

Annual Report of the Idaho Geological Survey

Fiscal Year 2008

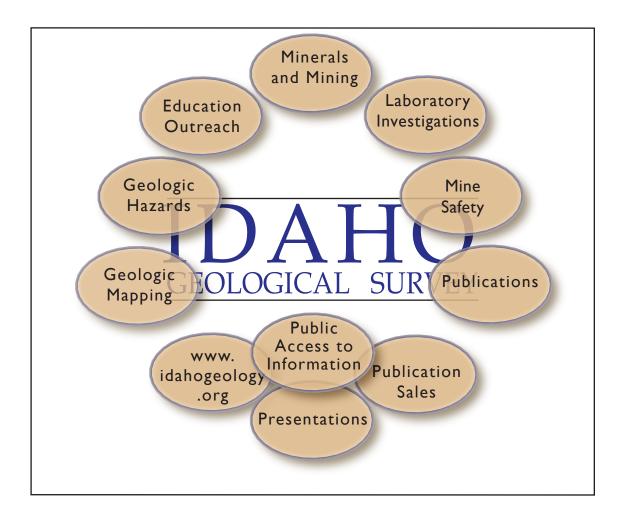
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HIGHLIGHTS

The funding and collegial support provided through cooperative projects have long been integral components of the agency's operation. The activities highlighted for the 2008 Annual Report represent long-term research, service, and education programs by the Survey. Over time, the staff has developed wideranging 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 branch 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 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 attended the AASG 100th Annual Meeting and Centennial Conference in West Virginia, the spring liaison in Washington, D.C., and the Western States Cluster meeting in Seattle, Washington. Roy is chair of the minerals and policy committee and also serves on the geologic hazards committee. With USGS colleagues he co-chaired sessions on Minerals Supply and Minerals Assessment at the annual conference. The AASG is a strong advocate for the federal reauthorization of the National Cooperative Geologic Mapping Program (NCGMP) as well as research programs for data preservation, minerals and energy resources, and geologic hazards.

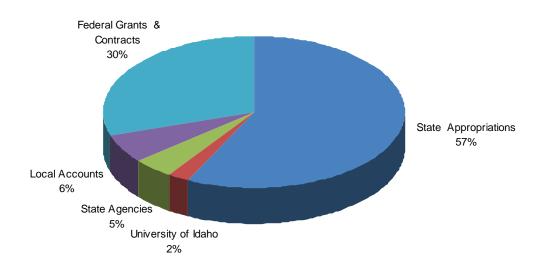
Fiscal Overview

This year, the State Legislature funded a merit salary increase that averaged 3 percent and a one time capital outlay for obsolete computer replacements. The Survey's operations budget was again funded at base level for FY-08. The 2002-2003 cuts and hold-backs to the budget base continue to adversely impact the agency's mission in research, public service, and education.

Budget Fiscal Year 2008				
Appropriation	Beginning Balance	Income	Expense	Ending Balance
Personnel		\$ 838,600.00	\$ 838,600.00	\$ 0.00
Operarating Expense		26,200.00	26,200.00	0.00
Capital Outlay		10,000.00	10,000.00	0.00
Total		874,800.00	874,800.00	0.00
U/I Personnel Funds		33,686.28	33,686.28	0.00
Local Accounts	\$124,029.56	107,703.31	94,152.64	\$13,550.67
Grants and Contracts	NA	456,372.04	456,372.04	NA
Total	\$124,029.56	\$2,347,361.63	\$2,333,810.96	\$13,550.67

NA = not applicable

Sources of Funding



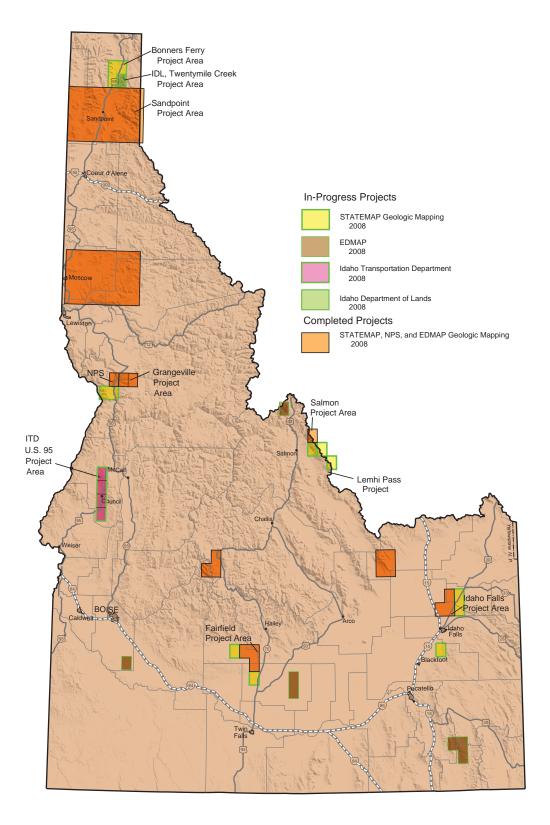
Research

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 is one of the fastest growing states in the country. The growth in population and concomitant expansion of transportation, housing, and industry places greater demands on land, mineral, and water resources. The Survey has a responsibility to provide knowledge and research expertise for conservation and sustainability of state resources. Idaho's growth is occurring primarily within population centers and along transportation corridors. Mapping projects within these zones are designated in long-range plans by the IGMAC. Specific quadrangles in a project area are chosen according to societal and scientific needs. Societal needs include geologic hazards such as earthquakes, landslides, floods, and subsidence; environmental concerns such as surface and ground water contamination; and resource issues such as surface and groundwater quantity, construction aggregate, base metals, phosphate mining and tree nutrition. Scientifically, Idaho's geologic framework is complex and includes rocks from Precambrian to Holocene and terranes in the Northern Rockies, Columbia Plateau, and Great Basin.

Geologic Mapping Projects



In many areas the latest available geologic mapping is small scale and decades old. Our new mapping updates the geologic understanding with modern concepts and techniques. Equally important, the new mapping is digital and is more accessible and usable by the public through the Internet (www.idahogeology.org/Services/GeologicMapping/).

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 \$2.5 million federal funds and matched an equal amount of state money to complete geologic mapping in Idaho. In 2008 the Idaho ranked highest in the nation with the largest award of all STATEMAP proposals. During the year Survey geologists mapped in the five Statemap project areas: Fairfield, Grangeville, Idaho Falls, Salmon, and Sandpoint shown on the adjacent map. Other mapping projects and funding sources include: White Bird (National Park Service), Lemhi Pass (U.S. Geological Survey, External Mineral Research Program), Twentymile Creek (Idaho Department of Lands), and US 95-Tamarack to Indian Valley (Idaho Transportation Department). The nine mapping project areas are shown on the adjacent index map. This year Survey geologists mapped thirty-five 7.5 minute quadrangles.

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.

Hydrogeology

The Survey conducts research applicable to improving the management of Idaho's ground-water resources in cooperation with state and federal agencies, local governments, universities, and community and tribal water users across the state. This year Survey geologists presented overviews of the local geology at a series of public ground water meetings throughout Idaho sponsored by the Idaho Association of Cities.

As part of the mapping under the STATEMAP program, researchers developed a methodology to utilize the vast amount of untapped lithologic information contained in the Well Construction Database (drillers' logs) maintained by the state. In certain stratigraphic contexts that are sufficiently well understood (like the eastern Snake River Plain), the lithologic contrasts that drillers report during water-well drilling provide information on the subsurface for statistically valid modeling of certain stratigraphic features. The methodology relies on Geographic Information Systems (GIS) technology and has been used successfully on the eastern Snake River Plain (ESRP) in the Idaho Falls area to create maps of overburden thickness, topography of the buried volcanic surface, geometry of Snake River fluvial deposits, and the elevations and thicknesses of major sedimentary interbeds within the basalt aquifer.

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.

The Survey continues to cooperate with other state and federal agencies, university programs, and water-user groups throughout Idaho to better understand the geology influencing the flow and recharge of ground water and the distribution and transport of ground-water contaminants. Results are provided to end-users for ground-water resource development and protection. Research applications include modeling the aquifer stratigraphy, analyzing and mapping the ground-water quality, and assessing ground-water vulnerability to septic sewage disposal.

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 Website support. The lab continues to compile geology from around the state in a geologic map database in addition to producing geologic maps. Thirty-three geologic maps were published this year. Most of these are available as print-on-demand color maps. All are available for free on the Web site, and paper copies can be purchased through the Survey's sales office.

The digital mapping lab added the Potlatch 30' x 60' geology tile to the statewide geologic map database. The statewide geologic map database will eventually supply map users with the best available data while helping the Survey to manage the data better and implement software updates and migration. The ESRI Geodatabase format lends itself to interactive online delivery.

The 12th annual Digital Mapping Techniques conference was hosted at the University of Idaho by the Idaho Geological Survey in May. The conference was sponsored by the USGS and the AASG to bring together experts to discuss the latest developments in digital cartography and the computer production of geologic maps, including the newest ideas in designing and implementing databases that are at the heart of

these complex mapping systems. Attendees to the invitation-only event include scientists, cartographers, specialists in geographic information systems from around the world. Select students from the University of Idaho and Lewis-Clark State College also participated.

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.

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, a summer field workshop 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 FY08, the Survey conducted earthquake and landslide hazard mitigation activities with funding from the Idaho Bureau of Homeland Security. These activities consisted of the following:

- Idaho Seismic Advisory Committee. The Survey organized and chaired the Boise meeting, bringing together 26 earth science and emergency manager experts for the purpose of promoting seismic hazard mitigation in Idaho.
- Landslide Hazards of Idaho brochure. This full-color,
 8-panel brochure helps homeowners, emergency

managers, and elected officials better understand how Idaho's geology and climate lead to landslides.

- *Idaho is Earthquake Country* poster. This poster reminds the public that Idaho experiences damaging earthquakes and suggests steps to reduce seismic risks.
- Purchase of a USArray (Earthscope) seismic station. The station is located 23 miles east of Boise. It will provide improved seismic monitoring for the largest population in Idaho.

Mines and Mining

Active Mining

A review of the state's mining for the year, a collaborative effort with the private sector and other government agencies, was presented at the Northwest Mining Association meeting held in Spokane, Washington. The report shows that mining and exploration activity in Idaho continued its upswing in 2007 as a result of favorable markets and higher commodity prices. Final USGS statistics of non-fuel mineral production value for the state in 2006 totaled \$797 million, a drop from the 2005 record production of \$ 906 million. In spite of rising metal prices in the last half of the year, the 2007 production value (\$817 million is USGS preliminary estimate) will be affected by several development projects nearing completion in 2007, with most of the increased production not due until 2008-2009 time frame. Construction-related materials were just starting to note the impact of the housing market slowdown in the last part of 2007.

Molybdenum is expected to contribute the most in value, particularly as prices for molybdenum oxide rose in 2007 to the \$25-\$30 per pound range, up from the \$25 per pound average in 2006 (but lower than in 2005). Silver and base metals from north

Idaho's Silver Valley also increased in value as silver prices were in the \$13 - \$15 per troy ounce range for 2007. In addition to metals, the phosphate markets, both for fertilizer and elemental phosphorus, and aggregate markets were healthy in 2007. Those operations had excellent and busy years, accounting for an estimated 25% of Idaho's nonfuel mineral production value, but a much larger share of the total mining employment in the state.

Idaho's Division of Financial Management has noted the turnaround in Idaho's mining industry and the rise in jobs and general business activity at mining centers. In their January, 2008, Idaho Economic Forecast, the DFM noted the 5-year decrease in mining employment from 1997 (3,000 jobs) to 2002 (1,750 jobs), followed by a gradual expansion with employment in 2007 topping 2,700 well-paid jobs in Idaho mining. This does not include the 1,000 plus employees in the chemical processing plants associated with the phosphate industry of southeastern Idaho. In addition they noted the increased number of mine expansions and exploration activity, attributing it to overall U.S. economic development. Because many Idaho-produced mineral commodities are distributed in global markets, the state's mining industry may weather any Idaho or national downturn. The complete text of the 2007 review of the mining industry was published in the May issue of Mining Engineering, and is also 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.

Mine Histories

The Survey continues with its popular — and award-winning — series of mine history reports, which combine published

references with unpublished materials from its mineral property files. Histories of the Lucky Lad, Franklin D, and Mountain Chief mines in Valley County and the Buckhorn and related mines in Lemhi County were published during the year.

In May the Idaho State Historical Society celebrated Idaho's Mining History as the theme for the 20th Anniversary of Idaho Archeology and Historic Preservation Month. Staff of the Idaho Survey participated in this special event by joining other groups in public presentations and displays at museums and libraries in Idaho.

Abandoned Mine Lands

The Abandoned Mine Lands project wound down during the year. Limited new funds were added to the contract with the U.S. Bureau of Land Management, extending the project to 2010. During the year, the Survey published two Staff Reports detailing abandoned mine land field investigations in the Salmon-Challis National Forest from previous years.

Lemhi Pass Research

Research continued on a project, "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," funded by the U.S. Geological Survey's Mineral Resources External Research Program.

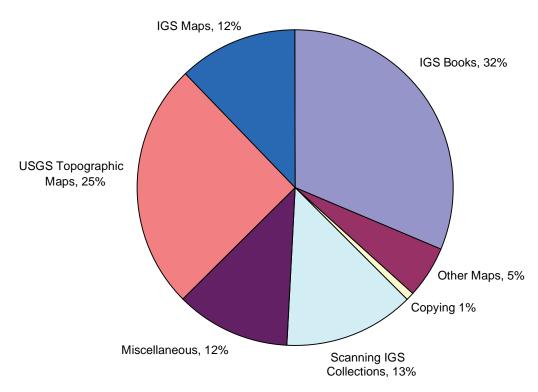
Outreach

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

Since 2000, the Survey has released 231 publications that include books, maps, reports, databases, and posters. The rate of output now averages over 28 publications a year. Geologic maps and Staff Reports represent most of the increase (see the Staff Publications and Activities section).





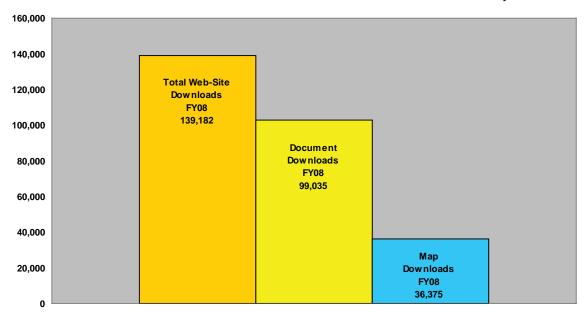
The substantial output in the Survey's geologic mapping in recent years can be traced back to the late 1970s when the agency broadened its published research to include topical and geologic maps designed to stand alone as finished products. Along the way, the Survey developed a solid mapping capability. Sensible investments in digital technology and computeraided cartography greatly expanded the potential of this small research agency to create very accurate maps using state-of-theart methods. In 1993, the nation's state surveys joined in support of the National Cooperative Geologic Mapping Act. Since then, The Survey has competed successfully in the federal program and received more than \$2.4 million to map 154 quadrangles. Two new publication series, Digital Geologic Maps and Digital Web Maps, were developed to address the expanded output, and they now account for over 100 titles in 8 years. Since 1990, 29 more titles have been added to the Geologic Map series, and the Surficial Geology Map series, started in 1991, has 14.

Since the late 1970s, the Survey has released 540 publications. Of these, nearly 210 are the stand-alone maps, over 80 percent of them geologic. These numbers reflect a strong research output, especially in mapping the state's geology.

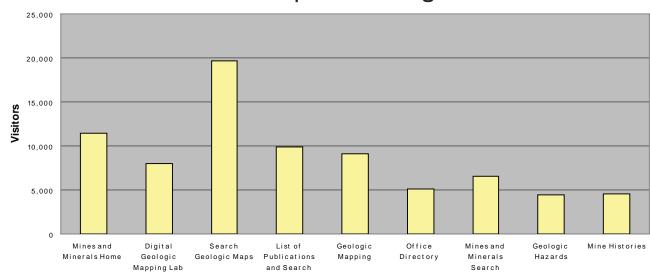
The Web Site—www.idahogeology.org

The Survey's 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



Most Popular Web Pages



Mine Safety Training

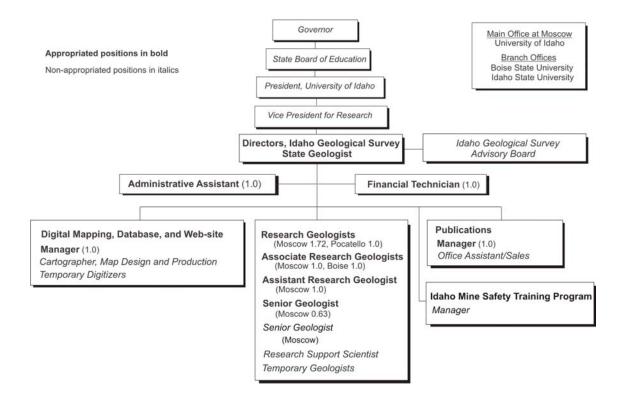
The U.S. Department of Labor's Mine Safety and Health Training Program in Idaho is administered by the Survey. During FY-08, this program trained and certified over 1,800 miners and industry supervisors in the state and region an increase of more than 300 over the previous year.

Earth Science Education

The Survey advances its commitment to earth science education through a summer field workshop for Idaho's educators and with materials available on its Web site. Over the years, the workshop has visited various geologic locales and served different Idaho communities. The annual Idaho Earth Science Educator Summer Field Workshop was held July 8-13, 2007 at Island Park near Yellowstone National Park. 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. Fourteen K-12 educators from around the state attended the workshop. A special part of the workshop was collaboration between Yellowstone National Park geologists, Survey, and Homeland Security staff to instruct participants on hazard mitigation, hydrothermal steam explosions, caldera eruptions, and the effects of the 1959 Hebgen Lake earthquake. The workshop culminated in teachers preparing materials for use in their own classrooms. In October 2007, the Survey and Homeland Security co-sponsored a display on geologic hazards at the Idaho Science Teachers Association annual meeting in Boise. The display served as both an educational resource and as a recruiting station for future participants at the summer field workshop. The two agencies also cosponsored a teleconference in December for the Idaho Earth Science Teachers Association in which future natural hazard education activities were planned.

ORGANIZATION AND PERSONNEL

Organization Chart



Directory

Main Office at Moscow

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

Branch Office at Boise

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

Branch Office at Pocatello

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
Charlotte D. Fullerton	Management Assistant
Christina L. Otto	Administrative Assistant
Tracy Kanikkeberg	Financial Technician
Sherry E. Pixley	Office Assistant/Sales
Michelle Hughes	Office Specialist II, Pocatello
Melissa M. Neiers	Financial Tech, Pocatello

Research, Full Time

Roy M. Breckenridge	· ·
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	
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
James R. Cash	Earth Science Instructor
Nelda A. Davis	
Glenn F. Embree	Geologist
Michelle L. Gordon	
Clinton W. Johnson	Work Study
Cherry L. Kersey	
Mark D. McFaddan	Geologist
Keegan L. Schmidt	Geologist
Kenneth F. Sprenke	Geologist
Brenda M. Steel	
David E. Stewart	Geologist
Theresa A. Taylor	
Peter J. Wampler	

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

PUBLICATIONS AND ACTIVITIES

Publications

- Age and Significance of Former Low-Altitude Corrie Glaciers on Hoy, Orkney Islands, by Colin K. Ballantyne, Adrian M. Hall, William Phillips, Steven Binnie, and Peter W. Kubik: Scottish Journal of Geology, v. 43, no. 2, p. 107-114, 2007.
- Annual Report of the Idaho Geological Survey, Fiscal Year 2007: Idaho Geological Survey Web site, December.
- Bedrock Geologic Map of the Troy Quadrangle, Latah County, Idaho, by John H. Bush, Reed S. Lewis, and Kurt L. Priebe: Idaho Geological Survey Geologic Map 46, scale 1:24,000, 2007.
- Extent of the Last Ice Sheet in Northern Scotland Tested With Cosmogenic ¹⁰Be Exposure Ages, by W.M. Phillips, A.M. Hall, C.K. Ballantyne, S. Binnie, P.W. Kubik, S. Freeman: Journal of Quaternary Science v. 23, no. 2, p. 101-107, 2008.
- Geologic Map of the Cocolalla Quadrangle, Bonner County, Idaho, by Russell F. Burmester, Reed S. Lewis, Mark D. McFaddan, Roy M. Breckenridge, David M. Miller, and Fred K. Miller: Idaho Geological Survey Digital Web Map 91, scale 1:24,000, 2007.
- Geologic Map of the Colburn Quadrangle, Bonner County, Idaho, by Reed S. Lewis, Steven E. Box, Roy M. Breckenridge, Russell F. Burmester, and Mark D. McFaddan: Idaho Geological Survey Digital Web Map 89, scale 1:24,000, 2007.
- Geologic Map of the Elmira Quadrangle, Bonner County, Idaho, by Reed S. Lewis, Russell F. Burmester, and Roy M. Breckenridge: Idaho Geological Survey Digital Web Map 90, scale 1:24,000, 2007.
- Geologic Map of the Headquarters 30 x 60 Minute Quadrangle, Idaho, by Reed S. Lewis, Russell F. Burmester, Mark D. McFaddan, John

- D. Kauffman, P. Ted Doughty, William L. Oakley, and Thomas P. Frost: Idaho Geological Survey Digital Web Map 92, scale 1:100,000, 2007.
- Geologic Map of the Kooskia 30 x 60 Minute Quadrangle, Idaho, by Reed S. Lewis, Russell F. Burmester, John D. Kauffman, Roy M. Breckenridge, Keegan L. Schmidt, Mark D. McFaddan, and Paul E. Myers: Idaho Geological Survey Digital Web Map 93, scale 1:100,000, 2007.
- Geologic Map of the Oden Bay Quadrangle, Bonner County, Idaho, by Reed S. Lewis, Mark D. McFaddan, Roy M. Breckenridge, and Russell F. Burmester: Idaho Geological Survey Digital Web Map 88, scale 1:24,000, 2007.
- History of the Buckhorn and Related Mines, Lemhi County, Idaho, by Victoria E. Mitchell: Idaho Geological Survey Staff Report 07-8, 18 p., 2007.
- History of the Lucky Lad, Franklin D, and Mountain Chief Mines, Valley County, Idaho, by Victoria E. Mitchell: Idaho Geological Survey Staff Report 08-1, 19 p., 2008.
- *Idaho*, by Roy M. Breckenridge, in Laura K. Wisk, comp., State Geological Survey Fact Book: Association of American State Geologists, 2007 edition, p. 12, 2007.
- *Idaho*, by Virginia S. Gillerman and Earl H. Bennett: Mining Engineering, v. 60, no. 5, p. 84-88, 2008 (2007 statewide mining review).
- *Idaho 2005 Chapter*, by Arnold Tanner and Virginia S. Gillerman: U.S. Geological Survey Minerals Yearbook 2005, v. II, p. 14.0-14.7, 2008.
- *Idaho Is Earthquake Country,* by William M. Phillips: Idaho Geological Survey poster (11" x 17"), 2008.
- Landslide Hazards in Idaho, by W. Phillips, D. Garwood, and R. Stewart: Idaho Geological Survey GeoNote 44, 2008.
- *List of Publications*—2008, by Roger C. Stewart: Idaho Geological Survey annual catalogue, 61 p.

- Major Oxide and Trace Element Analyses for Volcanic Rock Samples From Idaho, 1978 Through 2005, by John D. Kauffman: Idaho Geological Survey Digital Analytical Data 1, 2008 (updated version).
- Mineral Resources, by R.M. Breckenridge, Minerals Committee Chair: Association of American State Geologists Fact Sheet, 1 p., AASG. org Web site, 2008.
- North Idaho and Western Montana Nutrition Guidelines by Rock Type:
 Nutrition Guidelines for Use With Current Digital Geology for
 Idaho and Montana, by Mariann T. Garrison-Johnston, Leonard
 R. Johnson, and Reed S. Lewis: Intermountain Forest Tree
 Nutrition Cooperative, College of Natural Resources, University of
 Idaho, 109 p., 2007.
- Porphyry and Other Molybdenum Deposits of Idaho and Montana, by Joseph E. Worthington: Idaho Geological Survey Technical Report 07-3, 22 p., 2007.
- Site Inspection Report for the Abandoned and Inactive Mines in the Salmon-Challis National Forest: Mackay Area, Custer County, Idaho, by Ted Erdman and Victoria E. Mitchell: Idaho Geological Survey Staff Report 08-2, three DVDs, 2008.
- Site Inspection Report for the Abandoned and Inactive Mines in the Salmon-Challis National Forest: Northern Lemhi County and Vicinity, Idaho, by Ted Erdman and Victoria E. Mitchell: Idaho Geological Survey Staff Report 07-7, data, picture, and video files, 2007.
- Summary of State Activities, Idaho, by R.M. Breckenridge: Association of American State Geologists, State Geologists Journal, 2007.
- Tectonic Uplift, Threshold Hillslopes, and Denudation Rates in a Developing Mountain Range, by S.A. Binnie, W.M. Phillips, M.A. Summerfield, and L.K. Fifield: Geology v. 35, no. 8, p. 743-746, 2007.

Abstracts

- Application of in Situ Cosmogenic Nuclide Analysis to Landform Evolution in (Palaeo)-Periglacial Southwest Britain, by J.H. Hagg, M.A. Summerfield, C. Schnabel, W.M. Phillips, and S. Freeman: Geochimica et Cosmochimica Acta, v. 71, no. 15, p. A368-A368 supplement S, 2007.
- Evidence for Recurrent Paleoproterozoic and Mesoproterozoic
 Magmatism and Metamorphism in the Boehls Butte-Clarkia Area,
 North-Central Idaho, USA, by Jeffrey D. Vervoort, Nasser A.
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 Society of America Abstracts with Programs, v. 39, no. 6, p. 245,
 2007.
- Establishing a Chronology for the World's Oldest Glacier Ice, by D.R. Marchant, W.M. Phillips, J.M. Schaefer, G. Winckler, J.L. Fastook, D.E. Shean, D.E. Kowalewski, J.W. Head, III, and A.R. Lewis: U.S. Geological Survey and The National Academies, USGS Open-File Report 2007-1047, extended abstract 054, 4 p., 2007.
- Ground Water in the Portneuf Watershed: A Resource Under Stress, by J. Welhan: Portneuf Watershed Symposium, presenter abstracts, Pocatello, p. 14.
- Idaho Geologic Map Data in a Statewide Geodatabase, by Loudon R. Stanford, Kurt L. Othberg, and Roy M. Breckenridge: Geological Society of America Abstracts with Programs, v. 39, no. 6, p. 164, 2007.
- Minerals Assessment, by Roy M. Breckenridge and Michael Zientek: Association of American State Geologists, 100th Annual Meeting and Centennial Conference, Abstract in Program, Shepherdstown, West Virginia, 2 p., 2008.
- Minerals Supply, by Roy M. Breckenridge and John DeYoung: Association of American State Geologists, 100th Annual Meeting and Centennial Conference, Abstract in Program, Shepherdstown, West Virginia, 2 p., 2008.
- Multiple Punctuated Pulses of Voluminous Silicic Magmatism in Idaho: In Situ Geochronology and Isotope Geochemistry of the Idaho

- *Batholith*, by Richard M. Gaschnig, Jeffrey D. Vervoort, Reed S. Lewis, and Elizabeth King: Geological Society of America Abstracts with Programs, v. 39, no. 6, p. 608, 2007.
- New Cosmogenic ¹⁰Be Exposure Age Chronology for Payette Moraines, Central Idaho, USA, by William M. Phillips, Roy M. Breckenridge, Kurt L. Othberg, and Dean L. Garwood: Geological Society of America Abstracts with Programs, v. 39, no. 6, p. 514, 2007.
- Newly Discovered Intrusives at the Lemhi Pass Thorium-REE Iron Oxide District, Idaho: Cambrian Syenite and Mystery Ultramafics—Signatures of a Buried Alkaline Complex or Two Systems? by V.S. Gillerman, C.M. Fanning, P.K. Link, P. Layer, and R.F. Burmester: Geological Society of America Abstracts with Programs, v. 40, no. 1, p. 51, 2008.
- Role of NE-Striking Oblique Dextral Thrust Faults in the Development of the Wallowa Terrane in the Northern Cordillera: Implications for Terrane Accretion and Clockwise Rotation, by Keegan L. Schmidt and Reed S. Lewis: Geological Society of America Abstracts with Programs, v. 39, no. 6, p. 290, 2007.
- Sources of Ground-Water Nitrate Contamination, by J. Welhan: Idaho Environmental Summit, Program and Abstracts, Boise, p. 20., 2008.
- Sources of Nitrate Contamination in Ground Water of the Pleasant Valley Area, Power County, Idaho, by J. Welhan: Lemley 2007 Intermountain Conference on the Environment, Program and Abstracts, Pocatello, p. 9., 2007.
- Thorium and Rare Earths in the Lemhi Pass Region, Idaho, by R. Reed and V. Gillerman: Society for Mining, Metallurgy, and Exploration, Inc. (SME) annual meeting program, p. 90-91, 2008.

Reports

- Association of American State Geologists' Minerals and Policy
 Committee Report, by Roy M. Breckenridge, chair: Association of
 American State Geologists 100th annual meeting, Shepherdstown,
 West Virginia, June.
- Digital Geologic Map Database of the Potlatch 30' x 60' Quadrangle, Idaho: An ESRI GeoDatabase in ArcGIS 9.2, by Loudon R. Stanford: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, April.
- Geologic Map of the Goodwin Meadows Quadrangle, Idaho County, Idaho, by John D. Kauffman, Reed S. Lewis, David E. Stewart, and Keegan L. Schmidt: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.
- Geologic Map of the Homer Youngs Peak Quadrangle, Lemhi County, Idaho and Beaverhead County, Montana, by Jeffery D. Lonn, Reed S. Lewis, Russell F. Burmester, and Loudon R. Stanford: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.
- Geologic Map of the Lewisville Quadrangle, Jefferson and Bonneville Counties, Idaho, by William M. Phillips and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.
- Geologic Map of the Macon Quadrangle, Camas and Blaine Counties, 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 Magic Reservoir West Quadrangle, Blaine and Camas counties, 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 Menan Buttes Quadrangle, Jefferson and Madison Counties, Idaho, by William M. Phillips and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

- Geologic Map of the Rigby Quadrangle, Jefferson and Bonneville Counties, Idaho, by William M. Phillips and John A. Welhan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.
- Geologic Map of the Summit Reservoir Quadrangle, Camas and Lincoln Counties, 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 White Bird Quadrangle, Idaho County, Idaho, by Dean L. Garwood and Roy M. Breckenridge: Idaho Geological Survey progress report to National Park Service, December.
- Geologic Map of the White Bird Quadrangle, Idaho, by Dean L. Garwood, Keegan L. Schmidt, John D. Kauffman, David E. Stewart, Reed S. Lewis, Kurt L. Othberg, and Peter J. Wampler: Idaho Geological Survey report to the National Park Service, scale 1:24,000, December.
- Geologic Map of the White Bird Hill Quadrangle, Idaho County, Idaho, by John D. Kauffman, Reed S. Lewis, Keegan L. Schmidt, and David E. Stewart: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.
- Hydrogeology of South Ross Fork and Buckskin Basins, Fort Hall
 Indian Reservation, Idaho: Recharge Potential, Effect of Pumping
 on Ground-Water Levels, and Implications for Water Supply
 Management by J. Welhan: Final report to Tribal Water Resources
 Department, Fort Hall Indian Reservation, October.
- Idaho Earth Science Teachers Summer Field Workshop, Island Park, Idaho, by William M. Phillips: Final report to Idaho Bureau of Homeland Security, November, 2007.
- Idaho Geological Survey's Agency Profile and Performance Indicators, 2007, by Roy M. Breckenridge and Kurt L. Othberg: Idaho State Board of Education and Division of Financial Management, June.
- Idaho Geological Survey's Strategic Plan 2009-2013, by Roy M.
 Breckenridge and Kurt L. Othberg: State Board of Education,
 University of Idaho, Moscow, July.

- *Idaho STATEMAP Products*, by Roy M. Breckenridge: Association of American State Geologists, poster display, Shepherdstown, West Virginia, June.
- *Idaho's Ground Water*, by Idaho Geological Survey staff: Idaho Geological Survey fact sheet, 2007.
- *Mapping*, by Idaho Geological Survey staff: Idaho Geological Survey fact sheet, 2007.
- *Minerals*, by Idaho Geological Survey staff: Idaho Geological Survey fact sheet, 2007.
- Minerals Committee Midyear Report, by Roy M. Breckenridge, chair: Association of American State Geologists midyear meeting, Denver, October.
- Minerals Committee Report, by Roy M. Breckenridge: Association of American State Geologists Liaison, Washington, D.C., March.
- Minerals Committee Summary, by Roy M. Breckenridge: Association of American State Geologists, Liaison, report to executive committee, March.
- National Cooperative Geologic Mapping Program, Idaho, by Idaho Geological Survey staff: U.S. Geological Survey information sheet, 1 p., 2008.
- Preliminary Geologic Map of the Sandpoint 30 x 60 Minute Quadrangle, Idaho and Montana, and the Idaho Part of the Chewelah 30 x 60 Minute Quadrangle, by Reed S. Lewis, Russell F. Burmester, Roy M. Breckenridge, and William M. Phillips: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:100,000, April.
- Recommendations for Ground-Water Management in South Ross Fork and Buckskin Basins, Fort Hall Indian Reservation, Idaho: Summary of the Full Report, by J. Welhan: Executive summary to Tribal Water Resources Department, Fort Hall Indian Reservation, January.
- Sources of Nitrate Contamination in Ground Water of Pleasant Valley, Power County, Idaho, by J. Welhan: Final report to Idaho Department of Environmental Quality, December.

STATEMAP Projects in the Moscow Area, Field Trip Guide, by Dean L. Garwood, John D. Kauffman, Roy M. Breckenridge, Kurt L. Othberg, Reed S. Lewis, Keegan L. Schmidt: U.S. Geological Survey National Cooperative Geological Mapping Program, May.

Presentations

- Cosmogenic Nuclides, by William M. Phillips: Geology 423, Principles of geochemistry, Department of Geological Sciences, University of Idaho, November.
- Demonstration of Geologic Map Statewide Geodatabase, by Loudon R. Stanford: Utah Geological Survey GIS staff, Salt Lake City, Utah, September.
- Demonstration of IGS Mapping Lab Operations and Wacom Cintig Tablet, by Jane S. Freed and Theresa A. Taylor: Digital Mapping Techniques Workshop, Moscow, May.
- Demonstration of IGS Mapping Lab Operations: From Data Capture to Geologic Map Statewide Geodatabase, by Loudon R. Stanford: Geology Division, Washington Department of Natural Resources, Moscow, July.
- *Direct Digitizing Experience: Cintiq*, by Theresa A. Taylor and Loudon R. Stanford: Digital Mapping Techniques Workshop poster, Moscow, May.
- Effect of Recharge and Pumping on Ground Water in South Ross Fork and Buckskin Basins: Implications for Water Supply Management, by John A. Welhan: Fort Hall Indian Reservation, Tribal Business Council, May.
- Geologic Hazards of Idaho, by William M. Phillips: Idaho Science Teachers Association annual meeting, poster presentation, Boise, October.
- Geologic Hazards of Idaho, by William M. Phillips: 10th Annual Idaho Prepared Conference, Coeur d'Alene, September.
- Geologic History of Latah County, by Reed S. Lewis: Idaho Archaeology and Historic Preservation Month, 1912 Center, Moscow, May.

- Geologic History of Northern Idaho, by Reed S. Lewis: Idaho Archaeology and Historic Preservation Month, Coeur d'Alene Public Library, Coeur d'Alene, May.
- Geologic Perspective on Human Impacts to Our Ecosystem, by Virginia S. Gillerman: Congregation Ahaveth Beth Israel, panel discussion, Boise, January.
- Geology of North-Central Idaho, by John D. Kauffman, Kurt L. Othberg, and Dean L. Garwood: Association of Idaho Cities, open-house session, poster presentation, Lewiston, April.
- Geology of the Lewiston Basin, by Dean L. Garwood: STATEMAP field trip, north-central Idaho, May.
- Geology of the Portneuf Watershed, by J. Welhan: Bannock County Historical Museum, poster and display, Pocatello, July.
- Glacial Geomorphology, by William M. Phillips: Geology 335, Department of Geological Sciences, University of Idaho, 6 lectures, March-April.
- Ground Water in the Portneuf Watershed: A Resource Under Stress, by J. Welhan: Portneuf Watershed Symposium, Pocatello, June.
- Hazardous Faults in Idaho, by William M. Phillips: Workshop on Evaluation of Hazardous Faults in the Intermountain West Region, U.S. Geological Survey, Golden, Colorado, June.
- Hydrogeology of Eastern Snake River Plain, Idaho, and the Water for America Initiative, by William Phillips: U.S. Geological Survey, National Cooperative Geologic Mapping Program, Moscow, May.
- Hydrology of the Portneuf Watershed, by J. Welhan: Bannock County Historical Society, Pocatello, November.
- *Ice Dams and Glacial Floods in North Idaho*, by Roy M. Breckenridge: Idaho Historical Society trustees meeting, presentation and field trip, Sandpoint, June.
- Idaho Geological Survey Mapping in Northern Idaho, by R.M.
 Breckenridge and R.S. Lewis: Idaho Association of Cities water workshop, poster presentation, Coeur d'Alene, April.

- Idaho Geologic Map Data in a Statewide Geodatabase, by Loudon R. Stanford, Kurt L. Othberg, and Roy M. Breckenridge: Geological Society of America annual meeting, theme session T146—Geologic mapping: Innovations and interoperability, posters, Denver, Colorado, October.
- Idaho Mining and Exploration, 2007, by Virginia S. Gillerman: Northwest Mining Association annual meeting, Spokane, Washington, December.
- Idaho STATEMAP Overview, by Roy M. Breckenridge and Idaho Geological Staff: U.S. Geological Survey STATEMAP team and Idaho Geologic Mapping Advisory Committee, June.
- Inland Northwest Research Alliance Subsurface Architecture Field Trip, by J. Welhan, M. McCurry, and D. Rodgers: Field guidebook, Pocatello-Hagerman, March.
- Introduction and Welcome, by R.M. Breckenridge: Digital Mapping Techniques Workshop, Moscow, May.
- The Lower Portneuf River Valley Aquifer: Water Balance, Capacity, and Water Quality, by J. Welhan: Geology 100, Department of Geosciences, Idaho State University, April.
- A Methodology Based on Probability Kriging to Assist in Updating Statewide Nitrate Priority Area Maps, by J. Welhan: Idaho Department of Environmental Quality, ground-water monitoring technical committee, Boise, July.
- Minerals and Policy Committee 2008 Report, by Roy M. Breckenridge: Association of American State Geologists 100th annual meeting, Shepherdstown, West Virginia, June.
- Minerals Committee Report, by Roy M. Breckenridge: Association of American State Geologists midyear meeting, Denver, October.
- New Cosmogenic ¹⁰Be Exposure Age Chronology for Payette Moraines, Central Idaho, USA, by William M. Phillips, Roy M. Breckenridge, Kurt L. Othberg, and Dean L. Garwood: Geological Society of America annual meeting, Denver, Colorado, October.
- Newly Discovered Intrusives at the Lemhi Pass Thorium-REE Iron Oxide District, Idaho: Cambrian Syenite and Mystery Ultramafics—

- Signatures of a Buried Alkaline Complex or Two Systems? by V.S. Gillerman, C.M. Fanning, P.K. Link, P. Layer, and R.F. Burmester: Geological Society of America Rocky Mountain-Cordilleran section meeting, Las Vegas, Nevada, March.
- New OSL Ages for Loess in Eastern Snake River Plain, by William Phillips: Idaho Geological Survey staff, Moscow, January.
- Progress Update on Statistical Analysis of Borehole Data, by C. Stroupe and J. Welhan: Idaho State University, January.
- Results From Geologic Mapping in the Sandpoint Area, by Reed S. Lewis: Belt association annual Meeting, Spokane, Washington, December.
- Selected Geology of North Central Idaho, by Dean L. Garwood: Idaho Association of Cities, drinking water meeting, Lewiston, April.
- Thorium and Rare Earths in the Lemhi Pass Region, Idaho, by R. Reed and V. Gillerman: Society for Mining, Metallurgy, and Exploration, Inc. (SME) annual meeting, Salt Lake City, Utah, February.
- Update on Geologic Mapping in Northern Idaho, by Reed S. Lewis: Intermountain Forest Tree Nutrition Cooperative annual meeting, Moscow, April.
- *Update on Ice Age Floods and IGS Mapping*, by Roy M Breckenridge: Bonner County Historical Society quarterly meeting, presentation and field trip, Blanchard, May.

Professional Activities

- Advisory board, Advanced National Seismic System, Intermountain West Regional Advisory Council (R.M. Breckenridge).
- Association of American State Geologists annual meeting, Shepherdstown, West Virginia, June (R.M. Breckenridge).
- Association of American State Geologists midyear meeting, Denver, Colorado, October (R.M. Breckenridge).
- Association of American State Geologists spring liaison meeting, Washington, D.C., March (R.M. Breckenridge).

- Association of American State Geologists western cluster meeting, Seattle, Washington, May (R.M. Breckenridge).
- Belt Association annual meeting, Spokane, Washington, December (R.S. Lewis).
- Chair, minerals and policy committee, Association of American State Geologists (R.M. Breckenridge).
- Chair, search committee, financial technician position, Idaho Geological Survey, July-October (K.L. Othberg).
- Chair and organizer, Idaho Seismic advisory committee, Boise, September (W.M. Phillips).
- Co-chair, session on "Data in the Dumpsters: How Geology and Mineral Exploration Files Are Managed," Northwest Mining Association 112th annual convention, Spokane, Washington, December (V.S. Gillerman).
- Co-coordinator, field trip, Inland Northwest Research Alliance Subsurface Science graduate program, March (J.A. Welhan).
- Co-facilitator, minerals assessment session, Association of American State Geologists 100th annual meeting and centennial conference, Shepherdstown, West Virginia, June (R.M. Breckenridge).
- Co-facilitator, minerals supply session, Association of American State Geologists 100th annual meeting and centennial conference, Shepherdstown, West Virginia, June (R.M. Breckenridge).
- Co-Instructor, Geosciences 496-1, Independent study: Investigation of lead isotope ratios in minerals from Lemhi Pass district, Idaho (2 credits), Department of Geosciences, Boise State University, spring semester, Boise (V.S. Gillerman).
- Co-instructor, Idaho Earth Science Teacher Summer Field Workshop, Island Park, July (R.M. Breckenridge).
- Co-leader, field trip, Inland Northwest Research Alliance Subsurface Architecture, Pocatello-Hagerman, March (J.A. Welhan).
- Data capture working group teleconference, Association of American State Geologists and U.S. Geological Survey, February.

- Delegate, Western States Seismic Policy Council annual meeting, Reno, Nevada, September-October (W.M. Phillips).
- Digital Mapping Techniques Workshop 2008, Association of American State Geologists and U.S. Geological Survey, Moscow, May (R.M. Breckenridge, J.S. Freed, D.L. Garwood, R.S. Lewis, W.M. Phillips, L.R. Stanford, T.A. Taylor).
- Exhibitor, Idaho Science Teachers Association meeting, Boise, October (W.M. Phillips).
- Fellow, Society of Economic Geologists (V.S. Gillerman).
- Field trip, co-leaders, STATEMAP review panel, U.S. Geological Survey, National Cooperative Geologic Mapping Program, Moscow, May (R.M. Breckenridge, D.L. Garwood, J.D. Kauffman, R.S. Lewis, K.L. Othberg, K.L. Schmidt).
- Field trip, Idaho batholith, arranged for visiting Washington State University seminar speaker, September (R.S. Lewis).
- Field trip, STATEMAP, north-central Idaho, May (D.L. Garwood).
- Field trip preview, 2008 Earth Science Educators Field Workshop, McCall, June (D.L. Garwood, W.M. Phillips).
- Field trip, terrestrial laser scanning of Borah Peak fault scarp with U.S. Geological Survey, August (W.M. Phillips).
- Geological advisor, Box Canyon field trip, University of Wisconsin research group, Hagerman, September (V.S. Gillerman).
- Geological Society of America annual meeting, Denver, Colorado, October (R.M. Breckenridge, W.M. Phillips).
- Geological Society of America, Rocky Mountain-Cordilleran section meeting, Las Vegas, Nevada, March (V.S. Gillerman).
- Grant administrator training program and certification, Office of Sponsored Programs, University of Idaho, Moscow, October-February (T.T. Kanikkeberg).
- Iceland's geothermal delegation, Office of Energy Resources, Boise, May (V.S. Gillerman).

- Idaho Archaeology and Historic Preservation Month, Nez Perce National Historical Park Visitor Center, Spalding, May (D.L. Garwood).
- Idaho Bureau of Homeland Security, state agency emergency coordination working group, monthly meetings, Boise (V.S. Gillerman).
- Idaho Geologic Mapping Advisory Committee and STATEMAP meeting, Moscow, May (R.M. Breckenridge, D.L. Garwood, J.D. Kauffman, R.S. Lewis, W.M. Phillips, K.L. Othberg, L.R. Stanford, R.C. Stewart, T.A. Taylor).
- IdahoView (remote sensing) meeting, Boise, October (W.M. Phillips).
- Instructor, Geology 404/504, Natural hazards of the Island Park area, Department of Geological Sciences, University of Idaho Summer School, July (W.M. Phillips).
- Instructor, Geosciences 596-2, Readings in mineral resources (2-credits), Department of Geosciences, Boise State University, spring semester, Boise (V.S. Gillerman).
- Instructor, Idaho Earth Science Teacher Summer Field Workshop, Island Park, July (W.M. Phillips).
- Intermountain Forest Tree Nutrition Cooperative annual meeting, College of Natural Resources, University of Idaho, April (R.S. Lewis, W.M. Phillips).
- Judge, 8th Biannual International Mine Rescue Contest, Fernie, British Columbia, Canada, September (M.J. Weaver).
- Judge, 23rd Central Mine Rescue Contest, Kellogg, May (M.J. Weaver).
- Liaison, Idaho Commission for Libraries (R.C. Stewart).
- Member, American Institute of Professional Geologists (R.M. Breckenridge).
- Member, American Quaternary Association (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, Geological Society of Nevada (V.S. Gillerman).
- Member, geologic hazards and policy committee, Association of American State Geologists, (R.M. Breckenridge).
- Member, Governor's Geothermal Task Force, Boise (V.S. Gillerman).
- Member, Ice Age Floods Institute (R.M. Breckenridge).
- Member, panel on water issues in Idaho, Idaho State University's Intergovernmental Relations (J.A. Welhan).
- Member, Society of Mining Engineers (V.S. Gillerman).
- Member, steering committee, Greater Portneuf Water Resources Partnership (J.A. Welhan).
- Member, steering committee, Idaho Earth Science Teachers Association (R.M. Breckenridge).
- Member, steering committee, North American Digital Geologic Map Data Model (L.R. Stanford).
- Member, technical committee, Idaho Ground-Water Monitoring (J.A. Welhan).
- Members, American Geophysical Union (W.M. Phillips, J.A. Welhan).
- Members, Geological Society of America (R.M. Breckenridge, V.S. Gillerman, R.S. Lewis, V.E. Mitchell, W.M. Phillips).
- Members, Idaho Earth Science Teachers Association (R.M. Breckenridge, W.M. Phillips).
- Members, Northwest Mining Association (V.S. Gillerman, R.S. Lewis).
- Mine Safety and Health Administration refresher course, Boise, May (V.S. Gillerman).
- National Earthquake Conference, Seattle, Washington, April (W.M. Phillips).
- Nevada Quaternary faults working group, Reno, Nevada, November (W.M. Phillips).
- Northwest Mining Association, 112th annual convention, Spokane, Washington, December (R.M. Breckenridge, V.S. Gillerman, R.S. Lewis, M.J. Weaver).

- Organizer, Idaho Earth Science Teacher Summer Field Workshop, Island Park, July (W.M. Phillips).
- Organizers and hosts, Digital Mapping Techniques Workshop, Moscow, May (J.S. Freed, L.R. Stanford, and T.A. Taylor).
- Participant and co-organizer, Idaho Earth Science Teachers Association winter teleconference, December (W.M. Phillips).
- Planning meeting, 2007 revision of the Idaho State Hazard Mitigation Plan, Boise, August (W.M. Phillips).
- Protecting Idaho's Drinking Water, Association of Idaho Cities, training and open house, Idaho Falls, April (W.M. Phillips).
- Registered geologist, Oregon Board of Geologist Examiners (R.M. Breckenridge).
- Representative, Department of Geosciences, Idaho State University (J.A. Welhan).
- Representative, financial information group, Business and Accounting Services, University of Idaho, monthly meetings (T.T. Kanikkeberg).
- Representative, Governor's carbon sequestration advisory committee (J.A. Welhan).
- Representative, graduate faculty, School of Graduate Studies, Idaho State University (J.A. Welhan).
- Representative, Pocatello's geotechnical advisory committee (J.A. Welhan).
- Reviewer, Chapter 4: Earthquake Hazards, 2007 Idaho State Hazard Mitigation Plan, Idaho Bureau of Homeland Security, September-October (W.M. Phillips).
- Reviewer, Geomorphology, July (W.M. Phillips).
- Reviewer, Geomorphology and land-use dynamics program, National Science Foundation, September (W.M. Phillips).
- Reviewer, Journal of Geophysical Research, earth surface processes, March (W.M. Phillips).

- Reviewer, Journal of Quaternary Science, September (W.M. Phillips).
- Reviewer, Quaternary Geochronology, July (W.M. Phillips).
- Reviewer, "Porphyry and Other Molybdenum Deposits of Idaho and Montana," by Joseph Worthington: Idaho Geological Survey Technical Report 07-3 (V.S. Gillerman).
- Secretary, board of directors, Belt Association (R.S. Lewis).
- Seismic advisory council meeting, Idaho Bureau of Homeland Security, Boise, September (V.S. Gillerman).
- Society for Mining, Metallurgy, and Exploration, Inc. (SME) annual meeting, Salt Lake City, Utah, February (V.S. Gillerman).
- State grants meeting, Mine Safety and Health Administration, Eastern Washington University, Cheney, April (M.J. Weaver).
- Taylor Ranch Wilderness Research Workshop, Post Falls, May (R.S. Lewis).
- Technical advisor, planning and zoning department, Bannock County (J.A. Welhan).
- Technical advisor, water resources department, Shoshone-Bannock Tribes (J.A. Welhan).
- Technical advisor, statistical analysis of ground- water monitoring data, Idaho Department of Environmental Quality (J.A. Welhan).
- Tobacco Root Geological Society meeting and field trips, Dillon, Montana, August (R.S. Lewis).
- Tour, Hagerman Valley hydrogeologic project, Idaho Department of Water Resources, June (V.S. Gillerman).
- Tours, mines and prospects, central and southern Idaho, summer and fall (V.S. Gillerman).
- Training session, electronic personnel action forms, Department of Human Resources, University of Idaho, Moscow, November (T.T. Kanikkeberg).
- Training session, employee hiring procedures, Department of Human Resources, University of Idaho, Moscow, March (T.T. Kanikkeberg).

- Training session, policies on gifts, scholarships, endowments, and budgeting, Trust and Investment Office, University of Idaho, Moscow, January (T.T. Kanikkeberg).
- Women in Science, lunch with high school students, University of Idaho at Boise, April (V.S. Gillerman).
- Workshop on evaluation of hazardous faults in the intermountain west region, U.S. Geological Survey, Golden, Colorado, June (W.M. Phillips).

Media Interviews

- Earthquake Hazards in the Boise Area: KBCI-TV Channel 2 News, Boise, April (V.S. Gillerman).
- Earthquake: Idaho's Big One: KPVI-TV Channel 6 News, three-day earthquake preparedness feature, Pocatello, April 29-May 1 (J.A. Welhan).
- Forecasting Earthquakes: Twin Falls Times-News, June 8 (W.M. Phillips).
- *Grant Enables Extensive Mapping of Idaho Geology*: University of Idaho press release, April 3 (K.L. Othberg).
- *Idaho Geological Survey Receives Grant*: University of Idaho Argonaut, April 18 (K.L. Othberg).
- Idaho Is No. 6 in the U.S. for Quake Risk. Are We Prepared?: Idaho Statesman, Boise, June 13 (W.M. Phillips).
- *Mystery of the Megafloods*: PBS TV, NOVA, several rebroadcasts, fall and spring (R.M. Breckenridge).
- Quake Could Be One of Most Recorded in History: Twin Falls Times-News, February 22 (W.M. Phillips).
- Rocks and Minerals: Idaho PBS-TV Channel 4, Dialogue for Kids (D4K), May (V.S. Gillerman).
- What Lies Below—Scientists to Map Geologic Areas in South-Central Idaho: Twin Falls Times-News, April 4 (K.L. Othberg).

Graduate Thesis Committees

- Rachel Brewer, M.S., Geology, Washington State University (R.S. Lewis).
- Cephas Holder, M.S., Geological Sciences, Idaho State University (J.A. Welhan).
- Rich Gaschnig, Ph.D., Geology, Washington State University (R.S. Lewis).
- Keith Gray, Ph.D., Geology, University of Idaho (R.S. Lewis).
- Desiree Staires, M.S., Geological Sciences, Idaho State University (J.A. Welhan).
- Caleb Stroupe, M.S., Geological Sciences, Idaho State University (J.A. Welhan).
- Ashley Tefft, M.S., Geology, Washington State University (R.S. Lewis).

Awards

- Outstanding Contributor to Earth Science Education: Granted by the Idaho Earth Science Teachers Association to William M. Phillips, July.
- State of Idaho Appreciation Award: Granted by the Idaho Department of Commerce in "Recognition and Appreciation in Achieving the Snake River Valley AVA" to Virginia S. Gillerman, Boise, August.

Grants and Contracts

- Development of Kriging Methods to Delineate Nitrate Priority Areas: J.A. Welhan (Idaho Department of Environmental Quality, August 2007-December 2008, \$5,015).
- 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 Map of the White Bird Quadrangle: R.M. Breckenridge and D.L. Garwood (National Park Service, June 2006-December 2007, \$20,000).
- 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 Priest River 7.5-Minute Quadrangle: R.S. Lewis (Idaho Department of Lands, June 2007-June 2008, \$6,000).
- Geologic Mapping in the Sandpoint, Idaho Falls, Fairfield, Grangeville, and Salmon Project Areas and a Geodatabase Project: K.L. Othberg, R.M. Breckenridge, R.S. Lewis, J.D. Kauffman, W.M. Phillips, and L.R. Stanford (U.S. Geological Survey STATEMAP Program, May 2007-April 2008, \$241,558).
- 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).
- Hydrostratigraphy and Nitrate Distribution in Shallow Ground Water of Pleasant Valley: J.A. Welhan (Idaho Department of Environmental Quality, May 2006-December 2007, \$49,080).
- Idaho Earthquake Education and Mitigation: W.M. Phillips and R.M. Breckenridge (Idaho Bureau of Homeland Security, June-October 2007, \$10,000).
- *Idaho Hazards Mitigation*: W.M. Phillips and R.M. Breckenridge (Idaho Bureau of Homeland Security, June 2007-March 2008, \$35,000).
- *Mine Site Database*: R.S. Lewis (U.S. Department of Agriculture, U.S. Forest Service, Region 4, June 2003-December 2008, \$390,000).
- Mining and Geology Data Preservation: R.S. Lewis (U.S. Geological Survey, Data Preservation Program, September 2007-August 2008, \$5,000).
- Ross Fork Basin Hydrologic Analysis: J.A. Welhan (Shoshone-Bannock Tribal Water Resources Department, June-September 2007, \$2,623).

- Statistical Guidance Document Overview and Workshop: J.A. Welhan (Idaho Department of Environmental Quality, July-December 2008, \$12,968).
- Travel grant to annual meeting of the Geological Society of America, Denver, Colorado: W.M. Phillips (University of Idaho, October 2007, \$900).