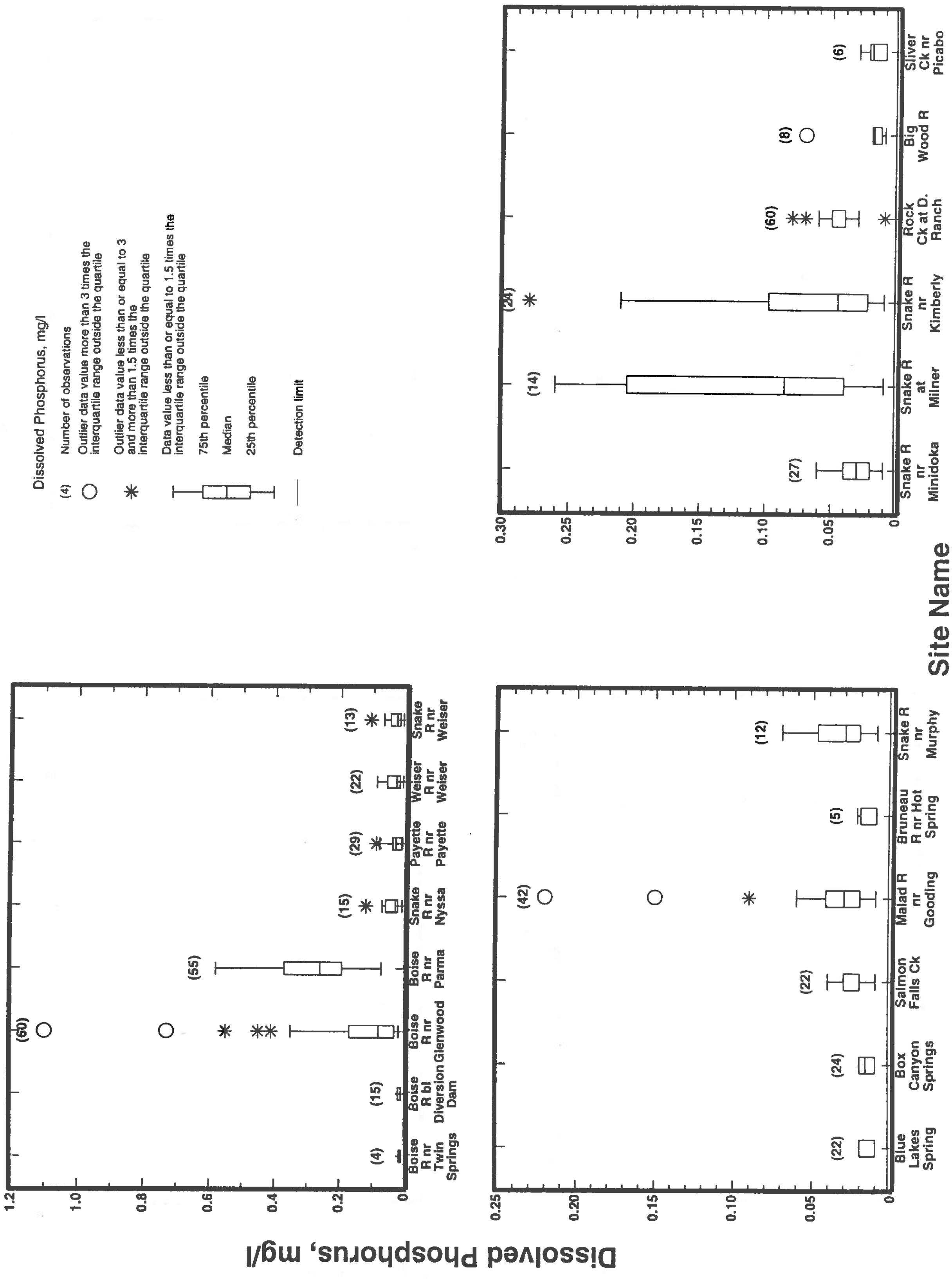

Figure III-7. Ambient surface water dissolved phosphorus concentration for selected sites (1989-1998).

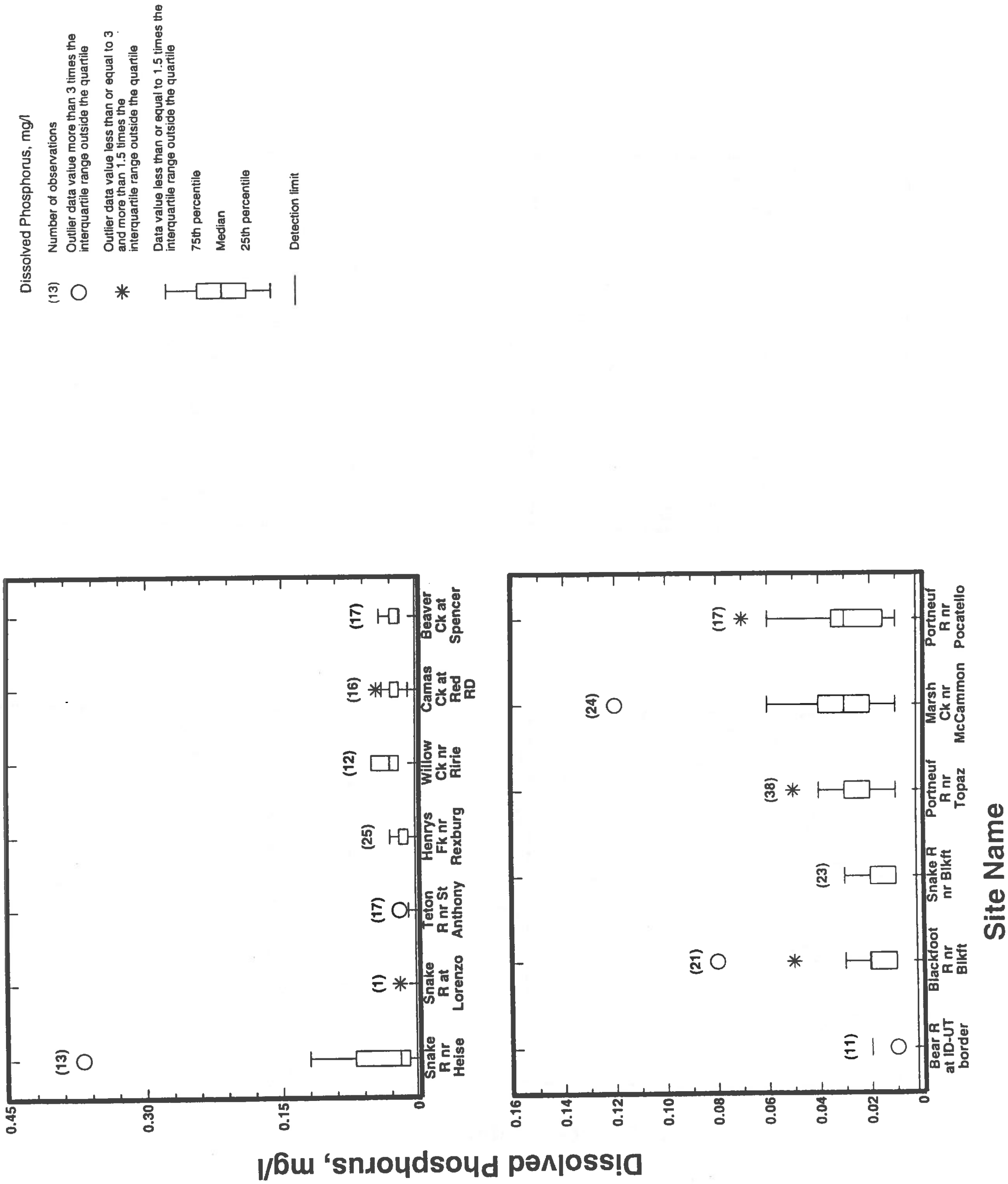

Figure III-8. Ambient surface water dissolved phosphorus concentration for selected sites (1989-1998).

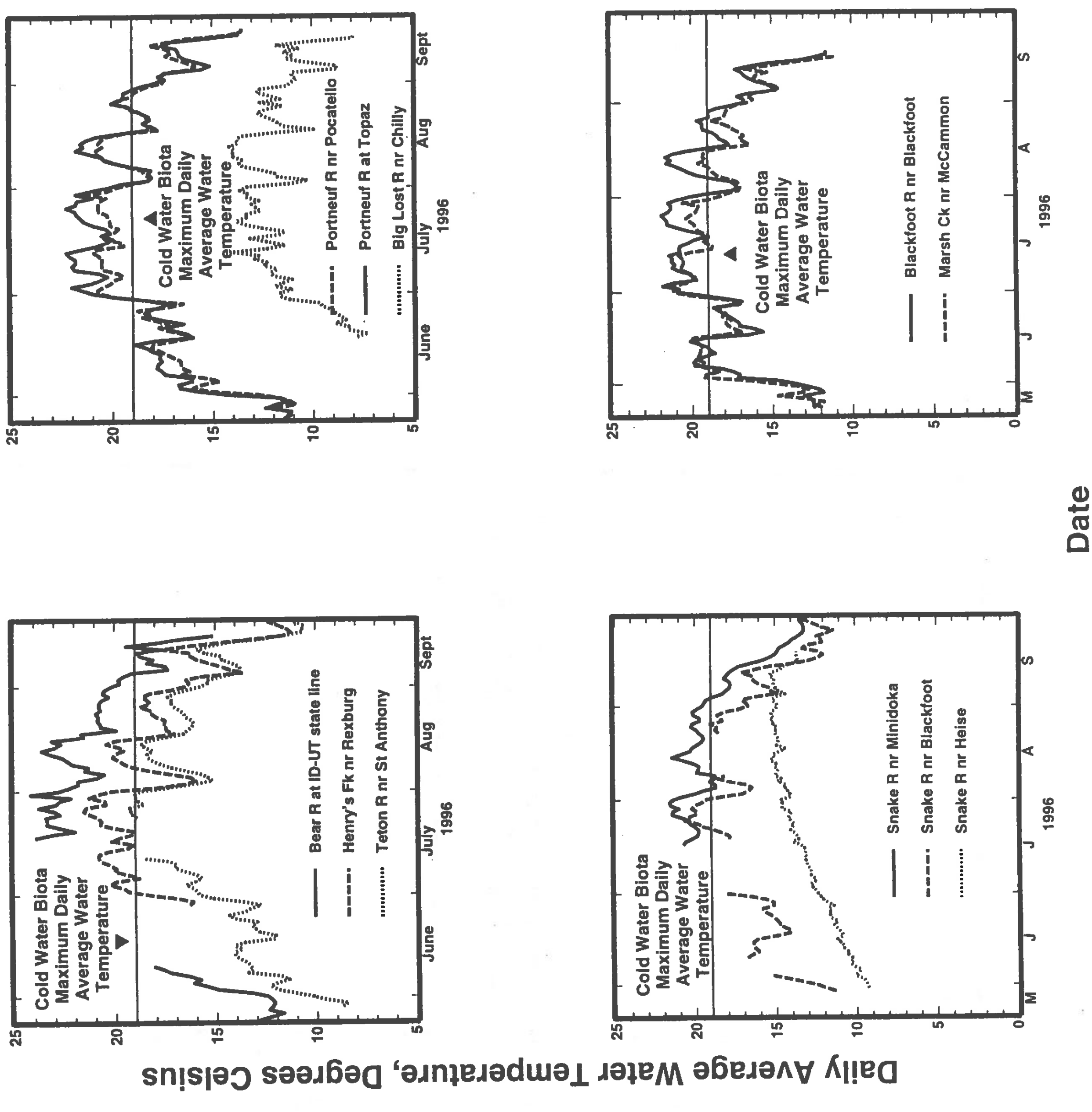

Figure III-9. Daily average water temperature, degrees Celsius (1989-1998).

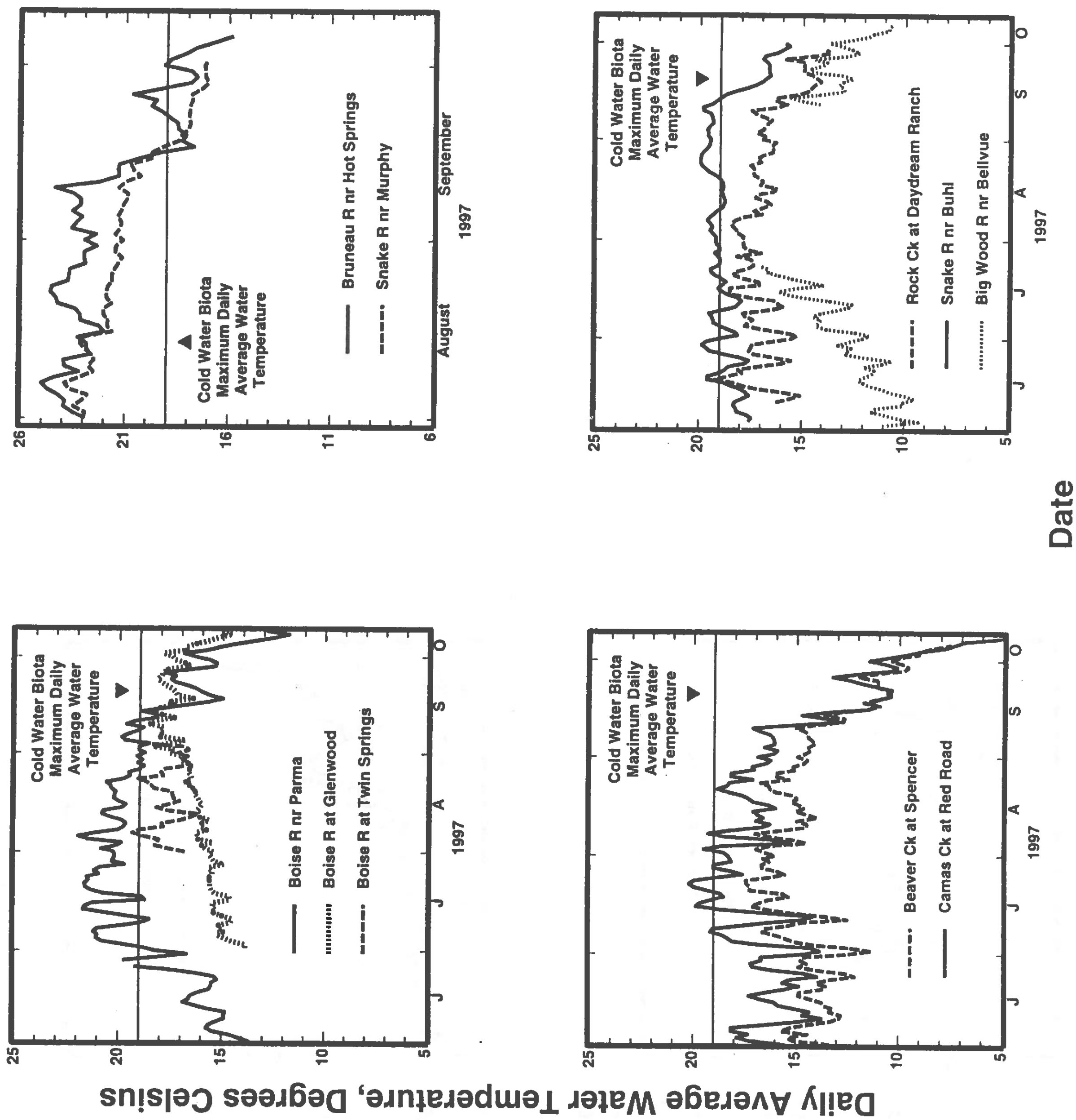

Figure III-10. Daily average water temperature, degrees Celsius (1989-1998).

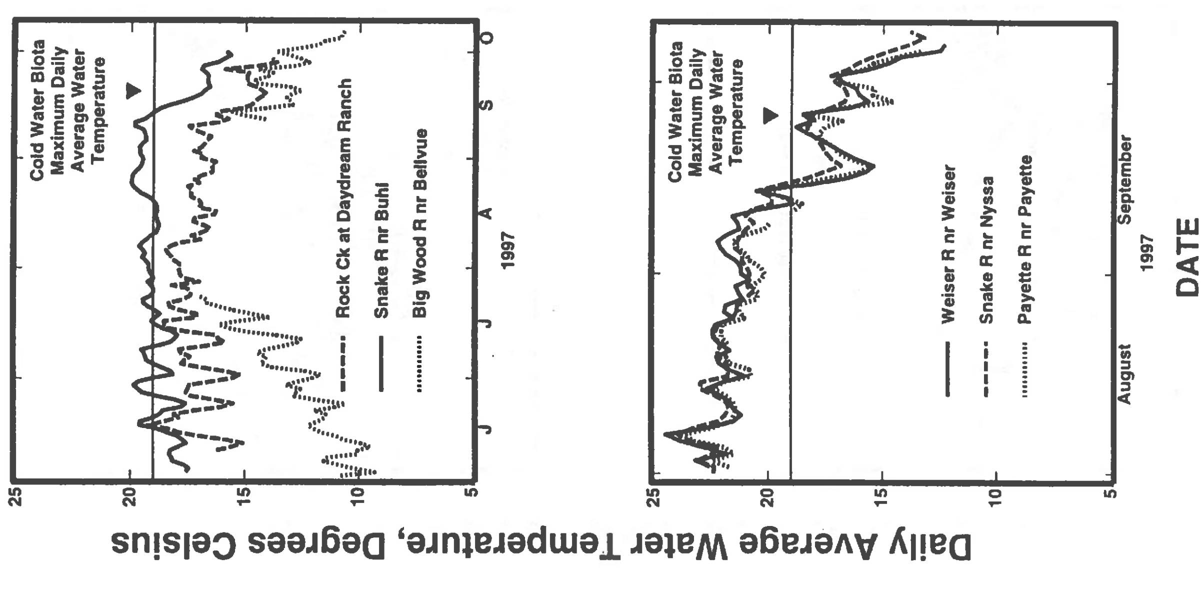

Figure III-11. Daily average water temperature, degrees Celsius (1989-1998).

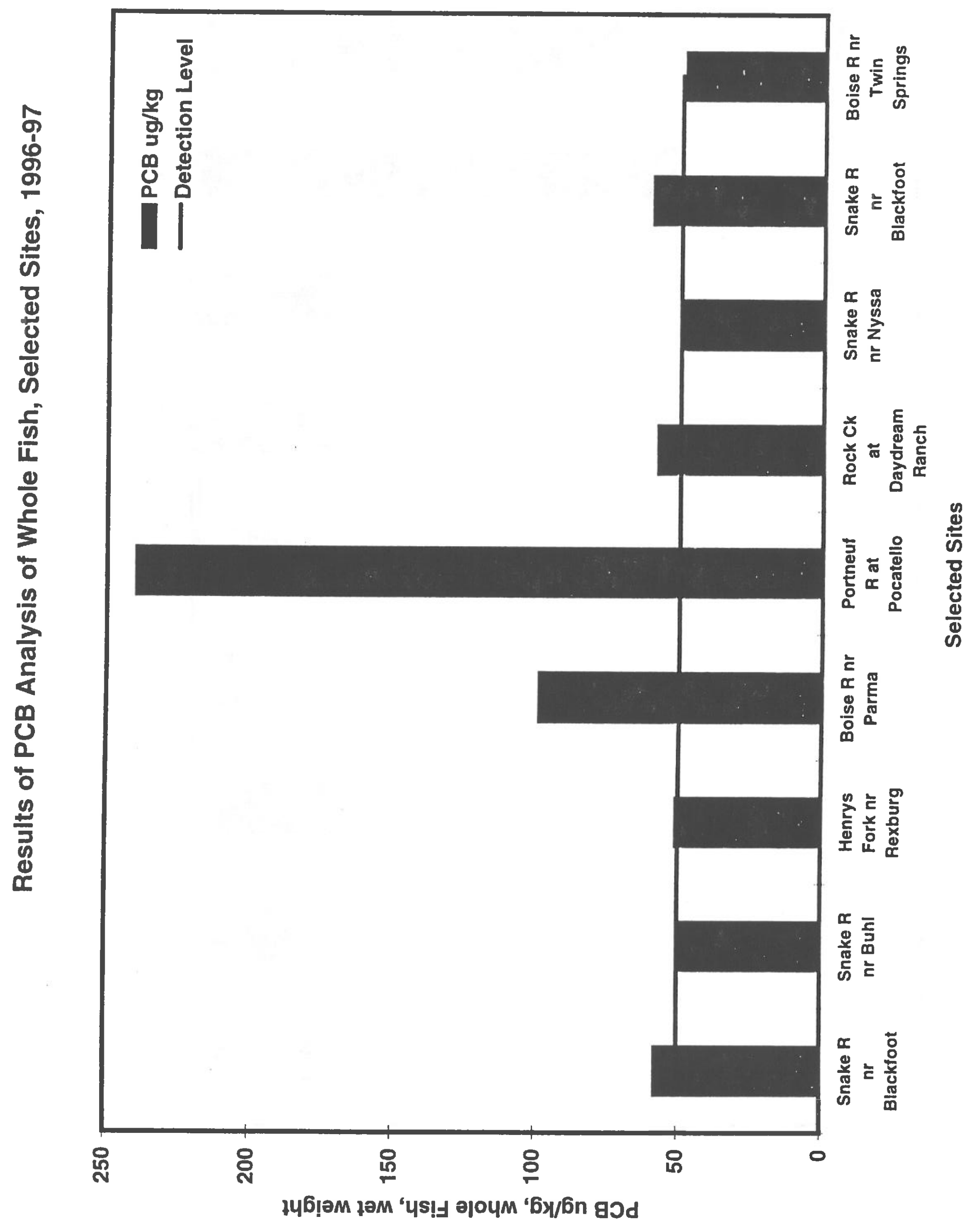

Figure III-12. Ambient surface water results of PCB analysis of whole fish, selected sites (1996-97).

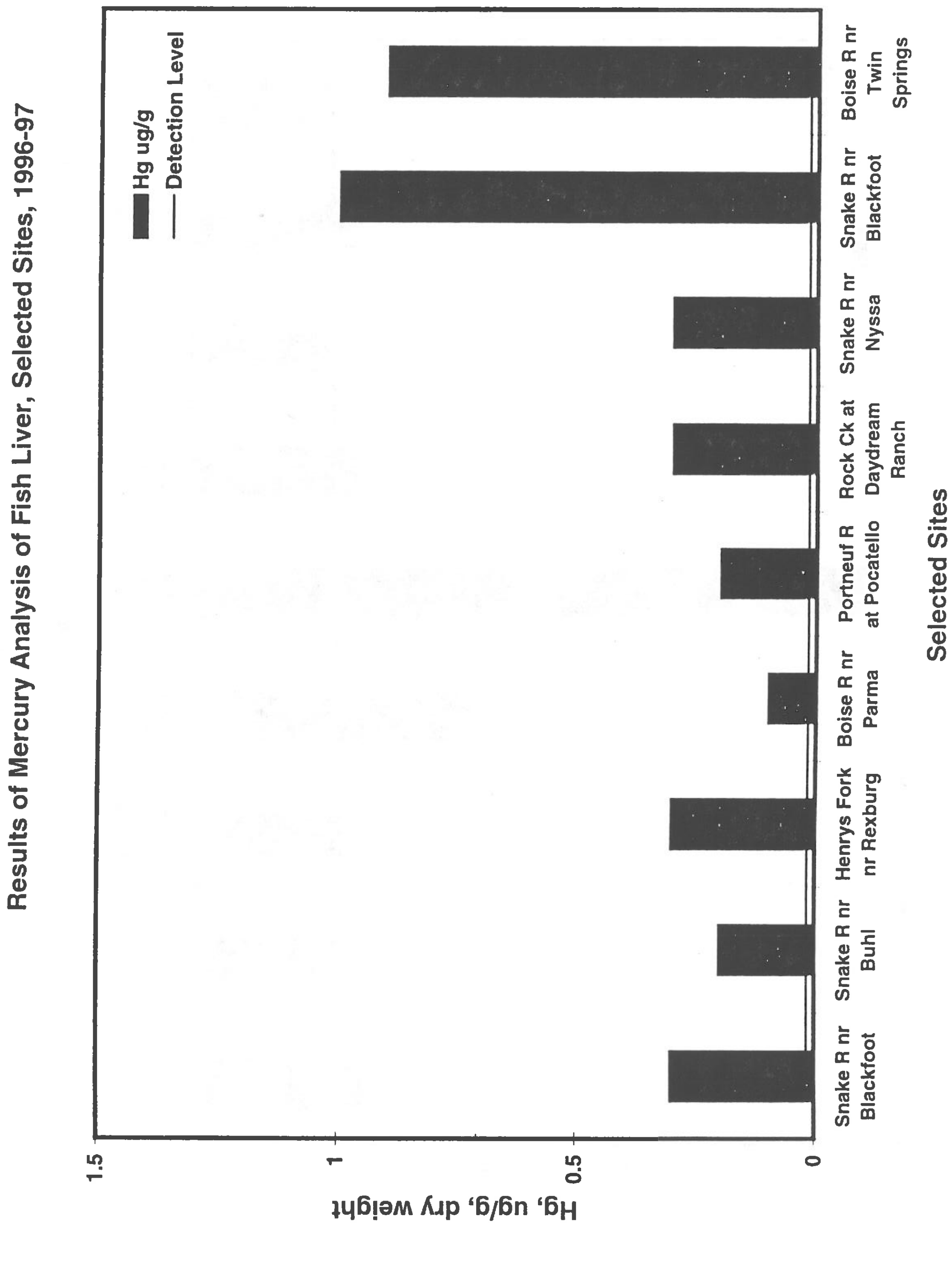

Figure III-13. Ambient surface water result of mercury analysis of fish liver, selected sites (1996-97).

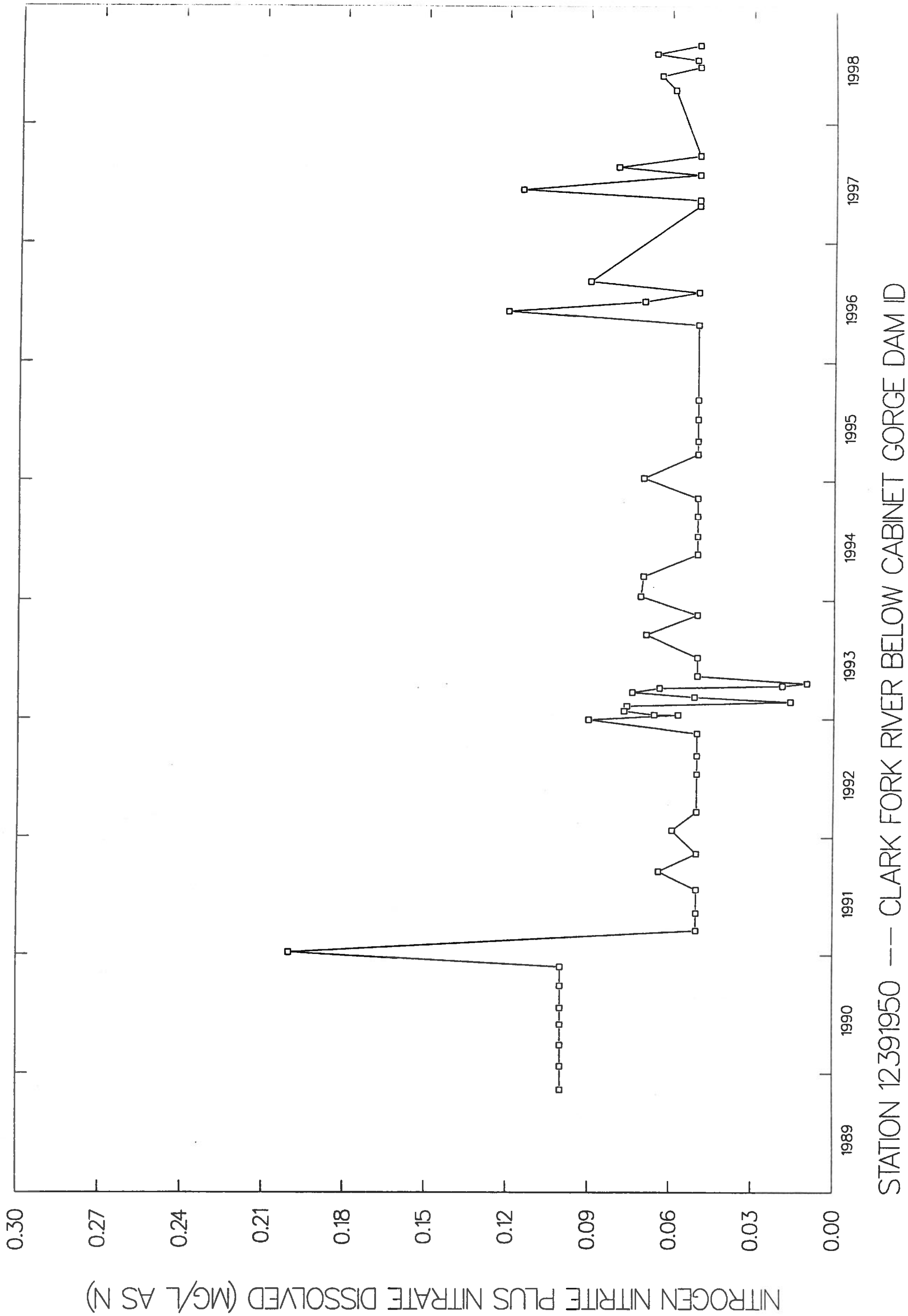

Figure III-14. Ambient Surface Water Nitrogen (nitrite plus nitrate, dissolved) for the Clark Fork River below Cabinet Gorge Dam (1989-1998).

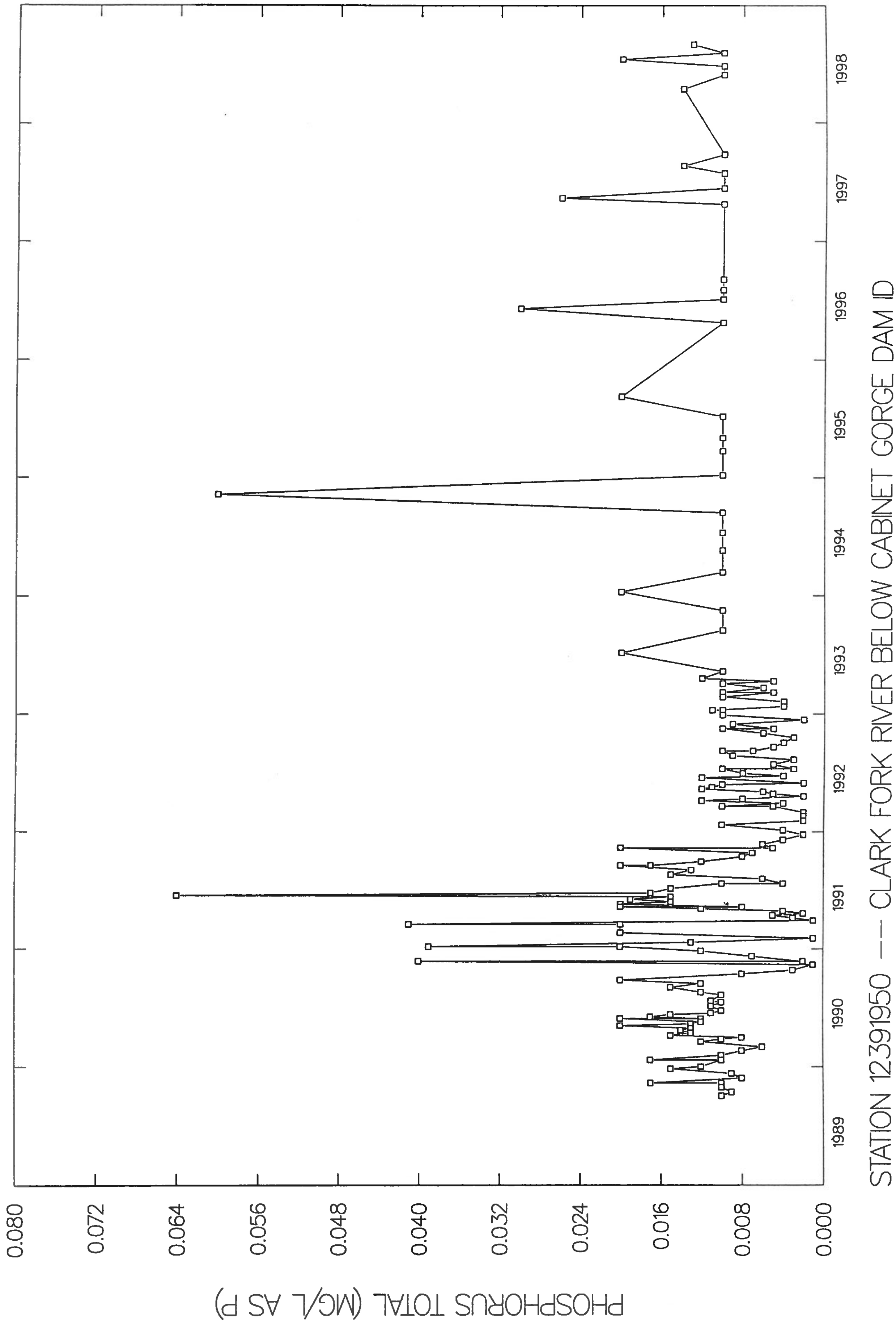

Figure III-15. Ambient surface water phosphorus (total) concentration for the Clark Fork River Below Cabinet Gorge Dam (1989-1998)

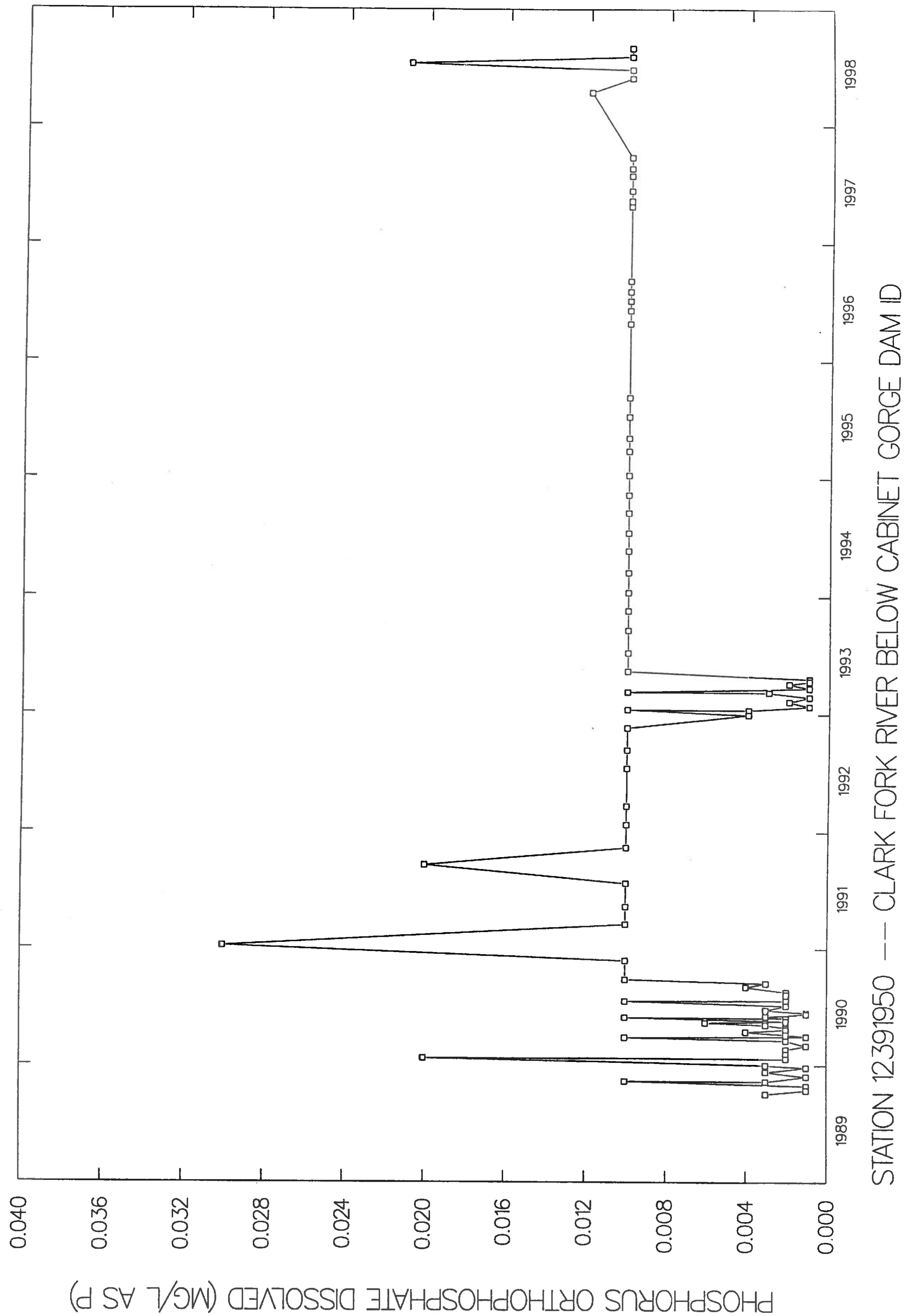

Figure III-16. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Clark Fork River below Cabinet Gorge Dam (1989-1998).

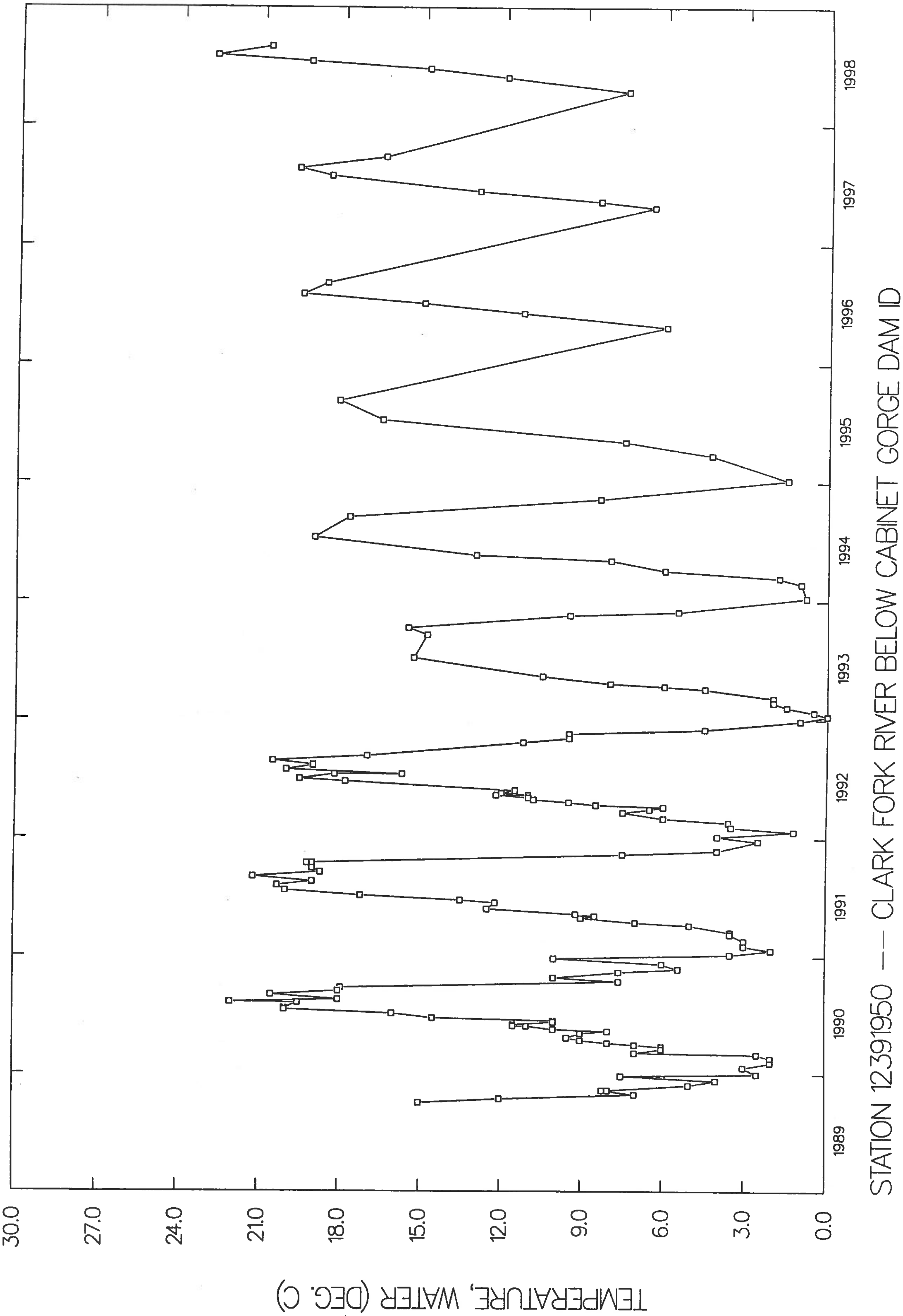

Figure III-17. **Ambient surface water temperature for the Clark Fork River below Cabinet Gorge Dam (1989-1998).**

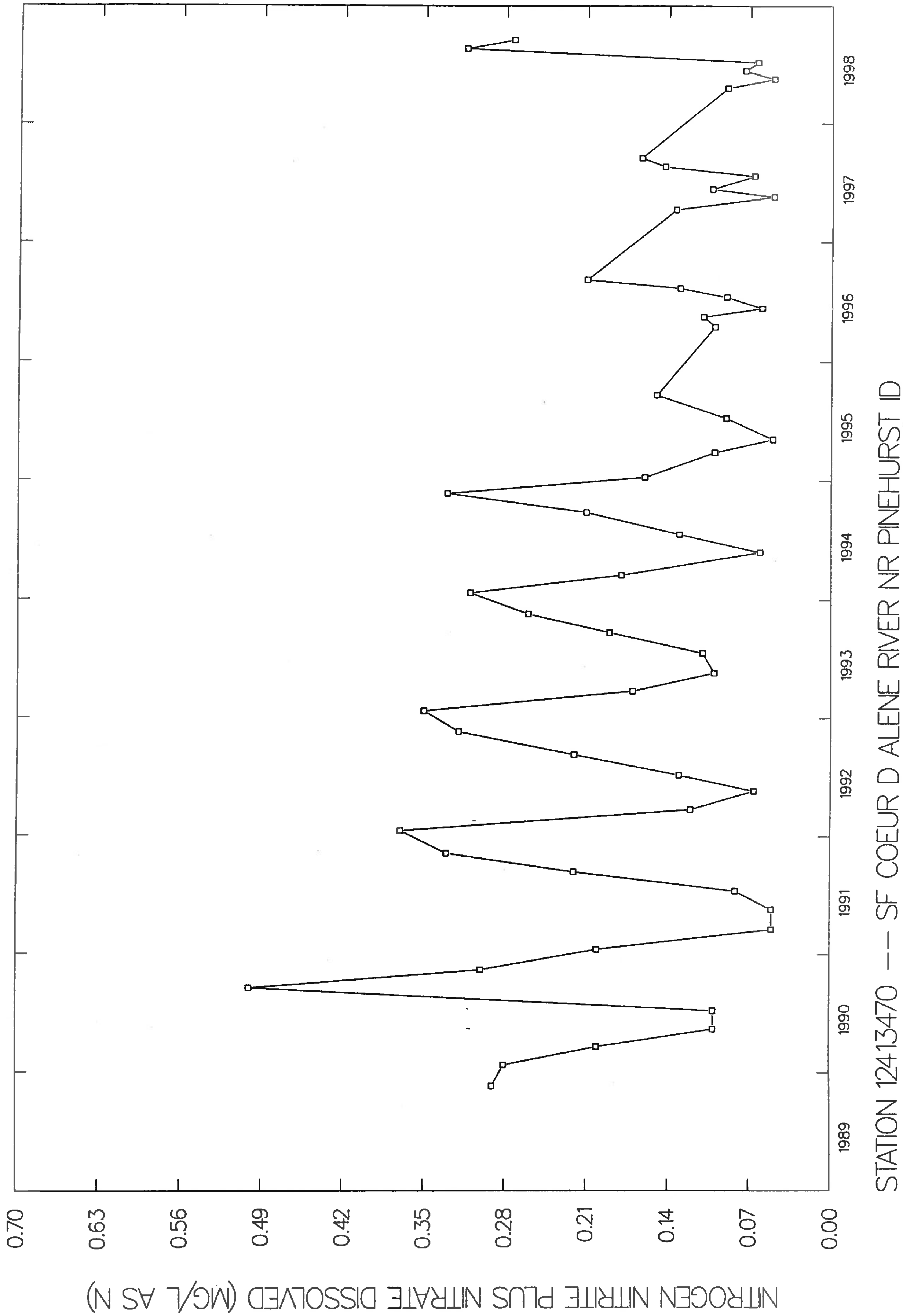

Figure III-18. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the SF Coeur d'Alene River near Pinehurst (1989-1998).

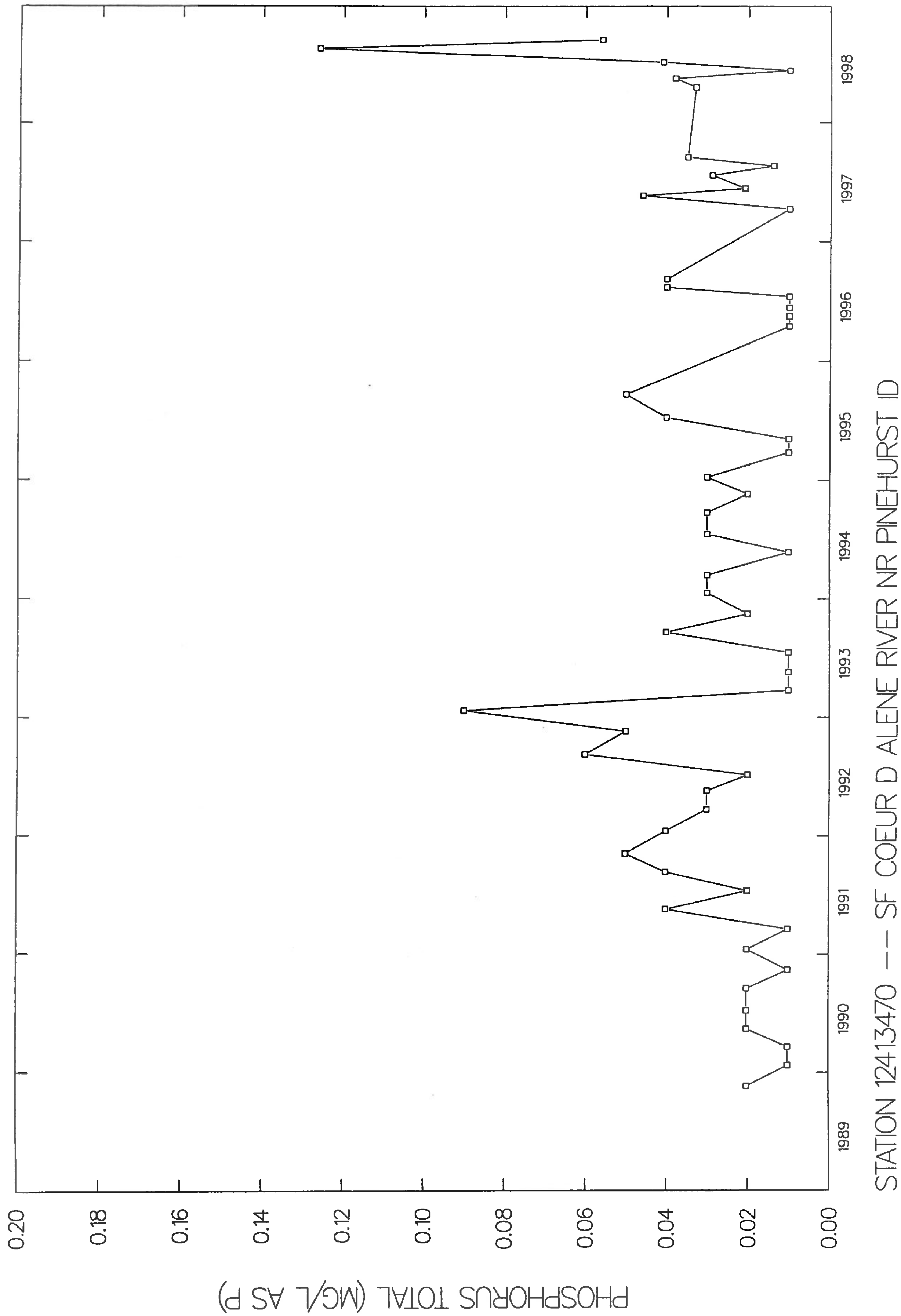

Figure III-19. Ambient surface water phosphorus (total) concentration for the SF Coeur d'Alene River near Pinehurst (1989-1998).

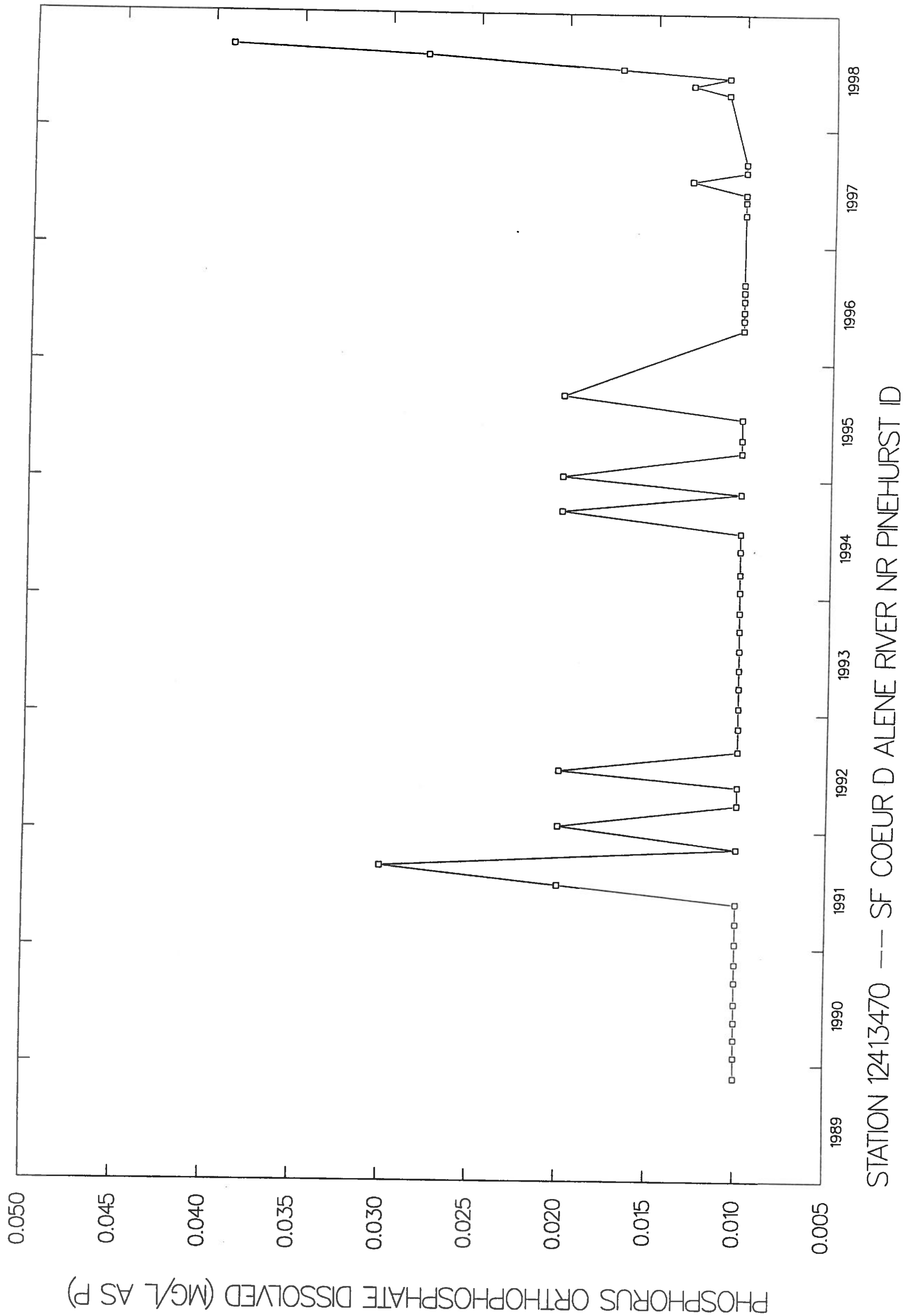

Figure III-20. **Ambient surface water phosphorus (orthophosphate dissolved) concentration for the SF Coeur d'Alene River near Pinehurst (1989-1998).**

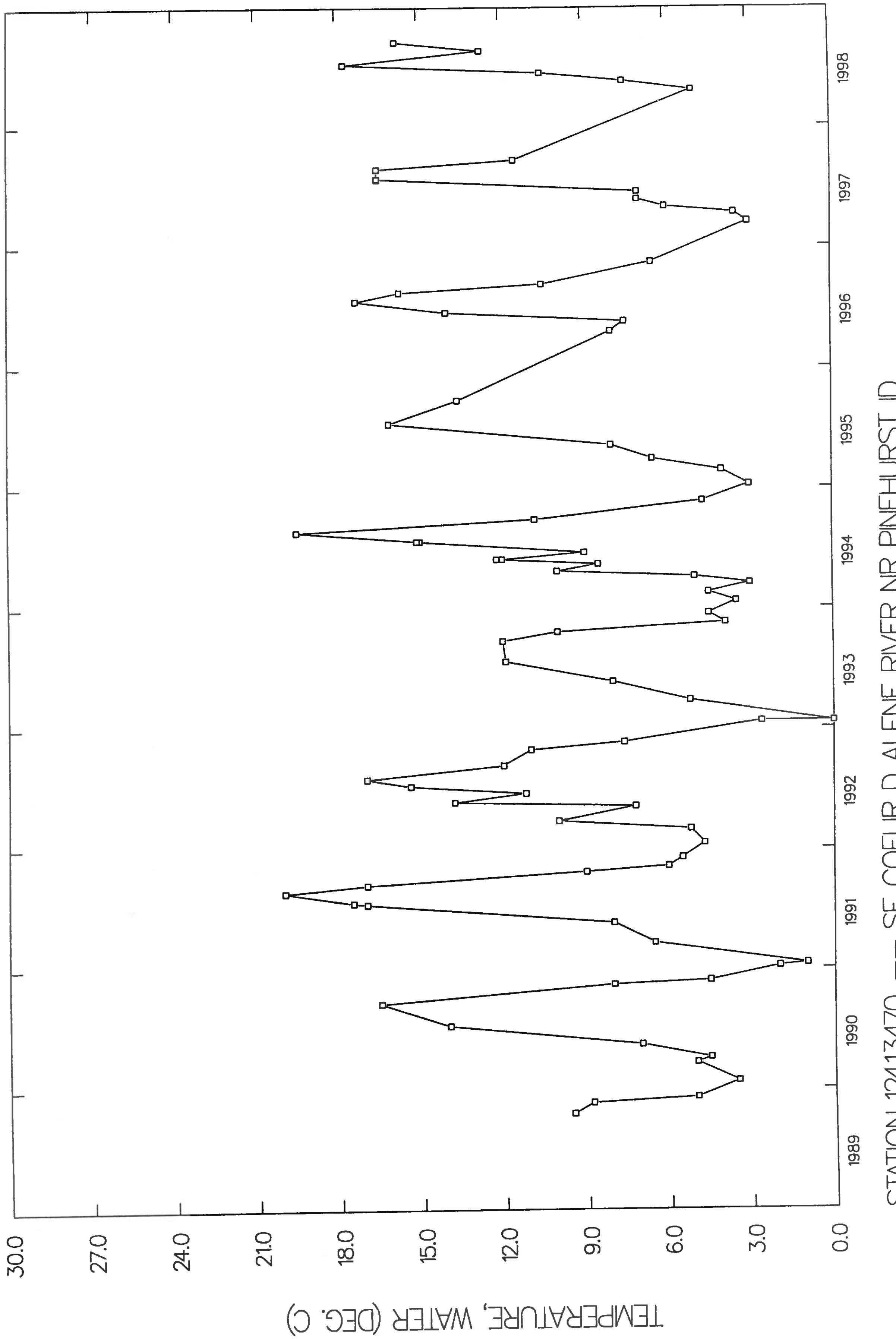

Figure III-21. Ambient surface water temperature for the SF Coeur d'Alene River near Pinehurst (1989-1998).

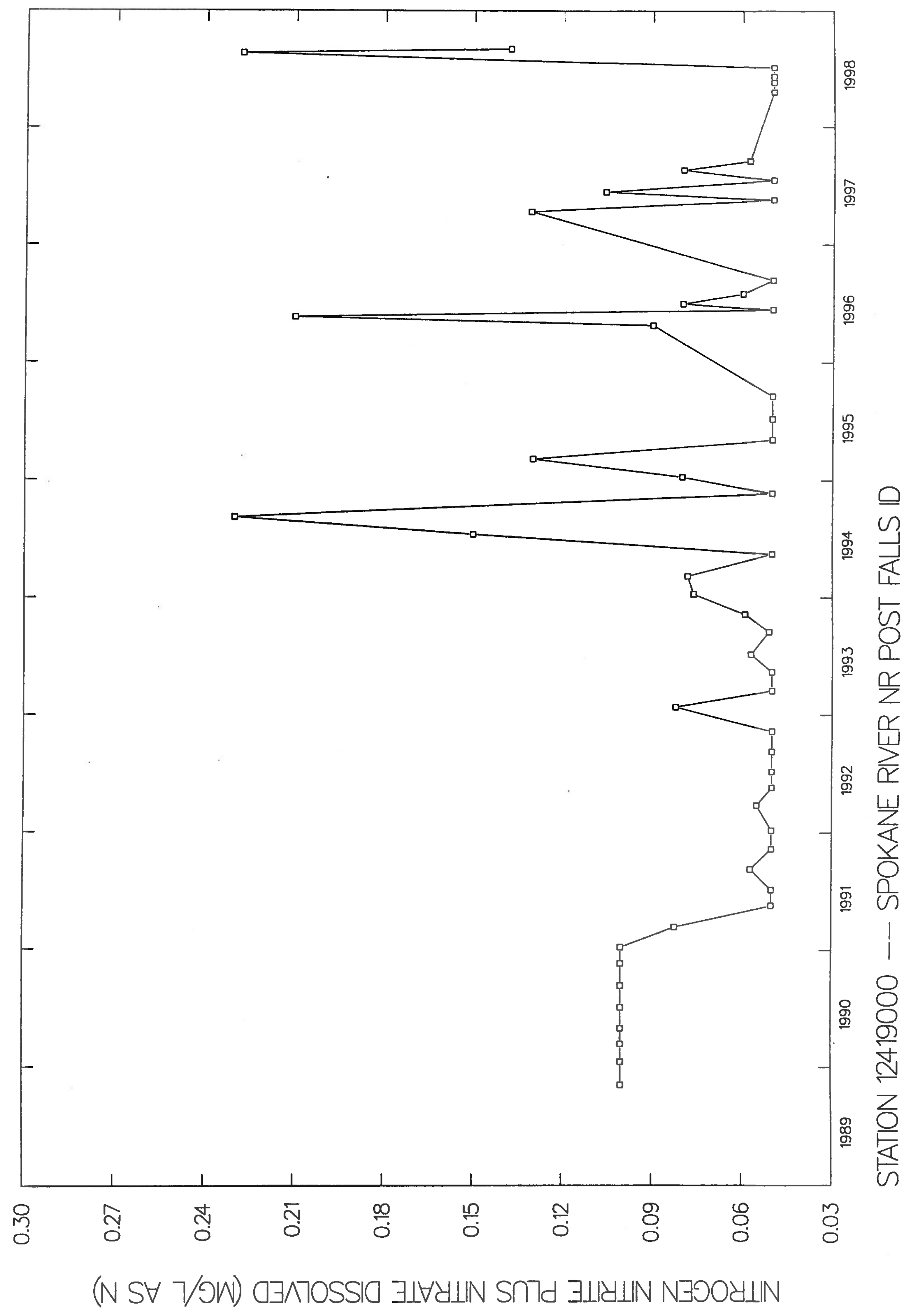

Figure III-22. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Spokane River near Post Falls (1989-1998).

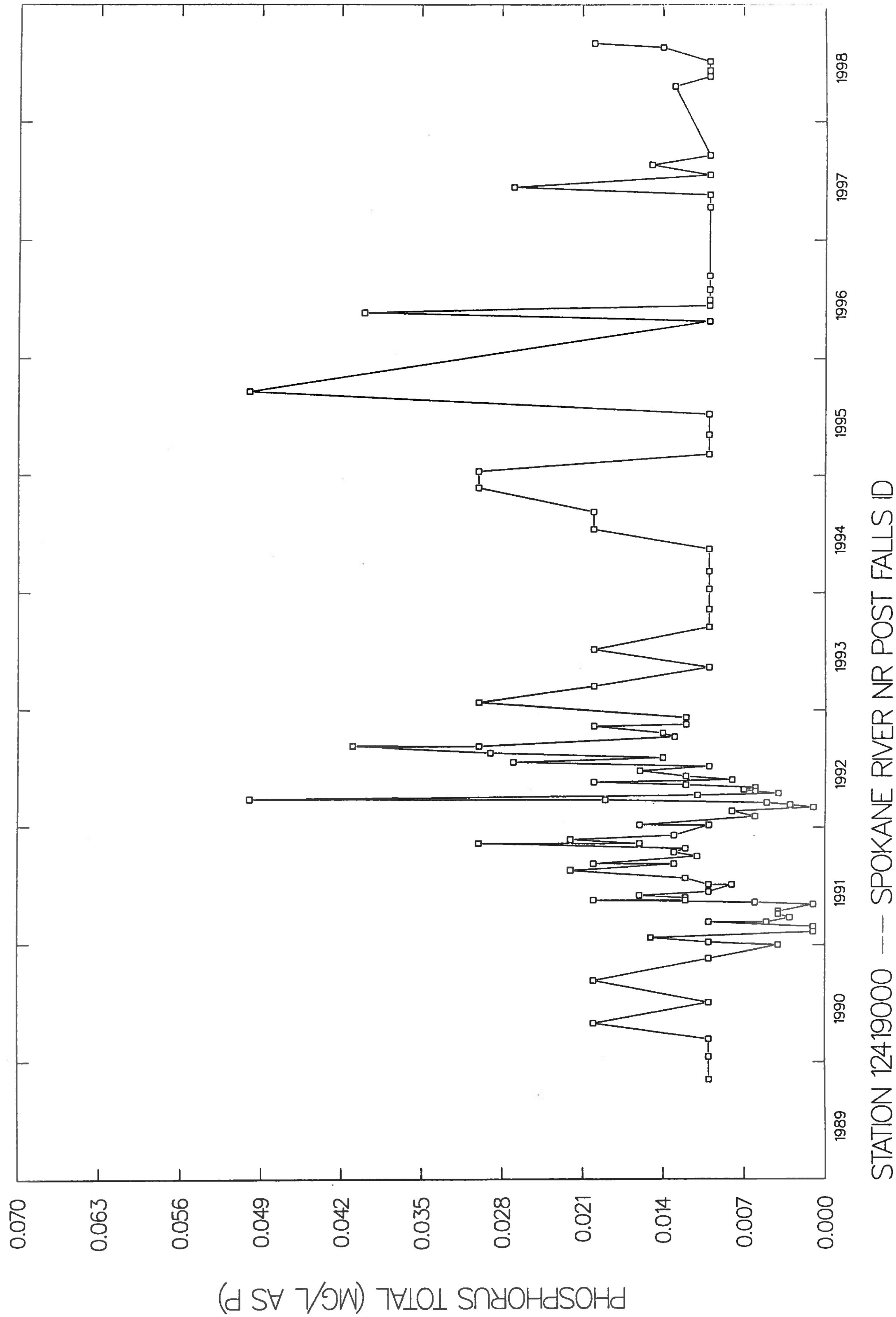

Figure III-23. Ambient surface water phosphorus (total) concentration for the Spokane River near Post Falls (1989-1998).

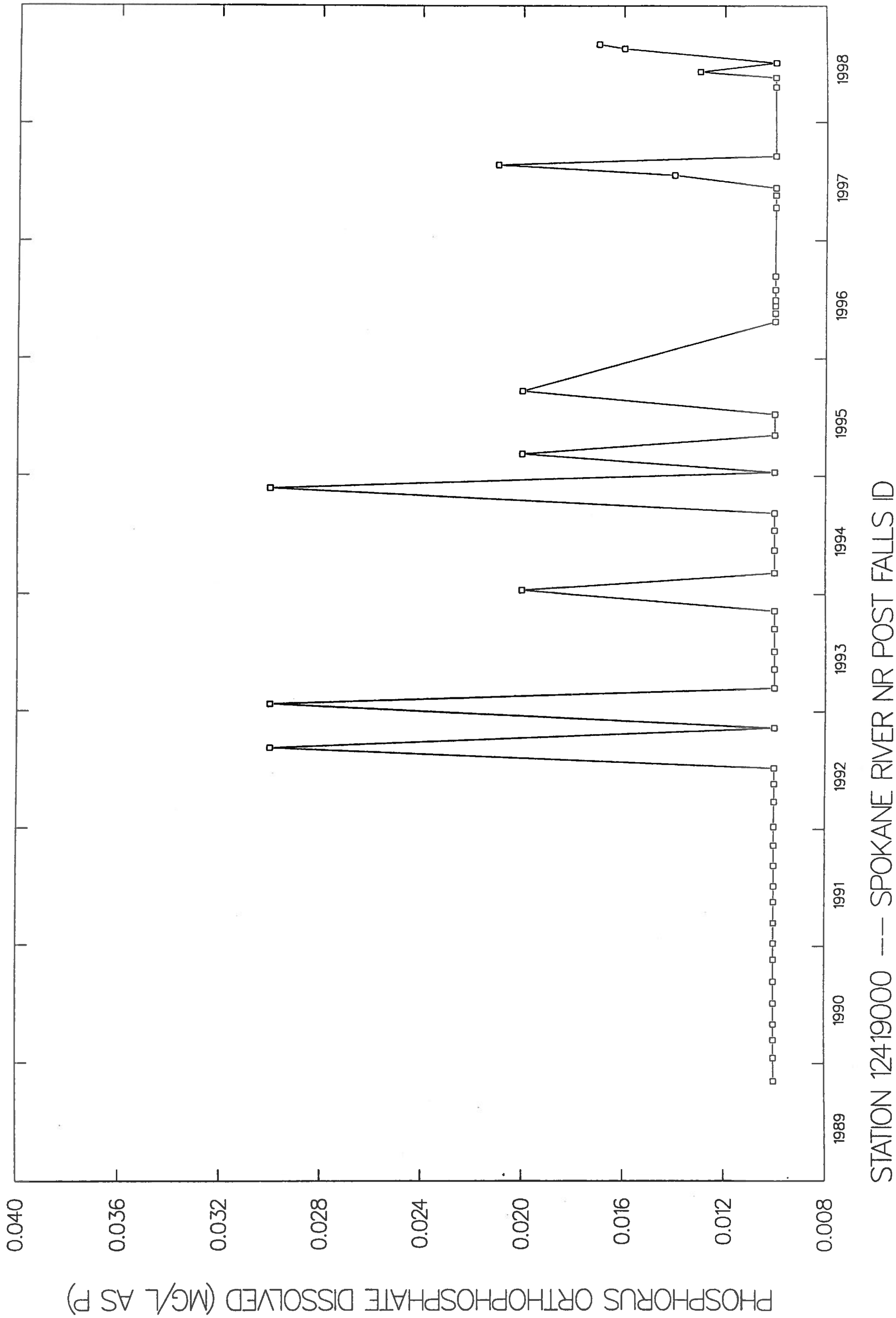

Figure III-24. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Spokane River near Post Falls (1989-1998).

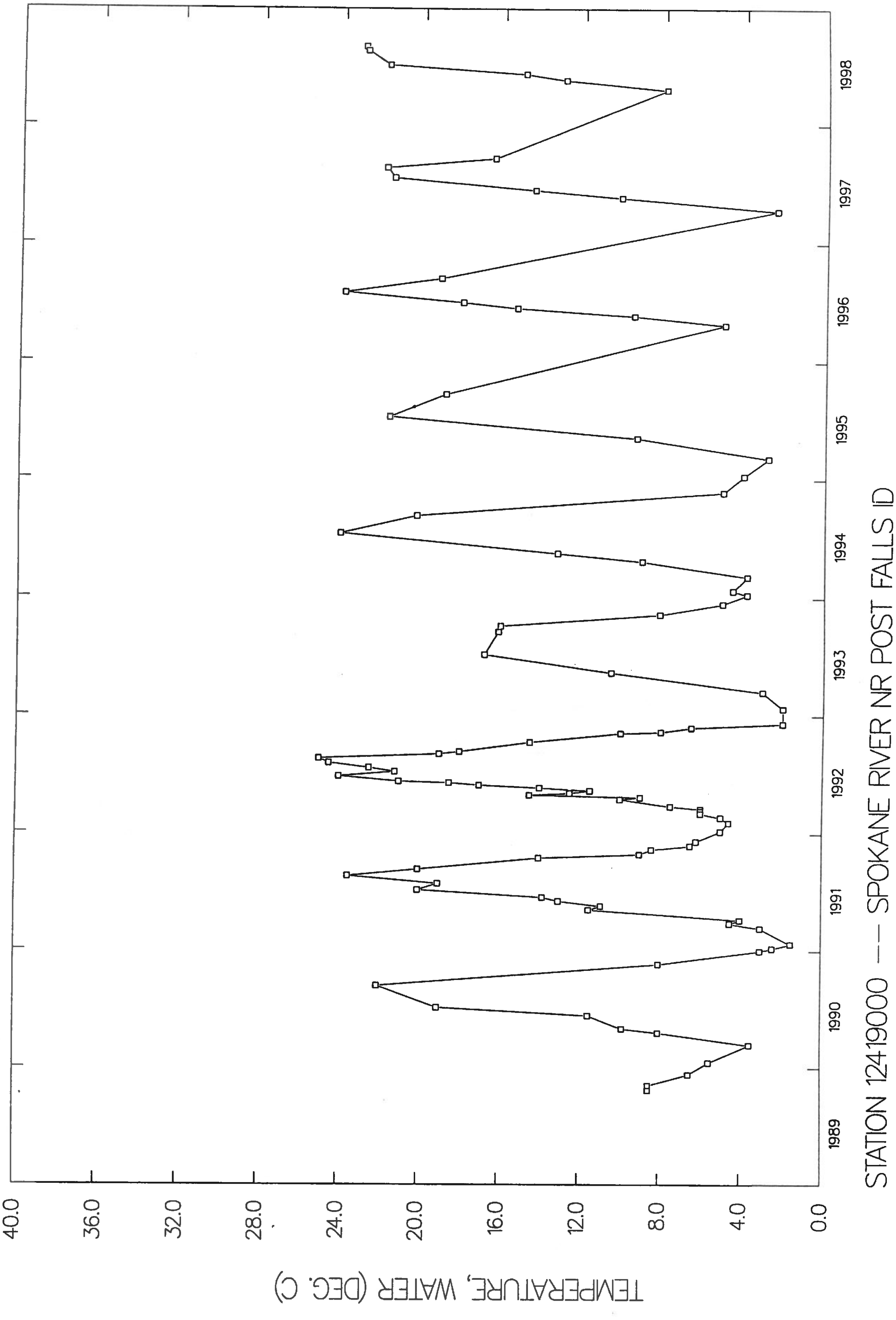

Figure III-25. Ambient surface water temperature for the Spokane River near Post Falls (1989-1998).

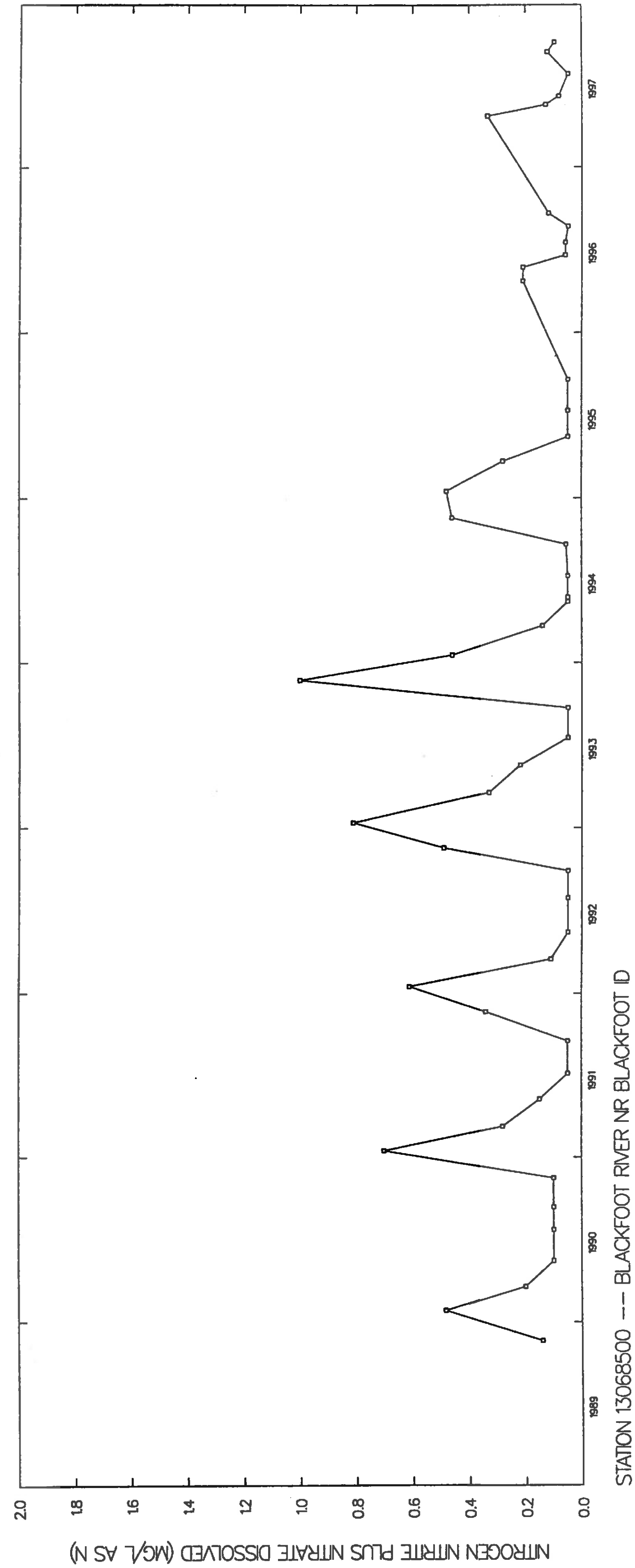

Figure III-26. **Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Blackfoot River near Blackfoot (1989-1998).**

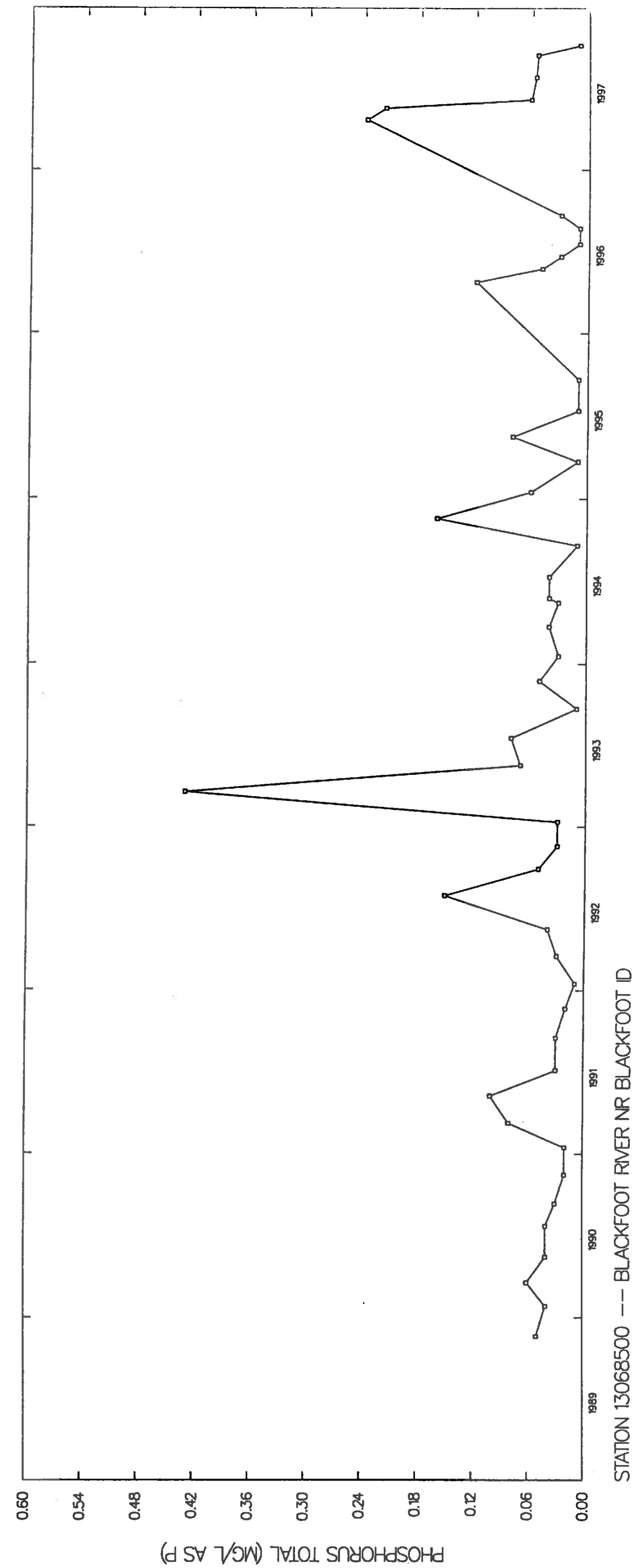

Figure III-27. Ambient surface water phosphorus (total) concentration for the Blackfoot River near Blackfoot (1989-1998).

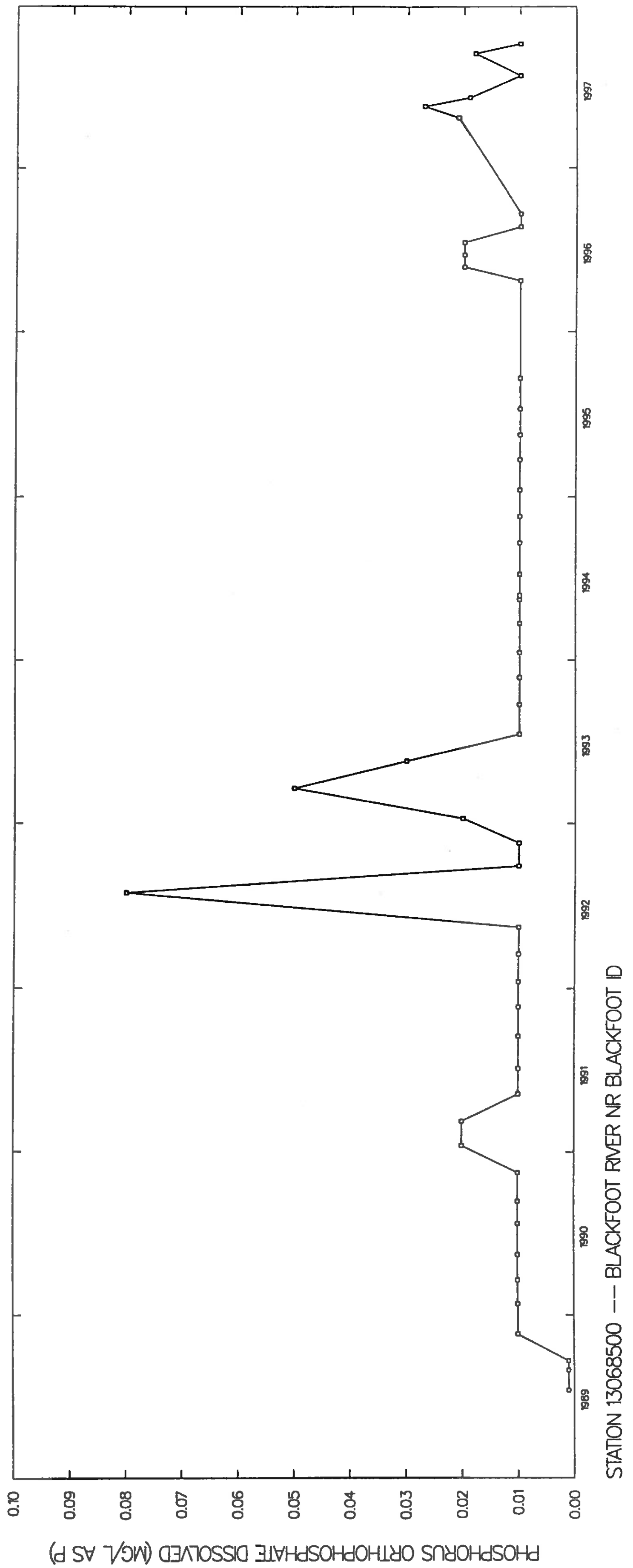

Figure III-28. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Blackfoot River near Blackfoot (1989-1998).

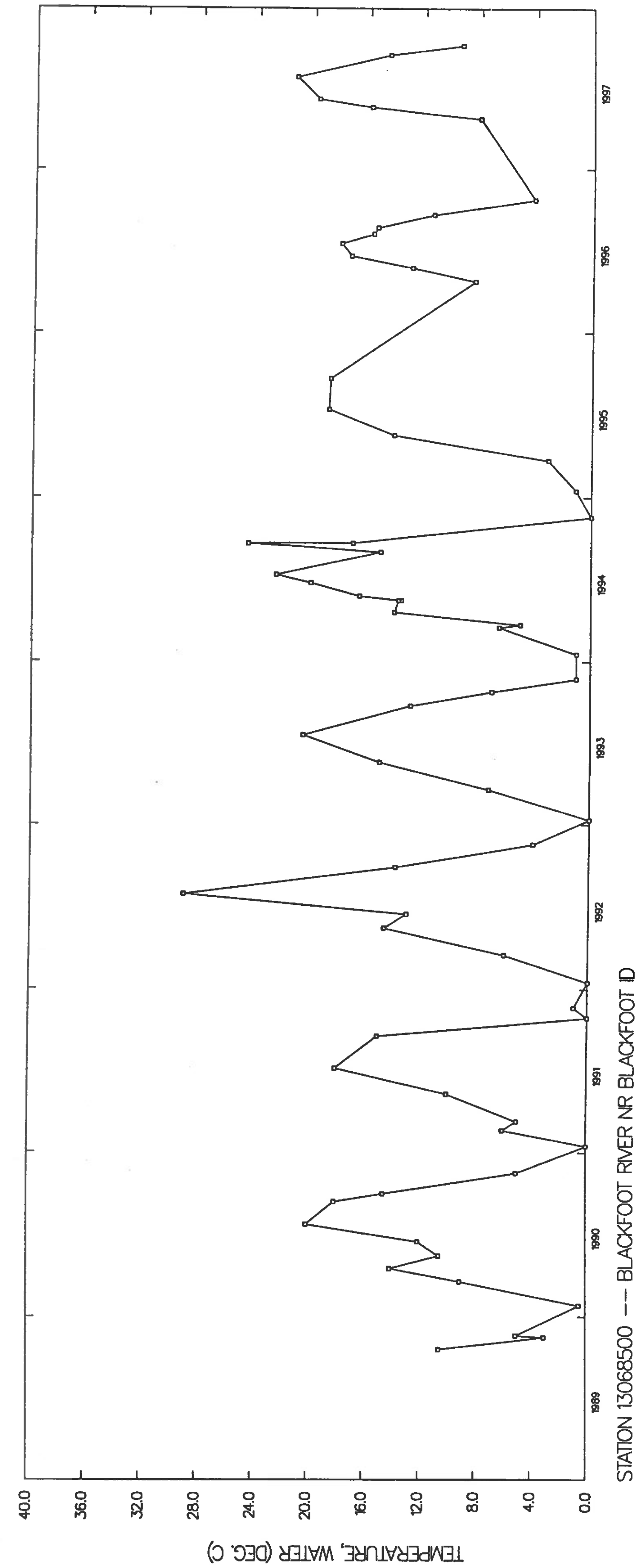

Figure III-29. Ambient surface water temperature for the Blackfoot River near Blackfoot (1989-1998).

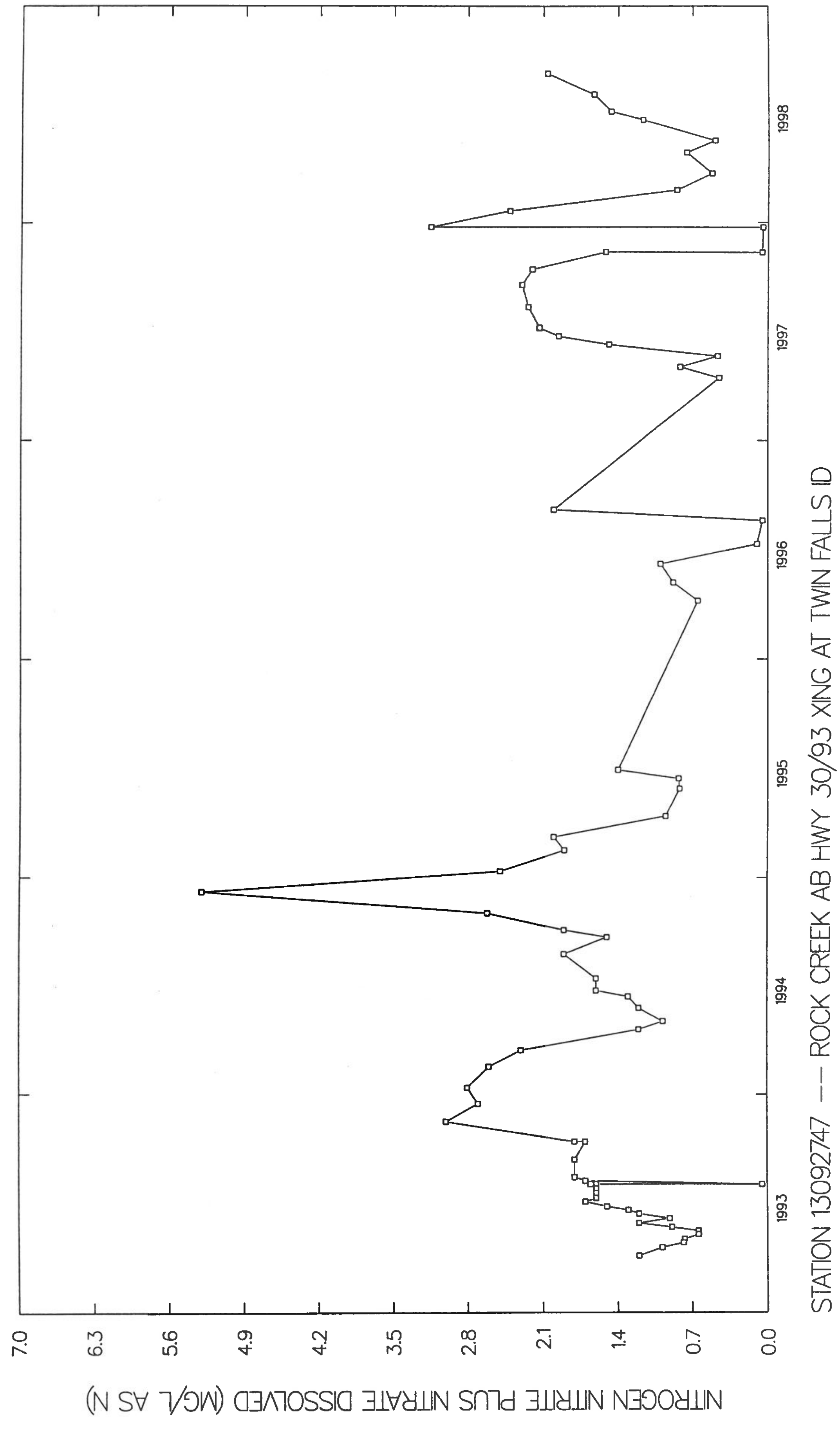

Figure III-30. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Rock Creek above Hwy 30/93 xing at Twin Falls (1989-1998).

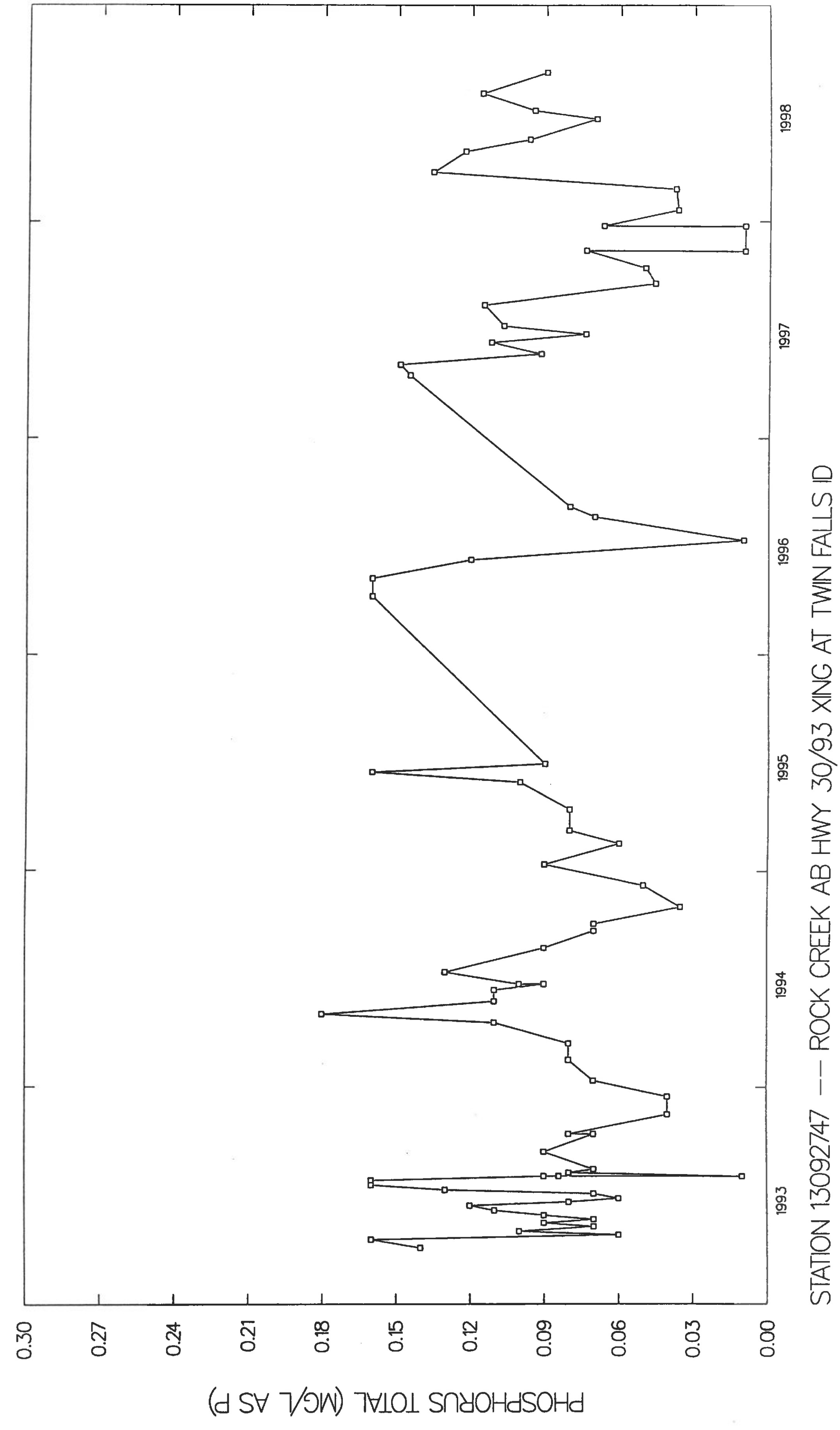

Figure III-31. Ambient surface water phosphorus (total) concentration for the Rock Creek above Hwy 30/93 xing at Twin Falls(1989-1998).

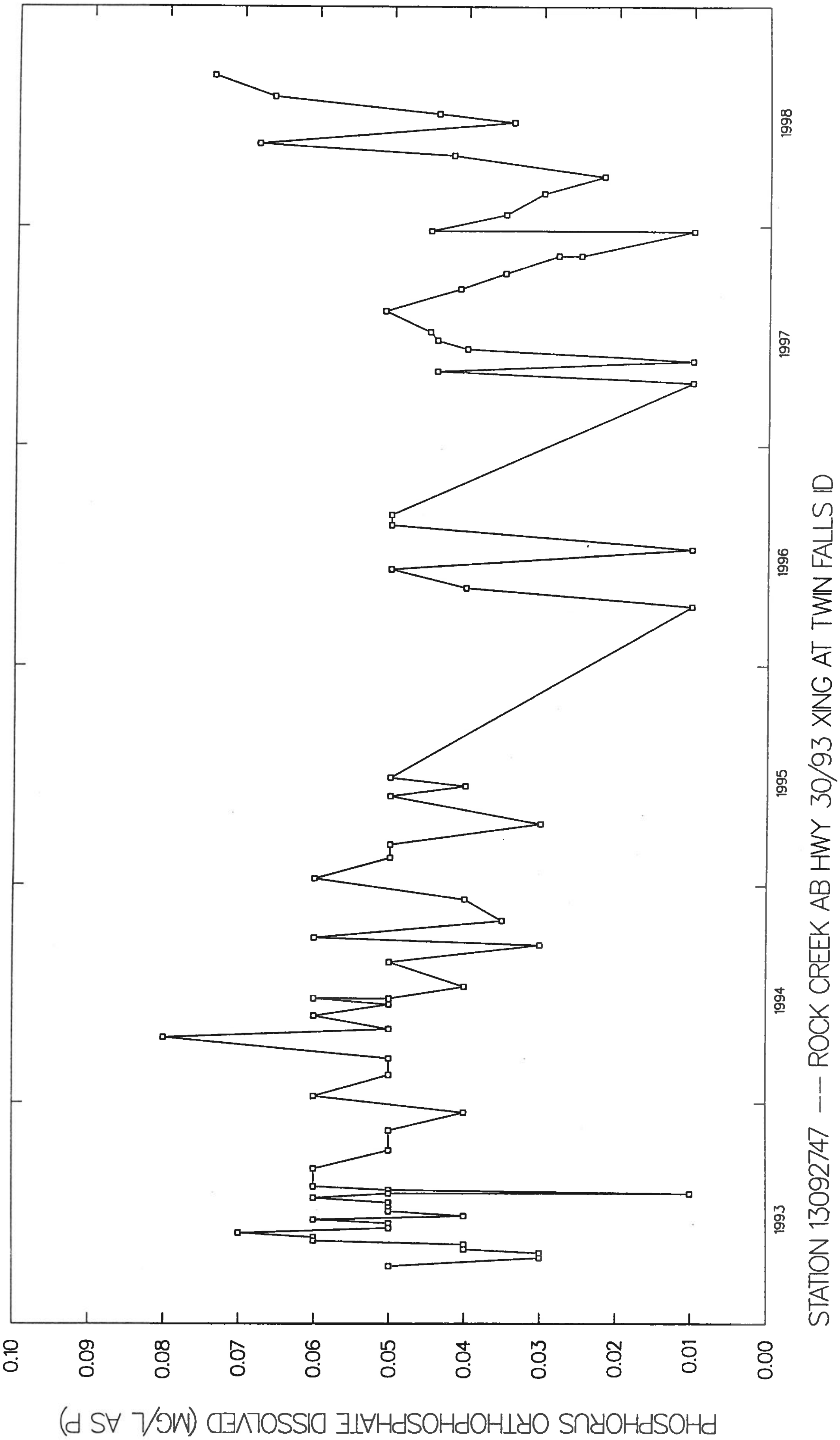

Figure III-32. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Rock Creek above Hwy 30/93 xing at Twin Falls (1989-1998).

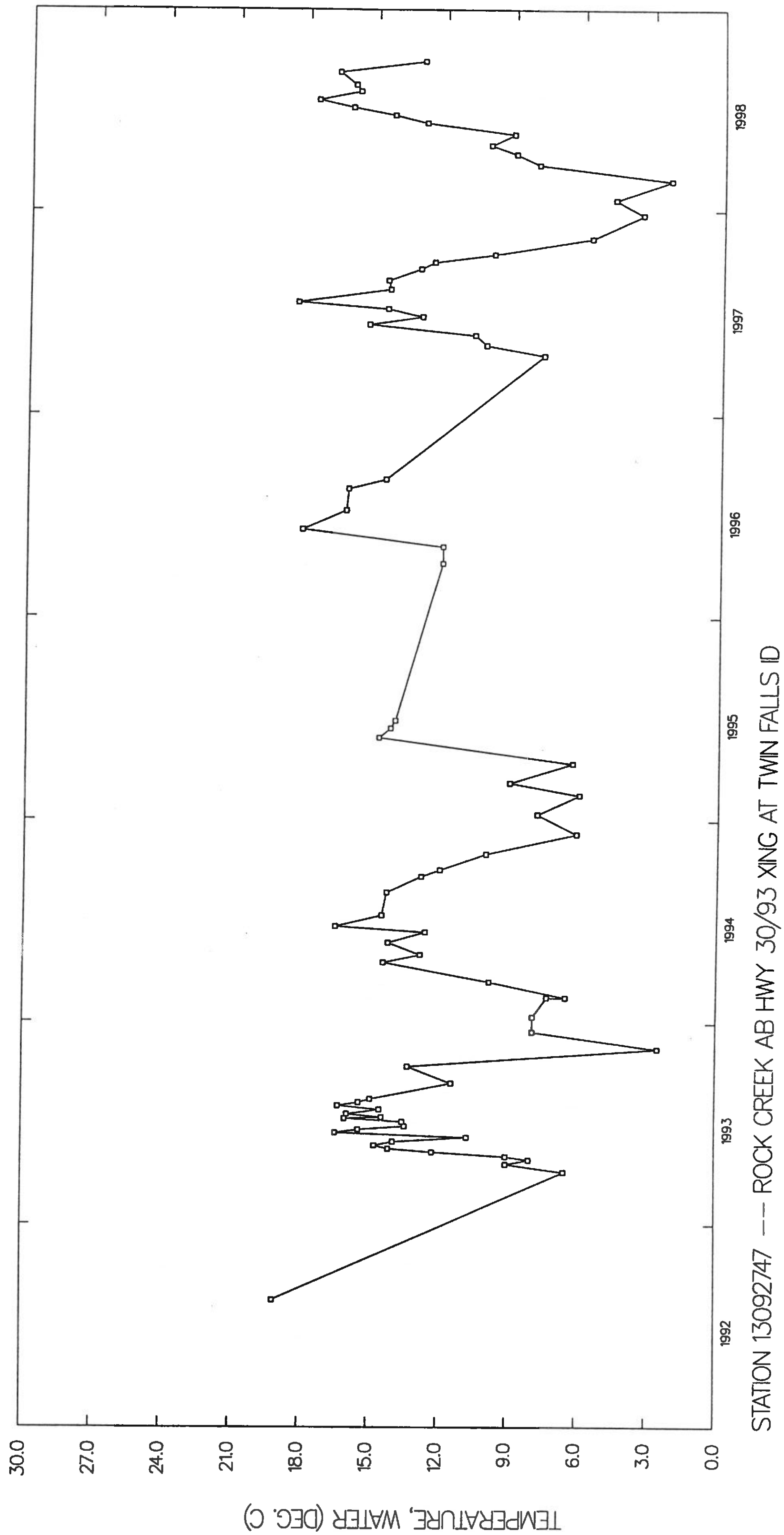

Figure III-33. Ambient surface water temperature for the Rock Creek above Hwy 30/93 xing at Twin Falls (1989-1998).

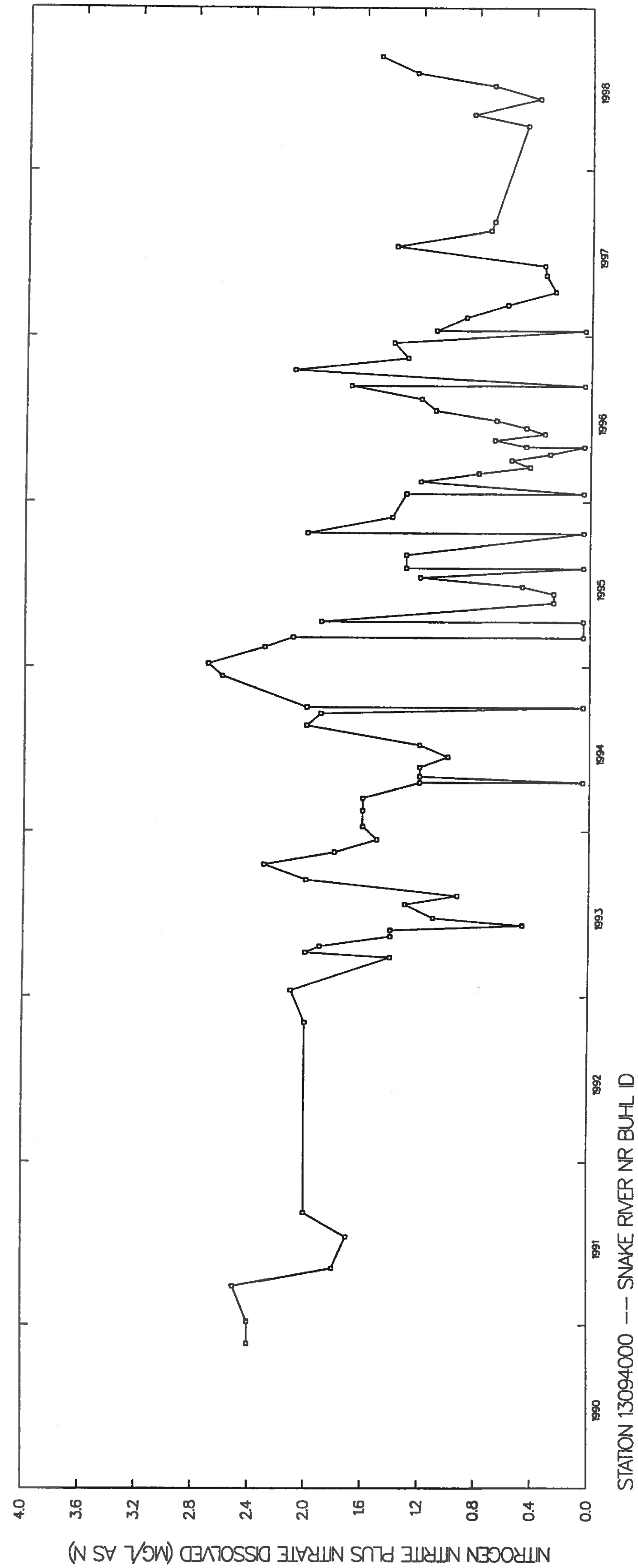

Figure III-34. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Snake River near Buhl (1989-1998).

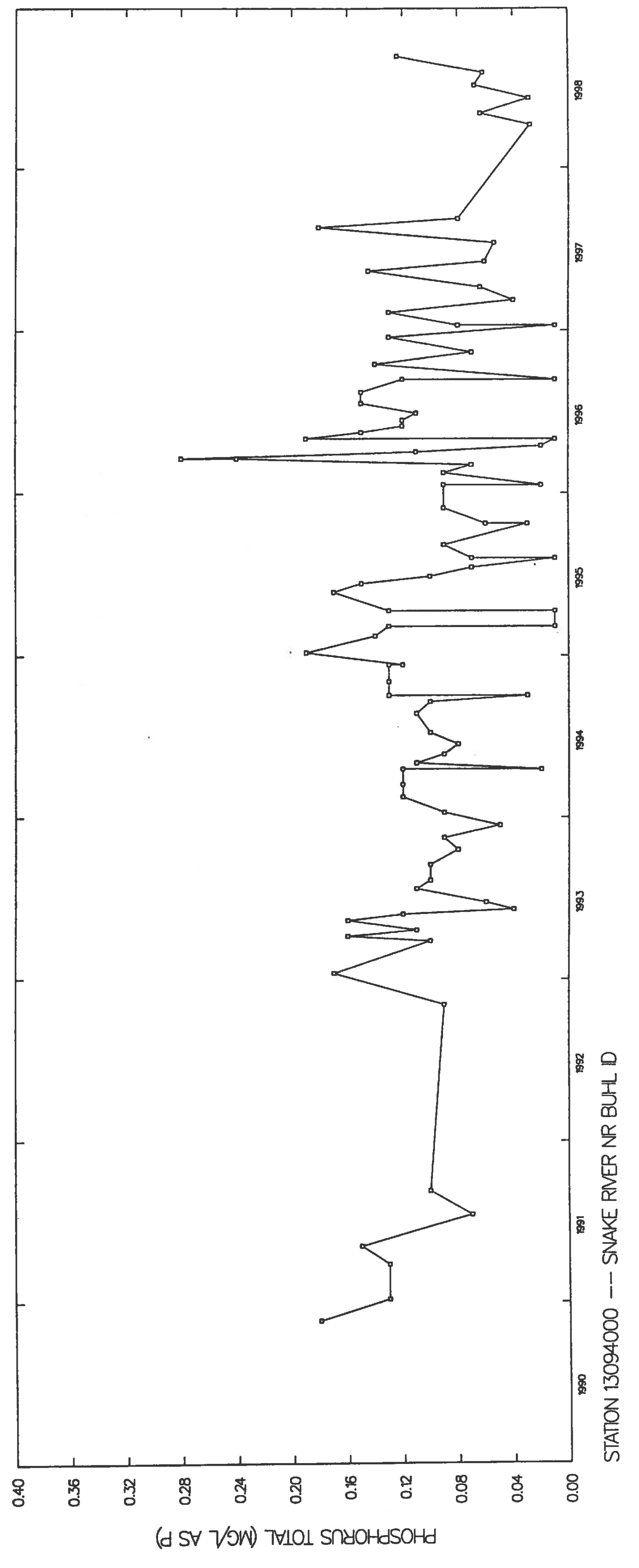

Figure III-35. Ambient surface water phosphorus (total) concentration for the Snake River near Buhl (1989-1998).

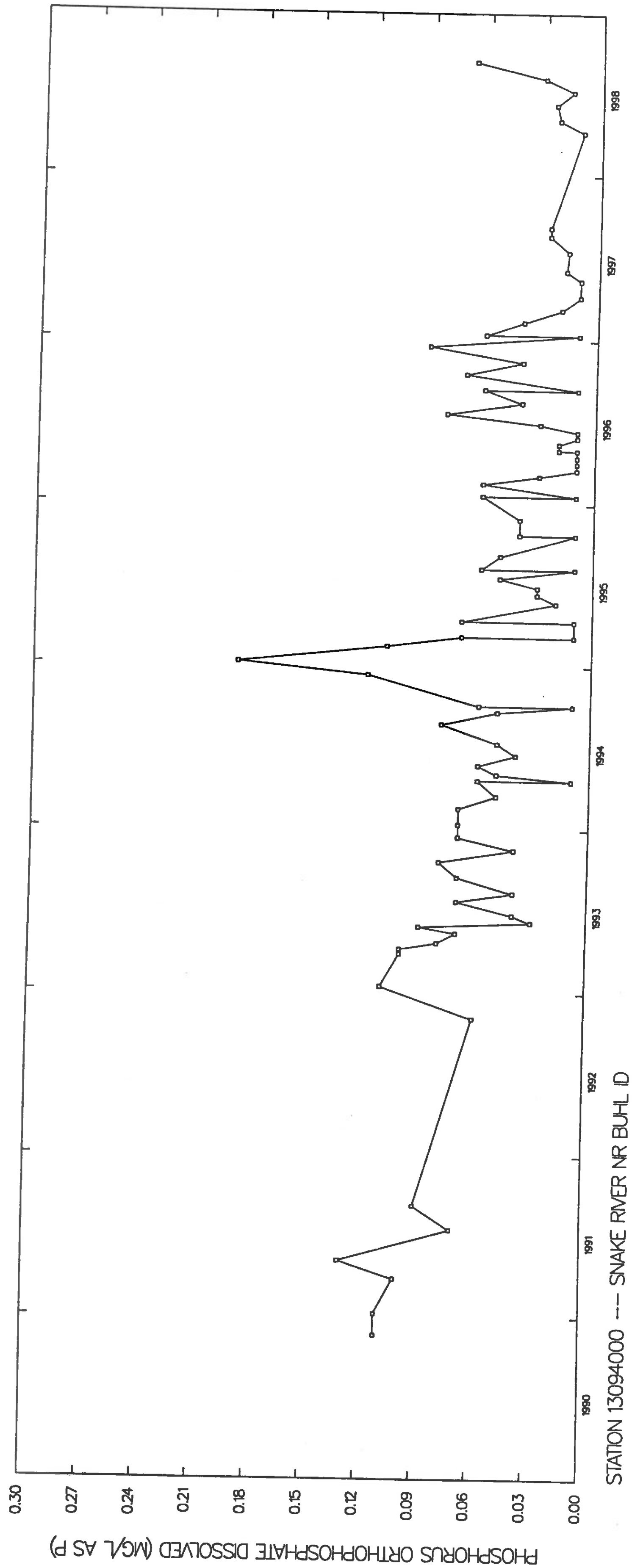

Figure III-36. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Snake River near Buhl (1989-1998).

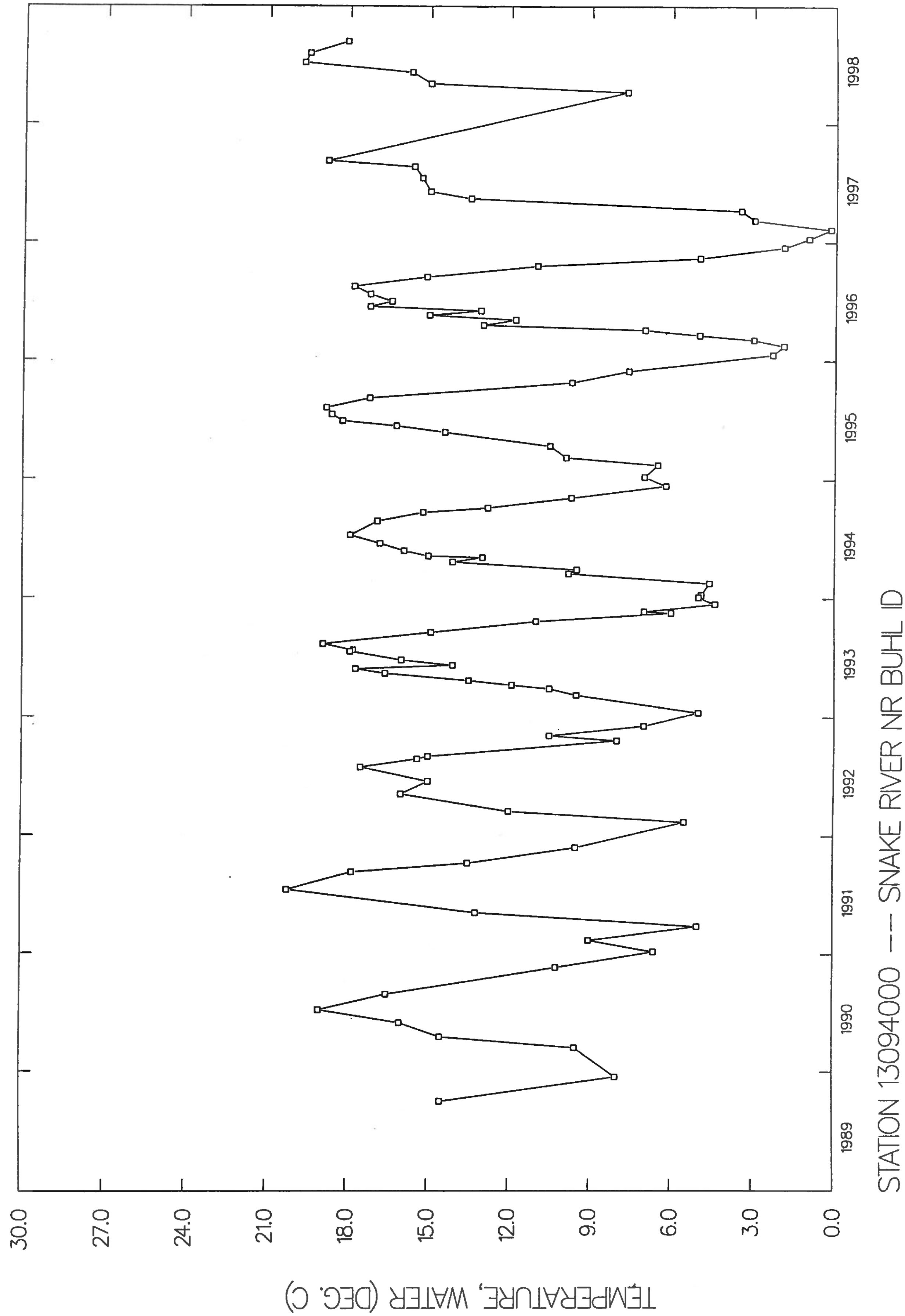

Figure III-37. Ambient surface water temperature for the Snake River near Buhl (1989-1998).

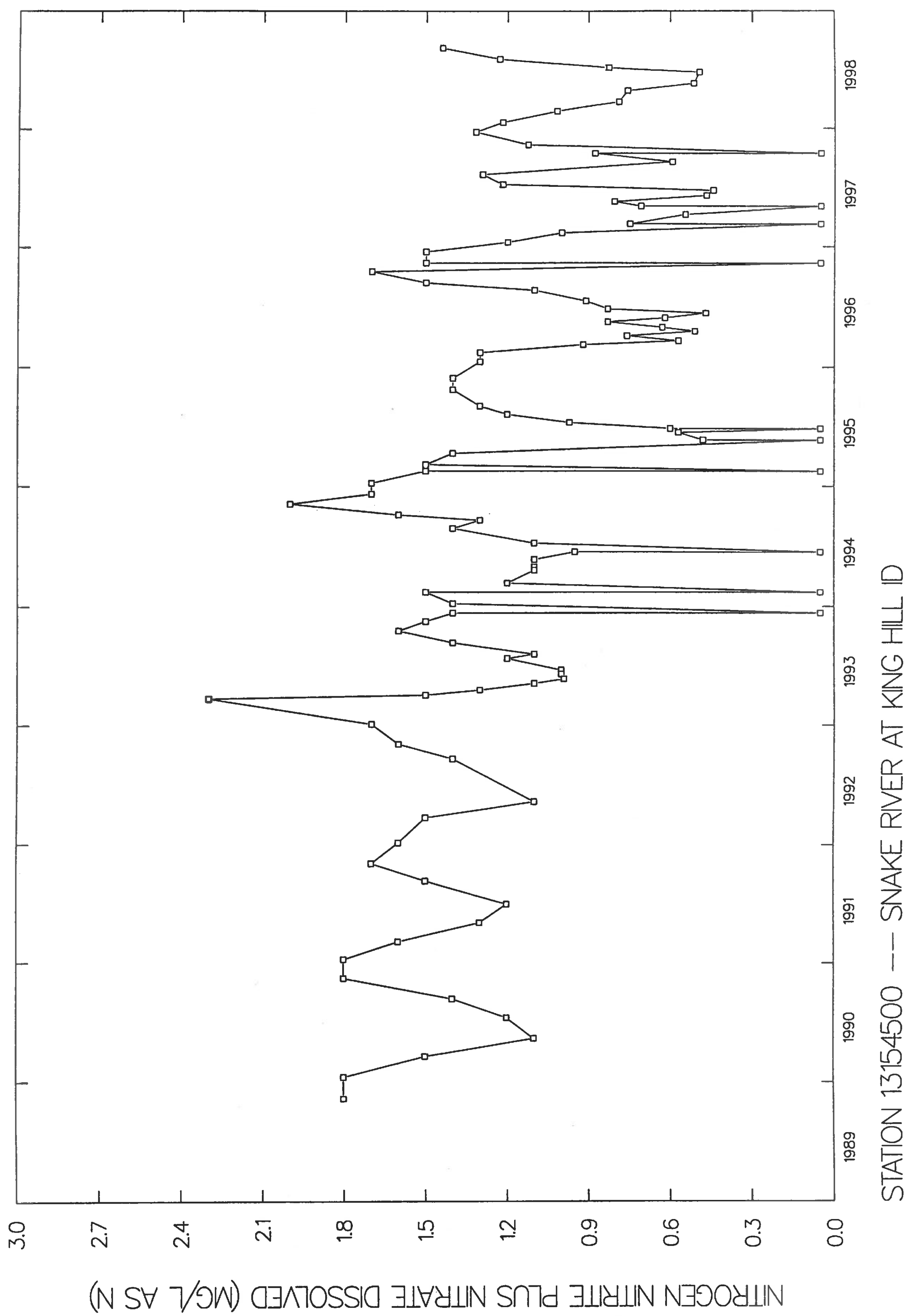

Figure III-38. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Snake River at King Hill (1989-1998).

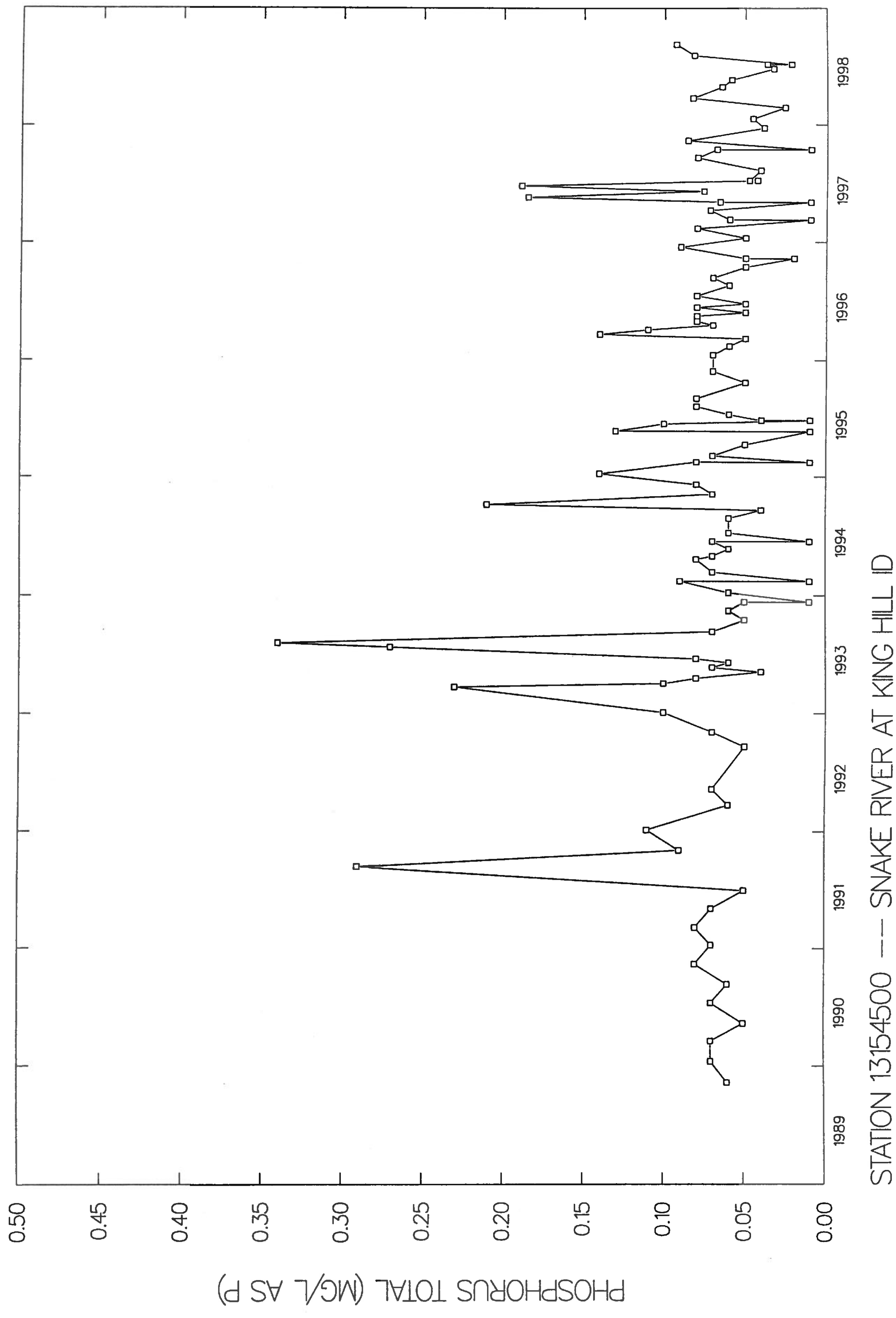

Figure III-39. Ambient surface water phosphorus (total) concentration for the Snake River at King Hill (1989-1998).

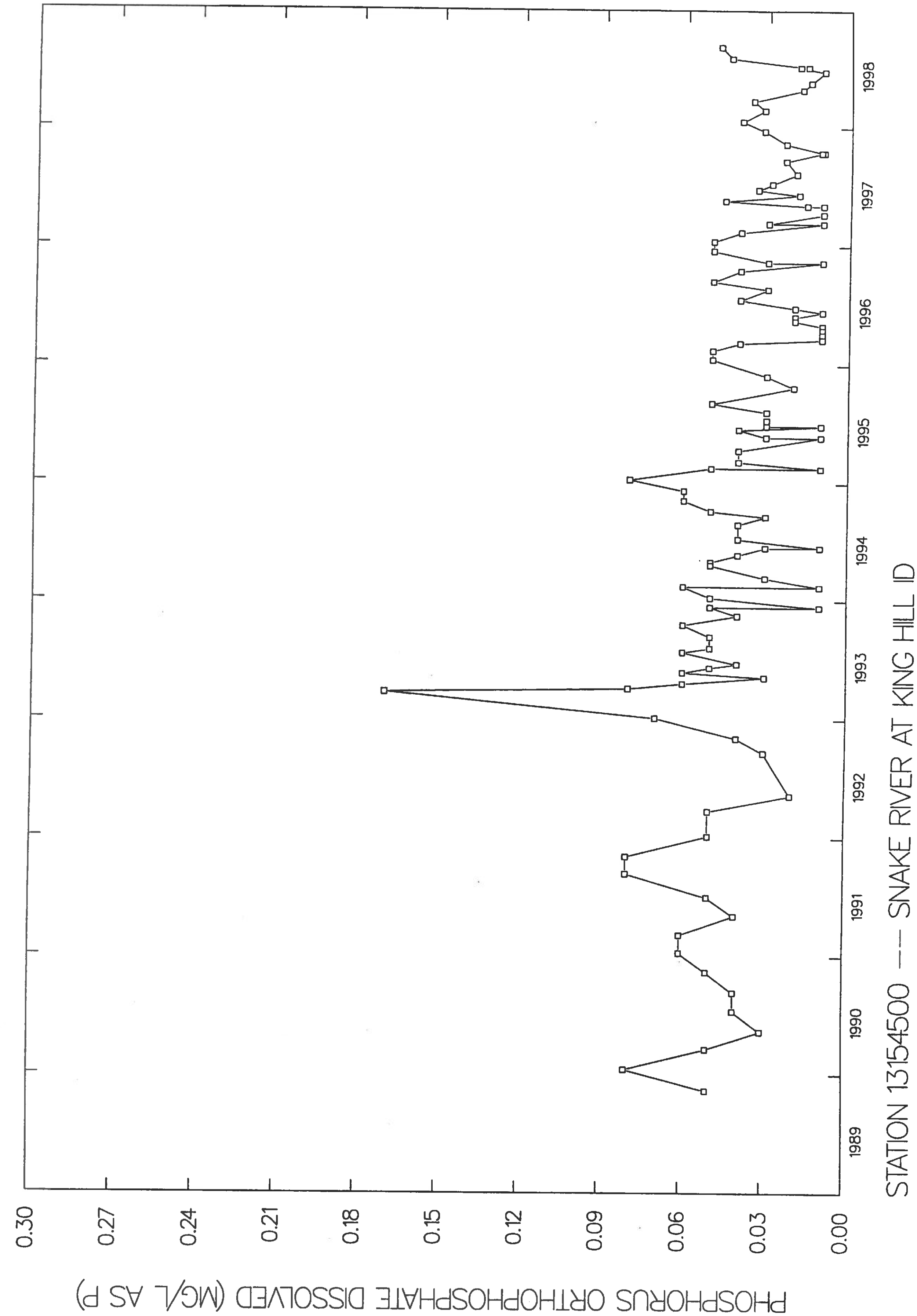

Figure III-40. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Snake River at King Hill (1989-1998).

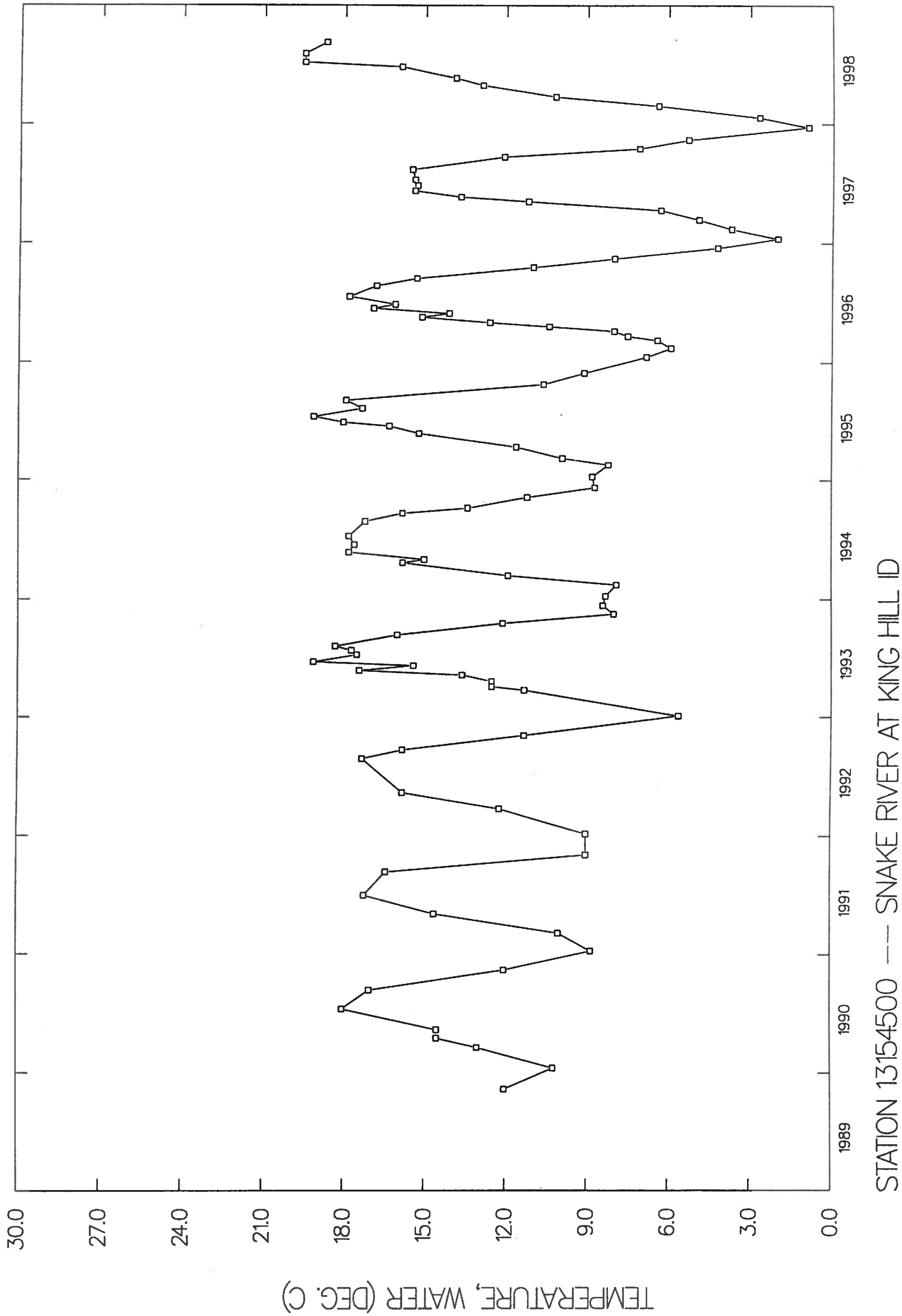

Figure III-41. Ambient surface water temperature for the Snake River at King Hill (1989-1998).

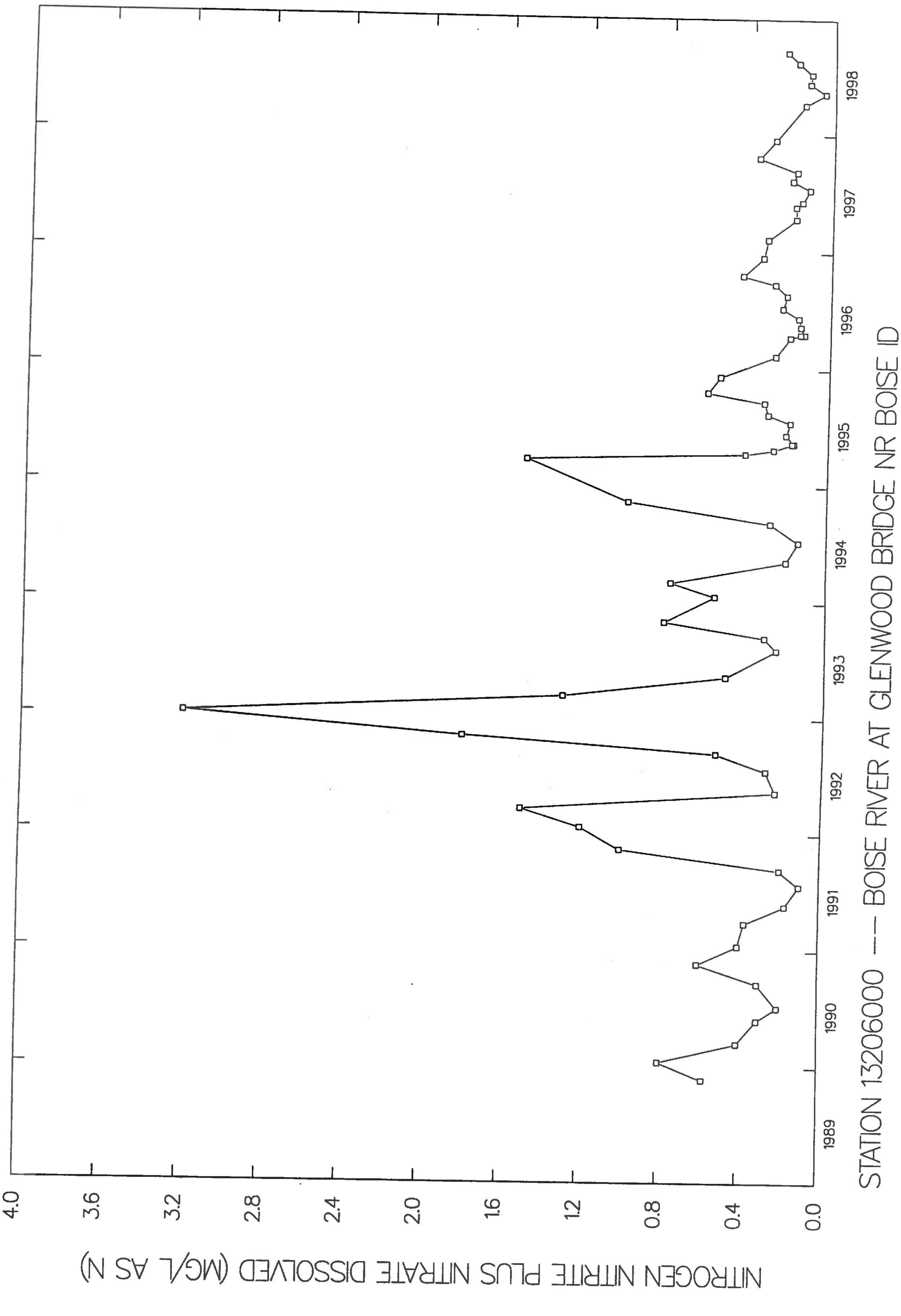

Figure III-42. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Boise River at Glenwood Bridge near Boise (1989-1998).

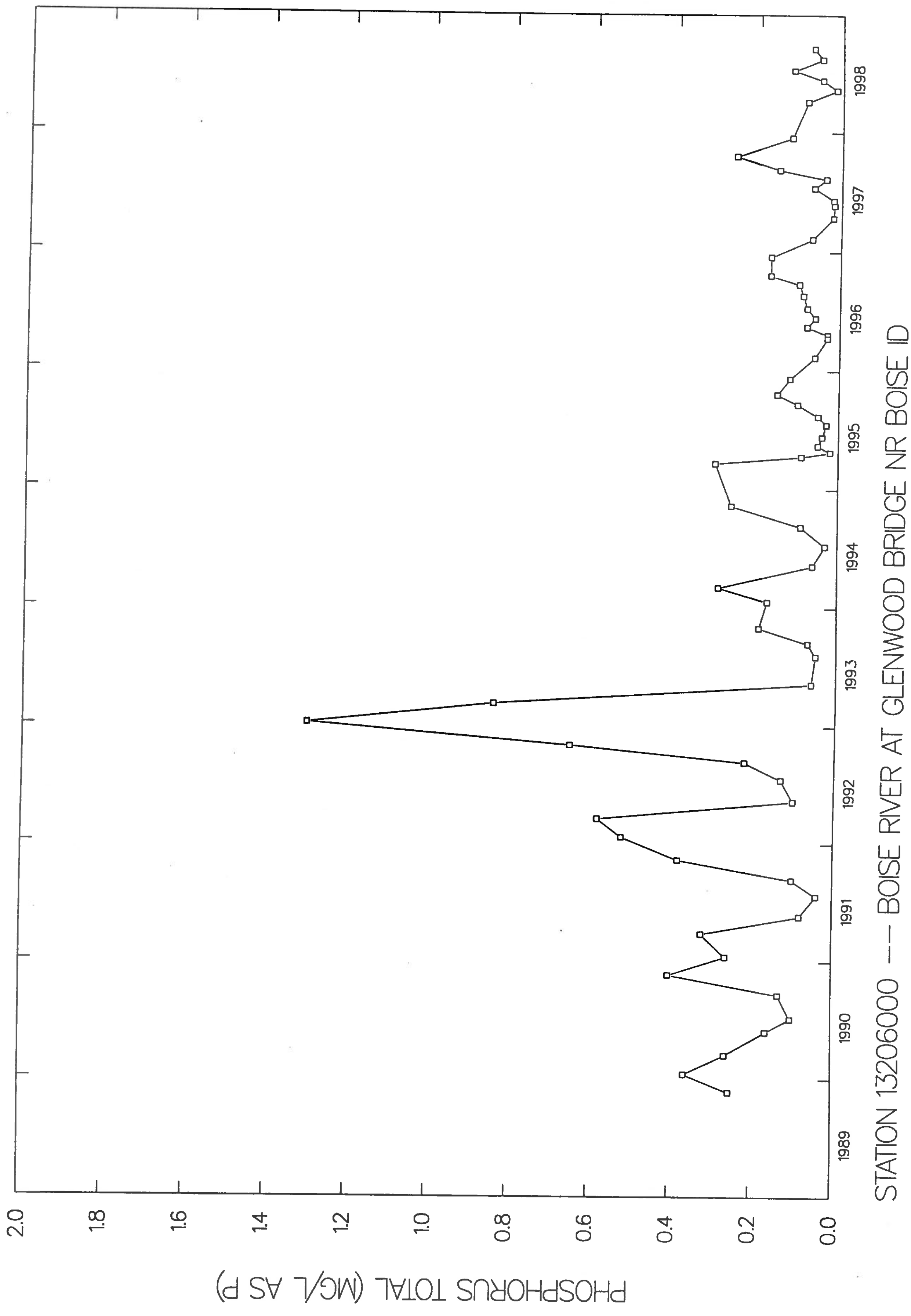

Figure III-43. Ambient surface water phosphorus (total) concentration for the Boise River at Glenwood Bridge near Boise (1989-1998).

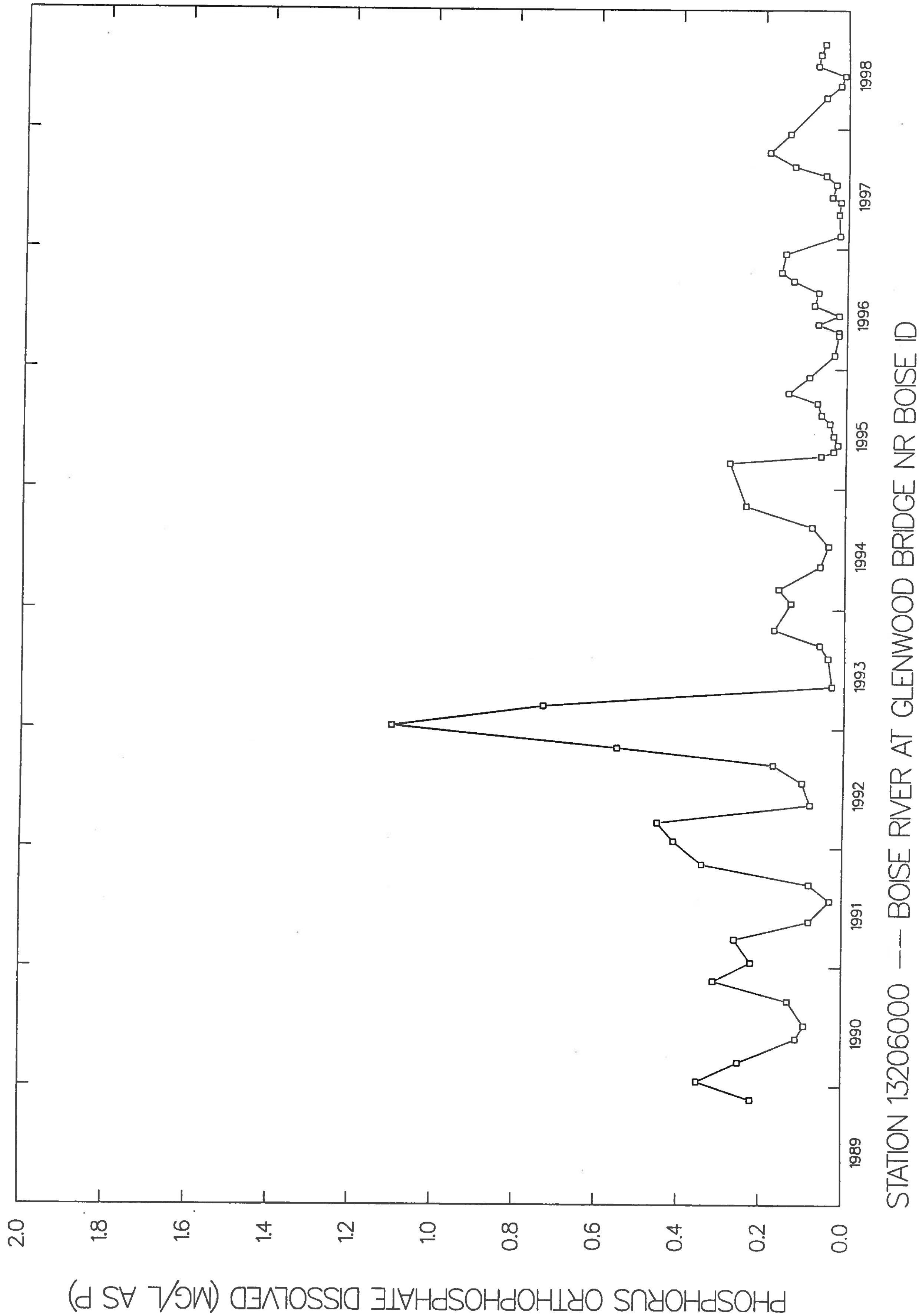

Figure III-44. Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Boise River at Glenwood Bridge near Boise (1989-1998).

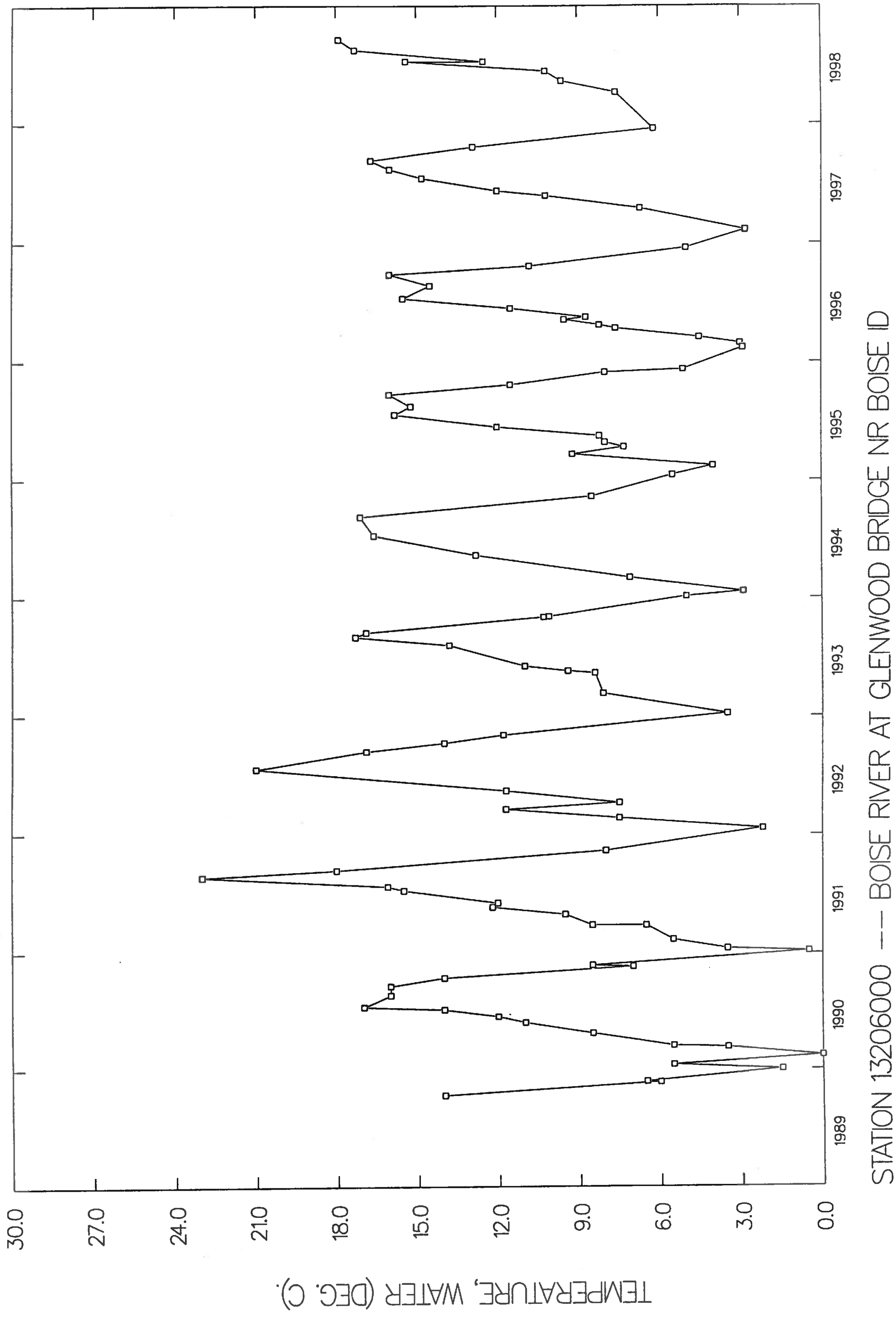

Figure III-45. Ambient surface water temperature for the Boise River at Glenwood Bridge near Boise (1989-1998).

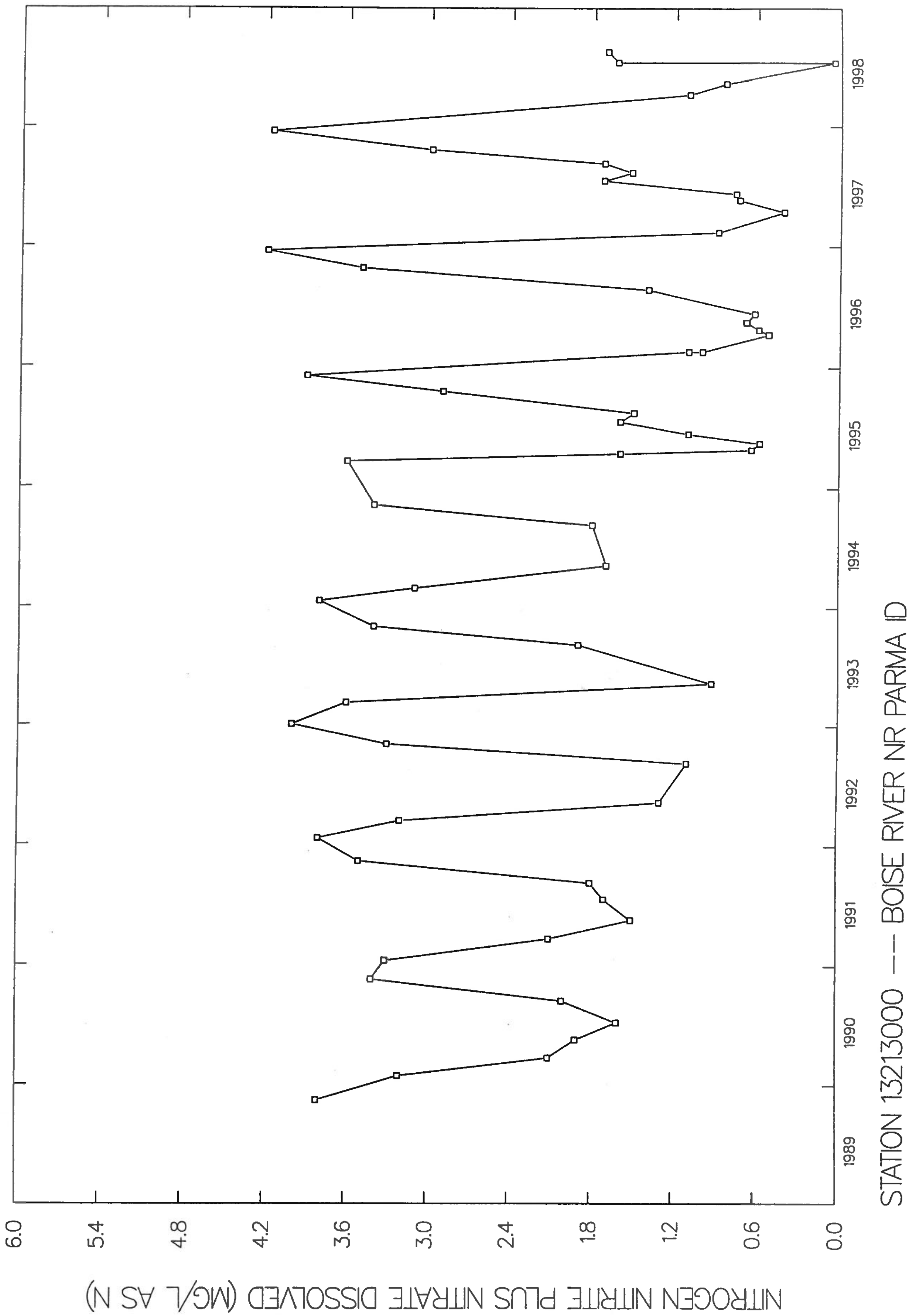

Figure III-46. Ambient surface water nitrogen (nitrite plus nitrate, dissolved) concentration for the Boise River near Parma (1989-1998).

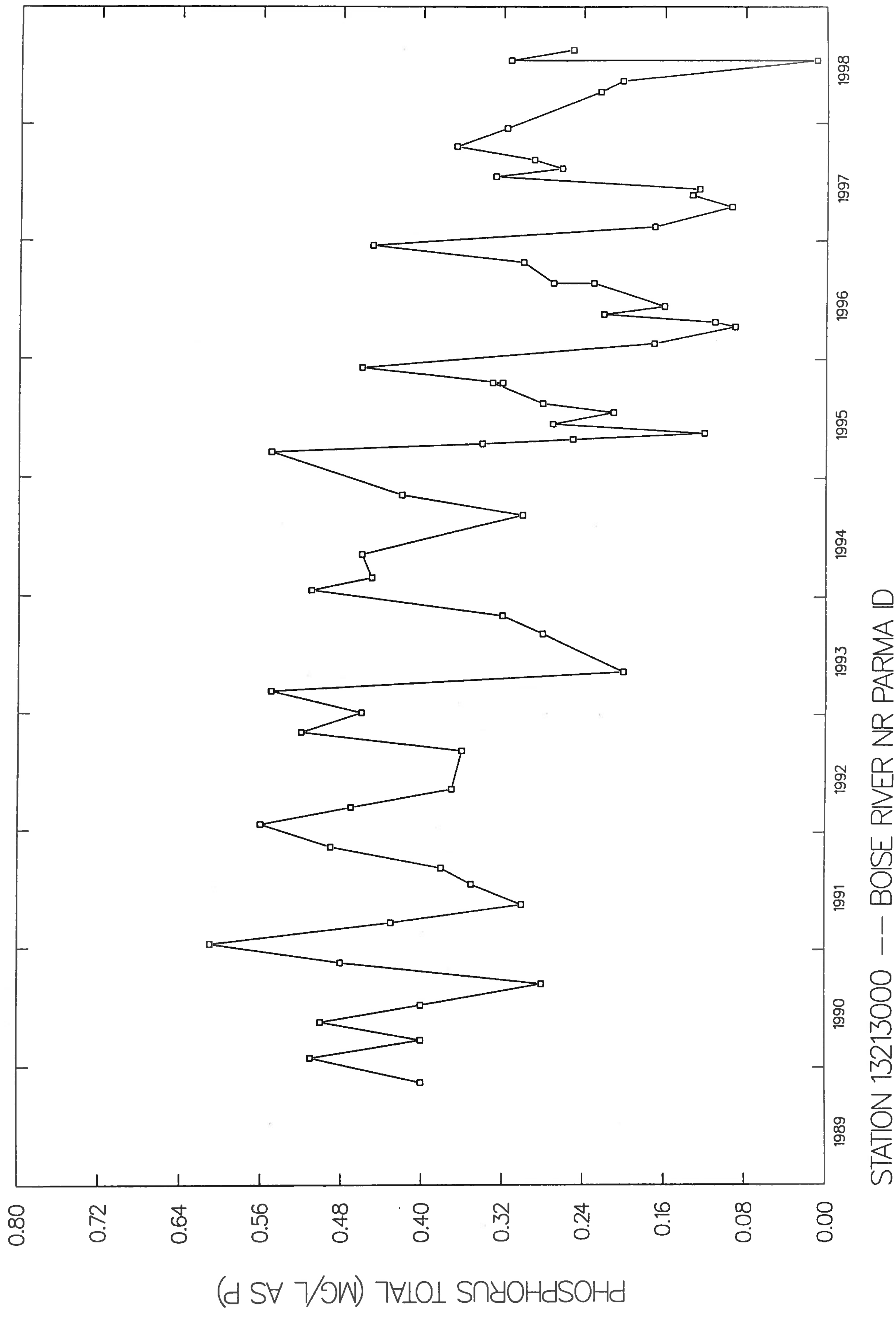

Figure III-47. Ambient surface water phosphorus (total) concentration for the Boise River near Parma (1989-1998).

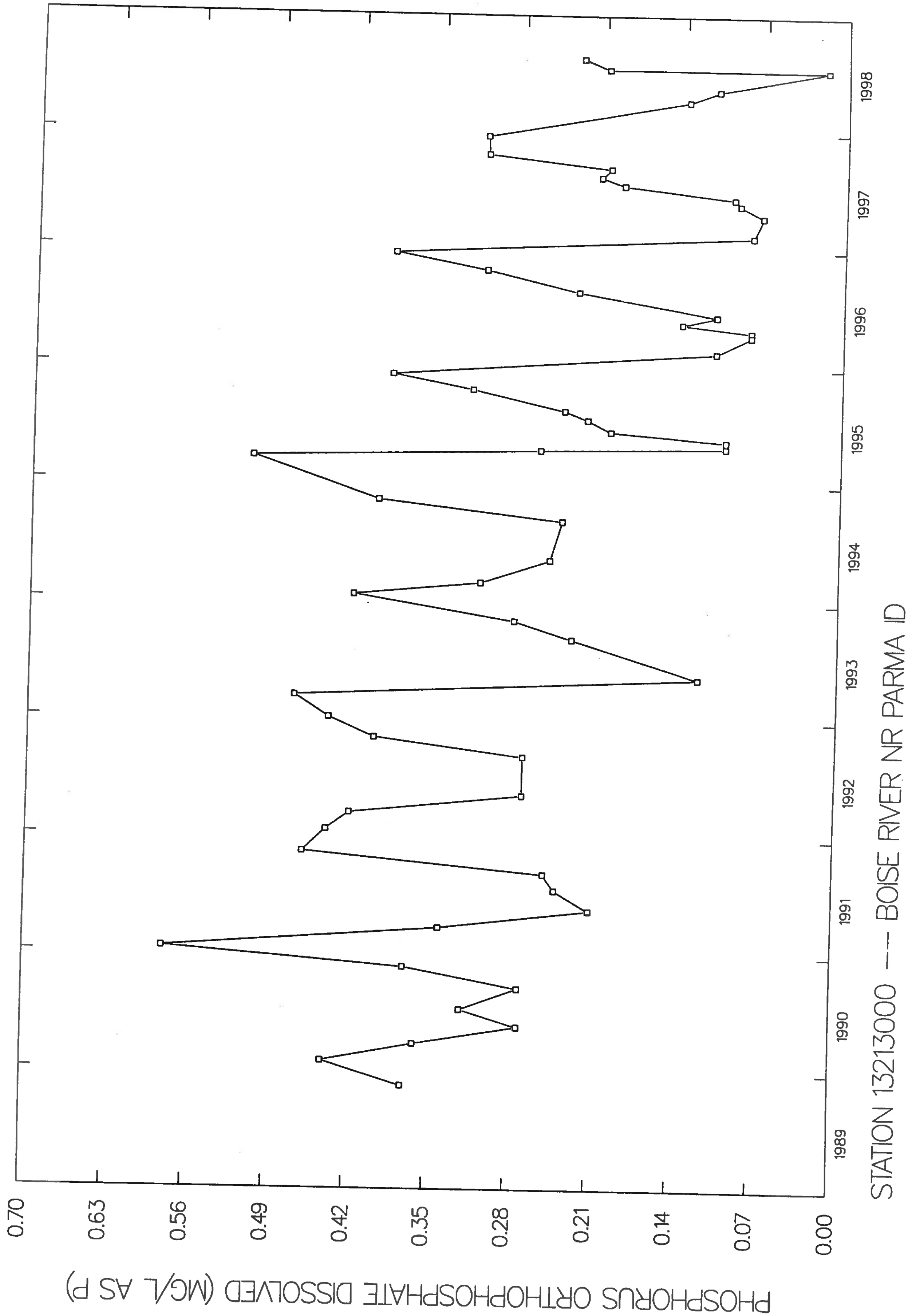

Figure III-48. **Ambient surface water phosphorus (orthophosphate, dissolved) concentration for the Boise River near Parma (1989-1998).**

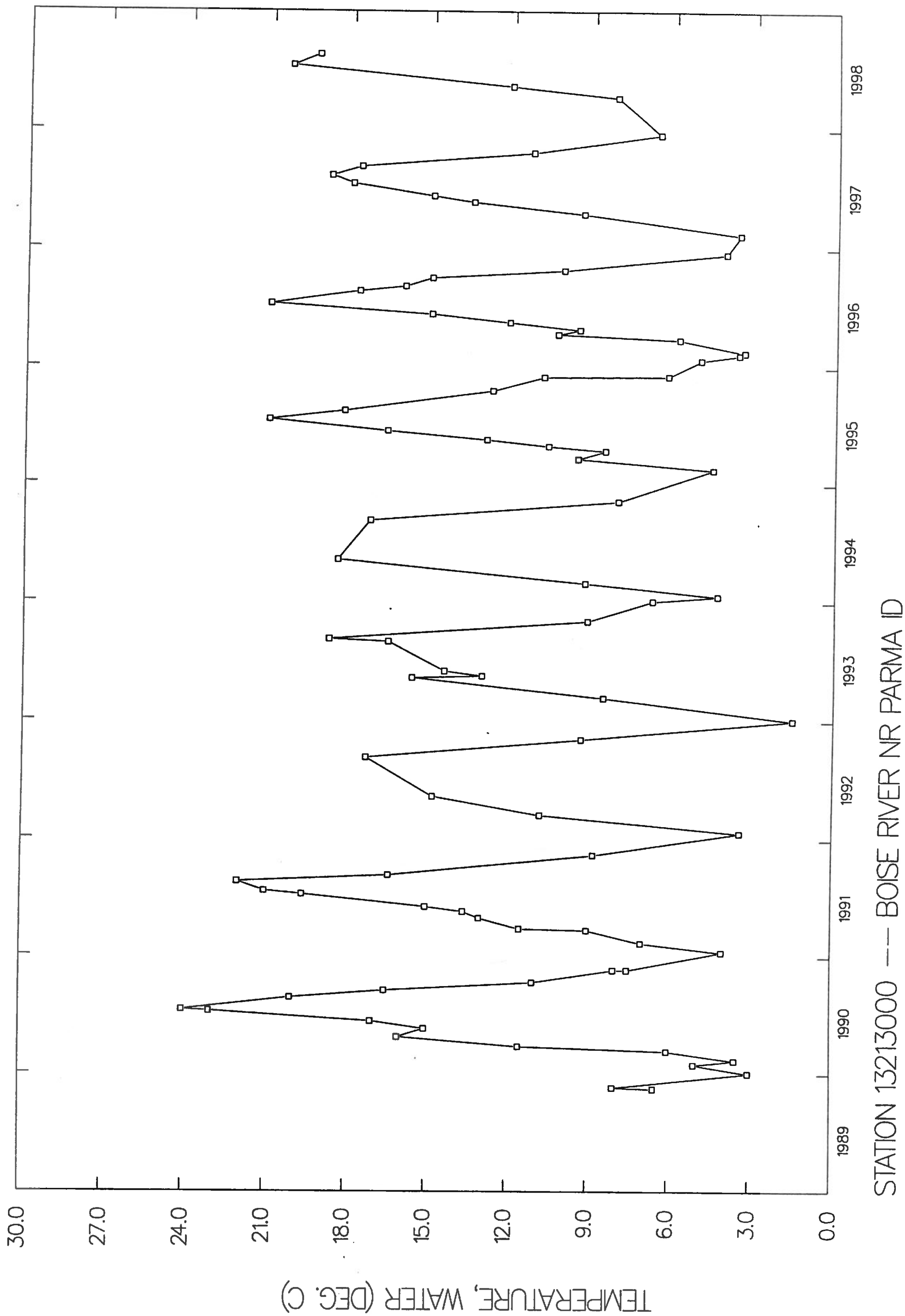

Figure III-49. Ambient surface water temperature for the Boise River near Parma (1989-1998).

Changes to Idaho's Statewide Surface-water Quality Monitoring Program

Background

In 1990, the U.S. Geological Survey (USGS) in cooperation with the Idaho Department of Health and Welfare, Division of Environmental Quality (DEQ), implemented a statewide water-quality monitoring program in response to Idaho's antidegradation policy as required by the Clean Water Act (CWA). The program objective was to provide water-quality managers with a coordinated statewide network to detect trends in surface-water quality.

The program design included the collection and analyses of samples from 56 sites on the Bear, Clearwater, Kootenai, Pend Oreille, Salmon, Snake and Spokane Rivers and their tributaries. Samples were collected every year (1990 - 1995) at 5 sites (annual sites), every other year at 19 sites (biennial sites) and every third year at 32 sites (triennial sites). Each year 25 of the 56 sites were sampled. During water years 1990 -1995 (October 1, 1989 to September 30, 1995) samples were collected bimonthly. On-site analyses were made for discharge, specific conductance, pH, temperature, dissolved oxygen, bacteria (fecal coliform and fecal streptococci) and alkalinity. Laboratory analyses were made for major ions, nutrients, trace elements and suspended sediment.

Changes to the Program

In 1996 the monitoring program added biological sampling to more effectively assess the status and trends of stream quality in Idaho, O'dell et al. (1998). In order to add biological and tissue contaminant variables without additional costs, analyses of trace elements in water were dropped and common ions analyses were reduced to one set of samples during base flow conditions in September. Nutrients, bacteria, turbidity, suspended sediment, discharge, conductance, pH, temperature and dissolved oxygen continue to be collected. In addition, continuous temperature are recorded during summer months (June-September).

The frequency of water chemical sample collection was changed from bimonthly, October to September, to monthly, April through September when most beneficial uses occur. The biological sampling is targeted for summer/fall low-flow conditions when cold water biota is most limited due to thermal stress, habitat loss, and/or other impacts.

To provide discharge records for all sites, the network continues to be made up of existing USGS surface-water gaged sites. The biological monitoring, due to limited funding, is divided into three regions, southeast, southwest and northern sites. At sites not conducive for biological monitoring, sampling is limited to water chemistry variables. The sites selected for biological monitoring are sampled once over a three-year rotation in each of the three regions. The first rotation of biologi-cal monitoring has been completed for the southeast and southwest regions; the northern region is scheduled for summer/fall 1998.

Why the Changes?

The original water quality monitoring program, using conventional chemical and physical monitoring, was not adequate to assess beneficial uses in surface water. More direct measures of biotic integrity and associated beneficial uses including cold-water biota populations, salmonid spawning and primary and secondary contact recreation were needed to determine status of designated uses. In addition, this approach will provide multiple lines of evidence using aquatic biological communities which are effective integrators of stream conditions, including chemical and habitat changes resulting from anthropogenic changes in a river basin. The collection of aquatic biological data will also provide a better understanding of the aquatic life found in the large rivers in Idaho, information that is currently lacking. Ultimately, this improved network will better meet the intended goals of the CWA and provide more useful information for water-resource management such as Total Maximum Daily Load process.

Methods for Biological Community and Tissue Data Collection

Biological monitoring at all designated biological sites consists of both qualitative and semi-quantitative macroinvertebrate samples, fish community assessment and measures of associated habitat parameters. Monitoring protocols for the collection of biological and habitat parameters follow protocols designed for the National Water-Quality Assessment (NAWQA) Program. The application of these protocols provides consistent and standardized methods for comparison to existing or future biological data collected by this national program. Organic and inorganic fish tissue samples are collected at approximately 20 percent of the biological sites. A total of 26 different organic compounds and 22 inorganic elements are analyzed in whole-body fish tissue and fish liver composite samples, respectively. Fish are collected from all habitats from a representative reach at each site where contaminant samples are collected. A fish community assessment of all species, including counts, size ranges, and occurrence of external anomalies (i.e., deformities, lesions, tumors, and parasites) is completed. Biological community data are summarized using various metrics (i.e., trophic group, pollution tolerances, and temperature preferences).

Preliminary Results

This program now has 10 years of data for selected sites. Data for nutrients (dissolved nitrogen and dissolved phosphous), daily average water temperature and PCBs and mercury from fish samples are shown in Figures III-3 - III-13. Figures III-14 — III-49 show the first 10 years trends for selected (annual) monitoring sites. Slight downward trends are seen at some locations for Nitrogen and Phosphorous mainly. (See Figures III-18, 26, 34, 35, 36, 38, 40, 42, 43, 44, 46, 47 and 48.)

River Monitoring

In 1997 and 1998, the Idaho Division of Environmental Quality (DEQ) performed reconnaissance monitoring methods on Idaho medium- and large-size rivers (rivers) as a component of the Beneficial Use Reconnaissance Project (BURP). The DEQ used modified methods developed by Idaho State University (ISU) and United States Geological Survey (USGS) to monitor 31 and 39 river sites, respectively. One crew traveled statewide and performed the monitoring with the assistance of regional contacts. The methods focused on quantitatively sampling macroinvertebrates and periphyton, and qualitatively measuring site habitat characteristics. Most of the statewide sites represented rivers located on the 1996 303(d) list or scheduled for upcoming sub-basin assessments.

The field season was lengthened and ran from August through October. Additionally, the crew size was increased from two to three people. Productivity, calculated from the number of sites sampled, increased by 26%. This increase in productivity included the sampling of more remote sites such as the South Fork of the Owyhee, lower Bruneau, lower Jarbidge, and Moyie rivers. However, expense per site increased by 12%. The increase in expenses was due mainly to increases in personnel and benefit costs from the additional crew member.

Several improvements in field equipment occurred in 1998. A rope and pulley system was developed for semi-wadable conditions. Additionally, a more durable, large raft was purchased and the Slack sampler was improved. Life jackets (PFDs) designed for kayaking were purchased for the crew members. These PFDs jackets provided greater range of motion and encouraged more consistent use by the crew members.

It is recommended that DEQ add larger scale river characterization to the protocol to aid classification and analysis of the data. Preliminary analysis results may indicate that site habitat measurements have little benefit to data analysis. Additionally, it is suggested to monitor more sites on an individual river rather than an individual site on several rivers. Finally, we will need to coordinate future monitoring to be conducted efficiently and cost-effectively out of the regional offices rather than the state office.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) are mandatory components of our surface water monitoring program. QA/QC begins with employee training and is a part of study design, all phases of field work, laboratory analysis, data processing, data analysis and report writing. A QA/QC section is required of all monitoring plans and subsequent reports.

A significant portion of our field QA/QC work involves following standard methods and protocols. In addition, field checks and audits by Region 10 EPA and DEQ are conducted to help standardize field methods, resolve problems and curtail "protocol drift". DEQ has published two reports which address quality assurance of water column sample data (Bauer 1986 and Bauer et al. 1986). The laboratory QA/QC is ongoing (Bureau of Laboratories 1994). The laboratory is certified by EPA.

An important QA/QC aspect of the biological monitoring program is collection, proper care and deposition of voucher specimens of macroinvertebrates and fish. The Idaho DEQ has made arrangements with the Orma J. Smith Museum of Natural History, Albertson College of Idaho, Caldwell, to house these voucher collections. In addition to documenting species occurrence, the DEQ uses vouchered specimens for assemblage assessment, staff training and public education.

QA/QC of data is done following the draft DEQ data management plan (Division of Environmental Quality 1993). Data QA/QC has its beginning in study design and follows through monitoring plan preparation, laboratory analyses, data processing, data analysis, and the final report. These functions take place at both the regional office and central office levels.

CHAPTER 2. WATER BODY ASSESSMENT METHODOLOGY

Water Body Index

The effort to establish a finer scaled and uniform basis for Idaho water quality and Clean Water Act reporting was begun in August 1993. In 1995, DEQ received a grant from the EPA to develop a geo-referenced water body indexing system for Idaho waters. The DEQ water body indexing system is based on the U.S. Geological Survey hydrologic cataloging (4th field) units and 1:250,000 scale hydrography coupled with 1:100,000 scale hydrography. Water body maps were produced for each cataloging unit and reviewed within DEQ as well as the basin advisory groups throughout the state. Extensive editing was done on the maps. The resulting water body units are currently being proposed as revisions to the Idaho water quality standards, sections 110 - 160.

Water Body Assessment Guidance

The Water Quality Assessment and Standards Bureau of DEQ has produced a water body assessment guidance document. It was designed as an analytical tool for determining if a water body was supporting or was not supporting its beneficial uses. The strength of this method is the use of ecological indicators in addition to more traditional chemical measures as found the *Idaho Department of Health and Welfare Rules and Regulations, Title 1, Chapter 2, Water Quality Standards and Wastewater Treatment Requirements*. A water body's water quality gets evaluated and compared to water quality levels needed for the protection and maintenance of viable communities of aquatic organisms. Findings from these assessments will be reported using the water body numbering system and incorporated in the 1998 EPA 303(d) list for Idaho.

CHAPTER 3. SECTION 303(d)

Water body assessment in Idaho was delayed because the U.S. District Court ruling on the Idaho 303(d) schedule and process. As a result, DEQ resubmitted the 1994 EPA 303(d) list for Idaho in 1996. The 1996 Idaho 305(b) report lacked a 303(d) section for this reason also. During 1998 DEQ produced a 303(d) list (Division of Environmental Quality 1998). The total package sent to EPA was nearly 500 pages in length, so is not repeated here. The package consisted of a cover letter and introductory material as well as chapters on Stream Assessment Process History, 1998 303(d) list, Temperature Issue Analyses, Response to Public Comment, and Administrative Record.

SUMMARY OF 1998 303(d) LIST

	# Segments	**# Miles***
1994 (1996) List	962	10,646
1998 List Carryover from 1994 (1996) New Segments Delistings	 List 112 390	 7,262 983 3,388
Threatened		669
Boundary changes	68	594
Assessed Full Support		N/A

*Rounded to whole miles.

Table III-6. Summary of Fully Supporting, Threatened, and Impaired Assessment*

Degree of Use Support	Assessment Category		Total Assessed Size
	Evaluated	Monitored	
Size Fully Supporting All *Assessed* Uses		3,384	3,384
Size Fully Supporting All *Assessed* Uses but Threatened for at Least One Use	669		669
Size Impaired for One or More Uses		8,227	8,227
Size Not Attainable for Any Use and Not Included in the Line Items Above			N/A
TOTAL ASSESSED		11,611	11,611

*Reported in miles.

Source: State of Idaho 1998 303(d) list.

Table III-7. Summary of Contaminants Used in the Assessment

Rivers and Streams (List Waterbodies)	Contaminants Included in the Assessment
127	Bacteria
2	Channel Stability
101	Dissolved Oxygen
159	Flow Alteration
113	Habitat Alteration
3	Mercury
43	Metals (Unspecified)
26	Ammonia
214	Nutrients (Unspecified)
15	Oil or Grease
7	Organics (Unspecified)
12	Pesticides (unspecified)
22	pH
1	Salinity
573	Sediment
6	Dissolved Gas
145	Temperature
109	Unknown

Source: State of Idaho 1998 303(d) list.

Idaho Division of Environmental Quality 1998 303(d) Process

The following sections display the major milestones that led up to the establishment of the 1998 303(d) list.

August 1996

A technical committee, known as the Technical Review Committee, reviewed the draft WBAG and made comments. These comments were taken into consideration by DEQ and a final WBAG was published in August 1996. DEQ actually began to process data using WBAG in October 1996. Between October and December 1996 operational questions were encountered and handled. For example, one question was whether multiple sites on a water body should be evaluated separately or combined. In this particular instance, DEQ decided that each BURP site should be evaluated independently of each other. Several other operational questions are dealt with through the errata and addendum to WBAG published in December 1996.

One of the outcomes from evaluating the data through WBAG was numerous BURP sites ending up in the "needs verification" category. DEQ elected to pursue fish data from federal and state agencies to assist in making a full support or not full support call. Staff collected outside data through May 1997.

December 1997 - January 1998

In October 1997, DEQ moved into the 1998 303(d) process. This procedure involved laying out the two-step public involvement process, first requesting data, commenting on the draft list second, **and lastly working up guidelines and assumptions**. The public involvement process came to fruition through the first public notice for data initiated in November 1997. This public notice ran through January 1998. (Public participation is more fully explained in Section 1.4 of this Chapter)

March 1 - April 30, 1998

Outcomes from the WBAG process were complied into an ARCVIEW project file. This project combined the 1996 303(d) list, along with the results of WBAG for each BURP site. DEQ made a conscious decision to limit BURP data considered for the 1998 303(d) process to 1993 through 1996, because the 1997 macroinvertebrate identification data was not available until April of 1998. By this time, DEQ was well into the analysis and interpretation of the existing data and to consider this new data would have precluded meeting a reasonable 303(d) submittal deadline. It should be noted that all sites were evaluated, whether they were on the 1996 303(d) list or not. The GIS product was a visual depiction of water body status calls from WBAG along with the associated data behind the GIS coverage.

DEQ also used the product to address suspect water bodies on the 1996 303(d) list. DEQ was not convinced all of the listed waters were truly water quality limited and thus required development of total maximum daily loads. DEQ's suspicions were supported by its first hand knowledge of many of these waters and the subjective nature of some of the data EPA used to develop the 1994 list. In most cases, two types of situations resulted in the water body being listed by EPA for Idaho: the water body did not meet U.S. Forest Service Plan objectives/standards or it was listed in Appendix D of Idaho's 1992 305(b) report. Upon close inspection of Appendix D, it can be noted that the majority of the calls were "evaluated" not monitored (Table 1.1). EPA states in Appendix A, page 2, "EPA agrees that Forest Plan objectives/standards do not have the same regulatory significance for purposes of Section 303(d) listing as do Water Quality Standards." "However, because exceedance of Forest Service standards are not directly correlated to an exceedance of State Water Quality Standards, additional supporting information is needed to establish that link" (See EPA's Appendix C). In response at A, page 13, EPA also states the following in relation to using the 305(b) report and evaluated data as a basis for listing, "Some of the data for specific water bodies listed in the 305(b) report or the Basin Status Reports may not accurately reflect the present day condition of that water body."

The State's position on this listing criteria is best summed up in a draft report by Bauer and Ralph (1998), "No one knows with certainty if these streams should be on this list, if the stressors are correctly identified, and if the causative agents are correctly identified." DEQ felt it was reasonable and responsible to re-evaluate the water bodies on the 1996 303(d) list in light of new site specific water quality data and beneficial use status information.

The DEQ regional staff reviewed and edited the ARCVIEW project based on data and their primary knowledge of the water bodies in question. The project file **showed** water bodies, 303(d) listing status, relative BURP sites, and their support status (full support, not full support or needs verification). This illustration allowed DEQ staff to quickly ascertain the water quality picture for an entire water body, according to applicable 303(d) boundaries.

At this point, DEQ reviewed different status calls on the same water body to determine an overall status call for the water body. The overall status call decision used the most conservative call from a series of status calls on the same water body. The order of most conservative calls was as follows: not full support →→ needs verification →→ full support. Any necessary changes or corrections were made to the project file at this time. Additionally, DEQ evaluated outside data provided through the public notice against the final beneficial use status call and resolved inconsistencies.

As noted above, there were situations where definite site status calls existed for a single water body. In some situations where the upper site(s) was full support and the lower site(s) was needs verification or not full support, DEQ considered making boundary changes. Such changes required justification based on impacts attributable to tributaries, lands use or ownership, acting alone or in combination. These boundary changes were reviewed by the regional staff who determined appropriate changes to the project file, (see Chapter 4, Section 4.3 for more detail on boundary changes).

May 1 - 14, 1998

The ARCVIEW project file was finalized and lists produced for the draft 1998 303(d) document. The list included those waters on the 1998 303(d) list, those being de-listed from the 1996 list, and those with boundary changes.

May 14 - June 15, 1998
The draft 1998 303(d) list was made public by Governor Phil Batt and Larry Koenig, DEQ Assistant Administrator. A 30-day public notice began in 18 papers around the state. Materials were made available for the public at various libraries around the state.

June 8, 1998
DEQ produces and mails out summary reports for the three lists: those water bodies on the 1998 303(d) list, those being de-listed from the 1996 list, and boundary changes. These summaries reflect the processing of data, site and water body status calls, decisions driving cold water biota beneficial use status calls, criteria exceedances, and sources of information.

June 12 - July 15, 1998
Due to public requests, DEQ extended the comment period an additional 30 days to July 15, 1998.

July 15, 1998 to Present
DEQ processing public comments for "consideration" in preparation of final 1998 303(d) list.

Summary of Events

DATE	ACTION
August 1996	DEQ WBAG finalized and published.
October 1996 - December 1997	DEQ processes 1993 - 1996 BURP data though WBAG.
December 1997 - January 1998	DEQ runs public notice for collection of outside data for 1998 303(d) list. Part of this notice includes notification of working rules and assumptions for acceptance of "qualified" data.
January 10 - March 10, 1998	DEQ melds outside data received in January announcement with DEQ support status outcomes, all incongruities resolved.
March 10 - April 30, 1998	Compile results of computer output into one ARCVIEW project file for purposes of draft 303(d) list.
May 1 - 13, 1998	1998 draft 303(d) list and associate maps finalized.
May 14 - June 15, 1998	DEQ releases draft 1998 303(d) list, begins 30 day public comment period.
May 15 - June 30, 1998	Regional Offices share draft list with respective BAGs.
May 28, 1998	DEQ meets with EPA in Seattle to explain 303(d) process and draft list.

DATE	ACTION
June 8, 1998	DEQ produces summary reports supporting 303(d) list, de-list and boundary changes. Report sent to interested publics.
June 12 - July 15, 1998	Due to public request, DEQ extends comment period additional 30 days.
July 15, 1998	Public comment period ends.
July 27 to present	Central and Regional DEQ staff meet to discuss public comments. DEQ Central and Regional staff to address general comment/questions and work up DEQ response.

Public Participation

The purpose of this section is to describe the different opportunities DEQ provided for public participation in the 303(d) process.

November 25, 1997 to January 5, 1998
DEQ ran its first "Public Notice" (see administrative record for announcement) for the 1998 303(d) process, starting in November of 1997. This notice covered what was proposed, the need for action, who was affected, history, where to find and review documents referenced in the notice, and finally what happened next. This notice was published in the legal section of 17 papers (see administrative record for papers) statewide over a 30 day period. The notice stipulated that this was the first round of public participation and requested data or information on waters (streams, rivers, lakes) in the state. According to the announcement, information received would be considered in making a new 303(d) listing for 1998 as required by the Clean Water Act. DEQ also stated the requirements for data consideration in the "working assumptions and guidelines" referenced in the notice and available through DEQ.

DEQ made it clear that this announcement was not for formal comment on the list, but merely to gather existing information for consideration in making the list. DEQ informed the public that a second round of public participation would involve commenting on the draft list itself. DEQ went on to clearly state where materials could be obtained by providing a street address, phone number and E-mail address.

May 14, 1998 to June 15, 1998
Governor Batt and Larry Koenig officially announced and highlighted the results of Idaho's draft 1998 303(d) list as a new conference (see administrative record). The news conference and Governor's news release, provided at the conference and statewide, stated that the draft list was out for a 30 day comment period ending June 15, 1998. The news release listed Larry Koenig as the point of contact along with his address and phone number. Copies of the draft 1998 303(d) package were handed out to the news media attending the conference. The draft 303(d) package

consisted of; working rules and assumptions for compiling Idaho's 1998 303(d) list; hydrologic unit map; draft list; draft de-listings; draft boundary changes; and assessment process paper.

Concurrent with the Governors news release, DEQ placed "display adds" in 17 newspapers statewide that ran over the 30 day period (minimum of three times in 30 days for each paper). These were the same news papers used in the previous public notice noted above (see administrative record for copy of the display ad). DEQ ran these ads with an advertisement format in the local sections of the newspapers rather than the legal sections. This was in response to public comment of the earlier public notice stating that many people do not look at the legal section of papers for public actions.

DEQ mailed copies of the 303(d) package to those who had requested it, who had sent information to DEQ during the request for data, and to many other state and federal agencies. All of the regions shared the draft list as well as provided copies to their respective Basin Advisory Groups, Watershed Advisory Groups and other interested parties (see administrative record for other interested parties). DEQ furnished 20 copies to the Boise National Forest who acted as a clearing house for all the national forests in Idaho. DEQ also furnished 10 copies each to the state BLM, and state Idaho Fish and Game offices. DEQ provided the state library with 20 copies of the 303(d) package and maps. The state library then circulated these copies to various county libraries designated as official repositories (see administrative record for list of repositories). On May 28, DEQ traveled to Seattle, Washington, to go over the draft list with the EPA Idaho 303(d) team. DEQ explained its process and all the components therein, for instance, BURP, WBAG, lists, maps, and summary reports.

In response to public comment, DEQ extended the public comment period an additional 30 days (60 total) from June 15 to July 15, 1998. This was accomplished by placing another "display ads" with the 17 newspapers referenced above (see administrative record for copy). During the entire 60 day public comment period all DEQ regional office and the central office made themselves available for questions and materials. The central office received and answered may "public information requests" regarding the list during this time. DEQ developed and mailed a summary report to those requesting additional information including EPA. These summary reports were for waters on the 303(d) list, those waters proposed for de-listing and boundary changes. These reports referenced the BURP/WBAG outcomes, and provided the following information: BURP site identification number; decision that drove the final status call; any criteria exceedances; other beneficial use support calls; and finally the source of information used.

Existing and Readily Available Information

DEQ assembled and evaluated existing and readily available water quality-related data and information when it developed the 1998 303(d) list.

DEQ reviewed those waters identified in Idaho's most recent Section 305(b) report and identified as Stream Segments of Concern (SSOC). The most recent 305(b) report and the Basin Status Reports that list SSOC were used by EPA in developing the 1994 303(d) list. EPA listed water bodies on the 1994 303(d) list that were identified in the Basis Status Reports and in Appendix D of the 305(b) report as impaired or threatened. However, the vast majority of such waters were listed based upon "evaluated" data, that does not include biological, physical or chemical monitoring data. In addition, the data used for 305(b) and SSOC does not meet the QA/QC requirements of the BURP process and are waters the state intended to assess further.

In compiling the 1998 list, DEQ compared those waters from Appendix D and the SSOC, and the source of Appendix D and SSOC listing, with the water quality monitoring data collected through the BURP process. When the BURP monitoring data established full support of beneficial uses and compliance with water quality standards, DEQ relied upon the BURP data and removed such water bodies from the 1998 303(d) list. (Table 1.1 shows the source of the information used for listing water bodies that DEQ has determined to remove from the 1998 list.) Removing such water bodies from the 1998 list is consistent with EPA regulations that provide water bodies may be removed from the list based upon more recent or accurate data (40 C.F.R. 130.7(b)(6)) and with EPA Region 10 guidance that provides states should analyze the data that supports the 305(b) reports when determining whether to place waters on the 303(d) list. EPA Region 10 Section 303(d) Listing Guidance (1995) at Page 3-2. It is also consistent with EPA's rationale for placing these waters on the 303(d) list in the first instance in 1994. When these waters were listed, EPA explained that the data that supported listing was not of the same quality or quantity as monitored data and that its listing was made pending the receipt of more recent and accurate data. See 303(d) Decision Document at pages 4-5 and Appendix A to the 1994 list at page 5-6 and 13-14. DEQ now has more recent and accurate data, and when this data shows full support and compliance with standards, it is appropriate to remove these waters from the 303(d) list.

DEQ considered, when available information existed, waters for which dilution calculations or predictive models indicate non-attainment of applicable water quality standards. Some of the waters were on the 1994 303(d) list based upon the result of Forest Service sediment models, such as BOISED, NEZSED and WATBAL. These models were developed as management tools by the U.S. Forest Service and not to establish compliance with state water quality standards. The state water quality standards do not incorporate or reference these models. When compared to the actual monitoring data collected by DEQ through the BURP process, the results from these models should not and were not used to retain waters on the 1998 303(d) list.

DEQ actively solicited and considered information from members of the public and from local, state and federal agencies. DEQ clearly explained how data would be used in making 303(d) listing decisions. DEQ spelled out the requirements for data submission and consideration in the November 1997 public notice, as set forth below:

> "The DEQ is asking that data submitted meet the following requirements: 1) information be available describing the quality assurance and quality control such that the DEQ can reasonably apply the available data; and 2) that enough information and data be submitted to indicate that the measurements do not represent an abnormal condition.
>
> Water bodies may be §303(d) listed based upon evaluation of biological, chemical or physical data demonstrating recurring numeric or narrative standards violations,

use impairment, or a declining trend in water quality such that standards would be exceeded prior to the next listing cycle."

Additional guidance was provided to the public regarding data/information in the working assumptions and guidelines referenced in the "Public Notice" and available through DEQ. Here DEQ stated:

> "The DEQ can only use "readily available" and "useful" data to evaluate whether to add or remove a water body from the list. Readily available means data the DEQ has received or is made aware of and is accessible. Usable means processed data summarized in final reports or data that has been assessed and placed into tabular format. File boxes/drawers or raw data sheets will be of no use as the DEQ will not have the time or resources to evaluate them. Reports will be most useful if submitted in an electronic format, such as WordPerfect or some other word processing software. Tabular data in an electronic form such as Lotus, Access, dBase or other spreadsheet/database software are strongly encouraged.
>
> Quality assurance data must be provided with any biological information submitted to the DEQ. This should demonstrate who, when, where, and how the data were collected and analyzed. For any chemical data submitted, Quality Assurance/ Quality Control must be included. This includes a description of field and laboratory methods used. Raw QA/QC data will be not helpful in this regard, it must have some analysis performed and interpretation made."

DEQ considered all information and data submitted during this data request process. It eliminated those data that did not comport with the requirements noted above. However, DEQ did read and take into consideration those comments in the overall decision to list, de-list, or make boundary changes. The region specific response to comments set forth in Chapter 4 demonstrate how DEQ considered, and in some instances changed its listing determination, based upon data submitted by members of the public and other agencies and entities.

It should be noted that DEQ received very little in the way of "real" data. That is, data in the form of numbers, tables, figures etc. A majority of the comments received were very subjective in nature. For example: "This stream is heavily impacted by grazing" or "This stream is known to be hammered." These types of comments were of very little use without collaborative evidence to support the subjective claims being made. What DEQ was looking for were numeric standard exceedances (generally for chemistry) with QA/QC information or biological data to support an impaired or unimpaired beneficial use. Again, DEQ received very little of this type of information.

Many commentors referred DEQ to reports that suggested water quality impacts based on factors in the riparian area or in the watershed, such as Forest Plan Standards and Guides, BLM Proper Functioning Conditions or qualitative stream surveys. These Forest Service and BLM standards and guides are not incorporated or referenced in the Idaho Water Quality Standards and, therefore, an exceedance of such standards or guides does not alone justify listing a water on the states 303(d) list. DEQ used its best professional judgment in conjunction with an analysis of BURP monitoring data to determine the relevance of such information. The Region specific responses to comments in Chapter 4 of this document reflect the consideration and use of such information by DEQ in making its listing decisions.

Idaho Division of Environmental Quality Working Rules and Assumptions for Compiling Idaho's 1998 303(d) List.

DEQ provided the public two separate opportunities to review the working rules and assumptions for compiling the draft 1998 303(d) list. The first opportunity was in the Public Notice DEQ filed in November 1997 through January 1998. The second chance was in May of 1998 with the draft 303(d) package. <u>The working rules and assumptions have been revised as set forth below, to better reflect DEQ's position with respect to several critical issues after review and evaluation of public comments.</u>

1. DEQ relied heavily on Beneficial Use Reconnaissance Project (BURP) data and assessments of this data using the 1996 Water Body Assessment Guidance process and all errata, additions, and supplements to the 1996 Guidance. Assessment calls for Not Full Support (NFS), Full Support (FS) and Needs Verification (NV) were evaluated for listing and delisting purposes. Not Assessed (NA) means the water body or a particular beneficial use could not be evaluated even after visiting the site (i.e. dry, beaver complex, water too deep and swift, no fish data, etc.) and was not evaluated for listing or delisting purposes.

2. Water bodies from the 1996 303(d) list with Not Full Support assessment calls remain on the list for 1998.

3. Water bodies on the 1996 303(d) list with Needs Verification assessment calls stay on list for 1998.

4. DEQ proposes to add "new" water bodies to the 1998 list. These are water bodies not on the 1996 303(d) list. They have been determined to not fully support existing or designated beneficial uses. However, DEQ has not identified the specific pollutants causing the impairment. While DEQ is able to distinguish impaired from not-impaired conditions using BURP data, it is unable to establish clear causative relationships between impaired conditions and specific pollutants with BURP alone.

   Further, a water body need not be included on the list if the application of existing required pollution controls would achieve water quality standards and restore full support status. However, at this time DEQ is uncertain of the adequacy of any such existing pollutant controls for these "new" water bodies.

   When DEQ published the draft 1998 303(d) list, it included in the material provided to the public, an invitation to provide information and comments relating to the addition of these water bodies to the 1998 303(d) list, including, but not limited to, information relating to the following: (a) the identification of significant sources of pollution affecting these water bodies by past and present activities; and (b) whether the application of required or cost-effective pollution control strategies or controls would restore the water body to full support within a reasonable period of time. DEQ received no information indicating pollution controls would achieve water quality standards and restore full support of beneficial uses in these water bodies in the next two years, therefore, these new water bodies remain on the final 1998 303(d) list.

These water bodies will be scheduled for Total Maximum Daily Loads (TMDL) starting in 2006, since Idaho has an existing, court-approved TMDL schedule. This doesn't mean they will all be done in 2006, merely that they will be scheduled for 2006 and beyond. These "new" TMDLs will have to come after those currently in progress or scheduled. However, should resources and circumstances allow, these added water bodies could be scheduled for TMDLs sooner. This would be determined on a case by case basis.

5. Under the Clean Water Act §303(d) and U.S. Environmental Protection Agency regulation (40 CFR 130.2(J), 130.7), states are given authority to determine which waters do not meet water quality standards or have impaired beneficial uses. Furthermore, Idaho water quality standards (IDAPA 16.01.02.054 01., 02) allow DEQ to evaluate whether required control technologies, if applied, would restore beneficial use to full support. Hence DEQ has elected, for purposes of Idaho's 1998 303(d) list, not to list "new" streams falling in the Needs Verification category, according to the 1996 Water Body Assessment Guidance. In some cases DEQ is unable to read the "biological signal" after monitoring and interpreting the data. In these situations, the Division is not sure if the signal represents an impairment or merely a mediocre or misclassified stream. Hence, DEQ will not classify these streams as water quality limited until further monitoring and analysis can be performed as referenced above.

6. Section 303(d) of the Clean Water Act only requires TMDLs be calculated for those "pollutants" which the administrator of EPA has identified as suitable for such calculation. 303(d)(1)(C). The administrator of EPA identified all pollutants as suitable for TMDL calculation. 43 Fed. Reg. 60662 (Dec. 28, 1978). Therefore, whether a TMDL must be calculated depends upon whether a "pollutant" as defined in the Clean Water Act is involved.

The definition of "pollutant" in § 502(6) of the Clean Water Act includes a number of listed materials and categories of materials. The alteration of water flow and aquatic habitat are not among those items specifically identified as a pollutant in the definition, and also do not fit within any of the general categories of pollutants, such as industrial and agricultural wastes. In addition, EPA, in its comments on Idaho's Draft 303(d) list, appears to agree that the alteration of flow or habitat are not pollutants. Therefore, the state will not identify these as pollutants or list waters that are impaired solely as a result of flow or habitat alteration.

DEQ did remove some water bodies that were listed for flow or habitat alteration. However, these water bodies were not removed because they were listed for these parameters; instead, they were removed because the scientific data collected by DEQ established compliance with water quality standards and full support of uses.

While not pollutants, flow and habitat alteration are often the result of or reflected by the existence of pollutants in the water body that are suitable for TMDL calculation. Thus, for example, there may be excess sediment that impairs a use and therefore, violates state Water Quality Standards on a water body that also may be affected by a lack of water flow. If the impairment is at least in part the result of excess sediment, the water body will be listed on the 303(d) list.

While not suitable for TMDL calculation, flow and habitat alteration are important factors affecting water quality and may be appropriately taken into account under other water quality programs.

7. Significant issues about water temperature criteria for cold water biota, salmonid spawning and bull trout were raised during the public comment period. Upon close inspection of DEQ's and others' temperature data, coupled with biology occurring in those waters, DEQ came to the realization that serious questions exist with regard to Idaho's current water temperature standard and its application. This situation is fully described in Chapter 3 of this document. In essence, DEQ is unable to distinguish temperature exceedances due to natural conditions from those caused by humans activities. DEQ does not want to identify streams water quality limited when their uses are supported despite temperature criteria violations, or be forced to write TMDLs to reduce stream temperatures where such actions are not warranted or even possible. Therefore DEQ is taking the following steps with regard to water temperature:

- A study will be conducted aimed at producing data to support new water temperature criteria;
- All streams which would be listed for temperature on the 1998 303(d) list, both carryovers from the 1996 list and those determined to have major temperature exceedance during the 1998 303(d) process, are placed on a separate list (see Chapter 3);
- Those streams on the temperature list referenced above will be re-evaluated once new water temperature standards are developed and implemented; and
- TMDLs for temperature will be postponed for streams on this list for approximately 18 to 24 months, to allow time for the collection of data and development of new water quality standards to take effect.

8. Some water bodies from the 1996 303(d) list were "dry" at the time of monitoring. This presents a unique problem for DEQ since there are no pollutants to identify or allocate and no uses to protect. Under these conditions, a TMDL could not be done in the traditional sense of a load in mass per unit time. In cases where the 1996 303(d) listed water body was dry, DEQ has elected to keep it on the list for 1998. It is the intent of DEQ to collect more information such that a sound analysis can be made regarding the appropriate beneficial use of such waters. This type of analysis and rationale are envisioned as part of a subbasin assessment.

9. Some of the waters listed on Idaho's 1998 303(d) list may be wholly or in part within Indian Reservations and/or on lands held by tribal members subject to a restriction on alienation or held by the United States in trust for Indian Tribes. Including these waters on the 1998 303(d) list does not constitute a determination, waiver, admission or a statement on the part of the State of Idaho with respect to jurisdiction over such waters.

10. "Threatened" waters and potential declining waters are those waters where a downward trend or significant statistical decline (IDAPA 16.01.02.003.55) in water quality can be demonstrated through data. Please see response to public comments, in the section entitled assessment process/DEQ policy for a further explanation on how DEQ handled threatened waters.

11. Any exceptions to these assumptions will be referenced in the list itself or associated appendices.

CHAPTER 4. RIVER/STREAM ASSESSMENT

The 1996 assessment of the water quality status of Idaho rivers and streams is delayed pending the ruling of the U.S. District Court on the 303(d) process and schedule. Once the ruling is received and any necessary modifications are made, an assessment will be conducted.

History of Rapid Bioassessment

The use of biology as indicators of environmental change or condition has been with us for a long time. Aristotle, who is credited with dabbling in nearly every known area of modern science, placed freshwater fish in salt water to observe their reactions. Sesto Giulio Frontion, who was the chief engineer for water in ancient Rome, monitored the health of local residents near the city's water source as a way to ensure the safety of the public at large.

Modern biomonitoring begins in Europe in the early 20th century. Here, Kolwitz and Marsson codified the study of microbiota into a system that could be used to gauge the severity of organic pollution, termed the Saprobien system in 1908 (Hynes 1994). The use of microbiota was further expanded by Kolkwitz in 1950 by focusing in on individual species of animals and plants with numeric ratings. Thus, the early science of biomonitoring began to focus on "indicator" organisms as the key to man's influence and effects on the environment.

At the same time others in the biomonitoring arena were stressing the nature of the community over the individual as a better indicator of environmental impact or condition. Dr. Ruth Patrick was a leader in this idea though her work with algae. She introduced the idea that the structure of the community is more relevant than a mere list of species. Indices of pollution were developed by scientists in place of the indicator species. The work of Wright and Tidd (1930) is considered by some to be the first to apply the "index" concept.

Hilsenhoff (1977) combined the idea of the saprobic system with the notion of index into a biotic index that relied on fish communities and information about the individual species within the community as the indicator of water (organic) pollution. Hilsenhoff revised his original biotic index in 1982 and 1987. He then developed a popular family-level biotic index for screening water quality (Hilsenhoff 1988). This family-level index has since been modified by others around the U.S. and applied on a regional scale (Davis 1995). Here is an appropriate place to define biomonitoring as it is being used today: **"Biological monitoring can be defined as the systematic use of biological responses to evaluate changes in the environment with the intent to use this information in a quality control program"** (Rosenberg and Resh 1993).

All of these biomonitoring measures attempt to quantify stress on the biotic community. Basic ecology has been brought to bear on the questions and solutions surrounding the use of biota (biology) to gauge environmental change (Plafkin, et al. 1989, Hynes 1994). The ecological approach to the use and interpretation of biomonitoring data has shown the close connection and interrelatedness of biotic and abiotic components of ecosystems. Thus, well balanced biomonitoring programs involve physical habitat structure, chemical, and biological measurements.

Rapid biomonitoring assessment, also known as Rapid Bioassessment Protocols (RBP), was developed through the work of Plafkin, et al. (1989). Rapid biomonitoring means **"to expend the minimum amount of effort to get reproducible, scientifically valid results"** (Lenat and Barbour 1994). Plafkin, et al. (1989), and others developed the RBP methodology in response to several national initiatives on surface water monitoring (EPA 1987b, EPA 1988, USGAO 1988) and the need for cost-effective biological techniques in view of reduced budgets and manpower at both the state and federal levels.

The RBPs as designed by Plafkin, et al. (1989), were a blend of existing methods that were in use by other states at that time, notably Ohio EPA, Florida Department of Environmental Protection, Delaware Department of Natural Resources and Environmental Control, Massachusetts DEP, Kentucky DEP, and Montana DEQ. Protocols for three aquatic assemblages (macroinvertebrates, fish, and periphyton) were described as possible assessment tools. Different levels of intensity existed, each one progressively requiring more resources to conduct, as well as more technical expertise to numerate and interpret (i.e., I, II and III). The objective of all three levels was to provide inexpensive screening tools for determining if a stream was supporting or not supporting a designated aquatic life use (EPA 1997).

Evolution of RBPs as water quality assessment tools has continued over the last nine years. Today nearly three-quarters of the states use bioassessment data to measure the attainment of their aquatic life uses, and all but three states use bioassessment in some manner in their water resource activities according to a report by Davis, et al. (1996), for EPA. Most states are relying on macroinvertebrates and fish, while a few also use algae or periphyton assemblages in their bioassessment programs.

In addition to states, federal agencies and other countries have adopted similar biomonitoring techniques as the RBPs (EPA 1991 EMAP, Bournaud, et al. 1996, and Zamora-Munoz and Alba-Tercedor 1996). The U.S. Geological Survey has a national biomonitoring program known as the National Water Quality Assessment Program (NAWQA). The objective of this program is to describe the status of, and trends in, the quality of the nations's surface and ground-water resources and to provide an understanding of the natural and human factors that affect the quality of these resources (Hirsch, et al. 1988 and Leahy, et al. 1990). Approximately 60 large watersheds across the country are being monitored and water quality evaluated based largely on bioassessment (Maret 1995). The Upper Snake River Basin is one of the 60 large watersheds in this program.

Shift from Traditional Water Quality Monitoring to Biomonitoring

Why the emphasis on bioassessment and biomonitoring? As described above, it is faster, cheaper and, by and large, results in better evaluation of human impacts to water quality. This comes about because water quality standards are set up to protect certain beneficial uses. Biomonitoring and assessment go right to the beneficial use, be they macroinvertebrates or fish, instead of relying on an array of individual parameters, such as pH or dissolved oxygen, to describe the conditions believed needed to support those uses.

Traditional water quality monitoring focused on specific numeric water quality standards that centered on the chemistry of water. This is due to the fact that the first aspect of pollution control dealt with drinking water and human waste water. Engineers were generally in the driver's seat because they designed the control facilities and structures to deal with these two critical water quality elements. Engineers, besides being well educated in engineering and design principles, were also well disciplined in chemistry. Since engineers were designing control measures that dealt with specific elements being released or discharged into water, water quality standards, such as pH, dissolved oxygen, biological oxygen demanding compounds, temperature, and nutrients, went down the same road. This was quantitative chemistry for which engineers and science had a good understanding and techniques to monitor.

Great strides were made in controlling these discharges or releases into surface waters. In fact, that is the success story of the Clean Water Act's first 25 years. However, there is a limitation to merely looking at chemical characteristics of water quality. What we have learned is discharges and releases are very episodic in nature, that is, they occur sporadically, especially outside of a waste water treatment or industrial plant, also known as point sources of pollution. Thus, monitoring that looked solely at chemical characteristics very frequently missed the big event or pulse being discharged to surface waters (Livingston, et al. 1997). If you don't sample during an event, your water column sample looks good and passes all the appropriate chemical standard tests, but what about the biota living in those waters?

While improvements have been made in controlling point source pollution, the next biggest challenge is nonpoint source pollution control (NPS). Nonpoint source pollution is diffuse in both space and time, that is, it does not originate from a single place or time, such as a pipe. "Programs to control nonpoint sources of pollution remain largely unsuccessful because of the difficulties involved in applying point-source approaches to diffuse nonpoint source problems" (Karr 1991). As recently as 1995, EPA identified nonpoint sources as the main culprit in declining water quality around the U.S. since point sources were the first type of pollution to receive serious control efforts (EPA 1995). In fact, the U.S. has spent upwards of $473 billion dollars to build, operate and administer water pollution control facilities since 1970, and yet the nation's waters continue to decline (Water Pollution Control Federation 1991). Ohio found nearly 50% more impaired waters by looking at biology versus nonbiological methods (Yoder and Rankin 1995). Yoder and Rankin (1995) concluded that nonbiological methods of water quality assessment underestimated human impact in this study.

Biomonitoring and assessment is not the silver bullet for gauging human impacts to water quality; the state of the science is still evolving. However, Idaho and several adjoining states in the region have elected to use this type of tool for determining water quality impairment and beneficial use support. Oregon, Washington, and Montana are using a very similar process to Idaho (Mulvey, et al. 1992, Wisseman 1996, Plotnikof and Ehinger 1997, Bahls 1996).

<u>Idaho Experience with Rapid Bioassessment</u>

There are a number of studies that have occurred in Idaho, both by DEQ and others, that have employed Rapid Bioassessment (RBP) methods. Common themes among these studies were time saved, money saved, and the fact that biology was used in the form of one or multiple aquatic assemblages as an integrator of water quality. Within DEQ, biological monitoring of Idaho's waters has been conducted since the early 1970s. Bauer (1981a,b) looked at macroinvertebrates and algae to assess water quality for major river basins in the state. Over a ten-year period during the 1980s, the Rock Creek Rural Clean Water Program (RCWP) resulted in the most intensive macroinvertebrate and fish data set collected by DEQ for the purposes of water quality assessment Maret (1991).

Idaho's Antidegradation Agreement in 1989 resulted in a Coordinated Monitoring Program for Idaho (Clark 1990) which stressed the importance of biological and physical habitat monitoring. This agreement was supported by the Governor's Office and the various state and federal agencies and environmental groups in Idaho. The agreement resulted in a series of eight monitoring protocols published by DEQ which were an attempt to standardize the collection and use of biological and physical habitat data. Clark and Litke (1991) looked at macroinvertebrates and fish in assessing water quality conditions in Cedar Draw in relation to agricultural nonpoint source pollution. McIntyre (1993a) looked at fish and macroinvertebrates in comparing differences between two streams subjected to different levels of management. Students of Dr. Brusven at the University of Idaho have used macroinvertebrates to assess the effects of sedimentation and a major gasoline spill (McClelland and Brusven 1980, Pontasch and Brusven 1988). Students of Dr. Minshall at Idaho State University have also looked at macroinvertebrates to gauge impacts from wildfire (Robinson and Minshall 1995) and flow regime (Robinson and Minshall 1993).

Other state and federal agencies in Idaho are using biomonitoring and assessment to gauge impacts from various land use practices, such as timber harvest (Burton 1993), grazing (Platts 1991), mining (Martin and Platts 1981), or agriculture (Bauer and Burton 1993). Two main points are demonstrated by the above: (1) biomonitoring and assessment have been around for a long time, and (2) these methods have been used by a plethora of entities to better understand man's impacts on water quality.

<u>Beneficial Use Reconnaissance Project</u>

DEQ investigated the feasibility of implementing the ISU biomonitoring methodology in late 1992. By this time ISU had two years' worth of sampling experience. Each year ISU adjusted or refined the process as more data was accumulated and analyzed. DEQ's critical review of the study determined which specific methods could be employed given laboratory cost, equipment availability, manpower, and training. DEQ elected to drop the chemical sampling portion due to holding time and quality control issues, otherwise the ISU study design was adopted in full (McIntyre 1993b). The initial pilot was run at three DEQ regional offices: Boise, Twin Falls, and Pocatello. One three-person crew was assigned to each regional office. A range of sites and water bodies were sampled, following the ISU strategy, to compare obvious impacted versus minimally impacted. Approximately 130 sites were inventoried in 1993.

In 1994, the project was expanded statewide due to its success with production and costs in 1993. In addition, this was an opportunity to standardize DEQ's water quality biomonitoring and tie results to in-stream beneficial uses. Up to this point monitoring was done according to regional office needs and priorities. Some changes to the BURP process occurred in 1994. These came about from input received from a Technical Review Group of senior DEQ water quality monitoring personnel. The biggest change for 1994 was a shift from the Plafkin, et al. (1989) habitat assessment form to the one developed by the EPA Region 10 Bioassessment Work Group (Hayslip 1993). The Region 10 Work Group is made up of water quality specialists from Oregon, Washington, Idaho, and Alaska. They meet every year to discuss advancements in biomonitoring methods and assessments. The Hayslip habitat form was judged more relevant to Idaho since it was put together for and by regional experts. The second change for 1994 was the emphasis on training and quality assurance along with focusing on water bodies listed on the 1994 303(d) list.

Things changed very little in 1995 and 1996, though site selection continued to focus on 303(d) water bodies (DEQ 1995 and 1996). A pilot project looking at relationships between water temperature and various vegetation surrogates was investigated. In 1996, another pilot looked at the differences between the zig zag and Wolman pebble count methods. In 1997, many regional offices had finished the wadable streams on the 1994 303(d) list and began looking at non 303(d) streams. In addition, DEQ implemented a reservoir and large river monitoring project since approximately 39 water bodies and 100 water bodies existed in these two categories respectively (DEQ 1997). Of the 2,151 sites monitored between 1993 and 1996 and then assessed for the 1998 303(d) list, 979 or 45%, were on "nonlisted" water bodies. Thus, the argument that DEQ's MBI or habitat reference benchmarks may be biased because the data comes from sites listed on the 1994 303(d) list and hence suspect is not supported by the numbers.

The Development of DEQ's Macroinvertebrate Biotic Index

As noted above, the RBP document by Plafkin, et al. (1989) really got the biomonitoring and bioassessment idea in front of everyone as a sensible approach to measuring human impacts on water quality. In response to this renaissance in biomonitoring/assessment, DEQ contracted with Idaho State University (ISU) to develop an Idaho specific biomonitoring/assessment methodology using the RBP as a model. They started with the basic RBP structure and modified it where the data or analysis suggested increaseability to discriminate human influence (Robinson and Minshall 1991, Robinson and Minshall 1992, Robinson and Minshall 1995). The most comprehensive review of this work was recently published in *Great Basin Naturalist* (Robinson and Minshall 1998).

As more and more streams were surveyed under this study, refinements in sampling and analysis evolved. A suite of physical habitat parameters and some basic chemistry were measured at each stream along with macroinvertebrates and fish. A range of conditions were selected to capture variability across a continuum of conditions, for example, sites with little to no human influence to those with obvious impairment. From a suite of possible metrics ISU settled on seven different macroinvertebrate metrics that made up their composite biotic index. Metrics were selected for their power to distinguish impacted from nonimpacted waters. ISU used the same scoring scheme as the RBP for macroinvertebrates and habitat, with similar impairment categories (i.e., 5 for least impacted sites and 1 for impacted). They established ecoregional references for habitat, macroinvertebrates, and fish based on the data gathered through monitoring. These reference conditions are the backbone to the bioassessment process; they constitute the benchmarks for comparing streams. ISU worked in two ecoregions for the first two years of the study, the Snake River Basin (SRB) and Northern Basin and Range (NBR) (Omernik and Gallant 1986) Omernik and Gallant delineated eight ecoregions in Idaho, though three of them comprise well over 75 percent of the state: Snake River Basin, Northern Basin and Range, and Northern Rockies.

In January 1995, DEQ sat down to review and analyze the data collected in 1993 and 1994 through BURP. DEQ was unable to pick with confidence regional reference sites— sites that would form the basis for all comparisons in determining whether or not a water body was impaired. While this was not a problem for the SRB and NBR ecoregions since ISU had set reference conditions, there were no reference conditions set for the Northern Rockies ecoregion. Also, DEQ noted a high degree of variation in the habitat evaluation and scoring process. In many instances the overall habitat rating did not match with "a priori" judgment of water body condition nor with the biotic index as calculated using the ISU procedure.

Changes in the Macroinvertebrate Biotic Index

In response to these two drawbacks, DEQ reevaluated the ISU study, especially the metrics making up the biotic index and habitat evaluation/rating. Twelve metrics were considered, including all those used in the original ISU study and those found meaningful in other Pacific Northwest states (%EPT, HBI, %Scrapers, EPT Index, Taxa Richness, %Dominance, Shannon's Diversity Index, %Shredders, Total Abundance, %Filterers, Ratio of Scrapers to Filterers and EPT to Chrionomidae Ratio). Scatter plots of individual metric scores against total biotic score and habitat score were examined. Those that suggested a relationship were regressed against the total biotic score. Significance was set at an $r^2 \geq 0.30$. Out of this analysis, seven metrics emerged that were incorporated into DEQ's MBI (%EPT, HBI, %Scrapers, %Dominance, EPT Index, Taxa Richness and Shannon's Diversity Index). DEQ's MBI uses a multi-metric index (i.e., an index made up of several individual metrics looking at macroinvertebrate structure and function).

A method for discerning reference had to be chosen. To do this, DEQ selected the highest ecoregion metric score for each individual metric. This ecoregional high was then set at one and all lower scores were normalized to this value. The data was then plotted in rank order. Slope breaks were noted at specific areas in the curves between 2.7 and 3.1 for component metrics and ecoregions. These breaks were more pronounced in small data sets ($n \leq 50$) and tended to smooth out as a data set increased. Hughes (1995) commented that curve inflection and curve breaks are sometimes used to determine acceptable or unacceptable index values. The range was arbitrarily widened to 2.5 and 3.5 as a more conservative assumption. It was deemed better to commit a type II error, not calling a BURP site "Not Impaired" when in fact it was, versus a type I error, calling a site "Not Impaired" when in fact it may not be. Three categories were thus created in this process; Not Impaired, Needs Verification and Impaired. Not Impaired indicated that the MBI score and hence the macroinvertebrate community at that site was within ranges that would be expected in minimally impaired water bodies. Impaired means the MBI score was indicative of water bodies experiencing impairment as set by the theoretical reference condition for that ecoregion. This would mean the kinds of macroinvertebrate organisms found at that site were more dissimilar than those that would be found in a minimally impaired site, again based on the constructed ecoregion reference condition. Needs Verification would mean the various aquatic assemblages (i.e., macroinvertebrates, fish) did not allow DEQ to make a definite statement on status. This area represents a gray zone in which the water body may be impaired or merely mediocre.

Water Body Assessment Guidance

In 1996 DEQ developed the Water Body Assessment Guidance to formalize its assessment of BURP data as well as water quality data from outside DEQ (DEQ 1996). This guidance was developed to provide a consistent method to assess water bodies in Idaho. It is a decision tree that takes water quality data and determines existing beneficial uses, use support status, and whether state water quality standards are being met for a water body. DEQ incorporated assorted "tools" for evaluating biological data for purposes of determining beneficial use support status. The following tools were added in section 2300 of WBAG: MBI, RIBI, ABI and HI.

The strength of this process is its ecological underpinnings. It evaluates biological beneficial uses directly, such as salmonid spawning or cold water biota, as well as numeric and narrative criteria designed to protect those beneficial uses. Ultimately, this guidance provides statewide consistency in process application and hence results. This guidance is a "dynamic" or living document, that describes an assessment process, one that is expected to change as DEQ collects better information and the science of bioassessment evolves.

When the guidance was in draft, DEQ convened a Technical Review Committee (TRC) of scientists with disciplines in stream ecology, hydrology, fisheries, and statistics. Their job was to review the guidance in light of the mission statement: a process in which QA/QC controlled water quality data is used to make decisions on existing beneficial uses, beneficial use support status, and beneficial use attainability. They were expected to review the document in the context of the mission statement above, note critical technical issues, and suggest solutions based on supporting documentation or studies. Comments and recommendations were received and reviewed by DEQ. DEQ then finalized the Water Body Assessment Guidance and published it in August 1996.

Changes in the Water Body Assessment Guidance

In October 1996, DEQ began the actual process of assessing BURP data using the guidance. As with any new process, challenges were experienced as DEQ moved into applying the guidance. In response to these challenges, DEQ published an errata and an addendum in December 1996, that corrected some errors and clarified what to do when "needs verification" occurred because of habitat (see section 2300 Ecological Indicators in WBAG). Instead of quitting at the needs verification point, it was suggested that we look to other measures or assemblages for status. This came about because of some inconsistencies that started to appear in the BURP data with habitat, notably which habitat parameters were collected and how they were measured and rated.

Further, DEQ staff began to question how the habitat reference conditions were set as well as question giving habitat equal weight to biology. Again, due to the lack of reference conditions across the state, DEQ elected to use a trisection method to determine habitat reference benchmarks by ecoregion (Fausch, et al. 1986, Karr, et al. 1986). In this methodology the habitat scores between 5% and 95% were trisected, the upper one-third being considered minimally impaired, the middle third being needs verification and the bottom third being impaired water bodies based on habitat. DeShon (1995) used a very similar method to quadrisect the range of biotic scores for the Ohio assessment process, "When it was decided if a direct, inverse, combination of both, or no relation existed, the appropriate 95 percentile line was estimated and the area beneath partitioned into four equal parts. . ."

Besides questioning equal weight for biology and habitat in the assessment process, DEQ became concerned with some inconsistencies and variability in how crews chose habitat parameters for ratings and the weighting of those parameters. Crews were unable to consistently pick pools, riffles, runs, and glides in the field. Difficulty with repeatability in habitat measurement and rating is not unique to DEQ. Platts, et al. (1983) noted the lack of repeatability in their paper on methods for evaluating stream riparian and biotic conditions, despite the fact that the personnel used in the study had advanced degrees in natural resource fields and were well trained. They signaled out subjective habitat measures as being particularly problematic and subject to the largest decrease in precision. Hannaford and Resh (1995) came to the same conclusions in their study looking at variability in habitat assessments. Results of the habitat survey followed neither predicted site rankings nor benthic survey results. Considerable variability occurred among groups in the classification of individual habitat parameters. Hannaford and Resh (1995) finally concluded that habitat assessments in their study did not produce consistent results, attributed to observer error and natural intrasite variability. Lenz and Miller (1996) concluded, "The visual, qualitative watershed survey results showed that qualitative habitat and physical setting categorizations were not consistent among the agencies." They looked at the repeatability of habitat assessments between water quality agencies. Lenz and Miller determined the bias of the collectors affected their categorization of each stream. They further concluded that qualitative surveys were not sufficient to interpret the influences of physical setting or habitat on macroinvertebrate community measures.

A number of sources, inside DEQ and out, have pointed out that regressing individual metric scores against the total MBI score can lead to spurious results due to auto correlation. While this could happen, DEQ feels it is a weak argument for a number of reasons. First, the seven metrics in the MBI are the same ones most frequently used in other studies and other state's bioassessment programs. Second, in a preliminary investigation of assessment methods, Tetra Tech, a contractor for EPA, found Idaho's classification scheme and metric scoring system to be as good as any other tested for Idaho data.

<u>Supplemental Guidance to the 1996 Water Body Assessment Guidance</u>

With these doubts about the precision of habitat parameters, DEQ wondered about the logic of giving habitat equal weight with biology in the WBAG process. Looking at what other states had done with habitat, it became clear that habitat is a critical part of water quality but lacks repeatability in application. Due to this, most states were found to be using their habitat information in "a posteriori" analysis in most water quality assessment programs (Resh, et al. 1995). In other words, most states were using their habitat information to explain what was going on with their biology, be it macroinvertebrates or fish. One of the main functions of Ohio's habitat assessment is to explain causes and sources of impacts to the aquatic life in their waters (Rankin 1995). On closer inspection of RBP, Plafkin, et al. (1989) admit the habitat evaluation carries considerable weight in the final assessment because of the minimal effort expended on the collection of biological data. However, in RBP levels III and V, which are most similar to Idaho's BURP, the biological collections are more rigorous and appropriately take precedence in the final assessment. In other words biology takes precedence over habitat. Plafkin goes on to say in RBP levels III and V, habitat evaluation plays a supporting role and is used to identify obvious constraints and help interpret the biosurvey results.

Considering all of the above, DEQ elected to develop a supplemental guidance to be used with the 1996 Water Body Assessment Guidance. The Supplemental Guidance alters the process described in Section 2300, Ecological Indicators, in the WBAG to give more weight to biology (see Attachment 1). This Supplemental Guidance merely changes the sequence of data consideration, placing habitat later in the sequence rather than earlier. Now exceedances are considered first and evaluated as either major or minor. Major exceedances override the biology in all cases. Minor exceedances defer to biology for the impairment and beneficial uses support status call.

Biology is the ultimate arbitrator for assessment calls in this Supplemental Guidance since calls are generally made before getting to habitat. Only after considering macroinvertebrates, fish and, where available, algae, and getting a Needs Verification (NV), does the process proceed to habitat for a status call. If the habitat evaluation is still inconclusive, then the water body status call is NV. At this point DEQ is not sure if water quality is affecting the biota or merely that the biota and water body in question are mediocre. DEQ feels the biology occurring in these waters is better at telling us what their habitat and water quality requirements are than we are at this time.

Defining major and minor criteria exceedance is critical in understanding the WBAG process and status determinations. The lack of clear definition was identified early on by the TRC in 1996. Several options were debated, but none were selected. This lack of definition was taken up again by the TRC in 1997. A member of the TRC was charged with looking into how other states handled the question of criteria exceedances. He found that the majority relied on best professional judgment; hence DEQ's approach was acceptable (see TRC minutes 1/20/98). For purposes of consistency, best professional judgment of what constituted a major or minor criteria exceedance was made by regional water quality professionals at DEQ. They evaluated the magnitude and duration of the criteria exceedance and its impact on the biota in that water body. If they determined that the magnitude and duration affected the biota, the exceedance was judged major. However, if the biota did not appear to respond to the exceedance and there was no other supporting information available, then the exceedance was deemed minor. The regional staff were viewed to have the best on-the-ground knowledge of the conditions and factors affecting the water body in question. Water temperature exceedances greater than 3 degrees for cold water biota and salmonid spawning were considered major, while temperatures of 3 degrees or less above the average were considered minor (water temperature >16 for salmonid spawning or 25° C. for cold water biota are consider major, while <=16 for salmonid spawning or 25° C. for cold water biota are considered minor).

Choosing to be conservative in our application of this new guidance, DEQ elected to use what was termed a "lowest common dominator" when multiple status calls were encountered on the same water body, for instance, a call of Full Support at one site and a call of Not Full Support at another site on the same water body. If a reasonable explanation could not be determined (i.e., land use change, ownership change, geology etc.), then the lowest support call (i.e., Not Full

Support or Needs Verification) was used for characterizing the entire water body. If a reasonable explanation was evident, then a boundary change was made to better focus where along the water body water quality impairments were occurring.

CHAPTER 5. LAKE ASSESSMENT

The 1996 assessment of the water quality status of Idaho lakes is delayed pending the ruling of the U.S. District Court on the 303(d) process and schedule. Once the ruling is received and any necessary modifications are made, an assessment will be conducted.

The assessment of Idaho's lakes and reservoirs water-quality status was initiated statewide in 1997 with the Lake and Reservoir Beneficial Use Reconnaissance Project. These efforts were continued in 1998. This project collects physical, chemical, and biological reconnaissance-level monitoring data. Thirty-nine waters have been or will be monitored by the end of 1998 (Table 1).

Table III-8. List of lakes or reservoirs in Idaho monitored in 1997 and 1998 as part of the Lake and Reservoir Beneficial Use Reconnaissance Project indicating water body size and support status.

Water Body Name	Water Body Size (acres)	Support Status
American Falls Reservoir	68480	pending
Anderson Ranch Reservoir	4740	pending
Black Canyon Reservoir	11000	pending
Blackfoot Reservoir	1024	pending
Black Lake	403	pending
Blue Creek Reservoir	186	pending
Brown's Pond	83	pending
Brundage Reservoir	192	pending
Brush Lake	NA	pending
Bull Trout Lake	NA	pending
(Roseworth) Cedar Creek Reservoir	1472	pending
C.J. Strike Reservoir	7501	pending
Crane Creek Reservoir	3200	pending
Cocolalla Lake	768	pending
Deadwood Reservoir	3200	pending

Water Body Name	Water Body Size (acres)	Support Status
Elk Creek Reservoir	90	pending
Fernan Lake	384	pending
Hauser Lake	591	pending
Hawkins Reservoir	70	pending
Hayden Lake	3840	pending
Henry's Lake	6848	pending
Island Park Reservoir	7680	pending
Lake Lowell	9472	pending
Lake Walcott	11850	pending
Little Wood Reservoir	570	pending
(Oakley) Lower Goose Reservoir	960	pending
Mormon Reservoir	1152	pending
Oneida Narrows Reservoir	518	pending
Palisades Reservoir	16100	pending
Ririe Reservoir	1536	pending
Sage Hen Reservoir	NA	pending
(Alexander) Soda Springs Reservoir	1062	pending
Spring Valley Reservoir	NA	pending
Spirit Lake	1338	pending
Sublett Reservoir	96	pending
Twin Lakes	883	pending
Waha Lake	NA	pending
Williams Lake	NA	pending

An assessment method to determine beneficial use support status has not yet been developed. Data collected during the last two years will be used to formulate the guidance.

Few waters were assessed as part of the Clean Lakes Program from 1996 to 1998. Big Payette Lake was completed and a technical report published. Winchester Lake Phase II was completed during the last reporting period, however, the report was published in 1996. Other lakes or reservoirs may be monitored as part of other federal, state, or institutional organizational studies, for example, Federal Energy Regulatory Commission relicensing.

CHAPTER 6. WETLANDS ASSESSMENT PREPARATION

The state of Idaho recognizes that wetlands play a vital role in water quality management programs including shoreline stabilization, nonpoint source runoff filtration and erosion control. All of these functions directly benefit adjacent downstream waters. Riparian wetlands supply stream shading which provides cover and water temperature cooling and allocthonous material as food and nutrient inputs to Idaho surface waters. In addition, wetlands provide important biological habitat, including nursery areas for aquatic life and wildlife and other benefits such as ground water recharge (which keeps streams flowing during dry seasons) and recreation. Idaho does not have a formal wetland regulatory program as such, but the DEQ is involved in wetland protection through authorities granted under the Federal Water Pollution Control Act, as amended (Clean Water Act).

While there exists a vast amount of information on wetlands located in various agencies throughout the state, there is no central data collection point. The DEQ continues the process of instituting a watershed plan that will include wetlands as part of the overall watershed planning approach. Also included in that plan is the collection of all existing wetland data from all state and federal agencies to be incorporated within a central data station and available to all agencies, municipalities and private persons. This is in cooperation with the Idaho Fish and Game Department where the main data base system is located. When completed, this watershed and wetlands data system will house all available data by watersheds including wetlands and can be accessed via a modem to review data needed for management decisions. Information collected from the TMDL studies will be transferred to this system to assure that water quality information is available to prospective users.

Wetland Water Quality Standard Development

Under a previous EPA grant the Idaho DEQ has developed §401 rules and regulations that will offer protection to wetlands. These rules are currently on hold as the Idaho Legislature has placed a moratorium on any new rules and regulations. Idaho DEQ currently uses the basic language from the CWA to regulate the §401 Certification program. The DEQ participates in monthly interagency coordination meetings to discuss and make recommendations on activities affecting wetlands. The DEQ relies on the U.S. Army Corps of Engineers and the National Resource Conservation Service for all wetland delineations associated with the §401 certification program.

Additional Wetland Protection Activities

The DEQ utilizes the §401 certification process for all activities requiring a federal permit including Corps of Engineers §404 permits, FERC licencing, NPDES permits, §402 stormwater permits and NEPA as directed. The DEQ has established a Water Quality Program Specialist position that is expressly directed to manage the §401 certification program. This person was hired in October 1993 and one of their primary goals is to compile a complete listing and tracking of §401 certification applications. This computerized reporting system is scheduled to be functional by April 1996 and will track a host of informational fields necessary to maintain scrutiny of the §401 program.

Past state activities utilizing §104(b)(3) wetland grant program funds include a grant in 1992-93 for the study, drafting and submittal of §401 rules to be enacted in 1993. These rules were submitted to the rules committee in October 1993 and are currently on hold.

The DEQ and Idaho Fish and Game Department was awarded a §104(b)(3) wetlands grant in 1994 for the purpose of collecting all available wetland data currently accessible. This grant will assist all DEQ regional personnel, other state and federal agencies, and the public at large in determining the extent of wetlands and impacts associated with the proposed activity. This grant will be the first step in the pursuit of a state watershed plan that includes wetlands.

CHAPTER 7. PUBLIC HEALTH/AQUATIC LIFE

Idaho Falls Regional Office

The Island Park area in eastern Idaho lies within a volcanic caldera consisting of heavily fractured rhyolitic and basalt formations. The area is vulnerable to ground water contamination due to the high water table and the porous nature of the rock strata.

During August 1995, visitors at a resort and an adjacent subdivision in Island Park developed acute diarrheal illness with five people requiring hospitalization. An epidemiologic investigation implicated contaminated drinking water as the cause of the outbreak and confirmed *Shigella sonnei* as the causative agent. The resort is supplied by a public water well which tested positive for fecal coliform. Private homes are supplied by individual wells. Six of ten private wells were sampled and found to be positive for fecal coliforms. However, *Shigella* could not be isolated from samples collected from the contaminated wells. An investigation to determine the source of the contamination was conducted jointly by DEQ, Idaho Department of Water Resources (IDWR), District 7 Health Department and the Fremont County Sewer District. The source of fecal contamination was not located. However, the presence of fecal contamination in multiple wells suggest that the contamination and spread of viable Shigella organisms occurred through the ground water. A new well and treatment system was sited and constructed in accordance with DEQ and IDWR recommendations which provided the resort with a safe potable water supply and allowed them to remain open for business.

The DEQ, IDWR and the District 7 Health Department performed an investigation of drinking water supplies in the Island Park area due to the lack of historical water quality data and unknown well construction features. The District 7 Health Department collected random bacteriological samples of several private and public water supplies. Sampling results showed approximately 50% of the wells had the presence of total coliform. The DEQ, IDWR, and District 7 Health Department collected additional coliform, nitrate and chloride samples from 50 public water supplies in Island Park. The results showed no significant anomalies of nitrate and chloride contamination. However, 38% of the public supply wells showed total coliform contamination and two wells had fecal coliform contamination. Repeat sampling and public notification of the bacteriological contamination was subsequently implemented. Treatment systems were installed on the fecal contaminated wells.

The IDWR with the concurrence of the DEQ instituted additional construction criteria for all new wells in the area. Several presentations by the DEQ, IDWR and District Health to the Fremont County Commissioners and Planning and Zoning were made to increase the public awareness of ground water quality and land use practices as well as to promote upgrading existing zoning ordinances to encourage community water and sewer systems. Media coverage prompted many private homeowners to test their water supply for the first time. Technical assistance was provided to many private homeowners on proper maintenance of onsite wastewater disposal system, well construction and location, water quality sampling, and water treatment.

Resources permitting, additional and periodic ground water monitoring as well as public education by the DEQ, IDWR and District Health will be implemented for the protection of public health and the environment of the Island Park area.

Lewiston Regional Office

Public health and aquatic life concerns in the Lewiston Region in the past two water years include fish kills and surface water supplied drinking water problems. No fish consumption advisories or bathing area closures were issued.

Three significant fish kills were documented in 1994. During the summer of 1994, a kill involving trout occurred on the main stem of the Clearwater River resulting from high water temperatures due to low flows and high ambient air temperature. In August of 1994, a kill involving trout occurred in the upper reaches of Dworshak Reservoir resulting from a combination of high water temperature and low flows. Winchester Lake experienced a trout kill during the fall of 1994 as a result of low dissolved oxygen and high water temperatures.

A number of boil orders were issued in the past two water years for public water supply systems taking water from the Clearwater River, Big Elk Creek and Big Canyon Creek. On the Clearwater River, the City of Riverside received a boil order in February of 1995, Orofino received boil orders in June and July of 1994 and Kamiah received a boil order in June of 1994. Elk City takes drinking water from Big Elk Creek and received boil orders in December of 1993 and January of 1994. Peck receives drinking water from Big Canyon Creek and was under a boil order during February of 1995.

Coeur d'Alene Regional Office

Public health and aquatic life concerns in north Idaho included a major fish kill, Pend Oreille Lake lead and mercury accumulation, three bathing area closures and the potential for contamination of surface water supplied drinking water systems. Other concerns are the more subtle and scattered nonpoint source problems that collectively have a cumulative effect on surface waters of the Panhandle basin. In 1993, 1994 and 1995, surface water complaints filed in the Coeur d'Alene Regional Office averaged 280 per year. The predominant pollutants in these surface water complaints were sediment, sewage and hazardous materials (oil, metal and pesticides).

In May 1994, Black Lake experienced a major fish kill. Fish involved in the kill were perch, crappie, pumpkinseed, largemouth bass, northern pike and bullheads. The Division of Environmental Quality sampled dissolved oxygen and found levels above state standards. The cause was not identified.

In 1993, as part of the Pend Oreille Lake diagnostic feasibility analysis, DEQ assessed the lake fishery for bioaccumulations of organic compounds and metals. Results were not based on statistically derived data and sample sizes were small. But, lead and mercury levels were high enough to warrant further evaluation of human health risks.

Between October 1993 and September 1995, the following beach closures were reported in the Panhandle Basin of Idaho. Hayden Lake beach was closed due to a sewage spill. The Spokane River beach was closed due to high bacteria levels, possibly due to wild geese feces. The Coeur d'Alene Lake and Priest Lake beaches were closed due to "swimmer's itch".

There are currently fifty (50) regulated public water systems in the Panhandle Basin using surface water sources (lakes and streams). Thirty two (32) systems draw water from streams and eighteen (18) draw from lakes. Approximately thirty eight percent (38%) of these systems use unfiltered surface water. The primary public health concern with these systems is contamination of the surface water sources with sediment, microbiological, or chemical contamination. High turbidity levels caused by erosion in the watersheds has led to boil water advisories in a number of cases. Chemical contamination has not been as big a concern although lead levels entering Coeur d'Alene Lake are a potential health threat to unfiltered systems drawing from the lake. Filtered systems drawing from the lake have not violated contaminant levels in treated water although excessive lead levels have been found in raw waters serving the treatment plants.

Pocatello Regional Office

No fish consumption advisories were issued in the 1994 or 1995 water years. No surface water influenced drinking water system problems were experienced. The lower Portneuf River was closed to primary contact recreation during middle to late summer in 1994 and 1995. In July 1994, a fish kill occurred in the Portneuf River between the North Main Street extension and Batiste Springs. An investigation of this fish kill was conducted by the Idaho Fish and Game Department and DEQ. The investigators concluded the fish kill was prompted by a dissolved oxygen problem.

The Blackfoot River, Rockland Valley, and Bannock Creek watersheds are also impacted by agriculture, forestry, and, in the case of the Blackfoot River, phosphate mining practices. Beneficial use surveys continue in all of these watersheds.

The Idaho portion of the Crow Creek drainage, as well as the smaller McCoy and Tincup drainages are similar in that they reside mostly on land administered by the US Forest Service. Water quality remains generally as high in these areas as is found in our region. Beneficial use surveys continue in these watersheds.

Boise Regional Office

The Boise Regional Office of the DEQ has a number of public health and aquatic life concerns that occurred in the past two water years. In the summer of 1994, a major fish kill occurred in Cascade Reservoir. This fish kill involved all species and was due primarily to low dissolved oxygen levels and high water temperature. Swimming beach warnings were also posted at Cascade Reservoir in 1994 due to a lift station failure at McCall. A fish consumption advisory for mercury contamination is still in effect on Brownlee Reservoir.

During spring runoff, high turbidity frequently occurs in Elk Creek. Elk Creek is the source of Idaho City's drinking water. When this occurs, a boil water notice is issued.

Additionally, we developed watershed plans for a number of high priority water bodies in southwest Idaho. A status report on priority watersheds in the Boise region is provided below for the Boise River and Payette watershed activities.

Boise River

The Boise River from Star to the river's mouth at the Snake River is considered a high priority stream due to its proximity to the largest urban area in the state and its popularity for recreation. High bacteria counts in excess of the standard recommended for primary contact recreation have been reported to occur in the river near Parma. Sediment deposits frequently occur in the lower part of the river which contribute to turbidity and reduction in fish habitat. Recent information indicates that this part of the river contains phosphorus concentrations as high as 0.5 mg/L during certain times of the year. Temperatures as high as 21 °C have been found in this portion of the river. These readings occur during the summer months, but may also be influenced by removal of riparian shading and higher temperature water from irrigation return flows. These water quality indicators demonstrate that the designated beneficial uses of the river are not fully supported. Due to these obvious problems and increased public concern, measures are necessary to address these problems.

Cascade Reservoir

A discussion of water quality conditions in Cascade Reservoir is contain in the State Special Concerns section (Part II, Chapter two) of this report.

Payette River

The Payette River from Black Canyon Dam to its mouth at the Snake River is considered a high priority stream. Irrigation return flows in the lower stretch of the river is one of the major sources of pollutants. The primary pollutants associated with these return flows are sediment, nutrients, bacteria and increased temperature.

CHAPTER 8. SUB-BASIN ASSESSMENT/TOTAL MAXIMUM DAILY LOAD PROJECTS.

Because the sub-basin assessment (SBA) and total maximum daily load (TMDL) projects are a major effort describing water quality status and plans for improvement in Idaho, a short description of each is listed. Following are the SBA/TMDL projects that DEQ is currently working on:

Clearwater Basin

TITLE:	Winchester Lake TMDL (Subbasin Assessment & Loading Analysis)
CONTACT(S):	John Cardwell, Lewiston Regional Office
HUC(s):	17060306
DATE DUE/SCHEDULE:	1998
PROBLEM(S):	Jointly developed with EPA and Nez Perce Tribe, required additional collaboration and reviews than expected. Upper Lapwai Creek also completed as requested by Tribe and EPA. Upper Lapwai Creek determined to be full support through 1996 BURP subsequently removed from 98 303(d) list by DEQ.
RESULTS OF STUDY:	Lake found to have excessive phosphorus loading. Lake found not to require pesticide, bacteria or temperature load allocations. Sediment load allocation based on meeting phosphorus allocation.
STATUS:	Currently under review by EPA and Nez Perce Tribe, scheduled to be jointly issued by DEQ, Tribe and EPA in February of 1999.
IMPLEMENTATION:	Process not defined through the joint management MOA, to be determined later as per Tribe and EPA. Will involve BMPs to address primarily agricultural non-point sources.
LITERATURE CITATIONS:	Major citation - Phase I and Phase II Clean Lakes Reports, others contained in TMDL.

Salmon Basin

TITLE:	Lemhi TMDL (Subbasin Assessment & Loading Analysis)
CONTACT(S):	Tom Herron/Chris Mebane, Idaho Falls Regional Office
HUC(s):	17060204
DATE DUE/SCHEDULE:	1998
PROBLEM(S):	Siltation, flow alteration, and bacteria associated with agriculture, grazing, rural sprawl, and hobby farms.
RESULTS OF STUDY:	13 tributaries to the Lemhi River were listed as threatened or water quality limited on the 1994 303(d) list for sediment, nutrients, flow alteration, and metals. Waters were evaluated through RBP protocols, core and surface sediment sampling for salmonid spawning suitability, and stream walk surveys to evaluate bank erosion/sediment production. Additionally, trace metal analyses of sediment and water from the one stream listed for metals were made. A cooperating volunteer monitoring program reported time series conventional water quality parameters on the Lemhi River. Study results found that 3 tributaries were biologically impaired, but that the previously unlisted mainstem Lemhi River did not meet water quality standards for fecal coliform bacteria. Sediment trace metals chemical results were below NOAA sediment quality guidelines and were similar to reference conditions. Stream bank erosion surveys results provided relative sediment load estimates in the TMDL mass per unit time format (tons/mile/year). In conjunction with biological condition data, and regional background loadings, these load are being used to allocate load reductions in the TMDL.
STATUS:	Subbasin assessment completed March 1998. TMDL to be completed March 1999.
IMPLEMENTATION:	The Lemhi Soil Conservation District and a watershed advisory group are assisting operators and landowners to install and maintain BMPs to protect and restore water quality. The implementation and maintenance of BMPs for agricultural practices in Idaho follows a voluntary, non-regulatory approach.

LITERATURE CITATIONS:

1998. Lemhi River Subbasin Assessment Summary. Prepared for: Principal Working Group of the Lemhi Country Riparian Conservation Agreement. Prepared by: U.S. Bureau of Land Management, Salmon Resource Area and Idaho Division of Environmental Quality, Idaho Falls, ID. 94 pp.

Southwest Basin

TITLE: Cascade Reservoir Phase II Management Plan (Subbasin Assessment & Loading Analysis)

CONTACT(S): Tonya Dombrowski, Cascade Satellite Office, Boise Regional Office

HUC(s): 17050123

DATE DUE/SCHEDULE: December 31, 1998

PROBLEM(S): Excessive algae growth caused by high nutrient loading to the reservoir has impaired beneficial uses (fishing, swimming, boating, agricultural water supply). Excessive algae growth has resulted in decreases in dissolved oxygen and fluctuations in water column pH, influencing a decline in available fish habitat during the summer months.

RESULTS OF STUDY: The water quality of Cascade Reservoir has been identified as impaired under Section 303(d) (1998) of the CWA, due to violations of water-quality standards for dissolved oxygen, nutrients and pH. Beneficial uses for Cascade Reservoir found to be at risk are agricultural water supply (toxic algal blooms), cold water biota (depressed dissolved oxygen (DO) and warm temperatures) and primary and secondary contract recreation (toxic algal blooms)

Water-quality studies have shown that phosphorus is the pollutant of concern within the watershed. Historical and current monitoring data have shown that phosphorus enters the reservoir from nonpoint sources (primarily spring runoff and irrigation returns) and from point sources. Continued inputs of phosphorus and fluctuations in water level within the reservoir have led to eutrophic conditions. Because of the direct relationship between high total phosphorus concentrations and excess algae growth within the water column, and the direct effect of the algal life cycle on dissolved oxygen and pH within the reservoir, the reduction of total phosphorus input to the reservoir is being specifically targeted as a mechanism for overall water-quality improvement. It is expected that phosphorus management will result in improvement in all listed water-quality parameters: nutrients (phosphorus), dissolved oxygen and pH.

To improve the quality of water in Cascade Reservoir, a 37% total phosphorus reduction has been identified through computer modeling techniques. This reduction is anticipated to result in water-quality improvements that attain 0.025 mg/L total phosphorus and 10 ug/L chlorophyll a within the reservoir. Reductions required are based on assessment of the maximum inlake load that can be sustained without beneficial use impairment. Reductions were assessed at the level required to achieve the inlake-water-quality objectives for phosphorus concentration.

STATUS: Currently in the final-edit period before printing. On track for December 1998 submission deadline.

IMPLEMENTATION: The formal implementation plan for Cascade Reservoir is currently in progress. Preliminary BMP evaluation mechanisms and issues of priority are being compiled by the existing TAC, WAG and Source (Forestry, Agriculture, and Urban/suburban) groups. The formal document is expected to be completed within an 18 month time frame. However, while the formal implementation plan is only in the preliminary phase, actual implementation projects have been in progress within the watershed since approval of the phase TMDL. A significant amount of work has been completed in the areas of *irrigation management* (conversion from flood to sprinkle, improvement of existing ditch and rainage condition and management, increased efficiency of water use, improvements to irrigation schedules), *grazing management* (reduced grazing densities, rotational grazing schedules and early removal of livestock, hardened stream crossing, off-site watering facilities, and fencing-off of riparian areas), *created wetlands* (constructed for improved catchment, filtration, sediment removal and phosphorus removal from storm water, snow-melt, precipitation events, and irrigation recharge), *sewer and septic reductions* (partial (soon to be total) removal of City of McCall WWTP effluent from the North Fork Payette River (a major tributary to the reservoir), septic to sewer conversions), and *urban storm water runoff treatment and reduction.* Additional projects are scheduled in the near future.

LITERATURE CITATIONS: Boise Cascade Corp. 1996; Idaho Division of Environmental Quality 1996; Idaho Division of Environmental Quality 1996; McGeehan 1996; Natural Resources Consulting Engineers, Inc. 1996; Whiting P.J, et al. 1997; Worth 1997.

TITLE:	<u>Lower Boise River TMDL (Subbasin Assessment & Loading Analysis)</u>
CONTACT(S):	Bryan Horsburgh, Boise Regional Office
HUC(s):	17050114
DATE DUE/SCHEDULE:	December 1998
PROBLEM(S):	303(d) List: Flow alteration, sediment, DO, Nutrients, Temperature, Bacteria. Complex mix of sources, including agriculture, urban, and industrial sources. Downstream from three major water storage reservoirs. Note: Flow alteration Lucky Peak to Barber only. Problem Pollutants: Sediment (suspended), fecal coliform phosphorus.
RESULTS OF STUDY:	Developed instream criteria for suspended sediment; Developed load allocations for suspended sediment; Developed load allocations (concentration based) for fecal coliform bacteria; Proposed no net increase cap loads for total phosphorus, tributaries and waste water treatment plants.
STATUS:	Draft TMDL available for public comment until November 13, 1998. Submitted to EPA December 1998, awaiting approval.
IMPLEMENTATION:	Pending, active WAG working on implementation, exploring effluent trading options for addressing phosphorus.
LITERATURE CITATIONS:	Anderson 1998, Dupuis and Nelson 1998, Miller 1998; Miller 1998; Nelson and Dupuis 1998; Schinke 1998; Schinke 1998.

TITLE:	<u>Lower Payette River TMDL (Subbasin Assessment & Loading Analysis)</u>
CONTACT(S):	Mike Ingham, Boise Regional Office
HUC(s):	17050122
DATE DUE/SCHEDULE:	December 1999
PROBLEM(S):	Water body is listed for nutrients bacteria and temperature. Sources are primarily agriculture.
RESULTS OF STUDY:	For nutrients; data is indicating that nutrients are not contributing to nuisance aquatic vegetation growth; no levels exceed 6.0 mg/L with no 24 hr. No sage temperature; data shows the state temperature criteria is exceeded, however, cold water biota and salmonid spawning appear to be supported (Mnt. White Fish), suggest change of designated use to Cool Water Biota; Bacteria; extensive bacteria monitoring shows exceedances of primary and secondary recreation for fecal coli, E. coli proposed change, no exceedance noted. Further monitoring proposed.
STATUS:	Sub-Basin Assessment in final development, TMDL in final development.
IMPLEMENTATION:	
LITERATURE CITATIONS:	Lower Payette River SBA, Boise Regional Office

TITLE:	<u>Middle Fork Payette River TMDL (Subbasin Assessment & Loading Analysis)</u>
CONTACT(S):	Johanna Luce & Bob Steed, Boise Regional Office
HUC(s):	17050121
DATE DUE/SCHEDULE:	Public comment period ends: November 18, 1998. Submitted to EPA: December 31, 1998
PROBLEM(S):	Excess sediment leading to loss of over-wintering and migration uses by bull trout and other fish species. Sources are primarily forestry activity and rural housing development, hobby farms.
RESULTS OF STUDY:	Sediment targets set as a function of "percent above background" deposition rates. TMDL targets will be met through documentation by land management agencies of reduced sediment production and on-going water body assessment for full support.
STATUS:	Public comment period between 9/30/98 and 11/18/98 (current status). Awaiting EPA approval.
IMPLEMENTATION:	No WAG has been formed. Southwest BAG has been the main public input vehicle. A WAG will be formed after EPA approval. Implementation will rely on BMPs to address land management sources.
LITERATURE CITATIONS:	

Upper Snake Basin

TITLE:	Lake Walcott (Subbasin Assessment & Loading Analysis)
CONTACT(S):	Tom Miller, Twin Falls Regional Office
HUC(s):	17040209
DATE DUE/SCHEDULE:	December 1998, TMDL due in 1999
PROBLEM(S):	Sediment, nutrients, dissolved oxygen.
RESULTS OF STUDY:	De-list Snake River 303(d) segments; do TMDL for Rock Creek (Power County) 303(d) segments.
STATUS:	Central Office Internal Review
IMPLEMENTATION:	Implementation plan will be developed by WAG and will identify BMPs for sediment on selected tributaries.
LITERATURE CITATIONS:	Miller 1998.

TITLE:	Portneuf River TMDL (Subbasin Assessment & Loading Analysis)
CONTACT(S):	Mike Rowe, Lynn Van Every- Pocatello Regional Office
HUC(s):	17040208
DATE DUE/SCHEDULE:	December 1998
PROBLEM(S):	Pollutants of concern: sediment, nutrients, bacteria, flow alteration, oil and grease, dissolved oxygen. Mixture of urban and rural non-point sources, irrigated agriculture.
RESULTS OF STUDY:	Levels recommended for sediment, nutrients, oil and grease bacteria, and PCBs. Site-specific criteria for dissolved oxygen. More information needed to establish loads for temperature. Flow alteration was not addressed.
STATUS:	Out for public review. Being revised to address comments, to be submitted to EPA in March 1999.
IMPLEMENTATION:	Implementation plan is due in mid-2000.
LITERATURE CITATIONS:	Rowe, et al. 1999

TITLE: Upper Henry's Fork (Subbasin Assessment & Loading Analysis)

CONTACT(S): Sheryl Hill or Chris Mebane, Idaho Falls Regional Office

HUC(s): 17040202

DATE DUE/SCHEDULE: 1998

PROBLEM(S): Two water bodies appeared on the 1994 section 303(d) list of water quality-limited water bodies. Henry's Fork was listed for sediment; Henry's Lake was listed for dissolved oxygen.

RESULTS OF STUDY: Development of total maximum daily loads (TMDLs) for the Henry's Fork and Henry's Lake are either not feasible or unnecessary. Sediment loading in the listed segment of the Henry's Fork was due to unusually extreme drawdown of Island Park Reservoir in 1992, and seasonal depletion of dissolved oxygen in Henry's Lake is a function of naturally high concentrations of phosphorus in the lake's watershed. Previous studies, cited in the assessment, concluded that actions which could reasonably be implemented to reduce the input of phosphorus to Henry's Lake would not eliminate winter oxygen depletion and the occasional fish kills, which does not adversely affect the fishery, are natural. High primary productivity, due to ample nutrient supply, is both a prime factor in seasonal dissolved oxygen depletion and the phenomenal fish growth and productivity which have made Henry's Lake a world class fishery. Recent data indicate that both Henry's Lake and Henry's Fork support the beneficial uses of cold water biota and salmonid spawning.

Water quality in the remainder of the subbasin is generally good, and the large number of water bodies sampled indicate that most support aquatic life beneficial uses. Where localized water quality problems exist, they are generally related to riparian habitat quality, Stream bank stability, and flow connectivity between water bodies. The lower reaches of Sheridan Creek, a large tributary of Island Park Reservoir, does not support salmonid spawning and has been identified by the Henry's Fork Watershed Council as its highest priority for restoration.

STATUS: Subbasin assessment completed December 1998. TMDLs for two water bodies appearing on the 1994 section 303(d) list will not be developed because results of the assessment indicated that development of TMDLs was either not feasible or unnecessary.

IMPLEMENTATION: Numerous resource management agencies, landowners, and nonprofit organizations are actively involved in voluntary implementation of water quality and habitat enhancement projects throughout the subbasin. Major ongoing projects include the Henry's Lake SAWQP Plan, implemented by the Yellowstone Soil Conservation District to reduce shoreline and Stream bank erosion in the Henry's Lake watershed, and the Sheridan Creek Restoration Project, implemented by a committee of the Henry's Fork Watershed Council to restore the hydrological and biological functions of Sheridan Creek.

LITERATURE CITATIONS:

Hill, S. and C. Mebane. 1998. Upper Henry's Fork Subbasin Assessment. Idaho Division of Environmental Quality, Idaho Falls, ID. 143 pp.

TITLE:	<u>Upper Snake/Rock TMDL (Subbasin Assessment & Loading Analysis)</u>
CONTACT(S):	Sonny Buhidar/Darren Brandt, Twin Falls Regional Office
HUC(s):	17040212 - 31 stream segments (16 Tributaries, 5 reservoirs, 10 middle Snake River segments)
DATE DUE/SCHEDULE:	SBA, 12-31-98; TMDL, 8-31-99 (tentative)
PROBLEM(S):	Sediment, nutrients, temperature, ammonia, flow alteration, pathogens. Sources are primarily agriculture with significant contributions from aquaculture and urban development.
RESULTS OF STUDY:	Violations of numeric (D.O., temperature, ammonia, pathogens) & narrative (sediment, nutrients) water quality criteria, which has affected cold water biota and salmonid spawning beneficial uses.
STATUS:	31 stream segments are designated water quality limited and are on 303(d) list for 1996. Subbasin assessment has been reviewed by public.
IMPLEMENTATION:	Possible - Mid-Snake TMDL includes NPDES permitting and BMPs with feedback loop to address agricultural non-point sources.
LITERATURE CITATIONS:	One major document is planned post-TMDL that is a Water Quality Status Report of the Upper Snake Rock tributaries and the middle Snake River.

PART IV
GROUND WATER ASSESSMENT

OVERVIEW

Idaho is one of the top five states in the country for the volume of ground water used. Idahoans use an average of 9 billion gallons of ground water daily. Sixty percent of this 9 billion gallons is used by agriculture for crop irrigation and stock animals. Thirty six percent is used by industry, and three to four percent is used for drinking water. Even though the volume of ground water used as drinking water is relatively small in comparison to the total ground water use, approximately 90% of the people in Idaho rely on this smaller volume of ground water for their drinking water supply. The other 10% of the people in Idaho rely on surface water for their drinking water supply.

Of the 90% of the population using ground water for drinking water, about two-thirds are served by public water systems regulated under the Safe Drinking Water Act (SDWA), and about one-third obtain their drinking water through private systems typically represented by private domestic wells.

Idaho's ground water also contributes to surface water flows throughout the year, especially during low flow periods. Therefore, the protection of Idaho's ground water quality is necessary to protect the wide range of ground water and surface water uses throughout the State.

CHAPTER 1. GROUND WATER CONTAMINATION SOURCES

Idaho's 1996 305(b) report identified the ten highest priority source categories of ground water contamination as well as other high priority source categories, based on the professional judgement of State ground water quality program personnel (reference Table IV-1). The ten highest priority source categories of ground water contamination in Idaho, listed in no particular order, were determined to be animal feedlots, fertilizer applications (including land application of manure), pesticide applications, land application (of wastewater, sludge, etc.), underground storage tanks, waste tailings, landfills, septic systems, shallow injection wells/urban runoff, and industrial facilities. Other high priority source categories of ground water contamination in Idaho, listed in no particular order, include agricultural chemical facilities, agricultural drainage wells, above ground storage tanks, surface impoundments, waste piles, deep injection wells, mining and mine drainage, and spills (including spills relating to on-farm agricultural mixing and loading procedure). These numerous ground water contamination source categories need to be addressed through ground water protection related activities and programs in order to protect the quality of Idaho's ground water and surface water.

Table IV-1. Major Ground Water Contamination Source Categories in Idaho (from 1996 305(b) report)

Contaminant Source Category	Ten Highest Priority Sources	Other High Priority Sources	Factors Considered in Selecting Contaminant Source Categories	Contaminants
Agricultural Activities				
Agricultural chemical facilities		(√)	A, B, C, D, E, F	A, B, D, E
Animal feedlots	(√)		A, B, C, D, E, F	E, G, J, K, L
Drainage wells		(√)	A, B, C, D, E, F	A, B, C, E, J, L
Fertilizer applications	(√)		A, B, C, D, E, F	E
Irrigation practices				
Pesticide applications	(√)		A, B, C, D, E, F	A, B, C, D
Storage and Treatment Activities				
Land application	(√)		A, B, C, D, E, F	E, G, H, J, M (organics)
Material stockpiles				
Storage tanks (above ground)		(√)	A, B, C, D, E, F	A, B, C, D, H
Storage tanks (underground)	(√)		A, B, C, D, E, F	B, C, D, H
Surface impoundments		(√)	C, D	F, G, H, I
Waste piles		(√)	A, E, F	F, H, I
Waste tailings	(√)		A, B, D, E, F	H, M (pH)
Disposal Activities				
Deep injection wells		(√)	A, B, C, D, E, F	B, C, E, J, L
Landfills	(√)		A, B, C, D, E, F	B, C, D, E, H, J, L, M (VOCs, IOCs)
Septic systems	(√)		A, B, C, D, E, F	E, J, L,
Shallow injection wells/Urban Runoff	(√)		A, B, C, D, E, F	A, B, C, D, E, G, H, J, L
Other				
Hazardous waste generators				
Hazardous waste sites				
Industrial facilities	(√)		A, B, D, E, F	C, D, G, H, M (creosote)
Material transfer operations				
Mining and mine drainage		(√)	A, D, E	H, M (cyanide compounds)
Pipelines and sewer lines				
Spills		(√)	A, C, E, F	A, B, C, D, I, M (fertilizer)
Transportation of Materials				

Factors used to select contaminant sources:

A. Human health and/or environmental risk (toxicity);
B. Size of the population at risk
C. Location of the sources relative to drinking water sources
D. Number and/or size of contaminant sources
E. Hydrogeologic sensitivity
F. State findings, other findings

Contaminants/classes of contaminants associated with each of the sources that was checked:

A. Inorganic pesticides
B. Organic pesticides
C. Halogenated solvents
D. Petroleum compounds
E. Nitrate
F. Fluoride
G. Salinity/brine
H. Metals
I. Radio nuclides
J. Bacteria
K. Protozoa
L. Viruses
M. Other

** Information is based on professional judgement and input from each of the six Idaho Division of Environmental Quality Regional Offices, the Idaho Department of Water Resources, and the Idaho Department of Agriculture.*

CHAPTER 2. EXISTING AND POTENTIAL GROUND WATER CONTAMINATION SITES

Table IV-2, developed for Idaho's 1996 305(b) report, summarizes some of the existing and potential contamination sites found throughout the State. These sites all relate to one or more of the major contaminant source categories found within Table IV-1. It is important to note that not all existing and potential sources of contamination are included in Table IV-2. Current efforts associated with Idaho's Source Water Assessment Program are expected to significantly improve available information pertaining to the numbers and locations of existing or potential contamination sites throughout the State. This information can then be used for future 305(b) reports.

Table IV-2. Statewide Summary of Existing & Potential Ground Water Contamination Sites (from 1996 305(b) report)

Source Type	Number of Sites	Number of Sites with Confirmed Ground Water Contamination	Typical Contaminants Which Have Been Detected or May Exist
CERCLA sites (includes Department of Defense and Department of Energy sites)	8	7	Metals, VOCs
Underground Storage Tank Sites	992	269	Petroleum Compounds
Underground Storage Tank Sites (no releases found)	2210	0	Petroleum Compounds
RCRA Corrective Action & Misc. Cleanup Sites	8	7	VOCs, Pesticides, Creosote
Wastewater Land Application Permitted Sites	116	24 (a)	Total Dissolved Solids, Chloride, Iron, Manganese, Nitrate
Ore Processing by Cyanidation Permitted Sites	11	2	Cyanide, Nitrate, Diesel
Septic Systems	190,000	data not available	Nitrate, Bacteria
Class V Underground Injection Wells (excluding septic systems)	>5000	data not available	Bacteria, Nitrate, Pesticides
Historical Landfills	1022	data not available	Metals, VOCs
Confined Animal Feed Operations (NPDES permitted)	63	data not available	Nitrate, Bacteria
Other Ground Water Contamination Locations (not covered above) (b)	28	19	VOCs, Nitrate, Bacteria, Pesticides, Metals

<u>Notes</u>:
(a) Some contaminated sites are associated with secondary MCLs such as Total Dissolved Solids.
(b) Includes voluntary remediation sites and other significant areas of contamination.

CHAPTER 3. SUMMARY OF GROUND WATER PROTECTION PROGRAMS AND ACTIVITIES

Table IV-3 is a list of Idaho ground water protection programs and activities, with implementation status and responsible agency information. Many of these programs and activities address one or more of the major contamination sources identified in Table IV-1, and the known and potential ground water contamination sites identified in Table IV-2. The following is a short narrative description of each program or activity, identified in Table IV-3, and its status:

Active SARA Title III Program

SARA Title III, also known as the Emergency Planning and Community Right-to-Know Act (EPCRA), helps state and local governments improve their preparedness to handle chemical accidents. In Idaho, SARA Title III is implemented under Federal guidelines by the Idaho State Emergency Response Commission (SERC). The implementation status of the State's highly successful program is considered "Continuing Efforts".

Ambient Ground Water Monitoring System

Idaho has a "Fully Established" statewide ambient ground water monitoring program that consists of a statistically-designed ground water quality monitoring network (Statewide Network) of more than 1500 wells of all types. The network was primarily designed to characterize the ambient water quality of the State's aquifers, and is stratified by the hydrogeologic subareas shown by Figure IV-1. About 400 of the network wells are sampled each year, resulting in most sites being sampled at least once every four years. To better identify time trends, annual monitoring of a subset of about 100 wells started in 1995. The results from this monitoring network are used in this report and discussed under Chapter 4. Chapter 4 also provides additional information about this Statewide Network.

Aquifer Protection Program: Rathdrum Prairie

This is a "Fully Established" aquifer protection program in the northern part of Idaho. The Spokane Valley - Rathdrum Prairie (Rathdrum Prairie) Aquifer receives additional regulatory protection because of its designation as a "sole source aquifer" under the Safe Drinking Water Act, and because of its categorization as a "Sensitive Resource" aquifer under the Idaho Ground Water Quality Rule. The sole source designation provides additional aquifer protection from Federal projects. The sensitive resource categorization, combined with specific narrative standards within the Ground Water Quality Rule, provides additional protection from all point source and nonpoint source activities. These regulations help support an active aquifer protection program which addresses multiple contaminant sources through improved pollution prevention technologies, education, and land use planning. These aquifer protection efforts have strong public support from area residents which initially resulted in the aquifer's listing as a sole source aquifer and helped lead to subsequent categorization as a Sensitive Resource.

Table IV-3. Summary of Idaho Ground Water Protection Programs

Program or Activities	Implementation Status	Responsible State Agency
Active SARA Title III Program	Continuing Efforts	State Emergency Response Commission
Ambient ground water monitoring system	Fully Established	IDWR
Aquifer protection program: Rathdrum Prairie	Fully Established	Panhandle Health District/DEQ
Aquifer vulnerability assessment	Continuing Efforts	DEQ/IDWR*
Aquifer mapping	Continuing Efforts	IDWR/DEQ
Aquifer characterization	Continuing Efforts	IDWR/DEQ
Comprehensive data management system	Continuing Efforts	IDWR
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)	Continuing Efforts	DEQ*
Ground water discharge permits	Continuing Efforts	DEQ/IDWR
Ground water legislation	Fully Established	DEQ
Ground water classification	Fully Established	DEQ
Ground water quality standards	Fully Established	DEQ
Ground water nonpoint source controls	Continuing Efforts	DEQ*
Ground water Best Management Practices	Continuing Efforts	DEQ*
Interagency coordination for ground water protection initiatives	Continuing Efforts	DEQ/IDWR/ISDA
Ore Processing by Cyanidation Regulations	Fully Established	DEQ
Pesticide State Management Plan	Under Development	ISDA
Pesticides control program	Continuing Efforts	ISDA
Pollution prevention program	Continuing Efforts	DEQ
Regional & local ground water quality monitoring	Continuing Efforts	DEQ/ISDA
Resource Conservation and Recovery Act (RCRA) Primacy	Fully Established	DEQ
Solid waste management	Continuing Efforts	DEQ*
Source Water Assessment Plan	Under Development	DEQ
State Superfund	Continuing Efforts	DEQ
State RCRA program more stringent than RCRA primacy	Not Applicable	NA
State septic system regulations	Fully Established	DEQ/Health Districts
Storm water program	Continuing Efforts	DEQ
Underground storage tank installation requirements	Continuing Efforts	DEQ
Underground Storage Tank Remediation Fund	Continuing Efforts	DEQ
Underground Storage Tank Permit Program	Continuing Efforts	DEQ
Underground Injection Control Program	Fully Established	IDWR
Vulnerability assessment for drinking water/wellhead protection	Continuing Efforts	DEQ*
Wastewater Land Application Permit Program	Fully Established	DEQ
Well installation regulations	Fully Established	IDWR

Program or Activities	Implementation Status	Responsible State Agency
Well abandonment regulations	Continuing Efforts	IDWR
Wellhead Protection Program (EPA-approved)	Fully Established	DEQ/Idaho Rural Water

SERC - State Emergency Response Commission DEQ - (Idaho) Division of Environmental Quality
IDWR - Idaho Department of Water Resources ISDA - Idaho State Department of Agriculture
* - indicates significant involvement of other agencies

Aquifer Mapping, Characterization, and Vulnerability Assessment

These areas are all rated as "Continuing Efforts". Because of the complex geologic makeup of the State, identifying and characterizing every aquifer is a difficult task. Graham and Campbell's *Groundwater Resources of Idaho* (1981) utilized an approach of identifying and describing the 70 major ground water flow systems within the State. Many of these 70 ground water systems comprise more than one aquifer. In addition, the USGS has performed a significant amount of aquifer mapping and characterization work in the State, with much of their work focused on the eastern Snake Plain aquifer. Aquifer mapping and characterization efforts continue, with the Statewide Monitoring Network providing additional aquifer characterization information and continuation of USGS aquifer characterization efforts. Characterization also occurs, and will continue to occur, as the result of studies and efforts undertaken by state universities, state agencies, local entities, and consultants to address issues such as resource protection and contaminant investigations. Much of the aquifer characterization work associated with ground water quality is included as part of this report.

Vulnerability assessment efforts include development of a modified version of the U.S. Environmental Protection Agency's DRASTIC model for the eastern Snake River Plain and the subsequent development of vulnerability maps for this and other significant aquifers in the State. In addition, the USGS has been developing calibrated vulnerability maps, referred to as probability maps, for the eastern Snake River Plain. These contaminant specific maps are complete for nitrate and nearly complete for the pesticide (herbicide) atrazine.

Comprehensive Data Management System

The Idaho Ground Water Quality Plan recognizes an Environmental Data Management System (EDMS) as the State's comprehensive data management system to include data from past, present and future ground water quality monitoring. Idaho's comprehensive data management system implementation status is considered "Continuing Efforts". Although the EDMS is currently in use, not all relevant ground water quality data is routinely submitted to and entered into the system and there is a backlog of past data that could be incorporated into the system. Recent efforts to help increase the amount of data routinely submitted to EDMS include development of a compatible Access database structure that can be placed on individual computers and utilized for project or program specific data. Once the data is entered into the Access database, it can be transferred into EDMS.

In addition, development is in progress to make EDMS data available on the Worldwide Web. This will utilize direct queries to the EDMS database. For data searches relating to specific geographic areas, map sequences will allow the searcher to visually identify the target area. Parameter selection will then allow "zeroing in" on specific characteristics of available data, providing tabular results from the EDMS database. Searchers with client SQL software (such as MS Access and ArcView 3.0) will be able to query the EDMS database directly through an Internet connection using the appropriate software that links a client to the server.

EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)
The status of CSGWPP is considered "Continuing Efforts" because Idaho is currently focusing available resources on implementing its Ground Water Quality Plan which contains the essential elements to establishing ground water protection as found within a CSGWPP. This Ground Water Quality Plan, which has been adopted by the State's legislature, includes the following sections: Protection, Prevention, Public Education, Government Interaction/Public Participation, Ground Water Quality Monitoring/Data Information System, and Remediation of Contamination. It is anticipated that CSGWPP strategic activity criteria concepts will be used to supplement Ground Water Quality Plan implementation efforts where appropriate. At this time Idaho either meets all of the applicable CSGWPP core adequacy criteria or is expected to in the near future as the result of ongoing Ground Water Quality Plan implementation.

Ground Water Discharge Permits
This area is considered "Continuing Efforts". Several potentially significant ground water discharge sources are permitted through different state programs, including Ore Processing by Cyanidization, Wastewater Land Application, and Underground Injection Control programs. These programs, and related permitting, are all discussed in greater detail within this chapter. Many existing types of ground water contaminant discharges are not currently covered under a permit program, although any such discharges need to be in accordance with appropriate management practices and generally must avoid causing significant ground water degradation in order to be consistent with the Idaho Ground Water Quality Rule.

Ground Water Legislation
Ground Water Legislation in Idaho is considered "Fully Established". The Environmental Protection and Health Act provides general authorities for protection of human health and the environment. In 1989, the Ground Water Quality Protection Act was enacted. This legislation established State goals for ground water quality which include: to maintain the existing high quality of the State's ground water, to satisfy existing and projected future beneficial uses, and to prevent contamination of ground water from point and nonpoint sources of contamination to the maximum extent practical. The Act also established the Ground Water Quality Council. This Council was tasked with developing a ground water quality plan which described the State's overall approach to protecting its ground water.

The Idaho Ground Water Quality Plan was adopted by the State Legislature in 1992 after a lengthy public involvement process. The Plan contains six major policy areas directing state agencies and entities in the protection of ground water quality. These six policy areas cover protection, prevention, public education, government interaction/public participation, monitoring/data information, and remediation. Rationales for the policies and implementation items which guide responsible agencies on protection activities are included within each of the policies. No new general ground water legislation has been considered over the past two years. The focus of activities has been on implementing the direction which has been provided within the Ground Water Quality Plan.

Ground Water Quality Standards/Ground Water Classification
Ground water quality standards and ground water classification (referred to as categorization in Idaho) are "Fully Established". Idaho's Ground Water Quality Rule (1997) includes ground water quality standards, an aquifer categorization system, and ground water quality protection requirements. The numerical and narrative ground water quality standards apply to all ground water in Idaho, and are based on the need to protect the resource for drinking water and other beneficial uses. The numerical standards are essentially equal to both the primary and secondary Safe Drinking Water Act Maximum Contaminant Levels. In addition, the Rule also requires that ground water quality be protected from significant degradation even if the standard has not been exceeded. The degradation is to be avoided through the use of appropriate ground water quality protection practices and methods.

Categories for aquifers or portions of aquifers include "Sensitive Resource", "General Resource", and "Other Resource" aquifers. Ground water quality is to be protected through a combination of best available methods, best management practices, and best practical methods depending on the aquifer category. All aquifers not categorized as a Sensitive Resource or Other Resource default to General Resource, for which the above referenced standards apply. To change from one category to another requires rule-making. Stricter standards and protection requirements are possible in a Sensitive Resource aquifer, and less strict standards and protection requirements are possible in an Other Resource aquifer. At this time, the Rathdrum Prairie aquifer is the only Sensitive Resource aquifer, and there are no Other Resource aquifers in the State.

Ground Water Nonpoint Source Controls and Ground Water Best Management Practices
Idaho's programs and activities for ground water nonpoint source controls and implementation of best management practices (BMPs) is rated as "Continuing Efforts". Section 319 of the Clean Water Act requires that states develop and implement a nonpoint source management program. Ground Water is included in Idaho's Nonpoint Source Management Plan (1989) and is also addressed in the State's revised plan. The revised plan was submitted to EPA on March 26, 1998 for review and approval. Both the existing and revised plan address the following ground water related sources: agriculture, septic systems, urban runoff and industrial chemicals. The revised plan, once approved, will provide further protection of ground water resources through the implementation of the State's wellhead protection and source water assessment programs. Additionally, the revised plan recognizes that the Ground Water Quality Rule (IDAPA 16.01.11) provides the underlying guidance for protection of the State's ground water from nonpoint source contamination. In addition, most ground water programs and activities described in this Table IV-

3 narrative and throughout the ground water section of the existing and revised Nonpoint Source Management Plan are continually updating and improving BMPs and nonpoint source controls. Many of these are documented through guidance manuals such as exist for septic systems, wastewater land application, and confined feed operations.

There are numerous agricultural related programs aimed at addressing nonpoint sources. The Agricultural Ground Water Quality Protection Program was adopted by the State Legislature during the 1995 session as a part of the Idaho Ground Water Quality Plan. The program was developed to, "describe the management approaches to prevent ground water contamination and to respond to the occurrence(s) of such ground water contamination." This program will also integrate pesticide management as described in the yet-to-be-developed State Pesticide Management Plan. A major focus of the program is implementation of the BMP feedback loop for agricultural nonpoint sources of contamination.

Interagency Coordination For Ground Water Protection Activities

There are "Continuing Efforts" within the State to further interagency coordination. The Ground Water Quality Plan of 1992 and other State statutes identify specific ground water protection roles for State agencies and local governments and contain policies which provide direction for interagency coordination. One significant accomplishment since the previous 305(b) report is the completion of Idaho Ground Water Protection Interagency Cooperative Agreement, signed by three major State ground water quality agencies: the Idaho State Department of Agriculture, the Idaho Department of Water Resources and the Idaho Division of Environmental Quality. This agreement focuses on implementing the Ground Water Quality Plan through coordination of the various agency ground water quality related programs. Quarterly meetings are held between the three agencies to help ensure a coordinated approach to ground water quality protection in Idaho.

Another method routinely utilized to facilitate interagency coordination is the formation of multi-agency committees to provide input on specific areas which may impact the ground water quality management activities of various agencies. Some of the committees currently facilitating this coordination include the Agricultural Coordination Committee, which was established to help implement the state's agricultural ground water program, and the Ground Water Monitoring Technical Committee, which was formed in 1996 to ensure a coordinated approach for regional and local monitoring efforts within Idaho.

Ore Processing by Cyanidation Regulations

Idaho has a "Fully Established" Ore Processing by Cyanidation Permit Program covered under *IDAPA 16, Title 1, Chapter 13, Rules and Regulations for Ore Processing by Cyanidation.* Permits are issued for ore processing facilities which utilize cyanide. The goal is to protect beneficial uses of surface and ground waters and not endanger public safety or the environment. Important ground water protection measures include design and operation plan approvals, design and operation requirements which include measures to prevent discharges to ground water, and a monitoring strategy that incorporates ground water and leak detection monitoring.

Pesticide State Management Plan

Idaho's Pesticide State Management Plan (SMP) is "Under Development" in accordance with applicable regulatory requirements and EPA guidance. Draft language and outlines have been developed for several key document chapters.

Pesticides Control Program

Idaho's pesticides control program implementation status is "Continuing Efforts". There is currently a Pesticide Cooperative Agreement with the USEPA for the implementation of FIFRA in Idaho. *IDAPA 02, Title 03, Chapter 3, Pesticide Use and Application Rules* addresses the registration, use, handling, transportation, storage, distribution and disposal of pesticides and their containers. The licensing of pesticide applicators is also covered. *IDAPA 02, Title 03, Chapter 4, Chemigation Rules* provides for regulation of the irrigation systems which are utilized for the application of pesticides and fertilizers. This includes backflow prevention standards, licensing, inspections, and training programs. Other program activities include initial and recertification training of applicators and dealers and a Pesticides Disposal Program which addresses the problems of unusable pesticides through collection and disposal of the unusable agricultural pesticides with no cost or liability to the participant.

Pollution Prevention Program

The Pollution Prevention Program promotes incorporation of pollution prevention into DEQ programs and business, industry, government, and public practices. The objective of the program is to prevent the contamination of air, land, and water through source reduction techniques. The program status is listed as "Continuing Efforts" because it is a dynamic program working in a matrix system with other programs and efforts. As projects are completed, the focus is re-evaluated and modified to fit current environmental concerns.

The document "Pollution Prevention Program Focus - A Summary of the Priority-Setting Process" describes the process used to prioritize pollution prevention efforts. Six categories (auto repair, agricultural crop production, metal mining, chemical production, lumber and wood products, and solvents) were chosen as a focus based on an evaluation of environmental data, including ground water contamination information. These categories address many of the major contaminant source categories identified in Chapter 1 and/or many of the specific contaminants often found in ground water as discussed within Chapter 4. Projects in the six pollution prevention categories are chosen based on input from business people and their proven success. Typical program accomplishments over the past few years include joint compliance assistance/pollution prevention visits to a couple of mining operations which resulted in pollution prevention recommendations associated with vehicle maintenance.

Regional and Local Monitoring Program

Regional and local ground water quality monitoring is used to investigate ground water contamination that is known or suspected to exist in Idaho's ground water. Regional and local monitoring are needed: 1) to identify and delineate ground water contamination problems which are typically local or regional in scale and may not show up on the scale of the statewide monitoring effort, 2) to determine the areal extent of ground water contamination so that the beneficial uses of the resource can be protected, and 3) to provide information, direction or prioritization to state ground water quality programs. Several contamination sites and areas within the State have been or currently are being characterized through regional and local monitoring, although there are still numerous contamination sites and areas throughout the State that need initial and/or further characterization. Therefore, this program is rated as "Continuing Efforts".

To help ensure that regional and local monitoring is pursued in a coordinated manner, the Idaho Ground Water Monitoring Technical Committee (GWMTC) was formed in 1996. The GWMTC includes representatives from 12 state and federal agencies. One of the key committee products has been the identification and prioritization of monitoring needs based on known problem sites and areas. The ground water quality data presented within Chapter 4 represents a major source for identifying these problem sites and areas. Another committee product has been the identification of ongoing, historical, and planned monitoring activities in Idaho. Both committee products are captured within GIS projects.

Resource Conservation and Recovery Act (RCRA) Primacy and Stringency

RCRA primacy implementation for the State is considered "Fully Established". The Idaho Hazardous Waste Management Act of 1983 directs the State of Idaho to maintain primacy for the implementation of the RCRA program in Idaho. *IDAPA 16, Title 1, Chapter 5, Rules and Standards for Hazardous Waste*, incorporate by reference 40 CFR Parts 260 through 266, 268, 270, 273, 279, 124, and RCRA 3005(j). Authorization to operate the RCRA program was given to Idaho Division of Environmental Quality (DEQ) in April, 1990 by the U.S. Environmental Protection Agency (EPA). This was for hazardous waste rules up to July, 1987. RCRA Corrective Action Authorization was approved in June of 1992 and a revision package for hazardous waste rules up to July, 1990 was approved in August 1992. The most recent revised RCRA Authorization Package to update primacy for rules up to July, 1993 was approved by EPA and effective in June, 1995. The State and EPA are currently working together on implementing Federal RCRA regulations promulgated after this date, and will continue to do so until Idaho's hazardous waste rules are again updated to incorporate changes and subsequently approved by EPA in a future Revised Authorization Package.

Solid Waste Management

The Idaho Solid Waste Facilities Act of 1992, amended in 1993 and 1996, has led to Idaho's EPA-approved municipal solid waste program. The program, rated as "Continuing Efforts", is designed to prevent ground water contamination from municipal solid waste landfill operations. This is accomplished through DEQ review and approval of landfill location, landfill design, and ground water monitoring plans; and through Health District approval of operations and closure.

The 1992 solid waste rules are being updated through the negotiated rulemaking process. This rulemaking will revise the entire solid waste rule and recommend a statute change to the legislature outlining the roles and responsibilities of state agencies and local governments. The revised solid waste rules will address transfer stations, composting/biological processing, chemical processing/incinerators, non-municipal solid waste landfills, and material recovery facilities.

<u>Source Water Assessment Plan</u>

Idaho's Source Water Assessment Plan is currently "Under Development". After an extensive mailing to solicit participation, a source water assessment advisory committee (SWAAC) was formed to develop the Plan. To assure that the Plan truly meets the needs of Idaho, the SWAAC is composed of citizens from all geographic regions of Idaho representing a broad spectrum of economic and civic interests. The entire SWAAC meets on a monthly basis with subcommittees meeting more frequently. Cooperative utilization of existing State and Federal ground water and surface water protection programs will be emphasized in the Plan.

The State intends to submit the Source Water Assessment Plan to EPA-Region 10 in February 1999. Significant resources from DEQ's existing ground water and drinking water staff are heavily engaged in working with the SWAAC in developing this Plan and in laying the foundation for work on source water assessments. Idaho will have to complete source water assessments for over 2000 public water systems by May 2003. As a result of this enormous task, a significant percentage of the Idaho's ground water staff may be dedicated to working on source water assessments for the next five years.

<u>State Superfund</u>

State Superfund status is "Continuing Efforts". The Idaho Ground Water Quality Plan provides policy and guidance for remediation, including allocating remediation costs and developing remediation rules. Most of the remediation policy within the Plan has yet to be implemented, and Idaho currently does not have a remediation fund or State Superfund program. Idaho does have a voluntarily remediation program that is comprised of numerous sites at which responsible parties have volunteered to undertake assessment and remediation activities. Participation in the program is voluntarily and dependent upon the cooperation of all parties involved. Any agency oversight activities must be funded by the responsible party. This effort has led to the cleanup of more than 35 contaminated sites.

<u>State Septic System Regulations</u>

Idaho's state septic system regulations are "Fully Established" under *IDAPA 16, Title 1, Chapter 03, Rules for Individual/Subsurface Sewage Disposal Systems*, and *IDAPA 16, Title 1, Chapter 15, Regulations Governing the Cleaning of Septic Tanks*. Implementation is primarily through Idaho's seven health districts with technical assistance from DEQ. The health districts implement the day-to-day activities in the program by conducting site evaluations, issuing system permits, issuing septic tank pumper licenses, and conducting inspections. DEQ responsibilities include plan and specification reviews. DEQ and the health districts also conduct training courses for installers and pumpers.

The *Technical Guidance Manual for Subsurface Sewage Disposal Systems* (TGM) is used to assist in site evaluations, septic tank designs, system operations and maintenance, land use planning, and implementation of best available technologies. The TGM serves as the reference for Environmental Health Specialists, licensed installers, and professional engineers.

Both the septic system regulations and the technical guidance manual are routinely updated. The TGM was updated in 1997. Updates included a new section in the Soils and Ground Water Chapter regarding cut-off trench design and installation. A new Recirculating Sand Filter Section was also added to the Alternative System Chapter. This new section addresses reducing nitrate loading to ground water by denitrifying nitrate to nitrogen gas in the recirculating tank.

Storm Water Program

Idaho's Stormwater Program is rated "Continuing Efforts". The program is responsible for watershed management and planning support through: technical assistance, education, and information transfer. The goal is to protect the quality of both ground water and surface water from the effects of stormwater runoff. A comprehensive set of storm water runoff statewide guidances have been prepared to assist in preventing and controlling urban and suburban-related nonpoint source pollution.

The following publications are available: *Environmental Planning Tools and Techniques*, which presents a menu of measures for local planners and land use decision makers that can be incorporated at the site and watershed levels to better integrate comprehensive design principles into land development; and the *Catalog of Storm Water BMPs*, which provides guidance for the selection (construction-phase/permanent), basic design, construction, and maintenance of source and treatment control measures. Currently, the Catalog is under-going its first update (i.e., inclusion of a new BMP fact sheet on dry wells).

Underground Storage Tank (UST) Installation Requirements, Permit Program, and Remediation Fund

The EPA currently maintains enforcement authority of federally regulated UST tanks, but the State has a small UST Program that provides pollution prevention outreach to UST owners/operators as well as operates and maintains the State UST registration data base system. Because of the State involvement, the implementation status is considered "Continuing Efforts" for *Installation Requirements* and also for the *Permit Program* because of the UST registration database system. USTs must be registered in the State, but there is no permitting requirement. The UST *Remediation Fund* is also considered "Continuing Efforts" because the existing Idaho Petroleum Storage Tank Fund provides environmental liability insurance that is applicable to new releases from insured sites. Idaho does not have a remediation fund that provides financial support for cleanups of existing contamination.

The State has a Leaking Underground Storage Tank (LUST) program that has full enforcement authority to address all petroleum releases, as defined under IDAPA 16.01.02 *Water Quality Standards and Wastewater Treatment Requirements*, which includes a section (Section 851) that addresses the reporting, investigation, and confirmation of petroleum releases. The LUST program utilizes a risk-based corrective action (RBCA) approach establishing site-specific cleanup levels. The LUST program's 1996 comprehensive publication, entitled *Risk-Based Corrective Action Guidance Document for Petroleum Releases*, provides detailed procedures for cleanups performed using the RBCA approach.

Underground Injection Control (UIC) Program
Idaho's UIC program is "Fully Established", with UIC rules covered under *IDAPA 37, Title 03, Chapter 3, Rules for Construction and Use of Injection Wells*. These rules apply to Class V wells and prohibit all other classes. The rules are reviewed periodically and updated to reflect changes in technology and policy to assure that ground water is protected from contamination. The most recent rule revision is April 1993.

Idaho's UIC program addresses ground water quality protection from underground injection wells. Program components include well inventory, permitting, and inspections. The underground injection well inventory contains information from over 5000 injection wells. Permitting applies to most injection wells deeper than 18 feet. Operational injection well inspections are unannounced and include inspection of well construction components, inspection of any treatment facilities, noting the position of any production wells in the area, and injection fluid sampling when possible.

Vulnerability Assessment for Drinking Water/Wellhead Protection
With most aquifers in the State providing drinking water, the vulnerability efforts addressed above under Aquifer Mapping, Characterization, and Vulnerability Assessment are applicable to drinking water and wellhead protection efforts. Implementation status is, therefore, considered "Continuing Efforts". It is anticipated that vulnerability information for Idaho's aquifers will be one of many tools used to enhance drinking water and wellhead protection efforts. In addition, future susceptibility determinations under the Idaho Source Water Assessment Plan (currently under development) will likely provide information pertaining to the vulnerability/susceptibility of specific water systems to potential contaminant sources.

Wastewater Land Application Permit Program
Idaho has a "Fully Established" Wastewater Land Application Permit (WLAP) Program covered under *IDAPA 16, Title 1, Chapter 17, Wastewater - Land Application Permit Regulations*. There are currently more than 100 permits which authorize wastewater application to more than 16,000 acres. About two-thirds of these permits are for Municipal Wastewater Treatment Plants, and about one-third are issued to industry, most of which are represented by agricultural food processors. The guidance and permit conditions are based on wastewater applications at agronomic rates during the growing season and on the available water capacity in the soils during the non-growing season to minimize leaching of nutrients below the crop root zone and into

ground water. Ground water quality monitoring is a standard permit requirement. The *Handbook for Land Application of Municipal and Industrial Wastewater* is a technical guidance document which was completed in April 1996, representing a significant program accomplishment over the past two years.

Well Installation and Abandonment Regulations

Well installation regulations are considered "Fully Established" under *IDAPA 37, Title 03, Chapter 09, Well Construction Standards Rules and Regulations*. These rules provide detailed well construction requirements for cold water, geothermal, injection, cathodic protection, monitoring and other wells, as well as requirements for well abandonment. The rules set up a well drilling permit system and a system to designate "Areas of Drilling Concern" to protect public health or to prevent waste and contamination of ground and/or surface water because of factors such as contaminated ground or surface waters. In addition, a technical guidance for well abandonment has been developed to supplement the well construction standards. Well abandonment regulations are rated as "Continuing Efforts" because of inclusion within the well installation regulations and the existence of technical guidance.

Wellhead Protection Program (EPA-approved)

Idaho has a "Fully Established" EPA-approved wellhead protection program. The *Idaho Wellhead Protection Plan* was approved by EPA in November 1996. Idaho's voluntary program stresses common sense methods for preventing ground water contamination. The State (DEQ) is working closely with the Idaho Rural Water Association to encourage wellhead protection and to provide technical assistance to public water systems developing wellhead protection programs. Technical assistance includes delineating wellhead protection areas based on site specific hydrogeologic information. Approximately 90 public water systems are pursuing wellhead protection. Numerous municipalities and a couple of counties have passed wellhead protection ordinances. At this time, no local wellhead protection plans have been submitted to the State to be certified as having met all requirements of the *Idaho Wellhead Protection Plan.*

CHAPTER 4. GROUND WATER QUALITY RESULTS SUMMARY

Ground Water Quality Monitoring Data Sources

The ground water quality results summarized in this report are from two major sources of ground water quality data. These two sources are the Idaho Statewide Ground Water Quality Monitoring Network (Statewide Network) and water quality data from Public Water System (PWS) locations regulated under the Safe Drinking Water Act (SDWA). Below is a more detailed description of each of these two data sources:

A. Statewide Network.
Idaho maintains a statistically-designed ground water quality monitoring network consisting of more than 1500 wells of all types for which the three most common are domestic (67%), irrigation (20%), and PWS (7%). The Statewide Network was designed using stratified random site selection to satisfy the sampling program's first objective, to characterize the (ambient) water quality of the state's aquifers. The Statewide Network is stratified by the hydrogeologic subareas (subareas) shown by Figure IV-1. The subareas represent geologically similar areas and generally encompass one or more of the major ground water flow systems identified within the State (Graham & Campbell, 1981). Each flow system includes at least one major aquifer, with some systems being comprised of several aquifers which may be interconnected. The vast majority of Statewide Network monitoring locations withdraw water from the major aquifers identified in Figure IV-1.

In the sample location selection process, the more populated subareas were weighted higher, generally causing more sites to be assigned to those subareas. Within each subarea, sampling was sometimes biased to the areas where wells were available versus remote locations where no wells were available. Of the 22 hydrogeologic subareas, sampling is not conducted in Subarea 21 (Central Mountains) and Subarea 22 (Southwestern Owyhee) because of the remote locations, sparse populations, and limited ground water use in both subareas.

About 400 of the network wells are sampled each year, so that as many sites as possible are sampled at least once every four years. To identify time trends more easily, a subset of about 100 wells are being monitored annually. This report provides data from the 1996 and 1997 sampling subsets, resulting in 701 different sample locations throughout the State during the two year period. Where there were two sets of data associated with yearly monitoring locations, the highest value (greatest level of contamination) was used for each available parameter for reporting purposes.

The monitoring analyses include many of those monitored under the SDWA. All locations were sampled for volatile organic compounds (VOCs), nitrate (all nitrate results in this report are nitrate-nitrogen), fecal coliform (SDWA monitoring requires total coliform monitoring, of which fecal coliform is a subset), metals (filtered), Radio nuclides, immunoassay pesticides (which include most of the pesticides generally found in Idaho's ground water), and major ions (filtered). In addition, a significant percentage of the sites were also sampled for pesticides using GC methods. Results from radio nuclide and GC pesticide sampling are not presented in this report. The term 'pesticide' as found throughout this report refers to the complete group of insecticides, fungicides, herbicides, and rodenticides.

More detailed information about the Statewide Network and results from earlier years can be obtained from Idaho's 1996 305(b) report as well as from the following two reports:

> *Idaho Statewide Ground Water Quality Monitoring Program Network Design*; by Kenneth W. Neely; November 1994 (Idaho Department of Water Resources Water Information Bulletin Number 50, Part 1)

> *Idaho Statewide Ground Water Quality Monitoring Program - Summary of Results, 1991 through 1993*; by Janet K. Crockett; April 1995 (Idaho Department of Water Resources Information Bulletin Number 50, Part 2)

B. Water Quality Data From PWS Locations

This information includes monitoring results from the PWS locations throughout the State. The results presented in this report were obtained from the Drinking Water Information Management System (DWIMS) database for monitoring performed during 1996 and 1997. This resulting DWIMS information represents essentially all available data from the reference time period for systems which use ground water. To correlate this data with the Statewide Network, all PWS locations were organized by the hydrogeologic subarea in which they are located. This results in accurate subarea determination for the community and non-community, non-transient wells since they have been located via Global Positioning Systems. Transient systems are currently located via mailing address which in some situations may be in a different subarea than where the system is physically located. Future 305(b) reports will be able to correct this situation since there is currently a project underway to locate all transient systems via Global Positioning Systems.

Many of the PWS locations had multiple sampling events over the 1996 through 1997 period. In such situations, the highest value (greatest level of contamination) was used for each available parameter for reporting purposes.

All PWS analyte sampling is in compliance with SDWA requirements. For the purpose of this report, general PWS parameter sampling groups include VOCs, nitrate, inorganic compounds (IOCs), and synthetic organic compounds (SOCs) which include many of the pesticides sampled via immunoassay methods under the Statewide Network. The standardized SDWA monitoring framework has sampling for VOCs, SOCs, and most IOCs due in 1998. In addition, monitoring for VOCs, SOCs, and many IOCs are not required for the non-community non-transient and transient systems under the SDWA. Therefore, monitoring associated with VOCs, SOCs, and many IOCs is limited to relatively small subsets of community PWS locations generally associated with those systems that were required to monitor due to previous detections. On the other hand, there are significant amounts of data available for nitrate, which has a greater sampling frequency for all PWS locations under the SDWA.

For the above reasons, the total number of wells sampled per subarea for the parameter groups of VOCs/SOCs and IOCs were not calculated for this report, whereas the total number of wells sampled per subarea for nitrate was calculated in order to obtain percentage values that could be compared to the Statewide Network results.

Many PWS locations consist of more than one well, with a common sampling point representing a mixture of ground water from several closely spaced wells. In this report, the terms "locations" and "wells" are used interchangeably. In some situations, the sampling well or location may actually be a spring or several wells or springs combined for distribution purposes. As previously mentioned, some PWS locations (a little more than 100) also serve as sample locations under the Statewide Network.

It is also important to note that some PWS locations may have undergone chlorination or other treatment approaches to address existing contamination concerns, although a large number of locations will have had no form of treatment.

C. Data Comparisons

Because of differences in areas such as sampling methods, sample parameters, and analytical methods, care must be taken in comparing the data from the Statewide Network with PWS data. Nevertheless, both data sets provide important information about ground water quality in Idaho, as well as important information regarding the quality of drinking water within Idaho.

Discussion of Results

Appendix IV-A Tables (IV-A-1 through IV-A-20)

Tables IV-A-1 through IV-A-20 of Appendix IV-A present ground water quality sampling results for 20 of the 22 subareas. Subareas 21 (Central Mountains) and 22 (Southwestern Owyhee) are not included because there is no Statewide Network data for these two subareas as discussed above. For the 1996 through 1997 period, there was also no PWS data in DWIMS for Subarea 22, whereas there were three PWS nitrate sample locations for Subarea 21. All three locations had nitrate levels below 2 ppm.

Note that there are no PWS data presented in Tables IV-A-7 (Subarea 7: Boise Valley Shallow) and IV-A-8 (Subarea 8: Boise Valley Deep). Instead, all PWS data from this area are presented in Table IV-A-7/8 since a determination was not made as to which aquifer/flow system each PWS location was obtaining ground water from. Some PWS locations may be drawing water from both Subareas 7 and 8, since Subarea 7 generally overlays Subarea 8.

Information contained within Tables IV-A-1 through IV-A-20 in Appendix IV-A includes the below listed items.

- General subarea/aquifer descriptions (reference Figure IV-1 for each subarea location within Idaho).
- Information relating to the number of wells/locations where a SDWA Primary Maximum Contaminant Level (MCL) is exceeded either from natural or human caused conditions
- The number of wells where certain non-naturally occurring compounds (VOCs, SOCs, pesticides) are found.
- A listing of the constituents which exceeded an MCL
- A listing of VOCs, SOCs, and pesticides detected above the minimum detection limit (MDL).
- Nitrate results sorted into four categories.

The four categories that the nitrate results are sorted into are:

- less than 2 mg/l (naturally occurring nitrate concentrations in ground water normally do not exceed 1 or 2 mg/l; therefore, concentrations greater than 2 mg/l are considered a reasonable indicator of human impact on ground water quality);
- greater than or equal to 2 mg/l and less than or equal to 5 mg/l;
- greater than 5 mg/l and less than or equal to 10 mg/l (5 mg/l represents 50% of the SDWA MCL, and is a level that requires additional monitoring for PWS systems); and
- greater than 10 mg/l, which exceeds the SDWA MCL for nitrate in drinking water.

The information presented in Appendix IV-A is summarized by Tables IV-4 through IV-8, each of which is further discussed within the remaining sections of this chapter.

<u>Tables IV-4 & IV-5. Information About Values Exceeding SDWA MCLs</u>

Table IV-4 is a summary of the number of wells per subarea where the sampling result is greater than a SDWA primary MCL value because of human activities. The Statewide Network also includes the percentage of wells with results that exceed an MCL. This percentage information is not included for the PWS data due to varying numbers of wells sampled for each parameter group.

Natural background levels that are greater than an MCL are not included in Table IV-4. All sampling results in this report where either arsenic, fluoride, and selenium are greater than the MCL are attributed to naturally occurring conditions. This does not mean that all such elevated occurrences of arsenic, fluoride, and selenium throughout the State would be from natural conditions, and it could later be determined that occurrences now attributed to natural conditions were actually caused by human activity. All other situations where sample results are greater than an MCL, or where there is a detection of a VOC, SOC, or pesticide, or where nitrate is greater than 2 mg/l, are attributed to human activity based on general knowledge on natural conditions from numerous ground water quality studies in Idaho and throughout the United States.

Some of the subareas with fairly high percentages (> 15%) of wells exceeding an MCL from the Statewide Network include Subarea 5 (Weiser; 27%), Subarea 10 (North Owyhee; 32%), and Subarea 18 (Upper Snake; 16%). In addition to providing ground water quality information relating to a specific subarea, Table IV-4 also shows that the total percentage of Statewide Network locations which exceeded an MCL from human activity is 7% (49 locations), and the total number of PWS locations which exceeded an MCL from human activity is 44.

All locations where a primary MCL was exceeded (except for those due to natural background conditions) also represent locations where a Idaho ground water quality primary constituent standard is exceeded (assuming that the contamination does not originate within the well's distribution system which could occasionally be the situation). This is true regardless of whether the location is a private domestic well or PWS location since the standards apply to all ground water in the State.

Table IV-5 provides a summary of all constituents where a primary MCL (or state ground water standard) is exceeded. This summary combines all subarea information throughout the State, and shows that nitrate, coliform, fluoride, and arsenic are the water quality parameters exceeding an MCL most frequently when looking at both data sources.

Table IV-6. Nitrate Results Summary

Table IV-6 shows, by subarea, the percentages of locations with nitrate levels ≥ 2 mg/l and > 5 mg/l for both the Statewide Network and PWS data. The higher the percentage within a subarea, the greater the impact to ground water quality from human activity associated with many of the contaminant sources listed in Table IV-1. Table IV-6 shows that the Statewide Network and PWS nitrate results are very similar for some subareas such as 2, 3, 6, 11, 12, 14, 15, and 17, but appear to be quite different for other subareas such as 5, 9, 10, and 18. The total results for all subareas (1 through 20) are somewhat similar for both sets of data, with 36% of all Statewide Network locations having nitrate levels ≥ 2 mg/l in comparison to 31% for PWS locations; and 13 % of all Statewide Network locations having nitrate levels > 5 mg/l in comparison to 8% for PWS locations.

Table IV-6 shows that some of the subareas with high percentages (>50%) of locations impacted by nitrate contamination (values greater than 2 mg/l) include Subarea 7 (Boise Shallow; 70% of Statewide Network locations), Subarea 9 (Mountain Home; 64% of PWS locations), Subarea 10 (North Owyhee; 58% of Statewide Network locations), Subarea 15 (Twin Falls; 74% of Statewide Network and 78% of PWS locations), and Subarea 17 (Portneuf; 52% of PWS locations).

The approximate percentage of Idaho's population within each subarea is also included in Table IV-6. There does not appear to be a strong correlation between subarea population and nitrate levels at the subarea scale. Table IV-6 also shows summarized results from the 1996 305(b) report for comparison purposes.

Some of the locations summarized through Table IV-6 where nitrate is elevated would likely represent sites or areas of significant degradation. As discussed under the Ground Water Quality Standards summary in Chapter 3, such situations may not be consistent with the goals of the Idaho Ground Water Quality Rule and the Idaho Ground Water Quality Plan. These situations of significant degradation may need to be addressed through the existing programs described within Chapter 3 or through new programs where necessary.

Tables IV-7 and IV-8. Summary of VOC and Pesticide Data

Table IV-7 is a summary of VOC, SOC, and pesticide detection information by subarea for Statewide Network and PWS locations. Table IV-7 shows the total number of Statewide Network locations with either a VOC and immunoassay pesticide detections is 92, which is about 13% of all the wells sampled, and that the total number of PWS locations with either a VOC or SOC detection is 56.

Table IV-7 shows that the areas with the highest percentage (> 25%) of Statewide Network detections or highest number (> 10) of PWS detections include Subarea 6 (Payette; 28% Statewide Network detections), Subarea 7 (Boise Valley Shallow; 42% Statewide Network detections), Subarea 7/8 (Boise Valley; 22 PWS detections), and Subarea 17 (Portneuf; 17 PWS detections).

Table IV-7 also shows the approximate percentage of Idaho's population within each subarea. The only correlation between populated subareas and the data seems to be the fact that the subareas with the higher number of PWS VOC or SOC detections tend to be the more populated subareas.

Table IV-8 provides a summary of the specific VOC, SOC, or pesticides detected. This summary combines all subarea information throughout the State, and shows that the pesticides, such as atrazine, simazine, metribuzin, and alachlor, are the most commonly detected constituents for Statewide Network locations, whereas the VOCs, such as tetrachloroethylene (Perc) and trichloroethylene (TCE) are the most commonly detected constituents for the PWS locations which were sampled for either VOCs or SOCs.

Some of the locations summarized through Tables IV-7 and IV-8 where VOCs or Pesticides are detected may also represent sites or areas of significant degradation. As discussed under the Ground Water Quality Standards summary in Chapter 3, such situations may not be consistent with the goals of the Idaho Ground Water Quality Rule and the Idaho Ground Water Quality Plan. Any significant degradation situations may need to be addressed through the existing programs described within Chapter 3 or through new programs where necessary.

Although not addressed in this year's report, Statewide Network GC pesticide sampling continues to detect pesticides at very low levels (parts per trillion) in most wells sampled in the more vulnerable locations in the State. For example, 115 of 141 (82%) locations sampled in 1996 had detections of at least one pesticide. Such high percentages are not found in immunoassay testing since the detection limits are significantly higher than those for the GC method utilized.

Ground Water Quality Indicators

The below list of ground water quality information derived from the data in this report represents potential ground water quality indicators for Idaho. This particular list is based on data that is derived from fairly consistent network/sampling location characteristics and sampling parameters through time. These have the potential of indicating whether Idaho's ground water quality is changing with time, although the below amount of data does not span a large enough time duration nor show great enough variations over the reporting periods to yet be able to draw any such conclusions.

- The percentage of Statewide Network locations exceeding a SDWA (primary) MCL from human activities:
  1996/1997 Data - 7%
  1994/1995 Data - 8%
- The percentage of Statewide Network locations with nitrate ≥ 2 mg/l:
  1996/1997 Data - 36%
  1994/1995 Data - 34%
- The percentage of Public Water System locations with nitrate ≥ 2 mg/l:
  1996/1997 Data - 31%
  1994/1995 Data - 29%
- The percentage of Statewide Network locations with nitrate > 5 mg/l:
  1996/1997 Data - 13%
  1994/1995 Data - 13%
- The percentage of Public Water System locations with nitrate > 5 mg/l:
  1996/1997 Data - 8%
  1994/1995 Data - 8%
- The percentage of Statewide Network locations with either a VOC or Immunoassay Pesticide detection (it may be best to use 10% of the MCL or health advisory for future reports since detection limits may vary over time due to improved analytical methods):
  1996/1997 Data - 13%
  1994/1995 Data - 10%

In comparing the above data sets it is important to remember that the 1994/1995 Statewide Network locations (786 total) are mostly different from the 1996/1997 locations (701 total) since many Statewide Network locations are sampled on a four year rotation. In regards to the PWS locations, the data from 1994/1995 (895 nitrate sample locations) is primarily a subset of the more comprehensive PWS data used for 1996/1997 (2192 locations).

Additional indicators of ground water quality can also be determined for specific hydrogeologic subareas or aquifers based on any of the data sources in this report or other regional monitoring studies.

Sites and Areas of Ground Water Quality Concern

Figure IV-2 is a map of Idaho showing areas where nitrate levels are greater than 5 mg/l in 25% of the wells sampled by the Statewide Network and/or by regional studies. Figure IV-2 also shows many identified locations where nitrate exceeds the ground water quality standard (and primary MCL) of 10 mg/l. Figure IV-3 is a similar map showing sites and areas where organic compounds (VOCs, SOCs, and/or pesticides) are of concern, and Figure IV-4 is a similar map showing sites and areas where certain metals and naturally occurring compounds are of concern.

These figures help identify the specific sites and areas of concern within the subareas and aquifers across the State, and were derived using regional and local monitoring program prioritization criteria developed by the Ground Water Monitoring Technical Committee (reference Chapter 3 discussion on Regional and Local Monitoring Program). This approach of identifying the specific sites and areas within a subarea or aquifer allows for a more focused approach for addressing ground water contamination concerns through implementation of many of the programs listed in Table IV-3, such as is being done for Idaho's Regional and Local Monitoring Program. Other potential uses include Source Water Assessment Program priority or susceptibility determinations, or identifying areas where best management practices need to be implemented for identified contaminant sources.

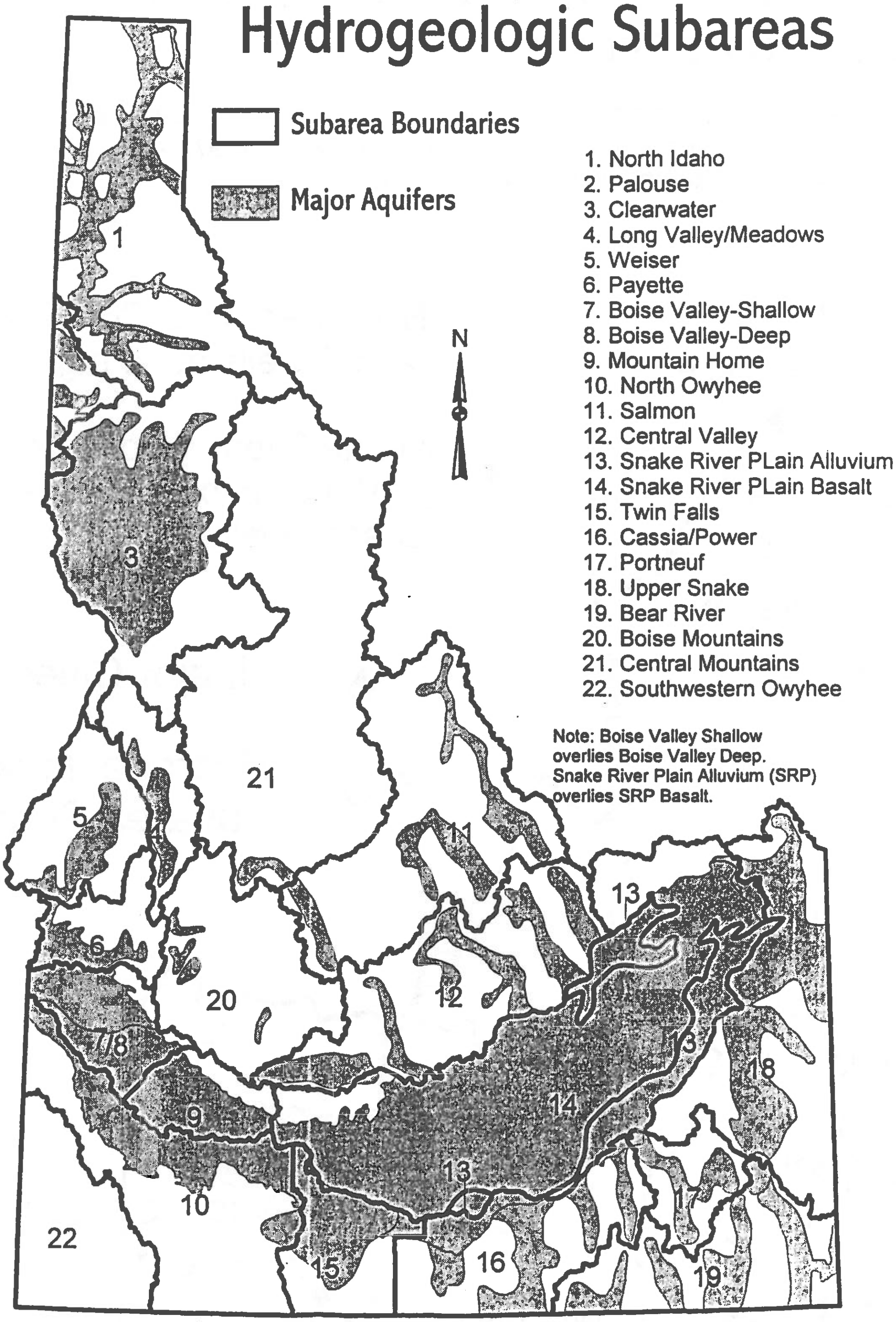

Figure IV-1: Twenty-two hydrogeologic subareas for the statewide monitoring program

Figure IV-2: Ground Water Areas and Sites Impacted by Nitrate

Based on Statewide Monitoring Network Data (1991 thru 1997); Public Water System Data (1996 & 1997); and Regional Monitoring Studies

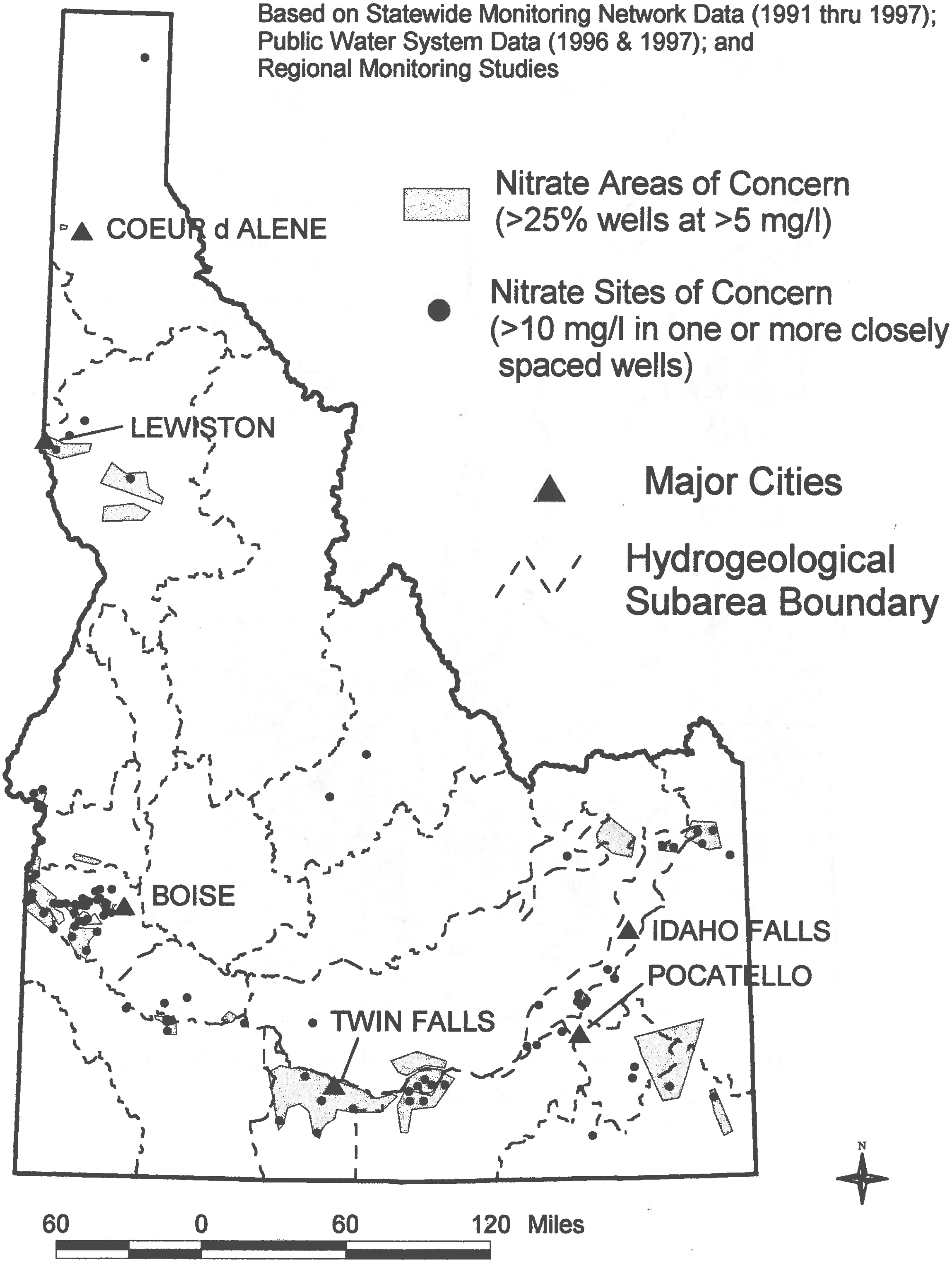

Figure IV-3: Ground Water Areas and Sites Impacted by Organic Compounds

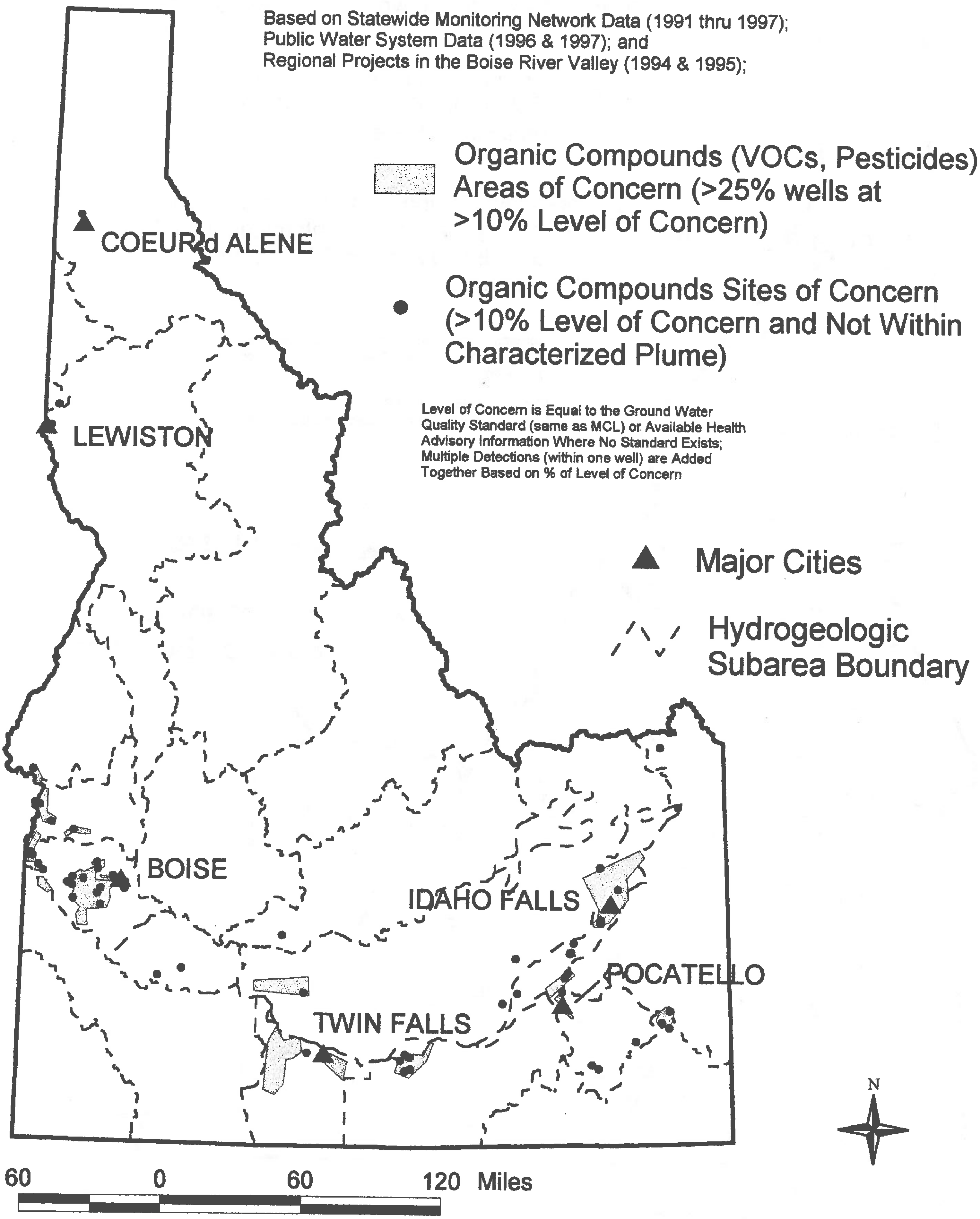

Figure IV-4: Ground Water Areas and Sites Impacted by Inorganic Compounds

Based on Statewide Monitoring Network Data (1991 thru 1997)

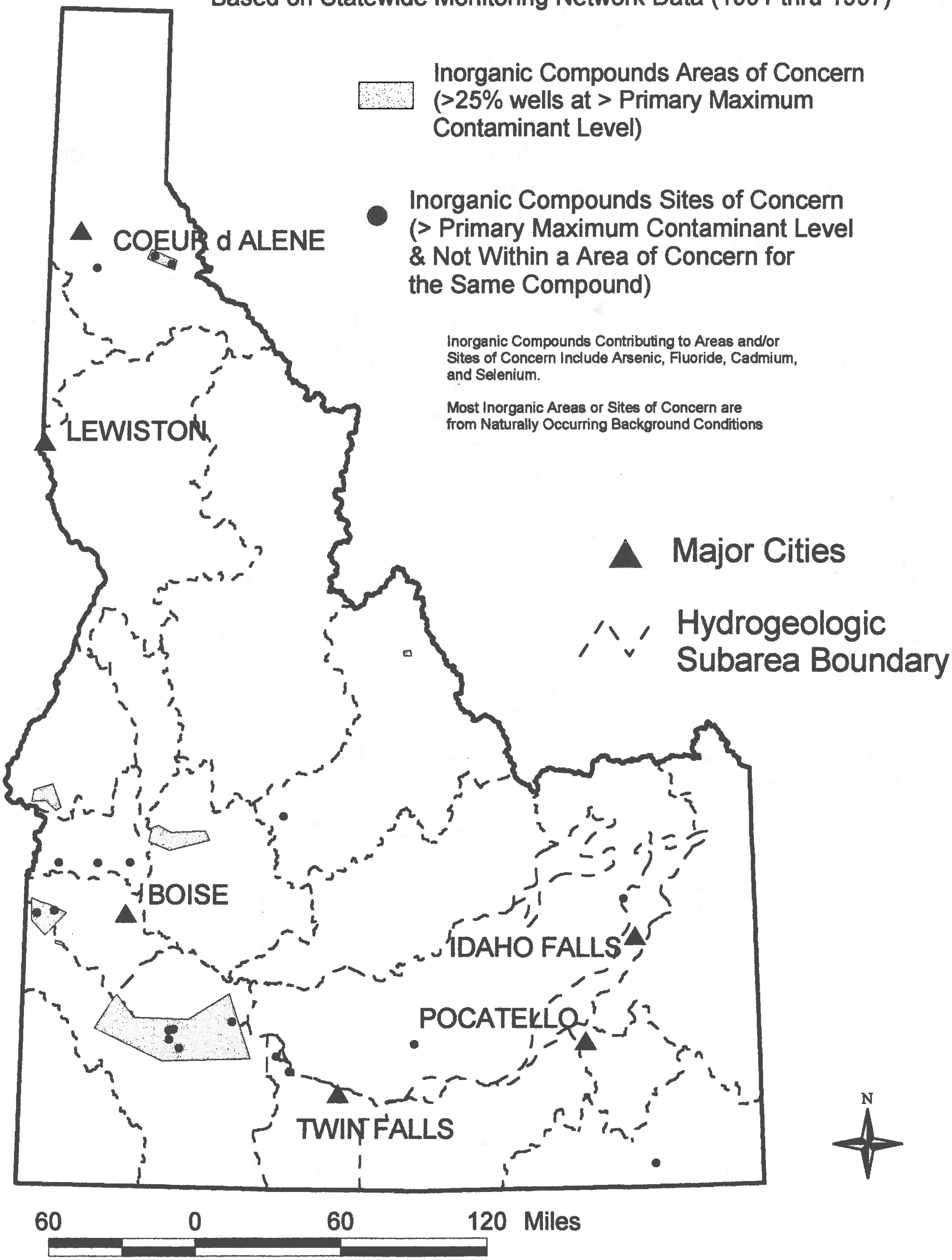

Table IV-4. Number of Locations Within Each Hydrogeologic Subarea Where Human Activities Have Caused at Least One Contaminant Value To Exceed an MCL; (1996 & 1997 Data)

Hydrogeologic Subarea Number	Number (& %) of Statewide Network Locations with at Least One Contaminant Value Exceeding an MCL	Number of Public Water System Locations with at Least One Contaminant Value Exceeding an MCL (a)
1	4 (6%)	4
2	0 (0%)	2
3	1 (3%)	4
4	0 (0%)	0
5	3 (27%)	2
6	0 (0%)	2
7	6 (8%)	NA
7/8	NA	10
8	2 (3%)	NA
9	2 (10%)	2
10	6 (32%)	1
11	1 (5%)	1
12	0 (0%)	0
13	2 (6%)	6
14	5 (4%)	0
15	2 (5%)	0
16	4 (15%)	2
17	4 (12%)	7
18	5 (16%)	1
19	2 (7%)	0
20	0 (0%)	0
Totals (96 & 97)	49 (7% (b))	44

NOTES:

(a) Percentage not calculated for public water system data due to varying numbers of wells sampled per parameter group. It is also worth noting that the public water system data does not include coliform results, which constitute a large percentage of the total wells exceeding an MCL for the Statewide Network..

(b) The percentage from the previous two year period (1994 and 1995) was 8% as reported in the 1996 305(b).

Table IV-5. Total Number of Locations Exceeding an MCL for a Specific Water Quality Parameter; All Subareas Combined (1996 & 1997 Data)

Water Quality Parameter	Number (& %) of Statewide Network Locations Exceeding the MCL Value	Number of Public Water System Locations Exceeding the MCL Value (a)
Nitrate	23 (3.3%)	32
Fecal Coliform (b)	20 (2.8%)	Data not calculated for this report
Tetrachloroethylene (also known as Perchloroethylene, Perc, or PCE)	0	4
Trichloroethylene (also known as Trichloroethene or TCE)	3 (0.4%)	2
Dichloroethene	0	2
Ethylene Dibromide (EDB)	1 (0.1%)	0
Di(2-ethylhexyl)phtalate (c)	0	1
Cadmium	3 (0.4%)	1
Antimony	0	1
Selenium (d)	1 (0.1%)	0
Arsenic (d)	7 (1.0%)	5
Fluoride (d)	7 (1.0%)	7

NOTES:

(a) Percentages are not calculated due to varying numbers of parameter group samples and a bias toward sampling those locations with VOC detections.

(b) MCL is actually for total coliform, of which fecal coliform is a subset.

(c) Detection could be representative of system contamination versus contamination within the ground water in the vicinity of the well.

(d) Arsenic, fluoride and selenium elevated levels are assumed to be from natural background conditions unless determined otherwise.

Table IV-6. Nitrate Results Summary (1996 & 1997 Data)

Hydrogeologic Subarea	Percentage of Locations with Nitrate Greater than or Equal to 2 mg/l		Percentage of Locations with Nitrate Greater than 5 mg/l		Total Number of Sample Locations		Approximate Percentage of Idaho's Population Within Each Subarea
	Statewide Network	Public Water System	Statewide Network	Public Water System	Statewide Network	Public Water System	
1	3	10	3	1	65	353	13
2	22	21	11	7	18	57	2
3	21	26	9	10	33	126	6
4	18	7	0	0	11	41	1
5	18	32	18	26	11	19	1
6	39	40	11	14	18	78	3
7	70	NA	26	NA	73	NA	31 (a)
8	28	NA	11	NA	63	NA	31 (a)
7/8	NA	36	NA	11	NA	497	31 (a)
9	30	64	5	19	20	52	2
10	58	23	42	4	19	22	1
11	10	8	0	1	19	89	1
12	5	4	0	0	20	71	2
13	36	39	11	5	36	375	17
14	40	37	9	8	128	62	3
15	74	78	21	20	39	65	5
16	30	48	15	18	27	56	2
17	50	52	12	16	32	90	6
18	31	18	28	2	32	54	1
19	45	35	10	17	29	52	2
20	12	17	0	7	8	30	< 1
Total for All Subareas (96 & 97)	**36%**	**31%**	**13%**	**8%**	**701 Locations**	**2192 Locations**	**> 99**
Total for All Subareas (94 & 95)	34%	29%	13%	8%	786 locations	895 locations	> 99

NOTES:
(a) The population is the same for Subareas 7 and 8 since Subarea 7 generally overlays Subarea 8.

Table IV-7. Summary of VOC and Pesticide Data (1996 & 1997 Data)

Hydrogeologic Subarea	Number (& %) of Locations with VOC (> MDL) or Immunoassay Pesticide Detections from Statewide Network	Number of Public Water System Locations with VOC or SOC Detections (> MDL) (a)	Approximate Percentage of Idaho's Population Within Each Subarea (1990 data)
1	4 (6%)	1	13
2	1 (6%)	2	2
3	0 (0%)	2	6
4	0 (0%)	0	1
5	0 (0%)	0	1
6	5 (28%)	0	3
7	31 (42%)	NA	31 (b)
8	5 (8%)	NA	31 (b)
7/8	NA	22 ©	31 (b)
9	0 (0%)	3	2
10	2 (11%)	0	1
11	1 (5%)	0	1
12	1 (5%)	0	2
13	8 (22%)	6	17
14	14 (11%)	0	3
15	4 (10%)	1	5
16	5 (19%)	1	2
17	6 (19%)	17 (d)	6
18	3 (9%)	0	1
19	2 (7%)	1	2
20	0 (0%)	0	<1
Total for All Subareas	92 (13%(e))	56	>99%

NOTES:

(a) Percentages not calculated due to varying numbers of VOC versus SOC sample locations for each subarea, and also because of a sampling bias toward those locations with historic VOC or SOC problems.
(b) The population is the same for Subareas 7 and 8 since Subarea 7 generally overlays Subarea 8.
(c) Mostly VOCs (Perc & TCE) in the Boise area.
(d) Mostly VOCs (Perc & TCE) in the Pocatello and Chubbuck area.
(e) The value from the 1996 305(b) report was 10%. This 10% value was from 1994 and 1995 data and may have been slightly lower if detections less than the MDL had been excluded as they had been for this 1998 report.

Table IV-8. Total Number of Locations Exceeding the Minimum Detection Limit for a Specific VOCs, SOCs, and Pesticides; All Subareas Combined (1996 & 1997 Data)

Water Quality Parameter	Total Number of Statewide Network Well Detections Exceeding the MDL Value	Total Number of Public Water System Detections Exceeding the MDL Value (DWIMS data only) (a)
Tetrachloroethylene (also known as Perchloroethylene, Perc, or PCE)	8 (1.1%)	29
Trichloroethylene (also known as Trichloroethene or TCE)	6 (0.9%)	19
Dichloroethene (also cis-1,2 dichloroethene)	1 (0.1%)	3
Ethylene Dibromide (EDB)	1 (0.1%)	0
Di(2-ethylhexyl)phtalate (b)	0 (0%)	3
Dichloropropane	0 (0%)	1
Trichloroethane	0 (0%)	1
Vinyl Chloride	0 (0%)	1
Toluene	1 (0.1%)	1
Xylene	0 (0%)	1
Atrazine	57 (8.1%)	5
Simazine	28 (4.0%)	3
Metribuzin	13 (1.9%)	0
Alachlor	15 (2.1%)	0
Cyanazine	3 (0.4%)	0
Aldicarb	2 (0.3%)	0
Metolachlor	1 (0.1%)	0
Carbofuran	1 (0.1%)	0
2,4-D	1 (0.1%)	0

NOTES:

(a) Percentages are not calculated due to varying numbers of parameter group samples and a bias toward sampling those locations with VOC detections.

(b) Detection could be representative of system contamination versus contamination within the ground water in the vicinity of the well.

Table IV-A-1. North Idaho Hydrogeologic Subarea (#1) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Kootenai Valley; Priest River; Pend Orielle River; Rathdrum Prairie; Coeur d'Alene River; St. Maries - St. Joe River.

Subarea/Aquifer(s) Description: Primarily unconsolidated alluvium consisting of stream, lake, and glacial sediments, with some Columbia River Basalt within the St. Maries - St. Joe River system.

Subarea Setting: Northern part of Idaho, forested mountains and valleys, several significant river drainages (see Aquifer/Flow System names above); includes the following cities: Coeur d'Alene, Sandpoint, Bonners Ferry, Kellog, and Wallace; also includes the Coeur d'Alene Indian Reservation.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	65	VOCs and Immunoassay Pesticides	61	4	NA	NA	NA	0	NA
		NO_3	NA	NA	63	0	1	1	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	3	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	1	NA
	353	NO_3	NA	NA	319	30	1	3	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	1

Notes:

MCL Exceeded:
Statewide Network - nitrate (1); cadmium (3)
Public Water System Data - nitrate (3); trichloroethylene (1); arsenic (1, probably naturally occurring)

Other VOC & Pesticide Detections:
Statewide Network (>MDL) - atrazine (1), simazine (1), metribuzin (1), alachlor (1)
Public Water System Data - none

Table IV-A-2. Palouse Hydrogeologic Subarea (#2) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Rock Creek; Hangman Creek; Palouse River; Moscow Basin

Subarea/Aquifer(s) Description: Fine grained sediments and Columbia River Basalts that filled the valley lowlands.

Subarea Setting: Hilly prairie and dry cropland located in the western part of north central Idaho; includes the Palouse River; cities include Moscow, Genesee, and Troy.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	18	VOCs and Immunoassay Pesticides	17	1	NA	NA	NA	0	NA
		NO_3	NA	NA	14	2	2	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	2	NA	NA	NA	0	NA
	57	NO_3	NA	NA	45	8	2	2	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - none
Public Water System Data - nitrate (2)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - toluene (1)
Public Water System Data (> MDL) - trichloroethylene (1), tetrachloroethylene (1)

Table IV-A-3. Clearwater Hydrogeologic Subarea (#3) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Clearwater Uplands; Clearwater Plateau; Joseph Plain; Mill Creek; Little Slate Creek

Subarea/Aquifer(s) Description: Larger Aquifers/Flow Systems are comprised primarily of Columbia River Basalts, smaller aquifers (Mill Creek, Little Slate Creek) are within unconsolidated alluvium.

Subarea Setting: North central portion of Idaho; includes hilly prairie with forested mountains to the south and east; dry croplands; major rivers include the Clearwater and Salmon; bordered by the Snake River on the west; cities include Lewiston, Orofino, Kamiah, and Grangeville; also includes the Nez Perce Indian Reservation.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	33	VOCs and Immunoassay Pesticides	33	0	NA	NA	NA	0	NA
		NO_3	NA	NA	26	4	2	1	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	2	NA	NA	NA	0	NA
	126	NO_3	NA	NA	93	20	9	4	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	2

Notes:

MCL Exceeded:
Statewide Network - nitrate (1)
Public Water System Data - nitrate (4), fluoride (1, probably naturally occurring), antimony (1, possibly naturally occurring or a system problem)

Other VOC & Pesticide Detections:
Statewide Network - none
Public Water System Data (> MDL) - trichloroethylene (1), xylene (1)

Table IV-A-4. Long Valley Hydrogeologic Subarea (#4) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Meadows Valley; Long Valley - Round Valley

Subarea/Aquifer(s) Description: Unconsolidated alluvium consisting of stream, lake, and glacial sediments, along with some Columbia River Basalts within the Meadows Valley system.

Subarea Setting: Forested mountains and valleys of west central Idaho; includes the North Fork of the Payette and Little Salmon Rivers; includes the following cities: New Meadows, McCall, and Cascade.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	11	VOCs and Immunoassay Pesticides	11	0	NA	NA	NA	0	NA
		NO_3	NA	NA	9	2	0	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	41	NO_3	NA	NA	38	3	0	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Ambient - none; Public Water System Data - none

Other VOC & Pesticide Detections: Statewide Ambient - none; Public Water System Data - none

Table IV-A-5. Weiser Hydrogeologic Subarea (#5) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Weiser River; Scott Creek - Mann Creek

Subarea/Aquifer(s) Description: Columbia River Basalts and sedimentary valley fill material.

Subarea Setting: High desert plains and mountains of west central Idaho; some forest land; includes the Weiser River; bordered by the Snake River on the west; cities include Weiser and Council.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	11	VOCs and Immunoassay Pesticides	11	0	NA	NA	NA	0	NA
		NO_3	NA	NA	9	0	1	1	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	2	1
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	19	NO_3	NA	NA	13	1	3	2	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Ambient - fecal coliform (2), arsenic (1, probably naturally occurring)
Public Water System Data - nitrate (2)

Other VOC & Pesticide Detections: Statewide Ambient - none
Public Water System Data - none

Table IV-A-6. Payette Hydrogeologic Subarea (#6) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Payette Valley

Subarea/Aquifer(s) Description: Primarily unconsolidated valley fill material comprised of sands, gravels, silts, and clays.

Subarea Setting: Lower Payette River valley of west central Idaho; high desert climate; some forested mountains; cities include Emmett and New Plymouth

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	18	VOCs and Immunoassay Pesticides	13	5	NA	NA	NA	0	NA
		NO_3	NA	NA	11	5	2	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	1
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	78	NO_3	NA	NA	47	20	9	2	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - fluoride (1, probably naturally occurring)
Public Water System Data - nitrate (2)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - atrazine (5), simazine (3)
Public Water System Data - none

Table IV-A-7. Boise Valley Shallow Hydrogeologic Subarea (#7) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Boise Valley - Shallow

Subarea/Aquifer(s) Description: Primarily within unconsolidated deposits of silt, sand, clay, and fine gravel overlaying the Boise Valley Deep Aquifer.

Subarea Setting: Boise River Valley of west central Idaho, from the foothills to its confluence with the Snake River; includes cities of Boise, Nampa, Caldwell, Eagle, Meridian, and Garden City; high desert climate

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	73	VOCs and Immunoassay Pesticides	42	31	NA	NA	NA	0	NA
		NO_3	NA	NA	22	32	17	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	4	2

Notes:

MCL Exceeded: Statewide Network - nitrate (2), fecal coliform (4), arsenic (2, probably naturally occurring)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - tetrachloroethylene (2), atrazine (24), alachlor (7), simazine (9), metribuzin (1), cyanazine (1)
(< MDL) - tetrachloroethane (1)

Table IV-A-7/8. Boise Valley Hydrogeologic Subarea (#s 7 & 8) Public Water System Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subareas: Boise Valley (shallow & deep)

Subarea/Aquifer(s) Description: Unconsolidated deposits of silt, sand, clay, and fine gravel with Snake River Basalts intercalated with the sedimentary deposits.

Subarea Setting: Boise River Valley of west central Idaho, from the foothills to its confluence with the Snake River; includes cities of Boise, Nampa, Caldwell, Eagle, Meridian, and Garden City; high desert climate

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	21	NA	NA	NA	1	NA
	497	NO_3	NA	NA	319	125	46	7	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	4

Notes:

MCL Exceeded: Public Water System Data - nitrate (7), di(2-ethylhexyl)phtalate (1, may be system problem), arsenic (2, probably naturally occurring), fluoride (2, probably naturally occurring),

Other VOC & Pesticide Detections: Public Water System Data (> MDL) - tetrachloroethylene (8), trichloroethylene (4), dichloropropane (1), trichloroethane (2), toluene (1), vinyl chloride (1), atrazine (4), simazine (3), di(2-ethylhexyl)phtalate (1, may be system problem)

Table IV-A-8. Boise Valley Deep Hydrogeologic Subarea (#8) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Boise Valley - Deep

Subarea/Aquifer(s) Description: Sedimentary and volcanic aquifer underlying the Boise Valley Shallow Aquifer; confined in places.

Subarea Setting: Boise River Valley of west central Idaho, from the foothills to its confluence with the Snake River; includes cities of Boise, Nampa, Caldwell, Eagle, Meridian, and Garden City; high desert climate

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	63	VOCs and Immunoassay Pesticides	58	5	NA	NA	NA	0	NA
		NO_3	NA	NA	45	11	5	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	2

Notes:

MCL Exceeded: Statewide Network - nitrate (2), arsenic (2, probably naturally occurring)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - atrazine (2), alachlor (3), simazine (1)

Table IV-A-9. Mountain Home Hydrogeologic Subarea (#9) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Mountain Home Plateau

Subarea/Aquifer(s) Description: Primarily within unconsolidated deposits of clay, silt, sand and gravel, Snake River Basalts and, at depth, silicic volcanics of the Idavada Formation.

Subarea Setting: Snake River Plain region of west central Idaho; desert climate; bordered by the Snake River to the South; includes city of Mountain Home and Mountain Home Air Force Base.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	20	VOCs and Immunoassay Pesticides	20	0	NA	NA	NA	0	NA
		NO_3	NA	NA	14	5	1	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	2	1
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	3	NA	NA	NA	0	NA
	52	NO_3	NA	NA	19	23	8	2	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - fecal coliform (2), fluoride (1, probably naturally occurring), Public Water System Data - nitrate (2)

Other VOC & Pesticide Detections: Statewide Network - none
Public Water System Data (> MDL) - trichloroethylene (3), cis-1,2 dichloroethene (1), di(2-ethylhexyl)phtalate (1, may be a system problem)

Table IV-A-10. North Owyhee Hydrogeologic Subarea (#10) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Homedale - Murphy; Bruneau - Grandview

Subarea/Aquifer(s) Description: Primarily within sedimentary sequences of unconsolidated to consolidated clay, silt, sand and gravel, basalts of the Banbury and Bruneau Formations, and, at depth, silicic volcanics.

Subarea Setting: Desert climate; includes northern and eastern portions of the Owyhee Mountains of Southwestern Idaho; bordered by the Snake River to the north; includes the Bruneau River drainage; cities include Marsing, Bruneau, and Murphy.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	19	VOCs and Immunoassay Pesticides	17	2	NA	NA	NA	0	NA
		NO_3	NA	NA	8	3	2	6	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	4
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	22	NO_3	NA	NA	17	4	1	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	1	2

Notes:

MCL Exceeded: Statewide Network - nitrate (6), fluoride (1, probably naturally occurring), arsenic (2, probably naturally occurring), selenium (1, probably naturally occurring)
Public Water System Data - cadmium (1), fluoride (2, probably naturally occurring)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - atrazine (1), alachlor (1)
Public Water System Data - none

Table IV-A-11. Salmon Hydrogeologic Subarea (#11) Monitoring Data

<u>Primary Aquifers/Ground Water Systems within Subarea</u>: Sawtooth Valley - Bear Valley; Lemhi Valley; Pahsimeroi Valley; Round Valley; Upper Salmon River; North Fork Salmon River

<u>Subarea/Aquifer(s) Description</u>: Primarily within valley fill materials comprised of stream, lake and glacial deposits.

<u>Subarea Setting</u>: Forested mountain ranges and intermountain valleys of central and eastern Idaho; comprises some of the headwaters to the Salmon River; including the upper portion of the Salmon River, the North & East Forks to the Salmon River, the Lemhi River, and the Pahsimeroi River; cities include Salmon, Challis, and Stanley.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	19	VOCs and Immunoassay Pesticides	18	1	NA	NA	NA	0	NA
		NO_3	NA	NA	17	2	0	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	1	2
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	89	NO_3	NA	NA	82	6	0	1	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

<u>Notes</u>:

MCL Exceeded: Statewide Network - fecal coliform (1), fluoride (2, probably naturally occurring)
Public Water System Data - nitrate (1)

Other VOC & Pesticide Detections: Statewide Network (> MDL) - metribuzin (1)
(< MDL) - MTBE (1), trichloroethane (1)
Public Water System Data - none

Table IV-A-12. Central Valleys Hydrogeologic Subarea (#12) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Camas Prairie, Big Wood River - Silver Creek, Copper Basin, Big Lost River Valley, Little Lost River Valley, and Birch Creek Valley

Subarea/Aquifer(s) Description: Valley fill material comprised of stream, lake and glacial deposits; southern systems also include basalts.

Subarea Setting: Mountainous valleys of central and east-central areas of Idaho; includes Big Lost & Little Lost Rivers, Big Wood River, and Camas Creek; cities include Mackay, Ketchum, Hailey, and Fairfield

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	20	VOCs and Immunoassay Pesticides	19	1	NA	NA	NA	0	NA
		NO_3	NA	NA	19	1	0	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	71	NO_3	NA	NA	68	3	0	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - none
Public Water System Data - none

Other VOC & Pesticide Detections: Statewide Network (> MDL) - aldicarb (1)
(< MDL) - vinyl chloride (1)
Public Water System Data - none

Table IV-A-13. Snake River Plain Alluvium Hydrogeologic Subarea (#13) Monitoring Data

Primary Aquifers/Ground Water Flow Systems within Subarea: Snake Plain (alluvium)

Subarea/Aquifer(s) Description: Alluvial deposits around the southern, eastern, and northern portions of the Snake Plain.

Subarea Setting: Plains and Snake River Valley areas of eastern and central Idaho; includes cities of Idaho Falls, Blackfoot, Arco, and Rupert; includes a portion of the Fort Hall Indian Reservation.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	36	VOCs and Immunoassay Pesticides	28	8	NA	NA	NA	0	NA
		NO_3	NA	NA	23	9	2	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	5	NA	NA	NA	1	NA
	375	NO_3	NA	NA	230	126	14	5	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded:
Statewide Network - nitrate (2)
Public Water System Data - nitrate (5), tetrachloroethylene (1)

Other VOC & Pesticide Detections:
Statewide Network (> MDL) - atrazine (3), simazine (4), metolachlor (1), metribuzin (3), 2,4-D (1)
Public Water System Data (> MDL) - tetrachloroethylene (4), trichloroethylene (1)

Table IV-A-14. Snake River Plain Basalt Hydrogeologic Subarea (#14) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Snake Plain (basalt)

Subarea/Aquifer(s) Description: Basalts of the Snake River Group and associated sedimentary and pyrocolastic interbeds.

Subarea Setting: Snake River Plain of south central and eastern Idaho; cities include Jerome and Shoshone.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	128	VOCs and Immunoassay Pesticides	114	13	NA	NA	NA	1	NA
		NO_3	NA	NA	77	40	8	3	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	2	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	62	NO_3	NA	NA	39	18	5	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded:
Statewide Network - nitrate (3), EDB (1), fecal coliform (2)
Public Water System Data - none

Other VOC & Pesticide Detections:
Statewide Network (> MDL) - atrazine (10), simazine (4), alachlor (1), cyanazine (2), metribuzin (5)
(< MDL) - MTBE (1)
Public Water System Data - none

Table IV-A-15. Twin Falls Hydrogeologic Subarea (#15) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Salmon Falls Creek - Rock Creek

Subarea/Aquifer(s) Description: Primarily within basalts of the Banbury Formation and, at depth, silicic volcanics.

Subarea Setting: Agricultural region of southern Idaho bordered by the Snake River to the north and Nevada to the south; includes cities of Twin Falls and Buhl.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	39	VOCs and Immunoassay Pesticides	35	4	NA	NA	NA	0	NA
		NO_3	NA	NA	10	21	6	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	1	NA	NA	NA	0	NA
	65	NO_3	NA	NA	14	38	13	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - nitrate (2)
Public Water System Data - none

Other VOC & Pesticide Detections: Statewide Network (> MDL) - atrazine (3), simazine (3), alachlor (2)
Public Water System Data (> MDL) - tetrachloroethylene (1)

Table IV-A-16. Cassia/Power Hydrogeologic Subarea (#16) Monitoring Data

<u>Primary Aquifers/Ground Water Systems within Subarea</u>: Goose Creek - Golden Valley; Marsh Valley; Raft River Valley; Rockland Valley; Arbon Valley.

<u>Subarea/Aquifer(s) Description</u>: Primarily within stream and lake deposited sediments and unconsolidated alluvial deposits with some basalts and other volcanic rocks.

<u>Subarea Setting</u>: Southern Idaho bordered by the Snake River to the North and Utah to the south; some mountainous terrain; cities include Burley and American Falls; includes a portion of the Fort Hall Indian Reservation.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	27	VOCs and Immunoassay Pesticides	22	5	NA	NA	NA	0	NA
		NO_3	NA	NA	19	4	2	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	3	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	1	NA	NA	NA	0	NA
	56	NO_3	NA	NA	29	17	8	2	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

<u>Notes</u>:

MCL Exceeded:
Statewide Network - nitrate (2), fecal coliform (3)
Public Water System Data - nitrate (2)

Other VOC & Pesticide Detections:
Statewide Network (> MDL) - atrazine (5), simazine (3)
Public Water System Data (> MDL) - tetrachloroethylene (1)

Table IV-A-17. Portneuf Hydrogeologic Subarea (#17) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Marsh Creek - Portneuf River; Portneuf Valley - Gem Valley

Subarea/Aquifer(s) Description: Primarily within the valley fill material comprised of unconsolidated alluvium and underlying poorly indurated sediments and volcanics of the Salt Lake Formation.

Subarea Setting: Southeastern Idaho mountains and valleys; includes Portneuf River; cities include Pocatello, Chubbuck, and Inkom.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	32	VOCs and Immunoassay Pesticides	26	3	NA	NA	NA	3	NA
		NO_3	NA	NA	16	12	4	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	1	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	11	NA	NA	NA	6	NA
	90	NO_3	NA	NA	43	33	13	1	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded:
Statewide Network - trichloroethylene (3), fecal coliform (1)
Public Water System Data - nitrate (1), tetrachloroethylene (3), trichloroethylene (1), dichloroethene (2)

Other VOC & Pesticide Detections:
Statewide Network (> MDL) - tetrachloroethylene (6), trichloroethylene (3), cis-1,2 dichlorethene (1), metribuzin (1)
(< MDL) - cis-1,2 dichloroethene (1), tetrachloroethane (1)
Public Water System Data - (> MDL) - tetrachloroethylene (10), trichloroethylene (7)

Table IV-A-18. Upper Snake Hydrogeologic Subarea (#18) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Upper Blackfoot River; Blackfoot Reservoir; Willow Creek - Grays Lake; Star Valley - Sage Valley; Teton Basin; Island Park

Subarea/Aquifer(s) Description: Primarily unconsolidated valley fill material.

Subarea Setting: Eastern portion of Idaho comprising some of the Snake River headwaters and associated mountains; includes a portion of the Snake River and Henry's Fork; cities include Driggs; includes a portion of the Fort Hall Indian Reservation.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	32	VOCs and Immunoassay Pesticides	29	3	NA	NA	NA	0	NA
		NO_3	NA	NA	22	1	7	2	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	3	0
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	54	NO_3	NA	NA	44	9	0	1	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded:
Statewide Network - nitrate (2), fecal coliform (3)
Public Water System Data - nitrate (1)

Other VOC & Pesticide Detections:
Statewide Network (> MDL) - atrazine (2), carbofuran (1)
(< MDL) - MTBE (3)
Public Water System Data - none

Table IV-A-19. Bear River Hydrogeologic Subarea (#19) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Black Pine - Curlew Valley; Pocatello Valley; Malad Valley; Cache Valley; Gem Valley - Gentile Valley; Soda Springs; Bear River - Dingle Swamp

Subarea/Aquifer(s) Description: Primarily unconsolidated alluvium. Some Blackfoot Basalts and fine-grained lake deposits, and, at depth, poorly indurated sediments and volcanics of the Salt Lake Formation.

Subarea Setting: Forested mountains and agricultural valleys in the southeast corner of Idaho; includes the Bear River; cities include Montpelier and Preston.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	29	VOCs and Immunoassay Pesticides	27	2	NA	NA	NA	0	NA
		NO_3	NA	NA	16	10	3	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	2	1
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	1	NA	NA	NA	0	NA
	52	NO_3	NA	NA	34	9	9	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	0

Notes:

MCL Exceeded: Statewide Network - fecal coliform (2), fluoride (1, probably naturally occurring)
Public Water System Data - none

Other VOC & Pesticide Detections: Statewide Network (> MDL) - atrazine (1), aldicarb (1), metribuzin (1)
Public Water System Data (> MDL) - atrazine (1)

Table IV-A-20. Boise Mountains Hydrogeologic Subarea (#20) Monitoring Data

Primary Aquifers/Ground Water Systems within Subarea: Garden Valley; Grimes Creek; Mores Creek; South Fork Boise River

Subarea/Aquifer(s) Description: Probably within the unconsolidated valley fill material.

Subarea Setting: Mountainous region northeast of Boise in the central and west central part of Idaho; includes headwaters to the Boise River and the South and Middle Forks of the Payette River; cities include Idaho City and Garden Valley.

Monitoring Data Type	Number of Wells Sampled Per Parameter Group	Parameter Groups	# of Wells: VOCs, SOCs, and/or Pesticides ≤ MDL	# of Wells: VOCs, SOCs, and/or Pesticides > MDL & ≤ MCL	Nitrate Levels < 2mg/l	Nitrate Levels ≥ 2mg/l & ≤ 5mg/l	Nitrate Levels > 5mg/l & ≤ 10mg/l	# of Wells where a Parameter Exceeds the MCL (does not include natural background)	# of Wells where the Natural Background Level Exceeds MCL
Statewide Monitoring Network (1996 & 1997 Data)	8	VOCs and Immunoassay Pesticides	8	0	NA	NA	NA	0	NA
		NO_3	NA	NA	7	1	0	0	NA
		Other (Inorganics, Bacteria)	NA	NA	NA	NA	NA	0	1
Water Quality Data from Public Water Supply Wells (1996 & 1997 Data)	Not determined for this report.	VOC & SOC	Not determined for this report.	0	NA	NA	NA	0	NA
	30	NO_3	NA	NA	25	3	2	0	NA
	Not determined for this report.	Inorganic Compounds	NA	NA	NA	NA	NA	0	2

Notes:

MCL Exceeded:
Statewide Network - fluoride (1, probably naturally occurring)
Public Water System Data - fluoride (2, probably naturally occurring)

Other VOC & Pesticide Detections:
Statewide Network - none
Public Water System Data - none

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