



Natural Resources
Canada

Ressources naturelles
Canada

Geological Survey of Canada

Strategic Plan 2013–2018



175 years

1842–2017

Canada



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Canada

Geological Survey of Canada

Strategic Plan 2013–2018

GSC@175

Sustaining and extending Canadian prosperity and well-being through internationally authoritative and accessible geoscience, anchored in a continuously improved understanding of earth dynamics and natural resources.

Aussi disponible en français sous le titre : Commission Géologique du Canada - plan stratégique 2013–2018

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Introduction

This strategic plan takes stock of our past and charts our future.

The Geological Survey of Canada (GSC) of Natural Resources Canada (NRCan) (Earth Sciences sector [ESS]) aspires to the highest levels of relevance and excellence. The GSC has taken stock of its accomplishments, considered key trends that will shape its future and developed this strategic plan to prioritize and focus its efforts through to the 175th anniversary (2017) of its founding in 1842.

In this document, *GSC@175*, we are pleased to present a brief summary of some of our recent accomplishments as a world-class science organization, a list of the trends that drive the need for on-going public geoscience, a description of our key clients and stakeholders, and an overview of our key priorities for the 2013–2018 period.

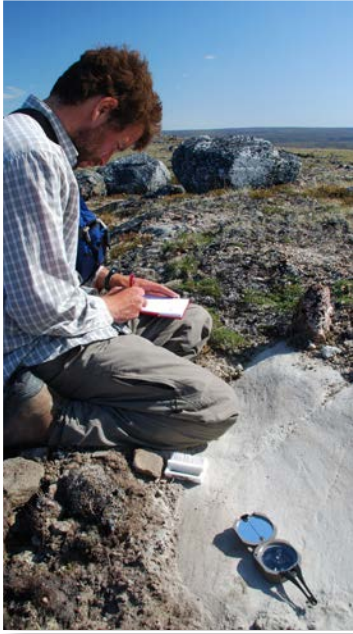
These priorities include

- delivering new public geoscience knowledge to successfully unlock Canada's energy and mineral resource potential, support sound environmental stewardship and land use, and reduce the risks associated with natural hazards and other threats. Success in these areas will require continued delivery of world-class science.
- implementing improved business and employee management practices to ensure the GSC retains the capacities, flexibilities and resilience that are necessary to adapt to evolving Government of Canada priorities, as well as changes in its financial resources and operational environment
- laying the groundwork that will be the foundation for activities the GSC will pursue to effectively meet challenges in the period beyond 2018

More extensive background information on strategic directions and our recent scientific achievements will become available as we implement this plan.

Many talented and dedicated staff from across the GSC contributed to the preparation of this strategic plan. We look forward to working with all GSC personnel and with stakeholders from across Canada and around the world to implement the strategic plan over the coming years and in so doing, advance the important contribution of public geoscience to society.

Defining the Geological Survey of Canada



The GSC is Canada's oldest scientific agency and one of its first government organizations. It was founded in 1842 to help develop a viable Canadian mineral industry by establishing the general geological base on which the industry could plan detailed investigations. Throughout its long and colourful history, the GSC has played a leading role in exploring the nation.

Today, the GSC is Canada's national agency for geoscientific information and research. Its world-class expertise focuses on the sustainable development of Canada's mineral, energy and water resources; stewardship of Canada's environment; management of natural geological and related hazards; and technology innovation.

In response to this evolution, the GSC's mission and vision statements have been updated to clarify its fundamental purpose in today's world and the effect it intends to have over the longer term.

The mission

Provide public geoscience knowledge to sustain the exploration effectiveness and international competitiveness of the mineral and energy sectors, inform the stewardship of its onshore and offshore lands, and increase the safety and security of Canadians.

The vision

Sustain and extend Canadian prosperity and well-being through internationally authoritative and accessible geoscience, anchored in a continuously improved understanding of earth dynamics and natural resources.

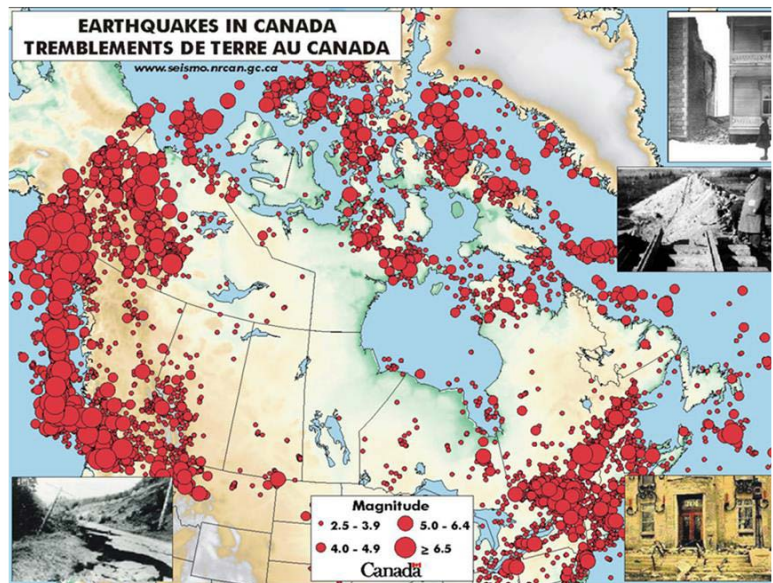
These mission and vision statements have framed and focussed this strategic plan and, in particular, the establishment of our new priorities and the road map for their implementation.



GSC: Delivering globally significant science

Throughout its history, the GSC has maintained an international reputation for scientific excellence. The following examples highlight recent achievements of its talented scientific and technical professionals:

- In 2003, GSC scientists discovered episodic tremor and slip (ETS) – one of the most significant advances in earthquake research of the last three decades. They applied ETS to generate substantially improved estimates of the location of the next big (>M9.0) Cascadia subduction zone earthquake (on the West Coast of Canada) and of the hazard it represents. They subsequently guided the incorporation of their findings into Canada's national building codes to increase the resilience of our built environments to anticipated earthquake impacts. Their discovery triggered ETS investigations and improved hazard assessments in all other subduction zones around the world.
- *Mineral Deposits of Canada* is a milestone scientific publication that synthesizes 12 major deposit types, distinct metallogeny and the evolution of geological provinces and exploration models in Canada. This multi-paper monograph, published in 2005 by the Geological Association of Canada, was conceived, authored and edited by the staff of the GSC. It provides synthetic descriptions of deposit types that have, and continue to, guide exploration in Canada and worldwide – a result of decades of studies of major mineral deposits in Canada by scientists and explorers in the GSC, provincial and territorial surveys, academia and industry. The monograph is an excellent distillation of public economic geoscience.
- GSC research documented variations in the flow conditions and temperatures at the base of the Laurentide and Cordilleran ice sheets that covered 90 percent of Canada 15 000 years ago. Research demonstrated that these two parameters were far more complex and variable than had been previously recognized and led to an improved understanding of the physical processes involved in rock and sediment movement beneath glaciers. As a consequence, a transformation in traditional drift prospecting paradigms has enabled the exploration community to improve its ability to target sought after, buried mineral deposits in Canada and other glaciated terrains around the world.



- Combining the latest theories on Sun-Earth interactions with data from global monitoring networks, GSC researchers have developed a world-class space weather forecasting capability for Canada, as well as mechanisms that enhance the resilience of space-based (e.g. satellites, Global Navigation Satellite Systems such as GPS) and ground-based (e.g. power systems, pipelines) critical infrastructures to the impacts of solar disturbances and other potentially harmful space weather phenomena. One example is the geomagnetically induced current (GIC) simulator. The GIC simulator issues automatic alerts when current flow through an electrical power grid exceeds predefined safety thresholds, permitting power system managers to take action that avoid disasters such as the 1989 Hydro-Quebec blackout that was triggered by a geomagnetic storm. The GSC's GIC simulator has been evaluated and adopted by Canadian and international power utility companies as the optimal way to mitigate such hazards.
- The cause of Earth's largest mass extinction and largest volcanic events that occurred 252 million years ago remains a focus of scientific investigation and debate. GSC researchers have provided new evidence that demonstrates that coeval oceanic sediments have anomalously elevated concentrations of mercury. Their work suggests that the mercury was moved as the volcanic materials erupted through major coal deposits, which caused toxic conditions throughout the world's oceans and thus triggered the extinctions. The research is an important step in unravelling Earth's history and developing a fuller understanding of the geological processes that affect our planetary environment.



- Through the 1990s, GSC scientists pioneered the development of computer techniques to effectively translate high-resolution, multibeam sonar soundings into visually comprehensive images of the seafloor. Then, integrating these images with established subbottom mapping strategies, they subsequently spearheaded development of an entirely new discipline of seafloor geomorphology and the concept of multidisciplinary seafloor mapping – a concept that has now been adopted by many marine nations to map and manage their offshore territories.
- A meticulous investigation of anomalies imaged on shallow seismic data led GSC scientists to the discovery of living glass sponge reefs along the British Columbia coast. Now demonstrated to exist from Washington State to Alaska, the sponge reefs are unique in today's oceans – their closest analogues are 40-million-year-old fossilized sponge reefs preserved in western Europe. The GSC researchers determined that, much like those of coral reefs, the sponges frame building processes that have diverse forms that are up to 25 metres (m) tall and clustered as reef complexes up to 600 square kilometres (km²) in area. Their research spawned numerous investigations that have established the important roles that these sponge reefs play in the marine ecosystem – a role that Fisheries and Oceans Canada is working to preserve by designating the four largest reef complexes off the north coast of British Columbia as marine protected areas.
- GSC scientific leadership led to the publication in 2014 of “Canada’s Groundwater Resources” – a multi-authored and richly-illustrated 800 page book that provides the most up-to-date and comprehensive summary of the state of knowledge on Canada’s groundwater resources. Drawing upon the expertise of leading government, academic and private-sector hydrogeologists, the book also discusses the vulnerability and sustainability of groundwater at global, national and regional-scales. Current Canadian management and regulatory practices are described, and insightful recommendations are made for addressing knowledge gaps to ensure the sustainability of this vital resource for ecosystems and the socio-economic well-being of Canadians now and into the future.



Trends that will shape our future

On a global-scale, important changes are underway that will influence Canada's ability to harness the full potential of its natural resource endowment, reduce the risks posed by natural disasters and other threats, and protect its natural environments. Key trends and changes are listed here. In each case, the GSC has a vital role to play in ensuring Canada is well positioned to face these challenges through its provision of authoritative geoscience information and knowledge products:



- Canada's mineral and energy resources will remain in high demand but with significant variability because of geo-political events and resultant market volatilities.
 - Although North America trade patterns will remain important, there will be increased growth in Asian and the southern hemisphere markets.
 - Resource exploration and development will push physical and technological frontiers: the North, offshore, deeply buried, diffusely distributed, renewables, etc.
 - Standards and expectations for environmental responsibility and public safety will continue to grow.
-
- Expectations for governments to provide robust guidance on management, mitigation and adaptation to the challenges of a changing climate will increase.
 - The demand for highly specialized geoscience experts will intensify, as will the demand for effective and efficient multidisciplinary and intersectoral engagement and partnerships (public sector, private sector, academia).
 - Expectations for rapid, evidence-based policy analysis and user-friendly data handling will continue to grow.
 - Governments will be under relentless pressure to improve efficiency.

Clients and stakeholders

The GSC's primary clients are policy makers and regulators in the Canadian federal government. The GSC's timely and authoritative geoscience knowledge products are used to inform economic development policy, land-use planning, environmental assessments and regulations, as well as emergency management planning and response.

Counterpart departments and agencies of the provincial and territorial governments, as well as the academic research community, are important collaborators with the GSC. Other levels of government also use its knowledge products to inform policy, planning and regulation within their jurisdictions.

Industry uses its knowledge products to inform investment decisions for mineral and energy exploration, environmental management, and secure infrastructure.

All GSC information and knowledge products are freely available. The general public uses these products to become better informed about Canada's land mass, including our natural resource endowment, environmental processes and geological hazards.



Key priorities



This strategic plan identifies five priorities for fiscal years 2013–2014 through 2017–2018 and related strategies to support their implementation. These priorities take into account the GSC’s firm and high-priority organizational commitments to the Government of Canada, as well as a broad spectrum of input received from GSC employees, partners, clients and others. They also address improvements that will transform the delivery of on-going programs and operations and the pioneering work that is needed to lay a foundation for our activities in the period beyond 2018.



Priorities 1 to 3 outline the key contributions the GSC plans to make to Natural Resources Canada’s (NRCan’s) strategic priorities by providing new geoscience knowledge. Priorities 4 and 5 describe organizational and business enhancements that the GSC plans to implement to improve our work environments and capacity to deliver this work.



What the GSC will do ...

Priority 1. Unlock Canada’s resource potential through geoscience

Priority 2. Environmental geoscience for responsible resource development

Priority 3. Geoscience for public safety and risk reduction

How the GSC will do it ...

Priority 4. Open geoscience

Priority 5. Excellence in our people and science

Priority 1. Unlock Canada's resource potential through geoscience

Strategic objective - Enhance the exploration effectiveness and international competitiveness of Canada's energy and mineral industries and support wise land-use decisions by providing geoscience knowledge.

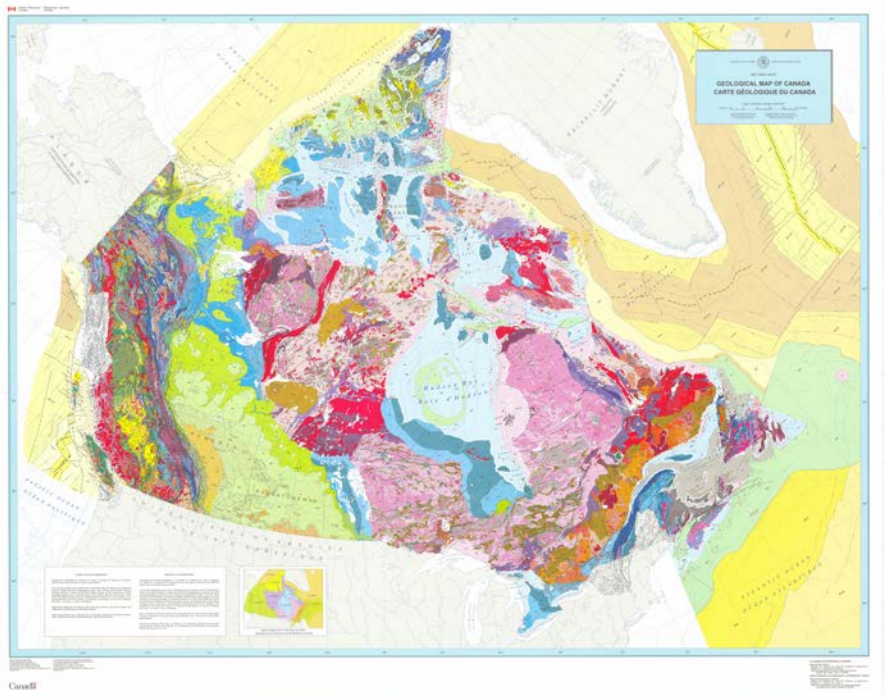
Context - Globally, demand for natural resources is increasing, especially among emerging economies of countries in Asia. Given its stable political system, along with a vast and diversified portfolio of energy and minerals, Canada is well-positioned to benefit from this rising demand, although not without some challenges. Challenges include

- Proven energy reserves continue to increase whereas mineral reserves are declining, and new discoveries are needed.
- Delivering resources to national and international markets, particularly from our vast North, is hampered by limitations in infrastructure.
- Sixty-five percent of Canada's geoscientists are expected to retire in the next decade, which creates an urgent need for highly skilled workers.
- Canada's commitment to responsible resource development is reflected in its associated high environmental permitting standards. These standards can make the regulatory approval processes take longer than in other jurisdictions that have lower regulatory standards.

Our role within government -

Within the federal government, the GSC is the primary provider of public geoscience information and knowledge products required to address many of the above noted challenges. Its outputs, in particular its mineral and energy resource assessments, support strategic land-use decisions by federal departments responsible for administering and regulating federal crown lands and help in the definition of areas appropriate for resource exploration and development.

Did you know? Canada's natural resources sector is a significant component of the national, provincial and territorial economies, contributing to high living standards for Canadians. According to Statistics Canada, in 2011, this sector directly accounted for 15 percent (\$263 billion) of GDP and 790 896 jobs, and the purchase of goods and services by the natural resources sector accounted for an additional 4 percent (\$70 billion) of GDP and 800 000 jobs in other sectors.



Departments such as Aboriginal and Northern Development Canada, Parks Canada, Fisheries and Oceans Canada, Environment Canada and the National Energy Board use this information. Through coordinated interdepartmental collaboration, the GSC supports NRCan in ensuring timely, high-quality reviews including providing scientific and technical expertise for environmental assessments of major resource projects and the infrastructure needed to get them to market under the *Canadian Environmental Assessment Act*.

Through its scientific research programs (e.g. Geo-mapping for Energy and Minerals (GEM), Targeted Geoscience Initiative (TGI-4), Geoscience for New Energy Supply [GNES]), the GSC defines new prospective regions for energy and mineral deposits and develops new tools and methods to assist in their discovery, whether at the surface or buried beneath barren material. Our outputs lower industry risks and stimulate increased exploration investments that contribute to economic development in many parts of the country but especially in the North and offshore.

Did you know? Through its 2009–2013 GEM program, the GSC provided new geoscience information for more than 40 percent of northern Canada. Early results indicate that this new information directly supported investment decisions about private sector exploration for many commodities, including iron ore (Melville Peninsula, Nunavut), diamonds (southeast Baffin Island, Nunavut), and copper-gold-silver (Yukon). In Yukon, the Tarsis Resources' discovery of a gold-copper-silver deposit at White River and the Solomon Resources' discovery of the Rosie epithermal gold deposit were announced with direct attribution to GEM results. GEM results also identified areas of high potential for nickel, platinum-group elements, rare metals and base metals and led to developing new models for hydrocarbon systems. These discoveries suggest that large oil and gas potential may exist in areas not currently explored by industry.

New contributions to our strategic objective - To advance its contributions to unlocking our nation's natural resource potential, the GSC has identified five key commitments for the next five years. These include

- completing onshore geological framework mapping in areas of the North that have the highest resource potential
- improving the understanding of major mineral deposit types through targeted and thematic studies
- conducting targeted resource assessments of key offshore basins in northern Canada
- completing and defending Canada's submission to the Commission on the Limit of the Continental Shelf under the United Nations Convention on the Law of the Sea
- developing methodologies for the assessment of shale gas and proxies for distinguishing fertile from infertile shale deposits for future energy supplies

Our future beyond 2018 - Canada's understanding of its offshore lands is limited relative to that of its onshore lands because less than 10 percent of the surface of its offshore seafloor has been mapped, and even less is known about the related subsurface. To lay the foundation for closing this knowledge gap, the GSC proposes to actively seek out collaborative opportunities for the potential undertaking of an incrementally structured flagship initiative.



Deliverables would include

- geophysical imaging and geological sampling of the subsurface for the establishment of a framework for assessing its resource potential
- detailed digital mapping of the seabed and shallow subsurface for the identification of barriers to offshore developments
- a marine cadastre (delivered by NRCan's Surveyor General branch) as a legal survey framework for offshore land tenure

All geospatial datasets will be integrated into the Federal Geospatial Platform and derivative knowledge products will be disseminated rapidly by using state-of-art transfer technologies and protocols.

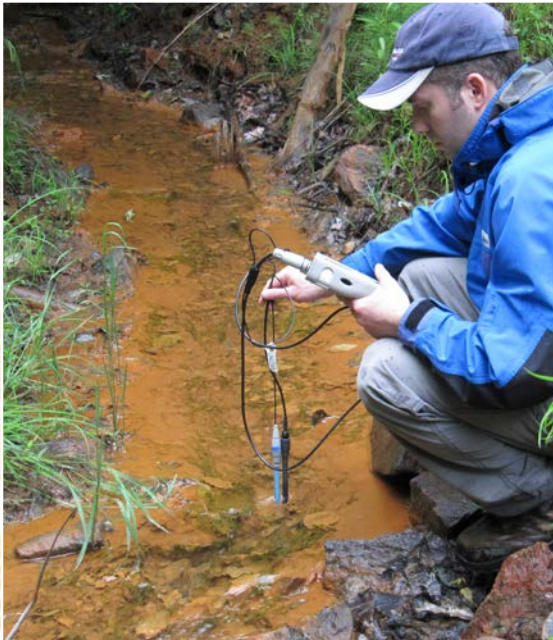
Priority 2. Environmental geoscience for responsible resource development

Strategic objective - Improve regulatory efficiency and reduce the environmental risks of resource development by providing reliable geoscience information.

Context - We live in a period of growing public expectation that the exploration, development and utilization of our natural resources will not compromise our natural environment or the integrity and vitality of associated ecosystems. To meet this expectation, all jurisdictions in Canada have established regulatory systems for the exploration and development of natural resources.

GSC research provides the scientific underpinning for the establishment of many regulations in Canada, and for best practice approaches that support sustainable resource development. Specifically, its research findings define environmental conditions before natural resource activities start; characterize short-term, long-term and cumulative changes induced by these activities, including those caused by a changing climate; and inform strategies to minimize certain impacts.

Our role within government - The GSC is the lead federal agency for




- evaluating environmental impact assessments that are completed by proponents of new developments to ensure they reflect current geoscience knowledge. This is a requirement of the 2012 *Canadian Environment Assessment Act*.
- providing reports and recommendations to enable federal regulators to take account of current geoscience knowledge in decisions about risk assessment
- developing new geoscience methods to differentiate natural geological processes from the environmental impacts of resource development activities
- conducting mineral and energy resource assessments on federal lands to inform decisions about land use, protected areas and park boundaries

New contributions to our strategic objective - Building on recent achievements, the GSC will focus on the following key activities over the next five years

- understanding the cycle and processes involved in the transport of contaminants from the oil sands to the environment
- understanding how hydraulic fracking in shale basins induces seismic hazards and risks to groundwater
- establishing and defining baseline geochemistry and understanding the geochemical processes associated with priority areas for mineral development
- understanding the response of permafrost to a changing climate in priority areas for northern infrastructure development
- understanding the dynamics of archetypical Canadian aquifers and developing methods to assess them
- timely and authoritative execution of mandated responsibilities for federal environmental assessments and resource assessments for federal protected areas

Did you know? There are more than 10 000 orphaned and abandoned mine sites in Canada, many of which were operated before the enactment of modern environmental regulations. In Nova Scotia, arsenic-rich tailings from historical gold mines are located close to residential areas and frequently used for recreational purposes. Research conducted under the GSC's Environmental Geoscience Program has led to the development of new tools to characterize the risks associated with these mine wastes and have delivered optimized remediation strategies for historical tailings sites.





Our future beyond 2018 - Increasingly, the management of energy resources and the management of water resources have become entwined in a relationship known as the “water-energy nexus.” As water resources show signs of increasing stress and the energy sector is increasingly reliant on water for oil and gas development, there is a need for a comprehensive national framework to support a more effective management of these two important resources. New geoscientific studies are required to support the development of this framework and inform the implementation of associated regulatory reforms and policy developments throughout Canada. The GSC proposes to embark on the development of a comprehensive science strategy as a contribution to this undertaking.

Did you know? “Naphthenic acids” can occur naturally from erosion of bitumen but can also be generated from processing oil sands. These acids are toxic to fish and other organisms in sufficient quantities, so minimizing how much is generated during oil sands development is important. A key first step toward this is being able to distinguish between natural and anthropogenic naphthenic acids. GSC researchers have accomplished this locally in a recent scientific breakthrough. Their isotopic-based discriminant tool is now being applied to a broader array of naphthenic acid sources in the Alberta oil sands region.

Priority 3. Geoscience for public safety and risk reduction

Strategic objective - Reduce the economic, social and environmental impacts from natural hazard events in Canada.

Context - Whereas the magnitude and recurrence of most geological hazards are relatively constant, the risks they pose to Canadians, our built infrastructures and our natural environment are increasing rapidly. This is a consequence of the growing concentration of people and wealth in hazard-prone regions and is exacerbated by an increased dependence on technological systems, including fragile and aging infrastructure (e.g. highways, pipelines, power lines, railways and telecommunications). Offshore, the major oil and gas developments that have taken place in the Atlantic Ocean over the last few decades are expected to continue and expand into the Arctic region, where little is known about the potential geological hazards to their responsible development. Collectively, these issues create a pressing need for an improved understanding of natural hazards and more effective approaches to managing the risks they pose. In Canada, reducing natural hazard risks is a responsibility of all levels of government. NRCan and the GSC exercise significant leadership and play unique roles across the full range of the emergency management continuum of *mitigation, preparedness, monitoring and alerting, and response and recovery*.

Our role within government - In Canada, the federal government becomes involved in emergency management for hazard incidents that are beyond a provincial capacity to manage, that cross jurisdictional boundaries or that lie outside provincial responsibilities. NRCan provides the national capacity to support this federal role in several specific areas, and the GSC is a key contributor.

Did you know? The world's largest earthquakes occur in subduction zones, and they typically generate tsunamis (e.g. the 2011 Japanese and 2004 Indonesian earthquakes and tsunamis). Although relatively rare, these events can be profoundly destructive and costly. Scientists have established that although the last such event to occur on the Cascadia Subduction zone off Canada's west coast was in 1700, we are now in a period when similar events could occur again.

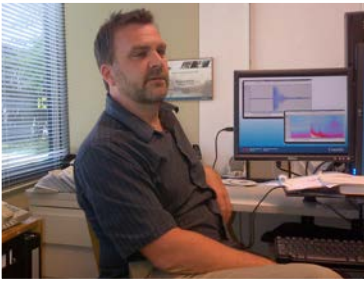
Five most expensive natural disasters in history

1. 2011 Tohoku earthquake and tsunami (Japan)
- \$210 billion
2. 2005 Hurricane Katrina (U.S.)
- \$125 billion
3. 1995 Kobe earthquake (Japan)
- \$100 billion
4. 2008 Sichuan earthquake (China)
- \$85 billion
5. 2012 Hurricane Sandy (Caribbean, U.S., Canada)
- \$65 billion

Source: Munich Re, 2013

Did you know?

On March 13, 1989, the largest magnetic storm of the last century caused a blackout of the entire Hydro-Quebec power system. The Montreal Gazette later reported that the blackout shut down car plants, aluminium smelters, pulp and paper, and other industries. The shutdowns are estimated to have cost the Canadian economy \$300 million.



The Canadian Hazard Information Service (CHIS) addresses mandated responsibilities under the *Emergency Management Act*, the *Comprehensive Nuclear Test Ban Treaty Implementation Act* and the Federal Nuclear Emergency Plan:

- CHIS provides 24/7 real-time monitoring and alerting for natural hazards such as earthquakes, tsunamis, volcanic eruptions and geomagnetic storms and for anthropogenic hazards such as nuclear explosions and radiological releases.
- CHIS coordinates the rapid delivery of mapping and earth observation information to emergency management organizations in times of disaster, for example, flood mapping.

The Public Safety Geoscience (PSG) program provides improved scientific understanding of the underlying causes and impacts of geohazards and their probability of occurrence in Canada's onshore and offshore lands:

- The PSG program delivers targeted and national-scale assessments for hazards such as earthquakes, tsunamis, onshore and offshore slope instabilities, space weather events and volcanoes.
- The PSG program develops tools, standards and guidelines for quantitative hazard and risk assessment and mitigation by Canadian decision makers in the public and private sector, and it provides input into regulations, policies and techniques to mitigate hazard impacts, e.g. via regular updates to the *National Building Code of Canada*.

New contributions to our strategic objective - The GSC has set five new, ambitious goals to further reduce the economic, social and environmental risks associated with geological hazard events in Canada. The goals are

- implementing and validating tools for the assessment of earthquake risk at regional and national scales
- advancing national- and regional-scale seismic monitoring and Global Navigation Satellite Systems (GNSS) to improve real-time earthquake and tsunami alerting
- conducting research to improve understanding of submarine geohazard processes and develop robust methods to establish their probability of occurrence
- developing tools to calibrate the accuracy of a GNSS as a function of space weather events
- executing the mandated responsibilities for emergency management in a timely and authoritative manner

Did you know? Canada is host on its west coast to one of the most dangerous earthquake generation environments in the world called “subduction zones.” On October 27, 2012, an M7.7 earthquake struck off the west coast of the Haida Gwaii Islands. Because of the extremely low population density on the islands, this second-largest recorded earthquake in Canada’s history did not cause injuries or significant property damage. It did, however, trigger several landslides and generated a tsunami with run-ups of 7 to 8 m at some locations along the west coast of Moresby Island. GSC scientific and technical staff quickly launched follow-up investigations to document the earthquake’s impacts. Their findings will be used to increase earthquake resiliency in more populated regions that are subject to similar earthquakes, such as southwestern British Columbia.



Our future beyond 2018 - Currently, the GSC provides earthquake notifications within a few minutes of the occurrence of potentially damaging events, but it cannot provide warning of earthquake-related shaking prior to the arrival of damaging seismic waves. Such “early-warning systems” (presently operational in several countries including Japan, Mexico, Turkey and Switzerland) allow owners of critical infrastructure and others to take actions (e.g. stop trains, keep airplanes in the air, shut off gas/water/power, etc.) to minimize earthquake impacts as well as enable more effective emergency response. In preparation for the future implementation of such a system for Canada, the GSC will conduct a user-needs assessment, research the integration of required sensor technologies (e.g. seismic and GNSS) and investigate the optimal communications required for effective earthquake early warnings in our most-at-risk regions.



Priority 4. Open geoscience

Strategic objective - Meet current and future needs of the Government of Canada and stakeholders for open geoscience, including sound stewardship of our knowledge and collections.

Context - Open Geoscience is conducting *public geoscience* within the framework of *Open Government*.



As a science leader for more than 170 years, the GSC has developed, implemented and adapted to vast technological changes in every stage of the public geoscience knowledge cycle (i.e. data acquisition, analysis, integration, interpretation, dissemination). Driven by advances in information management technology, the speed, volume, accuracy and precision of information flows between all stages of the cycle have increased exponentially, resulting not only in efficiencies, but also in fundamentally new geoscientific insights.

Moreover, the ever increasing sophistication of users, analytical tools and frameworks has influenced the structure of the geoscience knowledge cycle itself.

Our role within government - Within the public geoscience knowledge cycle, the core roles of the GSC are to

- create, acquire, validate and archive data
- perform scientific and policy analyses
- maintain awareness of how our knowledge products are used and what impacts they have on our strategic objectives

For dissemination of data, related knowledge products and policy papers, the GSC collaborates closely with a range of other federal entities:

- Within the Earth Sciences sector (ESS), the Canada Centre for Mapping and Earth Observation is the GSC's key partner for management of data, maps, publications and collections.
- Within NRCan, the Public Affairs and Portfolio Management sector is the GSC's key partner for managing its Web presence and engaging with both traditional and social media.
- Within the federal family, Shared Services Canada is the GSC's key partner for data centre and telecommunication services.

New contributions to our strategic objective - Building on our recent advances in this area, we have identified firm, high-priority commitments for the next five years:

- Within the scope of the federal [Open Government initiative](#) – and in collaboration with key partners, stakeholders and staff – develop and implement an Open Geoscience information management and technology (IMT) plan, which is fully integrated into the NRCan and ESS IMT plan and that ensures Canadians have freely available access to our geoscience data, information and knowledge.
- Acquire, manage and disseminate all geoscience data by using internationally accepted, Web-enabled methods and standards for quality, authority, timeliness and accessibility.
- Modernize and Web-enable all key ESS geoscience datasets and publications, including geological, geochemical, geophysical, hydrogeological and geohazard maps and data sets and metadata of rock collections and archive material.
- Implement a dashboard – accessible to all staff – that records performance measures for the quality, authority, timeliness and accessibility of our geoscience data, information and knowledge.

Did you know? Canada's *Open Government initiative* was launched in 2011 and has three streams:

- **Open Information** - proactively releasing information on government activities on an ongoing basis, making it more accessible to Canadians and easier to find
- **Open Data** - making raw data available in machine-readable formats to citizens, governments and not-for-profit and private-sector organizations to leverage them in innovative and value-added ways
- **Open Dialogue** - giving Canadians an opportunity to talk with the Government of Canada on federal policies and priorities

Our future beyond 2018 - The GSC anticipates that the drivers of Open Geoscience will become only stronger over the coming years. Open Geoscience will require persistent attention, stable resourcing, in-house expertise (including new types of expertise such as in advanced statistical analysis) and close partnerships with complementary expert and service providers, including the Canada Centre for Mapping and Earth Observation and Shared Services Canada.

A fundamental responsibility of the GSC is to acquire and communicate information on Canada's land mass. As the GSC completes framework mapping of the North, there will be an on-going need to integrate the results with information acquired by the provinces, the territories, academia and industry into comprehensive syntheses that can be applied to a range of issues facing Canada. To this end, the GSC will actively seek-out collaborative opportunities and resources for potential flagship initiatives in Open Geoscience such as Canada in 3D, which is a vision for an online and evergreen national geoscience library and compilation that would form the basis of a "next generation" view of the Canadian land mass.



Priority 5. Excellence in our people and science

Strategic objective - Engage our expertise and enhance the effectiveness of the GSC.

Context - As a part of Canada’s public service, the GSC supports, and aspires to be a leader in, fulfilling its vision – to be world-class and equipped to serve Canada and Canadians now and in the future. As well, critical to NRCan’s role as a science-based department, the GSC is part of the global scientific enterprise.

On-going efforts to eliminate the federal deficit and modernize how government delivers services to Canadians have resulted in a “leaner” public service. By adopting new technologies and centralizing some government services, the GSC has also become a smaller organization, and today has approximately 450 employees. The GSC leads several time-limited, well-funded geoscience initiatives such as the Geo-mapping for Energy and Minerals program (see the following table for others). Currently, funding from these initiatives provides the bulk of the GSC’s operating, capital, grant and contribution funding.



Program initiative	Goals	Years	Funding
Geo-mapping for Energy and Minerals (GEM) Phase 1	Provide a geoscience knowledge base in Canada’s territories to the minimum level needed for effective private-sector exploration	2008–2013 (5 years)	\$100 million
Geo-mapping for Energy and Minerals (GEM) Phase 2	Work with the provincial governments to fill critical gaps in the knowledge base needed to increase the exploration investment in the northern parts of provinces	2013–2020 (7 years)	\$100 million
Canada’s Extended Continental Shelf ¹	Define the limits of Canada’s continental shelf according to the United Nations Convention on the Law of the Sea	2004–2014 (10 years)	\$72 million
Targeted Geoscience Initiative (TGI) Phase 4	Develop new knowledge and innovative techniques to enhance the effectiveness of exploration for deeply buried mineral deposits	2010–2015 (5 years)	\$25 million
Targeted Geoscience Initiative (TGI) Phase 3	Increase the effectiveness of base metal exploration in existing mining camps	2005–2010 (5 years)	\$25 million

¹ led jointly with Foreign Affairs, Trade and Development Canada, and Fisheries and Oceans Canada

“We will be recognized as having the best people working together with citizens, making smart use of new technologies and achieving the best possible outcomes with efficient, interconnected and nimble processes, structures and systems. Our core objective is to improve the lives of our citizens and secure a strong future for our country.”

Blueprint 2020,
Clerk of the Privy Council
June 2013



Our role - The GSC supports and aspires to lead in implementing Blueprint 2020, the Government of Canada’s approach to public service excellence.

The following principles reinforce our activities

- an open and networked environment that engages citizens and partners for the public good
- a whole-of-government approach that enhances service delivery and value for money
- a modern workplace that makes smart use of new technologies to improve networking, access to data and customer service
- a capable, confident and high-performing workforce that embraces new ways of working and mobilizing the diversity of talent to serve the country’s evolving needs

New contributions to our strategic objective - The GSC is renewing four ambitious goals to ensure that our expertise is engaged and that we are as effective as possible:

- **People** - Define, cultivate and reward excellence, innovation and focus, and ensure recognition of the fact that all work contributing to our goals is valuable; ensure the maintenance and development of the skills and expertise necessary to deliver our objectives, and to manage efficiently.
- **Partnerships** - Seek out, maintain and enhance internal and external collaborations for mutually beneficial access to the best resources (expertise, facilities, equipment, infrastructure).
- **Programming** - Ensure the continuing alignment of our geoscience with current government priorities and responsiveness to emerging needs; maintain a geoscience project portfolio that balances long- and short-term objectives and that appropriately balances risks to ensure delivery of current objectives while striving for the innovations that will drive our future.
- **Organization** - Through efficient internal partnerships, ensure that staff has free and timely access to the data, information and knowledge that are necessary to deliver our objectives and that is necessary for professional development.

Implementation – Using this strategic plan and keeping it up-to-date

GSC@175 will be an important vehicle for guiding the delivery of our science for Canadians and for guiding our collaborations with key stakeholders.

The priorities in this strategic plan are theme-based and reflect the outcomes that the GSC is pursuing for Canada. For the management of resources and the delivery of results, the GSC works via time-limited programs of national scope, each of which is comprised of a suite of projects with specific scientific and technical objectives and outputs. Execution of projects takes place in GSC facilities across Canada, with program leadership assigned to one facility.

As a part of NRCan, the GSC contributes to a departmental report on plans and priorities (RPP) and a departmental performance report (DPR), both of which are tabled annually in Parliament (preceding and following the start of each new fiscal year, respectively). The GSC also contributes to the rolling three-year integrated business plans (IBPs) developed by NRCan and the ESS to provide greater details on each of their commitments.

Independently, and to effectively contribute to the planning and reporting exercises, the GSC undertakes an annual cycle of program planning, including both mid-year and year-end program performance reviews.

Via these processes, the GSC will assign the resources necessary to deliver on this strategic plan and make adjustments as needed.



How the strategic plan was developed

This strategic plan was developed over more than 18 months of research, analysis, planning and engagement. In December 2011, the GSC launched an analysis of current objectives and the strategic context in which the survey operates. GSC management drew on this analysis to develop draft priorities over the spring of 2012. Focus groups of staff and key stakeholders within the ESS of NRCan were then engaged to refine this draft, followed by a broader process of consultation with all GSC personnel.

Throughout this process, one of the most telling themes was how important organizational identity is to the GSC workforce. Over its long history, the GSC has built a reputation as an honest broker of scientific data, information and knowledge. These are fundamental public goods, and they have the potential to change the lives of Canadians by making their economy stronger, protecting and ensuring the health of Canada's environment because it is better understood, and making people safer thanks to improved knowledge of risks and hazards.

All of us at the GSC associate strongly with this reputation and want to celebrate with Canadians the achievements accrued since before Confederation and especially since the 150th anniversary of the GSC in 1992.

A further theme revealed by this process was the breadth and depth of expertise in the GSC: each centre of expertise clearly demonstrated the importance of its work, both in terms of its potential for scientific advances and its value to Canadians. Prioritization is one of the challenges of strategic planning, and the need for decisions on where to focus over the period of this strategic plan meant difficult choices were made. In making these choices, no judgement was rendered on those areas of on-going GSC work that are less-represented in this plan.