British Columbia Geological Survey Activities in 2011

by S.M. Rowins[1], L. Jones[1] and B. Madu[1]

INTRODUCTION

The British Columbia Geological Survey (BCGS) had another busy and productive year in 2011. It continued to play a leading role in the creation of a vibrant, safe, and sustainable mining industry in British Columbia by providing world-class geoscience expertise and data to government, industry, and the general public. These various groups use our expertise and data in different ways, but a common goal of all groups is to see the province position itself as a preferred destination for investment by the mineral exploration and mining industry. In the unpredictable world of today, the responsiveness of the BCGS to adapt to changing global market conditions (*i.e.* commodity scarcity) and government priorities is a clear advantage to the BC exploration and mining community. The variety of BCGS geoscience projects reported on in this volume highlights the organization's effort to deploy its people and resources in geoscience activities that deliver maximum return to the province. There are longer papers describing final results from multi-year field mapping programs, and shorter papers presenting preliminary results from projects initiated less than a year ago. A hallmark of the Survey is its ability to consistently deliver standardized high quality geological maps, geoscience reports, and online interactive geoscience databases in a very short timeframe. All geoscience products are made available online via MapPlace, the award-winning internet portal of the BCGS.

British Columbia's mineral exploration and mining industry continued to perform well and helped lead the economic recovery in BC. The total value of solid mineral production for 2010 was $7 billion and mineral exploration spending was $322 million, more than double the $154 million spent in 2009. It is anticipated that similar, if not stronger, numbers are expected for 2011. Nevertheless, core funding levels for the BCGS in 2011 were similar to those in 2010 and 2009. This resulted in the BCGS continuing to focus on creating new geoscience products in partnerships with universities, industry, and other public geoscience agencies. The BCGS continued its long collaboration with the Geological Survey of Canada (GSC) by participating in five joint field projects in 2011. Three field mapping projects were delivered as part of the GSC's Geo-mapping for Energy and Minerals (GEM) program. This was the third and final year of fieldwork these mapping projects. A four-year "specialty metals" project that started in 2010 under the auspices of the GSC's renewed Targeted Geoscience Initiative program (TGI-4) hit full stride in 2011. This specialty metals project is a national initiative with significant leadership provided by George Simandl of the BCGS. Its overall objective is to develop new exploration methodologies and technologies in the search for specialty metals. Specialty metals are important in the manufacturing of automobiles and many high-tech products such as cell phones and computers. Another, new, TGI-4 collaborative project between the BCGS and The University of British Columbia started over the summer and targeted Ni-Cu-PGE deposits associated with ultramafic intrusions in BC's orogenic belts. These "orogenic" Ni-Cu-PGE deposits are poorly understood and new models are needed.

Another important BCGS partnership included Geoscience BC (GBC). In 2011, the BCGS and GBC undertook a major collaborative bedrock mapping project in the Dease Lake area of northwestern BC. This area is highly prospective for porphyry Cu-Au, polymetallic skarn, epithermal Au, and orogenic (mesothermal) Au vein styles of mineralization. The project is part of the larger QUEST-Northwest initiative, a GBC program launched in early 2011 to stimulate mineral exploration in the northwestern part of the province along Highway 37. Finally, as in past years, university students were employed as co-op interns and geoscience assistants throughout the year. Their help with the delivery of our field programs and work on improving our digital geoscience databases is greatly appreciated.

BCGS FIELD ACTIVITIES

A main priority of the BCGS is to generate new geoscience data and products, including bedrock and surficial geology maps and targeted mineral deposit studies. The locations of the 2011 field projects are shown in Figure 1. Projects are typically chosen with the objective of helping to diversify local economies by attracting mineral exploration activity that may lead to the opening of new mines. In many parts of the province, mineral exploration and mining are essential drivers of

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This publication is also available, free of charge, as colour digital files in Adobe Acrobat® PDF format from the BC Ministry of Energy and Mines website at http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/Fieldwork.

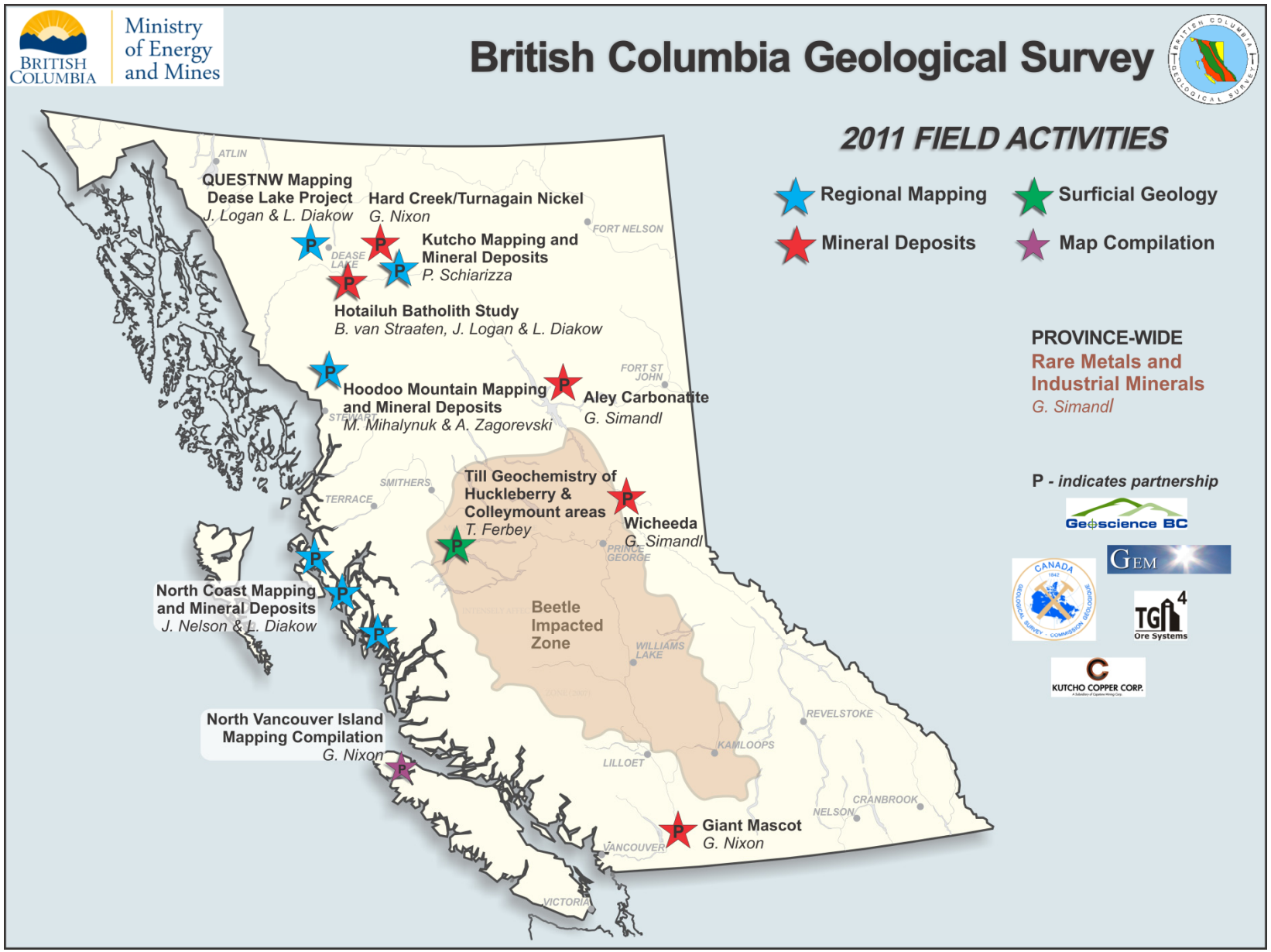

Figure 1. British Columbia Geological Survey 2011 field project areas.

local employment and tax revenue. These activities also directly support the development of regional infrastructure.

Multi-year field mapping studies (Figure 1) concluded in the North Coast (Nelson *et al.*, this volume; Angen *et al.*, this volume), the Hoodoo Mountain area north of the Iskut River (Mihalynuk *et al.*, this volume; Zagorevski *et al.*, this volume), and the Kutcho Creek area near the Kutcho Creek volcanogenic massive sulphide (VMS) deposit (Schiarizza, this volume). New field mapping projects started in the northwestern part of the province at Dease Lake (Logan *et al.*, this volume; Moynihan and Logan, this volume; Iverson *et al.*, this volume) and the Hotailuh batholith (van Straaten *et al.*, this volume). Several short trips by Graham Nixon to North Vancouver Island, which hosts the past-producing Island Copper mine, facilitated the release of five new 1:50 000 scale regional geology maps for that area.

In addition to these 2011 mapping projects, several other mineral deposit-related studies were undertaken. These include age determinations of potentially Cu (Mo) and Au prospective volcanic rocks near Ootsa Lake and Francois Lake in west-central BC (Ferbey and Diakow, this volume), new Mineral Deposit Profiles for sedimentary phosphate deposits (Simandl *et al.*, this volume) and carbonate-hosted, nonsulphide Zn (hypogene) deposits (Paradis and Simandl, this volume), and an investigation of metallic minerals in hand-panned black sands from creeks in the Atlin placer gold camp (Hora *et al.*, this volume). A study by Fajber and Simandl (this volume) evaluated the suitability of portable x-ray fluorescence (XRF) instruments for determining rare earth element (REE) abundances in sedimentary phosphate deposits. Finally, Soloviev (this volume) investigates the composition of granitic rocks - the Hellroaring Creek stock - associated with rare metal mineralization in southeastern BC.

Ongoing Projects

Edges – Modeling the Evolution of the Northern Cordillera Resource Environment from the Edges of Exotic Terranes

Edges is a highly focused multi-year geological mapping initiative involving formal collaboration between the Government of Canada, the Province of British Columbia, the Yukon Territory, Geoscience BC, the United States Geological Survey, and the Alaska Division of Geological and Geophysical Surveys. It began field operations in 2009 in British Columbia and will last until 2013. It is a key project in the Federal GEM program (Geoscience for Energy and Minerals). Support is being contributed by all participating agencies.

The ultimate goal of the initiative is to improve the effectiveness of resource exploration and discovery in the northern Cordillera by outlining resource-rich environments in British Columbia, the Yukon, and Alaska. The geological targets are the exotic outer terranes with their enclosed pre-accretionary syngenetic and epigenetic deposits and the metal-rich Triassic through Paleogene magmatic arcs and associated accretion zones that resulted from interaction of the terranes with the western margin of ancient North America. The target areas include parts of northern and central British Columbia where the geological map base is either several decades out of date or at insufficiently large scale to evaluate mineral potential using modern tectonic interpretations.

North Coast Partnership Project (Edges)

JoAnne Nelson and Larry Diakow, along with colleagues from the GSC, the University of Wisconsin at Eau Claire, the University of Arizona, and the University of Waterloo returned from a successful third field season mapping along the northern coastal region of BC (Figure 1). The first two years involved detailed mapping on and near Porcher Island in 2009 and near Klemtu in 2010. In this final field season, the focus was (1) to complete regional-scale geological coverage of the intervening area from Grenville Channel to northern Princess Royal Island, in order to update the provincial geological map for all of north coastal British Columbia, and (2) to address problems and questions arising from mapping and U-Pb isotopic results obtained from earlier fieldwork. A two-year sub-project was started by Joel Angen (his M.Sc. thesis) on the structural geology of Porcher Island. In 2011, the mapping team:

- Discovered new VMS showings on southern Kennedy Island (Figure 2).
- Collected sulphide samples for Pb isotopic analysis from the Pitt showing on Pitt Island. This is the only previously documented VMS occurrence in the southern Alexander terrane of BC.
- Documented and sampled a previously unrecognized late Paleozoic volcano-sedimentary unit east of the northern Grenville and Telegraph channels.
- Traced out the Grenville Channel fault for 300 km along strike.
- Investigated a Caledonian-age deformational event that probably marked the amalgamation of pericratonic and primitive arc elements within the composite Alexander terrane.

Iskut River Partnership Project (Edges)

Mitch Mihalynuk and Alex Zagorevski of the GSC returned to the Coast Belt of northwest BC and mapped the Hoodoo Mountain area immediately north of the Iskut River and the Rock and Roll VMS deposit. This was the third field season of an Edges partnership between the GSC and the BCGS. The Hoodoo Mountain area is located between the Galore Creek porphyry copper-gold

Figure 2. Cees van Staal (GSC) trying to remove the "Hard Case" showing he discovered on Kennedy Island.

deposit and the past-producing gold deposits of the Bronson Camp. Mapping in 2010 lead to the discovery of numerous copper-gold occurrences with similarities to the porphyry-style mineralization at Galore Creek (Figure 1). New mapping in 2011 extended the geological relationships, established in 2010, to the west. Project highlights include the recognition that the axis of the magmatic arc responsible for the Late Triassic and Early Jurassic strata lies in the eastern map sheet 104B/14E. Another finding was that north-trending regional folds may affect the Verrett-Iskut fault and, importantly, the location of the potentially offset host-rocks for the Rock and Roll VMS deposit. The project team also analyzed a large suite of Mississippian to Pliensbachian volcanic and hypabyssal rocks to test the usefulness of whole-rock geochemistry to discriminate petrographically similar rock sequences in the Hoodoo Mountain area.

Kutcho Partnership Project (Edges)

The Kutcho project is a two-year bedrock mapping program initiated by the BCGS in 2010 in partnership with the Geological Survey of Canada (Edges project) and Kutcho Mining Corp. (formerly Capstone Mining Corporation). The aim of this project, lead by Paul Schiarizza, is to gain a better understanding of, and provide more detailed geological maps for, the Permo-Triassic Kutcho assemblage, which hosts the Kutcho Creek volcanogenic massive sulphide deposit (Figure 1). In 2011, another 200 square kilometres of the Kutcho assemblage was mapped. Only a few minor base metal occurrences are currently known in the Kutcho district, but newly identified zones of pyritic quartz-sericite schist indicate that parts of the map area have potential for future base metal discoveries.

North Vancouver Island Regional Mapping Project

A series of five new 1:50 000 scale geoscience maps covering northern Vancouver Island were released by Graham Nixon and colleagues in 2011 (Figure 1). Several field trips to northern Vancouver Island in 2011 permitted final touches to be made to the maps prior to their release. North Vancouver Island is prospective for porphyry, skarn, and epithermal styles of mineralization and hosts the past-producing Island Copper mine. Together, these five maps provide a revised Early Mesozoic stratigraphic framework and Mesozoic-Tertiary plutonic history for southern Wrangellia (Figure 3).

Specialty Metals TGI-4 Partnership Project

The BCGS and GSC began collaborating on a multi-year province-wide study of specialty or rare metals in 2010. The term "specialty metals" refers mainly to uncommon, nonferrous metals used in small quantities, typically <150 000 tonnes/year, or derived from geographically restricted areas. The Specialty Metals TGI-4 Program is studying ore deposits in terms of geological setting, mineralizing processes, applied mineralogy, exploration methods, and metallurgical constraints. The results will address some of the major knowledge gaps related to these deposits and are expected to help the Canadian mining industry tap domestic sources of rare metals. George Simandl of the BCGS is leading the BC component of the Specialty Metals TGI-4 program. In 2011, his team conducted a series of field examinations of various specialty metal properties throughout BC (Figure 1). The results were released in numerous publications and presented at conferences in Canada and overseas. A study by Robert Fajber and George Simandl on the effectiveness of portable hand-held x-ray fluorescence (XRF) analyzers in measuring lanthanides and Y concentrations in sedimentary phosphate deposits will be of particular interest to the mineral exploration industry.

Major New Projects

Dease Lake Mapping Project (QUEST-Northwest)

The BCGS's Dease Lake Mapping Project is part of GBC's larger QUEST-Northwest initiative, a program launched in 2011 to stimulate exploration in the northwestern part of the province along Highway 37

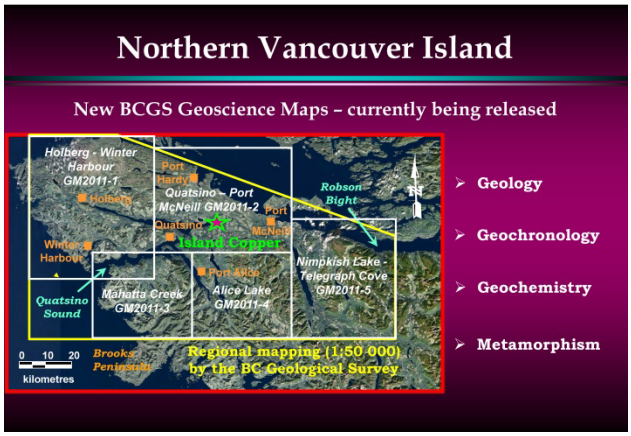

Figure 3. Series of five newly released 1:50 000 scale geoscience maps covering northern Vancouver Island.

(Figure 1). The Dease Lake area is highly prospective and proximal to the large porphyry Cu-Au deposits at Red Chris and Schaft Creek. Geoscience BC has committed $3.25 million in funding for high resolution airborne magnetic surveys, the collection of new regional stream sediment data, reanalysis of stream sediment samples, and the regional bedrock mapping done by the BCGS. The BCGS bedrock mapping program is complementary to the regional geophysical and geochemistry programs directly administered by GBC. Collectively, these programs will provide detailed, high quality geoscience data to aid mineral exploration in this highly prospective part of the province.

The Dease Lake Mapping project is lead by Jim Logan and Larry Diakow of the BCGS. Bram van Straaten and David Moynihan were Senior Geoscience Associates and selectively mapped and evaluated the mineral potential of the Hotailuh batholith and Snow Peak pluton, respectively. A group of enthusiastic summer students served as Geoscience Assistants on the project (Figure 4). Four field-based studies were completed within a 70 km radius of the community of Dease Lake. Collectively, these studies make up the Dease Lake Mapping Project. They include:

1. Dease Lake regional bedrock mapping conducted by Jim Logan, Larry Diakow, and David Moynihan;
2. Geological mapping and sampling of the Hotailuh batholith in order to understand its magmatic evolution and mineral potential. Bram van Straaten and a field assistant spent nine weeks visiting 331 field stations and collecting 134 samples for laboratory study and analysis. The 2011 study focused on mapping within the Gnat Pass area and seven smaller areas to the east. The field areas were chosen for their mineral occurrences and suitability for understanding the internal geology and external contact relationships for various phases of the batholith;
3. A focused study of the magmatic evolution and emplacement history of the Mo-bearing Snow Peak pluton. Preliminary results show that the Snow Peak pluton records Early Paleocene magmatism and associated Mo+/-Au and W mineralization that is about 10 Ma younger than other similar (?) plutons of the Surprise Lake Plutonic Suite of northern British Columbia and Yukon. This younger magmatic epoch may be the plutonic equivalent of the volcanic Carmacks Group exposed further to the north.
4. A study by Olivia Iverson and colleagues to establish the depositional environments, age, and lithogeochemical characteristics of the Late Triassic Tsaybahe and Stuhini group magmatic arc. New U-Pb detrital zircon data reveal that rocks previously assigned to the Triassic Stuhini Group are actually Middle Jurassic in age. They have been reassigned to the Hazelton Group. This implies that the Hotailuh thrust mapped in the present study area does not, in fact, exist.

Figure 4. Dease Lake field crew preparing traverse routes before helicopter set-outs.

Orogenic Ni-Cu-PGE TGI-4 Partnership Project

The BCGS (Graham Nixon), GSC (Doreen Ames), and the University of British Columbia (James Scoates) started the first year of a collaborative partnership examining the potential for "orogenic" Ni-Cu-PGE deposits associated with supra-subduction zone ultramafic-mafic intrusions exclusive of ophiolites and accreted large igneous provinces (*e.g.*, Wrangellia). The aim of the project is to establish mineral deposit models and exploration criteria for two poorly understood magmatic sulphide deposits in BC: (1) Giant Mascot – BC's only past-producing Ni mine (1958-74); and (2) the Turnagain Alaskan-type intrusion, which has a large resource of low-grade Ni and Co (Figure 1).

MAPPLACE AND DATABASE ACTIVITIES

MapPlace

Since 1995, the advanced web service of MapPlace has provided industry and government agencies with comprehensive tools and open geoscience data to aid in the discovery of mineral potential in BC. The mineral industry recognizes MapPlace as innovative and indispensable with unique and interactive web-based applications and tools to assist in decision-making for investment. MapPlace continues to provide clients with efficiencies in research time, data costs and analysis. Data themes and applications available on MapPlace include mineral potential, bedrock and surficial geology, publications, mineral and petroleum tenure, MINFILE, assessment reports, geochemistry, and geophysical surveys. Yao Cui and Pat Desjardins contributed geomatic expertise to MapPlace enhancements and the integration of servers. Major technical advances have taken place

since the inception of MapPlace 15 years ago, including growing databases, adding better servers, increasing bandwidth and using affordable advanced database software. Pat and co-op student Thomas Edgehill, while working with the next generation of Autodesk MapGuide®, are reviewing data modeling and architecture aspects to provide continued efficient delivery of data for the exploration community.

Property File, MINFILE, ARIS and RGS

During 2011, Property File, a collection of an estimated 98 000 unique industry documents and maps, continued to grow. As of December 2011, more than 31 100 Property File documents were available online, including 393 Falconbridge documents, 2710 Cyprus-Anvil documents, 330 Chevron documents, 618 Placer Dome documents, 2209 Rimfire documents, 2974 Mine Plans, more than 13 533 Library File items, and 7377 recently posted Tom Schroeter Project files. Another recent addition includes 879 RGS maps showing original locations of geochemical samples. Property File documents are retrieved through the search application (propertyfile.gov.bc.ca) or through links from MINFILE (minfile.ca). Kirk Hancock is the Property File contact and is currently accepting donations.

MINFILE contains geological, positional and economic information on more than 12 500 metallic, industrial mineral and coal mines, deposits and occurrences in BC. The BCGS has been allocated extra funding to update 2000 of the most critical records and add 400 new discoveries through the review of mineral assessment reports, recent publications, press releases and company websites. Sarah Meredith-Jones is the MINFILE contact and this year she approved the update of 300 occurrences and the addition of 100 new occurrences.

Users can now access more than 31 600 company mineral assessment reports using the online ARIS database. More than $1.8 billion of exploration expenditures has been recorded in assessment reports since 1947. In the past year, the value of expenditures on exploration programs reported was $86.3 million. The mining industry is encouraged to submit assessment reports in digital form to the Mineral Titles Branch. Benefits include higher quality line-work; more efficient digital reports; quicker approval; and lower costs for printing, mailing, storage, scanning and processing. During this year, 751 reports were submitted, of which 704 were approved. Of these, 616 or 85% were submitted digitally. This is up 65% from the previous year. Of these reports, 165 or 23% were sent back for amendments. Allan Wilcox and Ted Fuller work with clients to approve reports. The four most common reasons reports are returned are not enough detail in the cost statement, geochemical values were not plotted, full-scale geophysical maps were not included, and drillholes were submitted with missing cross sections and without proper scales.

Laura de Groot continues to manage 11 000 webpages and keeps staff on track with database management plans and needs. Website improvements include the addition of all new publications including 67 geological publications related to oil and gas activity and a listing of industrial minerals by commodity. The geosciences publications catalogue now has 4055 entries. CanGeoRef, a subscription-based bibliographic database of Canadian geoscience literature, was launched in September 2011. This database contains more than 200 000 entries from across the country, with gaps in grey literature having been filled for Alberta, Manitoba and Ontario. British Columbia is currently being updated.

The Regional Geochemical Survey (RGS) program covers roughly 75% of the province with stream sediment and stream water sampling at an average sample density of one sample per 13 km^2. Samples have been collected since the 1970s at a total estimated cost of $25 million. The most recent release of the entire RGS database of 61 425 samples was published as GeoFile 2011-7. The original hardcopy maps annotated with sample locations, labels and notes are an invaluable source for validating the positional accuracy of the sample locations and resolving issues of uncertainty in locations. Yao Cui managed the retrieval of the 900 original hardcopy NTS maps. Geoscience BC provided funding for the scanning to preserve this treasure of maps, which are now available as PDF documents through Property File. Yao would like to acknowledge assistance from Graham Green, Pat Desjardins and Wayne Jackaman for the retrieval of the maps, and Victoria Francis for quality assurance. Purple Rock Inc. indexed the collection, which was scanned by Camirage Imaging Services Inc.

During the past year, Kirk Hancock and Sarah Meredith-Jones provided mineral resource assessments of different areas of BC for the Ministry of Aboriginal Relations and Reconciliation to assist with treaty negotiations and other government business. Staff worked with the Mineral Policy and Regional Geology staff to develop economic and social assessments and exploration activity products.

BC's Digital Bedrock Geology Map: BCGeology Map

The province's digital geology map is essential for mineral exploration and assessing mineral potential. To facilitate the update and data integration of digital geological maps, Yao Cui continues the development of a Geology Operational Database Environment (GODE) to improve the efficiency of data maintenance and to enhance data quality. Certain components of GODE have already been completed, including the system architecture, data models, best practices, data quality assurance policies and rules, and some applications. The corporate spatial databases for GODE have been implemented in Microsoft® SQL Server 2008 (R2) to store source maps, archives and corporate resources. The spatial databases were also prototyped in

PostgreSQL/PostGIS. Upon completion, the GODE, together with Geology Application Database Environment (GADE), will result in all future provincial geological mapping products being available as online, digitally seamless geospatial databases. Pat Desjardins, Tian Han and students are working with Yao on this project.

The development of GODE has proven to be beneficial. One of the first results is a custom-built application for BCGS staff to retrieve styled TRIM topographic base maps stored in the corporate spatial database. When an area is selected in the province, with a single mouse click, up to hundreds of TRIM map sheets with typical topographic features can be retrieved in minutes, saving days of work to manually locate the TRIM maps on a file server, convert the GIS data format, transform the map projection, merge the map sheets and finally style the geographic features (Figure 5).

The development of GODE also helps to drive recent data quality-assurance work on the province-wide geological contact and fault line-work that has not been previously published. Two co-op students, Graham Green and Victoria Francis, contributed to the development and testing of data quality-assurance methodology, sequence-of-data processing and a test-run of recently compiled data quality rules for geological contacts and faults. The geological contact and fault line-work will become the base of future updates and to derive updated bedrock polygons.

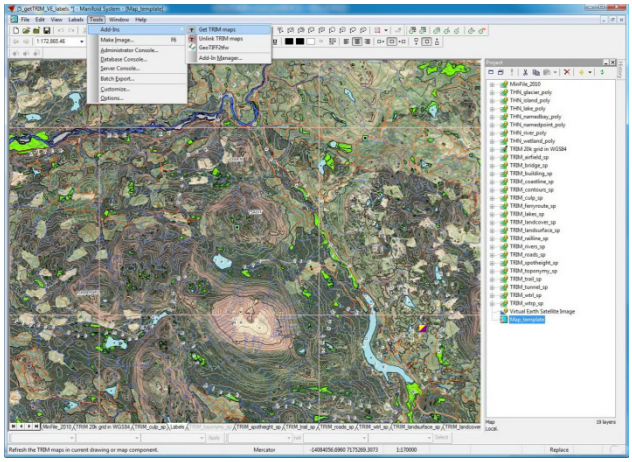

Figure 5: Instant access of styled TRIM topographic base maps (vector layers) and geoscience data stored in spatial databases.

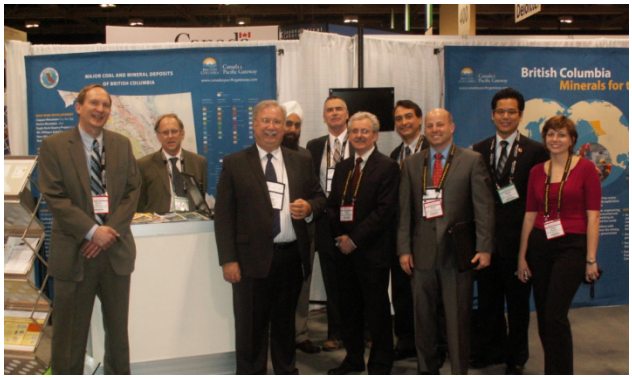

Figure 6. "Team BC" promoting the province's mineral resources to the world at the PDAC in Toronto, March 2011.

TECHNICAL MARKETING

Conferences and Workshops

Staff participated in numerous conferences and workshops during 2011, as organizers, speakers and attendees. Highlights from conferences and meetings included:

- presentations by JoAnne Nelson, Paul Schiarizza, and Mitch Mihalynuk at the Mineral Exploration Roundup 2011 in Vancouver;
- participation in the Prospectors and Developer's Association of Canada (PDAC) convention in Toronto by hosting a Ministry booth on the trade show floor and helping host an Asian investor luncheon (Figure 6);
- presentations by BCGS geoscientists at the 2011 KEG annual meeting in Kamloops;
- Yao Cui presented "Visualization of Geoscience Data from Multiple Sources" and Larry Jones presented an update of the BCGS at Minerals South in Kimberly during November 2011;
- a presentation by Bruce Madu on the activities of the BCGS at the NWMA's convention in Reno in December;
- presentations by George Simandl on BC specialty metals at the 2011 GACMAC meeting in Ottawa and at the 2011 Goldschmidt meeting in Prague, Czech Republic.
- presentation by Steve Rowins on Archean porphyry Au-Cu deposits at the 2011 GACMAC meeting in Ottawa;
- presentations by Jim Logan and Paul Schiarizza at the "Exploration Undercover Workshop" in Vancouver, October 12-14;
- Bruce Madu provided key leadership and technical expertise to the Premiers 2011 Asian Investment Mission and coincident annual mining events in Beijing, Tianjin and Hong Kong (Figure 7);
- Bruce Madu delivered high-level information for an inaugural mining and exploration session as part of the Premier's Mission in Delhi, India and supported the signing of an MOU between BC and India pertaining in some aspects to the exchange of geoscience expertise;
- public lecture by JoAnne Nelson at the Yukon Geoscience Forum in Whitehorse in November;

The Cordilleran Tectonics Workshop (CTW) is being organized by the BCGS and the Pacific Section of the Geological Association of Canada (the "GAC-PAC").

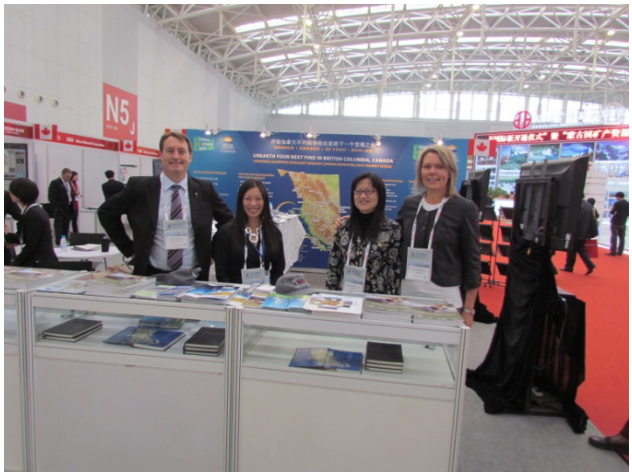

Figure 7. Bruce Madu, Janet Cho, Jin Xiuzhen (translator) and Tracey Sexton (AMEBC) ready to promote British Columbia's mineral resources at the China Mining Expo in Tianjin, China, November 2011 (photo courtesy of AMEBC).

This year it will be held at the Harbour Towers Hotel in Victoria, BC, February 24-26, 2012.

Earthbound Lectures

The BCGS hosts lectures throughout the year under the banner "Earthbound". Invited speakers in 2011 included:

1. February 25: **Jim Lewis** (Policy and Sustainability Branch, Mines and Mineral Resources Division, MEM) - Atlin-Taku Land Use Plan: A Social-Economic Assessment Method Based on GSB Mineral Potential Assessments.
2. March 18: **Tony Wass** (Ocean Floor Geophysics) - Dragon's Den: Exploration for Seafloor Massive Sulphides near Okinawa.
3. April 1: **JoAnne Nelson** (BCGS) - The Sinistral Side of the Mid-Cretaceous Gold Story.
4. May 18: **Steve Rowins** (BCGS) - Genesis of the oldest porphyry Au-Cu deposit in the Superior Province: The Troilus mine, Quebec.
5. September 30: **Mitch Mihalynuk** (BCGS) - Hooped in the Hoodoo Map Area.
6. October 7: **JoAnne Nelson** (BCGS) - Fishy Goings-on on the BC North Coast.
7. October 14: **Graham Nixon** (BCGS) - TGI-4: Ni-Cu-PGE and NVI update.
8. October 21: **Yao Cui** (BCGS) - Geology Operational Database Environment (GODE): progress and future.
9. November 4: **Paul Schiarizza** (BCGS) - The Kutcho Assemblage, Eastern King Salmon Allochthon.
10. November 18: **Fil Ferri** (Geoscience and Strategic Initiatives Section, MEM) - Geological Studies in the Toad River (094N) Map Area.

Publications

During the past year, the BCGS published *Geological Fieldwork 2011*; seven Open File maps and reports; five Geoscience Maps; twelve GeoFile maps, reports and data files; and four Information Circulars. Staff also provided contributions to the Canadian Journal of Earth Sciences' Mountain Pine Beetle Special Issue.

With the Regional Geologists as principal authors, the BCGS published *Exploration and Mining in British Columbia 2011* and *British Columbia Mines and Mineral Exploration Overview 2011* and coordinated articles on provincial industry activities in the other external publications.

All geoscience publications are available online at the BCGS website: www.empr.gov.bc.ca/geology.

BC MINERAL DEVELOPMENT OFFICE

The role of the BC Mineral Development Office (MDO) in Vancouver is to promote investment in the province's mineral exploration and mining industry, both domestically and internationally. This includes delivering a multifaceted technical campaign to highlight the province's superior coal and mineral potential, renowned geoscience database and expertise, and attractive business climate. The MDO interacts with decision-makers in industry, including executive management, geologists and prospectors, and forms part of the wider marketing efforts of government. The MDO also hosts incoming national and international companies and government representatives, and provides leadership for government trade missions.

Examples of MDO activities in the past year include acting as a key player to profile information on BC's mineral resources, investment procedures and specific mineral commodities to Asian investors, including the Asia Investment Mission to Hong Kong, China and India; preparing articles on BC's mineral resources and exploration and mining activity for numerous ministry and industry publications to promote the province; profiling BC mineral industry investment opportunities at numerous conferences, including the Mineral Exploration Roundup, the Prospectors and Developers Association of Canada (PDAC) Convention, the China Mining Conference and the KEG annual meeting; responding on a daily basis to requests for assistance from prospectors, geologists, companies and the public; working on various land-use issues, including those associated with referrals from Mineral Titles; delivering presentations to mining associations where possible; and updating publications such as Gold in BC, Copper in BC, and Opportunities to Explore – British Columbia Mining and Minerals.

Marketing Coal and Minerals to Asia-Pacific Region

Government continued an active Asia-Pacific marketing strategy to attract direct investment from Asia

in BC exploration and mining projects. The BC Jobs Plan specifically highlights the opportunities that the mining industry presents for growing the economy and creating more employment throughout the province. Asian countries are leading consumers of the province's coal and metal ores, and have a record of investment in BC's minerals industry. Key selling points are BC's rich geology, expert geoscience information, interactive online databases, continuing demand for commodities such as copper and coal, a Pacific Rim gateway, modern infrastructure and a skilled workforce. The BCGS provides marketing agencies with most of the technical expertise and professional delegates for international presentations and meetings with Asian companies. It is the point of contact for incoming international investors through the BC Mineral Development Office in Vancouver.

Regional Geologists

Regional Geologists are a vital component of government's ability to provide detailed geological knowledge of the region in which they live and work, and gather information on industry exploration and mining activity. The regional geologists remain in the Ministry of Forests, Land and Natural Resource Operations as part of government's consolidation of the natural resource agencies. There has been a significant turnover of staff recently and new staff is on board or incoming for several regions. Exciting times are ahead as all staff get into the field to visit many of the new projects in their regions.

Regional Geologist	Office	Region
Jeff Kyba	Smithers	Northwest
Paul Jago	Prince George	North-Central and Northeast
Jim Britton	Kamloops	South-Central
Dave Grieve	Cranbrook	Southeast
Bruce Northcote	Vancouver	Southwest

The MDO works closely with the regional geologists in attracting investment to BC and in preparing various publications.

STAFF UPDATE

Numerous staff changes occurred again in 2011 (Figure 8). Steve Rowins is the new Chief Geologist and Executive Director of the BCGS, replacing Dave Lefebure who retired in October 2011 after more than 25 years of service with the BC government. Steve, who joined the Survey in 2009, was previously the Director of Cordilleran Geoscience. Tian Han joined the BCGS in November 2011 as the new Senior Digital Information Geoscientist. He brings with him extensive knowledge of database and application development, mapping using remote sensing techniques, and geospatial data modeling and management. In January 2012, Alexei Rukhlov joined the Survey as the Provincial or Senior Geochemist. He replaced Ray Lett, who retired to a busy life of consulting in 2010. Kirk Hancock temporarily headed the MDO in

Figure 8. Staff of the British Columbia Geological Survey in 2011.

Vancouver as its Acting Director until the fall of 2011, when Bruce Madu arrived by sled from Kamloops. Bruce was the successful candidate for the vacant Director position. Bruce was previously the Regional Geologist in Kamloops. Another geoscientist stepping up into more of leadership role included JoAnne Nelson. She was promoted in the fall to the new Northern BC Manager and Senior Geologist in the Cordilleran Geoscience Section. She is also a co-author of the new edition of the bestselling book, *Geology of British Columbia*, published by Greystone Books. Melanie Mitchell returned from maternity leave to her position as the administrative assistant with the BCGS in February 2011.

Other good news was that three of the five Regional Geologists positions were finally filled in 2011: Jeff Kyba replaced the retired Paul Wojdak in the Smithers office in October 2011; Jim Britton replaced Bruce Madu in the Kamloops office in September 2011; and Paul Jago replaced John DeGrace in the Prince George office in January 2012.

The BC Jobs Plan, announced September 22, 2011, commits all Natural Resource Sector Agencies, including MEM, to a number of initiatives in support of economic development and job creation. The BCGS will be trying to fill four temporary positions until March 2013. These include a Senior Coal Geologist, a Marketing and Publications Geologist, a GIS Geologist and an Administrative Assistant for the Vancouver office.

NEED MORE INFORMATION? WANT TO COMMENT?

BCGS staff has considerable expertise and welcome the chance to share it. Our contact list is online at: http://www.empr.gov.bc.ca/Mining/Geoscience/Staff/Pages/default.aspx.

We always appreciate your input regarding our many programs and activities. To learn about new publications, data releases and upcoming events, join the BCGS release notification list by emailing Geological.Survey@gov.bc.ca or call (250) 952-0429.