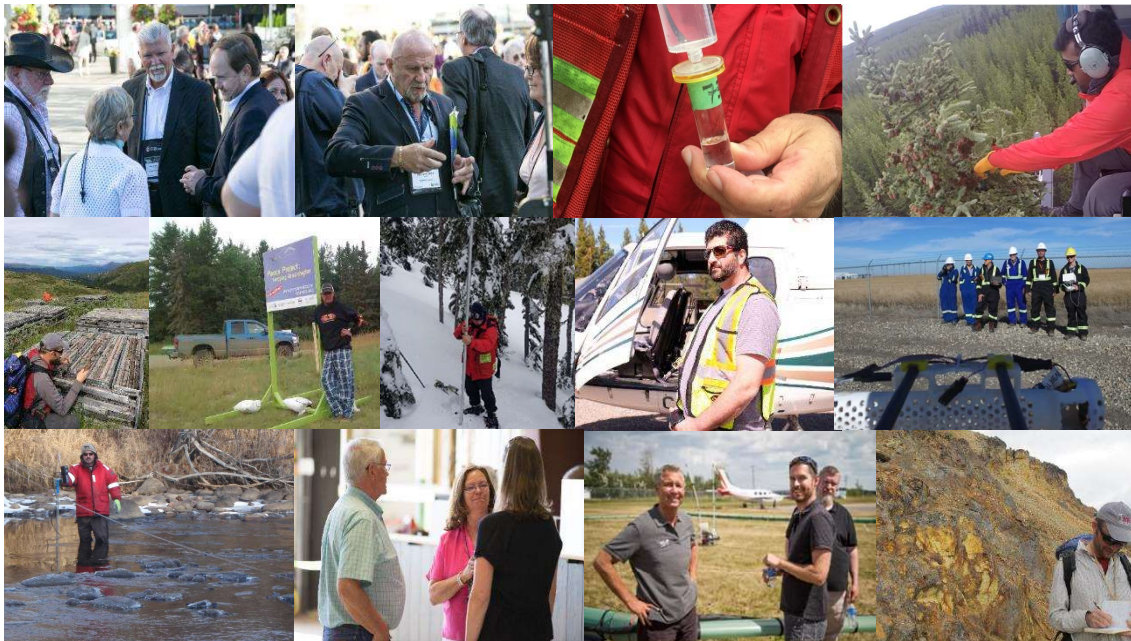




Geoscience BC's Recommendations to BC's Select Standing Committee on Finance & Government Services



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RECOMMENDATIONS

Geoscience BC's pre-budget 2019 recommendations to the Select Standing Committee on Finance and Government Services are:

1. To commit \$10 million per year for five years (\$50 million total commitment) through year-end funding as of March 31, 2019 to Geoscience BC to complete the relevant mineral, energy and water-related research projects proposed in Geoscience BC's comprehensive *Scientific Project Plan*.
2. To increase the British Columbia Geological Survey base funding to at least \$5 million per year so that they can effectively collaborate with partners in the delivery of their complementary mandate, such as providing field geological mapping and maintaining provincial geological databases.

CONTEXT

British Columbia's natural mineral, energy, and water resources provide real opportunities to address important issues, such as adapting to climate change and creating lasting benefits for people through responsible development.

The world's progression to a cleaner and greener economy is forecast to drive demand for natural resources, and with it the need for quality geoscience information required for people to make good decisions about mineral exploration and development, oil and gas activity, geothermal energy potential and water resources in the province. Simply put, public geoscience provides the critical foundation of technical knowledge to support our modern economy.

ABOUT GEOSCIENCE BC

Geoscience BC is an independent, not-for-profit society incorporated under the BC *Societies Act*. Geoscience BC's vision is to be a leading partner and provider of credible and relevant earth science research and data in BC. Geoscience BC functions to complement the efforts of provincial and federal geological survey agencies, but operates on an arms-length basis from the governments of both BC and Canada.

For the benefit of the people of BC, Geoscience BC's mission is to generate and publicly share high quality and unbiased earth science research and data about the province's minerals, energy and water resources that:

- improves our collective level of geoscience knowledge;
- informs responsible natural resource development decisions;
- catalyzes investment and socio-economic opportunities; and
- stimulates innovation and geoscience technologies.

Through the power of partnerships, Geoscience BC has been delivering high-quality, innovative geoscience research since 2005. It has collaborated with over 75 partners on more than 200



projects. Geoscience BC research is publicly accessible and has been welcomed by diverse groups including the resource sectors, academia, communities, Indigenous groups and governments.

Geoscience BC had its genesis with a \$25 million funding commitment announced by the Government of British Columbia in January 2005. The most recent funding of \$5 million per year for two years (\$10 million total) was announced in January 2017. To date, core funding for Geoscience BC has primarily (over 80%) been received from the Government of British Columbia (a total of almost \$72 million). Geoscience BC uses this funding to leverage further funding from partners such as the Geological Survey of Canada, Western Economic Diversification, Northern Development Initiative Trust and industry.

Since inception, Geoscience BC has invested over \$57 million and attracted partner contributions (direct and in-kind contributions) of over \$27 million, for a total investment in geoscience research projects of approximately \$84 million.

Geoscience BC has eight staff and is supported by more than 70 volunteers, including a diverse Board of Directors and technical advisory committee members with specific technical expertise to identify, plan, develop and review earth science research projects. The volunteers contribute an estimated 1,450 hours every year.

Geoscience BC has earned support from a wide range groups, demonstrated by resolutions passed in 2018 by the BC Chamber of Commerce and the Union of BC Municipalities (UBCM) calling for a BC Government commitment to fund Geoscience BC \$10 million per year for five years (\$50 million total) as of fiscal year-end March 31, 2019.

This level of year-end funding will allow Geoscience BC to continue to provide independent earth science to achieve the strategic objectives set out in the five-year *Strategic Plan 2018-2022*, to secure significant partner contributions and to complete the relevant mineral, energy and water-related research projects outlined in the *Scientific Project Plan*.

In addition to Geoscience BC, the Ministry of Energy, Mines and Petroleum Resources' Oil and Gas Division and the British Columbia Geological Survey (BCGS) provide the people of BC with an innovative and successful made-in-BC approach to coordinated public geoscience based on working collaboratively to efficiently and cost-effectively collect, share and consider technical information and geoscience facts.

BC GEOLOGICAL SURVEY

The BCGS is the Branch of the Ministry of Energy, Mines and Petroleum Resources responsible for producing and housing public geoscience information about BC's geology, including mineral resources and mineral potential. It was established in 1895 and today functions as a highly technical institution that carries out the systematic inventory and assessment of BC's varied and complex geology.

The BCGS' principal activities include mineral potential assessments for land use planning, geological mapping, mineral and coal deposit studies, exploration methods development,



industrial mineral inventories management, monitoring exploration activities, and assessing geologic hazards.

BCGS databases are the permanent repository for geoscience data and information. This includes geoscience data, maps, reports and extensive databases, which can be freely accessed online through *MapPlace*, BCGS' web-based data delivery portal.

The BCGS plays a vital role in conducting research and providing technical advice and information to the public, First Nations, communities, industry, and government agencies regarding mineral resources, geology, and mineral development and exploration activities.

Ensuring the BCGS remains appropriately resourced is key for developing robust land use strategies and strengthening BC's minerals and mining sector. Funding levels should be sufficient to support its mandate, enabling adequate numbers of geologists in the field to map and generate geoscience knowledge. To keep BC competitive in a global market, investment should be made in the maintenance, updating, and upgrading of BCGS databases as well as expanding and improving *MapPlace's* functionality.

GEOSCIENCE BC's SCIENTIFIC PROJECT PLAN – PROPOSED RESEARCH

Geoscience BC has developed a *Scientific Project Plan* that outlines 34 proposed research projects over the next five years to support the objectives set out in the *Strategic Plan 2018-2022*:

- Identifying New Natural Resource Opportunities
- Advancing Science & Innovative Technologies
- Facilitating Responsible Natural Resource Development
- Increasing Geoscience Literacy & Capacity
- Enabling Clean Energy
- Understanding Water

The *Scientific Project Plan* proposes:

- Minerals: 16 projects
- Energy:
 - Oil and Gas: 7 projects
 - Geothermal: 7 projects
- Water: 4 projects

GEOSCIENCE BC's RESEARCH FOCUS AREAS

MINERALS

BC has significant deposits of minerals and in metals such as copper, zinc, gold, silver and molybdenum – critical materials required for a greener and cleaner future. The province also has major deposits of steelmaking (metallurgical) coal and industrial minerals that are important to our modern world.

Exploration and mine development occur widely across BC and are a cornerstone of both regional and provincial economies, with a major portion of the sector's revenue generated from the sale and export of minerals and steelmaking coal. Exploration projects and mining operations benefit



nearby communities, provide thousands of direct and indirect jobs and contribute billions of dollars in economic activity each year. More than half of Canada's exploration and mining companies are based in BC, which has the largest concentration of exploration companies and geoscience professionals anywhere in the world.

Geoscience BC has invested \$35.4 million in mineral-related research to date, with 117 projects completed and 17 projects currently underway. The mineral-related research and data is useful to prospectors, explorers, mine developers, governments, community leaders and Indigenous groups in making informed, evidence-based decisions about mineral resources. It also helps to identify and mitigate risks, answer specific environmental and social questions and stimulate investment, jobs and socio-economic development in the province.

Geoscience BC mineral research and return on investment examples:

1. The Ministry of Energy, Mines and Petroleum Resources' Assessment Report Indexing System (ARIS) shows, conservatively, that from 2005 to 2017:
 - Geoscience BC data and projects are mentioned 2,483 times in 884 separate reports; and
 - Geoscience BC data and projects are mentioned in reports with a total exploration spend of \$154.3 million (which is more than 4 times the return on investment made by Geoscience BC in mineral-related research).
2. Geoscience BC's *QUEST-West* geophysical survey project directly contributed to extending the mine life of the Huckleberry copper mine, located southwest of Houston, BC. The project's survey results identified drill targets that led to an increase in the mine's mineral reserves. This meant production continued longer, provincial government revenue of \$4 million per year was realized, 224 jobs were extended and \$100 million per year in mine production continued for an additional two years.
 - Geoscience BC is still active in the area, with strong support from communities.
 - "We need a group like (Geoscience BC) to spur economic investment," Mayor Shane Brienen, Houston.
3. Geoscience BC's *QUEST-Northwest* survey resulted in the discovery of new gold-copper mineralization and a grassroots exploration program at the Hot Bath project near Dease Lake.
4. Geoscience BC's 2017 *Search Phase III* project invested \$1.8 million in a 9,600 km² aerial survey. The project was adapted following requests from Tsay Keh Dene staff and local hunting groups, and Tsay Keh Dene members were hired on the project.
 - The project included \$250,000 of funding from Northern Development Initiative Trust.
 - More than \$500,000 went directly back into the local economy.
 - In just six months, there were 64 new or expanded minerals tenures claimed in the *Search Phase III* area, covering nearly 350 km².
 - *Search Phase III* is publicly supported by communities and industry alike.



ENERGY

The oil and gas sector plays a vital role in BC's economy, providing essential energy products to global markets, supporting thousands of jobs and contributing billions of dollars in revenue, with the potential to grow in coming years. Collecting, interpreting and sharing new scientific data relating to this sector helps to guide clean, responsible energy development, identify and mitigate risks, answer specific environmental and social questions, and attract investment to BC.

Geothermal resources may play a significant role in the long-term energy strategy for BC as we transition to alternative sources of energy for electricity and heat. The concept of adding geothermal to the energy mix has been discussed for many years but its economic challenges have stifled development. Geoscience BC's geothermal research is focussing on projects and sites with high potential to provide communities and decision-makers with unbiased data and information that aim to assist in de-risking the development of geothermal resources.

Geoscience BC has invested \$9.8 million in energy-related research to date, with 28 projects completed since 2008 and 12 currently underway. This energy-related research and baseline data is beneficial and useful to the energy sector, governments, community leaders and Indigenous groups to make informed, evidence-based decisions about oil, gas and geothermal resources in the province.

Geoscience BC energy research and return on investment examples:

1. In 2012, the BC Oil and Gas Commission released new research linking hydraulic fracturing to low-level seismicity. Geoscience BC and partners have grown the national seismic-detection network from two to thirteen stations. The enhanced network is being used by the regulator and by energy companies to monitor and mitigate seismicity caused by hydraulic fracturing activities. Additional research is being conducted to understand the mechanisms that initiate seismicity and to predict and prevent these events.
2. The *GHGMap* project is developing technically-defensible, real-time, cost-effective technology to measure emissions of greenhouse gases (GHGs) such as methane, ethane and carbon dioxide. This provides independent data needed for informed decisions, as opposed to relying on computer-generated predictive models.
 - *GHGMap* is developing technology developed by NASA for its Mars missions. The highly sensitive new instrumentation is small and light enough to be mounted to a drone.
 - Geoscience BC funding for the project has been leveraged with additional funds from Western Economic Diversification Canada.
 - The oil and gas industry is involved in the research and has been providing the project team with support, including site access to test the technology and measure emissions.
 - The project will create new economic opportunities by bringing a made-in-Canada solution closer to commercialization and developing a business model for the technology.



3. Since 2012, Geoscience BC has been mapping BC's geothermal resources with a long-term view to provide foundational science for the development of the province's green energy portfolio. To date, high-level work has defined the provinces 'hotspots' and a 'roadmap' has been developed to help communities assess whether direct-use geothermal heat is a viable option. Geoscience BC is working with Natural Resources Canada to plan a new project in southwestern BC's Garibaldi Volcanic Belt. This will provide a regional assessment of one of Canada's largest hotspots.

WATER

With thousands of lakes, rivers, streams and aquifers in BC, fresh water is one of the province's most essential and important natural resources, supporting our environment, economy and quality of life. Geoscience BC has undertaken more than 25 water-related research projects related to aquifers and surface water. However, more earth science is needed to inform our understanding of water and to drive evidence-based decisions about water resources across BC.

Geoscience BC water research and return on investment examples:

1. New Geoscience BC data about deep groundwater in northeastern BC has resulted in companies involved in hydraulic fracturing investing \$150 million in water treatment plants in the region, thereby significantly reducing reliance on surface water for hydraulic fracturing.
2. Geoscience BC has an agreement in place with Fort Nelson First Nation to manage a network of hydrometric monitoring stations in Fort Nelson territory. The data produced by the network continues to be publicly available, and is valued by the community.
 - Fort Nelson First Nation Chief Harrison Dickie: *"This (agreement) gives us the ability to make decisions with sound data to ensure our water is being utilized in a safe and sustainable manner."*
3. The *Peace Project* used leading-edge airborne electro-magnetic survey mapping technology to better understand shallow groundwater and paleovalley aquifers in the Peace, an area of significant oil and gas industry development. It is the first regional-scale groundwater mapping exercise in the area, with significant support from partners.
 - The *Peace Project* was part-funded by Northern Development Initiative Trust. Joel McKay, CEO, Northern Development Initiative Trust: *"Studies like this are critical for providing government and industry with data needed to make informed decisions for sustainable resource development and groundwater protection."*
 - Project partners included the Ministry of Forests, Lands and Natural Resource Operations and Rural Development; the Ministry of Environment and Climate Change Strategy; the BC Oil & Gas Commission; the Ministry of Energy, Mines and Petroleum Resources; Progress Energy Canada Ltd.; ConocoPhillips Canada; Northern Development Initiative Trust; and the BC Oil & Gas Research and Innovation Society. Valuable input was also received from Doig River First Nation and Halfway River First Nation.



- The project had additional support from the Peace River Regional District and the Canadian Association of Petroleum Producers (CAPP), and provides valuable input to the Northeast Water Strategy.
4. Geoscience BC is working with the Canadian Mining Innovation Council (CMIC) to compile the *Mining Industry Knowledge Hub*. This pilot project has built a concept online hub for water data collected by mining companies operating in BC. By centralizing and sharing this information, the resource sector will be able to improve planning and communities will have access to data that has previously been private.

OBSERVATIONS FROM INDEPENDENT ASSESSMENT

In 2010, Geoscience BC commissioned Macauley & Associates Consulting Inc. to conduct an independent assessment of the organization's achievements to date. The following general observations were made:

1. Geoscience BC provides direct benefits to the regional economy of BC and local communities through spending on its projects.
2. Geoscience BC provides benefits to the BC economy and communities by encouraging increased mineral and oil and gas exploration and development activity.
3. Geoscience BC leverages funding from the Government of British Columbia by attracting funding from the Federal Government, industry and regional associations.
4. The novel structure and approach for Geoscience BC has obtained global recognition and thus provides a strong international advocate for exploration and development in BC.
5. Geoscience BC activities benefit from relationships with industry.
6. Geoscience BC gains extensive support from the communities that benefit from exploration and geoscientific programs.
7. Geoscience BC engages directly and successfully with First Nations.