# British Columbia Geological Survey's contributions to the Pan-Canadian Geoscience Strategy 2021-2026

Adrian S. Hickin[1, a]

[1] British Columbia Geological Survey, Ministry of Mining and Critical Minerals, Victoria, BC, V8W 9N3
[a] corresponding author: Adrian.Hickin@gov.bc.ca

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**Abstract**

With the goal of strengthening cross-jurisdiction coordination of public geoscience to support responsible resource development and the public good, the Pan-Canadian Geoscience Strategy was established as a collaboration among federal, provincial, and territorial geological survey organizations and is coordinated through the National Geological Surveys Committee. Through five priority areas (advancing framework geoscience, improving mineral and energy potential modelling, enhancing data accessibility, supporting geoscience training, promoting public literacy in Earth sciences), the Strategy aims to coordinate efforts to deliver accessible, high-quality geoscience data that supports resource development, land-use planning, climate action, and public safety while fostering innovation and training to strengthen Canada's role in the global energy transition and critical minerals supply chain. The Strategy encapsulates common objectives of Canadian jurisdictions and is intended to enhance collaboration and incrementally advance geoscience knowledge across the country. Since the Strategy was endorsed by federal, provincial, and territorial mines and energy Ministers in 2021, the British Columbia Geological Survey has made significant contributions to each of the priority areas, in large part related to critical mineral research, and has served to co-lead or champion related activities at the national level.

**Keywords:** Pan-Canadian Geoscience Strategy, National Geological Surveys Committee, Intergovernmental Geoscience Accord, public geoscience, critical minerals, framework geoscience, mineral potential modelling, geoscience data, training geoscientists, geoscience outreach, geoscience engagement

## 1. Introduction

Canada's mineral and energy sectors are vital to its economy, and public geoscience underpins investment, exploration, and environmental stewardship. High-quality geoscience data reduces exploration risk, informs land-use planning, and supports Indigenous self-determination and decision making. As global demand for critical minerals accelerates, Canada faces challenges in reversing declining reserves and identifying new opportunities. Coordinated public geoscience efforts are essential to maintain national competitiveness and meet environmental, social, and governance (ESG) expectations.

With a goal of strengthening cross-jurisdiction coordination of public geoscience to support responsible resource development and the public good, the Pan-Canadian Geoscience Strategy (Fig. 1) was established as a collaboration among federal, provincial, and territorial geological survey organizations and is coordinated through the National Geological Surveys Committee (NGSC; National Geological Survey Committee, 2025). Advances in science and technology offer expanded opportunities for data acquisition, predictive modeling, digital integration, and modernization of geoscience digital data systems and applications. The Strategy provides a framework for geological survey organizations to lever innovations, share expertise, and collectively enhance Canada's geoscience knowledge base. The strategy outlines five priority areas: 1) advancing framework geoscience; 2) improving mineral and energy potential modelling; 3) enhancing data accessibility; 4) supporting geoscience training; and 5) promoting public literacy in Earth sciences. These priority areas were identified as elements paramount to advance the Canadian economy and support evolving societal needs.

The present contribution describes each of these priority areas and details how the British Columbia Geological Survey (BCGS) has advanced each of them in the province, in large part through critical mineral research, and served to co-lead or champion related activities at the national level.

## 2. Strategy context and funding

The Strategy was developed in response to the Canadian Minerals and Metals Plan (Natural Resources Canada, 2019) and was endorsed by jurisdiction Ministers in 2021. It is coordinated through the National Geological Surveys Committee a federal-provincial-territorial body that facilitates cooperation among geological surveys and operates under the Intergovernmental Geoscience Accord (National Geological Survey Committee, 2022), which sets out principles for shared responsibilities in geoscience across Canadian jurisdictions. The Accord is signed by all sitting federal, provincial, and territorial mines and energy ministers except for Québec and Prince Edward Island. Québec participates in the spirit of the

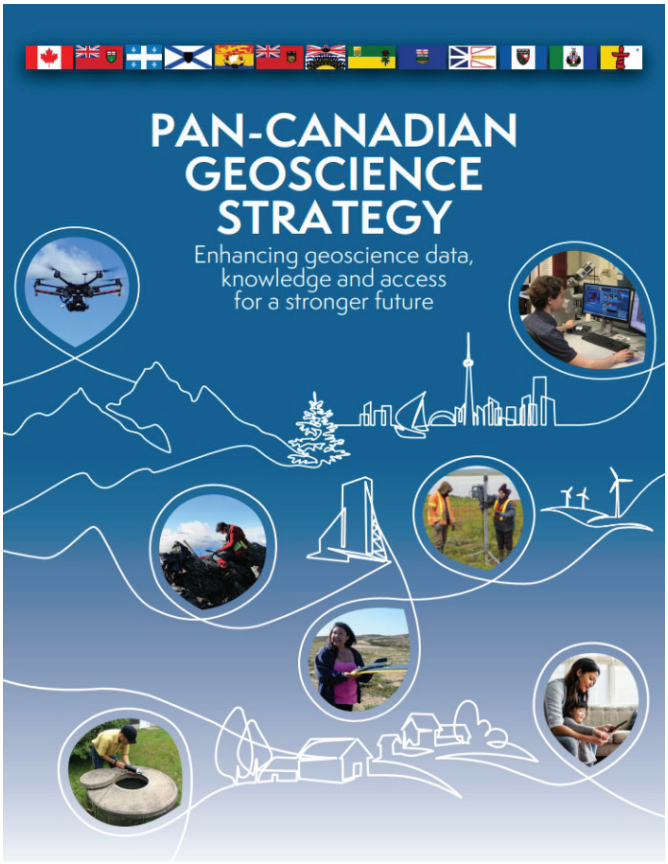


**Fig. 1.** Cover of Pan-Canadian Geoscience Strategy document. National Geological Surveys Committee of Canada (2022a).

accord, but Prince Edward Island does not have a geological survey organization. First signed in 1996, the accord is typically renewed every five years.

Although endorsed by mines and energy Ministers in Canada, the Strategy is not formally funded. This lack of funding is in marked contrast to large dedicated investment programs in Australia (Geoscience Australia, 2024, 2026), the United States (e.g., United States Geological Survey, 2026), and Europe (EuroGeoSurveys Secretariat, 2025; GeoERA, 2026) and to past coordinated federal-provincial funding frameworks in Canada such as the Mineral Development Agreements (MDAs) of the 1980s and 1990s. The MDAs were federal-provincial partnerships intended to stimulate mineral exploration, technological development, and regional economic growth. MDAs functioned as cooperative frameworks through which the federal government aligned its scientific and technological capabilities with provincial resource strategies (e.g., Janke, 1990). The primary goals included modernizing mineral research, strengthening geoscience programs, and promoting private-sector exploration during a decade characterized by depressed global commodity prices.

Since the MDAs, most federal funding flows to provinces and territories by cost sharing and contribution agreements through programs like Targeted Geoscience Initiative (TGI), Geomapping for Energy and Minerals-GeoNorth (GEM-GeoNorth) and Critical Minerals Geoscience and Data (CMGD). BCGS has benefitted from dedicated provincial funding since 2022 through CleanBC and the provincial Critical Mineral Strategy. These resources have been significantly levered by federal funding through programs like TGI, GEM-GeoNorth, and CMGD and partnerships with universities through Natural Sciences and Engineering Research Council of Canada (NSERC) grants. The injection of these new funds has stimulated projects and activities that have advanced the Strategy priority areas in British Columbia. In the absence of a formally funded strategy, these federal programs have been essential to bring resources into provincial and territorial geoscience organizations that advance the goals of the Strategy.

Although these programs are important for advancing federal, provincial, and territorial priorities, they remain in silos that are not specifically tied to the Strategy. Given massive, dedicated investments by competitors such as Australia, the USA, and the European Union, federal, provincial, and territorial geoscience programs have an opportunity to evolve and consider specific funding that would advance and optimize Strategy goals, objectives, and activities as the Pan-Canadian Geoscience Strategy matures into its second five years.

## 3. Advancing framework geoscience (priority 1)

Framework geoscience encompasses most of the traditional research by geological surveys and is the foundation for understanding Earth and its history. This work includes elements such as bedrock and surficial geology mapping, the most fundamental form of geoscience research, and ancillary petrographic, stratigraphic, structural, geochronologic, isotopic, lithogeochemical, regional geochemical, geophysical studies and metallogenic and tectonic syntheses. Since the inception of the Strategy, the Survey has been active across the province, carrying out local, regional, and province-wide framework geoscience work (Fig. 2).

Survey geologists have carried out mapping projects in the northwest part of the province in an area known informally as the ‘Golden Triangle’ (Fig. 3; e.g., van Straaten et al., 2022; Miller et al., 2023, 2025a), the Atlin area (e.g., Mihalynuk et al., 2021, 2024) and elsewhere (e.g., Schiarizza, 2022, 2024; Höy and Jackaman, 2024a, b; Veness et al., 2024; Höy and DeFields, 2025; Sauvé et al., 2025). Other studies have focused on regional stratigraphic, magmatic, geochronological, and isotopic frameworks (Table 1). Some of these studies have benefited from emerging technology such as data collection from remotely piloted aircraft systems (RPAS) popularly referred to as drones (Fig. 4; e.g., Elia et al., 2023, 2024a, b; Ferbey et al., 2024).

Like many jurisdictions in Canada and around the world, BCGS has recently focused on foundational work devoted to critical minerals (e.g., Hickin et al., 2023, 2024). The Survey’s approach has been to assess the critical mineral deportment in British Columbia’s primary mineral systems and mines and to provide data, tools, and knowledge that will encourage investment of underexplored resources. These studies have been


**Fig 2.** Sites of field-based framework geoscience activities by the British Columbia Geological Survey, 2021-2026.

directed at porphyry (e.g., Orovan et al. 2024, 2025; Graham et al., 2025b, 2026), volcanogenic massive sulphide (VMS, e.g., Piercey, 2025; Piercey et al., 2025; Wei et al., 2026), sedimentary exhalative (SEDEX; e.g. Northcote, 2025; Graham and Ootes, 2025; Graham et al., 2025a, b; Ootes et al., 2026a), magnetite skarn (e.g., Bain, 2024; Bain et al., 2025), mafic-ultramafic intrusive (e.g., Spence et al., 2022; Brzozowski and Zaborniak, 2024), and carbonatite (e.g. Rukhlov et al., 2024, 2025a, b, 2026) mineral systems.

In support of other critical minerals projects, the Survey has dedicated considerable resources to upgrading its rock and sediment sample archive (Rukhlov et al., 2023) and geochemical dataset. Of particular importance for understanding the geologic settings in which critical metals mineralize, archived samples have been reanalyzing using modern whole-rock, trace element, and stable and radiogenic isotopic methods (e.g. Van der Vlugt et al., 2022; Han and Rukhlov, 2024; British Columbia Geological Survey, 2025e;

**Fig. 3.** Field mapping of rocks in the 'Golden Triangle' of northwestern British Columbia.

Rukhlov et al., 2025c). In addition, work continues to establish the timing, emplacement setting, and geographic distribution of both fertile and barren intrusions using high-precision chemical abrasion isotope dilution-thermal ionization mass spectrometry (CA-TIMS) age and isotopic tracer data (e.g., Ootes et al., 2022, 2026b; Ootes and Wall, 2024), and evaluating geochemistry and indicator minerals in modern surface water drainages to develop exploration tools for fingerprinting upstream carbonatite-hosted niobium, rare earth element, and other critical mineral deposits (e.g., Rukhlov et al., 2024, 2025a, b, 2026). Many new and archived samples are being examined to reveal critical metal distributions and element partitioning behaviors between mineral phases by combining petrographic images with methods including scanning electron microscope-mineral liberation analysis (SEM-MLA; Fig. 5), electron probe microanalysis (EPMA); laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) and micro x-ray fluorescence analysis (e.g., Graham and Ootes, 2025;


**Fig. 4.** Remotely piloted aircraft system (RPAS), also know as a drone, deployed by British Columbia Geological Survey. **a)** DJI Matrice 600 Pro aircraft help investigate surface sediment composition in the Interior Plateau. **b)**, **c)**, and **d)** drone crew operating and maintaining equipment.

**Table 1.** Selected BCGS framework geoscience publications since 2021.

| Category | Title | Reference |
|---|---|---|
| **Geochronology** | U-Pb geochronological data for intrusive rocks near the Schaft Creek and Galore Creek deposits (southern Telegraph Creek area, NTS 104G), northwestern British Columbia | Bailey et al., 2025 |
| | U-Pb geochronologic data from samples collected as part of the Southern Nicola Arc Project | Mihalynuk et al., 2025a |
| | $^{40}Ar/^{39}Ar$ geochronologic data from samples collected as part of the Southern Nicola Arc Project | Gabites and Mihalynuk, 2025 |
| | New geochronologic data, Kitsault River area, northwestern British Columbia: Igneous zircons (high-precision CA-TIMS), detrital zircons (LA-ICP-MS), and molybdenite (Re-Os) | Miller et al., 2025b |
| | High-precision U-Pb zircon igneous crystallization and detrital zircon maximum depositional ages from the Toodoggone region, north-central British Columbia | Ootes and Wall, 2024 |
| | Rossland Group extends north: Detrital zircon U-Pb ages allow supracrustal unit reassignments in southern British Columbia and have tectonic implications | Ootes et al., 2026b |
| | U-Pb zircon dates for rhyolite and sandstone of Cadwallader terrane, lower Chilcotin River area, south-central British Columbia | Schiarizza and Friedman, 2023 |
| | Conodonts and detrital zircons from Triassic and Jurassic rocks above the Salmon River unconformity, Thompson Plateau, south-central British Columbia | Schiarizza et al., 2022 |
| | The age and provenance of the Lay Range assemblage provides an indirect record of basement to north-central Quesnellia, British Columbia | Ootes et al., 2022 |
| | Geochronologic data from the Kitsault River area, northwest British Columbia | Hunter et al., 2022a |
| | Geochronology of northern Hogem batholith, Quesnel terrane, north-central British Columbia | Jones et al., 2021 |
| | U-Pb zircon date for Eocene volcanic rocks on Mount Timothy, southcentral British Columbia | Schiarizza and Friedman, 2021 |
| **Magmatic** | New data on Late Triassic to late Early Jurassic plutonic suites in the northern Golden Triangle region of northwest British Columbia | Campbell and van Straaten, 2025 |
| | Apatite fission track data from northern Hogem batholith, Quesnel terrane, north-central British Columbia: A progress report | Wang, et al., 2025 |
| | Geology and geochemistry of the Kamloops Group (Eocene) in its type area, Kamloops, British Columbia | Van Wagoner and Ootes, 2022 |
| | Volcanism and geochemistry of the Kamloops Group, south-central British Columbia | Van Wagoner et al., 2021a |
| | Geochemical data from the Kamloops Group | Van Wagoner et al., 2021b |
| | Mineralogical control on critical companion metal distribution: Expanded workflow, with examples from the Sullivan Pb-Zn-Ag deposit | Ootes et al., 2026a |
| | Critical companion metals in porphyry deposits in British Columbia: Lithogeochemistry and scanning electron microscopy-mineral liberation analysis (SEM-MLA) from the Schaft Creek, Mount Polley, and New Afton deposits | Graham et al., 2026 |
| | Critical metal distributions in volcanogenic massive sulphide (VMS) deposits in British Columbia: A progress report | Wei et al., 2026 |
| | A multi-analytical approach to stream-sediment samples from modern drainages enhances the search for REE and rare metals | Rukhlov et al., 2026 |
| | Critical minerals at the Berg and Huckleberry porphyry deposits, British Columbia, using scanning electron microscopy-mineral liberation analysis (SEM-MLA) | Orovan et al., 2025 |

**Table 1.** Continued.

| Category | Title | Reference |
|---|---|---|
| **Magmatic** | A preliminary assessment of critical companion metals in SEDEX deposits of eastern British Columbia: Examples from the historic Sullivan mine and the Cirque project | Graham et al., 2025a |
| | Co-Te mineralization in iron skarns on Vancouver Island and Texada Island | Bain et al., 2025 |
| | Critical metals in volcanogenic massive sulphide (VMS) deposits in British Columbia: A progress report | Piercey et al., 2025 |
| | Geochemical analyses of SEDEX deposits in eastern British Columbia | Graham and Ootes, 2025 |
| | Textural evidence for ore fluid transport and the magmatic to hydrothermal transition at the past-producing Kitsault Mo-Ag mine | Orovan et al., 2024 |
| | Sulphide mineralization at the E&L magmatic Ni-Cu-PGE deposit: Textural evidence for contamination, vapour saturation, fluid immiscibility, and metal remobilization | Brzowski and Zaborniak, 2024 |
| | Ore and alteration textures of limestone-hosted magnetite-sulphide mineralization at the Merry Widow deposit, Vancouver Island, British Columbia | Bain, 2024 |
| | Did epithermal mineralization in the northern Toodoggone region develop synchronously with large-scale folding? | Ootes, 2023 |
| | Geology of the Tatogga property: Geologic framework for the Saddle North porphyry Cu-Au deposit and the Saddle South epithermal Au-Ag vein system, Iskut district, northwestern British Columbia | Greig et al., 2021 |
| **Stratigraphy** | Stratigraphic framework, structural setting, and timing of VMS, epithermal, and porphyry mineralization in the Kitsault River area, northwestern British Columbia | Miller et al., 2025c |
| | Upper Hazelton Group stratigraphy along the Stikine arch, northwestern British Columbia | van Straaten, 2024 |
| | Stratigraphy of the Stuhini Group (Upper Triassic) in the Galore Creek area, northwestern British Columbia | van Straaten et al., 2023 |
| | Time of deposition refinements for key stratigraphic intervals of the Nicola Group, southern British Columbia | Mihalynuk et al., 2025b |
| | Revised stratigraphy and geochronology of the Hazelton Group, host rocks for volcanogenic mineralization in the Kitsault River area, northwest British Columbia | Hunter et al., 2022b |
| | Revised stratigraphy of the Stuhini and Hazelton groups and LA-ICP MS zircon geochronology of the Scottie gold mine area, northwestern British Columbia | Stanley and Nelson, 2022 |
| **Surficial geology** | Interior Plateau surficial geology compilation: Selection and standardization of maps and data | Elia and Ferby, 2026 |
| | Surficial geology of the Nanitsch Lake area (NTS 94D/1) | Ferbey and Elia, 2025a |
| | Surficial geology of the Carruthers Pass area (NTS 94D/8), British Columbia | Ferbey and Elia, 2025b |

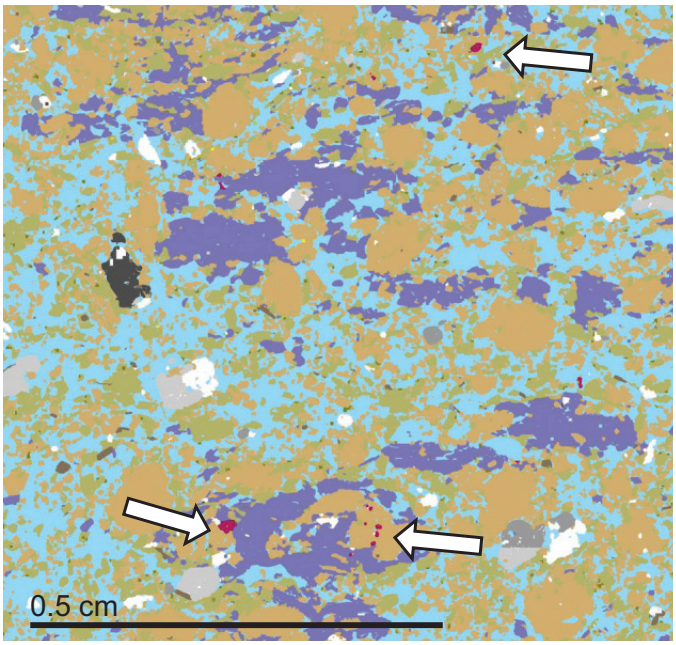


**Fig. 5.** False colour scanning electron microscope-mineral liberation analysis (SEM-MLA) to find trace minerals such as cassiterite ($SnO_2$; arrows). See Ootes et al. (2026a).

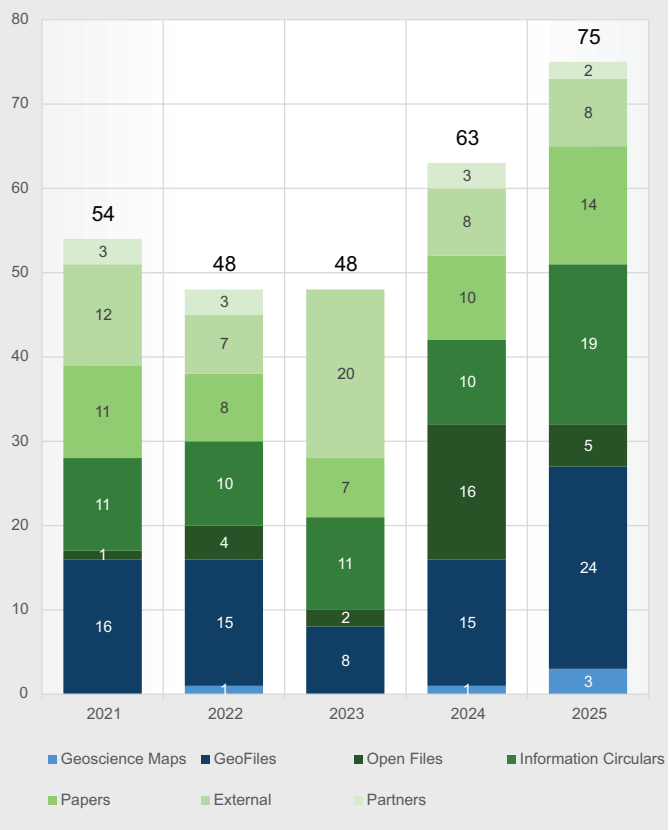


**Fig. 6.** British Columbia Geological Survey releases 2021-2025 broken down by publication series.

Orovan et al., 2025; Piercey et al., 2025; Ootes et al., 2026a; Wei et al., 2026).

In conjunction with the Geological Survey of Canada, the BCGS has partnered to examining the physical properties of archived samples (density, magnetic susceptibility, porosity) to improve geophysical interpretations and enhance potential fertility assessments remotely (Enkin et al., 2020). The surveys also released new province-wide compilations of high-resolution aeromagnetic data (Oneschuk et al., 2024).

As with all geological survey organizations, releasing the results of research carried out with public funds is essential, and the Survey strives for immediate publication of new foundational geoscience projects. Since 2021, BCGS has produced 288 publications (Fig. 6), most of which are related to the Strategy. Recent growth reflects the injection of new funding from sources not dedicated to the Strategy. Currently, the Survey is beginning to compile the footprint of publicly available geoscience publications in the province in a series geospatial geoscience knowledge density map (Zhang et al., 2026). These maps increase public awareness of geoscience activities and identify potential knowledge gaps for making land-use decisions, planning new projects, and mineral potential modelling.

## 4. Mineral and energy potential modelling (priority 2)

Mineral and energy resource potential modelling is a tool that uses diverse datasets to consider the likelihood of resources occurring in a given area by using advances in computer science, spatial analysis, and statistical predictive techniques. These models guide land-use and policy decisions, inform Indigenous self-determination processes, reduce exploration risk, attract investment, and support the discovery of critical minerals.

Mineral deposits and natural energy resources form in specific geological settings during distinct periods of Earth history, offering a certain level of predictability. The modelling process combines geological knowledge with spatial datasets such as geological maps, geophysical and geochemical surveys, and known occurrences, which are analyzed using statistical and Geographic Information System (GIS) tools. The main outputs are potential maps showing relative prospectivity for individual resource systems that can be integrated for comprehensive regional assessments. The goal of this priority area is to develop consistent, nation-wide predictive tools that integrate geological data and lever machine learning and data analytics. By coordinating efforts across jurisdictions, this priority area ensures standardized approaches, shared data, and innovative methods.

British Columbia was the first jurisdiction in Canada to complete a province-wide mineral potential assessment (Kilby, 1995, 2004). After a hiatus of about 30 years, the Survey has revitalized its mineral potential mapping program that builds on decades of new geological data, improved exploration techniques, new developments in programming languages and increases in computing power, which have led to significant advances in applying GIS platforms and using computerized

statistical methods. The Survey currently applies the weights of evidence method to integrate multiple geological proxies and training data, evaluate predictability, and generate probability models (Wearmouth, et al., 2024a, b). Modelling in northern British Columbia has focused on porphyry, volcanogenic massive sulphide (VMS), and mafic-ultramafic systems, which host critical minerals like copper, molybdenum, nickel, cobalt, and rare earth elements (Wearmouth et al., 2024c) and sedimentary exhalative (SEDEX) and Mississippi Valley-type (MVT) systems which host primary commodity critical metals such as lead, zinc and companions gallium, germanium, indium (Wearmouth et al., 2024d). These preliminary maps largely corroborate the 1990s assessments but benefit from new data and knowledge. Unlike the labour-intensive original work, the revitalized modelling uses automated spatial analysis, enabling easier updates and future expansion to additional mineral systems. Because of inherent uncertainties and limitations, these technical maps can easily be misunderstood, so the Survey has created more consumable versions for use by non-experts (British Columbia Geological Survey, 2025a, b, c). The Survey is now expanding its modelling program to extend across the entire province and include additional mineral systems.

British Columbia is not alone in advancing tools to predict mineral opportunities. Geological surveys in Canada are well-positioned to lead mineral potential modelling because of their expertise, extensive datasets, and digital infrastructure. As the National Geological Surveys Committee lead for this priority area, BCGS co-organized a workshop in the fall of 2025 (Fig. 7; British Columbia Geological Survey, 2025d) in which federal, provincial, territorial and international practitioners met to foster and coordinate innovation, discuss past, present, and future methods, explore emerging tools in artificial intelligence and geospatial analysis, and begin addressing shared challenges such as data integration, gaps in data coverage, model uncertainty and interpretation, and communicating results to non-specialists.

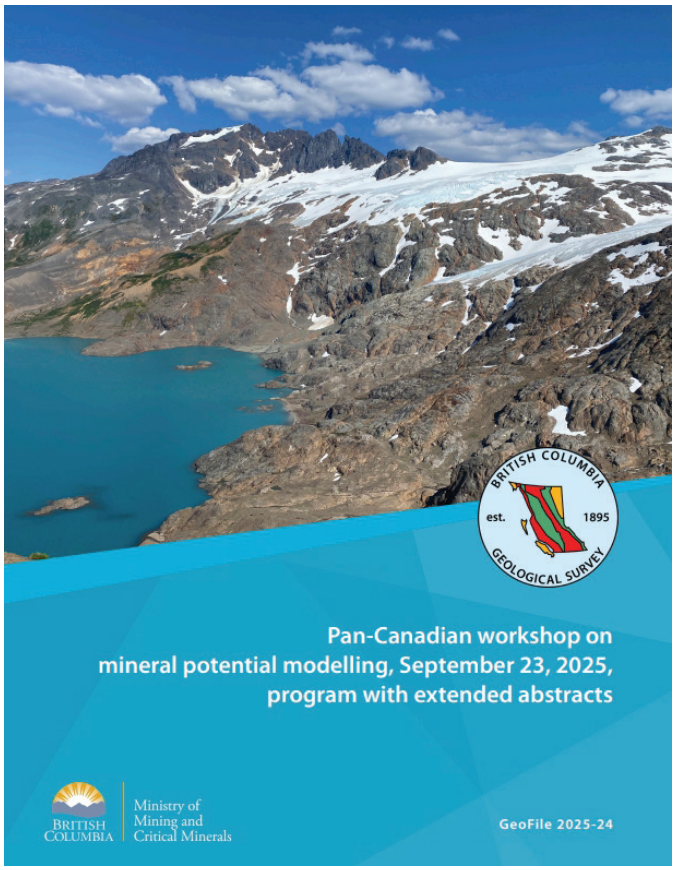


**Fig. 7.** Mineral potential modelling workshop, fall 2025 (British Columbia Geological Survey, 2025d).

**5. Data delivery (priority 3)**

Delivering high-quality geoscience data is essential for all publicly funded geological surveys. The data delivery priority of the Strategy is focused on making Canada's geoscience information easily discoverable, interoperable, and openly accessible through modern digital platforms. The goal is to integrate federal, provincial, and territorial datasets into standardized, user-friendly systems that support advanced analytics. This includes improving data quality, harmonizing formats, levering cloud technologies, and developing applications to enable sharing. By enhancing accessibility, this priority reduces duplication, accelerates innovation, and ensures that geoscience information is supporting emerging technology in the public and private sectors. As the steward of all provincial public geoscience and mineral resource data, the BCGS continues to deliver data through its geospatial web service (MapPlace), its digital coverage of bedrock geology (BC Digital Geology), and a suite of databases. Because much of the data are stored in a patchwork of legacy or obsolete systems, the Survey has initiated a project to modernize our databases and applications and bring them into an integrated system referred to as the BC geoscience Spatial Data Infrastructure (BCgSDI; Cui et al., 2026).

MapPlace, the Survey's geospatial web service, is a cornerstone of data accessibility. It enables users to query multiple databases simultaneously and is designed for ease of use, speed, and scalability, allowing anyone with internet access to visualize and access BCGS geoscience datasets and generate custom reports. Through continuous updates and upgrades, this platform significantly reduces the cost and complexity of accessing geoscience. The Survey also maintains a comprehensive catalogue of published reports, maps, and technical papers that can be freely accessed and downloaded online.

BC Digital Geology provides dynamic, province-wide geological coverage that evolves as new field mapping is completed. The coverage includes attributed bedrock geology as spatial data (lines, points, and polygons) that can be queried. BCGS has adopted a geospatial frame model (Cui, 2021) as a means of expediting map updates and strives to continuously enhance the accuracy and attributes for an

analytic-ready provincial bedrock geology data source. To support interoperable exchange of geological information, the BC Digital Geology has adopted the GeoSciML Lite schema and mapped the contents with the vocabularies used by the International Union of Geological Science Commission for the Management and Application of Geoscience Information. The Survey has recently undertaken a compilation of digital Quaternary geology focused on the Interior Plateau (Elia and Ferbey, 2026).

The Survey delivers raw information using a broad suite of databases that are routinely updated and available through the BCGS database webpage (British Columbia Geological Survey, 2026). The MINFILE mineral occurrence database catalogs more than 16,000 mineral occurrences and is currently being modernized and migrated to PostgreSQL/PostGIS; COALFILE contains extensive coal exploration data. The Assessment Report Indexing System (ARIS) database houses more than 41,500 assessment reports submitted since 1947. ARIS was recently modernized by migrating data from FoxPro to PostgreSQL/PostGIS. Because traditional paper or PDF assessment report formats make data extraction challenging, the Survey has a project to digitize older reports using Optical Character Recognition (OCR) to be machine-readable and has created assessment report-sourced databases in a GIS-ready GeoPackage format, thus transforming decades of hard-to-extract information into usable tools. One database contains surface-sediment geochemistry from the Interior Plateau and includes coordinates, sampling details, lab and analytical methods, and results from 34,000 samples with 1.45 million determinations (Norris and Fortin, 2019; Fortin and Silva, 2026). A second database includes drill hole information from the Interior Plateau and includes the locations and geometry of drill holes, core descriptions, sampling parameters, and geochemical assay results for more than 6000 drill holes, 80,000 samples, and 3.8 million determinations from 1300 assay certificates (Fortin and Silva, 2025). Property File is a unique collection of unpublished private documents donated by government, universities, industry, and individuals dating back to the late 19th century. In partnership with the Yukon Geological Survey, BCGS has initiated a Data Lake project, which includes scanning, indexing, and digitizing raw data and historical technical documents to a centralized repository that holds raw, structured, semi-structured, and unstructured data. The Data Lake will be available for interrogation through machine learning and natural language models to discover previously overlooked exploration information. The Survey geochemical database now includes five million determinations from more than 86,000 samples, and the geochronologic database contains about 8700 age determinations, including recent high-precision dating.

The British Columbia geoscience Spatial Data Infrastructure (BCgSDI) project (Cui et al., 2026) is perhaps the most significant enhancement being carried out at the Survey related to the data delivery priority. Although the public-facing end of the Survey databases have been well received, the back end is a patchwork of legacy systems, largely developed in-house, that are siloed and lack a common interface and coherent data management. These systems, many of which are decades-old, have resulted in several enduring challenges such as maintaining similar data in multiple systems and the cost of supporting disparate systems and obsolete technologies. In addition, the systems and applications are not immediately amenable to support AI (artificial intelligence) and LLM (large language models) for advanced data access and modelling. The general term ‘SDI’ (Spatial Data Infrastructure) refers to groups of logically arranged information systems that link data sources to products, are connected via a common interface, and facilitate data sharing and services. Adopting SDI concepts, the BCgSDI project is now making progress to eliminate current database-related service delivery impediments by linking currently disparate databases for better data access and updating. The Survey aspires to advance modern analytics by deploying an architecture on a Cloud platform. Ultimately, the BCgSDI supports efficient publication of analytic ready datasets and maps, improves discoverability through standardized metadata and services, and reduces friction in collaborative projects that span jurisdictions. The approach being used by the Survey also offers a practical template for similar modernizations in other agencies.

**6. Training the next generation geoscientists (priority 4)**

Building a strong pipeline of skilled geoscientists is needed to sustain Canada’s resource development and energy transition. This priority concentrates on promoting geoscience education and career pathways, strengthening collaboration with academic institutions to align training with emerging industry needs, and expanding experiential learning opportunities through employment and graduate work within geological survey organizations. Additionally, it aims to equip geoscientists with digital and data science skills to foster innovation and ensure a workforce that can lever advanced technologies for evidence-based decision making.

Although not part of its official mandate, BCGS has both formally and informally supported Earth Science post-secondary student projects and typically hires students, recent graduates, or early-career geoscientists as seasonal term geological assistants. Between 2021 and 2026, BCGS has been involved in training more than 30 graduate students and post-doctoral fellows through direct funding and/or through staff supervision. Staff are supporting or have supported student projects at the University of British Columbia, Simon Fraser University, University of Victoria, University of the Fraser Valley, University of Alberta, University of Manitoba, British Columbia Institute of Technology, Western University, Queen’s University, Memorial University of Newfoundland, Canterbury University (New Zealand), and Laoshan Laboratory (China). Projects include a variety of degree levels including PhD (20%), MSc (50%), and undergraduate (15%) as well as post-doctoral projects (15%). BCGS staff roles include supervisor or co-supervisor, advisor,

committee members, and external examiner. Upon request and as part of its general client focus, the Survey provides advice on how to access and use BCGS data and consultations to help students projects succeed.

The Survey contributes to the development of early career geoscientists by hiring them as geological assistants for seasonal term positions. These geological assistants are essential to geological surveys for the safe, efficient and cost-effective collection of field data while providing future geoscientists with hands-on field training that contributes to a highly skilled workforce. Since 2021, BCGS has provided 47 term positions (Fig. 8) mainly to geoscience undergraduate, graduate, and recently graduated university students from across Canada.

**7. Geoscience literacy and outreach (priority 5)**

Enhancing public literacy is intended to ensure Canadians understand the importance of how geoscience supports the economy, climate change adaptation, and public safety. This includes improving communication and outreach to make geoscience concepts, data, and expertise accessible to the public, policymakers, stakeholders, and rightsholders and be used to help balance resource development with environmental, cultural, and economic considerations. It also emphasizes engagement with Indigenous communities and diverse audiences to promote inclusivity and shared knowledge in managing Canada's geological resources responsibly. In 2023, BCGS hired a dedicated geoscientist to advance the Survey's engagement activities. Through its Engagement Program the Survey is connecting Indigenous Peoples, local communities, government, industry, and the public with the geology and mineral resources of the province. This work supports land-use planning, resource co-management, and relationship building.

Engagement with Indigenous Peoples is a central focus (Bacha, 2026). Many Indigenous Peoples seek a better understanding of the mineral endowment in their


**Fig. 8.** Training the next generation of geoscientists. **a)** BCGS-supported geological assistant hires. **b)** and **c)** Students being mentored in the field.

territories, recognizing its importance for self-determination and land-use discussions. As an unbiased public geoscience agency, the Survey strives to build trust with the more than 200 First Nations in the province by being an unbiased broker of information, sharing geological knowledge, and working collaboratively with Indigenous governments, leaders, and communities. Through the Engagement Program, BCGS works with Indigenous communities to raise awareness of research on their lands, identify opportunities and challenges, and explore partnerships.

The Survey has adopted, and is working to apply, dialogue and participatory models of engagement that are rooted in mutual respect, two-way communication, collaboration, and participation and strives to overcome barriers inherent in integrating Western geoscience with Traditional Knowledge (Bacha, 2026). The need to foster stronger relationships as an integral part of new fieldwork programs led the Survey to develop its Indigenous Peoples Engagement Policy, which ensures that all BCGS field projects go through multiple engagement sessions before, during, and after boots-on-the-ground activities (Fig. 9). BCGS has also enshrined archaeological and heritage considerations into fieldwork. While conducting work on the land, geologists may inadvertently encounter sites of Indigenous historical value, and the Survey has adopted a protocol that must be followed when finding unreported archaeological materials, commonly referred to as a 'chance finds'.

To date, the Engagement Geologist has worked with more than 50 Indigenous Nations in the province, with interactions ranging from addressing simple requests for information to multi-year partnerships. The geosciences can serve as a neutral and constructive entry point in land-use discussions because Traditional Knowledge and Western science intersections can be the foundation for dialogue. Fieldtrips provide unrivaled opportunities for Indigenous Peoples and geoscientists to come together on the land to build a common understanding of natural history and mineral resources. Collaboration between the Citxw Nlaka'pamux Assembly (CNA) of south-central British Columbia and the Survey led to a successful short course and fieldtrip in which CNA staff visited active exploration sites and experienced first-hand how geological research is carried out, and Survey and industry geologists learned about CNA values, worldviews, and understandings of nature (Fig. 10; Bacha, 2025).

Although focused on partnerships with Indigenous Peoples, the Engagement Program has a broader scope to bring geoscience knowledge to the public and to government groups. The Survey has provided public lectures and participated in events such as the Geodiversity Fest at the Royal British Columbia Museum (Fig. 11) and Discovery Day at the annual Association of Mineral Exploration Roundup convention that offered free, family-focused learning activities to spark interest in the Earth sciences, mineral exploration, and mining. Directed towards all natural resource ministry employees, the Survey

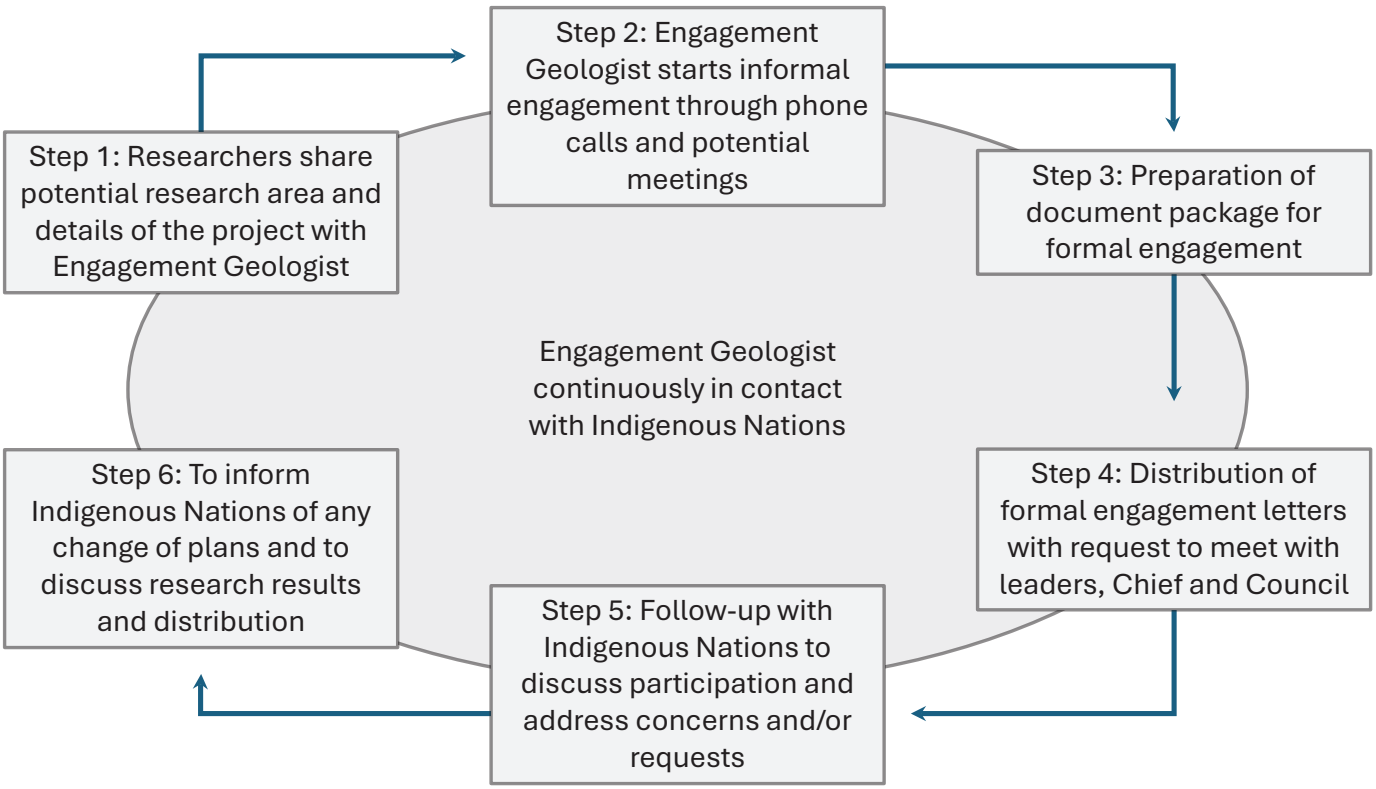


**Fig. 9.** Diagram depicting ideal Indigenous engagement timelines and workflow cycle for BCGS projects (see Bacha, 2026).


**Fig. 10. a)** Guidebook for field trip co-developed by BCGS and the Citxw Nlaka'pamux Assembly. **b)** Staff from the Citxw Nlaka'pamux Assembly at short course and **c)** on field trip.


**Fig. 11.** Engagement with the public. Lecture at the Royal British Columbia Museum, November 2025.

has repeatedly delivered a learning series encompassing topics such as the geological and tectonic history of the province, advances in geoscience, critical minerals, the exploration and mining life cycle, and environmental reclamation. In addition, at Mining Day at the Legislature, an event sponsored by the British Columbia Mining Association (MABC), the Survey provided experiential learning opportunities to the sitting government (Fig. 12), opposition members, and their staff.

## 8. National level

BCGS has been active at the national level. In 2020, the National Geological Surveys Committee, through a BCGS initiative, established the National Information and Data Management Working Group (IDM), with a goal to enhance the value of available and emerging geoscience data that remains isolated in provincial, territorial and federal repositories by enabling accessibility and interoperability for stakeholders internal and external to governments. The IDM is tasked with breaking down technical and jurisdiction barriers and finding solutions to data integration while recognizing that each jurisdiction must maintain its independence (Fig. 13). Since inception, BCGS has co-chaired or co-sponsored the working group.

**Fig. 12.** Engagement with government. Premier David Eby, and Minister of Mining and Critical Minerals Jagrup Brar, Mining Day at the Legislature, May 2025.

Following the release of the Strategy and after assessing federal, province and territorial readiness to deliver integrated geoscience data, the IDM was tasked to develop a method of delivering interoperable geoscience or mineral source information via a common portal. The IDM Working Group selected mineral occurrence data as a pilot project, co-led by the Geological Survey of Canada and BCGS, to successfully demonstrate the implementation of an open-standards-based, interoperable web service for accessing data across Canada. These data were networked in 2024 (Fig. 14). The project is continuing with bedrock geology as the next dataset, and a beta version is anticipated to be released to the public.

## 9. Conclusion

The Pan-Canadian Geoscience Strategy is a federal, provincial, and territorial collaboration that articulates the common needs and goals of geoscience organizations in Canada. All jurisdictions are delivering activities that are advancing the mission and vision of the Strategy and working together through the National Geological Survey Committee to enhance geoscience knowledge in Canada.

British Columbia, through the BCGS, has been active delivering projects and products that substantially advance each of the Strategy priority areas: 1) advancing framework geoscience; 2) improving mineral and energy potential modelling; 3) enhancing data accessibility; 4) supporting geoscience training; and 5) promoting public literacy in Earth sciences. In addition, the Survey has strived to lead at the national level, championing several areas and activities. The Survey will continue to develop geoscience programs to advance the Strategy while meeting the needs and objective of British Columbia.

Despite the contributions that British Columbia and the other Canadian jurisdictions have made, the Pan-Canadian Geoscience Strategy lacks dedicated funding, in contrast to competitors in Australia, the United States and the European Union. If Canada is committed to harnessing the country's mineral resources to contribute to the economy, mitigate external geopolitical threats like tariffs, compete with other nations, and combat climate change, then dedicated funding would help provinces and territories develop new collaborative programs that lever economies of scale. As the next five years of the Strategy is considered, Canada has an opportunity to embrace a national approach to funding Pan-Canadian Geoscience Strategy priority areas.

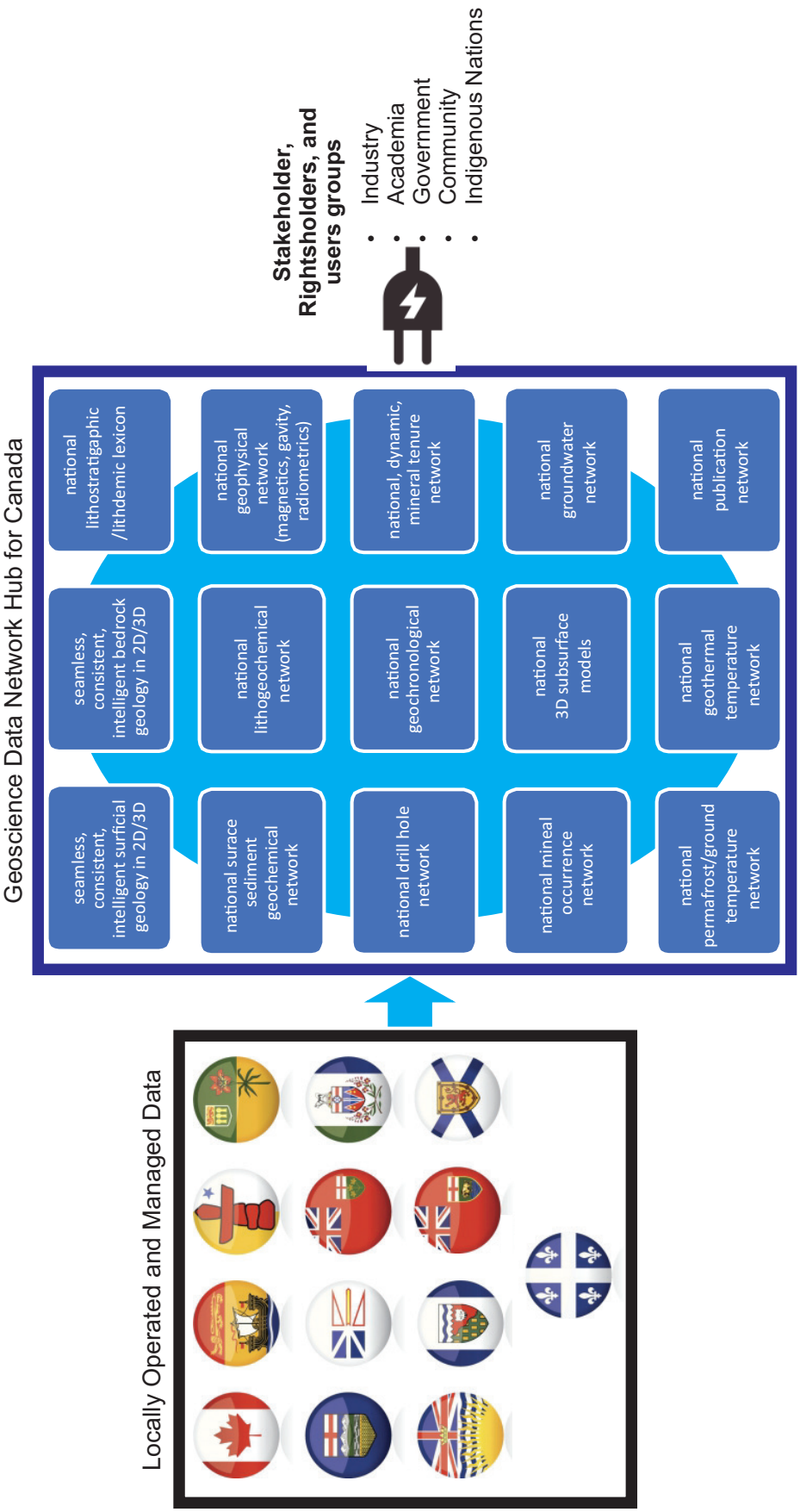


**Fig. 13.** National Geological Surveys Committee conceptual model for cross-jurisdiction data integration.

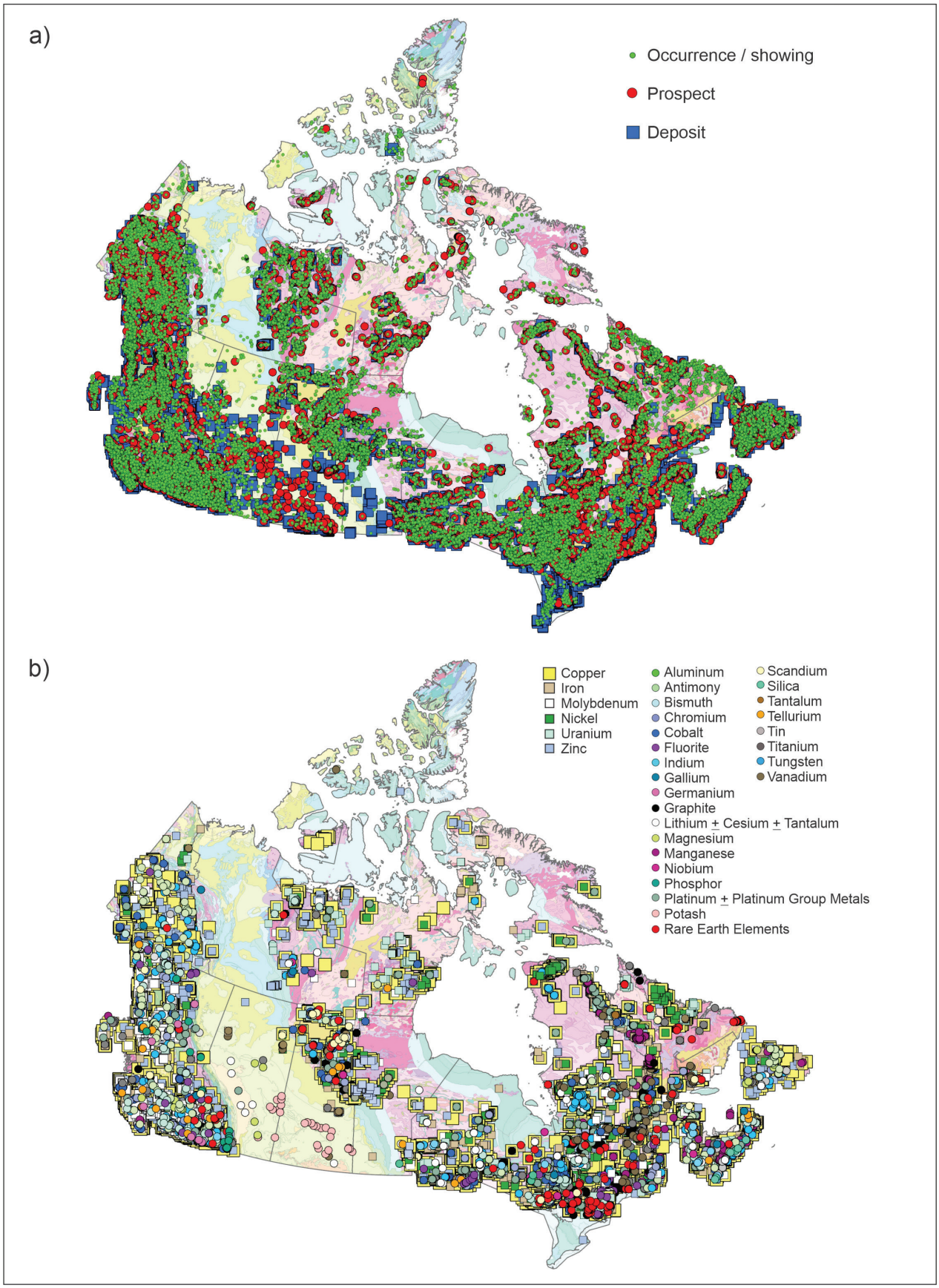


**Fig. 14.** Pan-Canadian mineral inventory pilot project. **a)** General inventory. **b)** Critical minerals. Base map from Wheeler et al. (1996).

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