UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

# ACTIVITIES IN IDAHO

# STATUS OF PROJECTS, FISCAL YEARS 1982-83

by Linda K. Channel

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Open-File Report 83-40

Boise, Idaho

December 1982

UNITED STATES DEPARTMENT OF THE INTERIOR

JAMES G. WATT, Secretary

GEOLOGICAL SURVEY

Dallas L. Peck, Director

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# ACTIVITIES IN IDAHO
# STATUS OF PROJECTS, FISCAL YEARS 1982-83

Compiled by
Linda K. Channel

## ABSTRACT

Twenty-three projects were conducted by the Water Resources Division of the U.S. Geological Survey in Idaho during FY's (fiscal years) 1982-83. These projects were done in cooperation with seven State and local and nine Federal agencies. State and local cooperative funding amounted to $566,123 in FY 1982 and $570,000 (projected monies) in FY 1983; Federal funding amounted to $2,083,748 in FY 1982 and $1,656,494 (projected monies) in FY 1983.

Eighty-three persons were employed as of September, FY 1982--40 full time and 43 other than full time. Sixty-five persons were employed as of October, FY 1983--35 full time and 30 other than full time. In addition, the Water Resources Division maintains a project office at the Idaho National Engineering Laboratory. Work there is done in cooperation with the U.S. Department of Energy, which provides most of the funding. Some Federal funds are provided for special projects.

Projects other than continuing programs for collection of hydrologic data included flood-mapping studies, geothermal-resource investigations, ground-water-quality assessments, basin- and region-wide water-resource investigations, river quality-of-water monitoring studies, volcanic-ash-related studies, ground-water-trends and stream-gaging program evaluations, river erosion and sediment-transport studies, water-budget and ground-water-use determinations, and a sole-source aquifer appraisal.

## INTRODUCTION

The U.S. Geological Survey was established as an agency of the Department of the Interior on March 3, 1879. The initial purpose of the Survey was to provide a plan that would secure the best possible results at the least possible cost for surveying and mapping the Territories of the United States. Today, the Survey is involved in solving basic problems in hydrology, geology, geophysics, and geochemistry; in developing new techniques and methods for appraising and conserving minerals and water; and in providing geologic and topographic maps of the country and extraterrestrial space.

The Water Resources Division, one of three major divisions of the Survey, has the mission to provide hydrologic information and understanding needed for optimum utilization and management of the Nation's water resources for the overall benefit of the people of the United States. This is accomplished, in large part, through cooperation with other Federal and non-Federal agencies by:

## Photos

Cover: Snake River Canyon near Blue Lakes Spring, Idaho

(1) Collecting suspended-sediment samples, Germania Creek near Clayton, Idaho

(2) Snake River Plain Regional Aquifer Systems Analysis study area

(3) Cableway at the Clearwater River at Spalding, Idaho, gaging station

(4) Lake Milner, Idaho

(5) Selected U.S. Geological Survey reports

(6) Gage house at Big Wood River near Bellevue, Idaho

(1) Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources;

(2) conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface water and ground water;

(3) conducting supportive basic and problem-oriented research in hydraulics, hydrology, and related fields of science to improve the scientific basis for investigations and measurement techniques, and to understand hydrologic systems sufficiently to quantitatively predict their response to stress, either natural or manmade;

(4) coordinating the activities of Federal agencies in the acquisition of water data for streams, lakes, reservoirs, estuaries, and ground waters;


(5) disseminating water data and results of investigations and research through reports, maps, computerized information services, and other forms of public releases; and

(6) providing scientific and technical assistance in hydrologic fields to other Federal, State, and local agencies, to licensees of the Federal Energy Regulatory Commission, and to international agencies on behalf of the Department of State.

## ACTIVITIES IN IDAHO

In October 1982 the Boise, Idaho, and Carson City, Nevada, District Offices combined to form the Idaho-Nevada District. The Idaho State Office in Boise and the Nevada State Office in Carson City are operated under the direction of the District Chief, who is headquartered in the Boise office. The organization chart on the following page shows the main operating sections and support units in the Idaho-Nevada District.

In conducting its FY 1982 activities in Idaho, the Survey employed a total of 83 persons (40 full time and 43 other than full time)--67 in the Boise State Office, 9 in the Idaho Falls Field Headquarters, 5 in the Sandpoint Field Headquarters, and 2 in the Twin Falls Field Headquarters. As of October, FY 1983, the Survey in Idaho employed a total of 65 persons (35 full time and 30 other than full time)--50 in the Boise State Office, 9 in the Idaho Falls Field Headquarters, 4 in the Sandpoint Field Headquarters, and 2 in the Twin Falls Field Headquarters. The primary effort of these persons focused on carrying out 21 funded and 2 proposed projects.

In addition to the Idaho State Office program in Boise, the Water Resources Division maintains a project office at the INEL (Idaho National Engineering Laboratory) near Arco. Work there is done in cooperation with the U.S. Department of Energy, which provides most of the funding. Some Federal funds are provided for special projects. INEL funds are not included in the Idaho State Office funding diagrams (fig. 1).

The U.S. Geological Survey and agencies of the State of Idaho have had cooperative agreements for the systematic collection of streamflow data since 1909 and for interpretive ground-water studies and ground-water-data collection since 1946.

In FY 1982 the following State, local, and Federal agencies participated in cooperative programs with the Idaho State Office:

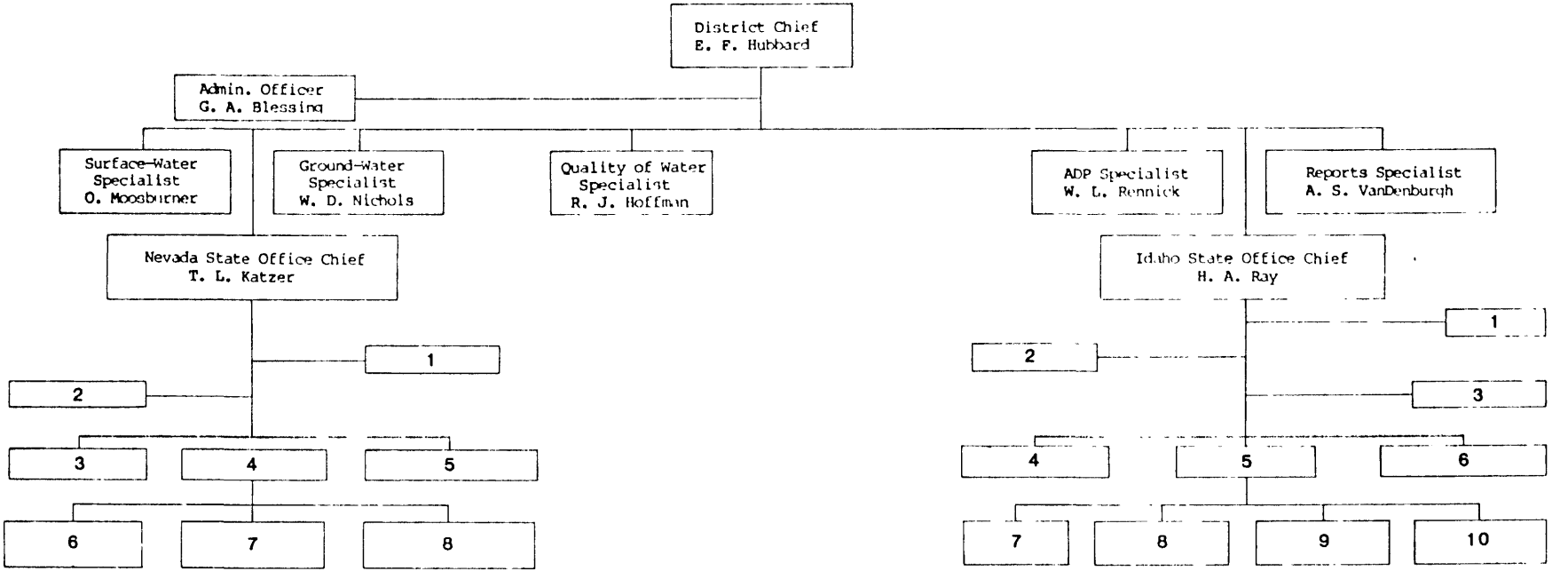
### State and Local

Butte Soil Conservation District
City of Orofino
Idaho Department of Health and Welfare
Idaho Department of Water Resources
Shoshone-Bannock Tribes, Fort Hall Indian Reservation
Teton County Commissioners, Wyoming

IDAHO-NEVADA DISTRICT

ORGANIZATION CHART*

December 31, 1982




1. Administrative Unit
2. Reports Unit
3. Great Basin RASA Section
4. Hydrologic Data Collection and Analysis Section
5. Hydrologic Studies and Computer Applications Section
6. Surveillance Unit
7. Elko Field Headquarters
8. Boulder City Field Headquarters

1. ADP Unit
2. Administrative Unit
3. Reports Unit
4. Snake River Plain RASA Section
5. Hydrologic Data Section
6. Hydrologic Studies Section
7. Hydrologic Records Unit
8. Idaho Falls Field Headquarters
9. Sandpoint Field Headquarters
10. Twin Falls Field Headquarters

*Personnel listed in District and State Offices are filling these positions on an acting basis pending permanent assignment.

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1982

| | |
|---|---|
| State and local funds | $ 566,123 |
| Federal funds | 2,083,748 |
| Total | $2,649,871 |

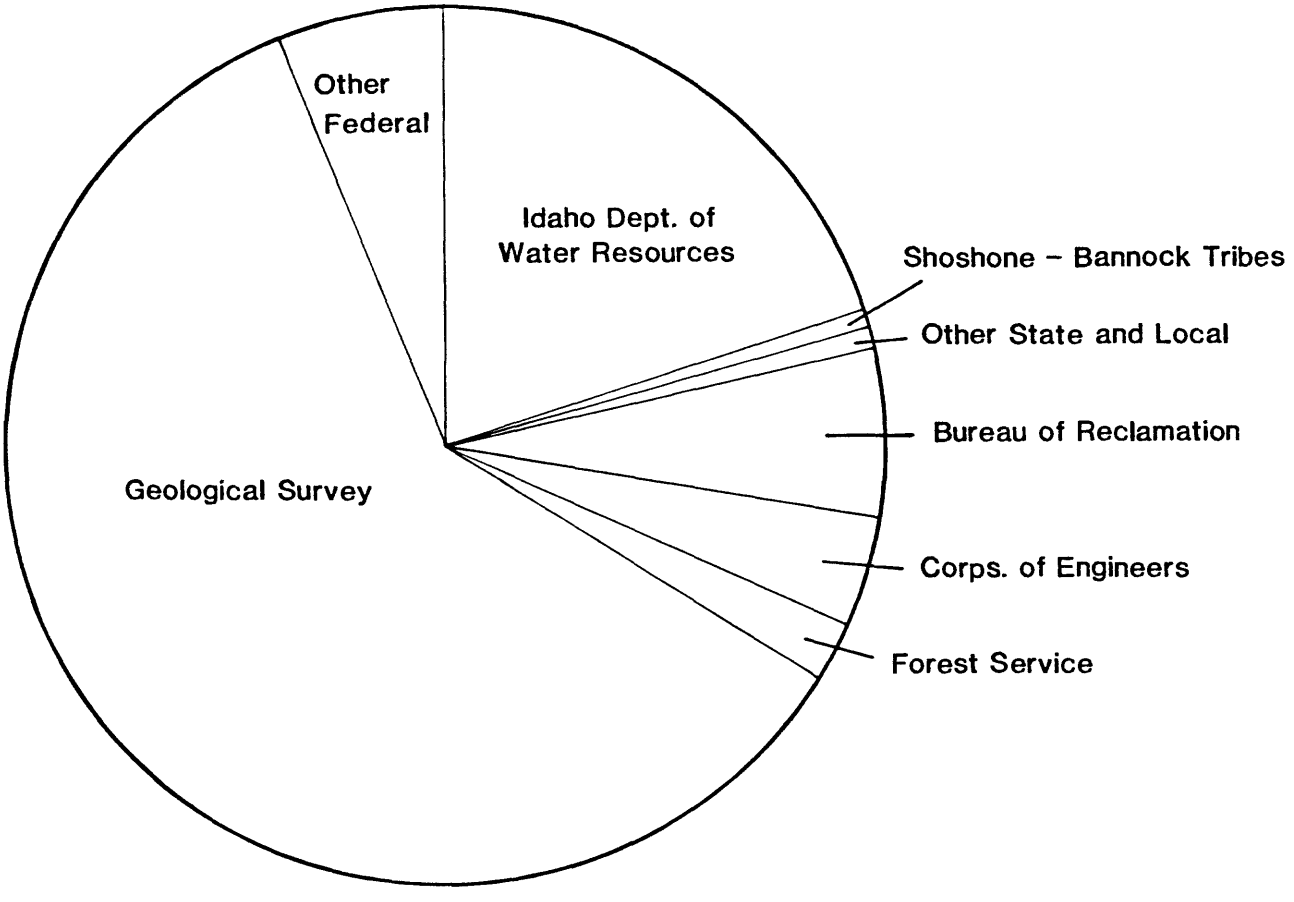
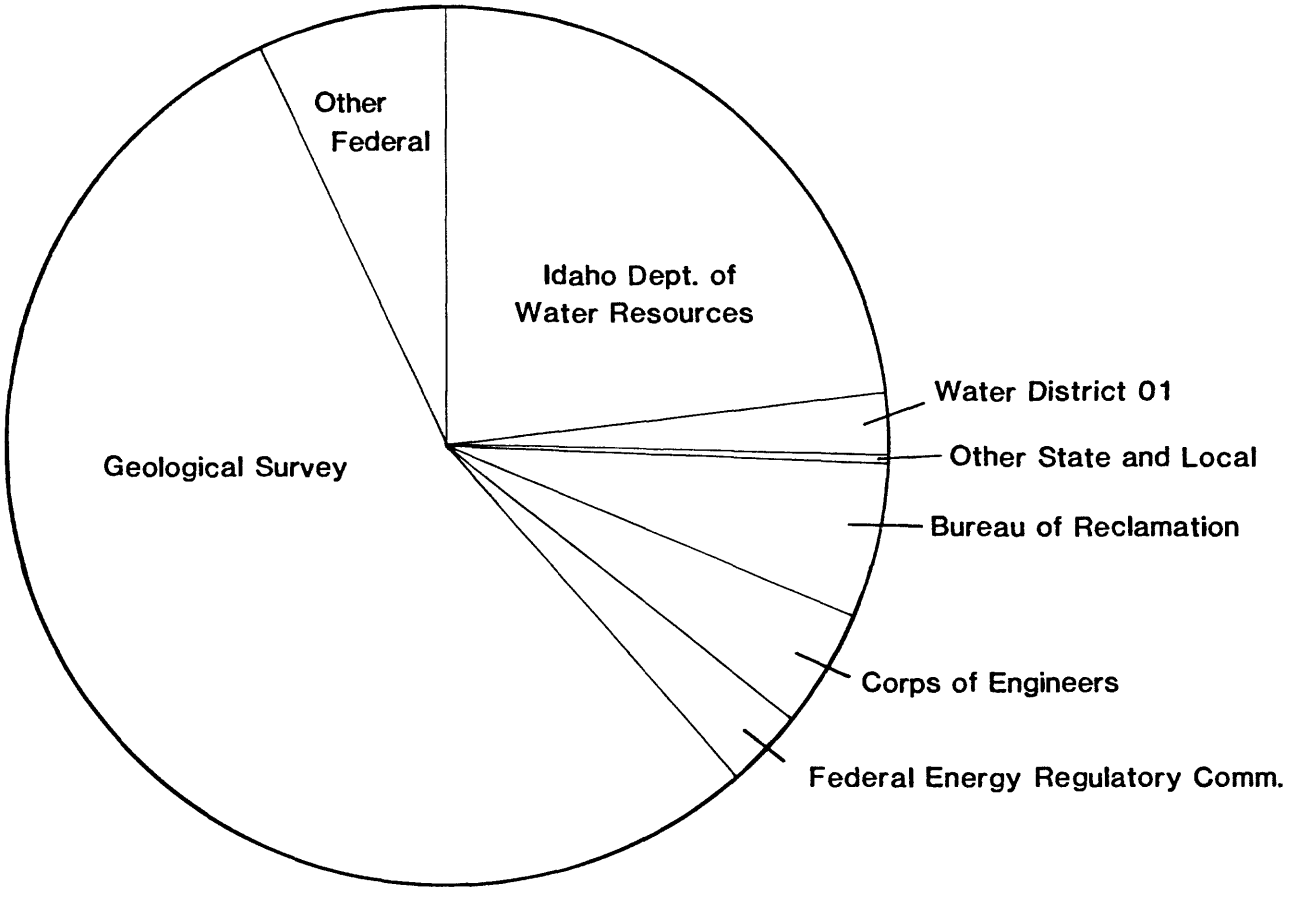



FIGURE 1. -- Idaho State Office

1983

| | |
|---|---|
| State and local funds | $ 570,000 |
| Federal funds | 1,656,494 |
| Total | $2,226,494 |




funding, fiscal years 1982 - 83.

Federal

Bonneville Power Administration
Federal Energy Regulatory Commission
International Joint Commission Waterways Treaty
(Department of State)
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Department of Energy
U.S. Forest Service
U.S. Geological Survey

As of October, FY 1983, the following State, local, and Federal agencies participated in cooperative programs with the Idaho State Office:

State and Local

Idaho Department of Water Resources
Shoshone-Bannock Tribes, Fort Hall Indian Reservation
Teton County Commissioners, Wyoming
Water District 01

Federal

Bonneville Power Administration
Federal Energy Regulatory Commission
International Joint Commission Waterways Treaty
(Department of State)
U.S. Army Corps of Engineers
U.S. Bureau of Land Management
U.S. Bureau of Reclamation
U.S. Environmental Protection Agency
U.S. Forest Service
U.S. Geological Survey

The proportional amount of funding from all contributing agencies is shown in figure 1.

## STATUS OF PROJECTS

The 21 funded and 2 proposed projects in the Idaho State Office program in FY 1982-83 are:

ID 001--Surface-water stations
002--Ground-water stations
003--Quality-of-water stations
004--Sediment stations
007--Water use
109--Flood-hazard mapping
110--Kootenay Lake Board of Control
116--Geothermal investigations, Idaho batholith
132--Ground-water-quality assessments
137--Snake River Plain RASA
139--Water quality of irrigation flows
141--Effects of ash
142--Ground water, Michaud Flats
143--Ground-water trends in Idaho
144--Channel change, Big Lost River
145--Evaluation of stream-gaging program
146--Ground-water-quality conditions
147--Ground water for irrigation, Bruneau plateau
148--Cottonwood geohydrology
149--Ground-water use
150--Snake River water budgets
151--Ground-water-resource assessment
152--Sole-source aquifer appraisal

ID 001, 2, 3, and 4 are continuing basic-data collection projects. The locations and types of data being collected for these projects are included in figures 2-8, at the back of this report. Locations of numerous wells where water levels and other related data are collected for specific projects are available from the Idaho State Office (address on back of inside cover page). Current descriptions of all the projects follow.

ID 001--SURFACE-WATER STATIONS

Location: Statewide

Period of project: Continuous since July 1889

Project leader: Robert W. Harper

Objectives: Collect surface-water data sufficient to satisfy needs for current uses, such as (1) assessment of water resources, (2) operation of reservoirs or industries, (3) forecasting, (4) disposal of wastes and pollution controls, (5) discharge data to accompany water-quality measurements, (6) legal requirements, and (7) research or special studies; and collect data for planning and design studies that define, for any location, the statistical properties of and trends in occurrence of water in streams, lakes, estuaries, etc.

Approach: Measure and record stage and discharge of streams and stage and contents of lakes and reservoirs. Standard methods of data collection will be used as described in the series "Techniques of Water Resources Investigations of the United States Geological Survey." Partial-record data collection will be used instead of continuous-record data collection, where it serves the required purpose.

Progress in FY 1982: Continued collection and compilation of surface-water data for 180 gaging stations, stage only records for 2 gaging stations, stage only for 9 lakes and reservoirs, and contents only for 13 lakes and reservoirs. All data were incorporated as part of the WATSTORE (National Water Data Storage and Retrieval) system.

Plans for FY 1983: Continue scheduled program of statewide data collection at a reduced scale.

Data supplied by: Water Districts 01, 31, 33, 34, 37, 37N, and 65K; Bureau of Indian Affairs; City of Nampa; Idaho Power Company; Utah Power and Light Company; Oakley Canal Company; and Salmon River Canal Company.

Funding sources: Idaho Department of Health and Welfare, Idaho Department of Water Resources, Bonneville Power Administration, Federal Energy Regulatory Commission, International Joint Commission (WWT), Teton County Commissioners (Wyoming), Water District 01, U.S. Army Corps of Enginers, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, U.S. Forest Service, and U.S. Geological Survey.

Report: U.S. Geological Survey, 1982, Water-resources data for Idaho, water year 1981: U.S. Geological Survey Water-Data Report, ID-81-1, 81-2.

ID 002--GROUND-WATER STATIONS

Location: Statewide

Period of project: Continuous since July 1946

Project leader: Harold G. Sisco

Objectives: (1) Establish and maintain an observation-well network sufficient to provide a minimum long-term data base so that the general response of the hydrologic system to climatic variations and induced stresses is known and potential problems can be identified early enough to allow proper planning and management of the water resources, and (2) provide a data base with which the short-term records acquired in areal studies can be compared and analyzed.

Approach: (1) Select wells in which the water-level fluctuations will be representative of the aquifers to be monitored; (2) make periodic water-level measurements in these wells, either manually or by recording device; (3) keep tabular and graphical (hydrograph) records of the water-level fluctuations; and (4) evaluate and revise the network on a continual basis to provide the best possible coverage at the least possible cost.

Progress in FY 1982: As of July, the regular statewide network consisted of 347 wells measured at monthly, bimonthly, semiannual, and annual frequencies; and 35 wells equipped with continuous recorders. In addition, 90 wells were measured for a special purpose network, in which 12 wells were equipped with continuous recorders and 78 were measured periodically. Locations of observation wells in the statewide network are plotted on maps in the report listed below.

Plans for FY 1983: Continue to update, code, and process well-data records for storage and retrieval in the automated data base.

Funding sources: Idaho Department of Water Resources, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, and U.S. Geological Survey.

Report: U.S. Geological Survey, 1982, Water-resources data for Idaho, water year 1981: U.S. Geological Survey Water Data Report, ID-81-1, 81-2.

ID 003--QUALITY-OF-WATER STATIONS

Location: Statewide

Period of project: Continuous since July 1966

Project leader: Ivalou O'Dell

Objectives: Provide a national bank of water-quality data for broad Federal and State planning and action programs and provide data for Federal management of interstate and international waters.

Approach: Establish and operate a network of water-quality stations to provide average chemical concentrations, loads, and time trends as required by planning and management agencies. Standard methods of water-sample collection and preparation for laboratory analyses will be used. Applicable field determinations will be made.

Progress in FY 1982: On June 30, 1982, periodic water-quality monitoring was discontinued at 85 gaging stations and 43 partial-record stations (including 19 springs). Continuous water-temperature records were obtained at 12 stations. Water-quality data were collected bimonthly at eight NASQAN (National Stream Quality Accounting Network) stations and three benchmark stations, and monthly at one special-study station, Little Granite Creek near Bondurant, Wyo.

Plans for FY 1983: Collect water-quality data bimonthly at one benchmark and six NASQAN stations, quarterly at one NASQAN and two benchmark stations, and monthly at the special-study station. Maintain collection of continuous water-temperature records at 12 stations.

Funding sources: Idaho Department of Water Resources, U.S. Army Corps of Engineers, U.S. Forest Service, and U.S. Geological Survey.

Report: U.S. Geological Survey, 1982, Water-resources data for Idaho, water year 1981: U.S. Geological Survey Water-Data Report, ID-81-1, 81-2.

ID 004--SEDIMENT STATIONS

Location: Statewide

Period of project: Continuous since November 1968

Project leader: Ivalou O'Dell

Objectives: Provide a national bank of sediment data for use in broad Federal and State planning and action programs and provide data for Federal management of interstate and international waters.

Approach: Establish and operate a network of sediment stations to collect data that would define spatial and temporal averages and trends of sediment concentration, sediment discharge, and particle size of sediment being transported by rivers and streams.

Progress in FY 1982: Daily suspended-sediment samples were collected by observer at Kootenai River near Copeland and by PS 69 automatic pumping sampler at a special-study station, Little Granite Creek near Bondurant, Wyo. Suspended-sediment samples were collected bimonthly at six NASQAN stations and two benchmark stations and monthly at one benchmark station. Periodic sampling at nine gaging stations in the Federal-State cooperative program was discontinued June 30, 1982; however, monthly sampling at four stations in the Weiser River basin continued through September 30, 1982.

Plans for FY 1983: Continue daily suspended-sediment sampling at the Kootenai River near Copeland station and at the mouth of Little Granite Creek; collect weekly bedload samples at the creek for an 8-week period during spring runoff. Continue bimonthly sampling at six NASQAN stations and at one benchmark station. Change sampling schedule to a quarterly basis at two other benchmark stations. Relocate the Kootenai River at Copeland gage downstream to the Kootenai River at Porthill site, and replace the daily observer sampler with an automatic pumping sampler.

Funding sources: Idaho Department of Water Resources, International Joint Commission (WWT), U.S. Forest Service, and U.S. Geological Survey.

Report: U.S. Geological Survey, 1982, Water-resources data for Idaho, water year 1981: U.S. Geological Survey Water-Data Report, ID-81-1, 81-2.

ID 007--WATER USE

Location: Statewide

Period of project: Continuous since October 1978

Project leader: William A. Harenberg

Objectives: Develop and implement a data-collection and management system that will be capable of providing water-use data for planning, budgeting, and managing the water and associated land resources of Idaho.

Approach: Contact governmental and private agencies currently collecting water data to establish a framework for coordinating water-use data. Identify data needs not met by existing activities, and determine the best ways to meet those needs. Investigate and develop new techniques for better data collection. Review the NWUDS (National Water Use Data System) State level data-elements dictionary, prepare a guide to Idaho water-data information sources, and furnish written documentation of study results.

Progress in FY 1982: Work continued on development of an Idaho State Water-Use Data-Base Management System. Data were entered into NWUDS for a number of categories. The cooperator prepared a new work plan and a guide explaining Idaho water-data information sources.

Plans for FY 1983: Continue development of the State Data Base System. Enter data into NWUDS as they are developed. Publish an explanatory guide.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

Report: Kennedy, S. K., 1980, The Idaho Water Use Data System: Boise, Idaho, Idaho Department of Water Resources, 54 p., 1 appendix.

ID 109--FLOOD-HAZARD MAPPING

Location: Statewide, selected areas

Period of project: Continuous since July 1972

Project leader: William A. Harenberg

Objective: Identify and label, on U.S. Geological Survey topographic quadrangle maps, the extent of the 100-year flood for cities and towns of more than 2,500 population, and adjacent areas where adequate maps are available and where flood-frequency/drainage-area relations can be determined.

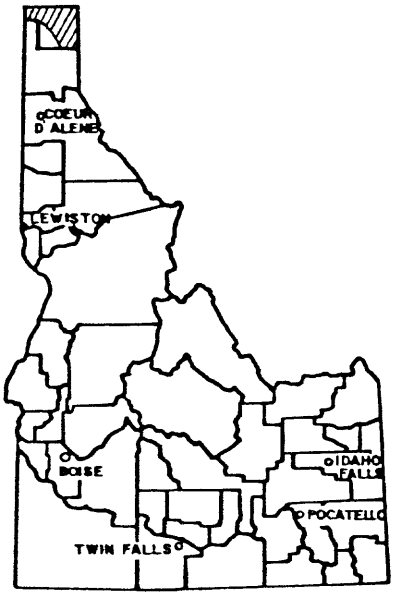
Approach: In general, project work is done in the office, using available information. Where possible, use factors such as flood depth, flood discharge, frequency of occurrence, and drainage area to define flood profiles and 100-year flood boundaries along streams where, in many cases, no flood information exists. Use regional flood-depth frequency relations where they can be defined.

Progress in FY 1982: Twenty-one flood-prone area maps were completed.

Plans for FY 1983: Complete nine more flood-prone area maps if funding is available.

Funding source: U.S. Geological Survey.

ID 110--KOOTENAY LAKE BOARD OF CONTROL




Location: Northern Idaho, Kootenai River basin

Period of project: Continuous since January 1938

Project leader: Ernest F. Hubbard

Objective: Fulfill United States responsibilities under the terms of the continuing International Waterways Treaty program. The Board serves as advisor to the International Joint Commission.

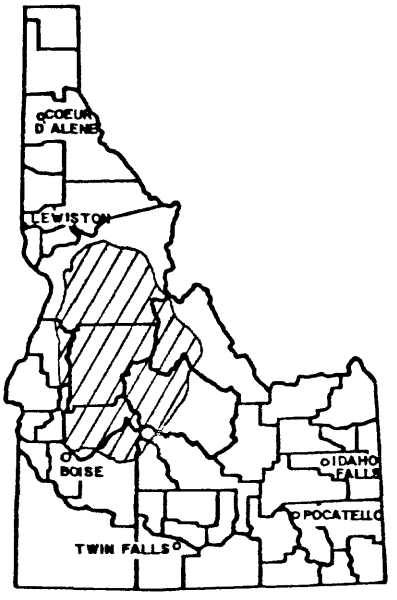
Approach: Attend scheduled meetings and inspection trips. Review hydrologic data concerning regulation of Kootenay Lake or effects of Libby Dam operation on Kootenay Lake.

Progress in FY 1982: Periodic inspections were made of the gaging installation and measurements of Kootenay River at Grohman Narrows, British Columbia. The Forty-Fourth Annual Report of the Kootenay Lake Board was provided to the International Joint Commission following review and signature by all members. A new gaging structure, which consisted of a gage house with an attached pier extending 90 feet into the river, was completed at Kootenai River at Porthill.

Plans for FY 1983: Provide consultation to the Board of Control as required. Install electromagnetic flow meter and automatic sediment sampler at the new gaging structure at Porthill to record daily discharge and suspended-sediment discharge. Compare records of daily discharge computed from the electromagnetic flow meter with those obtained by using a two-dimensional flow model and those computed from the slope gage-height discharge relation. When the automatic sediment sampler is operating satisfactorily, discontinue collection of daily suspended-sediment samples at Kootenai River at Copeland.

Funding source: International Joint Commission (WWT).

ID 116--GEOTHERMAL INVESTIGATIONS, IDAHO BATHOLITH




Location: Central Idaho

Period of project: October 1979 to September 1983

Project leader: Harold W. Young

Objectives: (1) Define the areal distribution and occurrence of hot springs in the Idaho batholith; (2) estimate, using chemical geothermometers, water temperatures in the geothermal reservoir; (3) determine the nature of the hydrothermal system and the relation of the hot waters to present-day meteoric water; and (4) quantify the amount of heat currently being discharged convectively.

Approach: Divide the batholith into three major drainage areas: Payette, Boise, and Salmon Rivers. Inventory all hot springs and selected cold springs in each drainage area. Collect water samples for standard analyses, plus arsenic, boron, mercury, and lithium, from all inventoried springs, and make measurements or estimates of discharge. In addition, collect water samples for deuterium, oxygen-18, and tritium from selected springs. Collect gas samples from hot springs, where possible. Install continuous recorders to monitor discharge and water temperature on selected hot springs. Prepare separate reports for each area and include discussion of water chemistry, isotopic composition, discharge rates, and convective heat loss.

Progress in FY 1982: Reports on hot springs in the Payette, Salmon, and Boise River drainages were completed. Water samples were collected from selected high-altitude nonthermal springs throughout the batholith and adjacent areas for chemical and isotopic analyses. Water samples were collected from 10 selected thermal springs for carbon-14 analyses. Five thermal springs in the Clearwater River drainage were inventoried, and water samples were collected for chemical and isotopic analyses.

Plans for FY 1983: Complete a Professional Paper describing the geochemistry and hydrology of thermal springs in the batholith and adjacent areas and submit for Director's approval.

Funding source: U.S. Geological Survey.

Reports: Lewis, R. E., and Young, H. W., 1980, Thermal springs in the Payette River basin, west-central Idaho: U.S. Geological Survey Water-Resources Investigations/ Open-File Report 80-1020, 23 p.

_____1982, Thermal springs in the Boise River basin, south-central Idaho: U.S. Geological Survey Water-Resources Investigations 82-4006, 22 p.

Young, H. W., and Lewis, R. E., 1980, Hydrology and geochemistry of thermal ground water in southwestern Idaho and north-central Nevada: U.S. Geological Survey Open-File Report 80-2043, 40 p.

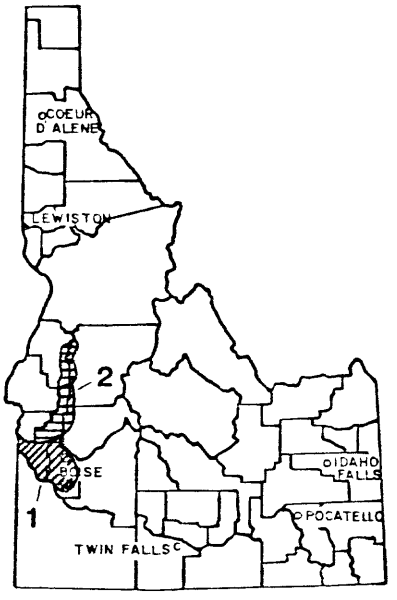
_____1981a, Application of a magnesium correction to the sodium-potassium-calcium geothermometer for selected thermal waters in southeastern Idaho: Geothermal Resources Council, Transactions, v. 5, p. 145-148.

_____1981b, Thermal springs in the Salmon River basin, central Idaho: U.S. Geological Survey Open-File Report 82-104, 27 p.

_____1982, Hydrology and geochemistry of thermal ground water in southwestern Idaho and north-central Nevada: U.S. Geological Survey Professional Paper 1044-J, 20 p.

Young, H. W., Lewis, R. E., and Backsen, R. L., 1979, Thermal ground-water discharge and associated convective heat flux, Bruneau-Grand View area, southwest Idaho: U.S. Geological Survey Water-Resources Investigations/ Open-File Report 79-62, 17 p.

ID 132--GROUND-WATER QUALITY ASSESSMENTS




Location: (1) Boise River valley, (2) Payette River basin

Period of project: Continuous since July 1978

Project leader: Deborah J. Parliman

Objectives: Define, on a reconnaissance level, ground-water quality conditions in selected areas of Idaho. Also, from available geohydrologic data, develop an understanding of factors that contribute to present and future water-quality conditions and establish a water-quality data base for future comparisons.

Approach: Make a literature and historic records search to compile geologic and well information and water-quality data. Code any data not stored in computer files and enter into storage for future retrieval and analysis. Collect ground-water samples representative of major aquifers in the area. Select well sites on the basis of available historic water-quality data and information concerning ground-water source, movement, and proneness to contamination. Sample only at well sites for which well-construction and geologic data are available. Make an inventory to determine suitability of wells for sample collection and obtain owner's permission to collect samples. Determine discharge, depth to water, pH, conductivity, water temperature, and concentrations of carbonate, bicarbonate, and dissolved oxygen onsite at the time of sampling, using accepted techniques for field determinations and sample preservation. Write a final report describing results of each study area.

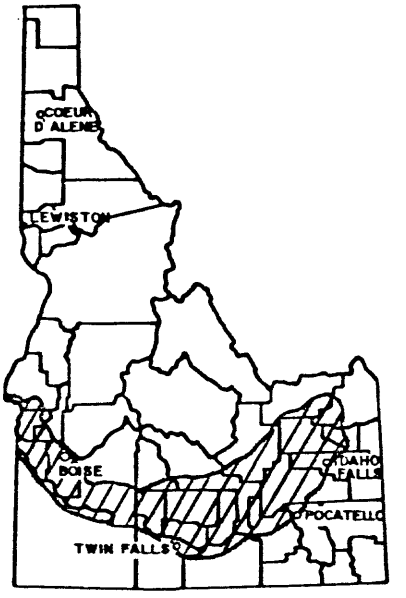
Progress in FY 1982: Collection of data in the Boise River valley and upper Payette River basin was completed. A report describing results of the Boise River valley study is in preparation. Previous reports for the eastern Snake River basin and southern Elmore and northern Owyhee Counties were completed. The former is being prepared for publication; the latter is in review. A noninterpretive report presenting ground-water quality data for selected wells in Elmore and Owyhee Counties and Boise River valley was compiled and approved for publication.

Plans for FY 1983: Complete collection of data in the lower Payette River basin and process a final report for publication. Submit the report on the Boise River valley for Director's approval, and publish the noninterpretive report.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

Reports: Parliman, D. J., 1982, Ground-water quality in east-central Idaho valleys: U.S. Geological Survey Open-File Report 81-1011, 55 p.

ID 137--SNAKE RIVER PLAIN RASA




Location: Southern Idaho

Period of project: June 1979 - September 1983

Project leader: Gerald F. Lindholm

Objectives: Describe the geologic, hydrologic, and chemical quality aspects of the aquifer system; evaluate the water-supply potential of the system; and predict responses of the system to changes in water development. Use ground-water-flow models to aid in understanding the system.

Approach: Work will be done in three phases: (1) Preliminary work--establish liaison committees; review existing literature and data base; initiate data collection and ground-water-flow modeling; plan and contract for geophysical, geological, and remote-sensing work; and test drilling; (2) data acquisition and analysis--assimilate phase 1 data, collect additional data, calibrate ground-water-flow models, and use models for testing hypotheses about the hydrodynamics of aquifer systems; and (3) production and completion--use models to simulate projected water-use schemes to evaluate resulting future conditions.

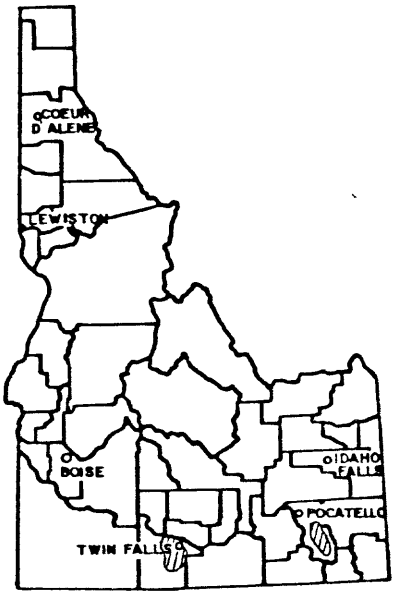
Progress in FY 1982: A 1,123-foot test hole was drilled to help verify surface-resistivity interpretations, which were then used to map the thickness of the basalts. Historical spring-discharge data were used to analyze hydrologic changes in the eastern plain. Ground-water-quality samples were collected at recharge and discharge points and along ground-water-flow paths to determine geochemical processes and their effects on water chemistry. Power-consumption records and Landsat data were examined to estimate irrigated acreage and volume of ground water and surface water pumped for irrigation in 1980. Transmissivity of regional aquifers in the eastern and western parts of the plain was estimated using two-dimensional steady-state models. Three-dimensional steady-state and transient modeling are in progress in both areas.

Plans for FY 1983: Complete geochemical analysis and transient three-dimensional ground-water-flow modeling. Direct most effort toward completion of subproject reports and preparation of a summary report.

Funding source: U.S. Geological Survey.

Report: Lindholm, G. F., 1981, Plan of study for the regional aquifer system analysis of the Snake River Plain, Idaho and eastern Oregon: U.S. Geological Survey Open-File Report 81-689, 21 p.

ID 139--WATER QUALITY OF IRRIGATION FLOWS




Location: Southern Idaho

Period of project: October 1979 to December 1981

Project leader: Thomas K. Edwards

Objectives: The overall objective is to provide the Idaho Department of Health and Welfare with current water-quality data so that effective management decisions can be made to improve water quality in rural areas. Specific objectives are to: (1) Identify pollutants, source of pollutants, and areas of degraded or improved water quality; (2) identify present general uses of affected waters; (3) provide 2 years of background data to enable future comparison of "best management practices"; and (4) summarize and relate trends in water quality with respect to irrigation practices, storm events, and spring runoff.

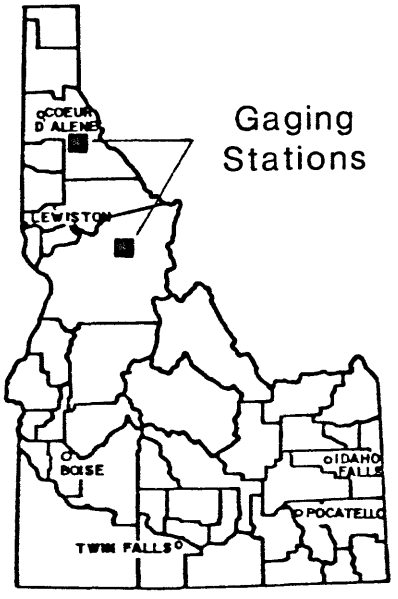
Approach: Establish a systematic monitoring program. Monitor a total of 15 sites on Rock Creek and Cedar Draw in Twin Falls County and Marsh Creek in Bannock County, in all months except November, January, and March. Include, in the monitoring program, quantity and specific types of nutrients, and selected chemical, bacterial, and physical characteristics that could be responsible for pollution of the three rural streams. Sample for all parameters in September; sample for selected parameter variations during other months. Do intensive (24-hour) sampling at all sites, two times each year.

Progress in FY 1982: Data analysis and final report were completed.

Plans for FY 1983: Submit the final report for Director's approval and publish.

Funding sources: Idaho Department of Health and Welfare and U.S. Geological Survey.

ID 141--EFFECTS OF ASH




Location: Northern Idaho

Period of project: July 1980 to March 1982

Project leader: Steven A. Frenzel

Objectives: (1) Determine physical and chemical effects of volcanic ash from the eruption of Mount St. Helens on water quality and aquatic biota of northern Idaho, and (2) determine the distribution and abundance of ash remaining in the study basin.

Approach: (1) Collect a continuous record of water stage, temperature, and conductivity on an ash-impacted stream (Big Creek near Calder, Idaho); (2) obtain periodic water samples for chemical analysis and suspended-sediment determinations; (3) collect qualitative samples of benthic invertebrates and conduct experiments on effects of ash on invertebrate communities in unimpacted streams; (4) sample soil/ash mixture throughout Big Creek basin to estimate dry weight of ash present; and (5) incorporate the results in an interpretive report.

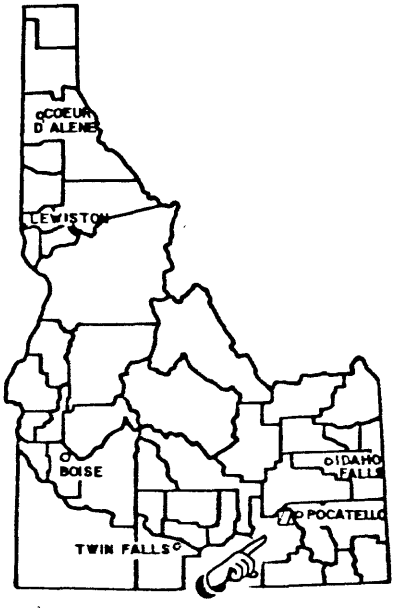
Progress in FY 1982: Data collection and interpretation was completed and the final report was prepared and submitted for Director's approval.

Plans for FY 1983: Publish the final report.

Funding source: U.S. Geological Survey.

ID 142--GROUND WATER, MICHAUD FLATS

Location: Southeastern Idaho




Period of project: October 1980 - September 1983

Project leader: Nathan D. Jacobson

Objectives: Describe degree and extent of ground-water contamination, identify major data gaps, and establish a ground-water-monitoring network. Using data obtained, determine occurrence and movement of ground water, describe hydrologic and geologic framework, identify land-use activities or waste-disposal practices that are potential sources of contamination, and assess the feasibility of alternative management strategies for controlling or eliminating ground-water contamination.

Approach: (1) Obtain historic water-quality data and review available literature; (2) design a water-quality-monitoring network to provide for semiannual sampling at selected sites; (3) obtain water-level measurements and water-quality samples from wells to determine direction and extent of contaminant migration; (4) evaluate alternative management strategies for controlling or eliminating ground-water contamination, as provided by the technical advisory committee; and (5) on the basis of availability of sufficient data, develop a solute-transport model.

Progress in FY 1982: The interim report summarizing findings of data was published. Observation wells were drilled to define subsurface geology and hydraulic continuity between aquifers. Transmissivities of aquifers were estimated from specific-capacity data, and chemical analyses of ground-water samples were made.

Plans for FY 1983: Complete the final report and submit for Director's approval. Continue collection of water samples from selected wells and springs for analyses of selected chemical and radiochemical data as part of a monitoring program.

Funding sources: Shoshone-Bannock Tribes and U.S. Geological Survey.

Report: Jacobson, N. D., 1982, Ground-water conditions in the eastern part of Michaud Flats, Fort Hall Indian Reservation, Idaho: U.S. Geological Survey Open-File Report 82-570, 35 p.

ID 143--GROUND-WATER TRENDS IN IDAHO

Location: Statewide

Period of project: October 1980 to December 1981

Project leader: Harold W. Young

Objectives: (1) Construct and publish hydrographs for the last 10 years (or less) of measurements made in most of the current observation wells in the statewide network and determine the current water-level trends in the aquifers being monitored; (2) determine and describe the causes that are governing water-level fluctuations in places where long-term trends reflect an imbalance between the normal recharge and discharge relation; and (3) publish a report describing study results in a format suitable for understanding by water users and managers.

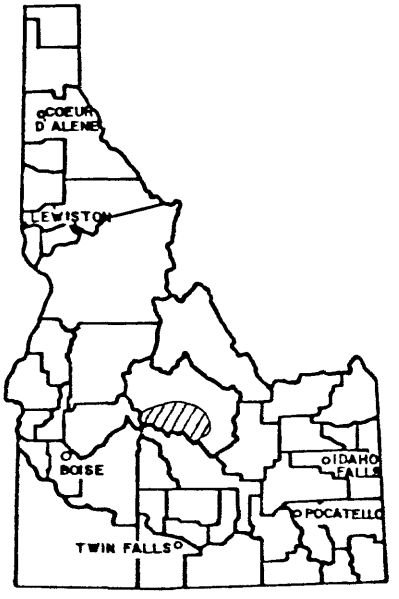
Approach: (1) Using WATSTORE capabilities, obtain and examine hydrographs for the period of record for each current observation well in the statewide network; (2) focusing on the last 10 years of record, select hydrographs that show inordinate water-level trends; (3) for the respective areas of selected hydrographs, obtain information that relates to factors affecting recharge and discharge to aquifers, including precipitation, changes in land use, changes in irrigation practices, and increases in ground-water pumpage; and (4) assimilate all information gained, relate causes to effects, and incorporate all findings to accomplish the proposed study objectives.

Progress in FY 1982: Net water-level changes for the period 1971-80 were determined for 357 wells in the Idaho statewide observation-well network. Causes of water-level trends were determined for 175 wells showing net declines. A draft report describing results of the study was written.

Plans for FY 1983: Complete the final report and submit for Director's approval.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

ID 144--CHANNEL CHANGE, BIG LOST RIVER




Location: East-central Idaho

Period of project: March 1981 to March 1982

Project leader: Rhea P. Williams

Objectives: Study the effects of stream discharge and hydraulic geometry on erosion, deposition, and sediment-transport rates in the Big Lost River.

Approach: Compile available streamflow data and measure discharge at 8-10 sites to establish stage-discharge relations. Survey channel cross sections at 5 sites before and after peak discharge to detect channel changes, and at 20 other sites to determine channel geometry. Collect suspended and bedload-sediment samples over a complete range of flows. Conduct particle-size analyses of stream samples and bed and bank material and compute sediment-transport rates.

Progress in FY 1982: Analysis of field and laboratory data was completed and a report was written and reviewed.

Plans for FY 1983: Submit the final report for Director's approval.

Funding sources: Butte Soil Conservation District and U.S. Geological Survey.

ID 145--EVALUATION OF STREAM-GAGING PROGRAM

Location: Statewide

Period of project: March 1981 to December 1982

Project leader: William A. Harenberg

Objectives: (1) Evaluate the Idaho stream-gaging program to insure that it is providing the water-resource data needed for both local and Federal purposes, and that it is operating to provide this information at the required accuracy level in a cost-effective manner; and (2) gain practical experience in new techniques for network evaluation.

Approach: Step 1 - identify gages in the present program, which comprises four networks: (1) flood-frequency, (2) general hydrologic, (3) water-management, and (4) long-term trends. Steps 2 and 3 - apply the NARI (Network Analysis for Regional Information) technique to networks (1) and (2). If gages can be discontinued in either of these two networks, apply the station-discontinuance technique to decide which gages to maintain. Steps 4 and 5 - apply the CE (Cost-Effectiveness) technique to networks (3) and (4). Evaluate results and find the most efficient schemes that give the required accuracy of data. Describe results in a final report.

Progress in FY 1982: Application of NARI indicated that no significant decrease in regression error can be achieved by the collection of additional streamflow data and that better models should be sought. The CE technique showed network uncertainty can be reduced when six- or one-visit per year minimum constraints are in force. The report describing results of the two techniques was published.

Plans for FY 1983: None.

Funding source: U.S. Geological Survey.

Report: Quillian, E. W., and Harenberg, W. A., 1982, An evaluation of Idaho stream-gaging networks: U.S. Geological Survey Open-File Report 82-865, 57 p.

ID 146--GROUND-WATER-QUALITY CONDITIONS

Location: Statewide

Period of project: May 1981 to January 1982

Project leader: Johnson J. S. Yee

Objectives: (1) Obtain and examine existing water-quality data and assess their value for use in representing natural and/or present water-quality conditions in particular aquifers or basins, (2) identify deficiencies in data collection and recommend ways to improve collection and analyses to make them representative of actual conditions, and (3) make an appraisal of current ground-water quality in Idaho and present the appraisal results in a format that is suitable for ready use by water-resource managers and the general public.

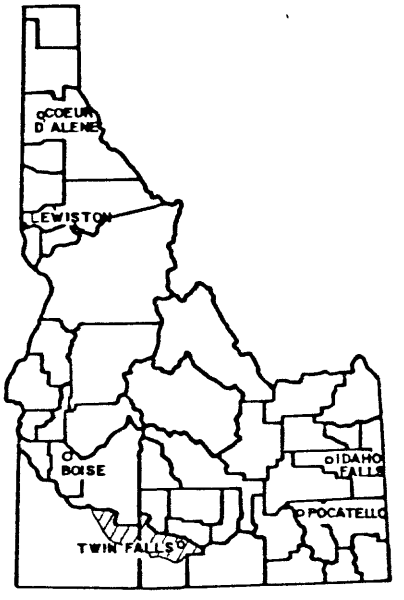
Approach: (1) On the basis of hydrogeologic criteria, delineate appropriate aquifer systems or parts of systems; (2) using existing data, select appropriate constituents, on the basis of hydrochemical, biological, and regulatory criteria, to represent natural and/or current ground-water-quality conditions in the aquifers; (3) use applicable statistical techniques to "test" the value of the data; and (4) organize and present information in a report suitable for use by water-resource managers and the general public.

Progress in FY 1982: Data analysis was completed and the final report was written and submitted for Regional review.

Plans for FY 1983: Submit the final report for Director's approval and publish.

Funding source: U.S. Geological Survey.

ID 147--GROUND WATER FOR IRRIGATION, BRUNEAU PLATEAU




Location: Southwestern Idaho

Period of project: April 1981 to June 1982

Project leader: Robert L. Moffatt

Objectives: The major objective is to make a reconnaissance of ground-water conditions in an area from the Bruneau plateau to Milner Dam. Focus will be on an evaluation of potential for additional ground-water development to supply water for irrigation on the plateau. Companion objectives include determination of: (1) effects additional development might have on existing supplies, (2) possibilities for formation of perched-water bodies that may cause drainage problems or that may constitute recoverable sources of supply, and (3) the quality of water as it relates to irrigation, stock, and domestic uses.

Approach: (1) Compile available data, (2) update well inventory, (3) quantify present level of water-resources development, (4) make mass water-level measurements and set up a monitoring network, (5) install and operate two weather stations, (6) collect and analyze water samples for chemical properties and stable-isotope data, (7) run pumping tests for determination of aquifer characteristics, and (8) analyze data and write a final interpretive report on study results.

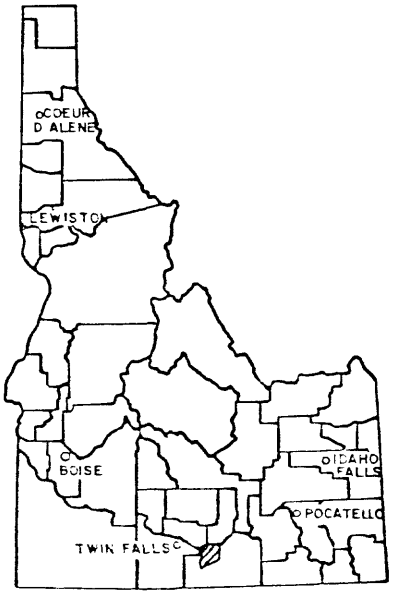
Progress in FY 1982: Collection and compilation of all data and their inclusion in the USGS ground-water and water-quality data bases were completed. The data were analyzed and a draft of the report was prepared.

Plans for FY 1983: Review the final report, submit for Director's approval, and publish.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

ID 148--COTTONWOOD GEOHYDROLOGY

Location: South-central Idaho




Period of project: December 1981 to November 1982

Project leader: Thomas K. Edwards

Objectives: (1) Describe the occurrence of ground water, and (2) determine the water budget in different parts of the area, being cognizant of the fact that budget determinations alone cannot fully appraise the ultimate potential ground-water yield of an area.

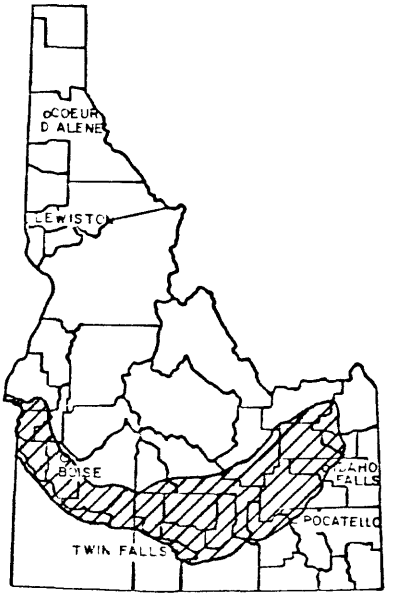
Approach: (1) Compile geologic and hydrologic data, (2) collect water samples for chemical analysis, (3) update well inventory, (4) make estimates of ground-water withdrawals, (5) make two mass measurements of water levels in wells, (6) define attitude of a fault that traverses the study area, (7) run pumping tests to determine aquifer characteristics, (8) estimate annual volume of precipitation, (9) estimate annual runoff in streams, (10) determine ground-water budgets for two subareas, and (11) write a final report describing study findings.

Progress in FY 1982: Data collection was completed. A potentiometric-surface map was constructed using water-level measurements made in wells during spring 1982. Aquifer test results were analyzed to determine transmissivities of aquifers in different geologic units. Chemical and borehole-temperature data were analyzed. The first draft of the report is in preparation.

Plans for FY 1983: Complete the final report and submit for Director's approval.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

ID 149--GROUND-WATER USE




Location: Southern Idaho

Period of project: July 1982 to September 1985

Project leader: Steven A. Frenzel

Objectives: (1) Compare techniques used to estimate ground-water pumpage in terms of cost, accuracy, comparability, and feasibility of application; and (2) develop a statistical model of the relations between climatic, cropping, soils, irrigation system, and economic factors as they influence regional patterns of ground-water withdrawal.

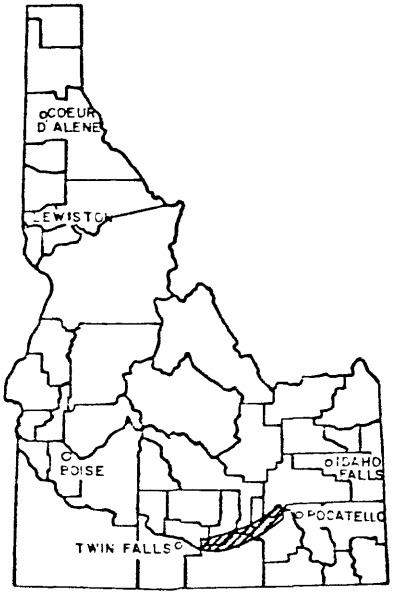
Approach: Install flow-measurement devices and compare these measurements to discharge estimates made by using indirect techniques. Assemble cost data associated with each technique. Quantify variables for each pumping site in the population. Apply multiple-regression analysis to show how independent variables determine the magnitude of ground-water-pumpage estimates. Analyze the sensitivity of pumpage estimates to changes in the independent variables.

Progress in FY 1982: A literature search of ground-water pumpage-estimation techniques was begun. A preliminary work plan was submitted for phases 1 and 2 of a three-phase project-completion schedule. Phase 1 is an identification of variables used in estimation of pumpage and analysis of variance of these variables. Phase 2 is the comparison of estimated pumpages to field-measured values collected during the 1983 irrigation season. Phase 3 is the development of a multiple-regression model for prediction of ground-water pumpage.

Plans for FY 1983: Submit a report on results of phase 1 for review by June 1983. Initiate phase 2 and complete collection of field data by September 30, 1983.

Funding sources: Idaho Department of Water Resources and U. S. Geological Survey.

ID 150--SNAKE RIVER WATER BUDGETS




Location: Southeastern Idaho

Period of project: October 1982 to September 1984

Project leader: Luther C. Kjelstrom

Objectives: Determine if the accuracy of the daily water budgets can be improved for the three reaches of the Snake River that contain American Falls Reservoir, Lake Walcott, and Milner Lake. If the accuracy can be improved, compile the additional data and information needed to obtain the best possible accuracy. Examine whether possible changes in methods used to compute daily water budgets will decrease the number of discrepancies. Determine if estimation of contents of American Falls Reservoir can be improved. Attempt to correlate ground-water discharge with measured spring flow. Identify, to the extent possible, ground-water/surface-water relations that may affect the water budget. Examine water budgets for Lake Walcott and Milner Lake for discrepancies, and verify or correct the method of estimating the contents of Milner Lake.

Approach: (1) Determine if discrepancies in inflow-outflow budget computations are significant in relation to normal errors of measurement or estimate that might be expected; (2) attempt to explain some of the misunderstandings of ground-water/surface-water relations that affect water-budget calculations; and (3) determine if contents tables or gaging systems for American Falls Reservoir and Milner Lake are in error, and if so, improve methods of estimating contents.

Progress in FY 1983, October to December: Four gage houses equipped with recorders were installed, three on American Falls Reservoir and one on Bonanza Lake. Recorders also were installed on three wells near American Falls Reservoir.

Plans for FY 1983, December 1983 to September 1984: Water budgets for past years will be examined and unbalanced budgets will be used for diagnostic purposes. Data will be collected from newly installed reservoir gages and from a network of observation wells.

Funding sources: Water District 01 and U.S. Geological Survey.

ID 151--GROUND-WATER-RESOURCE ASSESSMENT (Proposed)

Location: Statewide

Period of project: October 1982 to September 1984

Project leader: To be assigned

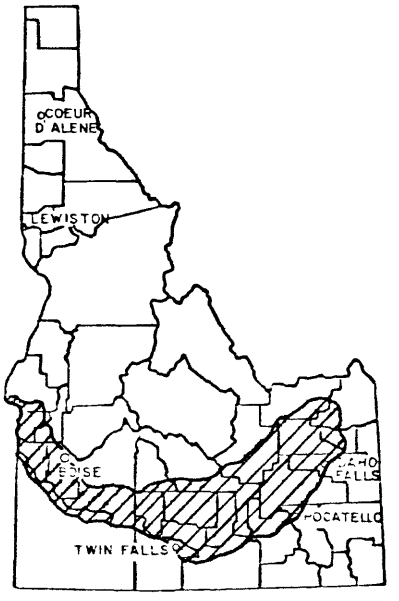
Objectives: Assimilate, review, and summarize available ground-water data to provide a logical basis on which to establish a ground-water policy for Idaho. Develop a data base suitable for making management decisions and write a summary report that will provide information needed for sound policy development. Identify in the report areas where ground-water data are insufficient to guide some management or policy decisions.

Approach: Review all existing data, including those available in the files of other agencies. Assimilate pertinent data into the data base and summarize or interpret to provide a thorough, efficient system for use by the State Water Board. Present the most salient information in a summary report and include withdrawals; current water-level trends; recharge; water budgets, where possible; potential sustained water yields; area boundaries; and water quality.

Remarks: Proposed project; work has not yet begun.

Funding sources: Idaho Department of Water Resources and U.S. Geological Survey.

ID 152--SOLE SOURCE AQUIFER APPRAISAL
(Proposed)




Location: Southeast/south-central Idaho

Period of project: January 1983 to September 1983

Project leader: To be assigned

Objectives: Gather existing hydrologic data that pertain to the Snake River Plain aquifer above Thousand Springs and present it in a series of easily understood plates and text for use by the U.S. Environmental Protection Agency as a decision-making aid in the disposition of a "sole source" petition.

Approach: (1) Compose a map showing the contributory drainage area for the Snake River Plain aquifer above Thousand Springs and the boundaries of the aquifer; (2) using available concurrent water-level measurements, prepare a water-table-contour map; (3) develop a depth-to-water map of the aquifer in relation to the position of the regional water table; (4) using best available estimates, produce a map delineating and quantifying recharge and discharge areas for the aquifer; (5) provide a generalized soils-cover map of the aquifer; (6) compose a land-use map of the aquifer area, which includes delineation of federally owned lands; (7) construct a map showing distribution of water use; (8) compile all available water-chemistry data from ground-water and surface-water sources and depict temporal changes in water quality, where data permit; (9) areally depict water-level hydrographs for selected wells on a map of the aquifer area; (10) prepare discharge hydrographs for selected springs and volumes of discharge by spring groups, where and if data are available; and (11) identify sites suitable for inclusion in a network to monitor change in water levels and water chemistry.

Remarks: Proposed project; work begins January 1983.

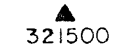
Funding source: U.S. Environmental Protection Agency.

Figures 2-8

EXPLANATION

# PART 13

River basin boundary and number




Gaging station and number
Inverted symbol indicates water-quality station

Chemical-measurement site

Temperature-measurement site

Biological-measurement site

Sediment-measurement site

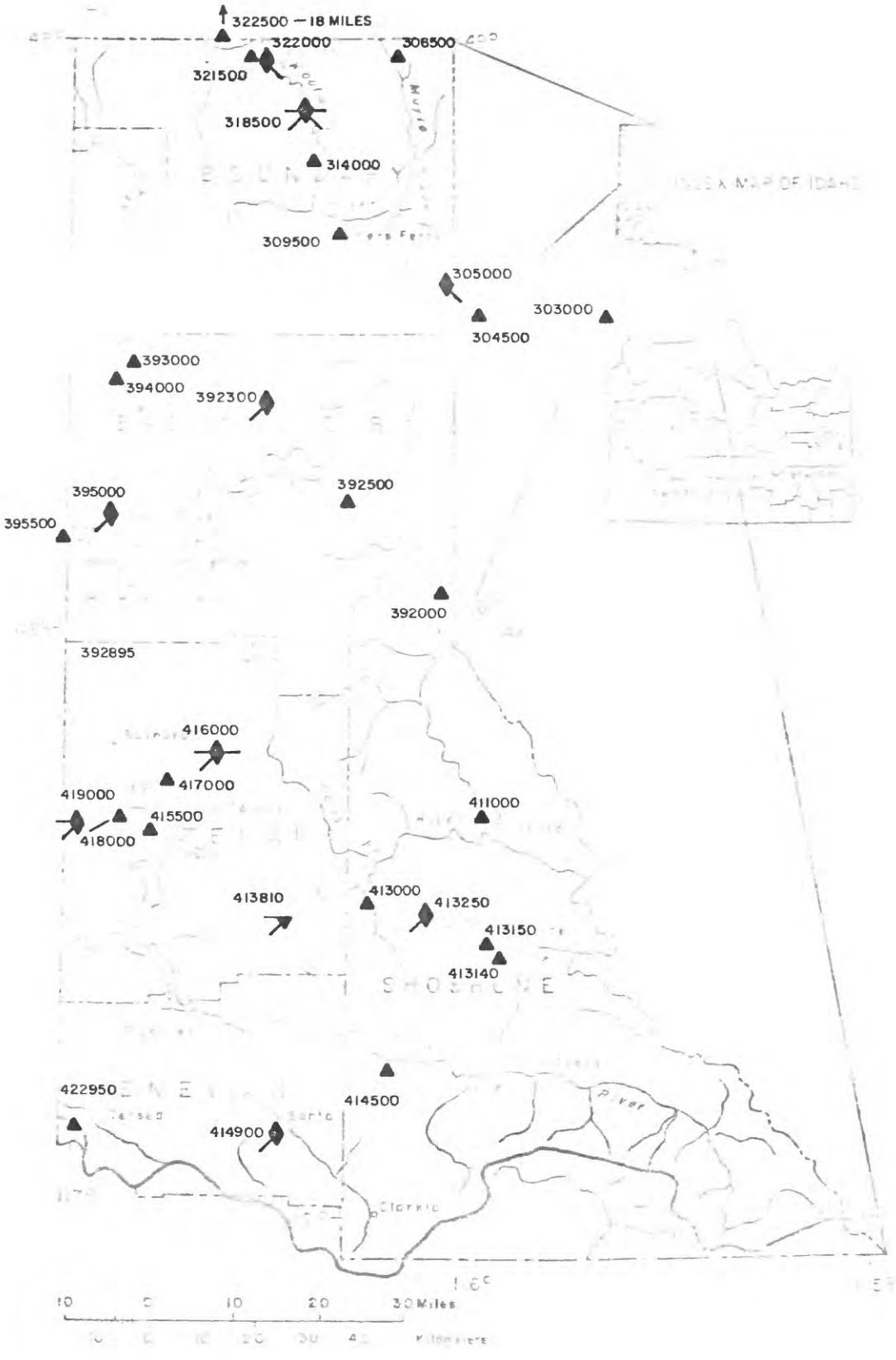



Figure 2. -- Locations of data sites in north Idaho.

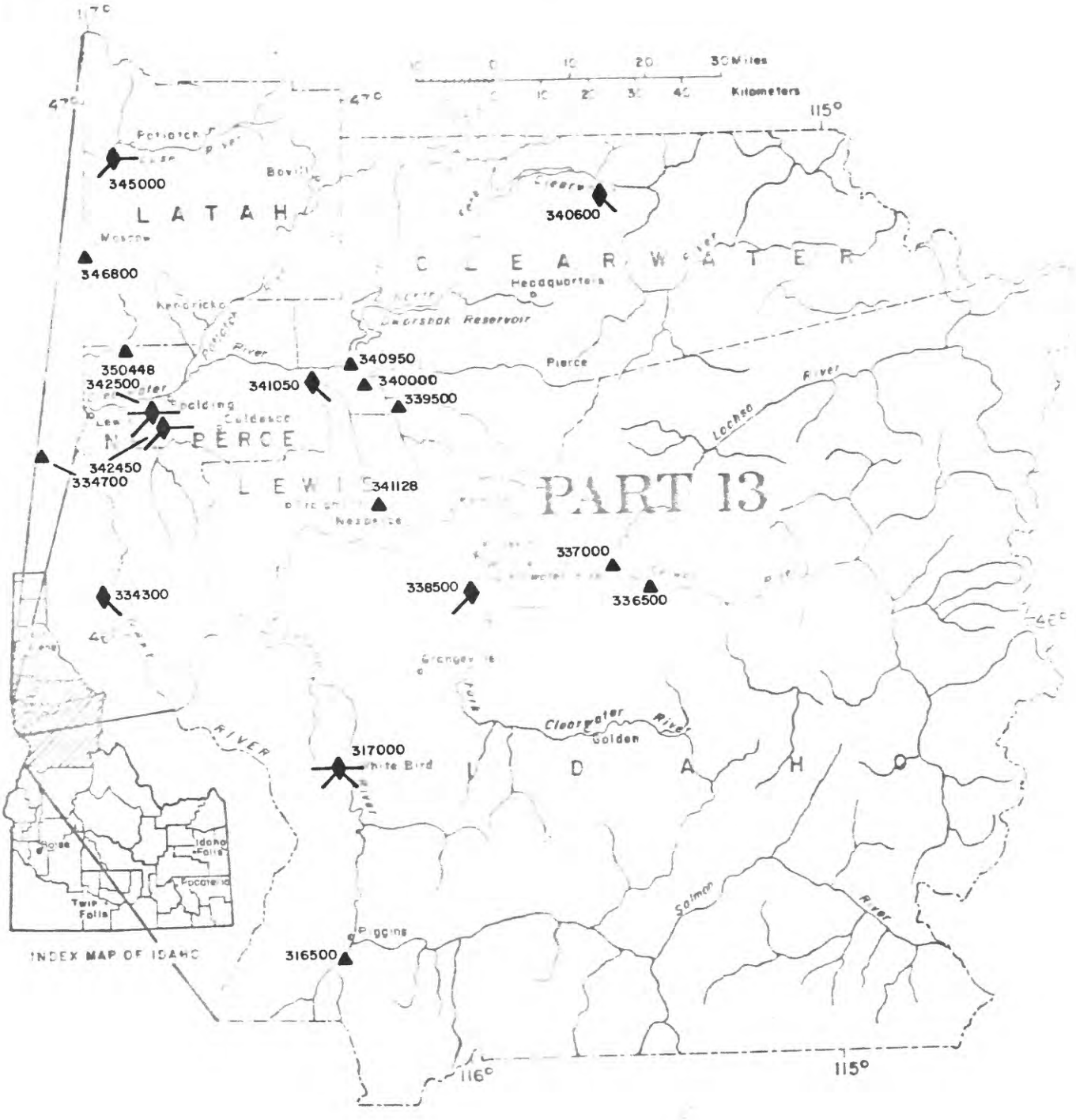



Figure 3. -- Locations of data sites in north-central Idaho.

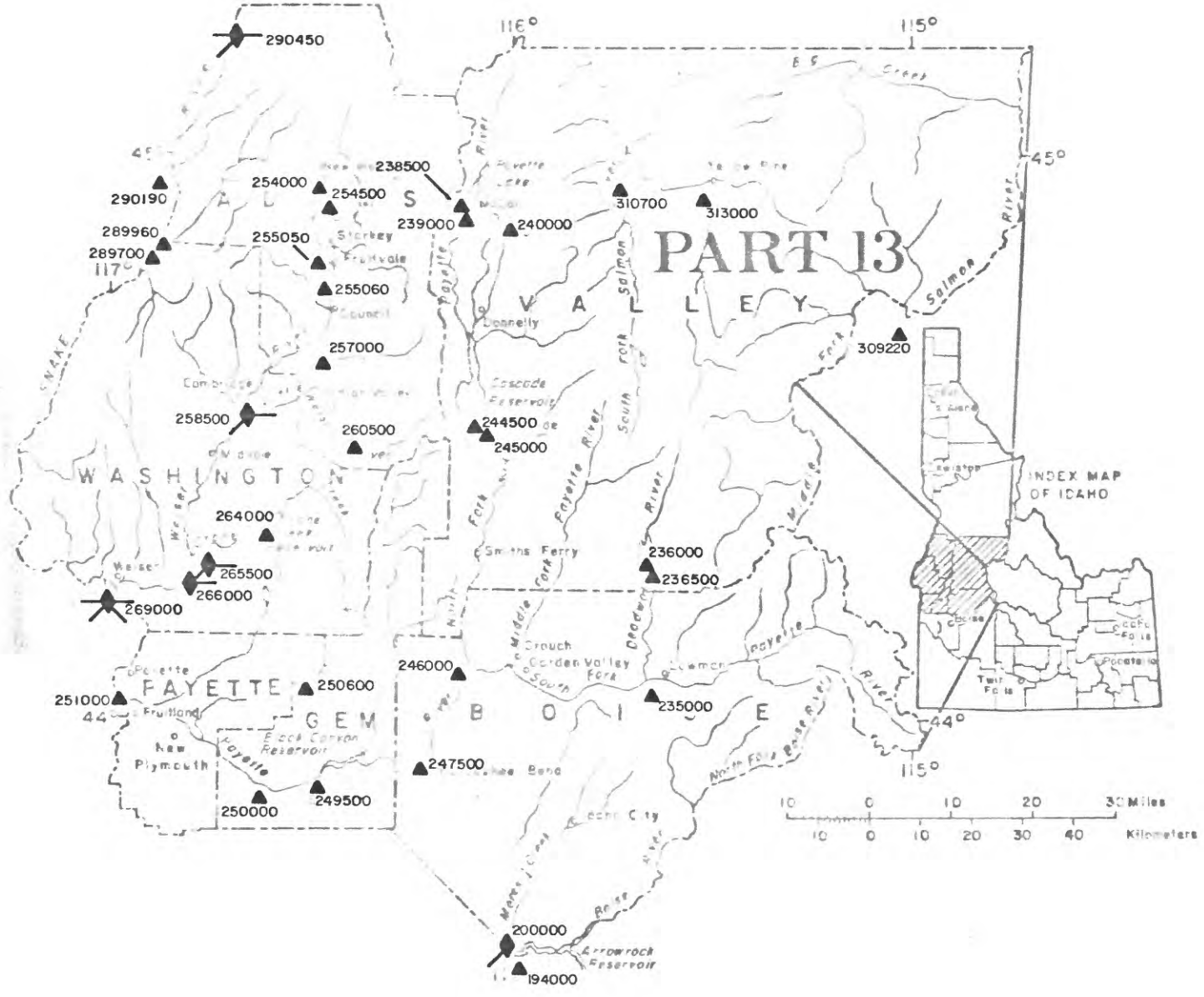



Figure 4. -- Locations of data sites in west-central Idaho.

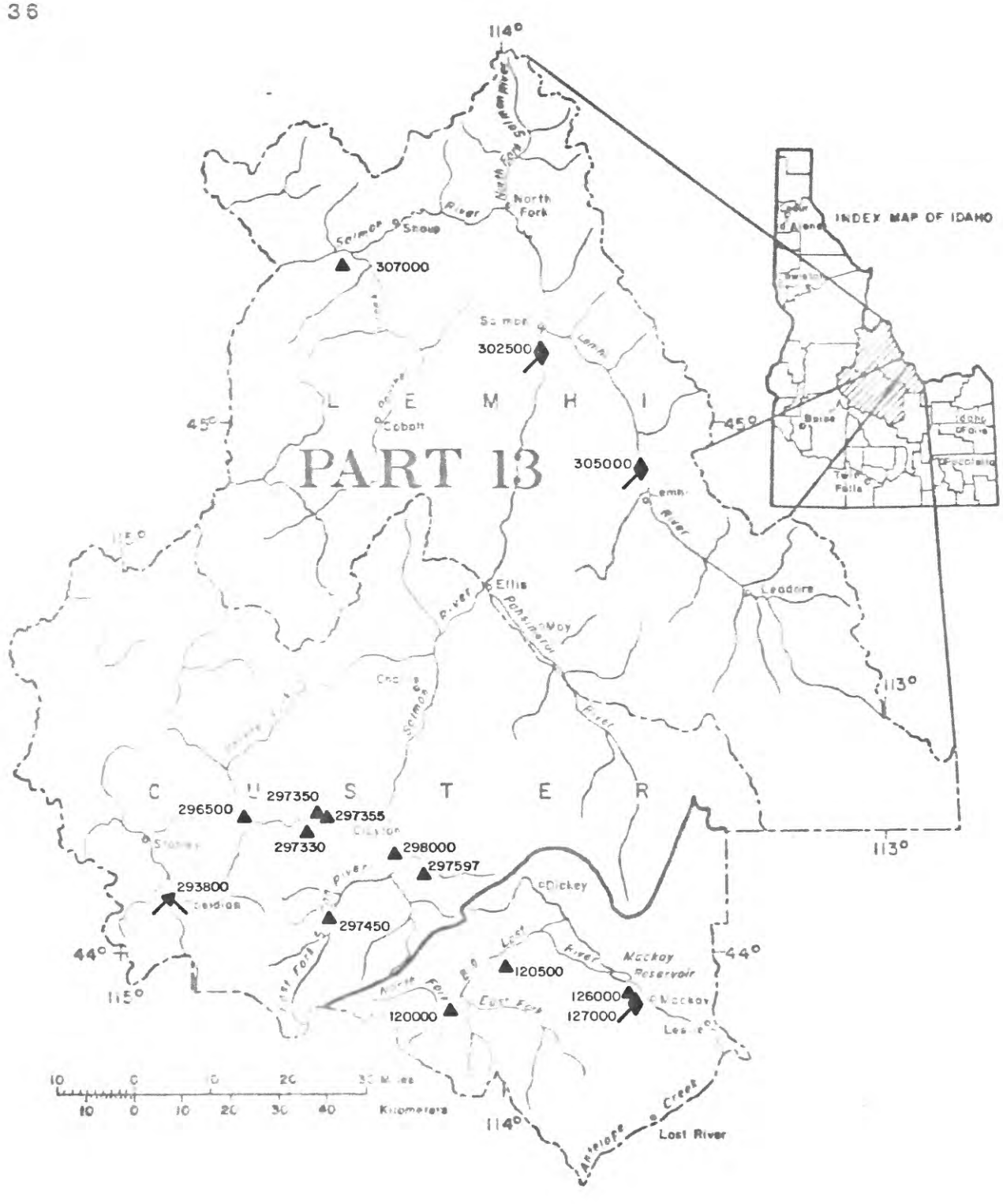



Figure 5. -- Locations of data sites in east-central Idaho.

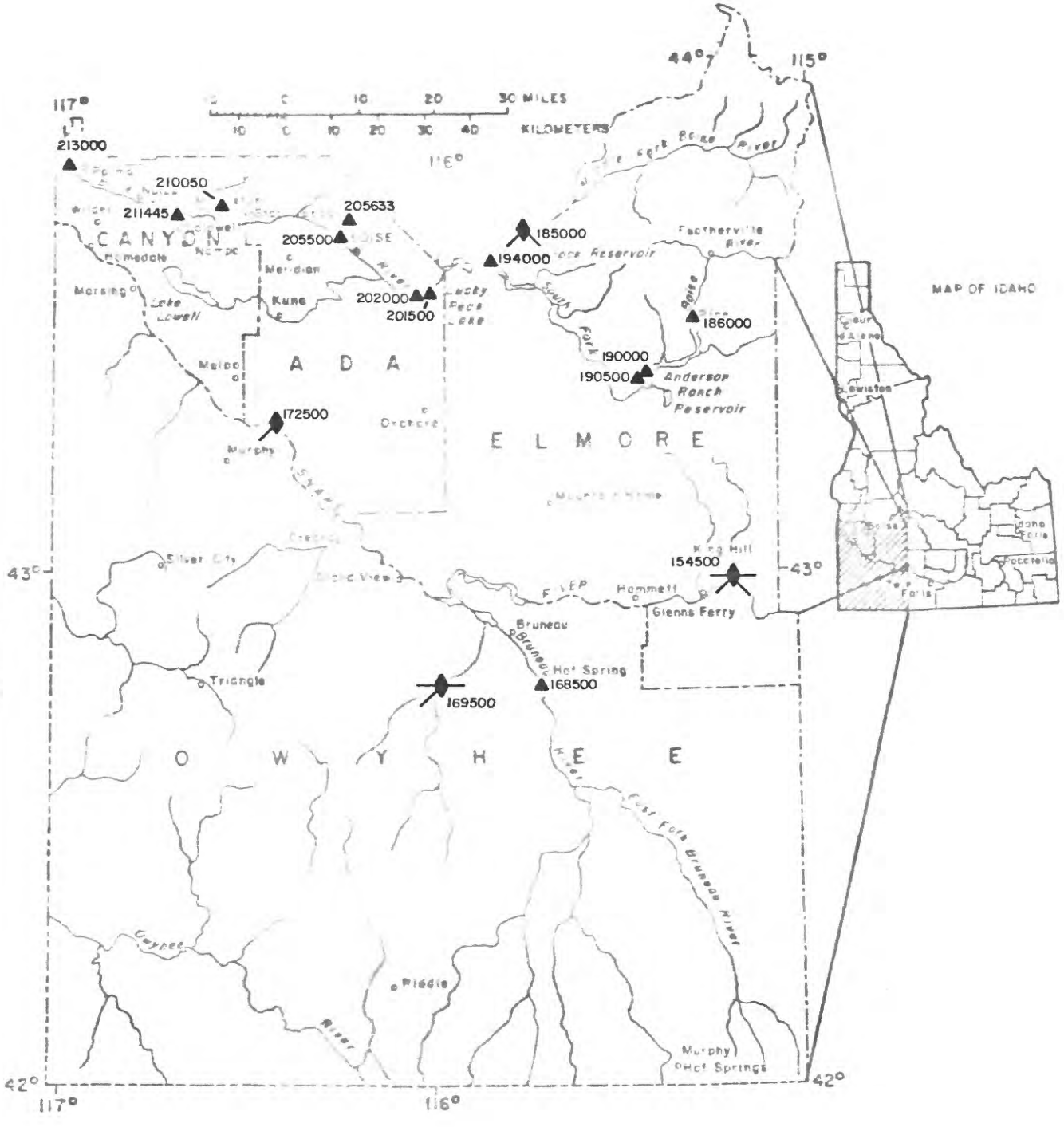



Figure 6. -- Locations of data sites in southwest Idaho.

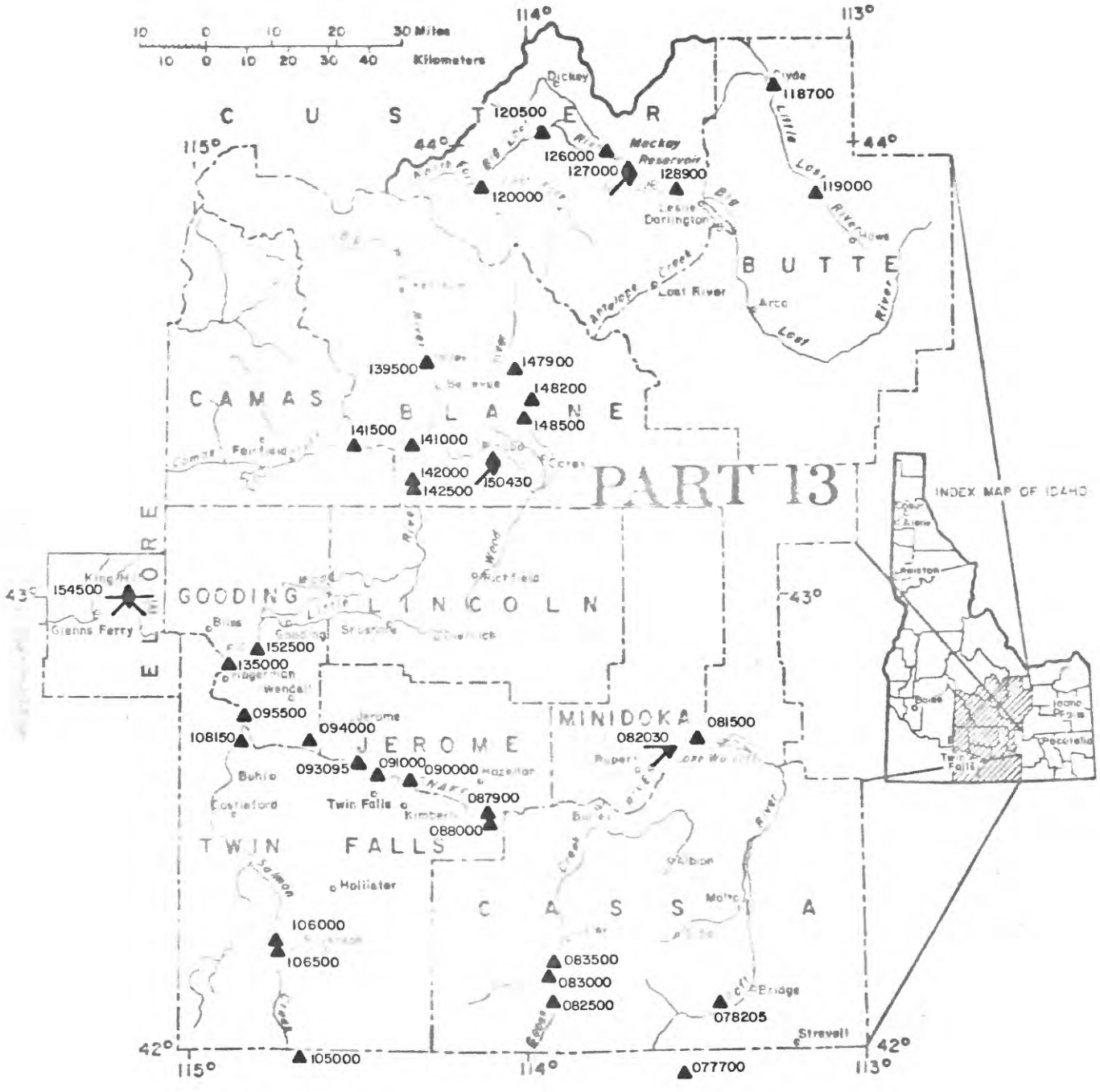



Figure 7. -- Locations of data sites in south-central Idaho.

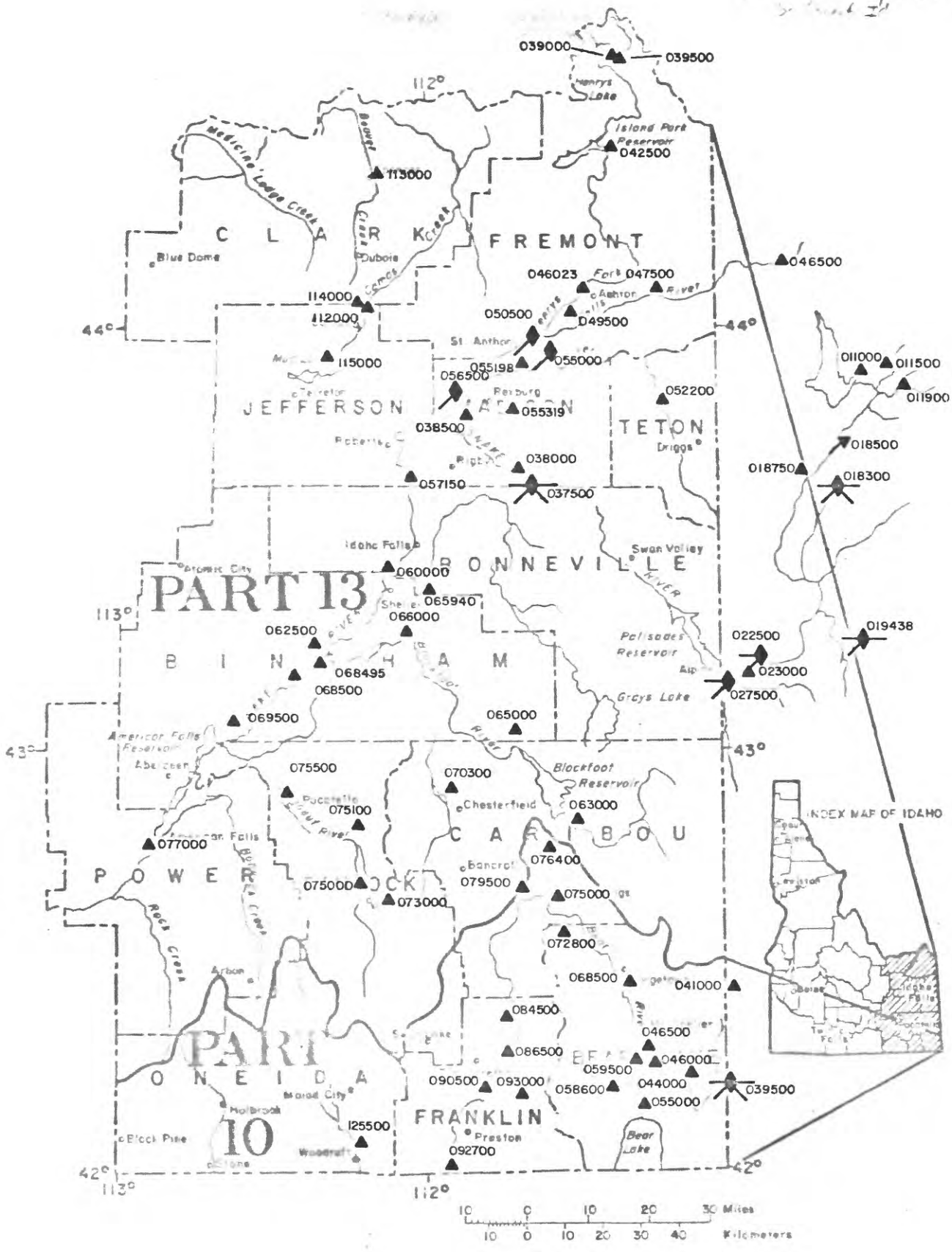



Figure 8. -- Locations of data sites in southeast Idaho.