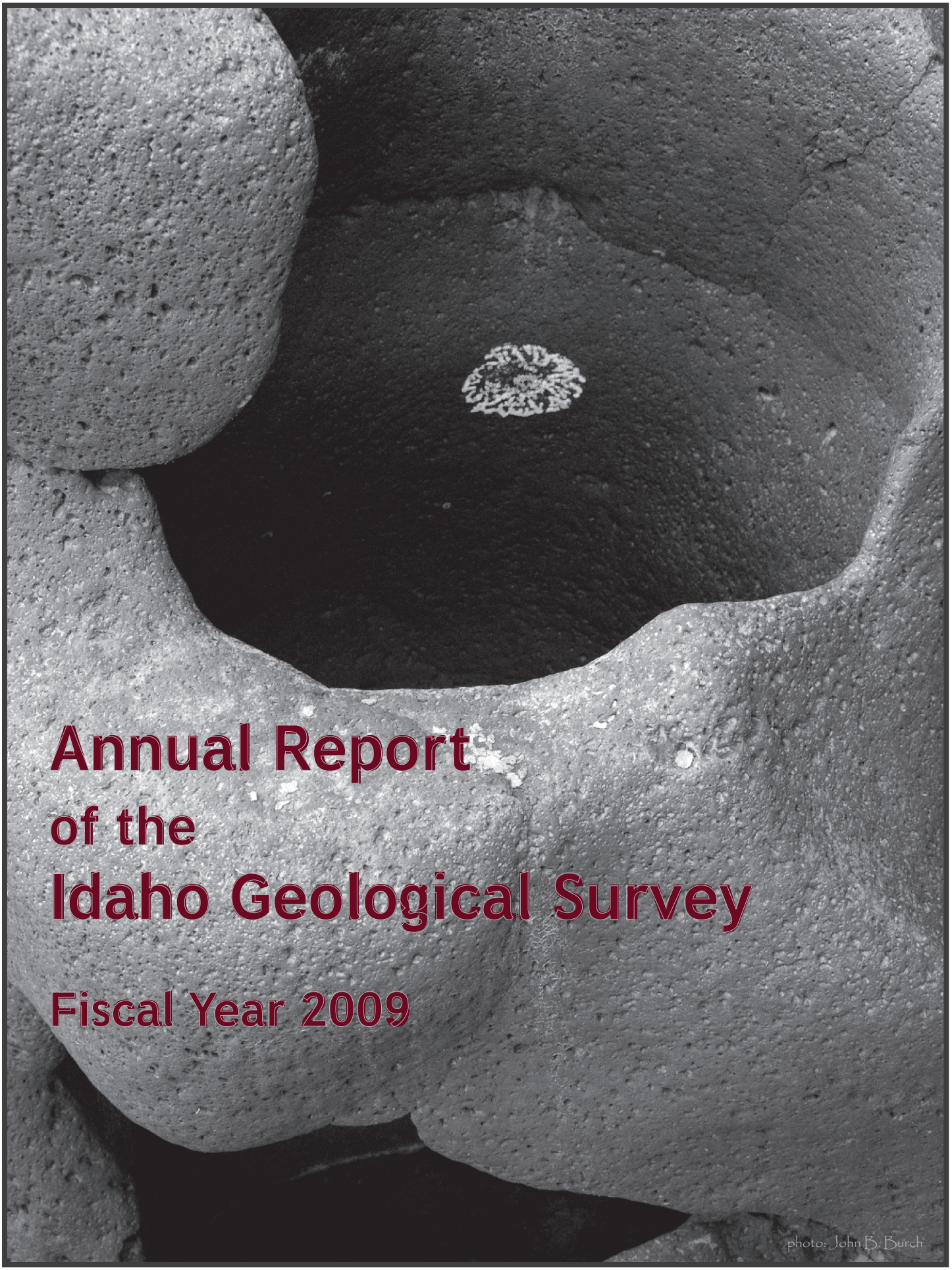

Annual Report of the Idaho Geological Survey

Fiscal Year 2009

photo: John B. Burch

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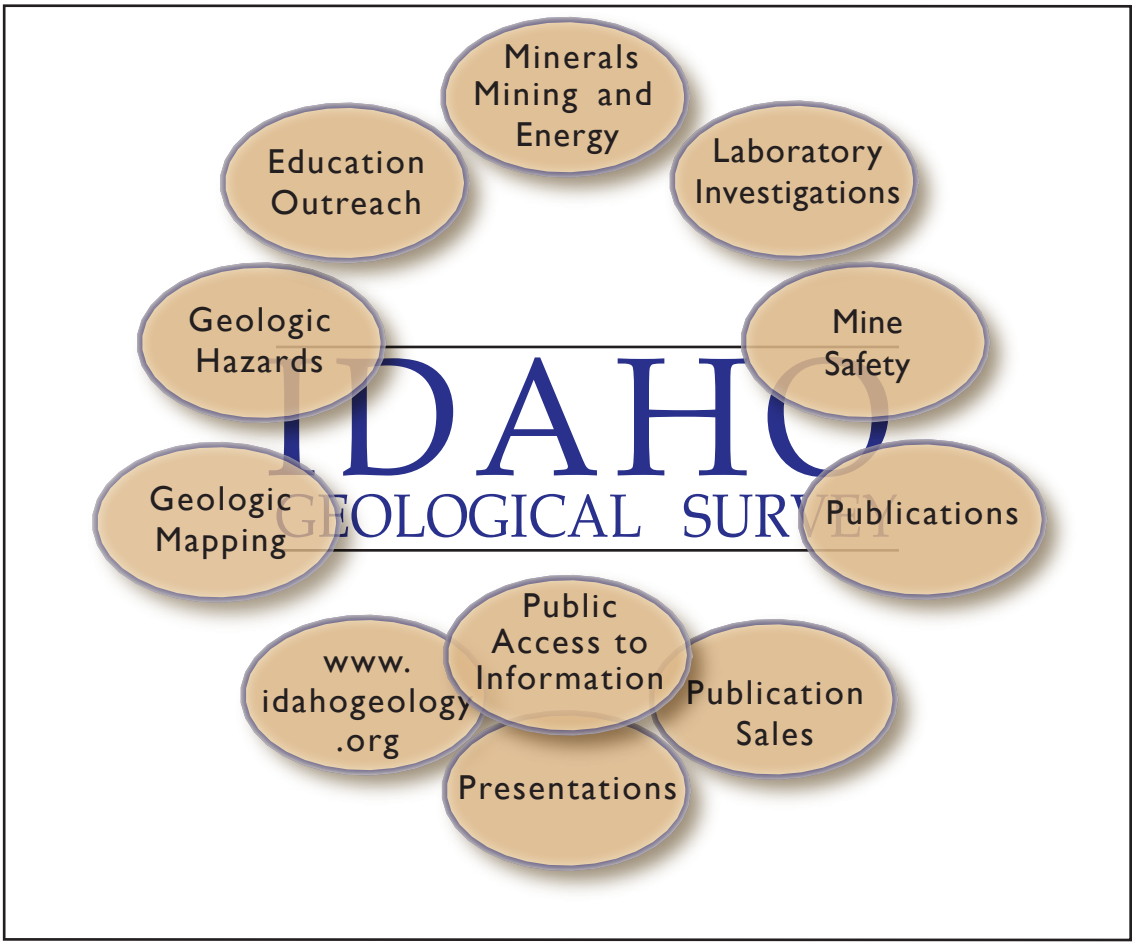
Contents

Highlights

The funding and collegial support provided through cooperative projects have long been integral components of the agency's operation. The activities highlighted for the 2009 Annual Report represent long-term research, service, and education programs by the Survey. Over time, the staff has developed wide-ranging interdisciplinary networks in support of its mission. For a one-year snapshot of what has been a very productive synergy, look at the Partners and Collaborators section for the many organizations currently involved in Survey projects. This is a tribute to the staff's interest, initiative, and ingenuity in building these relationships. Details of the staff's professional engagement in the agency's agenda are in the Staff Publications and Activities section at the end of this report.

Mission Statement



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 satellite offices in Pocatello at Idaho State University and in Boise at the Idaho Water Center and also Boise State University. Staff geologists conduct applied research with a strong emphasis on producing maps and information on Idaho's geologic setting, earth resources, and geologic hazards. Externally funded projects enhance this research.

Administration

Partners and Collaborators

The Survey's statewide mission encourages interdisciplinary partnerships and collaboration with many other agencies, organizations, and universities. This broad cooperation ranges from direct grants for individual projects to the collegial sharing of expertise and information. On the national level, the Survey is also directly involved in the initiatives of the Association of American State Geologists. These alliances offer many opportunities to engage in projects that enhance the agency's applied research and outreach.

Funding Partners

Idaho Bureau of Homeland Security ~ Idaho Department of Environmental Quality ~ Idaho Department of Lands ~ Idaho State University ~ Idaho Transportation Department ~ Incorporated Research Institutions for Seismology ~ National Park Service ~ National Science Foundation ~ U.S. Bureau of Land Management ~ U.S. Forest Service ~ U.S. Geological Survey ~ U.S. Mine Safety and Health Training Program ~ University of Idaho Research Office ~ Washington State University

Collaborators

American Geological Institute ~ Association of American State Geologists ~ Belt Association ~ Boise State University ~ Bonner County Museum ~ Cooperative Ecosystem Studies Units ~ Earthquake Engineering Research Institute ~ Greater Portneuf Water Resource Partnership ~ Ice Age Floods Institute ~ Idaho Conservation League ~ Idaho Earth Science Teachers Association ~ Idaho Mining Association ~ Idaho Historical Society ~ Idaho National Laboratory ~ Idaho Transportation Department ~ Idaho Water Resources Research Institute ~ Inside Idaho ~ Intermountain Forest Tree Nutrition Cooperative ~ Intermountain Regional Advisory Council, Advanced National

Seismic System ~ Latah County Historical Society ~ Lewis Clark State College ~ Montana Bureau of Mines and Geology ~ Natural Resources Conservation Service ~ Nez Perce County ~ North Idaho College ~ Northwest Mining Association ~ Oregon Department of Geology and Mineral Industries ~ Pacific Northwest National Laboratory and Battelle-Pacific Northwest Division ~ Pocatello Ground Water Task Force ~ Tobacco Root Geological Society ~ U.S. Department of Agriculture Plant Materials Center, Agricultural Research, Washington State University ~ University of Utah Seismograph Stations ~ Utah State University ~ Washington Division of Geology and Earth Resources ~ Western North American Volcanic and Intrusive Rock Database ~ Western States Seismic Policy Commission ~ Yellowstone National Park ~Yellowstone Volcano Observatory

Association of American State Geologists

The Survey is an active participant in the Association of American State Geologists (AASG). As Idaho State Geologist, Roy Breckenridge represented Idaho at the AASG 101st Annual Meeting in Utah and the AASG Spring Liaison in Washington, D.C. During the year Roy served as chair and member of the minerals and policy committee and also served on the geologic hazards committee. The AASG is a strong advocate for the funding and reauthorization of the US Geological Survey's National Cooperative Geologic Mapping Program (NCGMP) as well as research programs for data preservation, minerals, energy resources, and geologic hazards. Reauthorization for the NCGMP was accomplished with the passage and signing of the Omnibus Public Land Management Act of 2009. This Act also included the establishment of the National Ice Age Floods Trail that follows the path of Glacial Lake Missoula Floods through Montana, Idaho, Washington, and Oregon. AASG began the groundwork for a nationwide geothermal database proposal to the Department of Energy that would include all state geological surveys.

Fiscal Overview

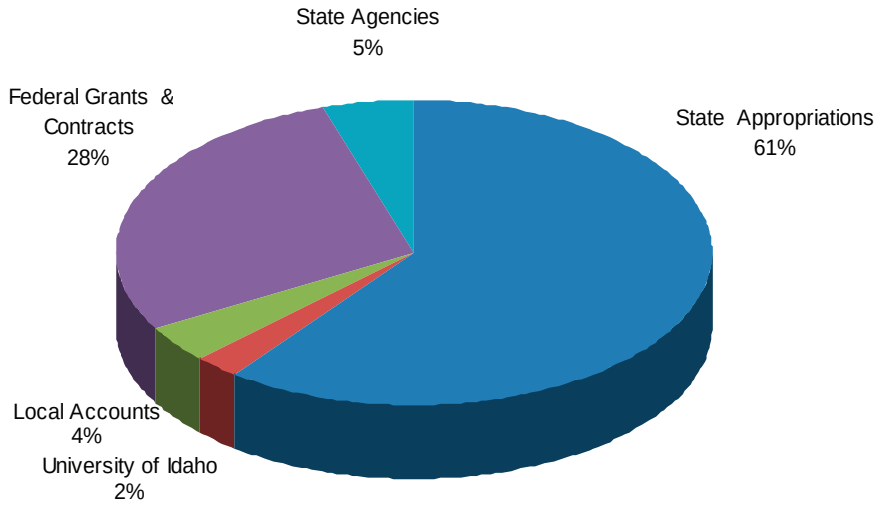
During the year mandated reductions in state funding reduced the Survey's budget from $907,300 to $848,100. During the legislative session, the Survey's budget was further reduced to $768,600 for FY2010. The reduction is mostly in personnel funds. These cuts to the budget base adversely change the agency's mission in research, public service, and education.

Budget Fiscal Year 2009

Appropriation	Beginning Balance	Income	Expense	Ending Balance
Personnel		$ 826,800.00	$ 826,800.00	$ 0.00
Operarating Expense		18,005.51	18,005.51	0.00
Capital Outlay		3,294.49	3,294.49	0.00
Total		848,100.00	848,100.00	0.00
U/I Personnel Funds		33,234.39	33,234.39	0.00
Local Accounts	$162,286.33	55,393.94	113,250.81	$104,429.46
Grants and Contracts	NA	468,971.23	468,971.23	NA
Total	$162,286.33	$1,405,699.56	$1,463,556.43	$104,429.46

NA = not applicable

Sources of Funding



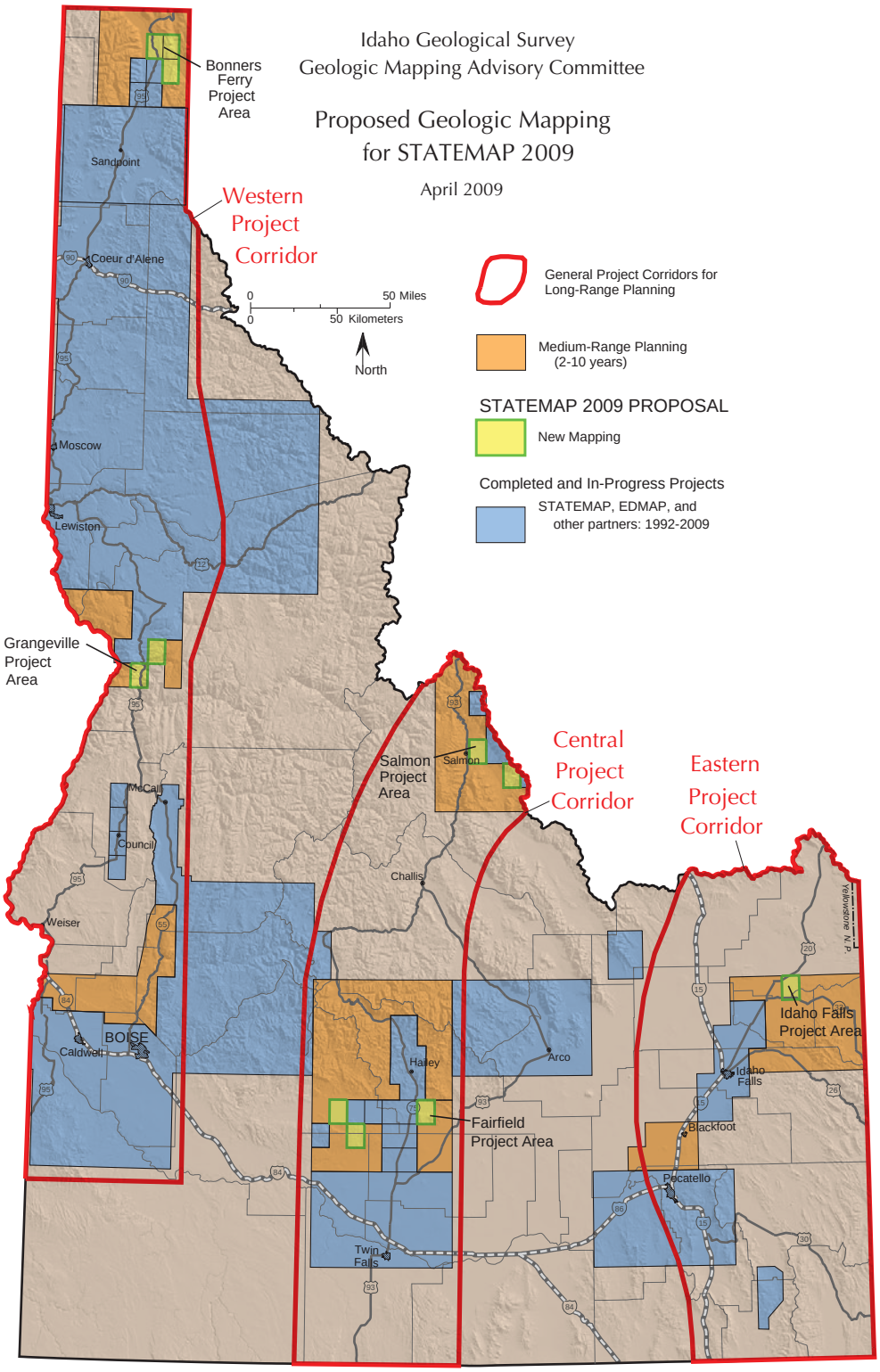
Research

Geological Mapping and Related Studies

Geologic mapping and topical studies are the Survey's primary applied research and generate the content of digital maps, databases, reports, and publications. Before 1990, geologic mapping in Idaho was conducted in rural areas primarily to facilitate extraction of earth resources. In the last two decades, the Survey has been mapping in areas selected specifically because of development impacts in urban settings, for earth-resource needs, and to advance the science. The Idaho Geologic Mapping Advisory Committee (IGMAC) assists the Survey by assessing Idaho's mapping needs and addressing long-term plans for geologic mapping. The committee guides the medium- and short-term mapping plans to take advantage of state partnerships. Idaho's geologic map products have been used, for example, to designate landslide hazards; to define mineralization potential; to delineate rock units that form boundaries of aquifers; to show geologic materials for engineering needs; to better predict groundwater resources; to aid in highway design and construction; and to define geologic resources of public lands including Idaho endowment lands and parks and recreation areas.

Idaho's geologic mapping program is partly funded by the STATEMAP component of the National Cooperative Geologic Mapping Program. Since 1993 Idaho has received nearly $2.7 million federal funds and matched an equal amount of state money to complete geologic mapping in Idaho. In 2009 the Idaho Survey ranked highest in the nation with the largest award of all STATEMAP proposals. During the year Survey geologists worked in project areas throughout the state and mapped twenty 7.5 minute quadrangles.

Geologic Mapping Projects



Hydrogeology

The Survey continues to cooperate with state and federal agencies, university programs, and water-users throughout Idaho to improve the management of the state's ground-water resources. Research applications include modeling aquifer stratigraphy and ground-water levels, analyzing ground-water contamination, and assessing the vulnerability of ground water to septic sewage disposal.

In the STATEMAP mapping program and the liquefaction modeling program, researchers are utilizing hydrogeologic information contained in the state's Well Construction Database to better understand the subsurface geologic and hydrologic characteristics of the eastern Snake River Plain in the Idaho Falls - Rexburg area. The information contained in drillers' reports, together with surface geologic mapping and historical hydrologic data, is used to derive statistically valid models of aquifer stratigraphy as well as aquifer response to long-term stresses imposed by climate and/or growing water demand. Geographic Information Systems (GIS) technology and spatial statistical analysis are used to identify correlations between water level changes in the state's network of monitoring wells and the water level variations recorded in thousands of drillers logs to extend the analysis of ground-water levels beyond what is possible using only the state's water-level monitoring network.

In cooperation with Idaho's Department of Environmental Quality (IDEQ), the Survey is developing a methodology to map the relative risk that septic sewage disposal poses to ground-water quality. Septic technology is widely used in Idaho and the contamination of Idaho's ground water by nitrate and other compounds derived from septic leachate is one of the most pervasive water-quality management problems in the state. Building on previous refinements in the mapping methodology,

and using readily available information derived from soils databases, county parcel maps, the state's well construction and water-quality databases, and the geohydrology of an aquifer, the Survey is developing a GIS-based risk assessment tool that relies on water-quality data and sensitivity analysis to enhance the utility of index-based GIS risk models in ground-water management and development planning.

Digital Geologic Maps

The Survey's digital mapping and GIS laboratory provides services that include digital cartography, spatial data management, database management and design, network system administration, graphic design and desk-top publishing, and Web-site support. The lab continues to compile geology from around the state in a geologic map database in addition to producing geologic maps. Fourteen geologic maps were published this year. All are available as print-on-demand color maps and can be viewed free on the Web site.

The statewide geologic map database is now available for download on the State Clearing House for Geospacial Data as an ESRI Geodatabase. This GIS database supplies map analysts with the best available geologic map data while helping the Survey to manage the data better and implement software updates and migration. The ESRI Geodatabase format lends itself to future interactive online delivery.

The mapping lab now uses Wacom Cintiq interactive digitizing tablets to capture and edit spatial data. With these tablets a stylus is used to make changes right on the screen much like a tablet PC. Digitizing, editing, and layout processes are more efficient and physically less demanding with these new devices.

Databases and Archives

The Survey stores and maintains several databases. Many of these data portray spatial information and include additional data tables all stored in relational databases. Interactive data available on the Survey's Web site include sets of information on epicenters, mines and prospects, and geologic faults. Mines and prospects data are available for download. The IGS archives were inventoried for the National Geological and Geophysical Data Preservation Program in FY08 and in FY09 precise location information was obtained for over 2600 mines and prospects within the IGS Mineral Property File collection.

Geologic Hazards

Idaho is susceptible to significant hazards from earthquakes, landslides, and volcanic activity. The Survey works to support hazard mitigation in several ways. Public awareness is addressed through Web site information, natural hazard activities for K 12 teachers, and direct contact by e-mail and telephone. Landslide hazards are documented in geological mapping conducted through the STATEMAP program.

In FY09, the Survey conducted earthquake hazard mitigation activities with funding from the Idaho Bureau of Homeland Security (IBHS). These activities consisted of the following:

- Chairing of a meeting by a Survey staff member of the Idaho Seismic Advisory Committee in Boise on October 16, 2008. Eight professionals from state government and a representative of private industry attended. The committee provides technical advice to the IBHS on seismic hazards and risk reduction strategies.
- Two Survey staff received instruction by the Federal Emergency Management Agency in the National Incident Management System (NIMS). This instruction

was designed to improve coordination and support by the Survey of the Idaho Emergency Operations Center in Boise in the event of a major natural disaster. The staff completed courses in Introduction to the Incident Command System (ICS), ICS for Single Resources and Initial Actions, Introduction to NIMS, Multi-Agency Coordinating Systems, Public Information Systems, Introduction to the National Response Framework.

Purchase of a seismic monitoring station for the Boise area from the USArray Transportable Array seismic network. The USArray is a large multi-year scientific experiment funded by the US National Science Foundation. Over 40 state-of-the-art seismic stations were placed temporarily in Idaho by USArray between 2007-2009. Purchase of the station fills a major sesimic monitoring gap for Idaho's most populous region. Station TA-J11A was purchased on October 8, 2008. Following purchase, the Survey negotiated a 10 year agreement with the landowner for continual operation and access for maintenance, and an agreement with the US Geological Survey to assume operation and maintenance of the station.

Mines and Mining

Active Mining

Statistics received from the USGS listed 2007 Idaho nonfuel mineral production value at $ 790 million; the preliminary estimate for 2008 is $ 1.2 billion for Idaho's mineral production.

Idaho's mining and exploration industry had a great first half of the year in 2008 with high commodity prices and buoyant optimism, but activity started to slowdown across-the-board in the fall as the nation's economic downturn and tightening credit markets took its toll. In March, 2008, the gold price topped $ 1,000 per troy ounce, silver neared $ 20 per ounce, and molybdenum

took top honors as the state's most valuable commodity with molybdenum oxide prices over $ 30 per pound for much of the year. By December, molybdenum oxide was under $ 10 per pound and the recession was in full swing. Precious metal prices have shown resilience as a hedge in uncertain times. Silver mining in north Idaho was hard hit as zinc and lead prices dropped 50% in the last half of 2008. Construction activity, especially residential, was down for most of 2008, and the aggregate-related commodities suffered accordingly. Employment in Idaho's mining sector, which had been rising since its low point of 1,759 jobs in 2002, increased to nearly 2,800 jobs in 2008, according to the Idaho Division of Financial Management. Unfortunately, it is projected to contract in 2009. The phosphate chemical plants in southeastern Idaho employ an additional 1000 plus people.

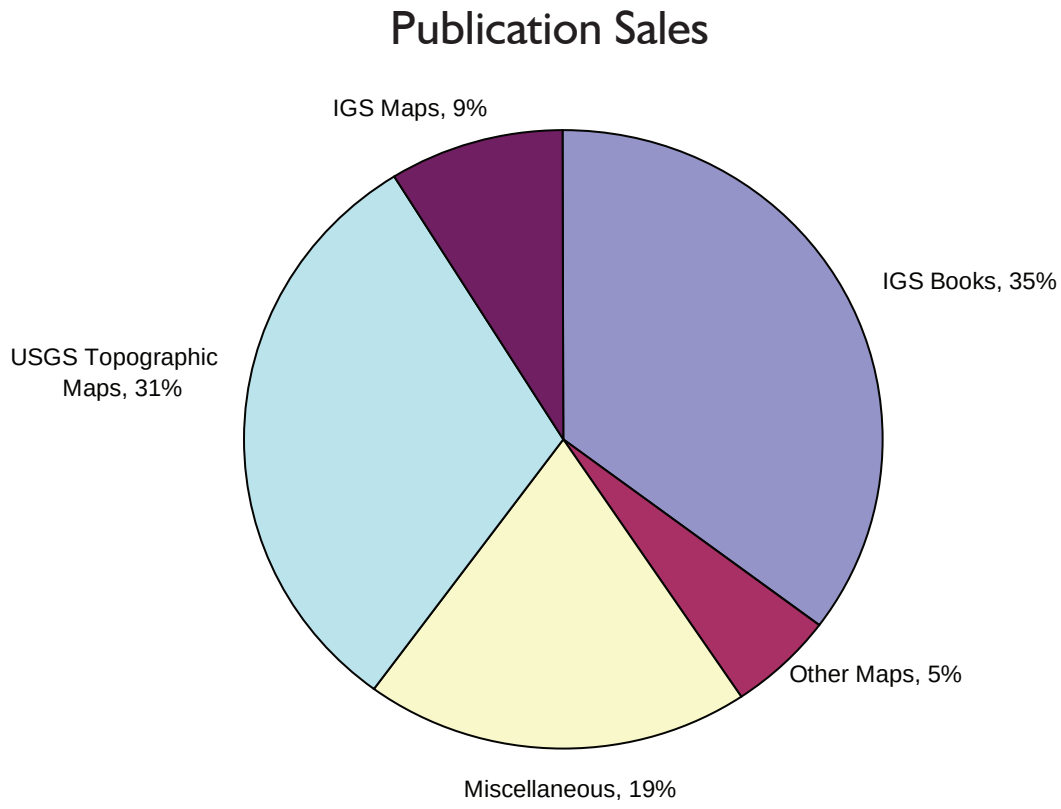
The USGS estimate for 2008 may be a bit optimistic given the downward prices at year's end, but, overall, 2008 was excellent for metals and agricultural commodities, while construction materials may be down 25%. Molybdenum is the state's highest value commodity. In the first half of 2009, precious metal prices were the best performers. Phosphate slightly trailed construction sand and gravel in 2007 but will surpass it in value in 2008. Commodity prices and market demand were very good for about the first three quarters of 2008 before the severe downturn. Housing construction and aggregate production were down significantly. The complete text of the 2008 review of the mining industry was is available on the Survey's Web site.

During the year requests for minerals information and mine files and reports dramatically increased as a result of the boom in exploration activity. Requests for geologic information related to energy exploration including uranium, geothermal, and oil and gas resources also increased.

Outreach

The Survey disseminates geologic and mineral data on Idaho primarily through its publications, Web site, in-house collections, and efforts by the staff in educating the public in the earth sciences.

Publications



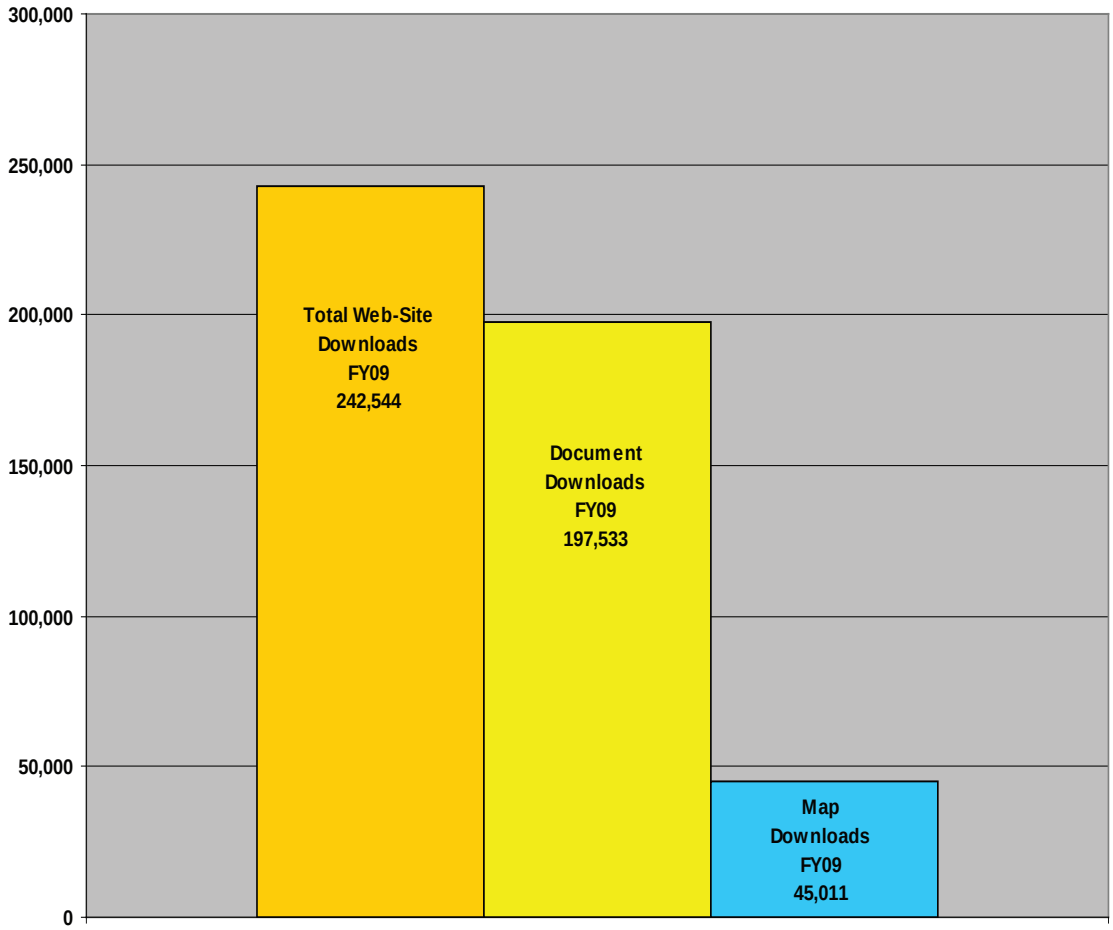
The Web Site—www.idahogeology.org

The Survey's Web site has been redesigned from start to finish. The new look is crisp and efficient. Complete with new search tools and site-wide search engines, users spend less time searching and more time finding what they need.

The Web site provides customers electronic access to its publications and data. Hundreds of online documents are available free for download in PDF format. Publications can be

located via search engines on the site. Geologic data are available there as well, including GIS geologic map data sets (Digital Geologic Map series), geochemical analyses (Digital Analytical Data series), and the mines and prospects digital database.

Customer Downloads of Documents and Maps



Mine Safety Training

The U.S. Department of Labor's Mine Safety and Health Administration Training Program in Idaho is administered by the Survey. During FY-09, this program trained and certified a record 2215 miners and industry supervisors in the state and region an increase of nearly 400 over FY2008.

Earth Science Education

In FY2009, the Survey advanced its commitment to earth science education through a summer field workshop for Idaho's educators, an exhibit at the annual Idaho Science Teachers Association (ISTA) meeting, a field trip commemorating the 25th anniversary of the 1983 Borah Peak earthquake, and with materials available on its Web site.

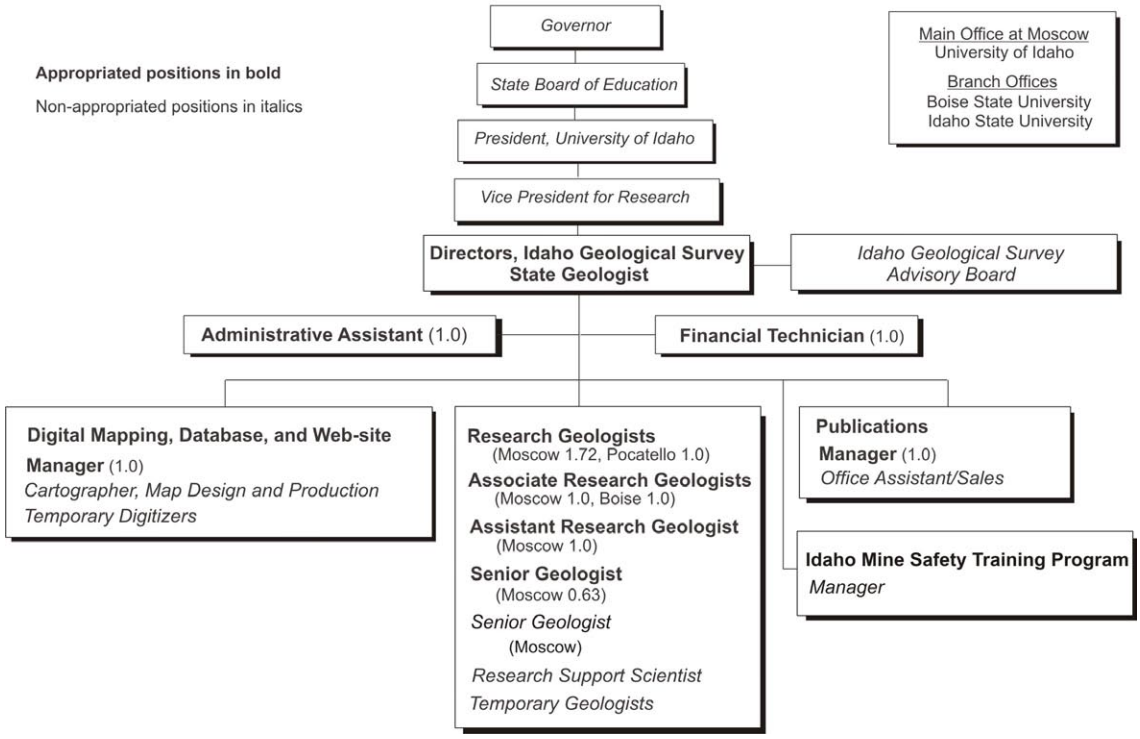
The Idaho Earth Science Educator Summer Field Workshop was held July 13-18, 2008 at Ponderosa State Park near McCall, Idaho. Major funding for the workshop was provided by the Idaho Bureau of Homeland Security (IBHS) with additional support from the National Energy Foundation and the Idaho Mining Association. As in previous years, the focus was on natural hazard education including earthquakes, landslides and wildfires. Eighteen K 12 educators from around the state attended the workshop, which was instructed by IGS staff and guest lecturers from Project Learning Tree (a program sponsored by the Idaho Forest Products Commission) and the IBHS. The educators examined how wildfires start and spread, how they are fought, how often they occur, and how some fires can increase the risk of landslides and flooding. A special treat was touring the US Forest Service McCall smokejumper base. Participants also learned about earthquake swarms, glaciers and glaciation, the geology of west-central Idaho, and how to evaluate risks posed by natural hazards. The workshop concluded with individual teacher projects designed to transform workshop material into activities suitable for use in real classrooms.

On October 2-3, 2008, the Survey exhibited a display on Idaho natural hazards at the annual ISTA meeting in Idaho Falls. The meeting was attended by over 300 teachers. Following the meeting on October 4th, the Survey conducted a field trip showing the effects of Idaho's largest earthquake, the 1983 Borah

Peak magnitude 6.9 earthquake, Twenty educators attended the trip, which was led by Survey staff, the president-elect of the ISTA, and a seismologist from the Idaho National Laboratory. The IBHS provided major funding for the ISTA meeting and field trip activities.

Organization and Personnel

Organization Chart



Directory

Moscow office
Morrill Hall, Third Floor
University of Idaho
PO Box 443014
Moscow, ID 83844-3014
208-885-7991 Fax 208-885-5826

Boise satellite
Idaho Water Center, Suite 201
322 E. Front Street
Boise, ID 83702-7359
208-332-4420 Fax 208-332-4400

Pocatello satellite
Physical Science, Room 201B
Idaho State University
MS 8071
Pocatello, ID 83209-8071
208-282-4254 Fax 208-282-4414

Administrative and Support Staff

Roy M. Breckenridge ..... Director and State Geologist
Kurt L. Othberg ..... Director
Roger C. Stewart ..... Manager, Publications and Communications
Tracy Kanikkeberg ..... Financial Technician
Sherry E. Pixley ..... Office Assistant/Sales

Research, Full Time

Roy M. Breckenridge ..... Full Research Geologist
Jane S. Freed ..... Cartographer
Dean L. Garwood ..... Senior Geologist
Virginia S. Gillerman ..... Associate Research Geologist, Boise
John D. Kauffman ..... Senior Geologist
Reed S. Lewis ..... Associate Research Geologist
Victoria E. Mitchell ..... Research Support Scientist
Kurt L. Othberg ..... Full Research Geologist
William M. Phillips ..... Assistant Research Geologist
Loudon R. Stanford ..... Manager, Digital Map and GIS Lab
Michael J. Weaver ..... Mine Safety Specialist, C.M.S.P.
John A. Welhan ..... Full Research Geologist, Pocatello

Research and Support, Part-Time

Russell F. Burmester ..... Geologist
Lilit Baghumyan ..... Intern
James R. Cash ..... Earth Science Instructor
Glenn F. Embree ..... Geologist
Richard M. Gaschnig ..... Geologist
Teresa A. Kusic ..... Work Study
Mark D. McFaddan ..... Geologist
Keegan L. Schmidt ..... Geologist
Kenneth F. Sprenke ..... Geologist
David E. Stewart ..... Geologist
Theresa A. Taylor ..... Cartographer/GIS Assistant
Peter J. Wampler ..... Geologist

Advisory Board

George Bacon
Director, Idaho Department of Lands

Peter Issacson and Mickey Gunter
Chairs, Department of Geological Sciences, University of Idaho

David Hawk
Representing Office of the Governor

Scott Hughes and David Rodgers
Chairs, Department of Geological Sciences, Idaho State University

David Jackson
Idaho Bureau of Homeland Security

Karl Languirand
Idaho Association of Professional Geologists

Jack Lyman
Executive Director, Idaho Mining Association

C.J. Northrup
Chair, Department of Geosciences, Boise State University

Ex Officio Members

Roy Breckenridge
Director and State Geologist, Idaho Geological Survey

Kurt Othberg
Director, Idaho Geological Survey

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Publications

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Reports

Borah Peak Earthquake HAZUS Scenario Project, Executive Summary, by David Jackson, Mark Stephensen, Julie Sendra, Patti Sutch, and William M. Phillips: Report to Federal Emergency Management Agency, Idaho Bureau of Homeland Security, December, 2008.

Geochronology of Iron Oxide-Copper-Thorium-REE Mineralization in Proterozoic Rocks at Lemhi Pass, Idaho, and a Comparison to Copper-Cobalt Ores, Blackbird Mining District, Idaho, by Virginia S. Gillerman: Idaho Geological Survey report to the U.S. Geological Survey, 149 p., December.

Geologic Map of the Bohannon Spring Quadrangle, Lemhi County, Idaho, and Beaverhead County, Montana, by Reed S. Lewis, Kurt L. Othberg, Russell F. Burmester, Jeffrey D. Lonn, Loudon R. Stanford, and Mark D. McFaddan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Bonners Ferry Quadrangle, Boundary County, Idaho, by Roy M. Breckenridge, Russell F. Burmester, Mark D. McFaddan, and Reed S. Lewis: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Council Quadrangle, Adams County, Idaho, by Dean L. Garwood, Kurt L. Othberg, and John D. Kauffman: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Fruitvale Quadrangle, Adams County, Idaho, by Dean L. Garwood and Kurt L. Othberg: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Goshen Quadrangle, Bingham and Bonneville Counties, Idaho, by William M. Phillips and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Grave Point Quadrangle, Idaho County, Idaho, by Keegan L. Schmidt, John D. Kauffman, David E. Stewart, Dean L. Garwood, Kurt L. Othberg, and Reed S. Lewis: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

Geologic Map of the Kitty Creek Quadrangle, Lemhi County, Idaho, and Beaverhead County, Montana, by Reed S. Lewis, Jeffrey D. Lonn, Russell F. Burmester, Loudon R. Stanford, Mark D. McFaddan, and Kurt L. Othberg: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Mammoth Cave Quadrangle, Lincoln County, Idaho, by John D. Kauffman and Kurt L. Othberg: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

Geologic Map of the Moravia Quadrangle, Boundary County, Idaho, by Russell F. Burmester, Roy M. Breckenridge, Reed S. Lewis, and Mark D. McFaddan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Naples Quadrangle, Boundary and Bonner Counties, Idaho, by Mark D. McFaddan, Roy M. Breckenridge, Russell F. Burmester, and Reed S. Lewis: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Rexburg Quadrangle, Madison Counties, Idaho, by William M. Phillips, Glenn F. Embree, and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Ririe Quadrangle, Bonneville, Jefferson and Madison Counties, Idaho, by William M. Phillips, Glenn F. Embree and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geologic Map of the Slate Creek Quadrangle, Idaho County, Idaho, by Keegan L. Schmidt, John D. Kauffman, David E. Stewart, Reed S. Lewis, Kurt L. Othberg, and Dean L. Garwood: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

Geologic Map of the Spring Creek Reservoir Quadrangle, Camas County, Idaho, Kurt L. Othberg and John D. Kauffman: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

Geologic Map of the Tamarack Quadrangle, Adams County, Idaho, by Dean L. Garwood and Kurt L. Othberg: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, 1:24,000 scale, April.

Geothermal Task Force Report, by D. Kunz, V. Gillerman, and others: Idaho Strategic Energy Alliance Board, 43 p., 2009.

History of the Belshazzar and Mountain Chief Mines, Boise County, Idaho, by Victoria E. Mitchell: Idaho Geological Survey report to the U.S. Forest Service, Region 4, 55 p., 2008.

Ice Age Floods Field Trip Guide to the Priest River Valley Area, Idaho, by Roy M. Breckenridge: Coeur du Deluge Chapter~Heart of the Floods, Ice Age Floods Institute, 4 p., 2008.

Idaho Annual Report, by William M. Phillips and David Jackson: Western States Seismic Policy Council meeting, October.

Idaho Natural Hazard Mitigation Activities, by William M. Phillips: Final report to Idaho Bureau of Homeland Security, September.

Preliminary Analysis of the Aquifer Beneath Fraser Plateau, Clearwater County, by John A. Welhan: Idaho Geological Survey report to the Idaho Department of Water Resources, August.

Statistical Guidance for Determining Background Ground Water Quality and Degradation, by X. Dai, J. Welhan, and E. Hagan: Idaho Geological Survey report to the Idaho Department of Environmental Quality report, November.

Presentations

The 2005 Alpha Earthquake Swarm, by William M. Phillips: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Arco Paleoseismology Trench, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

T*he Birch Springs Landslide and the 1983 Borah Peak Earthquake*, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Columbia River Basalts, Paleomagnetism, and Structure, by Dean L. Garwood: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Crows Nest Canyon Landslide and Earthscope Seismic Station, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Damage in Mackay From the 1983 Borah Peak Earthquake, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Determining the Age of Glaciation with Cosmogenic 10Be Surface Exposure Dating of Erratic Boulders, by William M. Phillips: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Effect of Recharge and Pumping on Ground Water in South Ross Fork and Buckskin Basins: Implications for Water Supply Management, by John A. Welhan: Business Council, Fort Hall Indian Reservation, February; Ross Fork Tribal residents, Fort Hall Indian Reservation, March.

Fault Scarp of the Thousand Springs Segment of the Lost River Fault, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Geologic and Mining History of Latah County, by Reed S. Lewis: Deary Public Library, Deary, May.

Geologic Map of the Bohannon Spring Quadrangle, Lemhi County, Idaho, by Loudon R. Stanford and Jane S. Freed: Digital Mapping Techniques 2009, Morgantown, West Virginia, May.

Geology and Seismicity of the Northern Snake River Plain at the Big Lost River Sinks Rest Area, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Geology of Southwest Idaho and the Boise Valley, by Virginia S. Gillerman: Idaho Botanical Garden summer lecture series, Boise, August.

Geology of the Lemhi Pass Thorium-Rare Earth District, Idaho and Montana: Evidence for a Buried Paleozoic Alkalic System? by V. Gillerman, P. Layer, M. Jercinovic, M. Gordon, and M. Schmitz: Society for Mining, Metallurgy, and Exploration, Inc. (SME) annual meeting, Denver, Colorado, February.

Geology of the Lemhi Pass Thorium-Rare Earth District, Idaho and Montana: Evidence for a Buried Paleozoic Alkalic System? by V. Gillerman, P. Layer, M. Jercinovic, M. Gordon, and M. Schmitz: Seminar series, Department of Geosciences, Boise State University, Boise, March.

Geomorphic Effects of Wildfire, by William M. Phillips: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Geothermal Potential of the China Hat Area, Blackfoot Lava Field, Caribou County, by John A. Welhan: US Geothermal Inc., Raft River, June.

Geothermal Task Force Report, by D. Kunz, V. Gillerman, and others: Idaho Strategic Energy Alliance Board, Boise, May.

Glacial History of the Payette Lakes-Long Valley Area, Idaho, by Roy M. Breckenridge: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Global Climate Change: A Scientific Examination, by Clay Nichols, DeWayne Cecil, Roy Breckenridge, and Von Walden: Friends of the Sandpoint Library Association, Sandpoint, December.

Ground-Water Quality Rule Statistical Guidance Workshop, by John A. Welhan: Idaho Department of Environmental Quality workshop, Boise, August.

Idaho Geological Survey Mapping Along the Snake River, by William M. Phillips and John Welhan: Dennis Dunn, Idaho Department of Water Resources, and Thomas Wood, consulting geologist, Idaho Falls, April.

Idaho Geological Survey Mapping and Data Modeling: an Update, by Loudon R. Stanford: Idaho Geospatial Forum, Boise, December.

Idaho Geological Survey Programs in Southeast Idaho, by Roy M. Breckenridge: Yellowstone Volcano Observatory Conference, U.S. Geological Survey and Yellowstone National Park, Bozeman, Montana, November.

Idaho Geological Survey Strategic Plan 2009-2013, by Roy M. Breckenridge and Kurt L. Othberg: University of Idaho, State Board of Education, Idaho State Web site, July.

Idaho Geology, by Virginia S. Gillerman: Idaho Mountain Recreation Club, Boise, May.

Idaho Geology and Old Mines–A Brief Look, by Virginia S. Gillerman: Boise Vista Lions Club, Boise, November.

Idaho Mining and Exploration, 2007-2008, by Virginia S. Gillerman: Snake River section, Society for Mining, Metallurgy, and Exploration, Inc., (SME), Pocatello, October.

Idaho Mining and Exploration 2008, by Virginia S. Gillerman: Northwest Mining Association Convention, Reno, Nevada, December.

Idaho STATEMAP Products, by Roy M. Breckenridge: Association of American State Geologists annual meeting, Park City, Utah, STATEMAP poster session, June.

The Lower Portneuf River Valley Aquifer: Water Balance, Capacity, and Water Quality, by John A. Welhan: Geology 100 class, Department of Geosciences, Idaho State University, April.

Mackay Dam and the 1983 Borah Peak Earthquake, by William M. Phillips, Theresa Taylor, and Julie Tullis: Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October.

Minerals Assessment Session Summary Report, by Roy M. Breckenridge and Mike Zientek: Association of American State Geologists 100th annual meeting and centennial conference, Association of American State Geologists, Shepherdstown, West Virginia, July.

Minerals Supply Session Summary Report, by Roy M. Breckenridge and John DeYoung Jr.: Association of American State Geologists 100th annual meeting and centennial conference, Shepherdstown, West Virginia, July.

Natural Hazards of Rainbow Bridge Area, Highway 55, Near Smiths Ferry, Idaho, by William M. Phillips: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

New Chronology for Upper Snake River Plain Periglacial System, by William M. Phillips and Tammy Rittenour: Geology seminar, Department of Geological Sciences, University of Idaho, November.

New Geologic Mapping and Detrital Zircon Results From the Belt Supergroup of Northern Idaho and Western Montana, USA, by Reed S. Lewis: St. Petersburg University, Russia, September.

OSL Chronology of Late Pleistocene Glacial Outwash and Loess Deposits Near Idaho Falls, Idaho, by William M. Phillips, Tammy M. Rittenour, and Glenn Hoffmann: Geological Society of America, Rocky Mountain Section, 61st annual meeting, May.

Objective Assessment of Septic Contamination Risk in Ground Water: Development of a Methodology, by John A. Welhan: Ground Water Monitoring Technical Committee, Idaho Department of Environmental Quality, Boise, December.

Preliminary Analysis of the Aquifer Beneath Fraser Plateau, Clearwater County, by John A. Welhan: Idaho Department of Water Resources public hearing, Orofino, June.

Proposed Methodology for Rating Septic Risk to Ground-Water Quality, by John A. Welhan: Idaho Department of Environmental Quality regional office, Pocatello, August.

STATEMAP Geologic Mapping Along the Snake River, Eastern Idaho, by William M. Phillips, John Welhan, Glenn Embree, and Dean Garwood: Geological Society of America, Rocky Mountain Section, 61st annual meeting, May.

Teaching Concepts of Geologic Time and Regional Stratigraphy With the "Tower of Time," by Jim R. Cash: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Tectonic Setting of the Cascade-Long Valley Area, by William M. Phillips and Roy M. Breckenridge: Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July.

Use of Paleomagnetic Analysis in the Interpretation of Pleistocene Flood Deposits, by Roy M. Breckenridge, William M. Phillips, and Kurt L. Othberg: Lewis Clark State College, Lewiston, November.

Web Products

2008 Natural Hazards Field Workshop for Idaho Educators, Payette Lake Area, July 13-18, 2008, by William M. Phillips and Dean L. Garwood: Idaho Geological Survey Web page, revised.

2009 Natural Hazards Field Workshop for Idaho Educators, Hagerman/ Glenns Ferry Area, July 12-17, 2008, by Dean L. Garwood: Idaho Geological Survey Web page, new.

Current Geologic Mapping Projects, 2009, by Idaho Geological Survey staff: Idaho Geological Survey Web page, 2009.

Digital Geologic Map Data Model V3.1b: ESRI Geodatabase Schema Diagram V5.2007, by Loudon R. Stanford and Steve Mulberry: Idaho Geological Survey Web document.

Earthquake Hazards, by William M. Phillips and Dean L. Garwood: Idaho Geological Survey Web page, revised.

Idaho Epicenters: 1872-2007 Google Earth Version, by William M. Phillips, Loudon R. Stanford, and Theresa A. Taylor: Idaho Geological Survey Web site search application, new.

Idaho Geological Survey Geologic Map Search: Google Map Search Tools, by Loudon R. Stanford, Dustin Thomas, and Reed S. Lewis: Idaho Geological Survey Web page.

Landslides, by William M. Phillips and Dean L. Garwood: Idaho Geological Survey Web page, new.

Landslide Hazards, by William M. Phillips and Dean L. Garwood, Idaho Geological Survey Web page, revised.

Links, by Dean L. Garwood and William M. Phillips: Idaho Geological Survey Web page, revised.

Publications, by Roger C. Stewart and Loudon R. Stanford: Idaho Geological Survey Web page, revised as products released.

Mine Histories Web Page: New Database-Linked Version, Dustin Thomas and Loudon R. Stanford: Idaho Geological Survey Web site search application, new.

Proposed Geologic Mapping for STATEMAP 2009, Idaho Geologic Mapping Advisory Committee, by Idaho Geological Survey staff: Idaho Geological Survey Web page, 2009.

Web Posting (PDF) of Idaho Geological Survey Out-of-Print Publications: Bulletins and Pamphlets, by Sherry E. Pixley, Theresa A. Taylor,

and Loudon R. Stanford: Idaho Geological Survey Web postings of published documents, new.

Web Posting (PDF) of Idaho Geological Survey Staff Reports, by Sherry E. Pixley, Theresa A. Taylor, and Loudon R. Stanford: Idaho Geological Survey Web postings of published documents, new.

Operational Improvements

Color swatch migration from FreeHand to Adobe Illustrator (J.S. Freed).

Digital mapping lab procedures documentation and posting to the Help Web page (T.A. Taylor and L.R. Stanford).

File transfer protocol (FTP) site for IGS data users (L.R. Stanford and A. Morris).

File transfer protocol (FTP) site for off-site staff (L.R. Stanford and A. Morris).

New procedures and techniques for terrain shading on geologic maps for publication (L.R. Stanford).

Updates to symbols and improvements to CAD map capture software (L.R. Stanford).

Professional Activities

Advisory board meeting, Idaho Geological Survey, teleconference–Moscow, Boise, and Pocatello, January (R.M. Breckenridge and K.L. Othberg).

Association of American State Geologists, annual meeting, Park City, Utah, June (R.M. Breckenridge).

Association of American State Geologists, spring liaison meeting, Washington, D.C., March (R.M. Breckenridge).

Chair, minerals committee, Association of American State Geologists (R.M. Breckenridge).

Co-chair (ex officio), Idaho Geological Survey annual advisory board meeting, teleconference–Moscow, Boise, and Pocatello, December (R.M. Breckenridge and K.L. Othberg).

Co-coordinator and co-leader, field trip, Blackfoot-Willow Creek volcanic field (J.A. Welhan).

Co-coordinator and co-leader, field trip, subsurface science graduate program, Inland Northwest Research Alliance (J.A. Welhan).

Co-instructors, Idaho Earth Science Teachers summer field workshop, McCall, July (D.L. Garwood, J.R. Cash).

Course certifications, Federal Emergency Management Agency, National Incident Management System (V.S. Gillerman, W.M. Phillips).

Co-organizer and participant, Idaho Earth Science Teachers Association winter teleconference, December (W.M. Phillips, D.L. Garwood, J.R. Cash).

Data capture working group teleconference, Association of American State Geologists and U.S. Geological Survey, June (L.R. Stanford).

Exhibitor, Idaho Natural Hazards, Idaho Science Teachers Association annual meeting, Idaho Falls, October (W.M. Phillips).

Expert witness, public hearing on disputed water right applications, Idaho Department of Water Resources, teleconference (J.A. Welhan).

Fellow, Society of Economic Geologists (V.S. Gillerman).

Field trip, basement rocks, Washington State University faculty and students, upper St. Joe River, August (R.S. Lewis).

Field trip, Belt Supergroup metamorphism, Washington State University faculty and students, Clarkia, July (R.S. Lewis).

Field trip, gold deposits of northern Nevada, Geological Society of Nevada, Winnemucca, Nevada, May (V.S. Gillerman).

Field trip, Intermountain Forest Tree Nutrition Cooperative, Emida, July (R.S. Lewis).

Field trip leader, 25th Anniversary Borah Peak earthquake field trip, Idaho Science Teachers Association annual meeting, Idaho Falls, October (W.M. Phillips).

Field trip leader, Ice Age Floods field trip, Priest River Valley area, Coeur du Deluge Chapter~Heart of the Floods, Ice Age Floods Institute, September (R.M. Breckenridge).

Field trip leader, mine tours: Atlanta, Silver Valley, and Thompson Creek mines and McCall area prospects (V.S. Gillerman).

Field trip preview, 2009 Earth Science Educators Field Workshop, Hagerman, November (D.L. Garwood, K.L. Othberg, J.R. Cash).

Field trip preview 2, 2009 Earth Science Educators Field Workshop, Hagerman, April (D.L. Garwood, J.R. Cash).

Field trip preview, Ice Age Floods Field Trip, Lake Pend Oreille and the Hoodoo Valley to Priest River, Idaho, Coeur du Luge Chapter~Heart of the Floods, Ice Age Floods Institute, June (R.M. Breckenridge).

Geothermal leasing on federal lands workshop, U.S. Bureau of Land Management, Boise, April (V.S. Gillerman).

Instructor, Geology 405/505, geologic hazards field workshop, University of Idaho, summer session, McCall, July (W.M. Phillips).

Instructor, Geology 404/504, bringing natural hazard teaching to the classroom: the 1983 Borah Peak earthquake, University of Idaho, Idaho Falls, October (W.M. Phillips).

Instructor, Geology 607, spatial analysis class, Department of Geosciences, Idaho State University, spring semester (J.A.Welhan).

Instructor and author, dynamic planet module, Idaho Science Olympiad Competition, Nampa, April (V.S. Gillerman).

Intermountain Forest Tree Nutrition annual meeting, Moscow, April (R.S. Lewis).

Judge, 24th annual Central Mine Rescue contest, Kellogg, May (M.J. Weaver).

Manager, rock-sample crushing facility, Department of Geological Sciences, University of Idaho, January-June (W.M. Phillips).

Member, American Geophysical Union (J.A. Welhan).

Member, American Institute of Professional Geologists (R.M. Breckenridge).

Member, American Quaternary Association (R.M. Breckenridge).

Member, Association of American State Geologists (R.M. Breckenridge).

Member, Association of Earth Science Editors (R.C. Stewart).

Member, data capture working group, Association of American State Geologists and U.S. Geological Survey (L.R. Stanford).

Member, geologic hazards policy committee, Association of American State Geologists (R.M. Breckenridge).

Member, Geological Society of Nevada (V.S. Gillerman).

Member, geothermal task force, Idaho Strategic Energy Alliance Board, Boise, May (V.S. Gillerman).

Member, Governor's geothermal task force, Boise (V.S. Gillerman).

Member, Idaho Earth Science Teachers Association (R.M. Breckenridge).

Member, Society for Mining, Metallurgy, and Exploration, Inc. (V.S. Gillerman).

Member, steering committee, North American Digital Geologic Map Data Model (L.R. Stanford).

Member, technical committee, Idaho Ground-Water Monitoring (J.A. Welhan).

Members, Geological Society of America (R.M. Breckenridge, V.S. Gillerman, R.S. Lewis, Victoria E. Mitchell, K.L. Othberg, W.M. Phillips, J.A. Welhan).

Members, Idaho EDMAP review board, Idaho Geological Survey (R.M. Breckenridge, K.L. Othberg).

Members, Northwest Mining Association (V.S. Gillerman, R.S. Lewis).

Mining expert and host, visiting delegation of legislators, Democratic Republic of the Congo, Boise, July (V.S. Gillerman).

Mining expert testimony, Owyhee County courthouse legal witness, Murphy, August (V.S. Gillerman).

Northwest Mining Association convention, Reno, Nevada, December (V.S. Gillerman).

Organizer, Idaho Seismic advisory committee, Boise, October (W.M. Phillips).

Participant, field methods in neotectonics and paleoseismology, Crestone Science Center, Crestone, Colorado, June (W.M. Phillips).

Participant, Friends of the Pleistocene geology field trip, Quaternary of the Idaho-Wyoming Overthrust Belt, September (W.M. Phillips).

Participant, university leadership conference, University of Idaho (R.M. Breckenridge).

Participant, Northern Idaho Legislative Tour, coordinating committee meeting, Moscow, October (R.M. Breckenridge).

Participant, Rural Earthquakes Conference planning group, Western States Seismic Policy Council, April and May (W.M. Phillips).

Participant and co-organizer, Idaho Earth Science Teachers Association winter teleconference, December (W.M. Phillips, D.L. Garwood).

Planning and writing a pre-proposal, 3-year geothermal research program in collaboration with Idaho State University, Department of Energy-EPSCoR (J.A. Welhan).

Regional Advisory Committee (RAC), Advanced National Seismic System (ANSS), Intermountain West (R.M. Breckenridge).

Representative, affiliate faculty and graduate faculty, Idaho State University (J.A. Welhan).

Representative, Department of Geosciences, Idaho State University (J.A. Welhan).

Representative, Governor's carbon sequestration advisory committee (J.A. Welhan).

Representative and disaster coordinator, Bureau of Homeland Security, state agency emergency coordinator working group meeting (V.S. Gillerman).

Reviewer, "Development of a Probabilistic Assessment of Methodology for Evaluation of Carbon Dioxide Storage," U.S. Geological Survey draft manuscript (J.A. Welhan).

Reviewer, "Examining the Influence of Heterogeneous Porosity Fields on Conservative Solute Transport," Journal of Contaminant Hydrology (J. Welhan).

Reviewer, Geological Society of America Bulletin, December, March, and May (W.M. Phillips).

Reviewer, Idaho Emergency Operation Plan, Idaho Bureau of Homeland Security, December (W.M. Phillips).

Reviewer, Quaternary Geochronology, March (W.M. Phillips).

Secretary, board of directors, Belt Association (R.S. Lewis).

Silver Summit meeting, Coeur d'Alene, September (V.S. Gillerman).

Supervisor, Lilit Baghumyan, geology intern, Edmund Muskie Fellowship (R.S. Lewis).

Supervisor, Teresa Kusic, work-study student, University of Idaho, September-December and January-May (W.M. Phillips).

Supervisor and instructor, Vincent Isakson, Lewis and Clark State College student, measurement of paleomagnetic properties of Missoula Flood sediments, March-April (W.M. Phillips).

Technical advisor, Aberdeen-Springfield Canal Company operations manager (J.A. Welhan)

Technical advisor, city of Lava Hot Springs (J.A. Welhan).

Technical advisor, planning and zoning department, Bannock County (J.A. Welhan).

Technical advisor, statistical analysis of ground-water monitoring data, Idaho Department of Environmental Quality (J.A. Welhan).

Technical advisor, water resources department, Shoshone-Bannock Tribes (J.A. Welhan).

Tour guides, North Idaho Chamber of Commerce, Northern Idaho Legislative tour, Moscow-Lewiston, November (R.M. Breckenridge, R.S. Lewis, D.H. Garwood).

Training, Pinnacle billing system, Information Technology Services, University of Idaho, July (T. Kanikkeberg).

Training, sales tax 101, Information Technology Services, University of Idaho, February (T. Kanikkeberg).

Training, space survey (phases I, II, and III), Office of Special Programs, facility and administration costs, University of Idaho, April-May (T. Kanikkeberg).

Training, effort reporting, Office of Sponsored Programs, University of Idaho, November (T. Kanikkeberg).

Training, supervising student and temporary employees, Department of Human Resources, University, August (T. Kanikkeberg).

Work-study workshop, Department of Human Resources, University of Idaho, March (T. Kanikkeberg).

Media Interviews

Button Found in Rock Found in Tree: KPVI Channel 6 News, Pocatello, January 26, 2009 (J.A. Welhan).

Carved by Cataclysm, by William L. Spence: Lewiston Tribune, June 7 (R.M. Breckenridge).

Ross Fork Basin Hydrologic Analysis: Sho-Ban News, May 7 (J.A. Welhan).

Graduate Thesis Committees

Lilit Baghumyan, M.S., Environmental Science, University of Idaho (R.S. Lewis).

Rachel Brewer, M.S., Geology, Washington State University (R.S. Lewis).

Rich Gaschnig, Ph.D., Geology, Washington State University (R.S. Lewis).

Keith Gray, Ph.D., Geology, University of Idaho (R.S. Lewis).

Cephas Holder, M.S., Geological Sciences, Idaho State University (J.A. Welhan).

Jessica Mitchell, Ph.D., Geological Sciences, Idaho State University (J.A. Welhan).

Nick Semenza, M.S., Geological Sciences, Idaho State University (J.A. Welhan).

Ashley Tefft, M.S., Geology, Washington State University (R.S. Lewis).

Erin Walker, M.S., Geology, University of Idaho (W.M. Phillips).

Grants and Contracts

Evaluation of Septic-Siting Suitability Using an Objective GIS Ranking Methodology: J.A. Welhan (Idaho Department of Environmental Quality, January 2009-February 2010, $28,631).

Geochronology of Iron Oxide-Copper-Thorium-REE Mineralization in Proterozoic Rocks at Lemhi Pass, Idaho, and a Comparison to Copper-Cobalt Ores, Blackbird Mining District, Idaho: V.S. Gillerman (U.S. Geological Survey, Minerals Resources External Research Program, extended to September 30, 2008, $61,372).

Geologic Mapping in the Idaho Falls, Fairfield, Grangeville, Salmon, and Bonners Ferry Project Areas: K.L. Othberg, W.M. Phillips, J.D. Kauffman, R.S. Lewis, and R.M. Breckenridge (U.S. Geological Survey STATEMAP Program, May 2008-April 2009, $230,611).

Geologic Mapping in the Idaho Falls, Fairfield, Grangeville, Salmon, and Bonners Ferry Project Areas: K.L. Othberg, W.M. Phillips, J.D. Kauffman, R.S. Lewis, and R.M. Breckenridge (U.S. Geological Survey STATEMAP Program, May 2009-April 2010, $253,611).

Geologic Mapping in the Twentymile Creek 7.5-Minute Quadrangle: R.S. Lewis (Idaho Department of Lands, August 2008-July 2009, $6,000).

Geologic Mapping, U.S. 95, Tamarack to Indian Valley: K.L. Othberg and D.L. Garwood (Idaho Department of Transportation, May 2006-September 2008, $60,000).

Idaho Mine Safety Training Program: M.J. Weaver (Mine Safety and Health Administration, October 2007-September 2008, $89,396).

Idaho Mine Safety Training Program: M.J. Weaver (Mine Safety and Health Administration, October 2008-September 2009, $91,146).

Idaho National Hazard Mitigation: W.M. Phillips (Idaho Bureau of Homeland Security, April 2007-August 2008, $35,000).

Idaho Natural Hazards Workshop and Outreach Activities: W.M. Phillips (Idaho Bureau of Homeland Security, July 2008-March 2009, $17,068).

Mine Site Database: R.S. Lewis (U.S. Department of Agriculture, U.S. Forest Service, Region 4, June 2003-December 2009, $390,000).

National Geologic and Geophysical Data Preservation Program: R.S. Lewis (U.S. Geological Survey, September 2007-August 2008, $5,000).

National Geologic and Geophysical Data Preservation Program: R.S. Lewis (U.S. Geological Survey, August 2008-July 2009, $29,993).

Part 1: Digital Liquefaction Susceptibility Maps and NEHRP Soil Class Maps at Scale 1:24,000 for the Idaho Falls Area: W.M. Phillips, J.A. Welhan, and L.R. Stanford (Idaho Bureau of Homeland Security, May 2009-April 2010, $20,637).

Part 2: Digital Liquefaction Susceptibility Maps and NEHRP Soil Class Maps at Scale 1:24,000 for the Idaho Falls Area: W.M. Phillips, J.A. Welhan, and L.R. Stanford (Idaho Bureau of Homeland Security, July 2009-September 2009, $20,000).

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