

**Annual Report**  
of the  
**Idaho Geological Survey**

**Fiscal Year 2000**

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## Program Highlights

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

The Survey publishes a variety of maps, books, and articles catalogued in the annual *List of Publications* that includes over 570 titles produced since 1919. In addition to handling on average 60 public inquiries a day, the staff makes numerous presentations and reports throughout the year.

**Launching the Web site—[www.idahogeology.org](http://www.idahogeology.org).** This spring the Survey embarked on the World Wide Web with a “black and white” prototype of its inaugural Web site. Our intention was first to get something basic started and then during the summer finish the design and content originally planned. The result is now viewable on the Internet. Interest in the site has been strong from the beginning and is expanding through an ever-widening network of links.

The Web site offers multiple opportunities to get information before the public. For example, a current *List of Publications* is always on line. The WWW provides electronic access to digital geologic maps, GIS databases, and wide-ranging information such as geologic hazards and earth science education. The Survey intends to make the Web site an active “work in progress.”

**Geological mapping and related research.** Central to the Survey's applied research is geologic mapping and related topical studies that together form the technical content of digital geologic maps, databases, reports, and publications. Since 1985 the Survey has been conducting detailed geologic mapping in selected urban areas of Idaho. The Survey participates in the U.S. Geological Survey's STATEMAP program, which has augmented geologic mapping in Boise, Coeur d'Alene, Lewiston, Moscow, Pocatello, and Twin Falls. From July 1999 through June 2000, seven 7.5-minute quadrangles were newly mapped in urban areas. These digital geologic maps are printed in color and, after GIS attributes are completed, the maps will be available in digital form.

As funds become available, the Survey sets priorities for regional geologic mapping in the large areas of Idaho that have never been studied in detail. The Coeur d'Alene, Idaho City, and St. Maries 30' x 60' quadrangle digital compilations were completed in fiscal year 2000. These projects were funded in part by STATEMAP and the U.S. Geological Survey's Headwaters project.

In cooperation with several universities, the Survey endorsed three EDMAP proposals for student geologic mapping in Idaho and participated for the second year in the student mentoring program sponsored by the Association of American State Geologists and the National Science Foundation.

**Digital geologic maps.** The Survey's digital mapping and GIS laboratory performs services ranging from digital cartography to spatial data management. The lab uses computer-aided design and GIS software to produce maps for publication and to fashion existing geologic maps into digital map compilations. New production techniques have allowed the Survey to publish digital geology as full-color, print-on-demand maps, thus improving map quality while reducing storage, inventory, and printing costs. The Survey participates in the North American Data Model Steering Committee that is developing digital legend design for geologic maps.

**Hydrogeology.** In selected areas of Idaho such as Pocatello, Boise, and Coeur d'Alene, the Survey works in cooperation with other agencies and university programs to better understand the geologic controls on recharge, flow, and transport of ground water and to provide technical information for ground-water protection.

To improve predictive models of ground-water contaminant transport at the Idaho National Engineering and Environmental Laboratories, the Survey is developing statistical correlation models for the lithology and permeability of the eastern Snake River Plain aquifer.

Building on the recently completed characterization of the Portneuf valley aquifer, the Survey works closely with Bannock County, the cities of Pocatello and Chubbuck, the Fort Hall Tribes, and citizen groups to protect and manage the ground-water resources in the region. The work includes designing and applying an environmental GIS database for aquifer vulnerability assessment.

In addition to mapping the surficial geology of the Rathdrum Prairie, the Survey completed new gravity profiles in the valley to help characterize the Rathdrum Prairie and the Spokane Valley aquifer near Coeur d'Alene.

**Databases, bibliographies, and collections.** Many of the digital geologic maps are also available as GIS databases. Other databases include Mines and Prospects, with data on more than 8,300 Idaho mines, and the state's earthquake database, earthquake observatory, and landslide database. Digital geologic databases and earthquake information are available on the Survey's Web site. Several technical bibliographies have been published, and an electronic bibliography on the state's geology with 11,000 references has been compiled. Many of these references, such as a complete collection of theses and dissertations on Idaho's geology, are available in special collections at the Moscow Office.

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

The Survey's digital mapping laboratory designed a statewide landslide database for use by state and federal agencies, local planners, and emergency response personnel. The design was tested in a pilot project in the Little Salmon River drainage. In addition, an inventory of landslides in the

Coeur d'Alene Lake basin has begun.

The Survey has conducted earthquake research in the Boise, Idaho Falls, and Pocatello metropolitan areas. Digital data capture for the Idaho active fault map has been completed, and a preliminary version of the map has been reviewed. The mapped faults are linked to an extensive database as well as a seismic reference collection.

As an active participant in the Western States Seismic Policy Council and regional planning groups of the Advanced National Seismic System, the Survey is involved in organizing and planning several hazard mitigation projects throughout the state, including the Federal Emergency Management Agency's Project Impacts for the communities of Boise, Kamiah, and Blaine County.

Mitigation of natural hazards is a major component of the Survey's annual summer workshop for teachers. Training activities provide knowledge of Idaho's tectonic setting and classroom safety and response. The Survey has expanded the geologic-hazard education component to include testing of classroom activities by master teachers.

**Mines and the geology of mines.** The Survey maintains a working knowledge of the geology of all active mines in Idaho. Information and statistics on Idaho's mines are collected and published annually. The Survey cooperates with the U.S. Geological Survey in collecting and interpreting mineral statistics and mining data and presents the results at the Northwest Mining Association's annual meeting. The Survey's summaries of Idaho's mining and exploration activity are published annually in the May issue of *Mining Engineering*, the U.S. Geological Survey's *Mineral Yearbook*, and the Idaho Department of Commerce's *Idaho Facts*.

Abandoned and inactive mines in Idaho are being evaluated and inventoried by the Survey in the Panhandle, Owyhee County, and the Hailey and Challis areas. The projects are conducted in cooperation with the U.S. Forest Service Region 1, the U.S. Bureau of Land Management, the Idaho Department of Lands, and the U.S. Environmental Protection Agency. The results identify physical as well as environmental hazards, and many mine histories are recorded for future analysis and remediation. Interest and concern over the physical hazards and potential environmental risks associated with abandoned mines have increased due to the expected influx of visitors, especially during the upcoming bicentennial of the Lewis and Clark Expedition.

The Survey's abandoned and inactive mines project, in cooperation with the U.S. Forest Service, also includes preparing detailed histories for several of the key mines in the Region 1 forests. These histories are available for inspection at the Moscow office and are being published in the Staff Report series.

**Earth science education.** The Survey staff supports geologic education efforts of public and private agencies, professional organizations, school classes, hobbyists, local clubs, and youth groups. Through close working relationships with the geology departments at the three state universities, Survey geologists make their expertise available by participating in seminars, field trips, and workshops, by teaching selected upper-division courses, and by directing graduate

student research.

This year the Survey has hired an Earth Science Education Coordinator to further our efforts to enhance earth science education in elementary and secondary schools. The Survey is primarily engaged in promoting earth science education with the state's teachers through the Idaho Earth Science Teachers Association, through its Web site ([www.idahogeology.org](http://www.idahogeology.org)), and through field workshops conducted around the state so that teachers can observe the methods and science of geology in Idaho's own outdoor laboratory. Idaho is one of a handful of states in which the state geological survey and earth science teachers work closely to enhance the teaching of earth science. The highlights of this partnership include Earth Science Week activities in early October and the summer field workshop. As part of the workshop, the Survey cosponsors and incorporates hazards mitigation education in cooperation with the Idaho Bureau of Disaster Services. The summer of 1999 marks the twentieth teacher workshop the Survey has conducted since 1986.

# Staff Publications and Activities

## Publications

*Application of a Digital Geologic Map Data Model in ArcView GIS*, by L.R. Stanford and V.T. MacKubbin, in D.R. Soller, ed., *Digital Mapping Techniques 2000 Workshop Proceedings*: U.S. Geological Survey Open-File Report 00-325, 2000.

*A Field Workshop Report: IAVCEI-CEV/IUGG Field Workshop, July 7-18, 1999: Inside Silicic Calderas*, by M.M. Godchaux and B. Bonnichsen: CEV (Commission on Explosive Volcanism) Newsletter of the IAVCEI (International Association of Volcanism and Chemistry of the Earth's Interior), December 1999, No. 99-02, p. 8-13.

*Geologic Map Compilation of the Pocatello 30' x 60' Quadrangle, Idaho*, by P.K. Link and L.R. Stanford: Idaho Geological Survey Technical Report 99-2, scale 1:100,000.

*Geologic Map of the Pocatello South Quadrangle, Idaho*, by D.W. Rodgers and K.L. Othberg: Idaho Geological Survey Geologic Map 26, 1999, scale 1:24,000.

*History of Selected Mines, in the Custer Area, Custer County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-7, 1999, 46 p.

*History of Selected Mines, in the Lakeview Mining District, Bonner County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-4, 2000, 164 p.

*History of Selected Mines in the Mineral District, Washington County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-14, 2000, 33 p.

*History of Selected Mines in the Pine Creek Area Shoshone County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-2, 2000, 302 p.

*History of the Atlanta Mining Area, Elmore County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-15, 2000, 218 p.

*History of the Bear Top, Ione, and Orofino Mines, Shoshone County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-8, 2000, 42 p.

*History of the Black Horse, Paragon, and St. Peter Mines, Shoshone County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-7, 2000, 46 p.

*History of the Copper Basin Mine, Custer County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-1, 1999, 10 p.

*History of the Golden Anchor Mine, Idaho County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-11, 2000, 28 p.

*History of the Idaho Almaden Mine, Washington County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-9, 2000, 43 p.

*History of the Idaho Continental Mine, Boundary County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-5, 2000, 112 p.

*History of the Ima Mine, Lemhi County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-2, 1999, 39 p.

*History of the Jack Waite Mine, Shoshone County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-6, 2000, 71 p.

*History of the Kimberly Mine, Idaho County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-10, 2000, 20 p.

*History of the Lead Belt Mine, Butte County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-3, 1999, 8 p.

*History of the Mines in the Bayhorse Area, Custer County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-8, 1999, 40 p.

*History of the Minnie Moore Mine, Blaine County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-12, 2000, 37 p.

*History of the Phi Kappa Mine, Custer County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-4, 1999, 12 p.

*History of the Princess Blue Ribbon Mine, Camas County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-13, 2000, 13 p.

*History of the Spring Mountain Mine, Lemhi County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-5, 1999, 7 p.

*History of the Stibnite Mining Area, Valley County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-3, 2000, 166 p.

*History of the Viola Mine, Lemhi County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-9, 1999, 25 p.

*History of the Wilbert Mine, Butte County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 00-1, 2000, 37 p.

*History of the Wildhorse Mine, Custer County, Idaho*, by V.E. Mitchell: Idaho Geological Survey Staff Report 99-6, 1999, 26 p.

*Idaho 1998 Annual Estimate: Mineral Industry Surveys*, by A. Tanner with V.S. Gillerman: U.S. Geological Survey, December, 1999, 5 p.

*Idaho Annual Report*, by R.M. Breckenridge and S. Weiser: Western States Seismic Policy Council Annual Conference Program Guide, 1999, p. 32-33.

*Idaho Geological Survey and the Idaho Bureau of Disaster Services, Western States Seismic Policy Council Member Agency Report, Part 2*, by R.M. Breckenridge and S. Weiser: Earthquake Quarterly,

Winter, 2000, p. 4.

*Mineral Industry of Idaho (1998)* by A. Tanner with V.S. Gillerman: U.S. Geological Survey Minerals Yearbook Chapter, v. II, p. 14.1-14.5.

*Mining and Exploration in Idaho, 1999*, by V.S. Gillerman and E.H. Bennett: Mining Engineering, May, 2000, v. 51, no. 5, p. 67-70.

*Simulating Basalt Lava Flows Using a Structure Imitation Approach*, by T.M. Clemo and J.A. Welhan, in L.R. Bentley, ed., Proceedings, XIII International Conference on Computational Methods in Water Resources, Calgary, 2000, v. 2, p. 841-848.

## Abstracts

*Crustal Assimilation at a Snake River Plain Basaltic Hydrovolcano and Its Relationship to Eruptive Style*, by C.M. White, C.A. Watson, and B. Bonnicksen: Proceedings of the IAVCEI Meeting, Bali, Indonesia, 2000.

*Geologic Map of the St. Maries 30' X 60' Quadrangle, Idaho*, by R.S. Lewis, R.F. Burmester, and T.P. Frost: Geological Society of America Abstracts with Program, 2000, v. 32, no. 5, p. 16.

*Ground Water Protection in the Pocatello-Chubbuck-Fort Hall Area: A Parallel Approach to the State Source Water Assessment Process*, by J.A. Welhan: Proceedings of the Intermountain Conference on the Environment, Pocatello, 1999, p. 68-72.

*Miocene and Younger Faults in Idaho*, by R.M. Breckenridge, G.W. Adema, R.S. Lewis, D.W. Weisz, and J.S. Freed: Geological Society of America Abstracts with Program, v. 32, No. 5, p. A-3.

## Reports and Presentations

*1999 Developments in Idaho's Mineral Industry*, by V.S. Gillerman: Northwest Mining Association 105th Annual Meeting, Spokane, Washington, December.

*The Application of a Digital Geologic Map Data Model in ArcView: Demonstration*, by L.R. Stanford, V. MacKubbin, and R. Anton-Erik: Intermountain GIS User's Conference 2000, Kalispell, Montana, May.

*An Assessment of Ground Water Levels and Flow in the Vicinity of the Highway Pond, Lower Portneuf River Valley*: by J.A. Welhan: Idaho Geological Survey unpublished report, May, 25 p.

*Bedrock Depth and Morphology of the Rathdrum Prairie, Idaho*, by G.W. Adema, R.M. Breckenridge, and K.F. Sprenke: Idaho Geological Survey unpublished report, June, 63 p.

*The Clark Fork Ice Dam and Breakout Area of the Missoula Floods*, by R.M. Breckenridge: Seventh Annual Idaho Earthquake Education Workshop, Farragut State Park, July.

*Comparison of Physical Features Observed in Silicic Ignimbrites in Idaho's Snake River Plain With*

*Those at the Snowdon, Scafell, and Glencoe Calderas, U.K.*, by M.M. Godchaux and B. Bonnichsen: IAVCEI Commission on Explosive Volcanism Workshop, United Kingdom, July.

*Demonstration of the Idaho Geological Survey's Digital Geologic Map Data Model*, by L.R. Stanford: Idaho Geographic Information Advisory Committee meeting, Boise, November.

*Demonstration of the Idaho Geological Survey's Digital Geologic Map Data Model Applied in ArcView GIS*, by L.R. Stanford: North American Digital Geologic Map Data Model Steering Committee meeting, Lexington, Kentucky, May.

*Economics and History of Mining in North Idaho*, by E.H. Bennett: Coeur d'Alene Economic Development Leadership Association, August.

*An Estimation of Ground-Shaking Hazard Due to Seismically Induced Bedrock Motion in the Vicinity of Idaho Falls, Idaho*, by B.K. Peterson, G.W. Adema, and R.M. Breckenridge: Idaho Bureau of Disaster Services report, January, 11 p.

*Evaluation of the Pollock Landslide*, by G.W. Adema, D.W. Weisz, and R.M. Breckenridge: Idaho Geological Survey unpublished report, September, 12 p.

*Exhibit of Surficial Geologic Map of the Post Falls and Part of Liberty Lake Quadrangles, Kootenai County, Idaho*, by L.R. Stanford: International Cartographic Exhibition, Ottawa, Canada, August.

*Exhibit of Surficial Geologic Map of the Post Falls and Part of Liberty Lake Quadrangles, Kootenai County, Idaho*, by L.R. Stanford, in C.A. Brewer, ed., *Cartography and Geographic Information Science*, 1999, v. 26, no. 3., p. 200.

*Geologic Hazards Curriculum Development Project*, by T.C. Walker: Idaho Earth Science Teachers Association winter meeting, March.

*Geologic Map of the Coeur d'Alene 30' x 60' Quadrangle, Kootenai and Shoshone Counties, Idaho*, by R.S. Lewis, R.E. Burmester, R.M. Breckenridge, M.A. McFadden, and J.A. Kauffman: Idaho Geological Survey unpublished map, scale 1:100,000, April.

*Geologic Map of the Idaho City 30' x 60' Quadrangle, Idaho*, by T.H. Kiilsgaard, L.R. Stanford, and R.S. Lewis: Idaho Geological Survey unpublished map, 1:100,000 scale, April.

*Geology and Geomorphology of Northern Idaho*, by K.L. Othberg: 40th National Soils Contest, University of Idaho, April.

*Geology and Landslide Hazards*, by K.L. Othberg: Latah County Planning and Zoning Commission meeting, May.

*Geology and Physiography of the Palouse*, by K.L. Othberg: Northwest Chapter of Biological Photographers Association, Pullman, Washington, June.

*Geology in Everyday Life*, by V.S. Gillerman: Silver Sage Girl Scouts, Boise, April.

*Geology of the Columbia Plateau and Steptoe Butte*, by K.L. Othberg: Architecture Senior Studio, University of Idaho, March.

*Glacial Geology of the Cabinet Gorge Dam Area, Idaho*, by R.M. Breckenridge: Ice Age Floods Institute and Avista Corporation, June.

*Ground-Water Protection in the Pocatello-Chubbuck-Fort Hall Area: A Parallel Approach to the State Source Water Assessment Process*, by J.A. Welhan: Intermountain Conference on the Environment, Pocatello, 1999.

*History of Mining in Idaho*, by E.H. Bennett: Lewis-Clark State College, Lewiston, November (E.H. Bennett).

*History of the Idaho Continental Mine, Boundary County, Idaho*, by V.E. Mitchell: Idaho Geological Survey unpublished report, 1999, 112 p.

*Idaho Geological Survey's Coeur d'Alene STATEMAP Products*, by R.M. Breckenridge: Report for National Geological Mapping Program Highlights, U.S. Geological Survey, 2 p., June.

*Idaho Geological Survey's Sun Valley STATEMAP Program*, by R.M. Breckenridge and K.L. Othberg: Blaine County Project Impact Steering Committee, Hailey, May.

*Idaho Geology and Seismic Risk*, by V.S. Gillerman: Soils and Geology Workshop, Idaho Chapter, International Conference of Building Officials, Nampa, January.

*Idaho Is Earthquake Country*, by K.L. Othberg and R.M. Breckenridge: Ada County Project Impact Brochure, 2000.

*Idaho Landslide Inventory Report, Phase II, Database Design*, by L.S. Stanford, G.W. Adema, and R.M. Breckenridge: Idaho Bureau of Disaster Services Report, January, 6 p.

*Idaho Update—Western States Seismic Policy Council Annual Report*, by R.M. Breckenridge and S. Weiser: Santa Fe, New Mexico, September.

*Interesting Rocks, Minerals, and Volcanoes*, by B. Bonnicksen and M.M. Godchaux: McSorley School Second Grade, Lewiston, May.

*Landslides in the Little Salmon River Corridor, Idaho—Pilot Study*, by G. Adema, L.S. Stanford, and R.M. Breckenridge: Project Report for Idaho Bureau of Disaster Services, Digital database and ArcView presentation, December.

*Miocene and Younger Faults in Idaho*, by R.M. Breckenridge, G.W. Adema, R.S. Lewis, D.W. Weisz, and J.S. Freed: Geological Society of America Rocky Mountain Section Meeting, Missoula, Montana, April.

*Morphology of Inflated Pahoehoe Lavas and Spatial Architecture of Their Porous and Permeable Zones, Eastern Snake River Plain, Idaho*, by J.A. Welhan, C.M. Johannesen, K.S. Reeves, T.M. Clemo, J.A. Glover, and K. Bosworth: Idaho Geological Survey unpublished report, 2000.

*National Park Service Inventory of Idaho Ice-Age Flood Sites in Idaho*, by R.M. Breckenridge: Ice-Age Floods Institute, Spokane, Washington, May.

*The Nature of Explosive Volcanism*, by M.M. Godchaux and B. Bonnicksen: Estacion Regional Del

Centro, Instituto De Geologia, Universidad Nacional Autonoma De Mexico (UNAM), Queretaro, Mexico, November.

*Origin and Evolution of the Snake River Plain, Idaho, U.S.A.*, by B. Bonnicksen and M.M. Godchaux: Estacion Regional Del Centro, Instituto De Geologia, Universidad Nacional Autonoma De Mexico (UNAM), Queretaro, Mexico, November.

*Overview and Synthesis of Lithologic Controls on Aquifer Heterogeneity in the Eastern Snake River Plain, Idaho*, by J.A. Welhan, C.M. Johannesen, J.A. Glover, L.L. Davis, and K.S. Reeves: Idaho Geological Survey unpublished report, 2000.

*Phenomena Produced by High-Temperature Explosive Silicic Volcanism As Contrasted to Features Occurring in Rhyolite Lava Flows, With Examples From the Snake River Plain, Idaho, U.S.A.*, by B. Bonnicksen and M.M. Godchaux: IAVCEI Commission on Explosive Volcanism Workshop, United Kingdom, July.

*Progress Report on Geologic Mapping and Belt Stratigraphy of the Coeur d'Alene Quadrangle, Idaho*, by R.S. Lewis: Belt Association session, Northwest Mining Association Annual Meeting, Spokane, December.

*Recommendations for TCE Plume Action*, by J. Welhan, J. Light, F. Ostler, F. Mullican, T. Hepworth, S. Smart, and D. Dawson: City of Pocatello, Portneuf Ground Water Forum, July, 13 p.

*Rocks, Ruins, and Eclipse*, by V.S. Gillerman: Graduate Seminar, Department of Geosciences, Boise State University, Boise, September; Boise Section of the Society for Mining, Metallurgy, and Exploration, Inc.(SME), Boise, January; Idaho Museum of Mining and Geology Lecture Series, Boise, March.

*Seismic Zones and Building Codes: An Exercise in Rapid Visual Screening of Buildings in Sandpoint, Idaho*, by S. Weiser and R.M. Breckenridge: Seventh Annual Idaho Earthquake Education Workshop Workbook, 1999, 24 p.

*Simulating Basalt Lava Flows Using a Structure Imitation Approach*, by T.M. Clemo and J.A. Welhan, in L.R. Bentley, ed., Proceedings of the XIII International Conference on Computational Methods in Water Resources, Calgary, Canada, 2000.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Bureau of Land Management Property in the Hailey-Bellevue Area: Bullion Gulch, Hailey-Bellevue Area, Blaine County, Idaho*, by V.S. Gillerman and F.S. Griggs: Idaho Geological Survey unpublished report, 2000, 78 p.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Bureau of Land Management Property in the Hailey-Bellevue Area: Upper Bullion Gulch, Hailey-Bellevue Area, Blaine County, Idaho*, by V.S. Gillerman and F.S. Griggs: Idaho Geological Survey unpublished report, 2000, 48 p.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VIII: Bonners Ferry Ranger District, Boundary County, Idaho*, by E.H. Bennett, J.D. Kauffman, and V.E. Mitchell: Idaho Geological Survey unpublished report, 2000, 262 p., 2 videotapes.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume V (Section C): Coeur d'Alene River Drainage Surrounding the Coeur d'Alene Mining District (Excluding the Prichard Creek and Eagle Creek Drainages) [secondary properties]*, by J.A. Kauffman, E.H. Bennett, and V.E. Mitchell, 1999: Idaho Geological Survey unpublished report, 225 p., 1 videotape.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume V (Section D): Coeur d'Alene River Drainage Surrounding the Coeur d'Alene Mining District (Excluding the Prichard Creek and Eagle Creek Drainages) [secondary properties]*, by J.A. Kauffman, E.H. Bennett, and V.E. Mitchell, 1999: Idaho Geological Survey unpublished report, 276 p., 1 videotape.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VI: St. Joe River Drainage*, by J.A. Kauffman, E.H. Bennett, and V.E. Mitchell, 1999: Idaho Geological Survey unpublished report, 399 p., 3 videotapes.

*Site Inspection Report for the Abandoned and Inactive Mines in Idaho on U.S. Forest Service Lands (Region 1), Idaho Panhandle National Forest: Volume VII: Priest Lake Ranger District, Bonner and Boundary Counties, Idaho*, by J.A. Kauffman, E.H. Bennett, and V.E. Mitchell: Idaho Geological Survey unpublished report, 2000, 283 p., 2 videotapes.

*Site Inspection Report for the Abandoned and Inactive Mines in Southern Idaho, Owyhee County: Volume I: Silver City-War Eagle Mountain Area, Owyhee County, Idaho*, by J.A. Kauffman, E.H. Bennett, and V.E. Mitchell: Idaho Geological Survey unpublished report, 2000, 415 p., 2½ videotapes.

*Stochastic Simulation of Aquifer Heterogeneity in a Layered Basalt Aquifer System, Eastern Snake River Plain, Idaho*, by J.A. Welhan, T.M. Clemo, and E.L. Gego: Idaho Geological Survey unpublished report, 2000.

*Surficial Geologic Map of the Clarkston Quadrangle, Nez Perce County, Idaho*, by K.L. Othberg, R.M. Breckenridge, and D.W. Weisz: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Harrison Quadrangle, Kootenai County, Idaho*, by R.M. Breckenridge and K.L. Othberg: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Lapwai Quadrangle, Nez Perce County, Idaho*, by K.L. Othberg, R.M. Breckenridge, and D.W. Weisz: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Lewiston Orchards North Quadrangle, Nez Perce County, Idaho*, by K.L. Othberg, R.M. Breckenridge, and D.W. Weisz: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Mount Coeur d'Alene Quadrangle, Kootenai County, Idaho*, by R.M. Breckenridge and K.L. Othberg: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Rockford Bay Quadrangle, Kootenai County, Idaho*, by R.M. Breckenridge and K.L. Othberg: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Surficial Geologic Map of the Worley Quadrangle, Kootenai County, Idaho*, by R.M. Breckenridge and

K.L. Othberg: Idaho Geological Survey unpublished map, scale 1:24,000, April.

*Thrift and Common Sense: Ground Water Protection Vs. Remediation in the Lower Portneuf River Valley*, by J.A. Welhan: The Gem, Idaho Rural Water Users Association, Issue 22, p. 11-12, 1999.

*An Update of Digital Geologic Mapping Projects in the Region*, by R.S. Lewis: Intermountain Forest Tree Nutrition Cooperative Annual Meeting, Moscow, April.

*Water Balance and Total Pumping Capacity of the Lower Portneuf River Valley Aquifer*, by J.A. Welhan: City of Pocatello Build-out Analysis Committee, 9 p., January.

## **Professional Activities**

Advisory board meeting, Idaho Geological Survey, Boise, December (E.H. Bennett, R.M. Breckenridge, C.D. Fullerton, K.L. Othberg, V.S. Gillerman, J.A. Welhan).

Annual Conference of Western States Seismic Policy Council, Sante Fe, New Mexico, September (R.M. Breckenridge).

Association of American State Geologists and U.S. Geological Survey cluster meeting, Santa Fe, New Mexico, September (E.H. Bennett, R.M. Breckenridge).

Association of American State Geologists Annual Meeting, St. Louis, Missouri, June (E.H. Bennett).

Association of American State Geologists liaison committee meetings, Washington, D.C., September and March (E.H. Bennett).

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

Business meeting, Idaho Earth Science Teachers Association, Coeur d'Alene, October (R.M. Breckenridge, C.D. Fullerton, K.L. Othberg, T.C. Walker).

Business meeting, Idaho Earth Science Teachers Association, Farragut State Park, July (R.M. Breckenridge, C.D. Fullerton, K.L. Othberg, T.C. Walker).

Business meeting, Idaho Earth Science Teachers Association, Boise, March (R.M. Breckenridge, V.S. Gillerman, K.L. Othberg, T.C. Walker).

Business meeting, Northwest Scientific Association Trustee's fall meeting, March (K.L. Othberg).

Chair, Portneuf Ground Water Forum, City of Pocatello (J.A. Welhan).

Change in Employment Compensation Committee meeting, Idaho Legislature, January, Boise (E.H. Bennett).

Community Appreciation Days, Bear Track Mine, Salmon, July (E.H. Bennett).

Convener and Chair, Highway Pond Ground Water Protection Working Group, Pocatello, (J.A. Welhan).

Convener and Co-Chair, Sensitive Resource Recategorization Working Group, Pocatello, (J.A. Welhan).

Coordinator at Idaho State University for the Idaho Geological Survey's contribution to the digital map compilation of the eastern Snake River Plain mapping project (J.A. Welhan).

Coordinator, cluster meeting for development of UI-ISU-BSU research proposal submission to DOE-EPSCOR for hydrologic research, eastern Snake River Plain (J.A. Welhan).

Co-supervisor, Digital Geologic Mapping/GIS Laboratory, Idaho State University's Geology Department and Idaho Geological Survey, Pocatello (J.A. Welhan).

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

Delegate, state geology, Western States Seismic Policy Council (R.M. Breckenridge).

Director, paleomagnetism laboratory, Idaho Geological Survey-College of Mines and Earth Resources (K.L. Othberg).

Earth Science Week Proclamation ceremony, Office of Gov. Dirk Kempthorne, October (V.S. Gillerman, K.L. Othberg).

Exhibitor, Boise Gem and Mineral Show, Boise, February (V.S. Gillerman).

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

Fellow, Geological Society of America (B. Bonnicksen).

Field trip co-leaders, Geology of the Deary area, Deary Cub Scout Troop, October, (B. Bonnicksen, M.M. Godchaux).

Field trip, Lewiston basin and vicinity, Earth Science Week, October (Moscow staff).

Field trip, Los Alamos National Laboratory, Western States Seismic Policy Council, September (R.M. Breckenridge).

Field trip, teacher workshop preview, Sawtooth Valley, June (R.M. Breckenridge, K.L. Othberg, T.C. Walker).

Field trip, Western Idaho suture zone, Hells Canyon Geological Society, July (R.S. Lewis).

Geologic history of Farragut State Park, talk and display, May (R.M. Breckenridge, D.W. Weisz).

Geological Society of America Annual Meeting, Denver, Colorado, October (V.S. Gillerman, R.S. Lewis).

Geological Society of America, Rocky Mountain Section Meeting, Missoula, Montana, April (G.W. Adema, R.M. Breckenridge, J.S. Freed, R.S. Lewis, K.L. Othberg, T.C. Walker).

Geological Society of Nevada Symposium: Geology and ore deposits 2000: The Great Basin and Beyond, Reno, Nevada, May (V.S. Gillerman).

Guest lecturer, courses in isotope geochemistry, hydrogeology, water system engineering, and ecology, Idaho State University (J.A. Welhan).

Ice Age Floods Institute Meeting, Spokane and Moses Lake, Washington, October, (R.M. Breckenridge).

Ice Age Floods Task Force Regional Meeting, Farragut State Park, February and June (R.M. Breckenridge).

Idaho Earth Science Teachers Association winter meeting and Teachers' Curriculum Project Presentations, Boise, March (R.M. Breckenridge, V.S. Gillerman, K.L. Othberg, T.C. Walker).

Idaho Association of Professional Geologists meetings, Boise (V.S. Gillerman).

Idaho Department of Lands Minerals Workshop, Boise, December (V.S. Gillerman).

Idaho Earth Science Teachers Association annual newsletter, June (B.D. Fullerton, C.D. Fullerton, K.L. Othberg, T.C. Walker).

Idaho Earth Science Teachers Association, compressed video meeting, December (R.M. Breckenridge, C.D. Fullerton, K.L. Othberg, T.C. Walker).

Idaho Environmental Forum meetings, Boise (V.S. Gillerman).

Idaho Geographic Information Advisory Committee meeting, Boise, November (L.R. Stanford).

Idaho Ground-Water Workshop, Boise, September (V.S. Gillerman).

Idaho Mining Association Congressional Dinner, Washington, D.C., May (E.H. Bennett).

Idaho Science Teachers Association and Idaho Earth Science Teachers Association annual conference, Coeur d'Alene, October (R.M. Breckenridge, C.D. Fullerton, K.L. Othberg, T.C. Walker).

Instructional assistant, graduate-student project on water-well logs in the Genesee area, University of Idaho (D.W. Weisz).

Instructional assistant, senior thesis project on paleomagnetism of basalt, University of Idaho (D.W. Weisz).

Instructor, earth science, Potlatch Jr.-Sr. High School, August-June (T.C. Walker).

Instructor, Geology 405, earth science education issues and activities, University of Idaho, spring (T.C. Walker).

Instructors, Geology 504, geology and geologic hazards, northern Idaho, July (R.M. Breckenridge, K.L. Othberg, T.C. Walker).

Joint Finance-Appropriations Committee meeting, Idaho Legislature, February, Boise (E.H. Bennett).

Leader, field trip, Clark Fork and Cabinet Gorge, Avista Corporation, April (R.M. Breckenridge).

Leader, field trip, Geology of the North Fork of the Coeur d'Alene River area, Idaho Geological Survey and Intermountain Tree Nutrition Cooperative, August (R.S. Lewis).

Leader, field trip, Lucky Friday Mine, University of Idaho's President Hoover and Provost Pitcher, Wallace, October (E.H. Bennett).

Leader, field trip, Ross Elementary School, Kuna and Boise, May (V.S. Gillerman).

Leader, field trip, Snake River geology, Walla Walla Community College, Clarkston, Washington, May (E.H. Bennett).

Leader, field trip, Silver Valley, Coeur d'Alene Chamber of Commerce, October (E.H. Bennett).

Leader, field trip, Stibnite Mining District, Idaho Museum of Mining and Geology, July (V.S. Gillerman).

Leader, field trip to Steptoe Butte, Architecture Senior Studio, University of Idaho, April (K.L. Othberg).

Leader, field trips, Workshop for Teachers, bedrock geology of northern Idaho, July (R.S. Lewis).

Leader, field trips, Workshop for Teachers, introductory geology and soils of northern Idaho, July (K.L. Othberg, T.C. Walker).

Leader, field trips, Workshop for Teachers, Lake Missoula Flood features on the Rathdrum Prairie, July (R.M. Breckenridge).

Leaders, field trip, Lewiston basin and vicinity, Moscow staff, October (B. Bonnicksen, R.M. Breckenridge, M.M. Godchaux, R.S. Lewis, K.L. Othberg).

Liaison, Idaho, National Earth Science Teachers Association, 1988-present (K.L. Othberg).

Member, Alpine Club of Canada (R.M. Breckenridge).

Member, Basin and Range Committee, Western States Seismic Policy Council (R.M. Breckenridge).

Member, Blackfoot storm-water grant technical advisory committee (J.A. Welhan).

Member, Commission on Explosive Volcanism of the International Association of Volcanology and Chemistry of the Earth's Interior (B. Bonnicksen).

Member, Earthquake Engineering Research Institute (R.M. Breckenridge).

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

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

Member, Ground Water Guardian Committee, Portneuf Chapter (J.A. Welhan).

Member, Hazardous Waste Management Council, Idaho State University (J.A. Welhan).

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

Member, Idaho Science Teachers Association (T.C. Walker).

Member, International Association of Volcanology and Chemistry of the Earth's Interior (B. Bonnicksen).

Member, liaison committee, Association of American State Geologists (E.H. Bennett).

Member, National Groundwater Foundation (J.A. Welhan).

Member, National Science Teachers Association (T.C. Walker).

Member, North American Digital Geologic Map Data Model steering committee meetings, Lexington, Kentucky, May; Denver, Colorado, October (L.R. Stanford).

Member, Northwest Scientific Association (K.L. Othberg).

Member, Pocatello storm-water master plan technical advisory committee (J.A. Welhan).

Member, Program Review Committee, Geography/Geology Program Review, North Idaho College, June (K.L. Othberg).

Member, Science language technical team, North American geologic map data model project (R.S. Lewis).

Member, Seismological Society of America (R.M. Breckenridge).

Member, Sigma Xi (V.S. Gillerman).

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

Member, Society for Sedimentary Geology (V.E. Mitchell).

Member, Technical Committee, Treasure Valley Hydrologic Modeling Project (K.L. Othberg).

Member, University of Idaho Employee Recognition Committee, 1999-2000 (K.L. Othberg).

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

Members, American Geophysical Union (T.C. Walker, J.A. Welhan).

Members, American Quaternary Association (R.M. Breckenridge, K.L. Othberg).

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

Members, Geological Society of America (E.H. Bennett, V.S. Gillerman, R.S. Lewis, V.E. Mitchell, K.L. Othberg, T.C. Walker).

Members, Idaho Earth Science Teachers Association (R.M. Breckenridge, C.D. Fullerton, K.L. Othberg,

T.C. Walker).

Members, National Association of Geology Teachers (K.L. Othberg, T.C. Walker).

Members, National Earth Science Teachers Association (K.L. Othberg, T.C. Walker).

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

Mentor, undergraduate program, Association of American State Geologists-National Science Foundation (R.S. Lewis).

National Mining Association Annual Meeting, St. Louis, Missouri, October (E.H. Bennett).

National Park Service Floods Study, Spokane and Moses Lake, Washington, October (R.M. Breckenridge).

Nevada Geological Society Gold Meeting, Sparks, Nevada, May (E.H. Bennett).

Northwest Mining Association 105th Annual Meeting, Spokane, Washington, December (E.H. Bennett, R.M. Breckenridge, C.L. Chaney, V.S. Gillerman, R.S. Lewis, K.L. Othberg).

Oregon Board of Geologists, geologist registration (R.M. Breckenridge).

Organizer, Northwest Scientific Association annual meeting, University of Idaho, March (K.L. Othberg).

Organizers and instructors, workshop for teachers, geology and geologic hazards of northern Idaho, July (R.M. Breckenridge, R.S. Lewis, K.L. Othberg, T.C. Walker).

Participants, geologic field trip to silicic volcanic centers in estados de San Luis Potosi, Guanajuato, Queretaro, and Mexico, led by UNAM staff members from Esstacion Regional Del Centro, Queretaro, November, (B. Bonnichsen, M.M. Godchaux).

Participants, IAVCEI Commission on Explosive Volcanism Field Workshop, July 7-18, Inside Silicic Calderas (Snowdon, Scaffell, and Glencoe, U.K.), Interactions of Caldera Development, Tectonism and Hydrovolcanism (B. Bonnichsen, M.M. Godchaux).

President-elect, Idaho Earth Science Teachers Association, 1999-2001 (T.C. Walker).

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

Recipients, Outstanding Supporter of Earth Science Education award, Idaho Earth Science Teachers Association, October (R.M. Breckenridge, C.D. Fullerton).

Representative and disaster coordinator, Bureau of Disaster Services (V.S. Gillerman).

Representative, Basin and Range Earthquake Clearinghouse Committee, January and February (R.M. Breckenridge).

Representative, Boise State University Department of Geosciences (V.S. Gillerman).

Representative, Department of Lands Mining Advisory Committee (V.S. Gillerman).

Representative, Idaho Department of Water Resources Water Planning Coordination Committee (V.S. Gillerman).

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

Representative, Technical Advisory Committee, Treasure Valley Hydrologic Project, Boise (V.S. Gillerman).

Reviewer, Rheomorphism of welded rocks from the Las Canadas caldera (Tenerife, Canary Islands), by Carles Soriano and others, for the Geological Society of America Bulletin (B. Bonnichsen).

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

Structural geology of the Lewiston basin discussion group, University of Idaho (B. Bonnichsen, R.M. Breckenridge, R.S. Lewis, K.L. Othberg).

Technical Advisor, Ice age Floods Institute (R.M. Breckenridge).

Trustee, Northwest Mining Association (E.H. Bennett).

Trustee, Northwest Scientific Association, 1997-2000 (K.L. Othberg).

University of Idaho research planning meetings, March (R.M. Breckenridge).

U.S. Army Corps of Engineers RAMS meeting, Reno, Nevada, November (E.H. Bennett).

Workshop, Digital Mapping Techniques, 2000, Lexington, Kentucky, May (J.S. Freed, L.R. Stanford).

Workshop for teachers, geology and geologic hazards of northern Idaho, July (R.M. Breckenridge, C.D. Fullerton, R.S. Lewis, K.L. Othberg, T.C. Walker).

## **Media Interviews, Appearances, and Articles**

Appearance in “Supervolcanoes”: BBC Horizon Series; television documentary released spring 2000 (B. Bonnichsen).

Appearance in “The Future of Mining”: Idaho Public Television, April (E.H. Bennett).

Appearances in “Volcanoes”: Idaho Public Television "Dialogue for Kids" Series, broadcast February 28 (B. Bonnichsen, M.M. Godchaux).

Telephone interview for KBOI TV (Channel 4, Boise) regarding the 20th anniversary of the Mount St. Helens eruption, May 18 (B. Bonnichsen).

## **Graduate Thesis Committees**

Rachel Ellisor, M.S., Geology, University of Idaho (B. Bonnichsen).

Gwen Gerber, M.S., Geology, Idaho State University (J.A. Welhan).

John Glover, M.S., Geology, Idaho State University (J.A. Welhan).

Paul Hitchcock, M.S., Geology, Idaho State University (J.A. Welhan).

Chad Johannesen, M.S., Geology, Idaho State University (J.A. Welhan).

Joel Murray, M.S., Environmental Science, University of Idaho (K.L. Othberg).

Jerry Potter, M.S., Geology, University of Idaho (B. Bonnichsen).

Christina Russell, Ph.D., Geology, University of Idaho (B. Bonnichsen).

Andy Smith, M.S., Geology, Idaho State University (J.A. Welhan).

Ron Warren, M.S., Environmental Science, University of Idaho (K.L. Othberg).

Doug Whitmire, M.S., Geology, Idaho State University (J.A. Welhan).

Cathryn Williamson, M.A., Anthropology, University of Idaho (K.L. Othberg).

## **Grants and Contracts**

*Digital Atlas of Idaho*: R.S. Lewis (Idaho State Board of Education, July 1999-June 2000, \$4,900).

*Eastern Snake River Plain Geological Mapping Initiative, Evaluation of the Status of Geological Mapping of Silicic Volcanic Rocks in the Ashton and Dubois 30' X 60' Quadrangles, Eastern Idaho*: B. Bonnichsen (Bechtel Corporation, June-September 2000, \$35,000).

*Headwaters Project Involving Geologic Mapping and Digital Compilation of the Coeur D'Alene and Idaho City 30' by 60' Quadrangles, Idaho*: R.S. Lewis (U.S. Geological Survey, July 1999-June 2000, \$29,000).

*Idaho Landslide Inventory Database*: R.M. Breckenridge, (Idaho Bureau of Disaster Services, April-September 2000, \$9,999).

*Idaho Source Water Assessment Wellhead Delineation*: J.A. Welhan (Idaho Department of Environmental Quality, \$10,400).

*Investigation of Abandoned/Inactive Mine Sites, continuation*: V.S. Gillerman (Bureau of Land Management, October 1998-September 2000, \$20,000).

*Investigation of Abandoned/Inactive Mine Sites, continuation*: V.S. Gillerman (Bureau of Land

Management, October 1999-December 2001, \$40,000).

*Investigation of Abandoned/Inactive Mine Sites*: E.H. Bennett (U.S. Forest Service, June 1999-June 2000, \$275,129).

*Investigation of Abandoned/Inactive Mine Sites*: E.H. Bennett (U.S. Environmental Protection Agency, May 1999-September 2000, \$17,719).

*Investigation of Abandoned/Inactive Mine Sites*: E.H. Bennett (Idaho Department of Lands, May 1999-January 2001, \$20,000).

*Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop*: R.M. Breckenridge and K.L. Othberg (Idaho Bureau of Disaster Services, June 1999-March 2000, \$47,900).

*Mitigation of Idaho Geologic Hazards, Earthquake Education Workshop*: R.M. Breckenridge and K.L. Othberg (Idaho Bureau of Disaster Services, April-September 2000, \$40,000).

*Portneuf Valley GIS Data Project-Phase II*: J.A. Welhan (City of Pocatello, July 1999-January 2000, \$65,900).

*Potlatch Basalt Mapping*: R.S. Lewis (Idaho Department of Lands, April 2000-March 2001, \$5,000).

*Potlatch Basalt Mapping*: R.S. Lewis (Potlatch Corporation, January 2000-March 2001, \$5,000).

*Project Impact Kamiah Flood Study*: R.M. Breckenridge (Idaho Bureau of Disaster Services, \$869).

*STATEMAP Project, Urban Geologic Mapping in Kootenai County and Lewiston, and Digital Compilation of the Coeur d'Alene 30' X 60' Quadrangle*: K.L. Othberg, R.M. Breckenridge, B. Bonnicksen, and R.S. Lewis (U.S. Geological Survey, May 1999-April 2000, \$108,265).

*STATEMAP Project, Urban Geologic Mapping in the Lewiston Area, the Sun Valley Urban Corridor, the Melba Area, and Digital Compilation of the Potlatch 30' X 60' Quadrangle*: K.L. Othberg, R.M. Breckenridge, B. Bonnicksen, and R.S. Lewis (U.S. Geological Survey, May 2000-April 2001, \$122,869).