

Program Highlights

The Idaho Geological Survey is the lead agency for collecting and disseminating geologic information and mineral data in the state. In addition to its main office in Moscow at the University of Idaho, the Survey has branch offices in Boise at Boise State University and in Pocatello at Idaho State University. Staff geologists conduct applied research with a strong emphasis on producing geologic maps and providing technical and general information about Idaho's geologic setting, earth resources, and geologic hazards. Externally funded projects enhance this research.

Annual Budget and Personnel. The State and University again experienced budget difficulties during the past year (FY 2005) but the University administration supported the Survey in replacing a faculty research geologist and reclaiming the part of a geologist position previously moved to an academic unit. The budget cuts and hold-backs of the last several years have reduced the budget base and continue to impact the operation of the Idaho Geological Survey in research, public service, and education. This year marked the second since a new enabling act placed the Survey with the University Research Office under the Vice President for Research. This reorganization has improved access to the administration and communication between the Survey and other research units, institutes, and cooperative programs.

Geologic Mapping and Related Research. Central to the Survey's applied research is geologic mapping and related topical studies that together form the technical content of digital geologic maps, databases, reports, and publications. Since 1985 the Survey has been conducting detailed geologic mapping in selected urban-impact areas of Idaho. The Survey participates in the U.S. Geological Survey's STATEMAP

program, which since 1990 has augmented geologic mapping in urban areas and development-impact corridors throughout Idaho. The Idaho Geologic Mapping Advisory Committee assists the Survey by assessing Idaho's mapping needs and addressing long-term plans for geologic mapping. During the year STATEMAP project geologists mapped seventeen 7.5-minute quadrangles. The Survey cooperated with Utah State University in EDMAP student geologic mapping of three quadrangles in south-central Idaho.

Geologic Map Production. The Survey's digital mapping and GIS laboratory performs services ranging from digital cartography to spatial data management. The lab continues to compile geology around the state in a geologic map database in addition to the ongoing work of producing new geologic maps. Eighteen new geologic maps were published this year. Most of these are available as print-on-demand color maps. All are available for free online.

The Survey participates in the North American Data Model Steering Committee to help make guidelines for digital-legend design for geologic maps. A Digital Geologic Map series is a new publication category for Idaho in which four new data sets were published during the fiscal year.

Geologic Hazards. As the state's population has grown and disaster losses have increased, the Survey devotes increasing amounts of time with geologic hazard mitigation. The agency works in close cooperation with the Idaho Bureau of Homeland Security both formally and informally to mitigate, respond to, and recover from the impacts of floods, fires, landslides, and earthquakes, and to provide technical analysis when needed. New surficial geologic maps are

being applied in a project interpreting geologic hazards in Clearwater, Kootenai, and Nez Perce counties.

As an active participant in the Western States Seismic Policy Council (WSSPC) and Pacific Northwest and Intermountain regional planning groups of the Advanced National Seismic System (ANSS), the Survey is involved in organizing seismic network operators and planning several hazard mitigation projects. The Survey is leading a state seismic network clearinghouse effort based on the EARTHWORM system in cooperation with the Idaho Bureau of Homeland Security, and participates at regional clearinghouse planning functions with the other basin-and-range states in WSSPC. Idaho was chosen as the host state for the upcoming 2005 annual meeting of WSSPC.

Mitigation of natural hazards is a major component of the Survey's annual summer workshop for teachers. This year the workshop was held at Cascade in the seismically active Long Valley area. Training activities provided knowledge of Idaho's tectonic setting, school safety, and disaster response. Workshop participants developed classroom activities for geologic-hazard education and for interpretive campfire programs for Cascade State Park.

Hydrogeology. The Survey continues to work to better understand the geologic controls on ground-water flow and recharge and the distribution and transport of ground-water contaminants. Results of the research are provided to end-users for ground-water resource development and protection. To accomplish this, the Survey cooperates with other state and federal agencies, university programs, and water-user groups throughout Idaho. Research applications include modeling of aquifer stratigraphy, data

analysis and mapping of ground-water quality, and assessing groundwater vulnerability to septic sewage disposal through mapping of surface geological and soils data and subsurface hydrogeologic information.

In collaboration with the USGS-Idaho National Laboratory Project Office, the Survey is conducting statistical analysis and three-dimensional stratigraphic modeling of sedimentary interbeds based on USGS well databases. This effort is in support of the USGS's development of a subregional-scale ground-water flow model and is also helping to advance basic geologic knowledge of the sedimentary and volcanic depositional setting of the Eastern Snake River Plain.

The Survey has developed and applied a new group of spatial-temporal geostatistical tools for analyzing patterns of change in both water quality and ground water storage. These practical approaches improve the effectiveness of monitoring network sampling designs and are being successfully applied in the analysis of other state ground water monitoring databases.

A ten-year evaluation of ground-water quality in the lower Portneuf River valley, has provided the first hard evidence of the magnitude of ground-water quality impairment due to septic sewage disposal. A novel modeling approach was applied to quantify the cumulative effects of individual septic systems on the city of Pocatello's municipal water supply and predict impacts of future development.

Mining Activity. The Survey maintains a working knowledge of the geology of all active mines in Idaho. Information and statistics on Idaho's mines are collected and published annually. The Survey cooperates with the U.S.

Geological Survey in collecting and interpreting mineral statistics and mining data, and presents an overview of Idaho exploration and mining at the Northwest Mining Association's annual meeting. The Survey's summaries of Idaho's mining and exploration activity are published annually in the May issue of *Mining Engineering*, the U.S. Geological Survey's *Mineral Yearbook*, and the Idaho Department of Commerce's *Idaho Facts*. These new data update the previous gold occurrences map and bring Idaho's historic gold production to approximately 12.4 million troy ounces (about 386 metric tons).

Abandoned and Inactive Mines. Abandoned and inactive mines in Idaho continue to be evaluated and inventoried by the Survey (AML program). To date the Survey has visited over 1100 properties, yet records reflect approximately 9700 properties in Idaho. Current projects are conducted in cooperation with the U.S. Forest Service Region 4 and the U.S. Bureau of Land Management. The results identify physical as well as environmental hazards, and selected mine histories are recorded for possible future analysis and remediation. New petrologic and geochronological research on the Lemhi Pass Thorium District show mineralization from Proterozoic through Mesozoic ages rather than the Tertiary ages in published literature.

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Outreach. The Survey disseminates geologic and mineral data on Idaho primarily through its publications, Web site, in-house library collections, and various efforts in educating the public in the earth sciences. In addition to handling public inquiries, the staff makes numerous presentations and reports throughout the year.

Publications. The Survey publishes a variety of maps, books, and articles catalogued in the annual List of Publications that includes over 700 titles produced since 1919. Since 2000, the Survey has released more than 100 publications that include books, maps, reports, databases, posters, and fact sheets (see Publication charts for sales and revenue results). This rate of output is over twice that of the previous decade, and now averages about 25 publications a year. Geologic maps and Staff Reports represent most of the increase (see Staff Publications and Activities). Access to publications is broadened through the agency's Web site.

The Web site—www.idahogeology.org. The Survey's Web site provides electronic access to geologic maps, GIS databases, and wide-ranging information such as geologic hazards and earth science education. Internet access to the research and services of the Survey continues to expand through added information, search engines, viewable PDF documents, and downloadable maps and documents.

The Web site offers multiple opportunities to get information before the public, including the

searchable List of Publications and the searchable Index to Geologic Maps. Most new geologic maps are viewable on the Web site and can be downloaded in PDF format free of charge. There are now over 70 downloadable maps online. This year's additions to the Web site include searchable versions of the Survey's Mines and Prospects database, a map of Miocene and Younger Faults in Idaho, and Idaho Earthquake Information.

Databases and Archives. Many of the digital geologic maps are also available as GIS databases. Other databases include Mines and Prospects, with data on Idaho mines, and the state's earthquake, fault, and landslide database. Digital geologic databases and earthquake information are available on the Survey's Web site. Several technical bibliographies are published. A collection of over 1200 theses and dissertations on Idaho's geology are available at the Moscow Office. The Survey recently completed a new digital database and index to geologic maps. To date the areal coverages of 614 thesis maps have been digitized for inclusion in the searchable database. These products complement the existing U.S. Geological Survey's index available on the Internet.

Earth Science Education. The Survey staff supports a variety of formal and informal geologic education efforts throughout the state, the region, and the nation. Through close working relationships with the geology departments at the three state universities, Survey geologists make their expertise available by participating in seminars, field trips, and workshops, by teaching selected upper-division courses, and by directing graduate student research. Survey geologists also designed and implemented displays, handouts, and field trips for the Ice Age Floods Institute, highlighting the ice-dam story

of Glacial Lake Missoula in north Idaho. A bill authorizing a National Ice Age Floods Geologic Trail in Montana, Idaho, Washington, and Oregon is now moving through Congress.

The Survey is primarily engaged in promoting earth science education with the state's teachers through the Idaho Earth Science Teachers Association, through its Web site (www.idahogeology.org), and through field workshops conducted around the state so that teachers can observe the methods and science of geology in Idaho's own outdoor laboratory. The summer of 2004 marked the twenty-fifth teacher workshop the Survey has conducted since 1986.

Association of American State Geologists (AASG). The Idaho Geological Survey is an active participant in the AASG. During FY 2005, Roy Breckenridge attended the Annual and Mid-year meetings as well as the Spring Liaison in Washington D.C. Roy served the first year of a three-year term as the Western Regional Representative on the U.S. Geological Survey's Peer-Review Panel for the STATEMAP Component of the National Cooperative Geologic Mapping Act. He also provided information requested by the Idaho Congressional delegation regarding re-authorization of the Mapping Act and its important benefits to Idaho. AASG was instrumental in the successful effort to restore planned cuts to the U.S. Geological Survey minerals and energy programs, as well as authorization of an external geologic hazards initiative and a data preservation program.