

United States Geological Survey Programs in Idaho



The USGS provides maps, reports, and information to help others meet their needs to manage, develop, and protect America's water, energy, mineral, and land resources. We help find natural resources needed to build tomorrow, and supply scientific understanding needed to help minimize or mitigate the effects of natural hazards and environmental damage caused by human activities. The results of our efforts touch the daily lives of almost every American.

Heavy-Element Contamination in the Coeur d'Alene River Valley

The Coeur d'Alene River valley in northern Idaho (fig. 1) has been adversely affected by smelter emissions and mine tailings derived from over a century of mining for lead, zinc, and silver. Toxic metals have spread downstream and contaminated sediment from the mining area to Coeur d'Alene Lake, a distance of about 40 miles. In 1986, the U.S. Environmental Protection Agency declared a Superfund site (NPL site No. 107) on a 21-square-mile area around the smelter complex. However, public pressure is building for additional action to remediate contaminated areas outside the Superfund site. U. S. Geological Survey (USGS) research in the Coeur d'Alene River valley is focused on the processes that control the distribution and bioavailability of heavy elements in contaminated sediments. USGS scientists are mapping the distribution and heavy-element content of contaminated stream and flood plain sediments in the valley and studying processes that affect the erosion and redeposition of these sediments. The presence of a large volume of contaminated sediment stored in the river downstream from Cataldo and frequent flooding in this reach strongly indicate that contaminated sedi-

ments are likely to be exposed and transported downstream to Coeur d'Alene Lake for years into the future.

National Water-Quality Assessment Program

The long-term goals of the National Water-Quality Assessment (NAWQA) Program are to describe status and trends in the quality of a large, representative part of the Nation's surface- and ground-water resources and to identify the natural and human factors that affect their quality. The NAWQA Program is designed to produce a wealth of water-quality information that can be useful to policy makers and water managers at the local, State, and national levels.

One NAWQA Program study, the upper Snake River Basin, has been underway in Idaho since 1991 (fig. 2). Investigations conducted for this study address these specific water-quality issues:

- potential surface-water contamination from elevated concentrations of sediments and nutrients, low dissolved-oxygen concentrations, and elevated water temperature associated with agriculture, grazing, and aquaculture that adversely affect living conditions for fish and other aquatic animals and plants;
- potential ground-water contamina-

Index of Subjects

Heavy-Element Contamination in the Coeur d'Alene River Valley
National Water-Quality Assessment Program
Regional Aquifer-System Analysis Program
Environmental Remediation at the Blackbird Mine
Natural Hazards and Disposal of Radioactive and Chemical Waste at the Idaho National Engineering Laboratory
Eastside Ecosystem Management Project
Geology of the Challis, Payette and Nez Perce National Forest
Mineral Resource Evaluations and the Age of Gold Deposits
Bruneau Hot Springs Snail
National Mapping Program
Collection of Hydrologic Data
Earth Observation Data
Cooperative Programs

tion from fertilizers and pesticides associated with agricultural activities in intensively irrigated areas which could threaten drinking-water supplies; and

- potential surface- and ground-water contamination from human wastes associated with recreational activities in the upper part of the basin which could degrade water quality downstream.

Another NAWQA Program study, the Northern Rocky Mountains Intermontane Basins, is planned for 1997 (fig. 2). Mining operations that began over a century ago in this part of the State have caused serious degradation of the water quality in rivers and lakes, including Coeur d'Alene Lake, a popular vacation destination known for its scenic beauty and trophy chinook salmon and northern pike.

Communication and coordination among the USGS and water-management and other water-resource agencies are key components of the program studies in the State. Program findings will be distributed in a variety of reports to local, State, and Federal agencies as results become available.

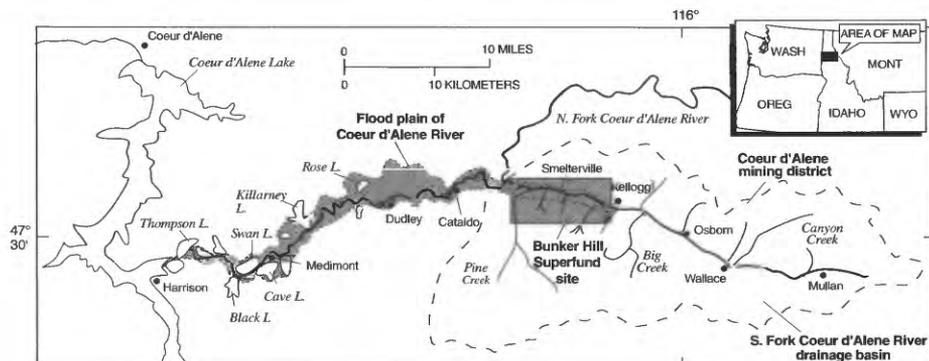


Figure 1. Map of Coeur d'Alene area showing the Coeur d'Alene mining district, Coeur d'Alene River, Bunker Hill Superfund site, and other significant features.

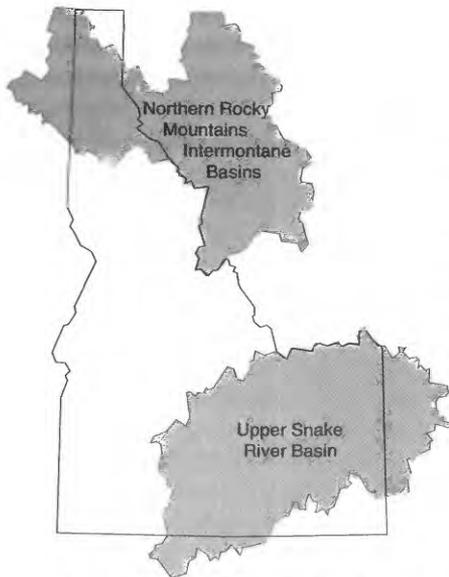


Figure 2. NAWQA study units in Idaho.

Regional Aquifer-System Analysis Program

The Regional Aquifer-System Analysis (RASA) Program was created by congressional mandate to develop quantitative appraisals of the major ground-water systems of the United States. The RASA Program represents a systematic effort to study a number of the Nation's most important aquifer systems, which in aggregate underlie much of the country and which represent an important component of the Nation's total water supply. The broad objectives for the study of each system are to assemble geologic, hydrologic, and geochemical information, to analyze and develop an understanding of the system, and to develop predictive capabilities that contribute to the effective management of that system.

Activities for the two RASA studies in Idaho, the Snake River Plain and Northern Rocky Mountains intermontane basins, were completed in 1994. Data, computer models, and interpretations from the Snake River Plain RASA (fig. 3) have become the benchmark of information that State water-management agencies use to understand the hydrology of the most productive agricultural area in Idaho. Historical records from diverse sources and new information collected by the USGS were analyzed to describe systematically, for the first time in many cases, the ground-water hydrology of the Northern Rocky Mountains intermontane basins.

Environmental Remediation at the Blackbird Mine

Metal-rich acid mine drainage at the inactive Blackbird cobalt-copper mine, a proposed Superfund site, has led Idaho to bring suit in Federal court against the mining companies currently holding the property. The mine drainage has potential adverse effects on wetlands, riparian habitat, and migrating salmon and other androgynous fish in a major tributary to the Federally designated "wild-and-scenic" Salmon River. The USGS has been studying the cobalt resources, both at Blackbird and in the surrounding region, and is now providing critical geologic and geochemical information and expertise directly applicable to cleanup of this site and resolution of the ongoing litigation. This information is being used by:

- State and Federal trustees of public lands surrounding the mine to evaluate site standards and remediation;
- Department of Justice to pursue legal issues;
- U.S. Environmental Protection Agency to oversee remediation at the proposed Superfund site; and
- consulting firms who have been hired by the involved mining companies and some government agencies to conduct technical studies relevant to litigation and remediation.

In addition, knowledge of the Blackbird deposit, the only primary source of cobalt in the United States, is essential for long-range national planning for strategic

mineral needs. The USGS studies of the Yellowjacket Formation and related rocks and mineral deposits are being used extensively for exploration by domestic mining companies.

Natural Hazards and Disposal of Radioactive and Chemical Waste at the Idaho National Engineering Laboratory

Contractors and subcontractors to the U.S. Department of Energy operate facilities at the Idaho National Engineering Laboratory (INEL) that process and store solid and liquid radioactive and chemical wastes generated onsite and in other States. The USGS has conducted regional and local surface geologic mapping, subsurface stratigraphic, isotopic, and paleomagnetic studies that are used to help develop hazard assessments for potential threats from earthquakes and volcanic eruptions for the entire INEL (fig. 3) site and for specific reactor and radioactive-waste storage facilities. A study currently is underway to delineate the possible extent, volume, and velocity of floods in relation to these processing and storage facilities.

Injection wells were used regularly until 1984 and infiltration ponds continue to be used at the INEL to dispose of wastewater that contains radioactive and chemical contaminants. These contaminants have been detected in water samples collected from the eastern Snake River Plain aquifer system. Water from the aquifer system downgradient from the INEL is used by tens of thousands of peo-

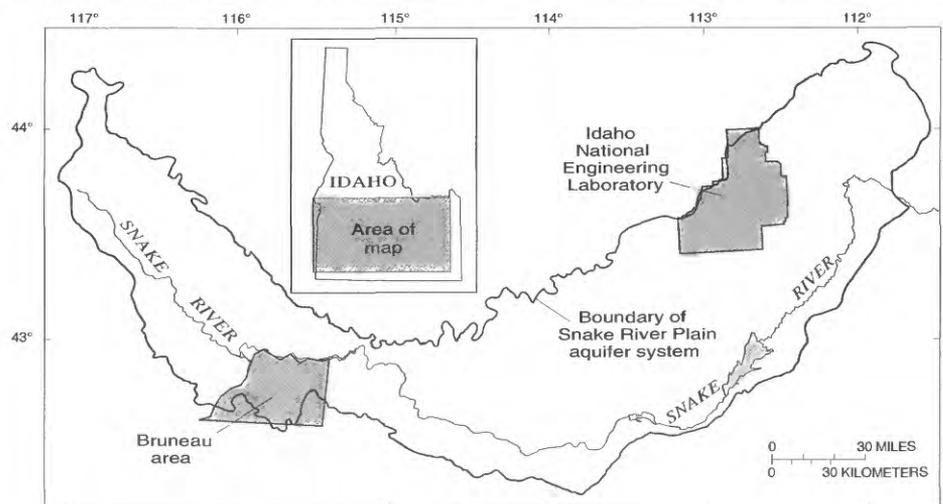


Figure 3. Selected study areas in southern Idaho.

ple for drinking, irrigation, and aquaculture. An extensive network is maintained by the USGS to collect geohydrologic, hydraulic, geochemical, and radioisotope data. Temporal and spatial distribution of radioactive and chemical contaminants and processes that control their concentrations and migration rates are described in numerous USGS reports. According to a recently published report, concentrations of iodine-129, a fission product disposed in wastewater, were used to calculate an average ground-water flow velocity that is at least 6 feet per day. The continuing USGS program at the INEL provides information needed to alert the public to prevailing water-quality conditions in the aquifer system and to support the current and planned geohydrologic research that could help water-resource managers resolve issues that concern the migration and disposition of radioactive and chemical wastes.

Eastside Ecosystem Management Project

The USGS is providing earth-science information that will be used in the development of a land-management framework and a broad scientific assessment for the Eastside Ecosystem Management Project, lead by the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM). This project applies ecological, economic, social, and managerial principles to a seven-State region of the interior Columbia River Basin. USGS scientific studies integrate geology and geologic processes into landscape modeling, predict areas of soil erosion, assess the potential for undiscovered energy and mineral resources, provide information for assessment of economic and social effects of major earthquakes or volcanic eruptions, illustrate variations in abundance of earth materials that affect ecosystem health, and help develop maps showing potential habitat for various species. These studies contribute to project goals to sustain or restore ecosystem integrity and to assure sustainability of desired conditions, uses, products, values, and services.

Geology of the Challis, Payette, and Nez Perce National Forests

The USGS is conducting studies of

national forests to provide geologic maps of mineral resources and, where needed, environmental evaluations. Recently completed USGS studies in the Challis National Forest provided a geologic map and resource information that will give the USFS an accurate gage of where gold exploration and possible development could occur in the near future, such as at Grouse Creek. Forest managers in the Payette and Nez Perce National Forests, as in other forests nationwide, are finding that adequate geologic maps are a basic necessity for making decisions regarding such needs as:

- slope stability for the location of roads and long-term structures;
- soil studies, particularly as they affect vegetation and wildlife habitat;
- ecological problems induced by soils and bedrock with naturally occurring high levels of toxic elements;
- fish habitat, where gravel eroded from different bedrock types greatly affects viable spawning beds or where the bedrock controls stream water chemistry and, hence, the ability of fish to survive; and
- evaluation and treatment of mine drainage problems created both by acid mine drainage and by unacceptably high levels of silt and sand washing downstream.

Mineral Resource Evaluations and the Age of Gold Deposits

Recent USGS studies using state-of-the-art argon isotope methods to determine the age of gold deposits are of considerable interest to Federal land managers and to the domestic mining industry. The Beartrack gold deposit, whose development is currently playing a major role in the economy of Lemhi County, Idaho, is late Cretaceous in age (about 68 million years old). Geologic mapping indicates that late Cretaceous granitic bedrock, which could host other such deposits, is common in Idaho. Because these rocks with potential for undiscovered gold deposits are widespread, private industries could expand their exploration programs, and land-use managers probably will be faced with

decisions regarding road building, drill location, mine permitting, and environmental evaluations.

Bruneau Hot Springs Snail

Ground-water withdrawals for irrigation from a regional geothermal aquifer have lowered hydraulic heads in the aquifer throughout the 600-square-mile Bruneau study area in southwestern Idaho. Irrigators seek to withdraw additional ground water to develop more agricultural land. Habitat for the Bruneau Hot Springs snail is dependent on geothermal springs adjacent to area streams. The continuation of documented declines in spring flow associated with declining hydraulic heads could lead to the snail's extinction. Several public agencies, the general public, and Idaho's congressional delegation have expressed widely divergent perspectives about the future plight of the snail.

The USGS, in cooperation with the U.S. Fish and Wildlife Service, conducted a study in the Bruneau area from 1987 to 1993. The hydraulic head/spring discharge relation that was developed from data collected during the study indicated that the measured decline in spring discharge of 2,400 gallons per minute between 1964 and 1992 corresponded to a decline in hydraulic head of 34 feet near the springs, an amount comparable to declines measured elsewhere in the area. Results from this study are being used in negotiations between the U.S. Fish and Wildlife Service and State water-management agencies to develop a water-management plan that includes tracking hydraulic-head declines near the springs to protect habitat for the Bruneau Hot Springs snail as an alternative to including this animal on the Endangered Species list.

National Mapping Program

Among the most popular and versatile products of the USGS are its 1:24,000-scale topographic maps (1 inch on the map represents 2,000 feet on the ground). These maps depict basic natural and cultural features of the landscape, such as lakes and streams, highways and railroads, boundaries, and geographic names. Contour lines are used to depict the elevation and shape of terrain. The entire State is covered by 1,715 maps at this scale,

which is useful for civil engineering, land-use planning, natural-resource monitoring, and other technical applications. These maps have long been favorites with the general public for outdoor uses, including hiking, camping, exploring, and back-country fishing expeditions.

The Idaho Geographic Information Advisory Committee has made it a priority to have complete state coverage with computerized (digital) mapping photos that were obtained via the National Aerial Photography Program. USGS has worked with BLM and Idaho Transportation Department in recent years to produce digital data throughout the State. In addition, much of Idaho is in national forest lands where the USFS also provides digital data sets. Between the USGS and the USFS, most of Idaho has digital cov-

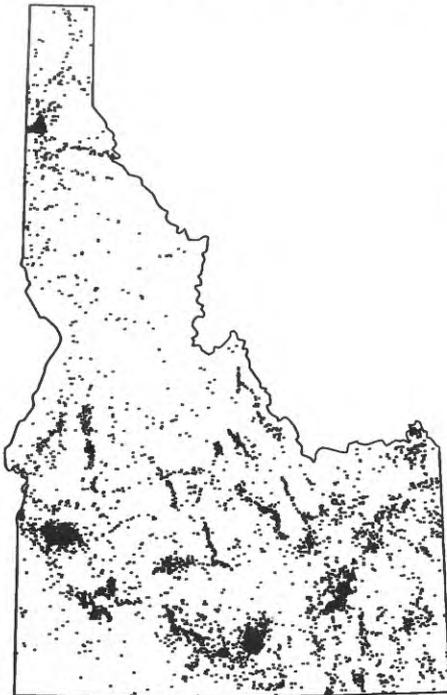


Figure 4. Water-quality data-collection sites in Idaho.

erage from primary printed map layers which include elevation, transportation, hydrography, Public Land Survey System, and boundaries.

Digital data are being used by many Federal and State agencies, and county, city, utility, and academic offices throughout the state. The Idaho Department of Lands uses the digital data in its geographic information system to manage state lands. Similarly, BLM uses the data for resources management on Federal lands. The Idaho Transportation Department uses the digital data to analyze and plan transportation corridors within the State.

Collection of Hydrologic Data

Idaho has six major rivers: the Bear, Clearwater, Kootenai, Pend Oreille, Salmon, Snake, and Spokane. These rivers supply surface water for agriculture, industry, hydroelectric-power generation, recreation, fish and wildlife habitat, and other uses within Idaho and in downstream States. Aquifers supply ground water for these same uses in many parts of the State. Naturally hot water from geothermal aquifers is also used for space heating. The USGS, in cooperation with more than 20 local, State, and Federal agencies, collects surface-water, ground-water, and (or) water-quality data at sites throughout the State (fig. 4). These data are critical for day-to-day administration and management of water resources, for determining the extent and severity of droughts, for characterizing and predicting conditions during floods, and for monitoring the effects of human activities on streamflow, ground-water supply, and water quality. The data also are essential to interpretive studies that provide infor-

mation for making decisions about water issues that affect millions of people.

Earth Observation Data

Through its Earth Resources Observation Systems Data Center near Sioux Falls, South Dakota, the USGS distributes a variety of aerial photographs and satellite image data products that cover the entire State of Idaho. Mapping photographs of some sites go back at least 40 years. Satellite images can be used to study changes in regional landscapes dating from 1972.

Cooperative Programs

The USGS cooperates with more than 50 local, State, and Federal agencies in Idaho. Cooperators include county and municipal public works departments, public health agencies, natural-resource agencies, water and sanitation districts, other Federal agencies, tribal governments, and many more. Cooperative activities include water-resources data collection, interpretive water-availability and water-quality studies, mineral-resource assessments, and mapping. When local and State agencies are involved, activities typically are funded on a matching-funds basis. In addition to agencies already mentioned, the USGS cooperates with the Idaho Department of Water Resources, the Idaho Department of Health and Welfare, Southwest Irrigation District, U.S. Army Corps of Engineers, and Bureau of Reclamation, to name only a few.

The USGS provides support to the Idaho Water Resources Research Institute, which conducts a program of research, education, and information and technology transfer.

For more information contact any of the following:

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Denver Federal Center, Mail Stop 510
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(303) 236-5825

For geologic information
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Menlo Park, California 94025
(415) 329-5101

National Earthquake Information Center
Denver Federal Center, Mail Stop 967
Denver, Colorado 80225
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Additional earth science information can be found by accessing the USGS "Home Page" on the World Wide Web at "<http://www.usgs.gov>".

For more information on all USGS reports and products (including maps, images, and computerized data), call 1-800-USA-MAPS.