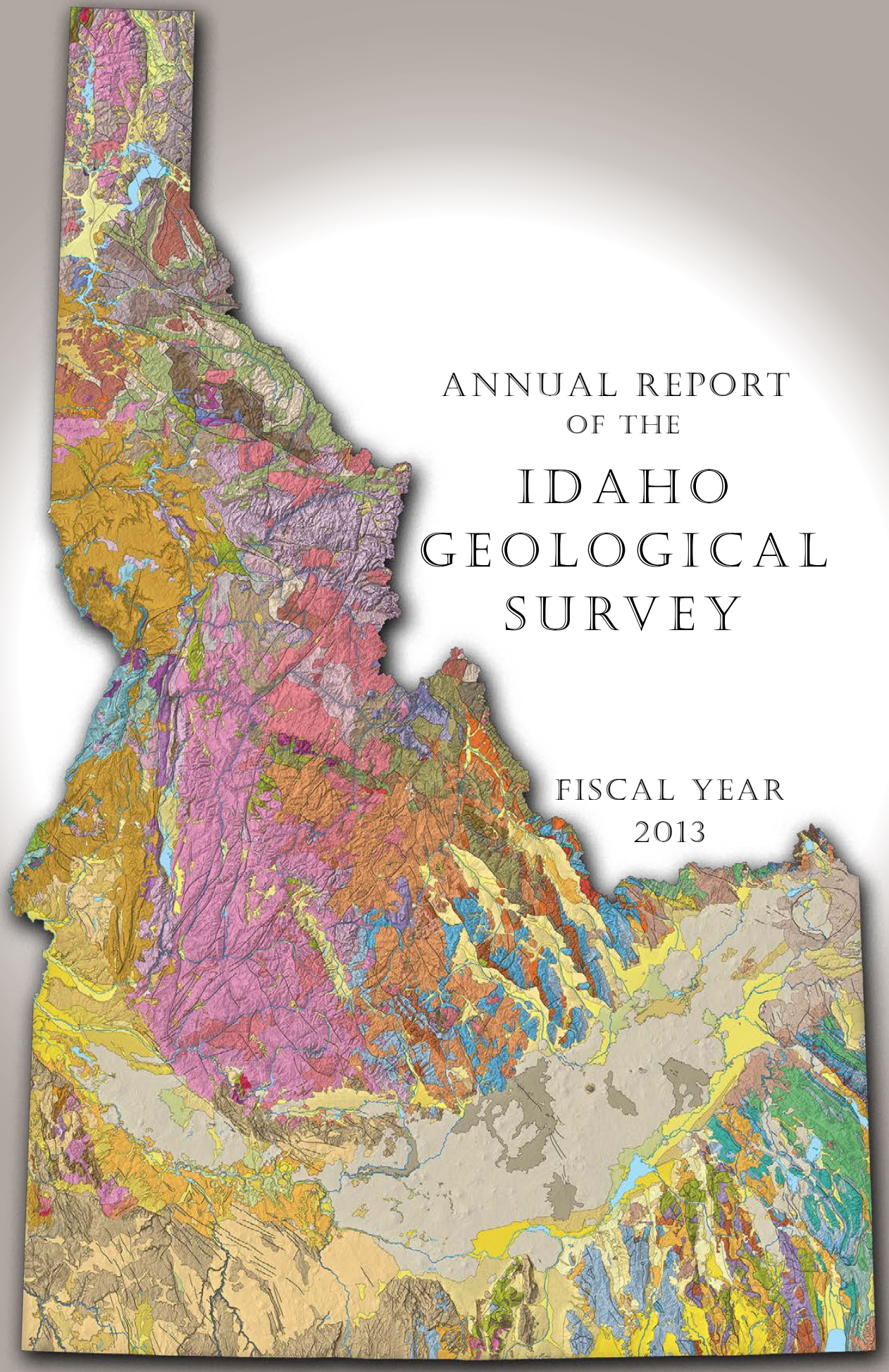


ANNUAL REPORT OF THE IDAHO GEOLOGICAL SURVEY

FISCAL YEAR 2013

Annual Report of the Idaho Geological Survey

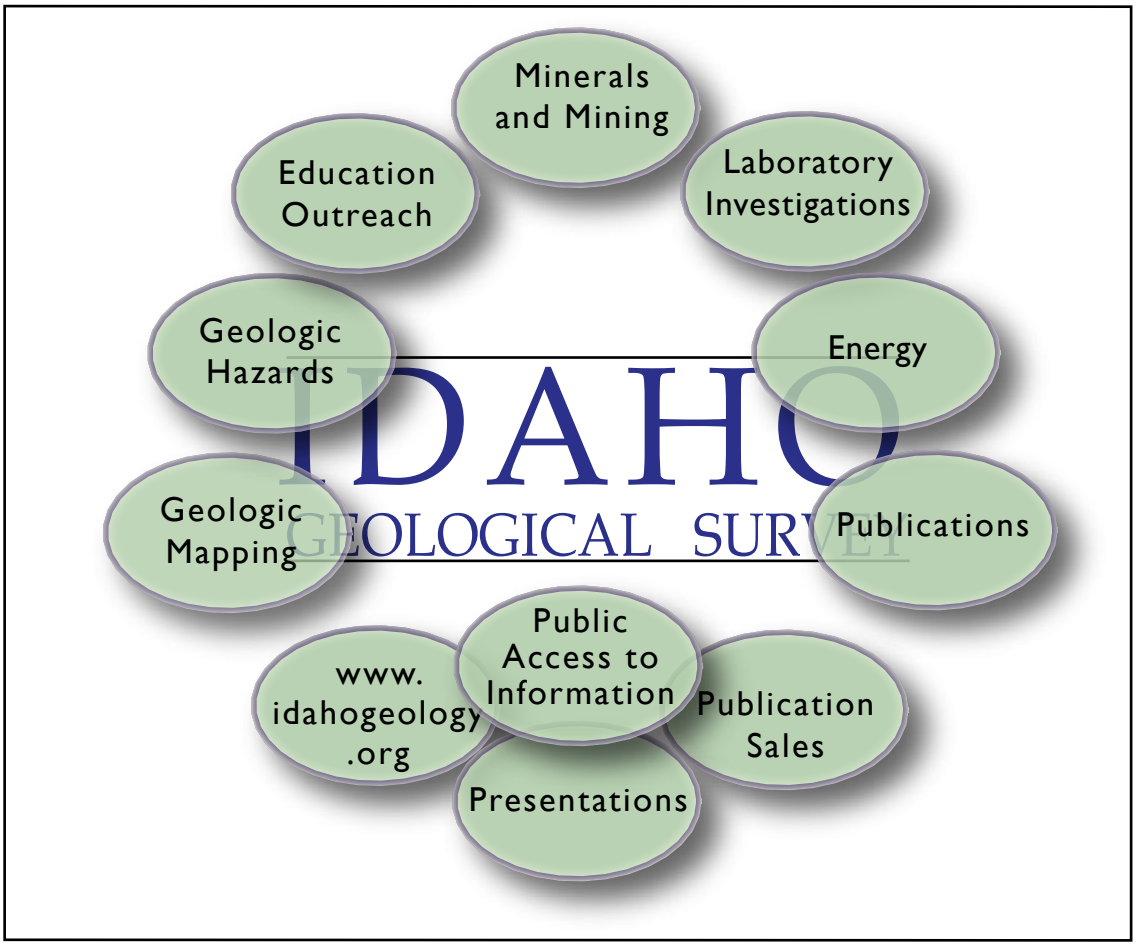
Fiscal Year 2013

Table of Contents

INTRODUCTION

The funding and collegial support provided through cooperative projects have long been integral components of the agency's operation. The activities highlighted for the FY2013 Annual Report represent long-term research, service, outreach, 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, refer to 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 *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, in Boise at the Idaho Water Center, and also at 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

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

Association of American State Geologists ~ Idaho Bureau of Homeland Security ~ Idaho Department of Environmental Quality ~ Idaho Department of Lands ~ Idaho National Laboratory ~ Idaho State University ~ Idaho Transportation Department ~ Midas Gold, Inc. ~ U.S. Department of Energy ~ U.S. Geological Survey

Collaborators

American Geological Institute ~ Army Corps of Engineers ~ Association of American State Geologists ~ Bannock County Groundwater Overlay Advisory Committee ~ Bannock County Planning and Zoning Department ~ Belt Association ~ Blaine County Disaster Services ~ Boise State University ~ Bonner County Museum ~ Brigham Young University-Idaho Center for Advanced Energy Studies ~ City of Boise ~ City of Pocatello Water Department, Planning Department and Environmental Department ~ ETH Zurich ~ Ice Age Floods Institute ~ Idaho Bureau of Homeland Security ~ Idaho Concrete and Aggregate Producers Association ~ Idaho Department of Environmental Quality ~ Idaho Department of Water Resources ~ Idaho Environmental Forum ~ Idaho Geospatial Council ~ Idaho Ground Water Monitoring Technical Committee ~ Idaho Historical Society ~ Idaho Mining Association ~ Idaho National Laboratory ~ Idaho Science Teachers Association ~ Idaho State University ~ Idaho Transportation Department ~ Inside Idaho ~ Intermountain Forest Tree Nutrition Cooperative ~ Montana Bureau of Mines and Geology ~ National Association of Geoscience Teachers ~ National Science Foundation, Earthscope Program ~ National Science Foundation, Geoscience Directorate ~ North Idaho College ~ Northwest Mining Association ~ Oregon Department of Geology and Mineral Industries ~ Pacific Northwest National Laboratory ~ Palouse Prairie School of Expeditionary Learn-

ing ~ Portneuf Watershed Partnership ~ Shoshone-Bannock Tribal Water Resources Department ~ Spokane Community College ~ U.S. Bureau of Land Management ~ USDA Forest Service ~ U.S. Geological Survey Minerals Program ~ U.S. Geological Survey US Topo ~ U.S. Geological Survey Water Resources Division ~ University of Idaho ~ University of Montana ~ University of Utah ~ University of Wisconsin-Madison ~ Utah Geological Survey ~ Utah State University ~ Wallace District Mining Museum ~ Washington Division of Geology and Earth Resources ~ Washington State University ~ Western States Seismic Policy Council ~ Wyoming Geological Survey ~ Yellowstone National Park ~ Yellowstone Volcano Observatory

Association of American State Geologists

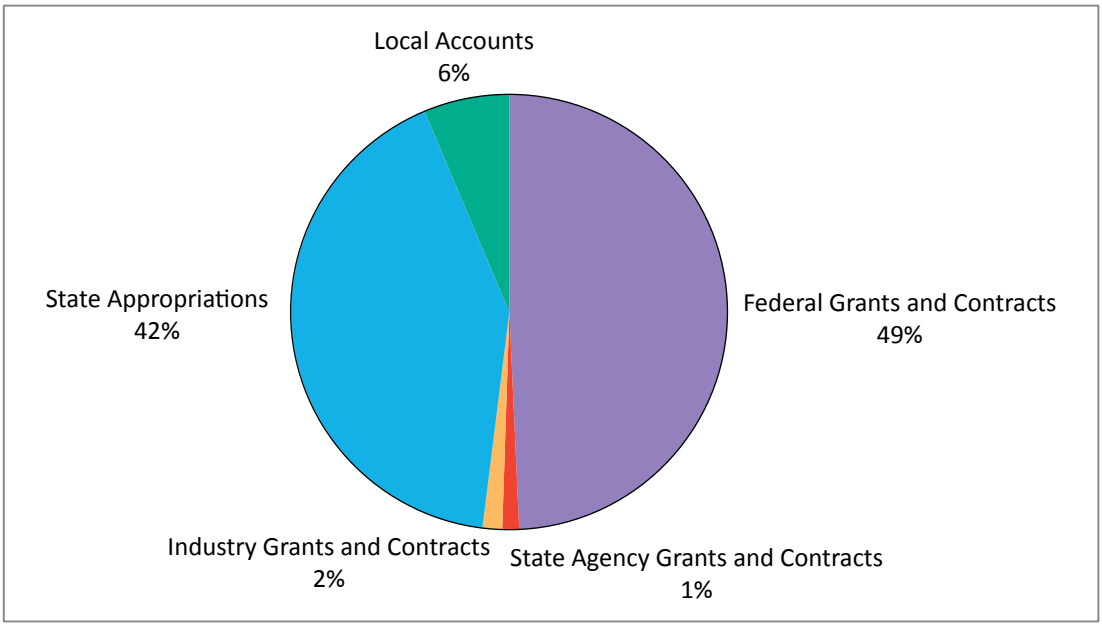
The Survey is an active participant in the Association of American State Geologists (AASG). The Idaho State Geologist represented Idaho at the AASG Spring Liaison in Washington, D.C. and the Annual Meeting in Deadwood, South Dakota. The AASG is a strong advocate for the funding and reauthorization of the U.S. Geological Survey's National Cooperative Geologic Mapping Program (NCGMP), as well as research programs for data preservation, minerals, energy resources, and geologic hazards. Association of American State Geologists is an important partner with the U.S. Geological Survey's National Geologic Map Database and the annual Digital Mapping Techniques Workshops.

Fiscal Overview

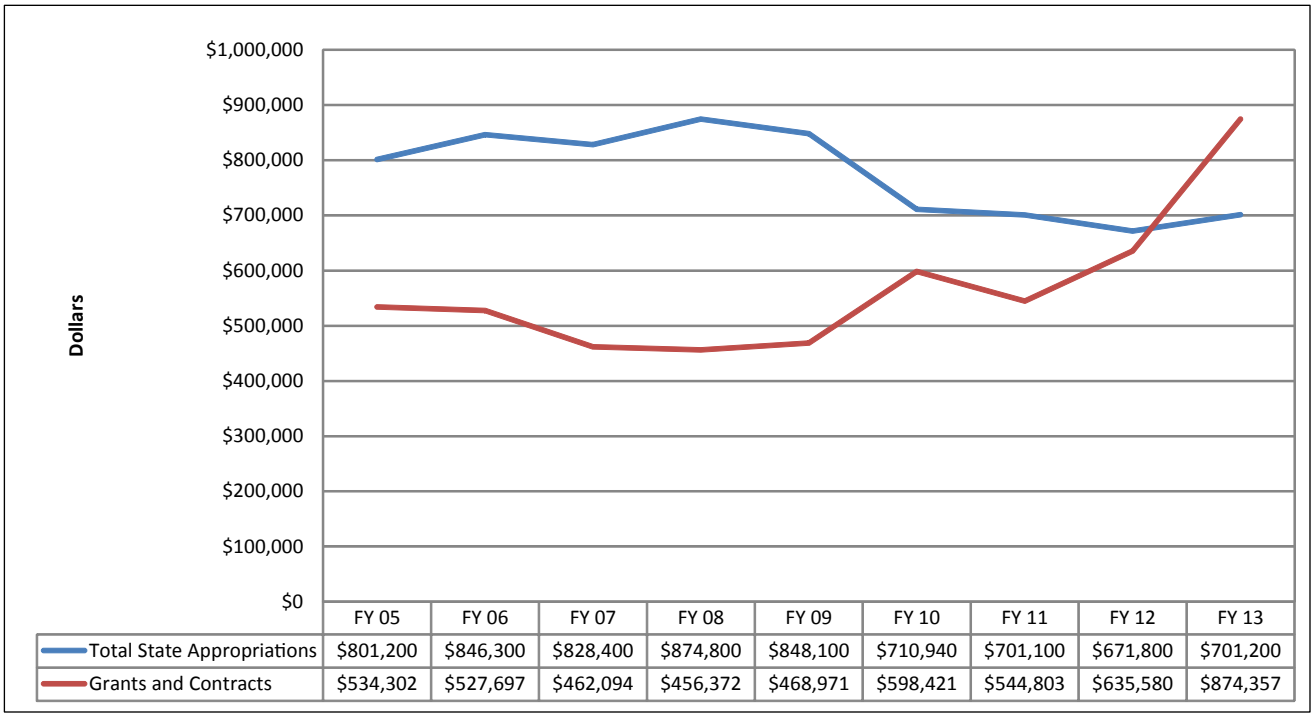
The Survey's state appropriated budget for FY 2013 was $701,200, an increase from $671,800 in FY 2012, but still well below FY05-FY09 funding levels. The mandated reductions in the state budget base have affected the agency's mission in research, public service, outreach, and education. Grants and contracts increased to $874,357 in FY13 from $635,580 in FY12. The FY 2014 appropriation has been set at $703,040.

Budget Fiscal Year 2013				
Category	Beginning Balance	Income	Expense	Ending Balance
Personnel		$ 618,936.00	$ 618,936.00	$ 0.00
Operarating Expense		19,478.00	19,478.00	0.00
Capital Outlay		62,786.00	62,786.00	0.00
Total Appropriation		701,200.00	701,200.00	0.00
U/I Personnel Funds		0.00	0.00	0.00
Local Accounts		106,766.62	44,037.24	$ 62,729.38
Grants and Contracts		874,357.17	874,357.17	0.00
Grand Total		$1,682,323.79	$1,619,594.41	$ 62,729.38

Sources of Funding



Overview of State Appropriations and Grants and Contracts Fiscal Years 2005-2013

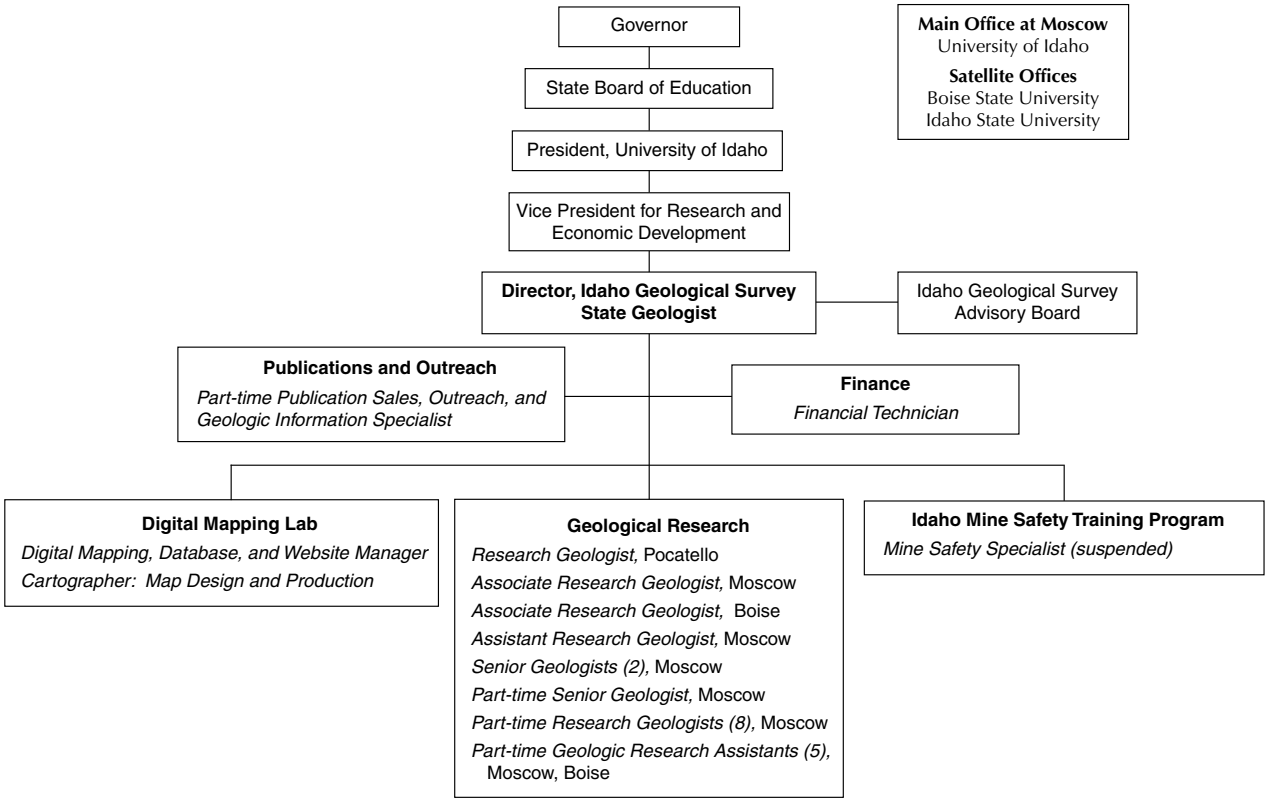


	FY 05	FY 06	FY 07	FY 08	FY 09	FY 10	FY 11	FY 12	FY 13
Total State Appropriations	$801,200	$846,300	$828,400	$874,800	$848,100	$710,940	$701,100	$671,800	$701,200
Grants and Contracts	$534,302	$527,697	$462,094	$456,372	$468,971	$598,421	$544,803	$635,580	$874,357

Organization and Personnel

Organization Chart

Idaho Geological Survey
Fiscal Year 2013



Directory

Moscow Office

Morrill Hall, Third Floor, Room 303
University of Idaho
875 Perimeter Drive MS 3014
Moscow, ID 83844-3014
208-885-7991

Branch Office at Boise

Idaho Water Center, Suite 242B
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
Tracy Kanikkeberg ..... Financial Technician

Research, Full-Time

Roy M. Breckenridge ..... Full Research Geologist
Dennis M. Feeney ..... Senior Geologist
Jane S. Freed ..... Cartographer
Collette Gantenbein ..... GIS Specialist
Dean L. Garwood ..... Senior Geologist
Virginia S. Gillerman ..... Associate Research Geologist, Boise
John D. Kauffman ..... Senior Geologist
Reed S. Lewis ..... Associate Research Geologist
William M. Phillips ..... Assistant Research Geologist
Loudon R. Stanford ..... Manager, Digital Map and GIS Lab
John A. Welhan ..... Full Research Geologist, Pocatello

Research and Support, Part-Time

Nicholas E. Bandy ..... Research Support
Mackenze C. Braun ..... Work Study Student
Russell F. Burmester ..... Geologist
John S. Byers ..... Research Support
James R. Cash ..... Earth Science Instructor
Glenn F. Embree ..... Geologist
Emily J. Forsberg ..... Work Study Student
Susan J. Jones ..... Research Support
Alyson R. Kral ..... Geographic Infomation Specialist
Mark D. McFaddan ..... Geologist
Victoria E. Mitchell ..... Research Support Scientist
Kurt L. Othberg ..... Full Research Geologist, Emeritus
Keegan L. Schmidt ..... Geologist
Darin M. Schwartz ..... Research Support
Cody J. Steven ..... Work Study Student
David E. Stewart ..... Geologist
Eric E. Stewart ..... Geologist
Kerrie N. Weppner ..... Research Support

Idaho Geological Survey
Advisory Board

Mickey Gunter
Chair, Department of Geological Sciences,
University of Idaho

David Hawk
Representing Office of the Governor

Tom Schultz
Director, Idaho Department of Lands

Glenn Thackray
Chair, Department of Geological Sciences,
Idaho State University

Mark Stephensen
Idaho Bureau of Homeland Security

Rich Reed
President,
Idaho Association of Professional Geologists

Jack Lyman
Executive Director,
Idaho Mining Association

David Wilkins
Chair, Department of Geosciences,
Boise State University

Ex Officio: Roy Breckenridge
Director and State Geologist,
Idaho Geological Survey

Idaho Geological Mapping Advisory Committee

William Capaul – Chairman
District Geologist
Idaho Transportation Department

James R. Bartolino
District Ground Water Specialist
U.S. Geological Survey

Stephen Box
Research Geologist
U.S. Geological Survey Minerals Program

Paul Gessler
Professor of Remote Sensing & Geospatial Ecology
College of Natural Resources, University of Idaho

Nancy F. Glenn, Ph.D., P.E.
Professor, Boise Center Aerospace Laboratory
Department of Geosciences - Idaho State University

Seth Grigg
Policy Analyst
Idaho Association of Counties

Janet Hohle
Project Manager - Clearwater Focus Program
Idaho Governor's Office of Species Conservation

Clint Hughes
Geologist
Nez Perce-Clearwater National Forests

Jim Myers
Senior Exploration Geologist
Hecla Silver Valley, Inc.

Paul F. Pedone
NRCS State Geologist (OR/ID)
Natural Resources Conservation Service – USDA

Kenneth C. Reid
State Archaeologist and Deputy SHPO
Idaho State Historic Preservation Office

Mark L. Stephensen
Mitigation Section Chief
State Hazard Mitigation Officer
Idaho Bureau of Homeland Security

Scott Van Hoff
Geospatial Liaison to Alaska and Idaho
U.S. Geological Survey

Sean Vincent
Hydrology Section Manager
Idaho Department of Water Resources

Sylvie White
Geographer/Cartographer
TerraPen Geographics

IGS Data Preservation Advisory Committee

Chris Dail
Exploration Geologist
Midas Gold Inc., Spokane, WA

Dave Frank
Outreach Coordinator
U.S. Geological Survey, Spokane , WA

Bruce Godfrey
GIS Specialist, Inside Idaho
University of Idaho, Post Falls, ID

Garth Reese
Head of Special Collections
University of Idaho Library, Moscow, ID

Research

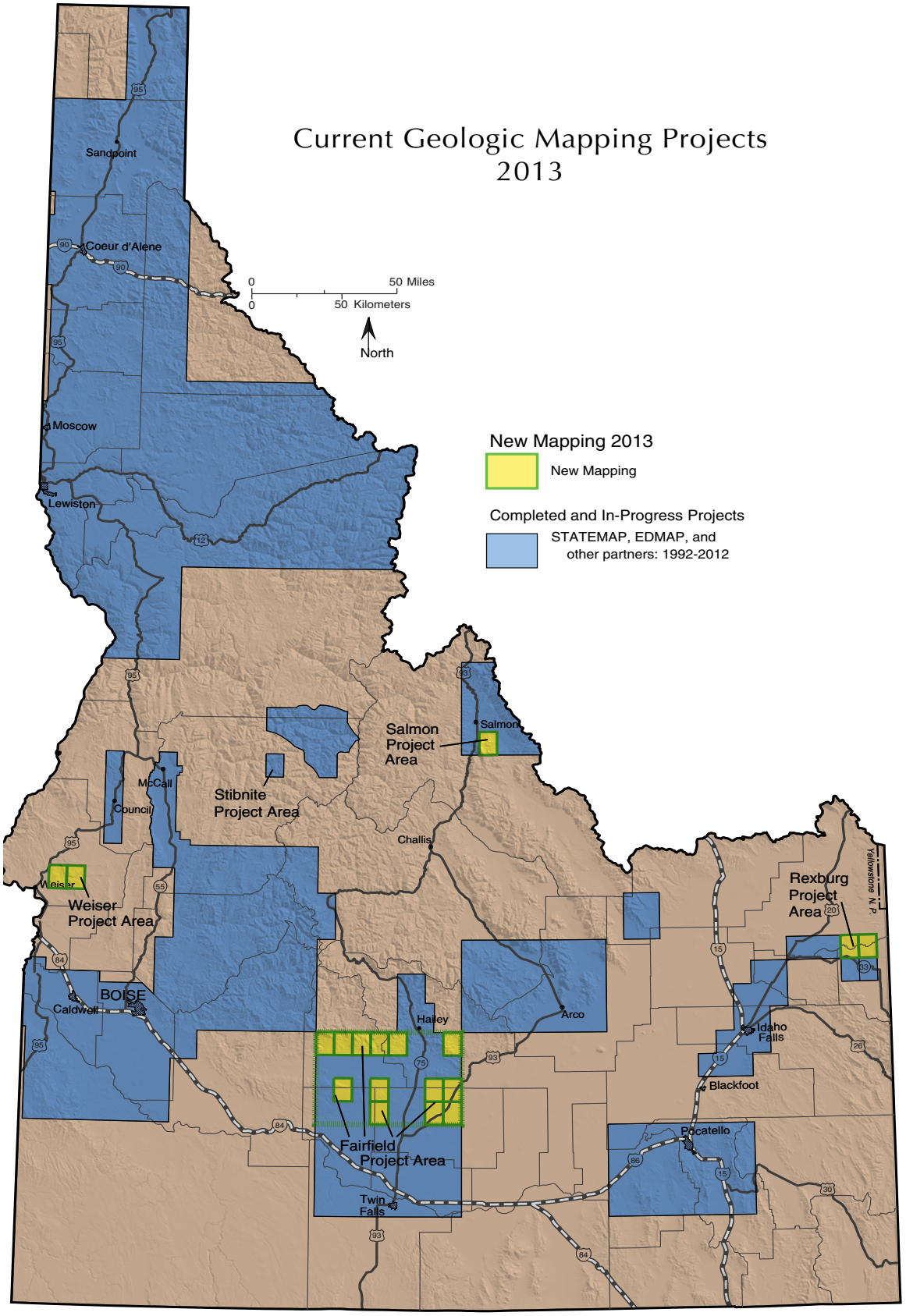
Geological Mapping and Related Studies

The Survey's primary research activity is mapping and publishing the geology of Idaho's 7.5' and 30' x 60' quadrangles. Before 1990, geologic mapping in Idaho was primarily conducted in localized rural areas 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 necessities 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 ground water resources; to aid in highway design and construction; and to define geologic resources on public lands, which include Idaho's parks, recreation areas, and endowment lands.

Funding of Idaho's geologic mapping program is shared by the STATEMAP component of the National Cooperative Geologic Mapping Program. Since 1993, Idaho has received over $3.3 million in federal funds and matched an equal amount of state money to complete geologic mapping within the state. In 2013, the Idaho Survey was again in the top five in the nation among all STATEMAP proposals. During the year, Survey geologists mapped eight 7.5' quadrangles, and mapped and compiled the eastern half of one 30' x 60' quadrangle under the STATEMAP Program. Mapping was also conducted in the Stibnite 7.5' quadrangle with funding provided by Midas Gold Corporation. In addition to traditional mapping efforts, this year marked the release of a new state geologic map of Idaho, the first since 1978. This map was ten years in the making and involved compilation from over 95 map sources, many of them funded by previous STATEMAP work.

Hydrogeology

As in the past, cooperation and collaboration characterize the Survey's work on Idaho's ground water resources. The IGS continues to be a primary source of hydrogeologic information for state and federal water resource agencies, university researchers, out-


Current Geologic Mapping Projects
2013
0
50 Miles
0
50 Kilometers
North
New Mapping 2013
New Mapping
Completed and In-Progress Projects
STATEMAP, EDMAP, and
other partners: 1992-2012
Sandpoint
Coeur d'Alene
Moscow
Lewiston
Salmon
Salmon
Project
Area
McCall
Council
Stibnite
Project Area
Challis
Weiser
Weiser
Project Area
BOISE
Caldwell
Hailey
Arco
Rexburg
Project
Area
Idaho
Falls
Blackfoot
Pocatello
Fairfield
Project Area
Twin
Falls
Yellowstone N. P.

of-state consultants, and tribal, municipal and citizen water users. The Survey's research activities include analysis of aquifer hydrogeology; ground water levels, temperatures and geochemical indicators; the sources and impact of ground water contaminants, and the water-bearing potential of aquifers proposed for development. Activities related to education and outreach also remain a key role, involving ongoing communication with tribes, regulatory agencies, planners and private interests, as well as active participation in graduate teaching and research.

A highlight of FY 2013 was the completion of a milestone study of the Mayfield-East Ada area, funded by Idaho's Department of Water Resources (IDWR). Six IGS staff were involved in this geologic mapping and subsurface hydrogeologic evaluation effort, resulting in a 1:36,000 scale map (DWM-144) and a comprehensive hydrogeologic report (S-12-2) that has materially aided IDWR in evaluating the development potential of this geographic area. The work represents a milestone because the mapping was commissioned specifically for the IGS, multiple staff geologists were involved in a hydrogeologic investigation, and resulting recommendations are being implemented by IDWR to guide water allocation decisions in the region.

Geologic Hazards

Idaho is prone to earthquakes, flooding, landslides, and volcanic eruptions. The Survey works to support mitigation of these hazards in several ways:

- Public awareness is addressed through website information and direct contact by e-mail, telephone, and occasional public lectures or field trips.
- Geological mapping conducted through the STATEMAP program provides baseline information on the location, magnitude, and frequency of hazards. This information is incorporated into planning documents and also serves as the basis for more detailed studies, such as mapping of liquefaction susceptibility and seismic site classes.
- The Survey collaborates with monitoring of natural hazard activity within the state. This includes volcanic monitoring of the Yellowstone area performed by the U.S. Geological Survey, and seismic monitoring performed by the U.S. Geological Survey, Montana Bureau of Mines and Geology, and the University of Utah.
- The Survey is a member of the Western States Seismic Policy Council (WSSPC). The Council's mission is to develop seismic policies and share information to promote programs that reduce earthquake-related losses.

In FY 2013, an IGS staff member served as the chair of the Basin and Range Province Committee of WSSPC.

- The Survey provides expert opinion and advice to state and federal agencies involved with Idaho hazard mitigation.

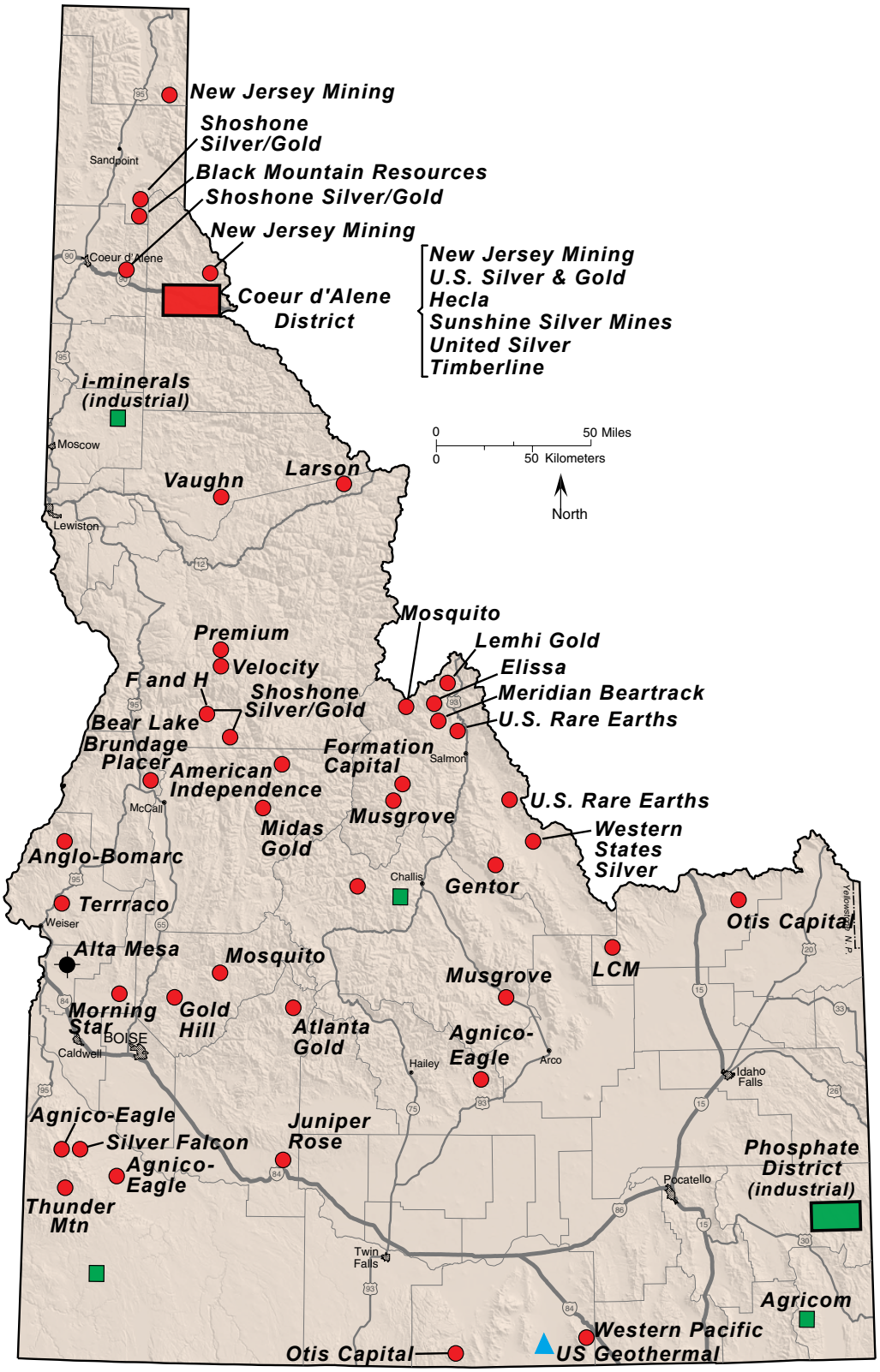
In FY13, the Survey performed the following hazard mitigation activities at the request of the Idaho Bureau of Homeland Security (IBHS):

- Participated in meetings of the Idaho Seismic Advisory Committee. This committee provides expert advice on issues related to earthquake hazards and risk reduction strategies.
- Participated in review and revision of the Idaho State Hazard Mitigation Plan which was successfully submitted to the Federal Emergency Management Agency in 2013. Updating the State Hazard Mitigation Plan qualifies Idaho for all available federal assistance in the event of disasters. It provides a framework to save lives and reduce vulnerability to natural and human made hazards.
- Partnered with the IBHS to produce an annual report for WSSPC on Idaho earthquake hazard mitigation activities. This report also documents earthquake activity occurring within Idaho.

Mines and Mining

Active Mining

Since its inception in 1919, the Idaho Geological Survey (IGS), formerly known as the Idaho Bureau of Mines and Geology, has been providing information for and documentation of the mineral industry of Idaho. The IGS collaborates with the U.S. Geological Survey in production of the Idaho chapter of the Minerals Yearbook, a widely used global compilation of developments and statistics in mining and minerals information. In calendar year 2012, the Idaho mining review was presented at the Northwest Mining Association convention in December. While there were still many great projects, the signs of an industry slowdown were apparent. Due to declining commodity prices and the temporary closure of the Lucky Friday mine, Idaho's nonfuel mineral production value for calendar year 2012 will be down significantly from the record 2011 value of $1.287 billion reported to the USGS. While markets for industrial minerals, including phosphate rock, were stabilizing, a lack of investor financing restricted exploration and development projects for junior companies.



EXPLORATION 2012

In the famous Coeur d'Alene District, the closure of Hecla's Lucky Friday mine followed an MSHA (Mine Safety and Health Administration) order to clean the 6000-foot deep Silver Shaft of all loose material, following an unrelated rock burst and two fatalities at the mine in 2011. Over 100 miners were laid off during the closure. Hecla completed power washing the shaft and other maintenance projects, as well as driving a bypass tunnel on the 5900 level around an area of bad ground. A new power cable was installed in early 2013 and development work recommenced on the #4 shaft expansion project. Hecla reported zero production during 2012 from the mine, but they had a very active exploration program in the district, focusing on drilling targets and exploring in the Star mine area.

Also in the Silver Valley, the Galena mine continued to operate at full production, reporting 2.15 million troy ounces of silver produced for calendar year 2012. The owner of the Galena complex, U.S. Silver Corporation, merged with RX Gold, and the new corporate name changed to U.S. Silver & Gold. The company was exploring the Lead Zone, a large zone of disseminated and stringer veins of galena that extends over considerable vertical distance and could be amenable to bulk mining techniques. Elsewhere in the district, exploration by United Silver at the Crescent mine included metallurgical sampling before a slowdown in the second half of the year. New Jersey Mining expanded their mill at Kellogg, and in a joint venture with Marathon Gold, drilled 7000 meters at the Golden Chest mine near Murray. In other metal mining, the Thompson Creek mine near Challis continued to operate at a reduced level due to declining molybdenum prices and deferred overburden stripping for the next mine phase in order to cut costs.

Phosphate mining continued at three large, open pit mines near Soda Springs in southeastern Idaho, though fertilizer prices were a bit lower than in calendar year 2011. Monsanto was mining at the South Rasmussen mine and constructing facilities for their new Blackfoot Bridge mine. J.R. Simplot operated the Smoky Canyon mine, and Agrium mined phosphate rock at their North Rasmussen Ridge mine. All three operators had exploration or permitting activities ongoing for future mine development. Further south, Stonegate Agricom evaluated potential for developing a new, underground phosphate mine in the Paris Hills near Bloomington. Other industrial mineral operations, such as dimension stone, pumice, and zeolites saw modest signs of improving markets.

Exploration activity is the necessary precursor to any mining or energy development. Alta Mesa, a Texas-based company, ran a 3D-seismic survey over their property where Bridge Resources had drilled and found natural gas in Payette County. Exploration for metals was focused on gold and silver, but the lack of financing reduced activity by many junior companies by the end of the 2012 calendar year. Outside of the Silver Valley, major or modest drill programs were completed at Premium's Friday

Petsite property near Orogrande, Midas Gold's Golden Meadow property at Stibnite, the Lemhi Gold project at Ditch Creek, Otis Gold's Kilgore property, Mosquito's Cumo property in Boise County, Terraco's Idaho Almaden project, and Thunder Mountain Gold's polymetallic South Mountain project. Midas Gold had the largest project with 46,000 meters of core drilled at the gold-antimony-tungsten district. Formation Capital Corporation constructed a haul road and other facilities at their Idaho Cobalt Project, a permitted cobalt-copper-gold mine in Lemhi County, but the company was still seeking financing for the remainder of the capital costs.

Minerals Related Research

Work continued on two multi-year minerals research projects during FY13. The first project, funded by the Idaho Transportation Department, is a study of aggregate quality, as related to alkali-silica reactivity (ASR), and its correlation with lithology and Idaho's geology. Sampling of 40 concrete-certified material source pits in Idaho was primarily completed in prior years, though those in northern Idaho were sampled in July. Rock types (i.e. lithologies) of the aggregate samples were quantitatively inventoried and the data compared with the new geologic map of Idaho and other literature sources to identify potential source units. Petrographic study of mortar bars, prepared for commercial AASHTO T 303 testing of ASR expansion potential, was conducted to better understand which units and rock types are the most reactive. Completion of the final report and presentation of the project result is planned for the first half of FY14.

The second project, funded by and in collaboration with Midas Gold Corporation, involved ongoing geologic mapping of the Stibnite 1:24,000 quadrangle and a petrologic and geochronology study of the complex gold-antimony-tungsten mineralization in the Stibnite Mining District, Valley County.

Energy

Geothermal

The Survey completed work on the third year of a major three and a half-year Department of Energy (DOE)/Association of American State Geologists (AASG) funded contract to digitally compile relevant geotechnical information that can help stimulate geothermal energy exploration within the state. The project is administered by the Arizona State Geological Survey. Data on 394 oil and gas wells and logs, drill stem tests and bottom-hole temperatures, 55 permitted geothermal wells and 165 low-temperature wells, 404 thermal springs, and hundreds of analyses of radioactive (heat-generating) elements in volcanic and igneous rocks in Idaho were published to the IGS website. Ad-

ditionally published to the website were the state's Quaternary and younger faults, the new statewide geologic map and database, a bibliography of references on Idaho-specific geothermal literature and a summary of Idaho-specific regulatory and permitting procedures including agencies responsible for geothermal development in the state.

All data compiled in FY13 have been submitted to, and are currently cataloged in, the National Geothermal Data System (NGDS) and will eventually be accessible via a national online browser interface to point users to the IGS server for Idaho-specific data.

The IGS successfully completed the installation, measurement and abandonment of three temporary thermal gradient wells in the Soda Springs area and acquired new heat flow measurements from these wells, which has helped clarify the overall geothermal resource potential. A comprehensive set of reports documenting the geothermal potential of this area is currently being written. Several presentations and conference publications have elicited considerable interest within the geothermal community, and new funding opportunities to pursue research in this geothermal prospect are being developed with colleagues at the Idaho National Laboratory (INL) and Utah's Energy and Geoscience Institute. The Survey is also collaborating with colleagues at Idaho State University (ISU) and the INL to promote development of a demonstration and research facility for enhanced geothermal systems (EGS) to develop commercial power from the volcanic systems in southeast Idaho.

As in past years, the Survey's research work has been closely integrated with its public outreach and graduate teaching activities. During FY13, the Pocatello office co-developed and co-taught the first geothermal exploration course in Idaho State University's Geoscience Department, arranged a Vulcan 3D geologic modeling software workshop for ISU students and faculty to develop expertise in this research tool, and was instrumental in co-leading four ISU graduate and undergraduate students to first place in DOE's National Geothermal Student Competition (NGSC). These successful students topped competitors largely due to the use of Vulcan software to visualize subsurface structures, in addition to the choice of study area suggested by the Survey's staff. The NGSC's focus on novel approaches in exploring and developing the Snake River Plain's geothermal resources, and the student's success, brought considerable media attention to the Survey's role in geothermal energy exploration in Idaho.

Oil and Gas

The Idaho Geological Survey maintains files on about two-hundred historic oil and gas exploration wells in the state. These files include the reports and logs provided by companies to the Oil and Gas Commission from 1903-1988. The files contain drilling correspondence, permits and applications, reports, maps, and geophysical logs. Many are unique historic documents and in fragile condition.

Information on historical oil and gas exploration wells in Idaho was transferred to the Idaho Geological Survey in 2009 from the Idaho Department of Lands. Recent geothermal and oil and gas exploration in Idaho has greatly increased the number of requests for these logs. The Survey's goal to make them available on the website led to development of a database and a map search application to deliver the historical statewide oil and gas well logs, and records collection.

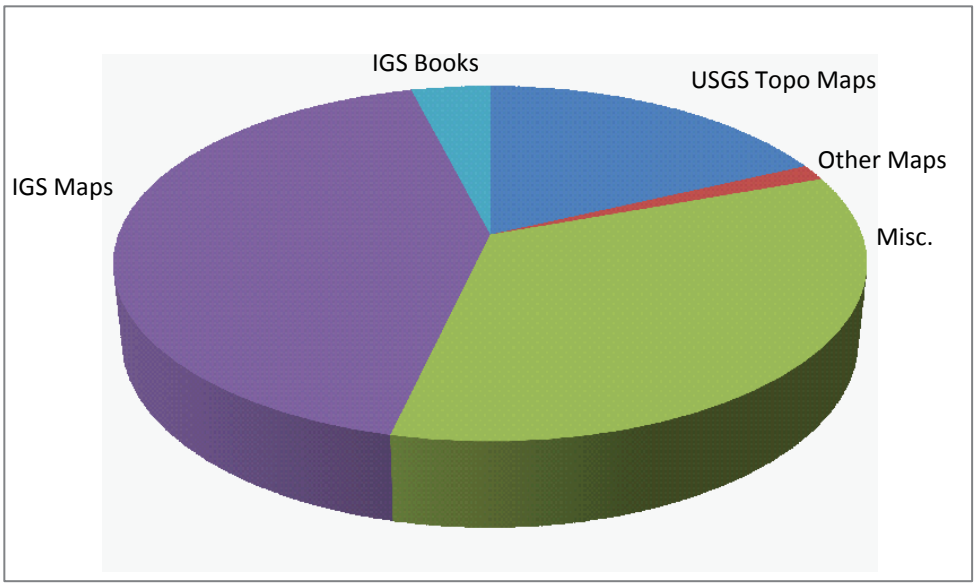
Recent exploration efforts in Idaho have been focused on the western Snake River Plain. One project of particular note is the development of the Hamilton and Willow fields in Payette County. Drilling from 2010 to recent has resulted in 13 new exploration wells with hopes of producing Idaho's first commercial gas. These discoveries prompted the 2011 revision of Idaho's regulations on oil and gas drilling to include hydraulic fracturing (fracking) of the host rocks to stimulate gas flow.

Outreach

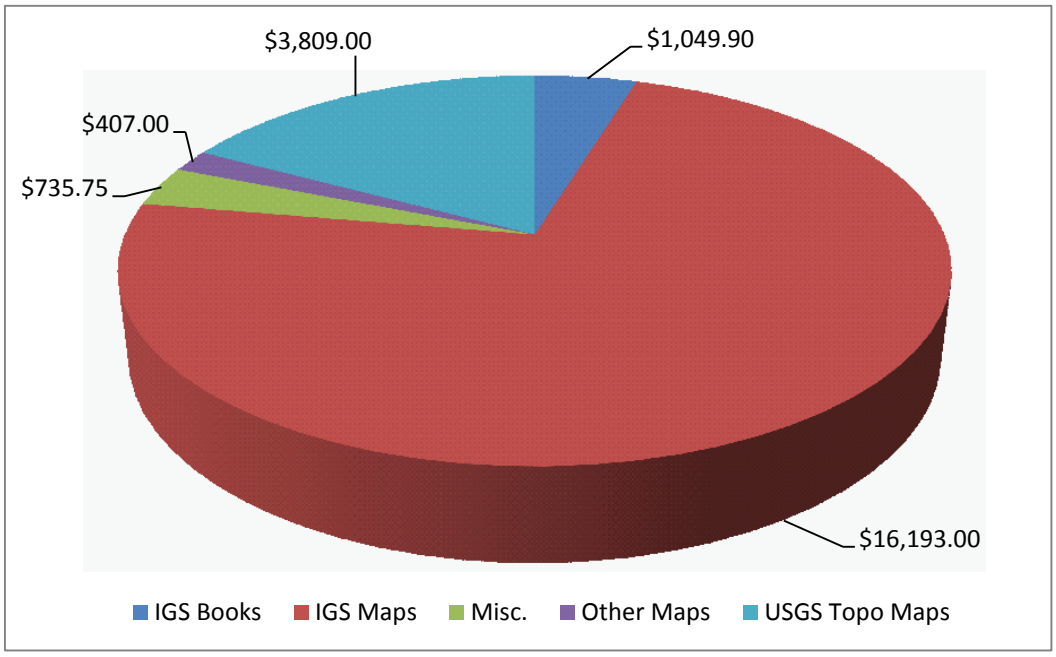
The Survey disseminates geologic and mineral data on Idaho primarily through IGS publications, the website, in-house collections, and efforts by the staff to educate the public in the earth sciences.

Publications

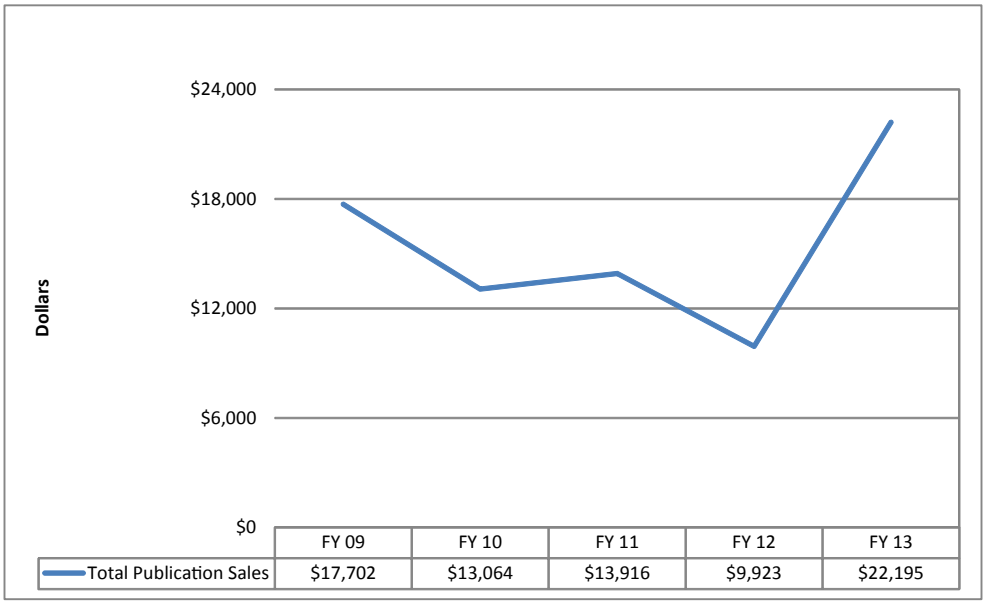
Publication Sales by Item Type



Publication Sales in Dollars

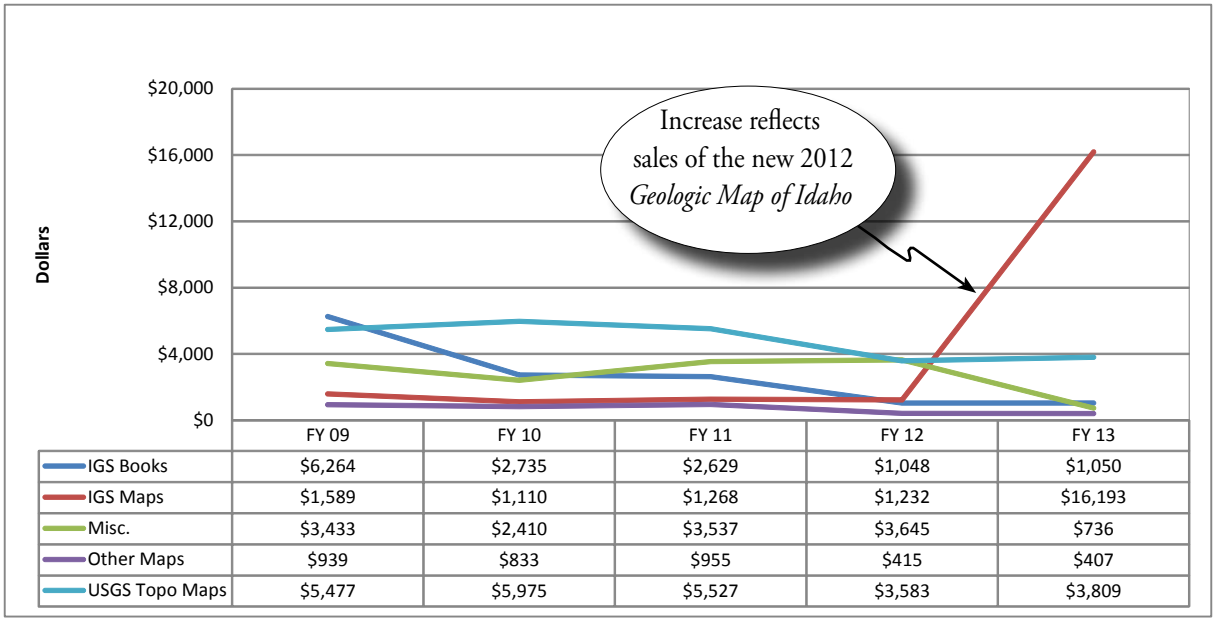


Total Publication Sales FY 09-13



	FY 09	FY 10	FY 11	FY 12	FY 13
Total Publication Sales	$17,702	$13,064	$13,916	$9,923	$22,195

Overview: All Sales Categories FY 09-13



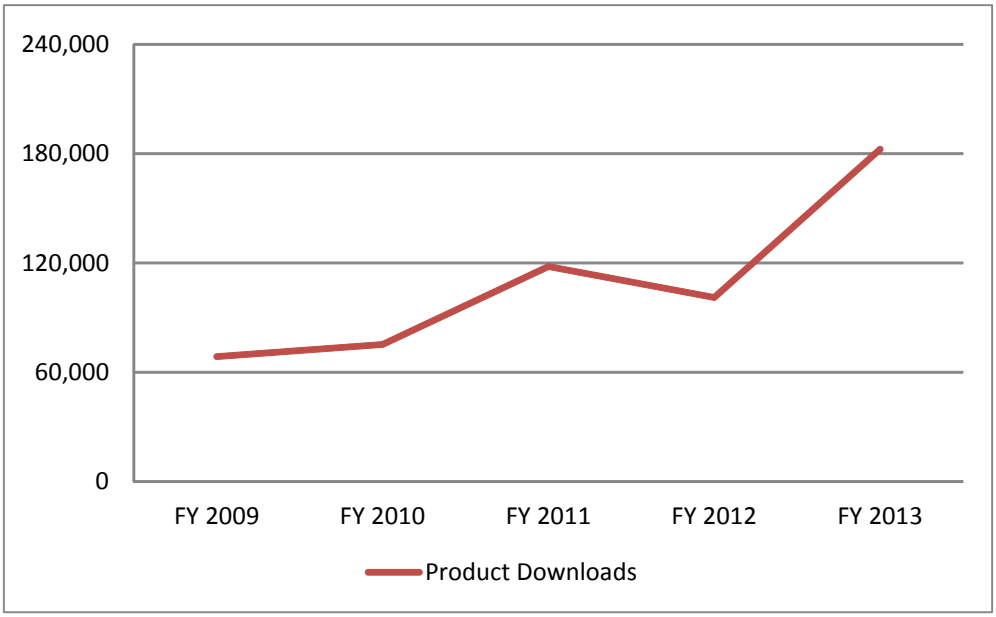
	FY 09	FY 10	FY 11	FY 12	FY 13
IGS Books	$6,264	$2,735	$2,629	$1,048	$1,050
IGS Maps	$1,589	$1,110	$1,268	$1,232	$16,193
Misc.	$3,433	$2,410	$3,537	$3,645	$736
Other Maps	$939	$833	$955	$415	$407
USGS Topo Maps	$5,477	$5,975	$5,527	$3,583	$3,809

Website—idahogeology.org

The website provides customers easy access to its publications and data. Nearly all of IGS publications are available free for download in PDF format. Finding information on the website has been simplified through search engines. A new interactive web map version of the *Geologic Map of Idaho* allows users to browse the map and view results of simple queries about rock type and age. This new application also includes map layers

covering Idaho including oil and gas wells, geothermal wells, and thermal hot springs. In FY 2013, 255,000 visits (504,000 with web crawlers) were logged on the website and users downloaded 180,000 products (359,000 with web crawlers). Twenty-six new survey publications were posted on the website this year. Online delivery tools were updated to allow users to download multiple products for each IGS publication.

Product Downloads FY 09-13



Digital Mapping and GIS Laboratory

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 geologic map databases, in addition to producing geologic map products. Twenty-one geologic maps were published this year. All are available as a printed product or can be viewed free on the website.

Databases and Archives

Databases continue to be an important way of managing and distributing information to IGS customers. Database updates of active faults, mines and prospects, oil and gas wells, and survey publications were ongoing. The largest archive is the Mineral Property Files and associated Mine Map Collection both of which increased in size as

donated files were indexed thanks to funding provided by the Idaho Department of Lands. Also in FY 13, IGS added a database for geothermal wells with the assistance of funding from U.S. Department of Energy and Association of American State Geologists.

Mine Safety Training

The U.S. Department of Labor's Mine Safety and Health Administration (MSHA) distributes federal grants to 49 states and the Navajo Nation. Grant funds are used to support health and safety training courses and programs designed to reduce mining accidents, injuries, and illnesses.

The Idaho Geological Survey suspended MSHA training in FY 2012 and is presently evaluating whether to resume the program. Training is available in neighboring states and interested individuals are directed to those facilities.

Earth Science Education

The American Geosciences Institute sponsors Earth Science Education Week in cooperation with its member societies on behalf of the geoscience community. Each year, local groups, educators, and interested individuals organize celebratory events. Earth Science Education Week offers opportunities for elementary through university students to discover the earth sciences through these presentations and events. The program is actively supported by the U.S. Geological Survey, National Aeronautics and Space Administration, the National Park Service, the American Association of Petroleum Geologists Foundation, Environmental Systems Research Institute, American Geophysical Union, and other geoscience groups.

For Earth Science Education Week in FY 2013, the Idaho Geological Survey unveiled its new geologic map of Idaho on national mapping day (the Friday of Earth Science Education Week). In addition, the Survey distributed Earth Science Education Week educational packets to teachers and the general public. The packets are comprised of explanatory information, student learning modules, and posters. The Survey created a bulletin board in a public hallway to highlight earth science activities and resources, and later updated the bulletin board to reflect ongoing agency projects and research.

The Idaho Geological Survey takes part in meetings and field trips associated with the Pacific Northwest section of the National Association of Geoscience Teachers annual field conference. This year we presented status and discoveries of the IGS, and participated in field trips in and around Coos Bay, Oregon. The survey was asked

to represent Idaho as a state councilor to the section this year, and gladly accepted. In addition, five local field trips and classroom presentations were led by Survey staff from the main and satellite offices during the year. Due to continued funding shortages, the Idaho Geological Survey's field workshop for teachers was not offered in FY 2013.

Publications and Activities

Publications

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An Objective GIS Screening Tool for Rating the Suitability of Land for Septic-based Development, by John A. Welhan and Carol Moore: Idaho Geological Survey Staff Report 12-1, 78 p., 2012.

Do Magmatic-Related Geothermal Energy Resources Exist in Southeast Idaho?, by Michael O. McCurry and John A. Welhan: Geothermal Resources Council Transactions v.36, pp. 699-707, 2012.

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Geologic Map of the Curley Creek Quadrangle, Boundary County, Idaho, and Lincoln County, Montana, by Roy M. Breckenridge, Russell F. Burmester, Reed S. Lewis, and Mark D. McFaddan, and Jeffrey D. Lonn: Idaho Geological Survey Digital Web Map 148, scale 1:24,000, 2012.

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Geologic Map of the Salmon Quadrangle, Lemhi County, Idaho, by Reed S. Lewis, Kurt L. Othberg, Russell F. Burmester, Loudon R. Stanford, Mark D. McFaddan, and Jeffrey D. Lonn: Idaho Geological Survey Digital Web Map 154, scale 1:24,000, 2012.

Geologic Map of the St. Anthony Quadrangle, Fremont and Madison Counties, Idaho, by William M. Phillips: Idaho Geological Survey Digital Web Map 145, scale 1:24,000, 2012.

Geologic Map of the Thorn Creek SW Quadrangle, Gooding County, Idaho, by John D. Kauffman: Idaho Geological Survey Digital Web Map 146, scale 1:24,000, 2012.

Geologic Map of the Twin Falls 30 x 60 Minute Quadrangle, Idaho, by Kurt L. Othberg, John D. Kauffman, Virginia S. Gillerman, and Dean L. Garwood: Idaho Geological Survey Geologic Map 49, scale 1:100,000, 2012.

Geologic Map of the Ucon Quadrangle, Bonneville County, Idaho, by William M. Phillips: Idaho Geological Survey Digital Web Map 147, scale 1:24,000, 2012.

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AASG Geothermal Data: Well Log Data Compilation Workbook for Historical Oil and Gas Wells in Idaho, by Dean L. Garwood and James R. Cash: Idaho Geological Survey report to the Arizona Geological Survey for United States Geoscience Information Network (USGIN) Document Repository, April.

AASG Statistics Report for Idaho, by Roy M. Breckenridge and Tracy T. Kanikkeberg: Idaho Geological Survey, May.

ARRA/AASG Geothermal Data Project Year 3-Fourth Quarterly Progress Report, by John A. Welhan: Idaho Geological Survey for Arizona Geological Survey, June.

ARRA/AASG Geothermal Data Project Year 3-Second Quarterly Progress Report, by John A. Welhan: Idaho Geological Survey for the Arizona Geological Survey, January.

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Final Report on Thermal Gradient Well Installation: Lithologic Logs and Data Summary, by John A. Welhan: Idaho Geological Survey report to Bureau of Land

Management and Idaho Department of Water Resources for geothermal drilling permits, January.

Final Technical Report, Data Preservation Grant, by Reed S. Lewis: Idaho Geological Survey report to the U.S. Geological Survey Data Preservation Program, October.

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Geologic Map of the Davis Mountain SW Quadrangle, Gooding County, Idaho, by John D. Kauffman, Dean L. Garwood, 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 East Half of the Bonners Ferry 30 x 60 Minute Quadrangle, Idaho, by Roy M. Breckenridge, Russell F. Burmester, Reed S. Lewis, and Mark D. McFaddan: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:75,000, April.

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Geologic Map of the Seamans Creek Quadrangle, Blaine County, Idaho, by Keegan L. Schmidt, Reed S. Lewis, Kurt L. Othberg, Jessica L. Meyers, and David E. Stewart: Idaho Geological Survey report to the U.S. Geological Survey for STATEMAP, scale 1:24,000, April.

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Historical Oil and Gas Well Data for Idaho, by Dean L. Garwood and James R. Cash: Idaho Geological Survey report to the U.S. Geological Survey Data Preservation Program, October.

Idaho Geological Survey Performance Indicators FY2012, by Roy M. Breckenridge and Alyson R. Kral: Idaho Geological Survey report to University of Idaho State Board of Education Division of Financial Management, July.

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Presentations

Clark Fork Ice Dam, by Roy M. Breckenridge: Coeur du Deluge Chapter Ice Age Floods Institute, Sandpoint, September.

Conversion Tools for Idaho Geologic Map Data: AutoCAD to NCGMP09 Geodatabase, by Loudon R. Stanford and Bill Richards: Digital Mapping Techniques 13, Golden, Colorado, June.

Current Status and Highlights of the Idaho Geological Survey, by Dean L. Garwood: Annual Meeting of the Pacific Northwest Section of the National Association of Geoscience Teachers, Coos Bay, Oregon, June.

Erosion on the South Side of Kamiak Butte, WA, by Dennis Feeney: Palouse Prairie Expeditionary School of Learning 4th & 5th grade geology field trip, Kamiak Butte, Washington, April.

Field Tour of ARRA-AASG Drilling Project for DOE/AASG Project Manager Arlene Anderson, by John A. Welhan: Blackfoot volcanic field, Soda Springs, September.

Field Tour of Geology of the Rexburg Bench Area, by William M. Phillips: southeastern Snake River Plain, Idaho, July.

Geologic Aspects of Hydraulic Fracturing: An Idaho Emphasis, by Virginia S. Gillerman: University of Idaho Law Review Symposium: Legal Aspects of Hydraulic Fracturing, Boise, March.

Geologic Tour of STATEMAP Results for Grangeville 100k, by Dean L. Garwood and Reed S. Lewis: Idaho Geological Survey for Tim Petty (Deputy Legislative Director for Senator Risch) and Darren Parker (Staffer for Energy and Natural Resources), north central Idaho, August.

Idaho: Mining and Exploration, 2012, by Virginia S. Gillerman: Northwest Mining Association Convention, Spokane, Washington, December.

Idaho Ore Deposition Through Time, by Reed S. Lewis: University of Idaho Geology 404 Special Topics Course, Moscow, February.

Late Wisconsin Glaciation in Northern Idaho, by Roy M. Breckenridge: Ice Age Floods National Geologic Trail Partnership Workshop, Wenatchee, Washington, July.

Lithologic Characterization of Active ITD Aggregate Sources and Implications for Aggregate Quality, by Kerrie N. Weppner and Virginia S. Gillerman: Idaho Transportation Department Technical Advisory Committee, Boise, February.

Metadata Standards Discussion, by Loudon R. Stanford: Idaho Geospatial Council, Executive Committee Teleconference, December.

Mining in Idaho, by Virginia S. Gillerman: Timberline High School geology class, Boise, Idaho, September.

Moving Beyond Your Metadata Comfort Zone: FGDC versus ISO, by Bruce Godfrey and Loudon R. Stanford: Idaho Geospatial Council, Executive Committee Meeting, Boise, Idaho, February.

North Idaho Legislative Tour, Geologic Map of Idaho 2012, by Loudon R. Stanford and Roy M. Breckenridge: Idaho Geological Survey, University of Idaho, Moscow, November.

North Idaho Legislative Tour, Jet Boat Tour of the Lewiston-Clarkston Valley, by Dean L. Garwood: Idaho Geological Survey, November.

North Idaho Legislative Tour, Lewiston to Craigmont, by Dean L. Garwood: Idaho Geological Survey, November.

North Idaho Legislative Tour, Lewiston to Orofino, by Reed S. Lewis: Idaho Geological Survey, November.

Preliminary Characterization of the Geothermal System at Stanley, Idaho for Possible Resource Utilization, by John A. Welhan: Geothermal Resources Council 36th Annual Meeting, Reno, Nevada, October.

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The Last Glaciation of Idaho, by William M. Phillips: University of Idaho and Washington State University Geology Seminar, March.

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Earthquake Hazards, by Alyson R. Kral: Idaho Geological Survey web page update, May.

How to Order Idaho Geological Survey Products, by Alyson R. Kral and Loudon R. Stanford: Idaho Geological Survey web page, November.

Idaho GIS Web Map, by Loudon R. Stanford, Dustin Thomas, and John A. Welhan: Idaho Geological Survey web application, May.

Idaho Oil and Gas, by Dean L. Garwood: Idaho Geological Survey web page update, April.

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IGS CAD Geologic Map Data- Schema Tool, by Loudon R. Stanford and Bill Richards: Idaho Geological Survey for NCGMP09, June.

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Improvements and Updates of Point of Sale Software Data, by Alyson R. Kral: Idaho Geological Survey, January-March.

Improvements to IGS Publication Delivery and Search Engine, by Loudon R. Stanford, Dustin Thomas, and Alyson R. Kral: Idaho Geological Survey web application, February.

Updated Grant Track, by Dean L. Garwood and Tracy T. Kanikkeberg: Idaho Geological Survey funding source and salary tracking worksheet, September.

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University Helps Idaho's Blaine County Prepare for Big Temblor, The Times-News, Twin Falls, April 9, 2013 (W.M. Phillips and K.N. Weppner).

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Professional Activities

Adjunct Graduate Faculty, Boise State University (V.S. Gillerman).

Affiliate Faculty, Graduate Faculty Representative, Idaho State University (J.A. Welhan).

Affiliate Faculty, Graduate Faculty Representative, University of Idaho (W.M. Phillips).

Affiliate Faculty, Graduate Faculty Representative, University of Idaho and Washington State University (R.S. Lewis).

Chair, Basin and Range Committee, Western States Seismic Policy Council (WSSPC), October, November (W.M. Phillips).

Chair, Search Committee, Geologic Information Specialist, University of Idaho. Moscow, September (L.R. Stanford).

Chair, Search Committee, Senior Geologist, University of Idaho, Moscow, October (R.S. Lewis).

Committee Member, Ice Age Floods National Geologic Trail Logo (R.M. Breckenridge).

Committee Member, Ice Age Floods Partnership, Geologic Resources (R.M. Breckenridge).

Coordinator, Annual Belt Association Meeting, Wallace, Idaho, September (R.S. Lewis).

Coordinator, Training Workshop on Vulcan 3D modeling for Idaho State University's Geosciences National Geothermal Student Competition, July (J.A. Welhan).

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

Field Trip Member, Aerial Reconnaissance and Field Trip of the Wasatch Fault Zone, Utah Geological Survey, September (W.M. Phillips).

Field Trip Member, Association of American State Geologists, Annual Meeting and Field Trips, Deadwood, South Dakota, June (R.M. Breckenridge).

Field Trip Member, Blacklock Point and Cape Blanco: Shear Zone Geology, Pacific Northwest Section of the National Association of Geoscience Teachers, southwest Oregon, June (D.L. Garwood).

Field Trip Member, Centennial Valley- East to West: A Field Trip Crossing the Great Divide (twice), Tobacco Root Geological Society, southwest Montana, July (D.L. Garwood).

Field Trip Member, Coastal Geology of Cape Arago, Pacific Northwest Section of the National Association of Geoscience Teachers, southwest Oregon, June (D.L. Garwood).

Field Trip Member, Eocene Igneous Rocks of the Centennial and Henry's Mountains and Geology of the Henry's Fork Caldera, Idaho and Montana, Tobacco Root Geological Society, southeast Idaho, July (D.L. Garwood, W.M. Phillips).

Field Trip Member, Galloway Dam Site, U.S. Army Corps of Engineers, August (W.M. Phillips).

Field Trip Member, Geology and Mineral Deposits of the Iron Hill (Powderhorn) Carbonatite-Alkaline Complex, Gunnison County, Colorado, May (V.S. Gillerman).

Field Trip Member, Geology of the Oregon Dunes National Recreation Area and Coquille Tribe Community Plankhouse, Pacific Northwest Section of the National Association of Geoscience Teachers, southwest Oregon, June (D.L. Garwood).

Field Trip Member, Geology of the Seven Devils and Bandon Area, Pacific Northwest Section of the National Association of Geoscience Teachers, southwest Oregon, June (D.L. Garwood).

Field Trip Member, Lucky Friday Mine, Mullan, April (R.S. Lewis).

Field Trip Member, Mine and Field Tour, Aggregate Pits of Northern Idaho, Idaho Transportation Department, July (V.S. Gillerman, K.N. Weppner).

Field Trip Member, National Aeronautics and Space Administration Mars Conference, Channeled Scablands, Washington, September (R.M. Breckenridge).

Field Trip Member, Pacific Northwest and Rocky Mountain Friends of the Pleistocene Field Trip, Owyhee River, Oregon, August (W.M. Phillips, K.L. Othberg).

Field Trip Member, Payette County Oil and Gas Tour, Boise State University, September (V.S. Gillerman).

Field Trip Member, Stibnite Core Facility, Midas Gold Corp., Lake Fork, Idaho, April-May (V.S. Gillerman).

Field Trip Member, The Hebgen Lake Earthquake, Tobacco Root Geological Society, southwest Montana, July (D.L. Garwood, W.M. Phillips).

Judge, Graduate Student Posters, University of Idaho College of Science Student Research Exposition, November (W.M. Phillips).

Judge, Graduate Student Presentations and Undergraduate Posters, University of Idaho Innovation Showcase, April (W.M. Phillips).

Judge, Outstanding Student Paper, American Geophysical Union Fall Meeting, San Francisco, California, December (W.M. Phillips).

Member, American Geophysical Union (W.M. Phillips, J.A. Welhan).

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

Member, Association of American State Geologists/United States Geological Survey Data Capture Working Group (L.R. Stanford).

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

Member, Departmental Grant Administrator (DGA) Roundtable, Office of Sponsored Programs, University of Idaho (T.T. Kanikkeberg).

Member, Editorial Board, Quaternary Geochronology (W.M. Phillips).

Member, Electronic Personnel Action Form (EPAF) Users Group, Office of Human Resources, University of Idaho (T.T. Kanikkeberg).

Member, Executive Committee for Update of the Idaho State Hazard Mitigation Plan, Idaho Bureau of Homeland Security, July- December (W.M. Phillips).

Member, Financial Information Group, Office of Business Systems and Accounting Services, University of Idaho (T.T. Kanikkeberg).

Member, Geological Society of America (R.M. Breckenridge, V.S. Gillerman, R.S. Lewis, W.M. Phillips).

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

Member, Geothermal Resources Council (J.A. Welhan).

Member, Ice Age Floods Institute (R.M. Breckenridge).

Member, Idaho Ground Water Monitoring Technical Committee (J.A. Welhan).

Member, North American Geoscience Teachers (D.L. Garwood).

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

Member, Quaternary Geology and Geomorphology Division, Geological Society of America (R.M. Breckenridge, W.M. Phillips).

Member, Seismic Hazard Technical Advisory Committee, Idaho Bureau of Homeland Security, July- December (W.M. Phillips).

Member, Seismic Technical Advisory Work Group, State Hazard Mitigation Plan, Idaho Bureau of Homeland Security, February (W.M. Phillips).

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

Member, Western States Seismic Policy Council (R.M. Breckenridge, W.M. Phillips).

Mentor, Idaho State University's winning student team in Department of Energy's 2012 National Geothermal Student Competition, October (J.A. Welhan).

Mentor, Roy J. Shlemon Mentor Program in Applied Geoscience, Geological Society of America Rocky Mountain Section Meeting, Gunnison, Colorado, May (V.S. Gillerman).

Participant, Administrator's Conference, Office of Sponsored Programs, University of Idaho and Washington State University, May (T.T. Kanikkeberg).

Participant, American Association of Petroleum Geologists, Rocky Mountain Section 2012 Annual Meeting, Grand Junction, Colorado, September (D.L. Garwood).

Participant, American Geophysical Union Fall 2012 Meeting, San Francisco, California, December (W.M. Phillips).

Participant, Association of American State Geologists (AASAG)/ARRA West Coast Project Participant Workshop, National Geothermal Data System, May (J.A. Welhan).

Participant, Association of American State Geologists (AASG) Western Cluster Wildfire Hazard Assessment Webinar, July (R.M. Breckenridge).

Participant, Basin and Range Committee Teleconference, Western States Seismic Policy Council Annual Meeting, May (W.M. Phillips).

Participant, Construction Materials Lab, Boise State University, Fall Semester (V.S. Gillerman).

Participant, Data Collection and Mapping Technical Advisory Committee Teleconference, Idaho Bureau of Homeland Security, September (W.M. Phillips).

Participant, Digital Mapping Techniques 2013 Workshop, Golden, Colorado, June (L.R. Stanford).

Participant, Earth Science Week Activities, American Geosciences Institute, October (IGS Staff).

Participant, Executive Committee for Revision of Idaho State Hazard Mitigation Plan Teleconference, Idaho Bureau of Homeland Security, November (W.M Phillips).

Participant, Geologic Mapping Day, American Geosciences Institute, October (IGS Staff).

Participant, Geological Society of America, Rocky Mountain Section Meeting, Gunnison, May (V.S. Gillerman, R.S. Lewis).

Participant, Geology Community of Use, US Topo Teleconference, August, October-December, February (L.R. Stanford).

Participant, Human Resources Summer Session Electronic Personnel Action Form (EPAF), Budget Office, University of Idaho, April (T.T. Kanikkeberg).

Participant, Idaho Geospatial Council Executive Committee meeting, Boise, October, December, February (L.R. Stanford).

Participant, Idaho Silver Jackets Multi-Agency Flood Hazard Teleconference, September (W.M. Phillips).

Participant, National Incident Management System Self-Assessment of Implementation for Idaho Geological Survey, Federal Emergency Management Agency, Online Course, August (W.M. Phillips).

Participant, Northwest Mining Association Convention, Spokane, Washington, December (V.S. Gillerman, R.S. Lewis, S. Jones).

Participant, Quarterly Electronic Personnel Action Form (EPAF) Advisory Group, Office of Human Resource, University of Idaho, December (T.T. Kanikkeberg).

Participant, Seismic Hazard Technical Advisory Committee Teleconference, Idaho Bureau of Homeland Security, Boise, August and September (W.M. Phillips).

Participant, Seminar on Powerful Listening Skills, Rockhurst University Continuing Education Center on the University of Idaho campus, Office of Sponsored Programs, November (T.T. Kanikkeberg).

Participant, Service Center Rate Training, University of Idaho, March (T.T. Kanikkeberg).

Participant, State of Washington Earthquake Scenario Catalog Webinar, October (W.M. Phillips).

Participant, Tobacco Root Geological Society 37th Annual Field Conference, West Yellowstone, Montana, July (D.L. Garwood, W.M. Phillips).

Participant, Training for Idaho Emergency Operation Planning Tool, Idaho Bureau of Homeland Security, Boise, August (W.M. Phillips).

Participant, Workshop on Handling Difficult Conversations at Work, Department of Education, University of Idaho, November (T.T. Kanikkeberg).

Participant, Workshop on Intro Tools for Making Quick Video Tutorials and How-To's: Professional Development and Learning, University of Idaho, July (T.T. Kanikkeberg).

Participant, Workshop on Intro to Presentation and Training Tools: Professional Development and Learning, University of Idaho, July (T.T. Kanikkeberg).

Participant, Workshop on Microsoft Outlook: Advanced Features and Functions and Learning, University of Idaho, January (T.T. Kanikkeberg).

Participant, Workshop on Time-Saving Microsoft Excel Tips & Shortcuts for Every User, University of Idaho, January (T.T. Kanikkeberg).

Representative, Bureau of Homeland Security (BHS) State Agency Emergency Coordinator's Working Group (V.S. Gillerman).

Representative, Cooperative Idaho-Montana STATEMAP Planning Meeting, Montana Bureau of Mines and Geology, Butte, Montana, September (R.M. Breckenridge).

Representative, Geology and Geologic Hazards Idaho Framework Layers, Technical Working Group (L.R. Stanford).

Representative, Ice Age Floods National Geologic Trail Partnership Workshop, Wenatchee, Washington, July (R.M. Breckenridge).

Representative, Idaho State Councilor, North American Geoscience Teachers (D.L. Garwood).

Representative, Western States Seismic Policy Council Basin and Range Committee, September-October (W.M. Phillips).

Reviewer, Bathymetry, Morphology, and Lakebed Geologic Characteristics of Potential Kokanee Spawning Habitat in Lake Pend Oreille, Bayview and Lakeview Quadrangles, Idaho, by U.S. Geological Survey Scientific Investigations Map 3272 (R.M. Breckenridge).

Reviewer, Geoarchaeology, April (W.M. Phillips).

Reviewer, National Science Foundation proposal, April (W.M. Phillips).

Reviewer, National Science Foundation proposal, May (W.M. Phillips).

Reviewer, Palouse Prairie Expeditionary School of Learning Kamiak Butte Geology Pamphlet, May (D.M. Feeney).

Reviewer, Pocatello Shear Wave Velocity and P-Wave Mapping- NEHRP Site Response and Liquefaction Susceptibility Mapping for Pocatello, Idaho, by Fugro Consultants, Inc., October (W.M. Phillips).

Reviewer, Quaternary Science Reviews, November (W.M. Phillips).

Search Committee, Geologic Information Specialist, University of Idaho, Moscow, September (D.L. Garwood, T.T. Kanikkeberg, R.S. Lewis, W.M. Phillips).

Search Committee, Mineral Separation Technician, University of Idaho, Moscow, January-February (T.T. Kanikkeberg, R.S. Lewis, W.M. Phillips).

Search Committee, Senior Geologist, University of Idaho, Moscow, October (D.L. Garwood, V.S. Gillerman, W.M. Phillips, L.R. Stanford).

Secretary, Belt Association Board of Directors (R.S. Lewis).

Supervisor, Cody Steven, Work Study student, University of Idaho, August-May (R.S. Lewis).

Supervisor, Emily Forsberg, Work Study student, University of Idaho, July- May (W.M. Phillips).

Supervisor, James Cash, Temporary Employee, University of Idaho, January- March (D.L. Garwood).

Supervisor, Kerrie Weppner, Temporary Employee, University of Idaho, FY13 (V.S. Gillerman).

Supervisor, Mackenzie Braun, Word Study student, University of Idaho, July- May (T.T. Kanikkeberg).

Supervisor, Nick Bandy, Mineral Separation Technician, University of Idaho, February-April (W.M. Phillips).

Supervisor, Susan Jones, Temporary Employee, University of Idaho, FY 2013 (R.S. Lewis).

Technical Advisor, Bannock County Groundwater Overlay Advisory Committee (J.A. Welhan).

Technical Advisor, Idaho State University's National Science Foundation: Opportunities for Educational Diversity in the Geosciences (J.A. Welhan).

Technical Advisor, Shoshone-Bannock Tribes' Water Resources Department (J.A. Welhan).

Technical Advisor, Statistical Tools for Ground Water Quality Monitoring, Department of Environmental Quality (J.A. Welhan).

Technical Advisor, Statistical Tools for Updating Nitrate Priority Area Designations, Idaho Department of Environmental Quality (J.A. Welhan).

Graduate Thesis Committees

Andrew Stratton, M.S. Geosciences, Idaho State University (J.A. Welhan).

Diane Wilford, M.S. Geology, Washington State University (R.S. Lewis).

Keith Gray, Ph.D. Geology, Washington State University (R.S. Lewis).

Kirk Schleiffarth, M.S. Geology, Washington State University (R.S. Lewis).

Liane Stevens, Ph.D. Geology, University of Montana (R.S. Lewis).

Michael Ginsbach, M.S. Geological Sciences, Idaho State University (J.A. Welhan).

Rachael Hoover, M.S. Geology, Washington State University (W.M. Phillips).

Rebecca Ohly, M.S. Geological Sciences, Idaho State University (J.A. Welhan).

Grants and Contracts

ARRA Geothermal Data Compilation Project: J.A. Welhan and R.M. Breckenridge (DOE-AASG, May 2010- January 2014, $412,389).

ARRA Geothermal New Data Supplement Project: J.A. Welhan and R.M. Breckenridge (DOE-AASG, June 2011- January 2014, $457,663).

Cooling in Fractured Geothermal Reservoirs: Software Tools: J.A. Welhan, co-PI (DOE-INL LDRD, October 2012- September 2015, $524,000).

Geologic Mapping in the Rexburg, Bonners Ferry, Salmon, and Fairfield Areas: R.S. Lewis, W.M. Phillips, D.L. Garwood, and R.M. Breckenridge (U.S. Geological Survey STATEMAP Program, May 2012- April 2013, $204,695).

Geologic Mapping in the Rexburg, Weiser, Salmon, and Fairfield Areas: R.S. Lewis, W.M. Phillips, D.L. Garwood, and D.M. Feeney (U.S. Geological Survey STATEMAP Program, June 2013- May 2014, $189,701).

Geologic Mapping of Stibnite 7.5' Quadrangle and Pilot Investigation of Hydrothermal Alteration, Mineralization and Geochronology within Stibnite Mining District, Idaho: V.S. Gillerman and R.S. Lewis (Midas Gold, Inc., May 2012- December 2014, $75,000).

Idaho Department of Lands Abandoned Mine Lands Project, task 2: R.S. Lewis (Idaho Department of Lands, May 2012-May 2014, $89,857).

Lithologic Characterization of Active ITD Aggregate Sources and Implications for Aggregate Quality: V.S. Gillerman and W.M. Phillips (Idaho Transportation Department, March 2011- September 2013, $119,999).

Modifications to Department of Environmental Quality (DEQ) Statistical Guidance Document to Refine Existing Ground Water Quality Data Assessment Procedures: J.A. Welhan (Idaho Department of Environmental Quality, May- December 2013, $13,332).

NEHRP Site Class and Liquefaction Susceptibility Maps for a Portion of Blaine County, Idaho: W.M. Phillips (Idaho Bureau of Homeland Security, January- June 2013, $63,000).

Recruiting and Retaining Native American Students in the Geosciences: J.A. Welhan (subcontract to ISU, NSF, December 2011- November 2013, $17,122).

USGS Geological Survey FY2011 Data Preservation Program: R.S. Lewis (United States Geological Survey, August 2011-July 2012, $21,989).