

MINERAL INVENTORY PROJECT

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ABSTRACT

The mandate of the Mineral Inventory Project is to document geological and mineral resource information on the Province’s mineral occurrences and to make the information available to the public. Updates in 2022 were Province-wide with a focus on areas where mineral exploration is ongoing and new information released.

INTRODUCTION

The Mineral Inventory Project maintains the principal repository for geological information on the Province’s mineral resources. The Mineral Occurrence Data System (MODS) is a digital mineral occurrence database containing over 7300 records. It is recognized as an important mineral exploration tool and is consistently used by the mineral exploration and mining industries (Figure 1). Updating of the database is an ongoing process, and in 2022 it continued on a Province-wide basis using data taken mainly from mineral industry press releases and assessment reports.

The MODS consists of summaries of data including location, geological descriptions, mineralogy, deposit type, work histories, resource and/or reserve statistics, analytical results and bibliography on known mineral occurrences. It offers fast and easy access to mineral occurrence information throughout all of Newfoundland and Labrador. The main delivery point for the MODS data is the Geological Survey of Newfoundland and Labrador website. Clients can search the database using either the “Geoscience Atlas” (<https://geoatlas.gov.nl.ca/>) or the MODS “Search Form” (<https://gis.geosurv.gov.nl.ca/mods/mods.asp>). It provides a current, high quality, online mineral deposit database that helps to further define the Province’s mineral potential and highlight its prospectivity.

MINERAL OCCURRENCE DATA SYSTEM (MODS)

The MODS data are within the Oracle database management system; however, data entry is achieved using an application of the Microsoft-Access database software (Stapleton *et al.*, 2005). Microsoft-Access connects to the Oracle database using object database connectivity technology (ODBC).

MODS data originate from three main sources; mineral industry assessment reports/press releases, government reports and academic reports (Figure 1). Data are reviewed to ensure compliance with the MODS coding standards before information is delivered to clients as occurrence specific, mineral inventory reports *via* the Geoscience Atlas and the MODS query form. Fields from the MODS database record (Table 1) can be downloaded from the Geoscience Atlas, which gives clients the ability to use the data in a GIS environment.

The MODS internet application is dynamically linked to the Oracle database, which serves as the common platform for all of the Geological Survey’s databases. This enables efficient sharing of information between the databases giving clients same-day access to updated information.

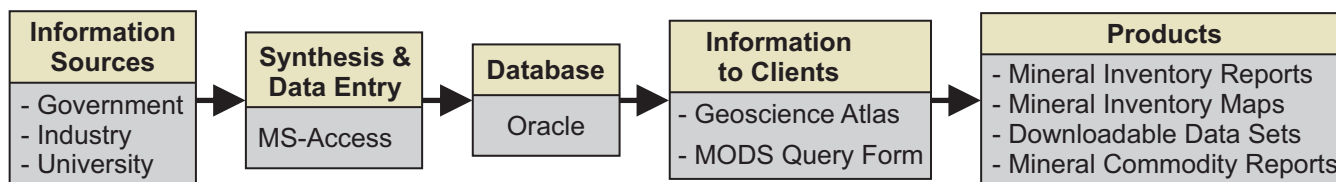


Figure 1. MODS flow chart.

Table 1. Fields and field descriptions from MODS for GIS record

| | |
|------------|--|
| Depname | Usual name |
| Altname | Alternate name |
| Recid | Record ID number |
| Nmino | National mineral inventory number |
| Comname | Major commodity present |
| Modslabel | Symbol for major commodity present |
| Commods | Secondary commodities present |
| Deptype | Deposit type; coded genetic classification of deposit |
| Desc | Description of deposit type |
| Status | Indicating amount of work done, and hence the amount of information available on a deposit |
| | Producer - Commodity is extracted for sale |
| | Developed Prospect - Reserves or demonstrated resources of the commodity can be calculated, but the commodity has not yet been produced (<i>i.e.</i> , three dimensional data plus grade) |
| | Past Producer Dormant - The commodity is no longer produced, although there are known reserves or demonstrated resources |
| | Past Producer Exhausted - The commodity is no longer produced and there are no longer reserves or demonstrated resources |
| | Prospect - Two-dimensional data and grade are available, but not enough data to calculate reserves |
| | Showing - Mineralization exists in outcrop with little information known about its spatial extent; assay data exists |
| | Indication - An indication of the existence of the commodity (<i>i.e.</i> , field observation, map symbol) |
| Depchar | Deposit description |
| Geoprov | Geological province |
| Tectbelt | Tectonostratigraphic zone |
| Strunit | Stratigraphic unit |
| Stratigrap | Stratigraphic age of the host unit |
| Rocks | Rock type(s) associated with deposit |
| Trench | Trenching? y = trenching done |
| DDH | Number of drillholes into the deposit |
| Working | Type of mine workings |
| | Underground - u |
| | Open Pit or Quarry - o |
| | Underground and Open Pit - uo |
| Adit | Adit? y = adit present |
| Shaft | Shaft? y = shaft present |
| Utmeast | Easting coordinate |
| Utmnorth | Northing coordinate |
| Utmzone | UTM Zone |

2022 UPDATES

Areas updated in 2022 include parts of 1L, 1M, 2D, 2E, 2L, 2M, 12A, 11P, 12H and 12I (Newfoundland) (Figure 2), and 13M, 13N, 14C, 14D and 23B (Labrador) (Figure 3). Although updates are implemented Province-wide, focus is placed on documenting occurrences in areas with ongoing mineral exploration programs, *e.g.*, gold exploration in the Valentine Lake area located in south-central Newfoundland (Figure 2).

VALENTINE LAKE AREA

The Valentine Lake property is located about 80 km southwest of Buchan's (Figure 2) and has been explored by several companies since the 1960s. The region was originally explored for its base-metal potential by ASARCO Inc., and Hudson's Bay Oil and Gas Company.

The property was recognized for its gold potential, first by Abitibi Price Inc. (Abitibi) in 1983 and later by BP Canada Inc. (BP), who acquired Abitibi in 1985. At the time, BP identified gold prospects occurring along a northeast-southwest structural trend, that subsequently became the Leprechaun and Victory deposits. From 1992 to 2010, the property passed through several owners and joint venture arrangements until Marathon Gold Corp. (Marathon) acquired a 100% interest in the property in 2012.

Between 2010 and 2022, Marathon conducted systematic exploration programs to explore historic prospects, and discovered numerous additional zones of mineralization along the structural trend. Marathon subsequently discovered the Marathon, Sprite and Berry deposits (Figure 4) and significantly expanded the known extents of mineralization at the Leprechaun and Victory deposits (Figure 4). Additional early stage exploration targets were identified by Marathon along the 20-km mineralized trend – this includes the Rainbow, Triangle and Narrows occurrences (Figure 4).

Marathon produced a feasibility study in April 2021 (Staples, 2021) that outlined plans to construct an open-pit mine, and conventional milling operation. The project will have a thirteen-year mine life and produce an average of 173 000 ounces of gold per year for the first 9 years. The project has estimated Proven and Probable Mineral Reserves of 2.01 M oz. (47.1 Mt at 1.36 g/t Au) and a Total Measured and Indicated Mineral Resource (inclusive of the Mineral Reserves) of 3.14 M oz. (56.7 Mt at 1.72 g/t Au; Staples, 2021). Additional Inferred Mineral Resource is 1.64 M oz. (29.68 Mt at 1.72 g/t Au; Staples, 2021).

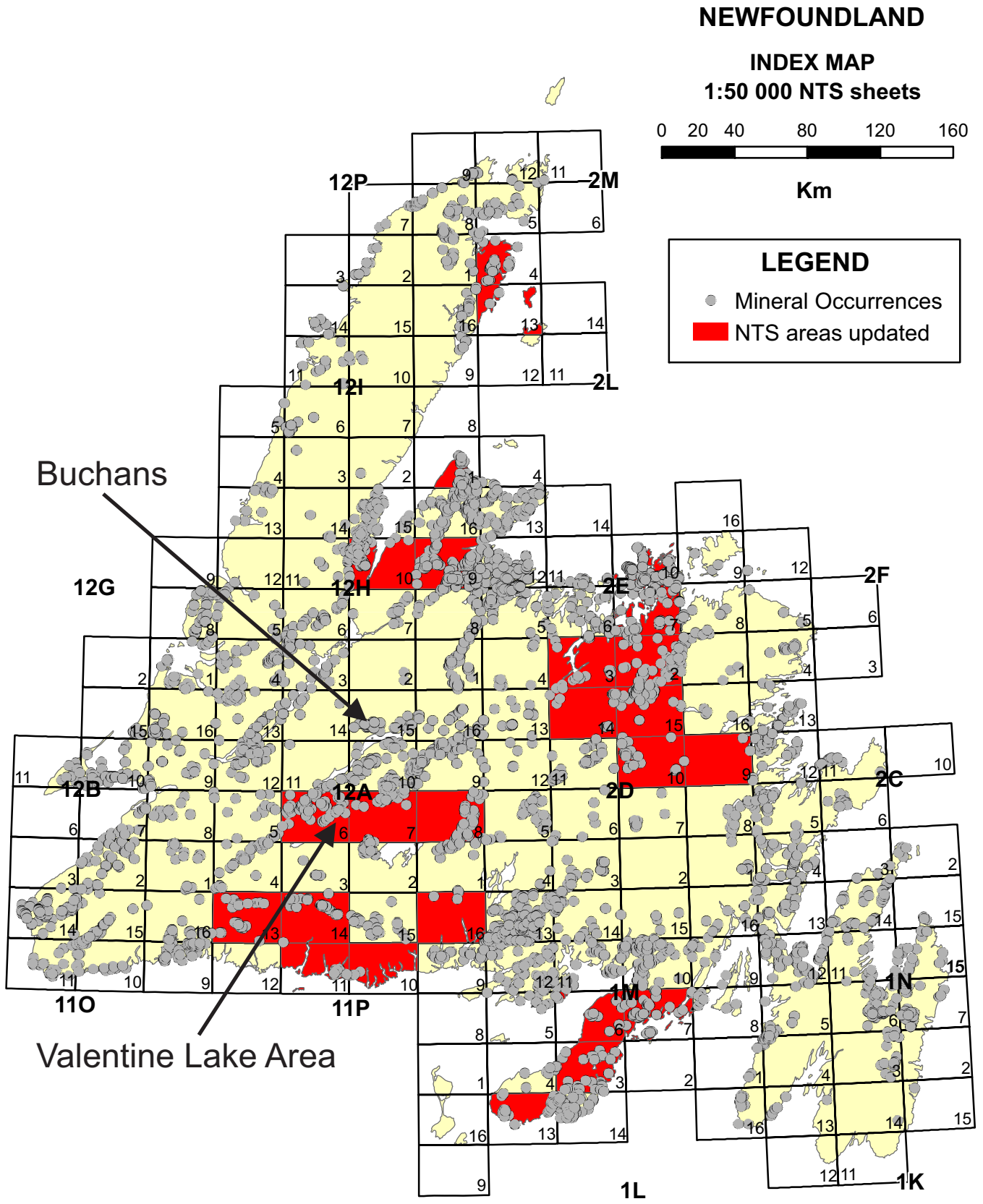


Figure 2. NTS areas updated, Newfoundland.

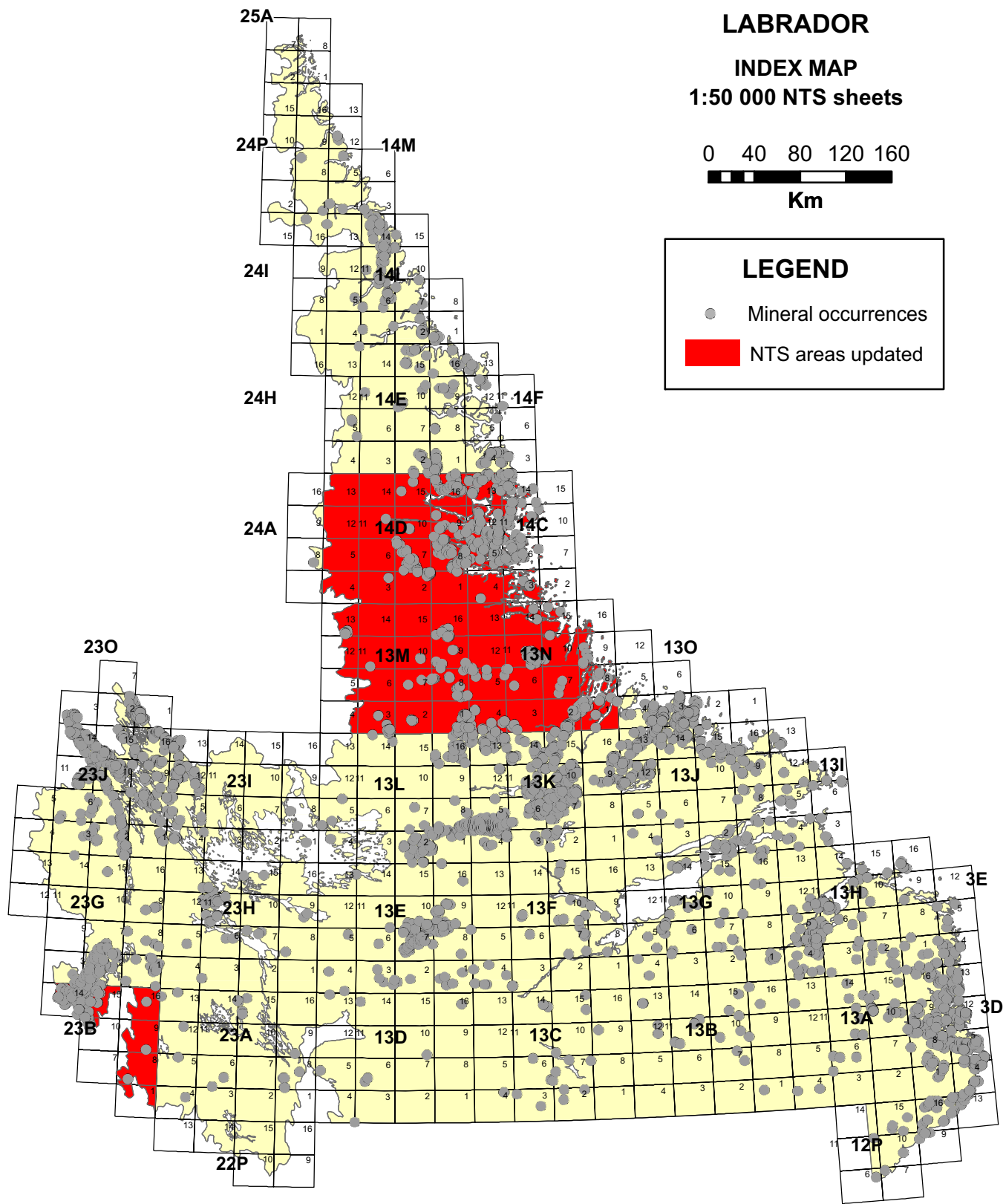


Figure 3. NTS areas updated, Labrador.

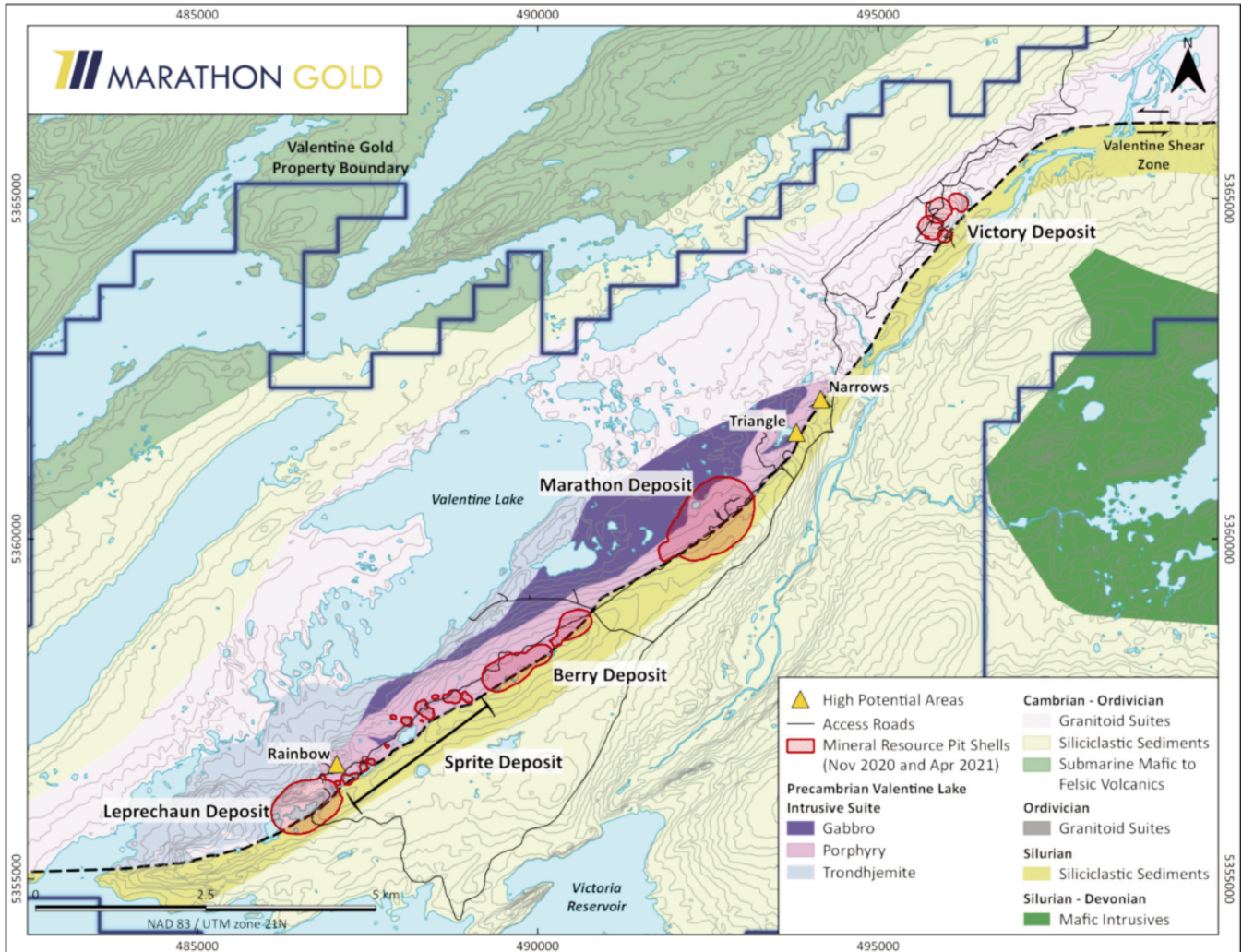


Figure 4. *Geology and mineral deposits, Valentine Lake areas (Staples, 2021).*

GEOLOGY AND MINERALIZATION

The following summarized description of the geology and mineralization at the Valentine Lake property is from Staples (2021 and references therein).

The Valentine Lake property is located within the Exploits Subzone of the Dunnage (tectonostratigraphic) Zone of central Newfoundland, part of the Newfoundland Appalachian belt. Gold mineralization within the Dunnage Zone correlates with late syn- to post-Salinic orogenic events and is typically spatially related to major structural features. The gold deposits at the Valentine Lake property (Figure 4) are primarily hosted by the Neoproterozoic Valentine Lake Intrusive Complex (VLIC), which occurs proximal to the contact between the Victoria Lake Supergroup to the northwest and the Silurian (or younger) Rogerson Lake Conglomerate (RLC) to the southeast. This contact correlates with a northeast-southwest lithotectonic

boundary identified as the Valentine Lake Shear Zone, which is characterized by localized shearing and faulting and was previously described as exhibiting sinistral reverse transpressive deformation correlated with the Salinic (450–423 Ma) Appalachian orogenic event. The VLIC comprises an elongate northeast-trending body of igneous rocks, predominantly composed of fine- to medium-grained trondhjemite and quartz-eye porphyry units, and lesser aphanitic quartz porphyry, gabbro, and minor pyroxenite units. The RLC occurs as a narrow linear unit that extends for approximately 160 km and lies unconformably (locally overturned) on the southeast margin of the VLIC. The conglomerate is interpreted to have infilled a fault-bounded paleo-topographic depression. The majority of the project area is overlain by glacial till between 1 and 5 m thick, as well as boggy areas and ponds, with local bedrock exposures occurring along northeast-southwest-trending ridges throughout the property and in streambeds. Regional metamorphism in the Valentine Lake area ranges from lower to upper greenschist

facies, with the higher grades occurring in the southern portion of the property. Deformation, observed in the VLIC, ranges from early ductile, transitioning to late-stage brittle deformation. The RLC exhibits a strongly developed pervasive foliation, isoclinal folding and flattened primary clasts indicative of a pure shear crustal shortening regime.

Mineralization is structurally controlled, mesothermal and associated with Salinic aged crustal shortening and deformation. Gold mineralization is developed within quartz–tourmaline–pyrite (QTP) vein sets associated with brittle–ductile deformation of granitoid rocks of the Neoproterozoic VLIC in proximity to the contact with the Silurian RLC

MODS USER STATISTICS

The MODS is used by mineral explorationists to help guide their exploration programs. It is used daily by government geologists in land-use planning. The 2022 web server statistics for the MODS indicate that it was accessed 32 769 times (Figure 5). Over the past fifteen years it has been consistently used, averaging 28 070 hits per year. A hit is logged when the user opens a MODS record. A detailed study of the 2013 web server statistics indicated that the database has a global audience, being accessed from one hundred countries, representing approximately half of the countries of the world. It is accessed most frequently from Canada and the

commodity of greatest interest is gold (Stapleton *et al.*, 2015).

STAFFING CHANGES

In May of 2022, Janice Smith retired from the Geological Survey of Newfoundland and Labrador (GSNL) after a career spanning four decades. Jan joined the Mineral Deposits Section, Mineral Inventory project, in 1981 after spending a year with the Iron Ore Company of Canada where she was responsible for overseeing resource definition on some of the iron-ore deposits in the Schefferville area of Labrador. Upon joining the GSNL, Jan continued her work on iron ore in western Labrador documenting virtually all of the known iron-ore resources from that region in the Province’s mineral inventory system. Among many other accomplishments, Jan was responsible for documenting most of the mineral deposits and occurrences that were found as a result of the Voisey’s Bay discovery. We wish Jan “all the best” during a well deserved retirement.

Nicolas Lachance joined the GSNL, Mineral Deposits Section, Mineral Inventory project as a Geologist II in January 2023. Nicolas completed a B.Sc. in Geology at UQAM in 2005 and M.Sc. in geology at Memorial University in 2015. Nicolas joins the GSNL after seventeen years of diverse work experience ranging from environmental and geotechnical to mineral exploration. Nicolas’s min-

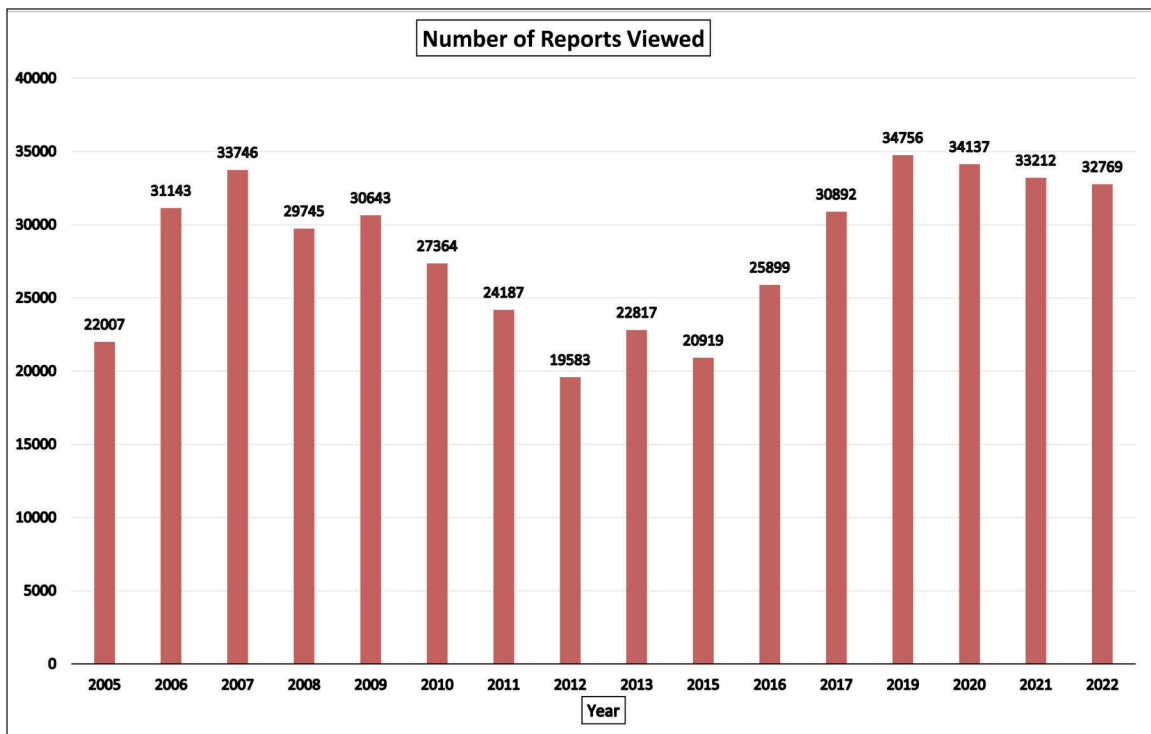


Figure 5. Number of MODS reports viewed per year from 2005–2022 (data for 2014 and 2018 unavailable).

eral exploration experience includes commodities such as uranium, iron ore, aggregate, gold and base metals.

SUMMARY

During 2022, consistent delivery of MODS data continued to be achieved through the query form and the graphical interface, with both updated and new non-confidential records copied to the public domain on a 24-hour basis. This database provides the mineral exploration sector and other clients with a current dataset of the Province's mineral occurrences. The data generated by the Mineral Inventory project contribute toward longer term benefits evidenced by increased investment in the provincial mineral exploration and mining industries (Stapleton *et al.*, 2014).

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