Program Highlights—Fiscal Year 2004

The Idaho Geological Survey has a statewide mission as the lead agency collecting and disseminating geologic and mineral information for 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 geology. Externally funded projects enhance this research. The staff handles numerous public inquiries and generates reports and presentations throughout the year (see Staff Publications and Activities).

Annual Budget and Personnel. Idaho again experienced budget difficulties during the past year, but with University-administration support the Survey filled two geology positions: a research faculty position opened through retirement and a senior geologist position expanded to full time during University realignment (see Budget and Personnel Trends chart). The budget cuts of the last several years have reduced the state-appropriated budget base and continue to change the way the Survey funds research, public service, and education. Fiscal Year-2003 saw a reorganization of the University of Idaho, a new enabling act for the Survey, and an administrative realignment of the Survey with the University Research Office under the Vice President for Research (see the FY-2003 Annual Report at www.idahogeology.org). The new enabling act took effect with the beginning of Fiscal Year-2004. The act internalized the director within the agency, and Kurt Othberg and Roy Breckenridge were appointed Directors; Breckenridge was also named State Geologist (see Organizational Chart).

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 areas of Idaho. During the year, geologists mapped sixteen 7.5-minute quadrangles. The Idaho Geologic Mapping Advisory Committee assists the agency by assessing Idaho's mapping needs and addressing long-term plans for geologic mapping. The Survey participates in the U.S. Geological Survey's STATEMAP program, which since 1990 has augmented geologic mapping in growth-, resource-, and development-impact areas. The Survey cooperates with several universities by endorsing EDMAP proposals for the U.S. Geological Survey's support of student geologic mapping in Idaho.

Geologic Map Production. The Survey's digital mapping and geographic information system (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. Ten 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 completed the final phase of a geotechnical hazard assessment project for Clearwater and Nez Perce counties in cooperation with a geotechnical contractor. The mapping lab supplied the necessary digital mapping expertise to produce a GIS database of each county that will be used for planning, road building, and possible zoning purposes.

The Survey is a member of the North American Data Model Steering Committee, an inter-

agency organization that develops guidelines for designing computer-digitized legends of geologic maps. The Survey has created a new publication category, the Digital Geologic Map series, in which four new data sets were published during the 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 projects interpreting geologic hazards in Clearwater, Kootenai, and Nez Perce counties.

The Survey is a active member in the Western States Seismic Policy Council (WSSPC) and Pacific Northwest and Intermountain regional planning groups of the Advanced National Seismic System. Participation involves organizing seismic network operators and planning several hazard mitigation projects. The Survey is leading the efforts to organize a state seismic network clearinghouse capability based on the EARTHWORM system in cooperation with the Idaho Bureau of Homeland Security. The Survey and nearby basin-and-range states coordinate regional clearinghouse functions.

Mitigation of natural hazards is a major component of the Survey's annual summer workshop for teachers. Training activities provide knowledge of Idaho's tectonic setting and classroom safety and disaster response. Teachers develop classroom activities for geologic-hazard education.

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 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 includes the modeling of aquifer stratigraphy, data analysis and mapping of ground-water quality, and assessing ground-water vulnerability to septic sewage disposal through the mapping of surface geological and soils data and subsurface hydrogeology.

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 is developing and applying novel spatial-temporal geostatistical techniques to analyze ground-water quality data and to improve the effectiveness of monitoring network sampling designs. The approach is an outgrowth of previous research performed for the Idaho Department of Water Resources and is being successfully applied in the analysis of other state ground-water monitoring databases. Statistically-based GIS tools are used to identify areas of water quality concern, to define temporal and spatial trends in water quality, and to rank problem areas.

In the greater Pocatello area, the Survey assists local jurisdictions in creating effective ways to protect and manage the lower Portneuf Valley ground-water resources. Methods developed include a GIS database for soils and related attributes for ranking suitability for septic-based development, aquifer vulnerability assessment, and educational components that include a Web site devoted to this program.

Mining Activity. The Survey maintains a working knowledge of the geology of all active mines in Idaho. Information and statistics on 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's exploration and mining at the Northwest Mining Association's annual meeting. Summaries of Idaho's mining and exploration activity are published annually in the May issue of *Mining Engineering*, the U.S. Geological Survey's *Minerals Yearbook*, and the Idaho Department of Commerce's *Idaho Facts*. The current article in *Mining Engineering* is viewable on the Survey's Web site.

Abandoned and Inactive Mines. Since 1994, the Survey has been evaluating and inventorying abandoned and inactive mines in the state in cooperation with federal agencies. In FY-2004, work was 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. The petrologic and geochronological research on the Lemhi Pass thorium district arose out of a field visit on the AML program. A small contract was negotiated with the Idaho Department of Parks and Recreation for field exams of several large mines on private property in the Bayhorse mining district near Challis.

Mine Safety Training Program. Since FY-2003, Idaho's Mine Safety Training Program has been a service component of the Survey. The program provides courses approved by the U.S. Department of Labor's, Mine Safety Health Administration (MSHA). Courses include new miner training, annual safety refreshers, and mine rescue training. The Survey's Mine Safety Trainer conducted twenty-seven training sessions during the year. The program has proved to be an important asset to the Survey.

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.

Publications. Since 2000, the Survey has released more than 100 publications that include books, maps, reports, databases, posters, and fact sheets (see Idaho Geological Survey Publications for sales and revenue charts). 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: Ten geologic maps and twenty-three staff reports were published in FY-2004. The latest Bulletin, *Tectonic and Magmatic Evolution of the Snake River Plain Volcanic Province*, was published in the spring and was featured at the Survey's booth at the Geological Society of America meeting held in Boise during May. Access to publications is broadened through the agency's Web site.

The Web site—www.idahogeology.org. The Survey's Web site provides electronic ac-

cess 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. This year's additions to the Web site include a searchable verison of the Idaho Survey's *Mines and Prospects* database and an online searchable GIS version the *Miocene and Younger Faults in Idaho*. There are now over 60 downloadable maps online. The Survey has begun to track use of the Web site (see Web Site Performance chart).

Databases and Archives. The Survey's databases include digital geologic maps, mines and prospects, and information on the state's earthquakes, faults, and landslides. Digital geologic databases and earthquake information are available on the Survey's Web site. At the Moscow office, the agency maintains statewide collections of reports on mines and graduate theses and dissertations on geology. The Survey recently completed a database and index to geologic maps. The digitized areal coverages of 614 thesis maps are included 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, region, and 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 have also designed and implemented displays, handouts, and field trips for the Ice Age Floods Institute that highlight the ice-dam story of Glacial Lake Missoula in northern Idaho. A bill authorizing a National Ice Age Floods Geologic Trail in Montana, Idaho, Washington, and Oregon was introduced in Congress to be administered under the National Park Service. The state geologists of Montana, Idaho, Washington, and Oregon have formed an ad hoc advisory panel to track progress and provide input from the state surveys.

The Survey is primarily engaged in promoting earth science education with the state's teachers through its active role with the Idaho Earth Science Teachers Association, its Web site (www.idahogeology.org), and its field workshops conducted around the state so that they can observe the methods and science of geology in Idaho's own outdoor laboratory. The summer of 2003 marked the twenty-fourth workshop the Survey has conducted since 1986.

Association of American State Geologists (AASG). The Idaho Geological Survey continues to be active in the AASG. During FY-2003, Roy Breckenridge was named State Geologist and was formally recognized at the AASG annual meeting in June. Both Roy and Kurt Othberg participated in AASG's annual and midyear meetings. Breckenridge was selected by the other western state geologists to serve a three-year term as the 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 was requested by Sen. Larry Craig's Subcommittee on Public Lands and Forests to provide testimony regarding reauthorization of the Mapping Act and its benefits to Idaho.