

Idaho

The U.S. Geological Survey (USGS) has been assessing, mapping, and reporting on Idaho's earth resources for more than 100 years. Ongoing USGS programs in Idaho include geochemical and biological investigations, topographic and geologic mapping, surface- and ground-water data collection, and mineral exploration (fig. 1). The USGS contributes to the health, safety, and economic well-being of Idaho's citizens through each of these programs and through cooperative efforts with local, State, and other Federal agencies, as well as universities and other public organizations.

Biological Resources

The USGS Forest and Rangeland Ecosystem Science Center is headquartered in Oregon but has field stations in several Western States, including the USGS Snake River Field Station in Boise. The station's research staff maintains strong cooperative ties with Boise State University, which serves as the field station's host institution. Other important partners include the Bureau of Land Management (BLM), the Idaho Department of Fish and Game, Idaho State University, the University of Idaho, the U.S. Fish and Wildlife Service-Boise Office, and The Peregrine Fund, Inc.

The USGS has played a major role during the last 10 years in assessing the effects of military training, wildfires, and livestock grazing on a National Conservation Area for birds of prey. Birds of prey, also known as raptors, include hawks, eagles, and

falcons (fig. 2). The Snake River Birds of Prey National Conservation Area in southwestern Idaho consists of 481,855 acres (753 square miles) of public lands managed by the BLM. This Conservation Area, which includes an 80-mile stretch of the Snake River Canyon and the surrounding shrub-steppe rangeland, supports one of the highest densities of nesting raptors in the world. Parts

of it continue to be used for National Guard training and livestock grazing. These activities, combined with invasions of nonnative plants such as cheatgrass, have altered the pattern of wildfires in the Conservation Area. USGS researchers have found that areas that had burned since 1980 were associated with increased dominance by exotic annual vegetation, which is highly susceptible to fire and drought.

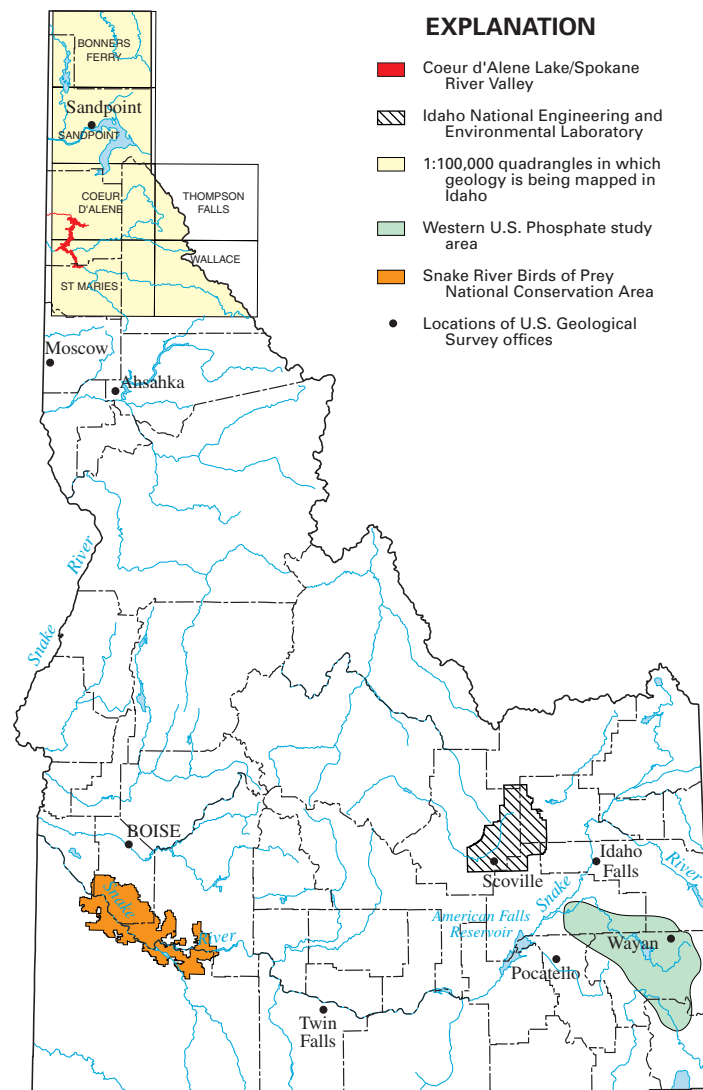


Figure 1. USGS activities extend throughout Idaho and cover a broad range of topics.



Figure 2. A golden eagle returns to its nest on the edge of a cliff in the Snake River Birds of Prey National Conservation Area, Idaho.

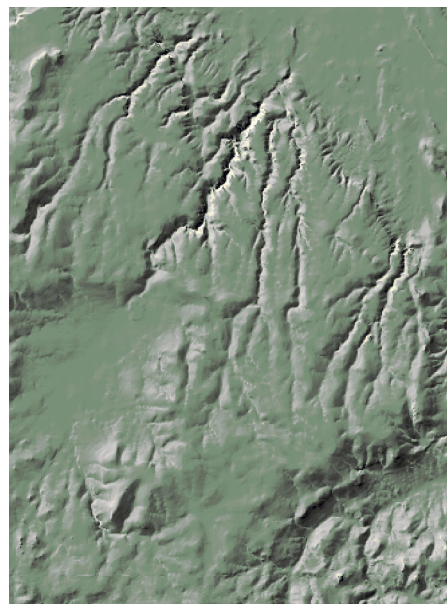
Loss of shrublands and larger fluctuations in habitat conditions can seriously influence prey and raptor populations.

The USGS Snake River Field Station has an extensive collection of literature on birds of prey, which is housed at the station's Richard R. Olendorff Memorial Library. The Raptor Information System, a database describing the library's collection, is accessible on the World Wide Web at <http://www.ris.idbsu.edu>. Because of extensive capability with raptor research, USGS staff commonly responds to national requests for information and other forms of assistance. The coordination of a national survey of bald eagles exemplifies this type of assistance. Nationwide counts of bald eagles were coordinated by the National Wildlife Federation from 1979 until 1992, when the Snake River Field Station assumed responsibility for overseeing this activity. The objective of the survey is to determine long-term trends in wintering populations of bald eagles. In addition to coordinating ongoing surveys, the USGS is analyzing national trend data collected since 1986 to assess their usefulness for monitoring regional and national population trends.

Mapping Partnerships

The National Aerial Photography Program (NAPP) began in 1987. NAPP photographs taken at an altitude of 20,000 feet above the land surface are captured on 9- by 9-inch film, and have a base scale of 1:40,000 (1 inch on the photograph equals about 0.6 mile on the Earth's surface). Federal agencies and State Governments contribute to the NAPP program. Most of Idaho had new NAPP imagery taken during the summer of 1998.

The USGS is working with several Federal and State agencies to produce Digital Orthophoto Quadrangles (DOQ's) of Idaho. DOQ's are scanned aerial photographs from which distortion and displacements caused by the camera orientation and terrain have been removed. A DOQ may be loaded into a geographic information system and used with other data for analysis and geographic applications. The Natural Resources Conservation Service uses DOQ's for mapping soils, delineating agricultural field boundaries, collecting and updating land-use and land-cover data, and other natural-resource mapping.



The USGS works with several State and Federal agencies in Idaho to upgrade all Level 1 Digital Elevation Model (DEM) data in the State to improved level 2 DEM's. DEM's are sampled arrays of regularly spaced elevations used for depicting topographic relief of the landscape (fig. 3). USGS DEM's support a wide variety of natural-resource management and environmental-monitoring projects in Idaho, including ground- and surface-water quality assessment and management, and Federal water rights processing. The completion of the upgrade is scheduled for September 1999.

The USGS completed coverage of digital raster graphics (DRG) data for Idaho from the 1:24,000-scale topographic maps. These data contain the same map features depicted on 1:24,000-scale topographic maps. The DRG's are useful for civil engineering, land-use planning, natural-resource monitoring, and other technical and scientific applications. The DRG data are available online from the Idaho Geospatial Data Center (IGDC) site at <http://geolibrary.uidaho.edu>. The IGDC is a digital library for public domain

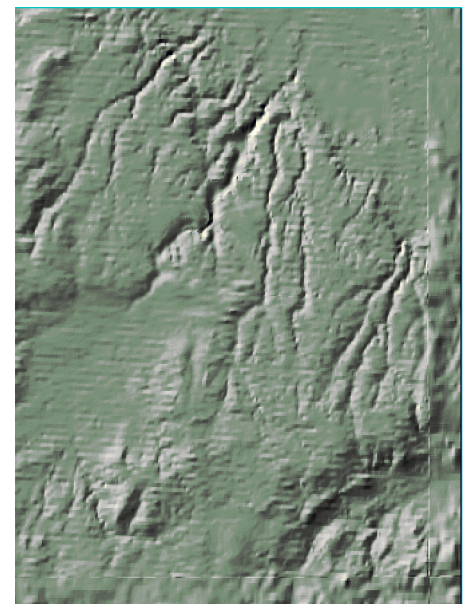


Figure 3. New Level 2 DEM's (left) result in superior image quality compared with Level 1 DEM's (right).

geographic data of Idaho that is accessible free-of-charge to any group or person in or outside of the State.

Multipurpose Geologic Mapping

The Northwest Forest Lands Project (NWFLP) is a partnership among the USGS, the Idaho Geological Survey, and other State and Federal entities to compile digital geologic maps of the Sandpoint 1:250,000 and Bonners Ferry 1:100,000 quadrangles, and to produce new digital geologic maps of the Wallace, Thompson Falls, and St. Maries 1:100,000 quadrangles. The maps and related products depict lithologic, geochemical, nutrient, and physical attributes of the land, and are intended to be used as tools for mineral-resource analysis, geochemical and forest-health studies, stream-condition and fish-habitat assessment, hazards mapping, and other applications. The new Headwaters Project expands on the work of the NWFLP to provide additional digital geologic maps at 1:100,000 and 1:250,000 scale, including new mapping in the Coeur d'Alene 1:100,000 scale quadrangle and in the Beaverhead National Forest. The project also will provide up-to-date inventories and status of significant mineral deposits, document ongoing and recent historical exploration, update and classify mineral-deposit records, and develop mining-claim histories based on the Public Land Survey System. These interim products may be used with the new digital geologic maps and with existing geophysical, geochemical, and other data to provide a 10- to 20-year forecast of mineral exploration and development on Federal lands. The U.S. Forest Service may use this information to help guide their Revised Forest Plans, which are due by 2001.

Minerals and the Environment

Western U.S. Phosphate Project in Idaho

The Western U.S. Phosphate project will characterize the extent of phosphate mineralization within the Western U.S. Phosphate Field and the impact of its presence and development on the environment, with emphasis in southeast Idaho. The USGS is working with the BLM, the U.S. Forest Service, the Idaho Department of Environmental Quality, the Idaho Department of Lands, and the mining industry to enhance the ability to evaluate additional phosphate mineralization and to anticipate environmental hazards, such as selenium toxicity, that are associated with the existence and societal use of the phosphate. This project is expected to provide:

- New information about the distribution, migration pathways, and bioavailability of selenium, heavy metals, and other potentially toxic elements associated with the phosphate mineralization;
- Improved assessment methods, models, and tools for evaluating this type of phosphate deposit;
- Knowledge of the role of weathering in phosphate ore formation and trace-element distribution;
- New information about the effects of mining and ground disturbance and of potentially toxic elements on plants and animals; and
- Improved mining, waste-handling, and reclamation strategies.

Coeur d'Alene River Valley

In 1998, the U.S. Environmental Protection Agency (EPA) began a Remedial Investigation/Feasibility

Study of the entire Coeur d'Alene-Spokane River drainage to assess the potential risks to human health and the environment posed by mining-related metal enrichments. The USGS is working with the EPA to determine the nature and extent of mine waste materials in the basin and the geochemical, hydrologic, and sedimentary processes that cause them to spread throughout the environment. These studies are intended to guide future alleviation of adverse environmental effects of past mining and ore processing. Two important components of the study are:

- An intensive streamflow and water-quality monitoring program launched in October 1998. The USGS is measuring streamflow and metal (cadmium, lead, and zinc) and nutrient (phosphorus and nitrogen) concentrations at 24 sites in the Spokane River Basin. This information will be used to calculate the total annual amount of metals and nutrients being carried into and out of Coeur d'Alene Lake.
- Geologic maps showing the distribution and types of metal-enriched flood-plain sediments in the valley of the South Fork Coeur d'Alene River. Most of these sediments were deposited before 1930, and residential and commercial development and large interstate highway embankments have been steadily encroaching upon the contaminated flood-plain areas. Because the flood-plain sediments are believed to contribute much of the dissolved-metal load to surface water in the South Fork, precise mapping of these deposits is important. Additional studies include development of descriptive models for lead-zinc-silver veins of the Coeur d'Alene mining district.



Figure 4. A USGS hydrologist collecting flood-flow data on the Snake River in eastern Idaho. (Photograph by Randy Hayes, Idaho Falls Post Register.)

Statewide Hydrologic and Water-Quality Data

When Idaho experienced widespread and severe flooding during the winter and spring of 1997, the USGS assisted agencies directly involved in flood emergency response and mitigation (fig. 4). The realtime streamgaging network, accessible through the World Wide Web at <http://idaho.usgs.gov/usgs/water.html>, provided early warnings to the National Weather Service, the Idaho Bureau of Disaster Services, County Emergency Coordinators, and the public, and helped reduce the loss of lives and property as rivers crested throughout the State. Followup flood-mitigation efforts by the Federal Emergency Management Agency, the U.S. Army Corps of Engineers, and the Idaho Bureau of Disaster Services also were supported by the USGS.

The USGS is working with the Idaho Department of Water Resources (IDWR) on a statewide ground-water

quality monitoring program, one of the most comprehensive in the Nation. Every year, water samples are collected from 400 randomly selected wells across the State. The samples are analyzed for water-quality constituents, including bacteria, major ions, nutrients, radionuclides, and pesticides. These water-quality data are maintained by the IDWR in the Environmental Data Management System and by the USGS in its water-quality database. USGS scientists used these data to develop a map that shows areas in the eastern Snake River Plain aquifer where ground water is most susceptible to contamination by nitrates. This map was constructed by identifying the correlations between nitrate in ground water and factors such as soils, land use, depth to the water table, and geology. The same method is being used to develop contamination susceptibility maps for pesticides. These maps are intended to help resource-protection agencies focus on areas of greatest potential for contamination.

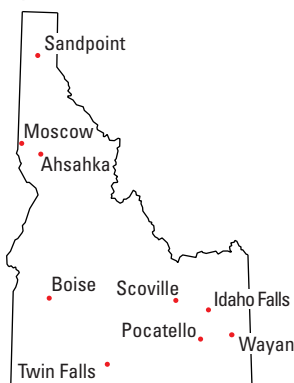
The Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL), operated by the U.S. Department of Energy, is located on the eastern

Snake River Plain in southeastern Idaho. Facilities at the INEEL were used for developing peacetime atomic energy applications, nuclear safety research, defense programs, and advanced energy concepts. Wastewater containing radiochemical and chemical wastes generated at these facilities was discharged to infiltration ponds and disposal wells beginning in 1952. Wastewater disposal has resulted in detectable concentrations of waste constituents in water from the Snake River Plain aquifer system that underlies the INEEL. Water from the aquifer system near the INEEL is used extensively for drinking, irrigation, and aquaculture. The USGS has monitored hydrologic conditions in the Snake River Plain aquifer at the INEEL since the early 1950's. A large-scale, multiphase project began in 1987 to determine and describe the fate and transport of radioactive and chemical constituents in the aquifer. In addition, the USGS began a floodplain study in 1994 to delineate the possible extent, volume, and velocity of floods along the Big Lost River near INEEL processing and storage facilities.

USGS office locations

The USGS has 119 employees in Idaho



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