



**EXPLORE  
DISCOVER  
DEVELOP**

# RARE METALS

Rare metals (Zr, Y, Nb, Be, Ta, Sc and the rare earth elements) are increasingly important economic commodities, notably in the green energy and high-technology manufacturing sectors. The market for rare metals is expected to grow significantly, and supply deficits are predicted for several of these metals.

Rare-metal mineralization in Newfoundland and Labrador is associated with peralkaline igneous suites of mainly Proterozoic age (1.33 – 1.24 Ga; 580 – 540 Ma). The most significant deposits occur in the Labrador areas of Strange Lake, Port Hope Simpson, and Letitia Lake. The Strange Lake Deposit, the largest known in the province, is estimated to contain 57 million tonnes at 2.93% ZrO<sub>2</sub>, 0.38% Y<sub>2</sub>O<sub>3</sub>, 0.08% BeO, 0.31% Nb<sub>2</sub>O<sub>5</sub> and 0.54% total rare-earth oxides (TREO). Compared to similar deposits elsewhere in Canada, Strange Lake is enriched in valuable heavy rare earth elements (HREE).

Rare-metal mineralization is also known on the island of Newfoundland, notably in the Fortune Bay and Southern Long Range areas.

Igneous rocks having compositions considered favourable for rare-metal mineralization are widespread in the province, and remain largely unexplored.

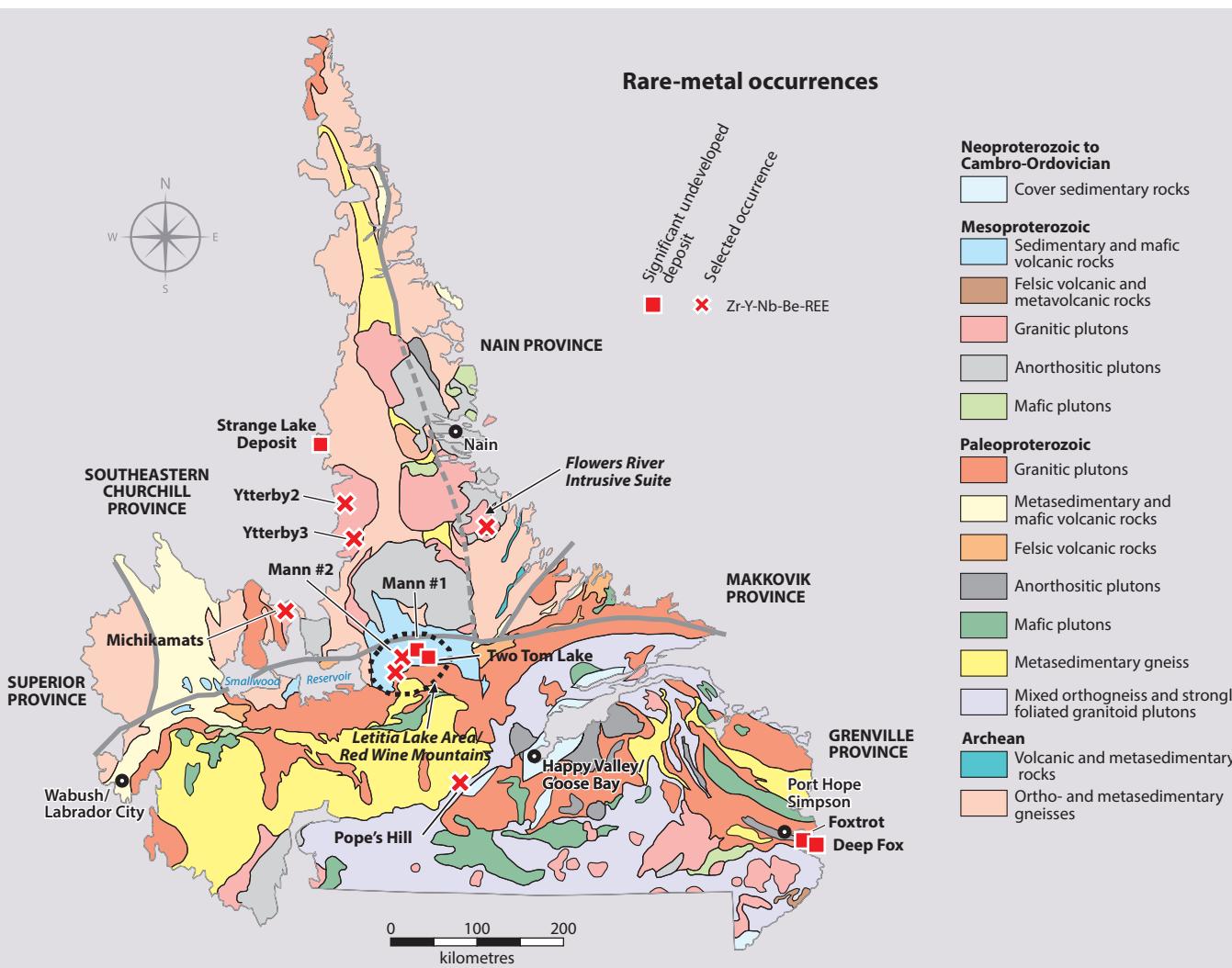
# RARE METALS IN LABRADOR...

Rare-metal mineralization in Labrador is generally associated with peralkaline igneous rocks (granites, syenites and volcanic rocks) that were intruded in the final stages of a major Mesoproterozoic magmatic event across the Nain and Churchill provinces, and also within areas now in the 1.0 Ga Grenville Province.

The Strange Lake Deposit, located on the Québec-Labrador border, is the largest rare-metal resource in the province and one of the largest undeveloped deposits in the world. Strange Lake was explored in the 1980s, with most interest focused on Zr, Y and Nb. The deposit is currently closed to exploration pending land-use decisions by the Nunatsiavut (Inuit) government. However, the Québec part of the deposit is now in the early stages of development.

Another group of rare-metal prospects occurs in the Letitia Lake and Red Wine Mountains areas. These were discovered in the 1950s, but had seen very little systematic exploration until recently. Active exploration in this area has resulted in a resource estimate of 40.635 million tonnes grading at 1.18% TREO, 0.26% Nb<sub>2</sub>O<sub>5</sub> and 0.18% BeO for the Two Tom prospect.

In southeastern Labrador, new rare-metal discoveries have been made within metamorphosed felsic rocks and associated pegmatites. At Port Hope Simpson, a combined mineral resource estimate of 15.1 million tonnes at grades of 375 ppm Pr, 1,402 ppm Nd, 185 ppm Dy and 32 ppm Tb (indicated), and 6.3 million tonnes at grades of 369 ppm Pr, 1,382 ppm Nd, 188 ppm Dy and 32 ppm Tb (inferred) has been released for Foxtrot and Deep Fox. Other Mesoproterozoic granites having evolved or peralkaline affinities have also become exploration targets, and discoveries have been made (e.g., Pope's Hill, Ytterby and Michikamats).

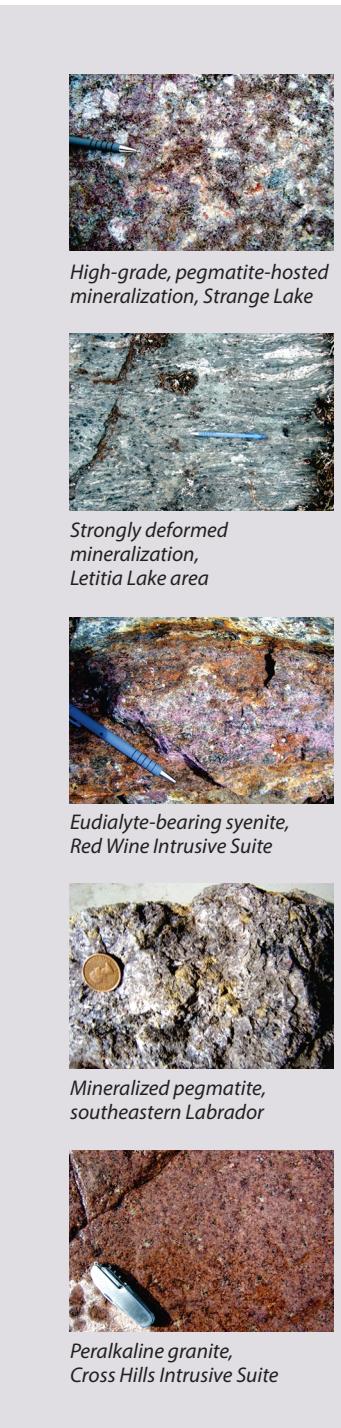
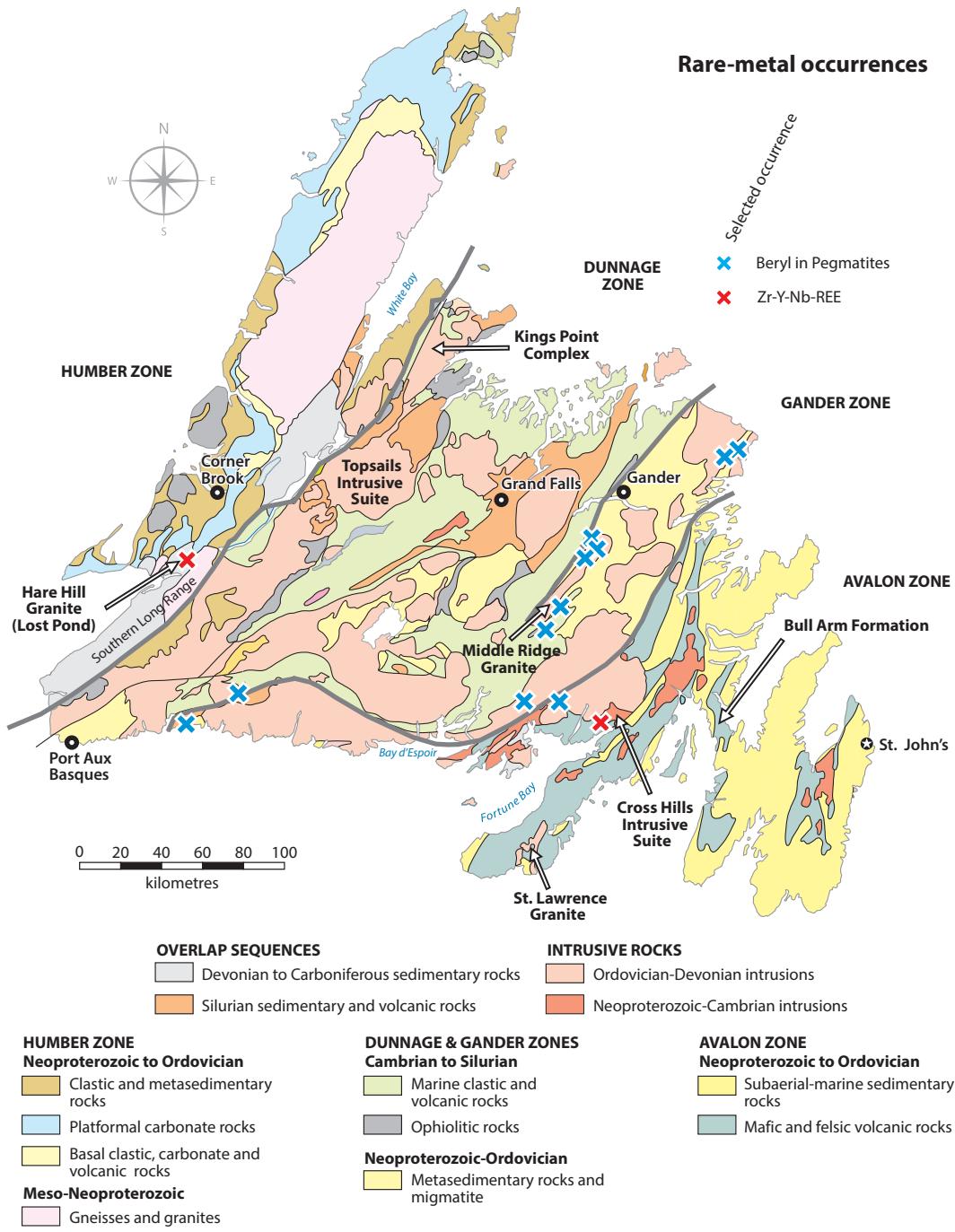


# IN NEWFOUNDLAND...

The best-known examples of rare-metal mineralization in Newfoundland are associated with late Neoproterozoic peralkaline igneous suites, believed to be linked with the rifting of the Iapetus Ocean during the Appalachian orogenic cycle. These include the Cross Hills Intrusive Suite in eastern Newfoundland, and the Hare Hill Granite in western Newfoundland. Both contain zones of surface Zr-Y-Nb-REE mineralization, and are now active exploration projects.



Peralkaline igneous suites of mid-Paleozoic age are also present, including the Topsails and Kings Point complexes (Silurian) and the St. Lawrence Granite (Devonian). These all include prospective rare-metal-enriched rocks, and are now the subjects of early stage exploration. Beryl-rich pegmatites, common in the Gander Zone, are also potential targets for exploration.



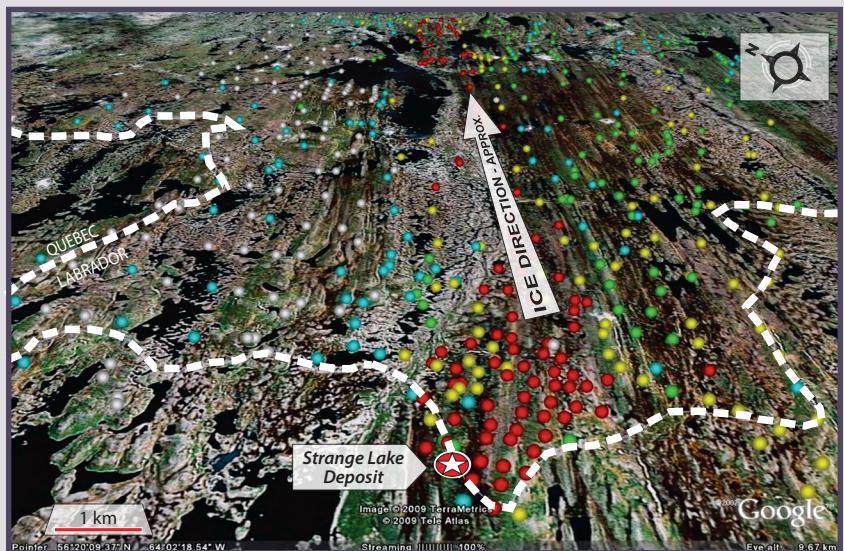
# EXPLORATION POTENTIAL

Presently, historic prospects are being evaluated for the first time in decades, new showings are being discovered, and entirely new targets identified.

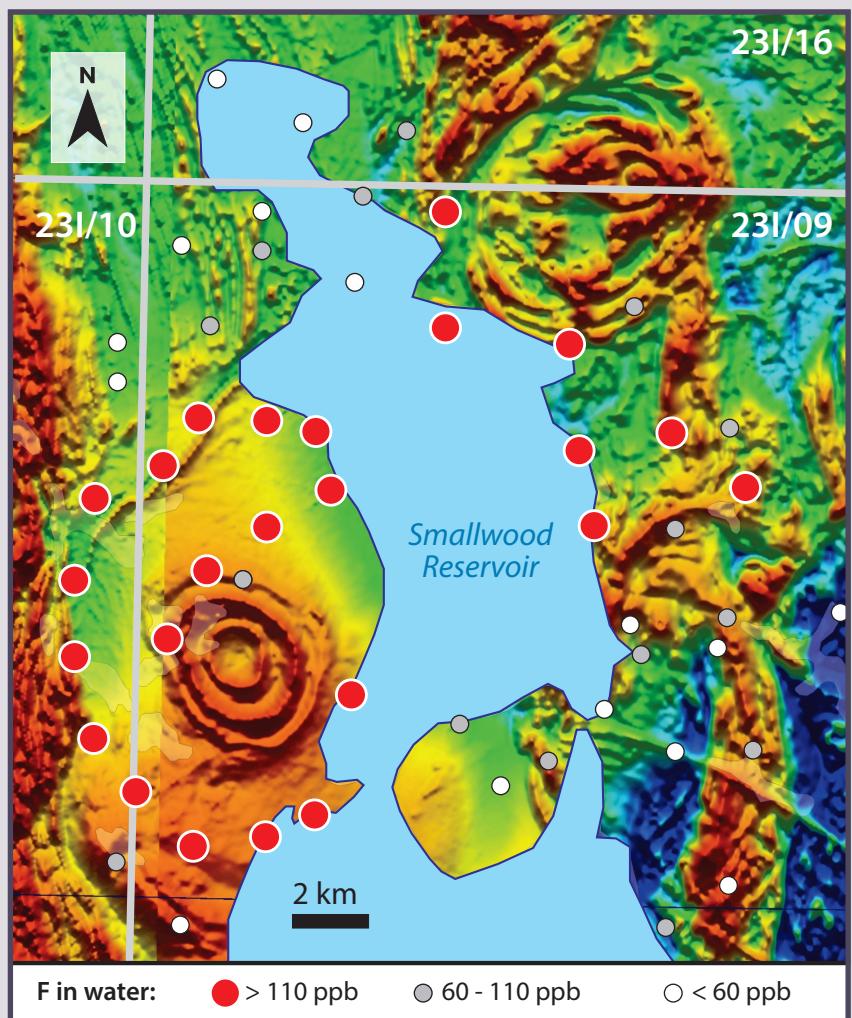
Mineralization occurs in distinctive geological settings identified during systematic bedrock mapping and through metallogenic and lithogeochemical studies. These prospective rock types are widespread and underexplored, indicating considerable geological potential for new discoveries. Prospective areas include the Flowers River Igneous Suite and associated volcanic rocks in Labrador, and the Topsails Intrusive Suite and the King's Point Complex in Newfoundland.

Well-developed surficial dispersion patterns from the Strange Lake Deposit imply that early stage exploration techniques (lake-sediment and till geochemistry) are effective exploration tools for deposits of this type. The association of rare metals with elevated radioactivity indicates that airborne radiometry is also effective in discovering such occurrences. In addition, high-resolution aeromagnetic surveys can be used to detect unexposed and poorly exposed ring complexes, characteristic hosts of rare metals. Comprehensive geochemical and geophysical databases are made available online by the Geological Survey of Newfoundland and Labrador.

The Geological Survey is releasing new geological maps and lithogeochemical data, and reassessing lake-sediment and till results for elements of interest. Existing dispersion patterns are being examined statistically to develop more sensitive multi-element indices for rare metals. Consideration is also being given to the use of indicator mineral surveys, akin to those used in regional diamond exploration.



The Strange Lake Deposit is revealed by a very well-defined geochemical dispersion trail. This 3D illustration shows the pattern for yttrium (Y). Similar patterns can be defined for other elements. Red – most enriched; white or blue – background levels.



Circular aeromagnetic anomalies in the Québec-Labrador border region may reveal previously unrecognized ring-complexes having rare-metal potential (GSC data). Red circles show fluoride in water above the 97.5 percentile.