ACTIVITIES IN IDAHO
STATUS OF PROJECTS, FISCAL YEAR 1981

Open-File Report 82-169

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

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

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Open-File Report 82-169

Boise, Idaho

December 1981

DMP

UNITED STATES DEPARTMENT OF THE INTERIOR

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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 fiscal year 1981. These projects were made in cooperation with 6 State and local and 11 Federal agencies. State and local cooperative funding amounted to $720,670; Federal funding amounted to $2,437,628.

Eighty-three persons were employed--40 full time and 43 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, the sole funding source.

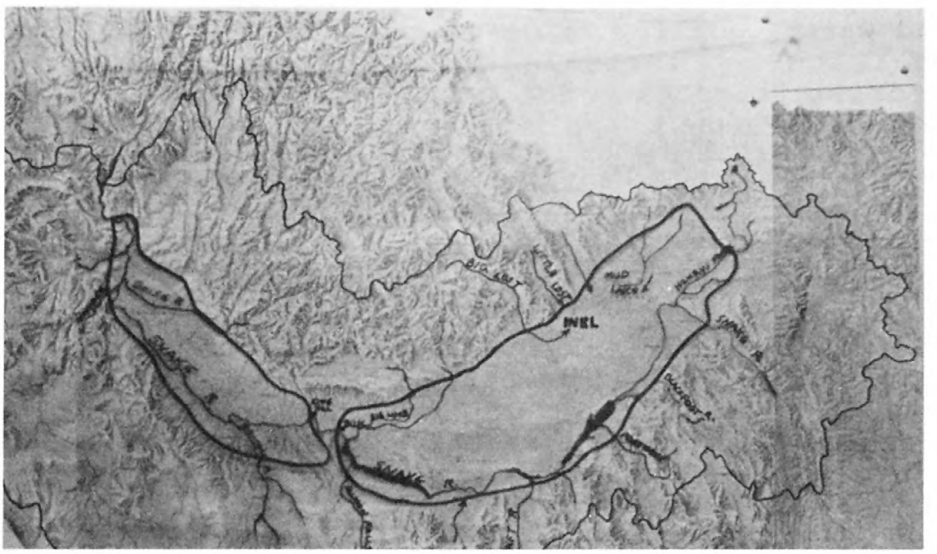
Projects other than continuing programs for collection of hydrologic data included flood-characteristics and flood-mapping studies, geothermal-resource investigations, ground-water quality assessments, basin- and region-wide water-resource investigations, river quality-of-water monitoring studies, volcanic-ash related studies, and ground-water-trends and stream-gaging program evaluations.

INTRODUCTION

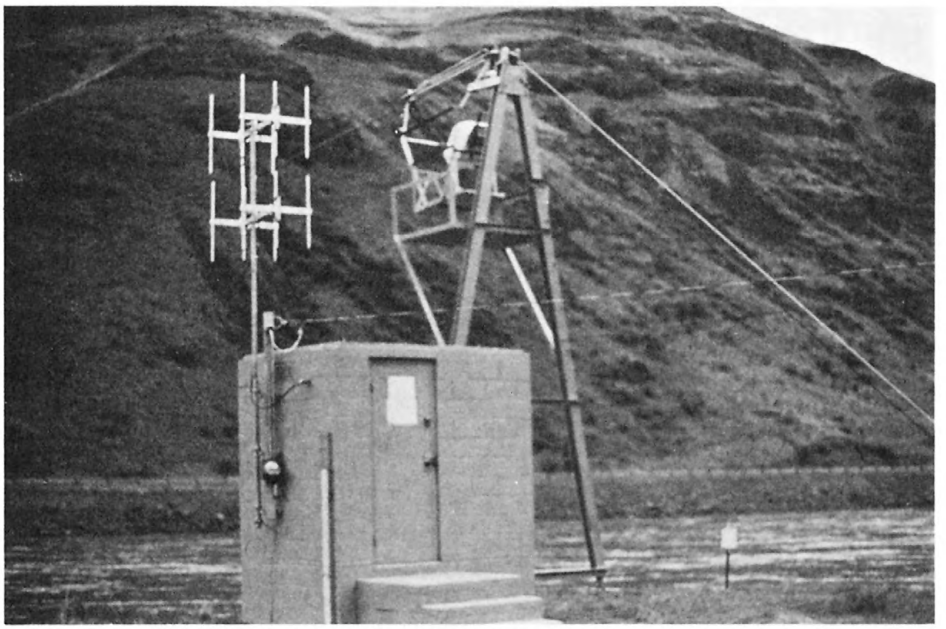
The U.S. Geological Survey was established as an agency of the Department of the Interior on March 3, 1879. The initial purpose of the Survey was to provide a plan that would secure the best possible results at the least possible cost for surveying and mapping the Territories of the United States. Today,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

The Water Resources Division, one of four 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:

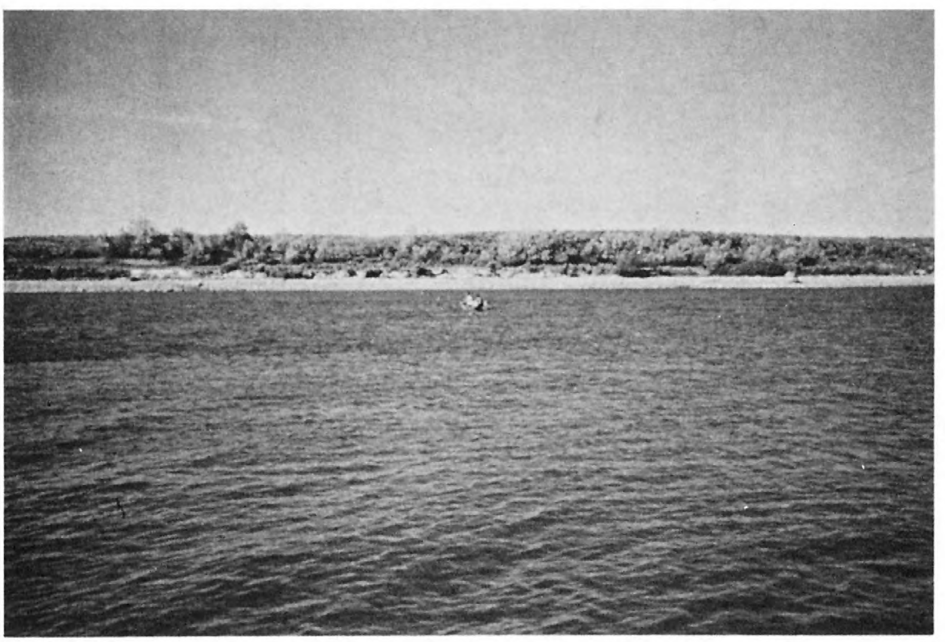
(1) Collecting, on a systematic basis, data needed for the continuing determination and evaluation of the quantity, quality, and use of the Nation's water resources;



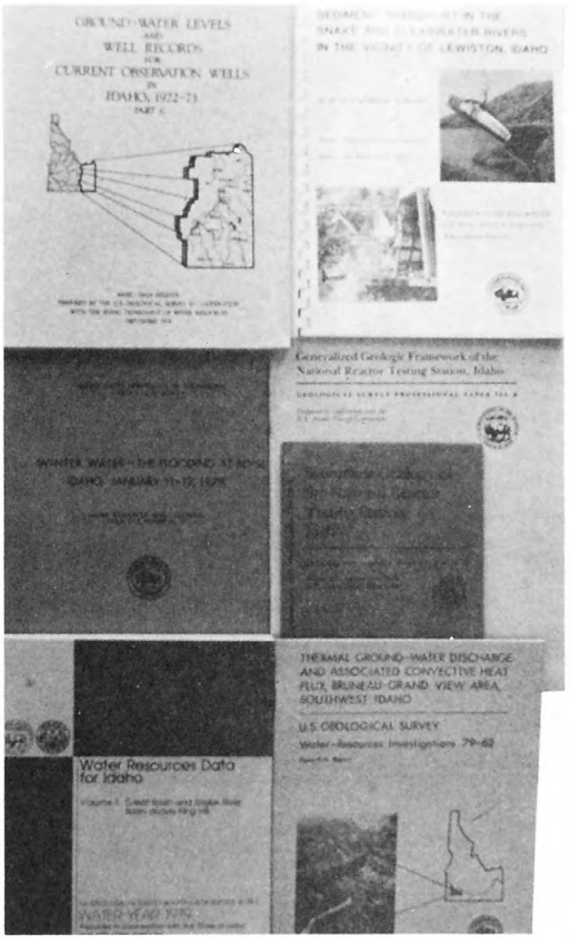
(2) conducting analytical and interpretive water-resource appraisals describing the occurrence, availability, and the physical, chemical, and biological characteristics of surface water and ground water;



(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;

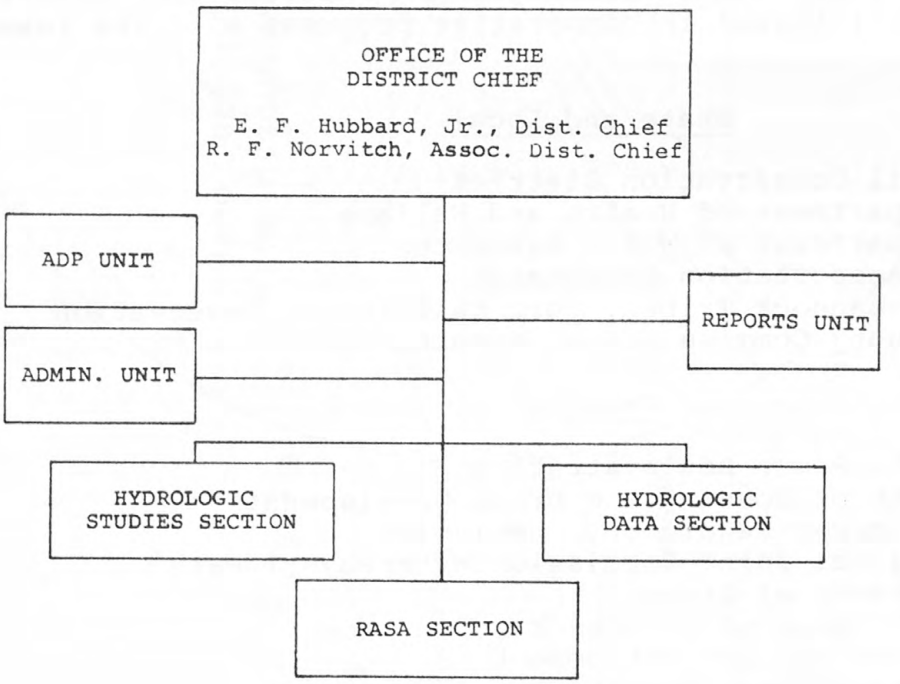


(5) disseminating the water data and the results of these investigations and research through reports, maps, computerized information services, and other forms of public releases; and

(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

The Idaho District of the Water Resources Division consists of three main operating sections and three support units. The three main operating sections are: (1) Hydrologic Studies, (2) RASA (Regional Aquifer Systems Analysis), and (3) Hydrologic Data. The three support units are: (1) Administrative, (2) Automatic Data Processing, and (3) Reports Processing.



In conducting its FY 1981 activities in Idaho, the Survey employed a total of 83 persons (40 full time and 43 other than full time)--67 in the Boise District Office, 9 in the Idaho Falls Field Headquarters, 5 in the Sandpoint Field Headquarters, and 2 in the Twin Falls Field Headquarters. The primary effort of these persons focused on carrying out 23 funded projects.

In addition to the district program headquartered in Boise, the Water Resources Division maintains a project office at the INEL (Idaho National Engineering Laboratory). Work there is done in cooperation with the U.S. Department of Energy, the sole funding source. INEL funds are not included in the Idaho District funding diagram (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 1981, the following State, local, and Federal agencies participated in cooperative programs with the Idaho District:

State and Local

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

Federal

Bonneville Power Administration
Department of Housing and Urban Development
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. 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.

State and local funds	$ 720,670
Federal funds	2,437,628
Total	$3,158,298

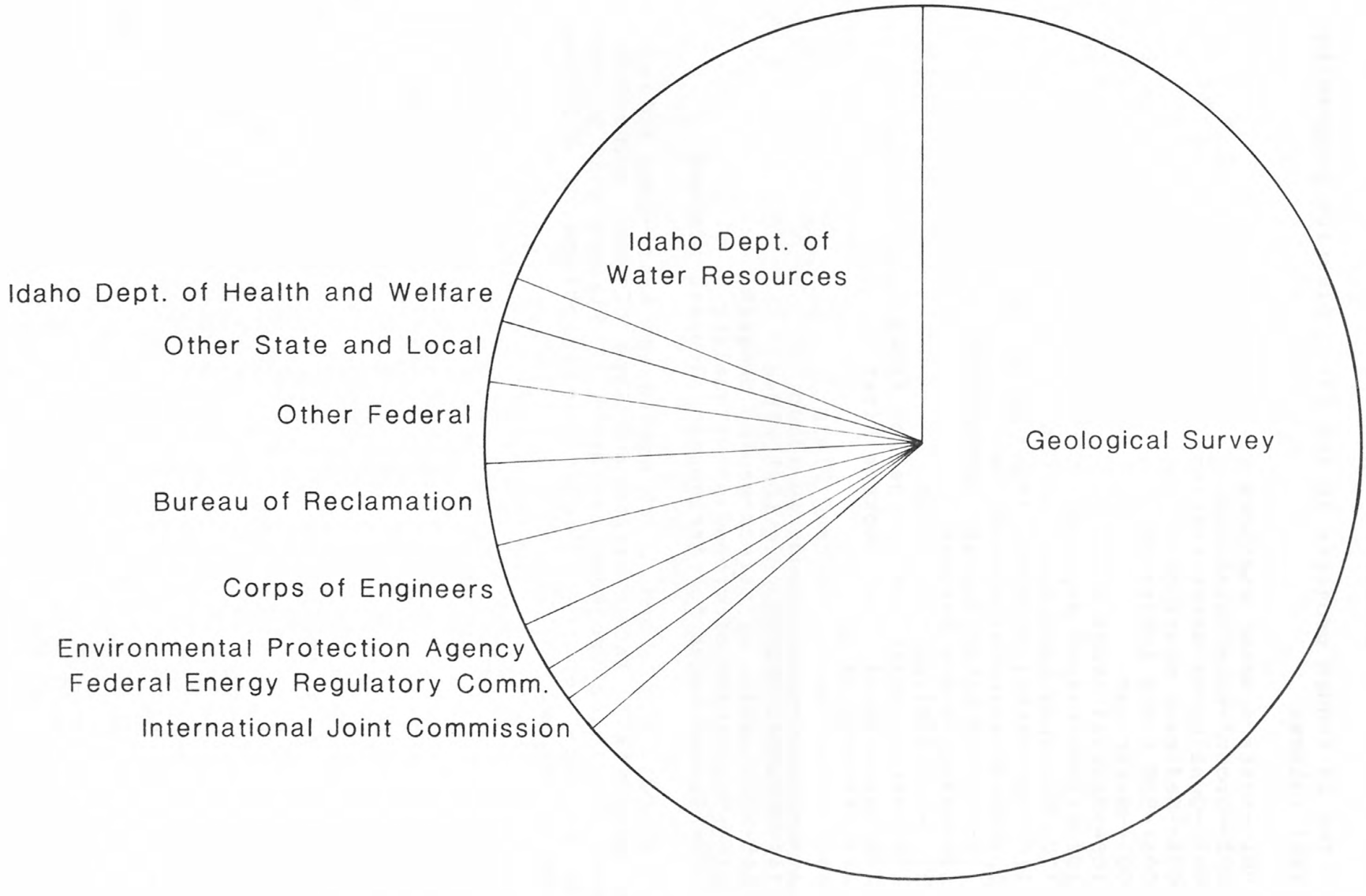


Figure 1. -- Idaho District funding, FY 1981.

STATUS OF PROJECTS

The 23 funded projects in the Idaho District program in FY 1981 follow:

ID 001--Surface-water stations
002--Ground-water stations
003--Quality-of-water stations
004--Sediment stations
006--HUD flood insurance
007--Water use
108--Special studies
109--Flood-hazard mapping
110--Kootenay Lake Board of Control
116--Geothermal studies, Idaho batholith
124--Evaluation of streamflow
132--Ground-water quality assessments
135--Banbury Hot Springs
137--Snake River Plain RASA
139--Water quality of irrigation flows
140--Water quality of Spokane River
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--Evaluation of ground-water quality
147--Ground water for irrigation, Bruneau plateau

ID 001, 2, 3, and 4 are continuing basic-data collection projects. The location and type of data being collected for these projects are shown in figures 2-8, at the back of this report. Current descriptions of all the projects follow.

PROJECT DESCRIPTIONS

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 analytical studies that define, for any location, the statistical properties of and trends in occurrence of water in streams, lakes, estuaries, etc., for use in planning and design.

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 gaging will be used instead of continuous-record gaging, where it serves the required purpose.

Progress in FY 1981: Continued collection and compilation of surface-water data for 214 recording gages, stage only for 2 sites, stage for 6 lakes and 5 reservoirs, contents for 16 lakes and reservoirs, 46 crest-stage stations, and 61 low-flow partial-record stations. All data were incorporated as part of the WATSTORE (National Water Data Storage and Retrieval) system.

Plans for FY 1982: Continue scheduled program of statewide data collection.

Data supplied by: Water Districts 01, 31, 33, 34, 37, 37N, and 65K; Bureau of Indian Affairs, 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; Idaho Transportation Department; Bonneville Power Administration; Federal Energy Regulatory Commission; International Joint Commission (WWT); Teton County Commissioners, Wyoming; 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.

Reports: U.S. Geological Survey, 1981, Water-resources data for Idaho, water year 1980: U.S. Geological Survey Water-Data Report, ID-80-1, 80-2.

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 1981: As of July, the regular statewide network consisted of 362 wells measured at monthly, bimonthly, semiannual, and annual frequencies; and 36 wells equipped with continuous recorders. In addition, 110 wells were measured for a special purpose network, in which 21 wells were equipped with continuous recorders and 89 were measured periodically.

Plans for FY 1982: Well-data records will continue to be updated, coded, and processed for storage and retrieval in the automated data base. The number of wells measured in the State observation well network and special purpose network will be decreased because of funding limitations.

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

Reports: U.S. Geological Survey, 1981, Water-resources data for Idaho, water year 1980: U.S. Geological Survey Water Data Report, ID-80-1, 80-2.

ID 003--QUALITY-OF-WATER STATIONS

Location: Statewide

Period of project: Continuous since July 1966

Project leader: Thomas K. Edwards

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 1981: Statewide monitoring of water quality continued at 79 gaging stations, 76 partial-record sites (including 19 spring sites), 7 NASQAN (National Stream Quality Accounting Network) stations, 3 benchmark stations, and 7 NWQSS (National Water Quality Surveillance System) stations for EPA (U.S. Environmental Protection Agency). Continuous water-temperature records were obtained at nine sites. Precipitation quality was monitored at five sites at the beginning of the year as part of the Mt. St. Helens atmospheric deposition monitoring network. The number of sites was later reduced to two.

Plans for FY 1982: The present network will be continued at a reduced level. The NWQSS program for EPA will be discontinued, the 7 NASQAN stations will be sampled on a reduced bimonthly schedule, and several partial-record sites will be discontinued. Continuous water-temperature records will be maintained at eight stations. Precipitation quality monitoring will be continued at the two existing atmospheric deposition monitoring sites.

Funding sources: Idaho Department of Water Resources, U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, and U.S. Geological Survey.

Reports: U.S. Geological Survey, 1981, Water-resources data for Idaho, water year 1980: U.S. Geological Survey Water-Data Report, ID-80-1, 80-2.

ID 004--SEDIMENT STATIONS

Location: Statewide

Period of project: Continuous since November 1968

Project leader: Thomas K. Edwards

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 1981: Suspended-sediment samples were collected daily at Kootenai River near Copeland, monthly at 12 stations, and bimonthly at 1 station. Suspended-sediment samples were obtained periodically at nine miscellaneous sites.

Plans for FY 1982: Suspended-sediment samples will be collected monthly at six sites and bimonthly at seven sites. The Kootenai River at Copeland gage will be relocated downstream to the Kootenai River at Porthill site, and an automatic pumping sampler will replace daily observer-collected samples. Daily suspended-sediment samples also will be collected at the mouth of Little Granite Creek near Bondurant, Wyo., using an automatic pumping sampler. Weekly bedload samples will be collected at this site for an 8-week period during spring runoff.

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

Reports: U.S. Geological Survey, 1981, Water-resources data for Idaho, water year 1980: U.S. Geological Survey Water-Data Report, ID-80-1, 80-2.

ID 006--HUD FLOOD INSURANCE

Location: Statewide, specified areas

Period of project: April 1976 - September 1980

Project leader: William A. Harenberg

Objectives: Conduct the necessary hydrologic and hydraulic studies on the areas assigned by FEMA (Federal Emergency Management Agency), on a month-to-month basis, and develop the most efficient procedures to attain the accuracy specified by FEMA in the most appropriate format, with minimum personnel requirements.

Approach: Conduct necessary surveys by ground and photogrammetric methods, prepare computer models of drainage networks, compute magnitudes and profiles of floods of specified frequencies, and furnish results in reports prepared to FEMA specifications.

Progress in FY 1981: Technical questions that were posed by FEMA on the Nez Perce County reports were answered, and some reworking of problem areas was done. Several computer runs were made using the Survey's step-backwater program to redefine the hydraulics in the Mason Creek special-problem area in Canyon County.

Plans for FY 1982: None.

Funding source: Department of Housing and Urban Development.

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 1981: Work began on developing an Idaho State Water-Use Data-Base Management System. Cooperator agencies were contacted, and arrangements were made for participation in the collection of Idaho water-use data. Data were entered into NWUDS for a number of categories.

Plans for FY 1982: Continue development of the State Data Base System. Enter data into NWUDS as they are developed.

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

Reports: Kennedy, S. K., 1980, The Idaho water use data system: Boise, Idaho, Idaho Department of Water Resources, 54 p., 1 appendix.

ID 108--SPECIAL STUDIES

Location: Southwestern Idaho

Period of project: June and July, 1981

Project leader: Harold W. Young

Objectives: Provide special hydraulic and hydrologic studies as requested by other Federal and State agencies.

Approach: Experienced hydrologists will use latest available techniques to provide the requested work. Western Region specialists will be contacted as required.

Progress in FY 1981: A study was conducted and results presented to the U.S. Bureau of Land Management to determine the availability and quality of ground water for irrigation on Federal and State lands in Owyhee County between Bruneau and Oreana.

Plans for FY 1982: Activate as needs arise.

Funding sources: U.S. Bureau of Land Management and U.S. Geological Survey.

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 for which adequate maps are available and for which flood-frequency/drainage-area relations can be determined.

Approach: In general, project work will be done in the office, using available information. Where possible, relations among flood depth, flood discharge, frequency of occurrence, and drainage area will be used to define flood profiles and 100-year flood boundaries along streams for which, in many cases, no flood information exists. Regional flood-depth frequency relations will be used where they can be defined.

Progress in FY 1981: Thirty-three flood-prone area maps were completed.

Plans for FY 1982: None.

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.

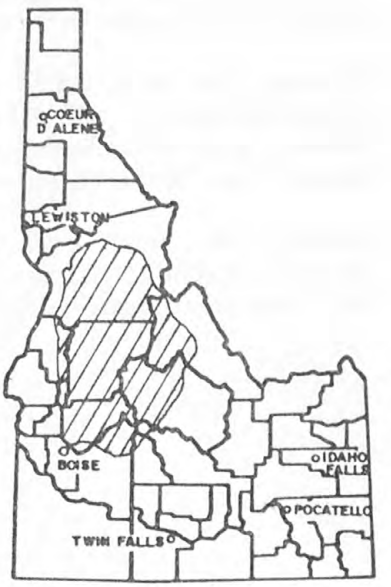
Approach: Attend scheduled meetings and inspection trips. Review special hydrologic data as required by changes in operation of Kootenay Lake and effects of Libby Dam operation on Kootenay Lake.

Progress in FY 1981: Thrice-yearly inspections and measurements of Kootenay River at Grohman Narrows, British Columbia, were reinstated after having been suspended in FY 1980. Following review and signature by all members, the Forty-Second Annual Report of the Kootenay Lake Board was provided to the International Joint Commission.

Plans for FY 1982: Hydrologic expertise will be provided to the Board of Control as required. Related work includes plans for continuation of completion of a two-dimensional flow model of the Kootenay River and to construct a pier shelter for installation of a PS 69 automated pumping sampler and Marsh-McBurney electromagnetic discharge meter at Porthill gage. Reduction of funding is anticipated for FY 1982.

Funding source: International Joint Commission (WWT).

ID 116--GEOTHERMAL STUDIES,
IDAHO BATHOLITH



Location: Central Idaho

Period of project: October 1979 - September 1982

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: The batholith will be divided into three major drainage areas: Payette, Boise, and Salmon Rivers. All hot springs and selected cold springs in each drainage area will be inventoried. Water samples for standard analyses, plus arsenic, boron, mercury, and lithium, will be collected from all inventoried springs, and measurements or estimates of discharge will be made. In addition, water samples for deuterium, oxygen-18, and tritium will be collected from selected springs. Gas samples will be collected from hot springs where possible. Continuous recorders will be installed to monitor discharge and water temperature on selected hot springs. Separate reports will be prepared for each area and will include discussion of water chemistry, isotopic composition, discharge rates, and convective heat loss.

Progress in FY 1981: A report on hot springs in the Salmon River drainage was completed. An inventory was made of hot springs and selected cold springs in the Boise River drainage, and water samples were collected for chemical and isotopic analyses.

Plans for FY 1982: A report for the Boise River drainage will be completed and submitted 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.

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.

Young, H. W., and Lewis, R. E., 1982, Thermal springs in the Salmon River basin, central Idaho: U.S. Geological Survey Open-File Report 82-104 (in press).

ID 124--EVALUATION OF STREAMFLOW

Location: Snake River basin, Bear River basin, and Upper Columbia River basin, Idaho

Period of project: Continuous since January 1976

Project leader: Robert L. Moffatt

Objective: Evaluate the adequacy of streamflow records at gaging stations in terms of factors that influence the flow characteristics. Such factors include diversions, bypass channels, underflow beneath or around the gage, regulation, return flows, flows out of or into the basin, and adequacy of length and period of records.

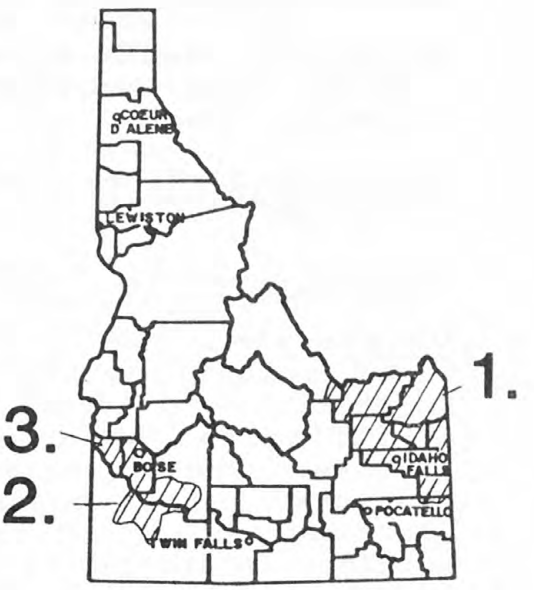
Approach: Evaluate historical flow records for about 140 gaging stations in the Snake River drainage basin and about 50 gaging stations in the Bear River and Upper Columbia River drainage basins. Evaluation of historic streamflows will include an effort to determine the nature and significance of geologic factors and the works of man that affect surface-water flows, occurrence and movement of ground water, and adequacy of the discharge record at each gaged site.

Progress in FY 1981: Streamflow records have been evaluated in terms of flow characteristics and gains and losses in flow for all but two of the stream-gaging stations operated in the State in 1979. A first draft of the final report for the Snake River basin was completed and was started in the review process. About two-thirds of the final report for the Upper Columbia and Bear River basins was written.

Plans for FY 1982: Final reports will be completed.

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

ID 132--GROUND-WATER QUALITY ASSESSMENTS



Location: (1) Eastern Snake River Plain region, (2) southern Elmore County and northern Owyhee County, (3) Boise River valley

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: A literature and file search will be made to compile geologic and well information and water-quality data. Any data not stored in computer files will be coded and entered into storage for future retrieval and analysis. Water samples will be collected from wells, on the basis of information concerning ground-water source, movement, and yield. Efforts will be made to select only wells for which well-construction and geologic data are available. An inventory will be made to determine suitability of wells for sample collection and to obtain owner's permission. Determinations of conductivity, temperature, discharge, and concentration of carbonate and bicarbonate will be made onsite at the time of sampling. Accepted techniques for preparation, preservation, and storage of samples will be used to insure accurate laboratory determinations. For each area studied, a final report describing the results of study will be written.

Progress in FY 1981: Collection of field data in southern Elmore and northern Owyhee Counties was completed and a first-draft report was written. The report on the eastern Snake River basin was prepared for colleague review. The report "Ground-Water Quality in East-Central Idaho Valleys" was approved for publication. About 50 percent of the field work for the Boise River valley was completed.

Plans for FY 1982: Final reports on southern Elmore-northern Owyhee Counties and eastern Snake River basin will be completed. Field work for the Boise River valley will be completed and a report submitted for review.

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

ID 135--BANBURY HOT SPRINGS

Location: South-central Idaho

Period of project: March 1979 - September 1982

Project leader: Robert E. Lewis

Objectives: The overall objective is to define the nature and extent of the geothermal reservoir in the vicinity of Twin Falls. Specific objectives are to: (1) Determine the present quantity of direct use of the thermal water; (2) define the areal extent of the geothermal reservoir, insofar as possible using available data; and (3) evaluate the existing resource as to temperatures, pressures, and chemistry of the water, and estimate reservoir temperatures.

Approach: Inventory selected thermal wells and springs; collect hot-water samples and analyze for standard chemical constituents and selected trace elements; measure or estimate discharge from wells and springs; measure head pressures in wells; analyze for deuterium, oxygen-18, and tritium in water at selected sites; and write a final report summarizing the findings of the investigation.

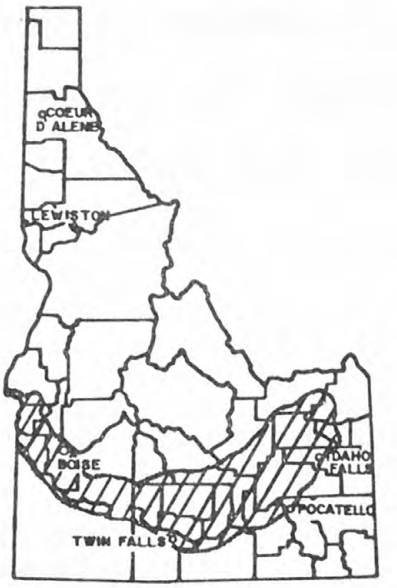
Progress in FY 1981: Data collection, which involved well information and water-quality sampling, in the vicinity of Twin Falls was completed; analysis of the chemical and isotopic data was begun.

Plans for FY 1982: Operation of wells that monitor pressure or discharge will continue. Data collection will be extended eastward from Twin Falls to near Murtaugh to determine the extent of the thermal ground-water resources.

Funding source: U.S. Department of Energy.

Reports: Lewis, R. E., and Young, H. W., 1980, Geothermal resources in the Banbury Hot Springs area, Twin Falls County, Idaho: U.S. Geological Survey Water-Resources Investigations/Open-File Report 80-563, 35 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 ground-water development. Use ground-water-flow models to aid in understanding the system.

Approach: A three-phase approach will be followed, which will include: (1) Preliminary work--establishment of liaison committees, review of existing literature and data base, initiation of data collection and ground-water flow modeling, planning and contracting for geophysical, geological and remote-sensing work, and test drilling; (2) data acquisition and analysis--assimilation of phase 1 data, collection of additional data, calibration of regional models, and use of models for testing hypotheses about the hydrodynamics of aquifer systems; and (3) production and completion--use of models to simulate projected water-use schemes to evaluate resulting future conditions.

Progress in FY 1981: Surface geophysics were used to help define the geologic framework. About 250 mi of resistivity profiles were completed to aid in determining the distribution of basalts and sedimentary rocks. New data suggest that basalts in the eastern plain are thinner than previously thought, maximum thickness being less than 2,500 ft. Field maps for 90 mi of the northern Snake River Canyon wall between Milner and King Hill were completed through an agreement with the Geologic Division. Sixty-five wells were added to supplement the existing observation-well network. A plan of study was developed for the water-chemistry phase of the study. Water 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 company data were acquired to determine 1980 pumpage for irrigation from ground- and surface-water sources. Two-dimensional parameter estimation ground-water flow models were developed for the east-

eastern and western Snake River Plain. Hydraulic parameters from the calibrated two-dimensional models will be used as initial input for three-dimensional models. Progress was made in cooperative work by the Idaho Department of Water Resources in their mapping of 1980 irrigated lands using Landsat data and by the University of Idaho in their modeling of the Mud Lake ground-water system.

Plans for FY 1982: Pre-RASA study resistivity data will be reprocessed and computer-generated profiles developed to make them more comparable with new data. A test hole will be drilled in Gooding County to determine hydraulic characteristics of the Snake River basalt aquifer and to verify basalt thickness as determined by surface resistivity. Data analysis will be emphasized, as data collection is nearly complete. Ground-water flow will be studied by constructing flow sections, which will aid in conceptualizing and modeling the three-dimensional systems. Steady-state three-dimensional models will be calibrated to 1980 data. An American Falls subarea model will be developed in an attempt to understand local hydrologic problems. Several reports are in process and will be completed in FY 1982.

Funding source: U.S. Geological Survey.

Reports: 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 - September 1981

Project leader: Harold R. Seitz

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: A systematic monitoring program will be established. A total of 15 sites will be monitored on Rock Creek and Cedar Draw in Twin Falls County and Marsh Creek in Bannock County, in all months except November, January, and March. The monitoring program will include quantity and specific types of nutrients, and selected chemical, bacterial, and physical characteristics that could be responsible for pollution of the three rural streams. All parameters will be sampled for in September; other parameter variations will be sampled for during other months. Intensive (24-hour) sampling also will be done at all sites, two times each year.

Progress in FY 1981: Water-quality sampling continued as scheduled on Rock Creek, Marsh Creek, and Cedar Draw. Discharge measurements were made and samples of suspended sediment were obtained. Data collected were presented at meetings with the cooperating agencies.

Plans for FY 1982: The final report will be completed and submitted for Director's approval.

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

ID 140--WATER QUALITY OF SPOKANE RIVER

Location: Northern Idaho and northeastern Washington

Period of project: January 1980 - June 1981

Project leader: Harold R. Seitz

Objectives: The overall objective is to provide current water-quality data for making management decisions concerning sewage-plant discharges to the Spokane River in Idaho. Specific objectives are to: (1) Characterize the quality of water entering the river from Coeur d'Alene Lake, and (2) describe the physical details of the reach from Coeur d'Alene Lake to Post Falls, Idaho, as to depth, width, velocity, and water discharge.

Approach: (1) Survey selected cross sections for width and depth and determine velocities at low, medium, and high flows; (2) measure river feet between cross sections; (3) tie all measurements to one datum; and (4) make field estimates of streambed-roughness coefficients. In addition, monitor nutrient inflow to and outflow from Coeur d'Alene Lake on a monthly basis.

Progress in FY 1981: Depths, widths, and velocities were determined at eight cross sections on the Spokane River in Idaho. A draft copy of the final report was completed and sent for colleague and cooperator review.

Plans for FY 1982: None.

Funding source: Idaho Department of Health and Welfare.

Report: Seitz, Harold R., and Jones, Michael L., 1981, Flow characteristics and water-quality conditions in the Spokane River, Coeur d'Alene Lake to Post Falls Dam, Northern Idaho: U.S. Geological Survey Open-File Report 82-102, 56 p.

ID 141--EFFECTS OF ASH

Location: Northern Idaho

Period of project: July 1980 through March 1982

Project leader: Steven A. Frenzel

Objectives: (1) Determine physical and chemical effects of volcanic ash from the eruption of Mt. 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 1981: (1) Collected a continuous record of water stage, temperature, and conductivity on Big Creek since November 1980. (2) Collected suspended-sediment, water, and benthic invertebrate samples on a periodic basis since November 1980. (3) Collected soil samples throughout Big Creek basin. (4) Conducted an experiment in Gedney Creek (unimpacted) to determine effect of ash on substrate colonization by benthic invertebrates.

Plans for FY 1982: (1) Continue collection of water stage, temperature, and conductivity records and water chemistry, sediment, and biological data through November 1981 to obtain 1 full year's record. (2) Complete the analysis of soil samples and calculate weight of ash in Big Creek basin. (3) Collect and identify benthic invertebrates during late fall low-flow period. (4) Conduct an experiment in Gedney Creek to determine effects of ash on existing invertebrate communities. (5) Analyze all data collected during the investigation and write a final report.

Funding source: U.S. Geological Survey.

ID 142--GROUND WATER, MICHAUD FLATS

Location: Southeastern Idaho

Period of Project: October 1980 - March 1982

Project leader: Nathan D. Jacobson

Objectives: Describe the degree and extent of ground-water contamination, identify major data gaps, and establish a ground-water monitoring network. Using data obtained, determine the occurrence and movement of ground water, describe the hydrologic and geologic framework, identify the 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 the 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 of movement 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 1981: Interpretation was made of data collected in the vicinity of Michaud Flats, and a report summarizing the findings was prepared.

Plans for FY 1982: Observation wells will be drilled at strategic points to determine extent of ground-water contamination. Data-collection activities will continue, and a report covering management alternatives will be written.

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

ID 143--GROUND-WATER TRENDS IN IDAHO

Location: Statewide

Period of project: October 1980 - June 1981

Project leader: Robert E. Lewis

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 nature of 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 and segregate 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 1981: Long-term hydrographs were obtained and analyzed for more than 360 wells in the State observation-well network. Cumulative departure curves for about 90 precipitation stations were generated. Trend lines were determined for the last 10 years on all of the hydrographs and evaluation for causes of the trends began. A map showing areal grouping of similar ground-water-level trends was completed. The current observation-well network has large gaps in areal coverage; the largest concentration of coverage is on the Snake River Plain.

Plans for FY 1982: Data analysis will be completed, and a final report that describes results of the study will be written.

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 - 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 1981: Surface-water, sediment, and groundwater data were collected for all sites. Ninety percent of the data have been analyzed and assimilated.

Plans for FY 1982: Data analysis will be completed. All data will be incorporated into a final report.

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 - September 1981

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: The study will be done in five steps. 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 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 report form.

Progress in FY 1981: Analyses were completed using the NARI and CE (Cost-Effectiveness) techniques. Extending records, by adding either stations or years, did not significantly reduce standard errors of estimate. The CE technique was applied to two field trips being run out of the Boise office. A preliminary report that describes the results of using the NARI and CE techniques was submitted to the Surface Water Branch of the Water Resources Division.

Plans for FY 1982: More work will be done to develop the CE technique of network analysis. A final report that describes the application of techniques and results obtained will be written.

Funding source: U.S. Geological Survey.

ID 146--GROUND-WATER QUALITY CONDITIONS

Location: Statewide

Period of project: May 1981 - 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 managers and the general public.

Progress in FY 1981: The initial plan of study was completed. A search for available data from other agencies was made. The NAWDEX (National Water Data Exchange) system was searched for data sources. All quality of water data in the WATSTORE (National Water Data Storage and Retrieval) system were retrieved and analysis of data began.

Plans for FY 1982: Data analysis will be completed and a report will be written in the STOP (Sequential Thematic Organization of Publications) format.

Funding source: U.S. Geological Survey.

ID 147--GROUND WATER FOR IRRIGATION, BRUNEAU PLATEAU

Location: Southwestern Idaho

Period of project: April 1981 - November 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 suppy, 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 1981: Available geologic and hydrologic data were compiled, which included voluminous well-log records from State cooperator files. Initial study plans were formulated and area maps were made.

Plans for FY 1982: All wells in the study area will be inventoried. Monitoring wells will be established and recording equipment installed. Water samples from selected wells will be obtained for chemical analyses. Two mass water-level measurements will be conducted during the spring and summer. A report that presents study results will be written.

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

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

Crest-stage measurement site

Observation well and number

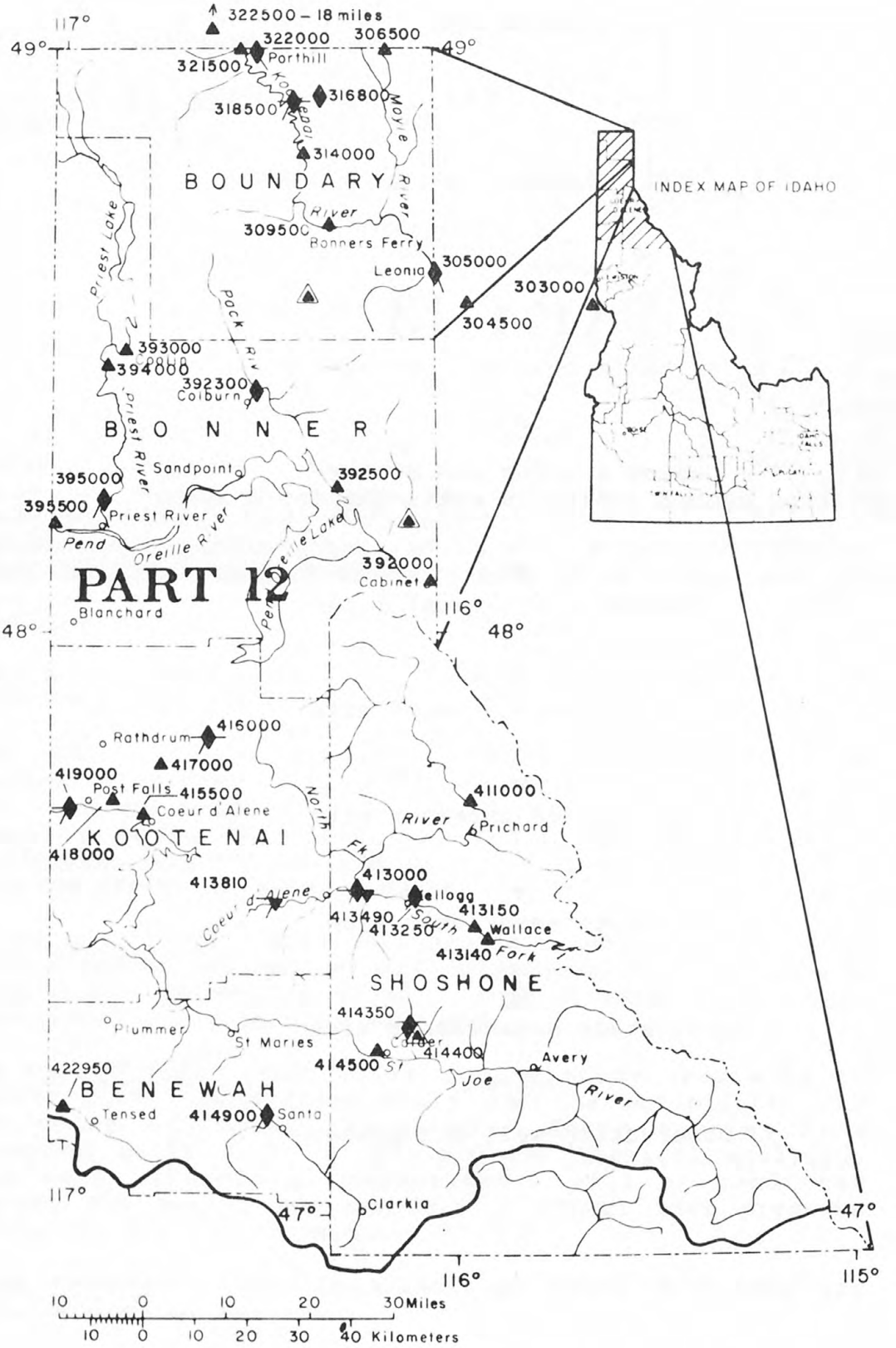


Figure 2. -- Locations of data sites in north Idaho.

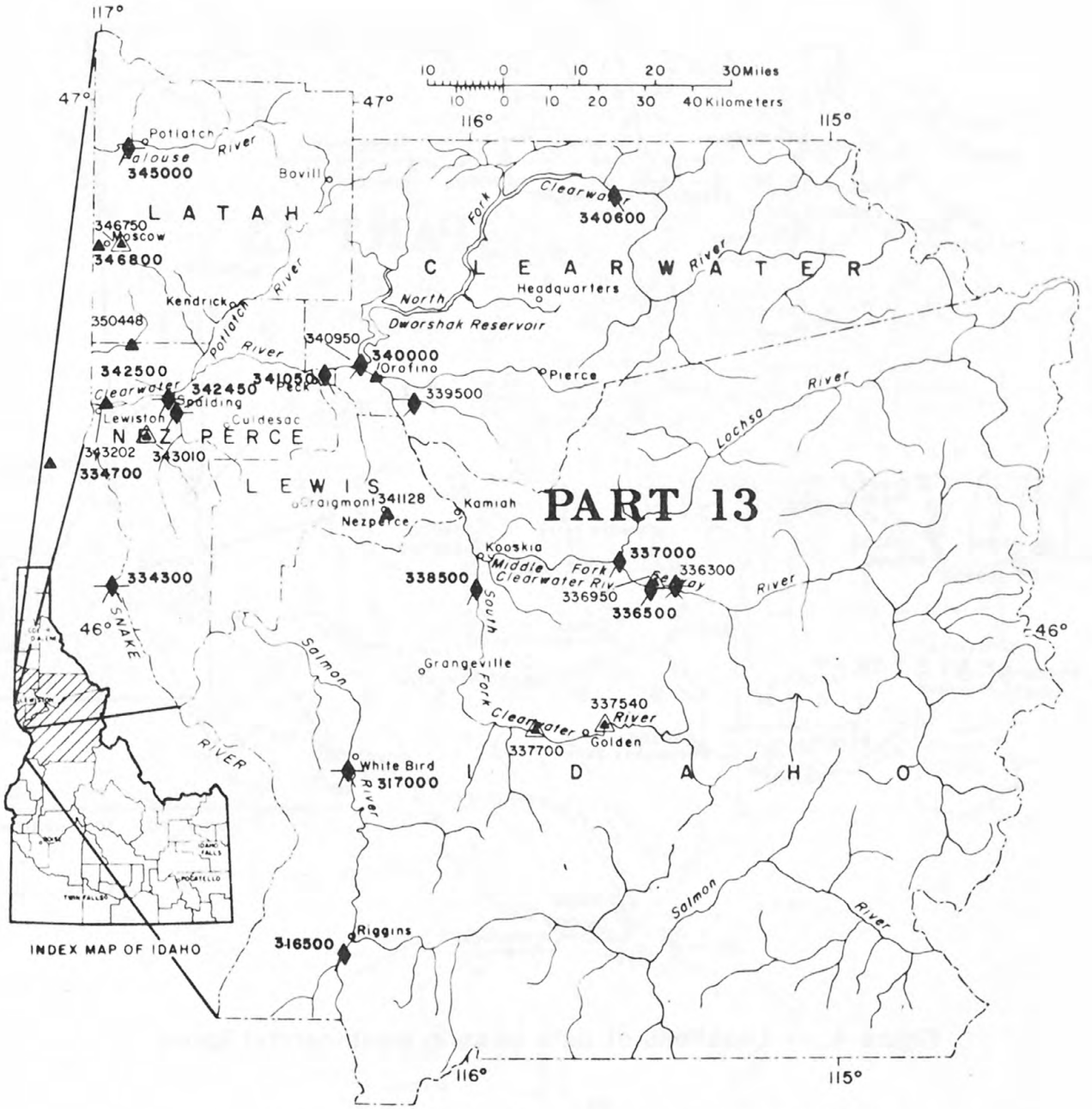


Figure 3. -- Locations of data sites in north-central Idaho.

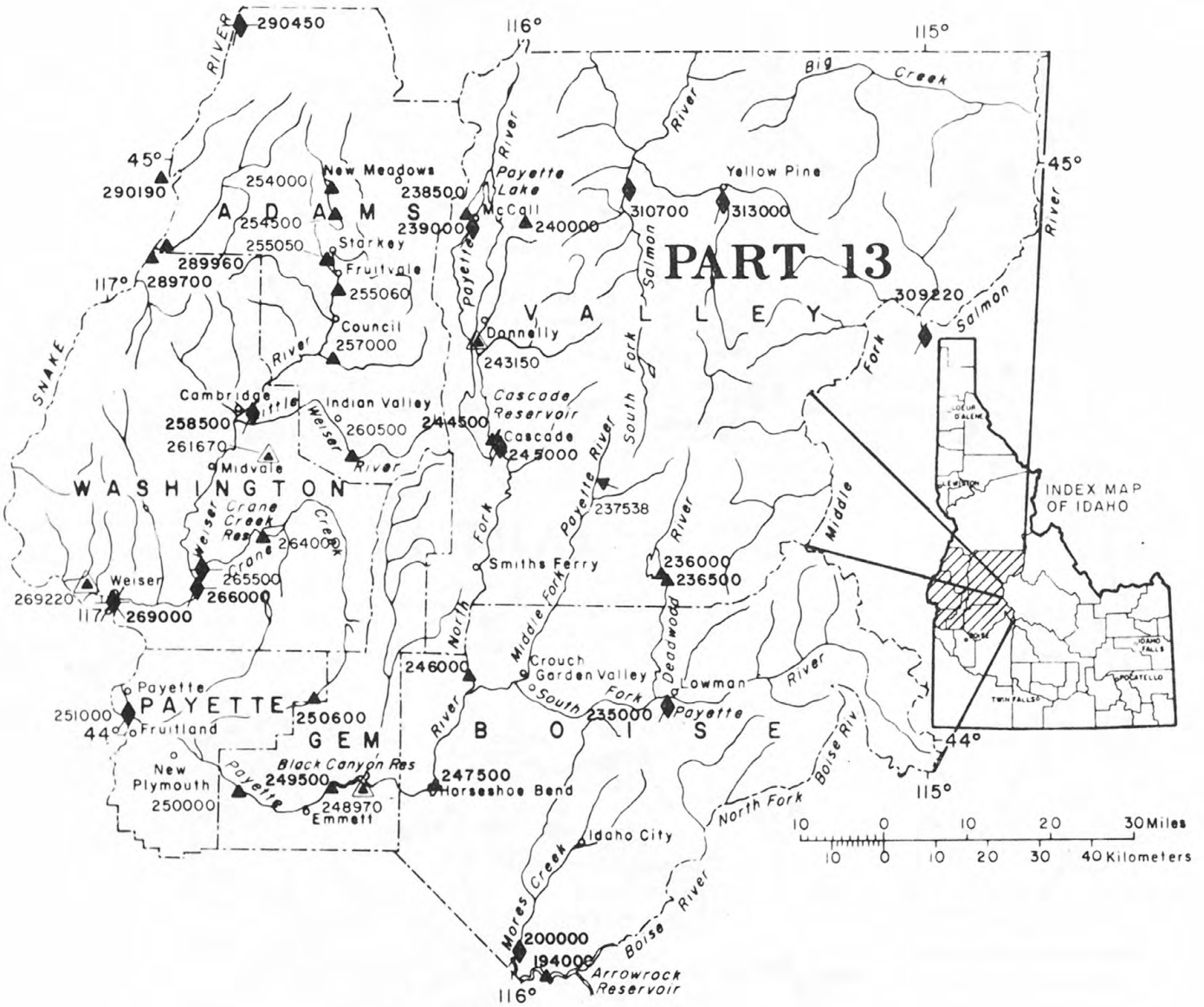


Figure 4. -- Locations of data sites in west-central Idaho.

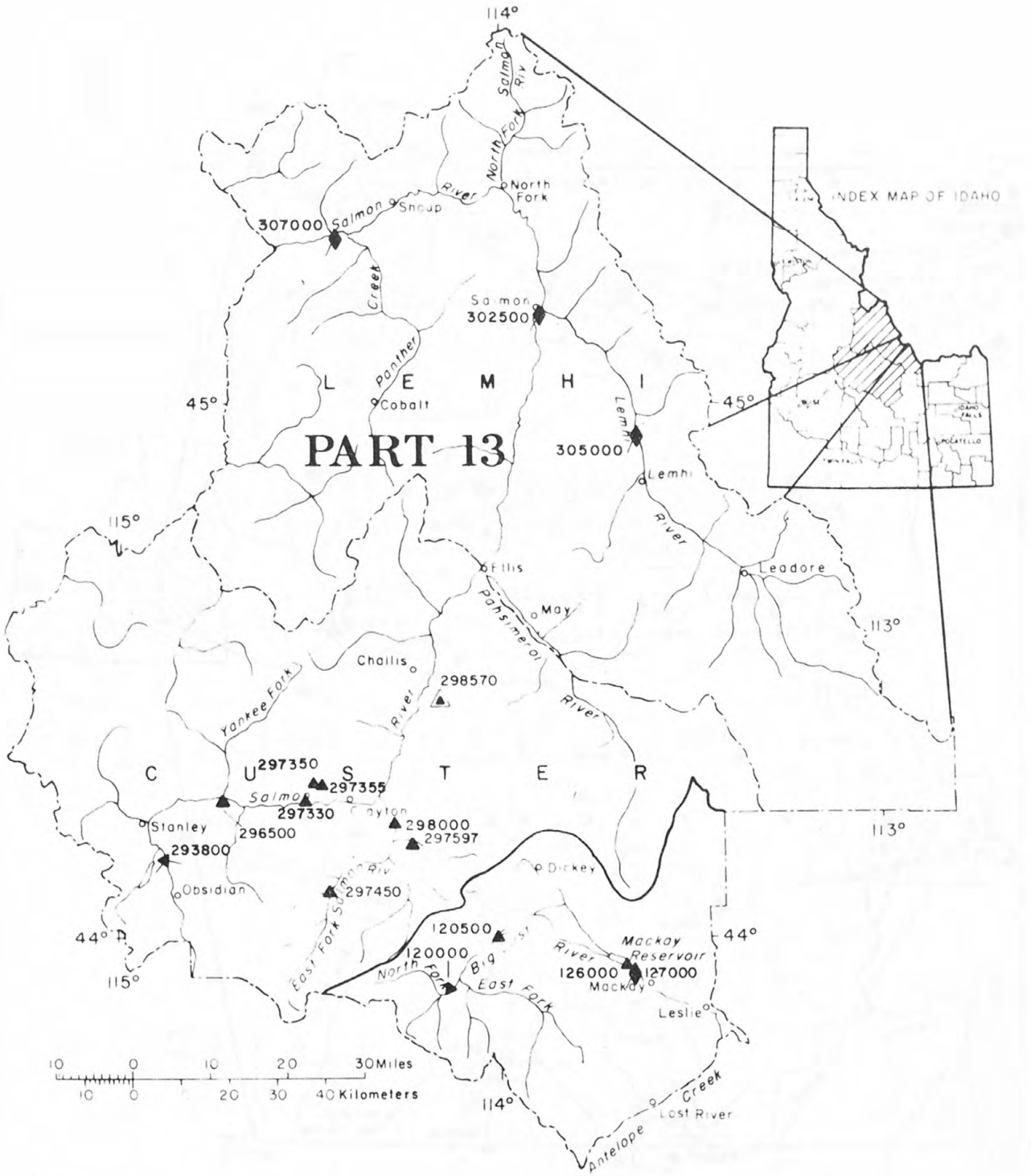


Figure 5. -- Locations of data sites in east-central Idaho.

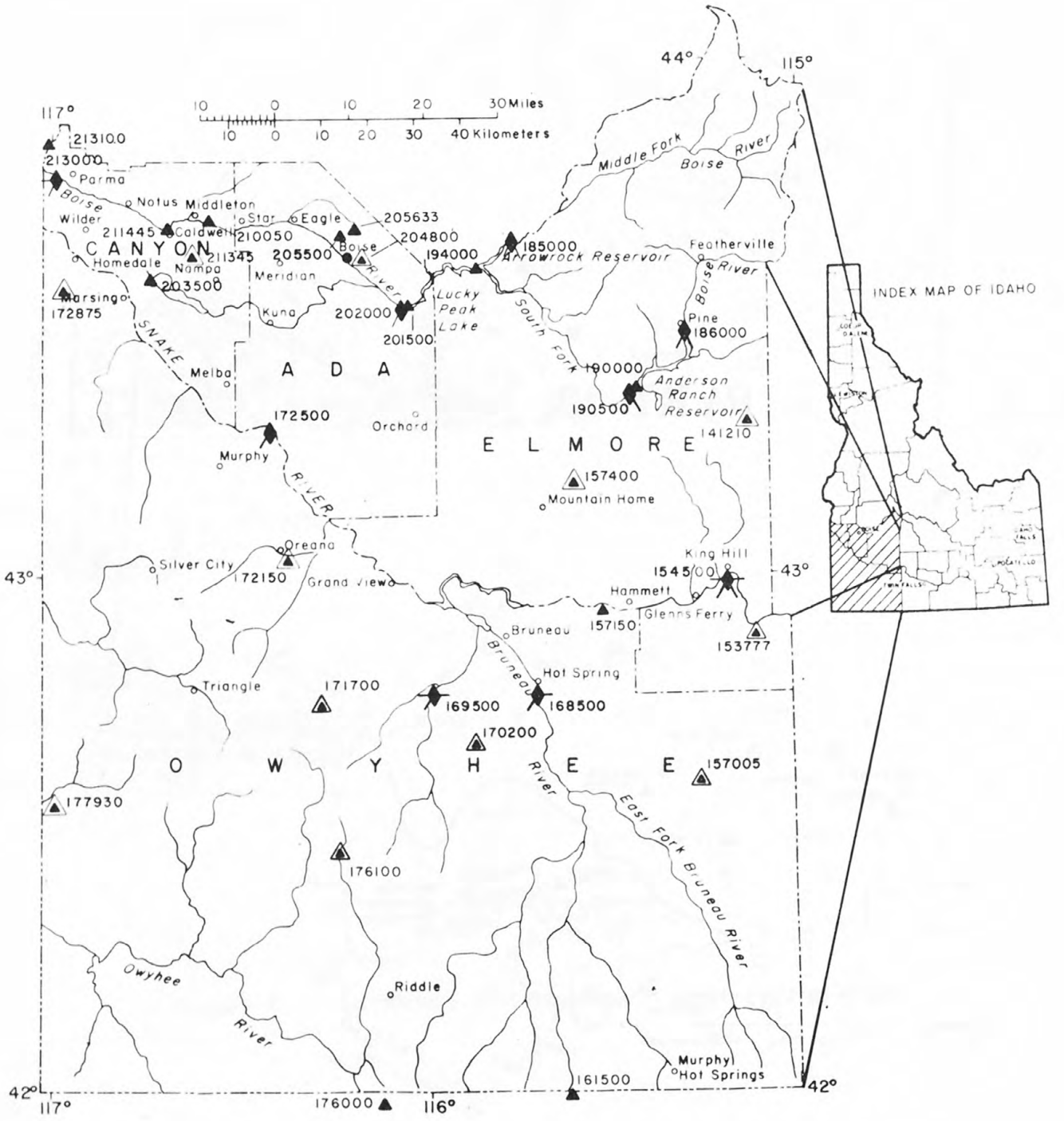


Figure 6. -- Locations of data sites in southwest Idaho.

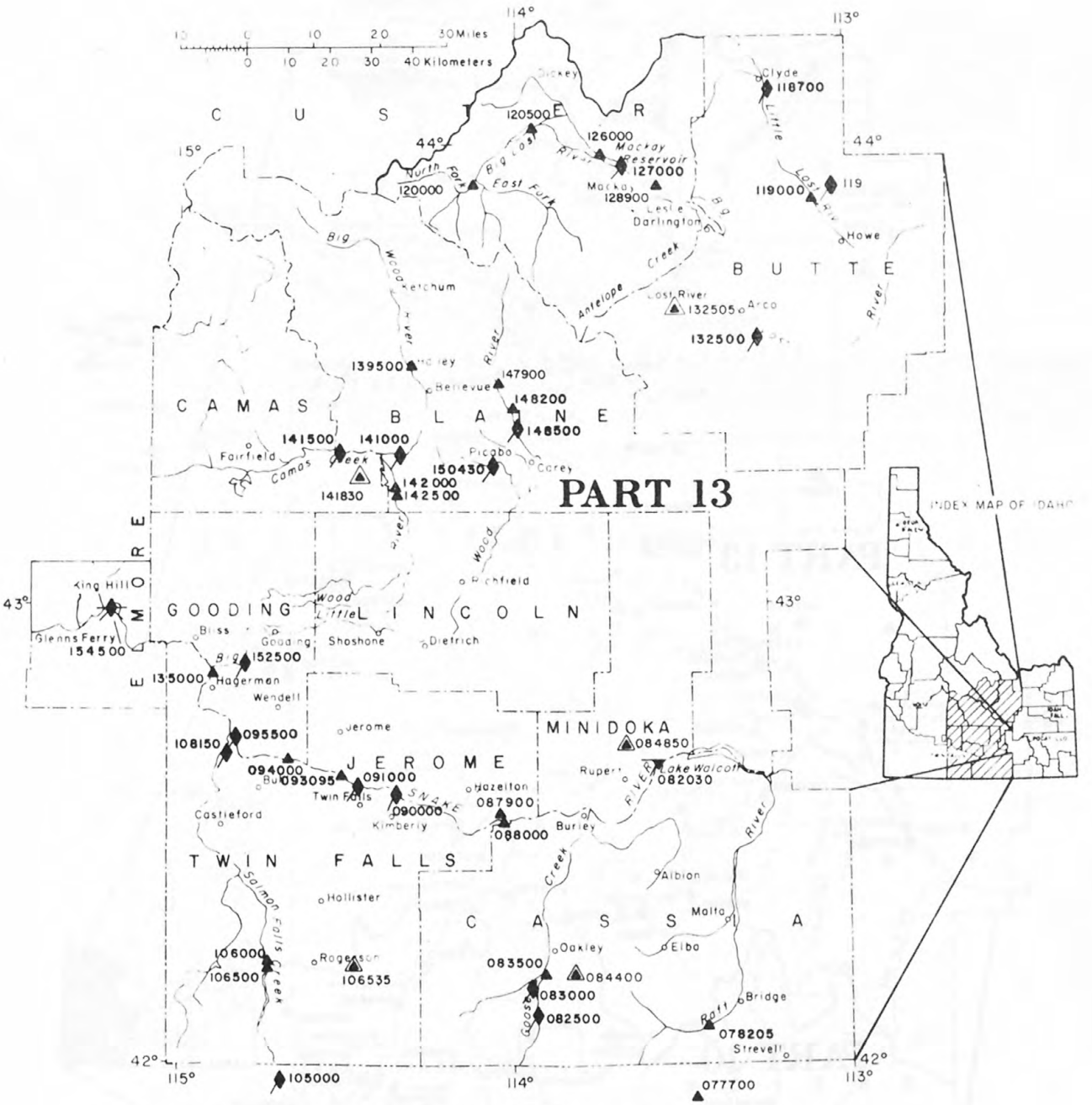


Figure 7. -- Locations of data sites in south-central Idaho.

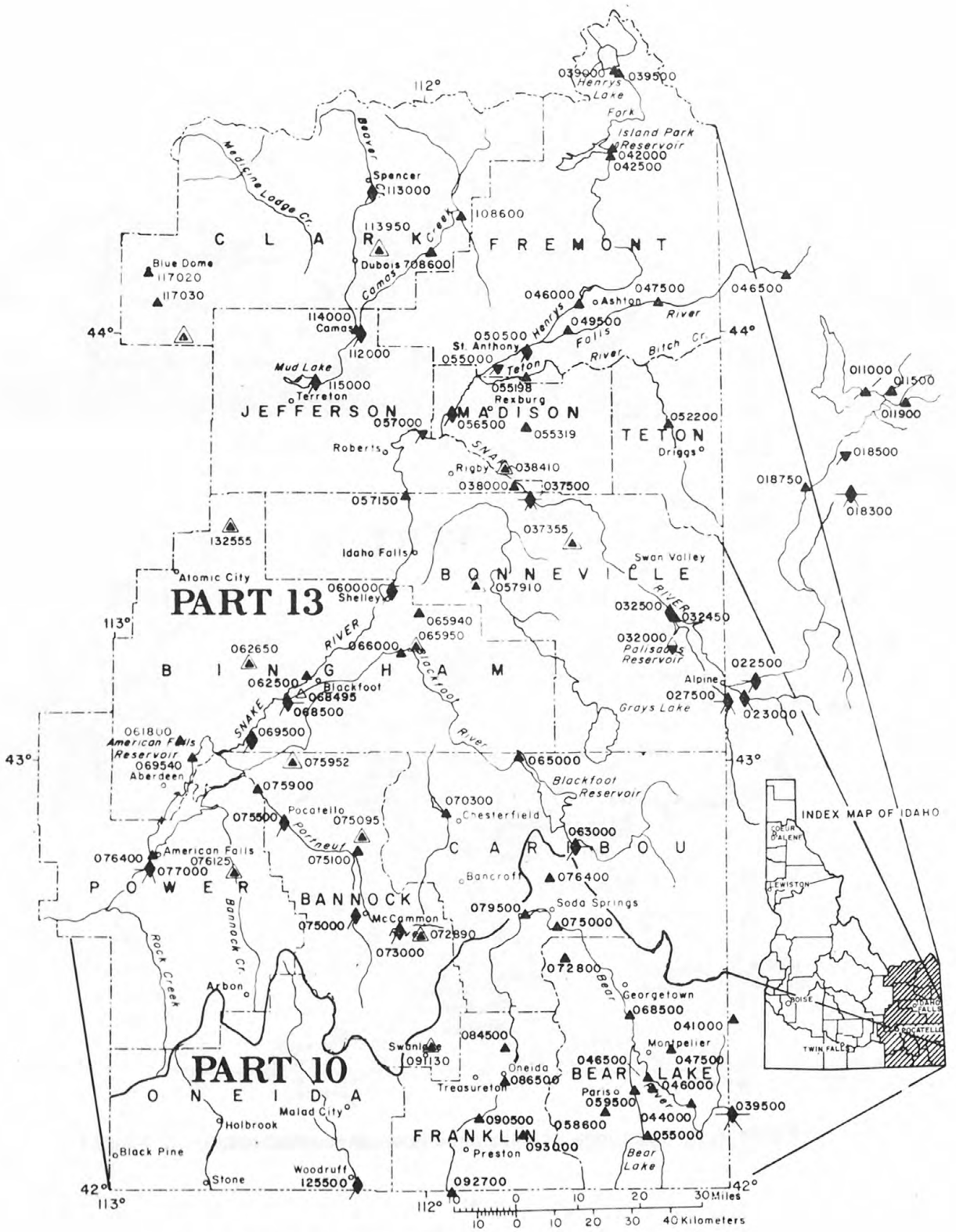


Figure 8. -- Locations of data sites in southeast Idaho.