

Lithium

Manitoba is home to world-class deposits and high mineral potential in extensive underexplored terrains.
Learn more at manitoba.ca/minerals



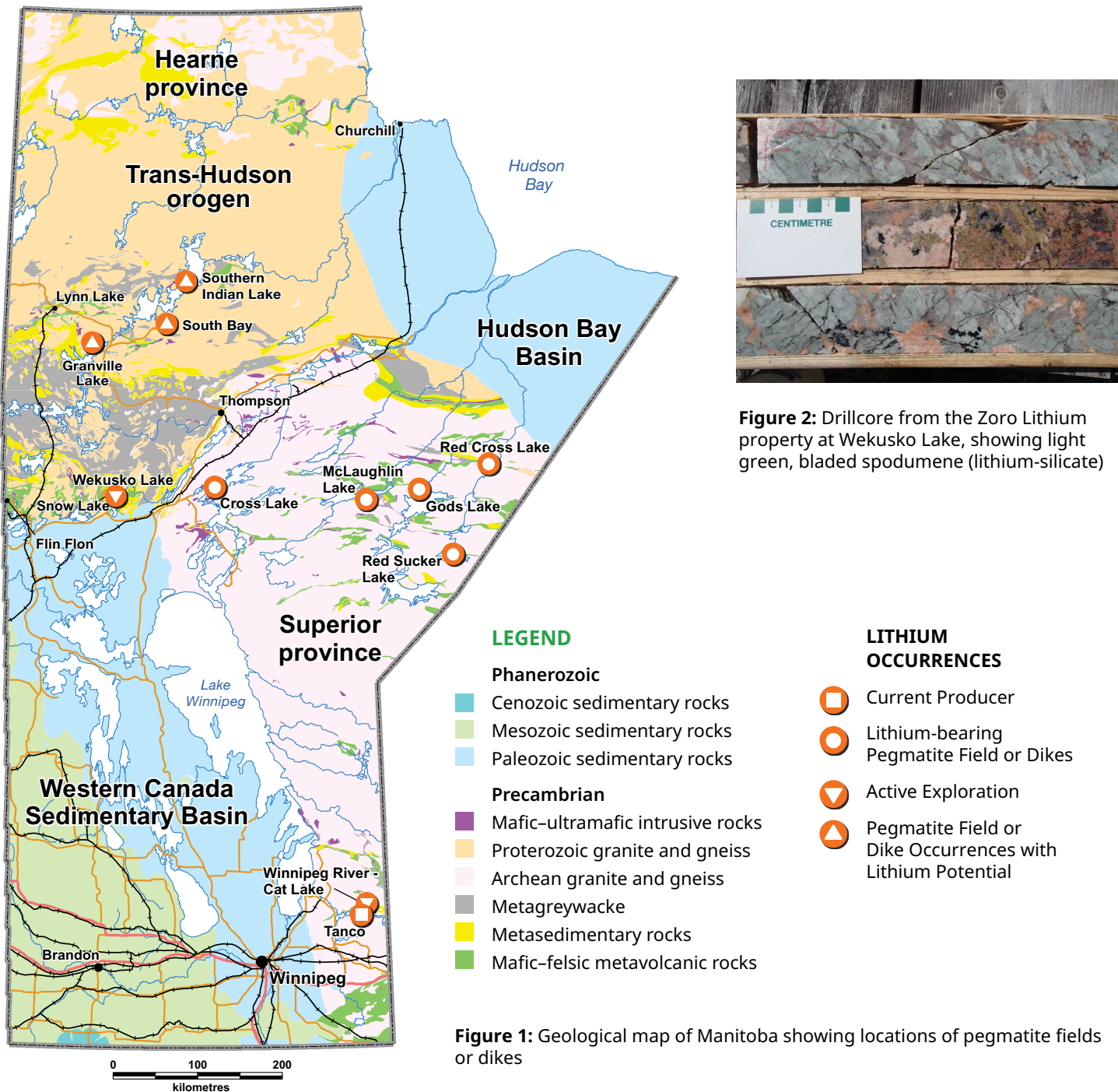
Lithium in Manitoba

LITHIUM, the lightest metallic element, has physical and chemical properties uniquely suited to a wide range of applications including pharmaceuticals, glass and ceramics, and aerospace technologies. More recently, the manufacture of lithium batteries for use in personal electronic devices and electric or electric-hybrid vehicles has brought about substantial increases in demand.

The major worldwide sources of lithium production are salt lake brines (e.g., Salar de Atacama, Chile) and granitic pegmatites (e.g., Tanco mine, Manitoba, Canada; Greenbushes mine, Australia). Manitoba's lithium production currently comes from spodumene, which is mined from the world-class Tanco pegmatite located in the Bird River greenstone belt of the Archean Superior province.

This new production comes online after a long hiatus and is in direct response to growing demand in the electric vehicle market.

The **MANITOBA GEOLOGICAL SURVEY** is committed to improving the understanding of lithium resources in the province. Magmatic deposits (pegmatite) in the Archean Superior province and Paleoproterozoic Trans-Hudson orogen are currently being evaluated as sources of lithium. The Williston Basin overlies the Precambrian basement in southwestern Manitoba and contains several stacked saline aquifers, as well as thick evaporite deposits, that may host lithium brines or salts but have yet to be systematically evaluated for their potential.



Lithium-bearing Pegmatite in Manitoba

Granitic pegmatite contains the largest known resources of lithium in Manitoba. The most prolific region is the Winnipeg River-Cat Lake pegmatite field, which hosts the world-class Tanco lithium-cesium-tantalum deposit, along with numerous other pegmatites that collectively define this large field. Another prolific region is the Wekusko Lake pegmatite field, located just east of the town of Snow Lake (Figure 1). The main lithium-bearing minerals associated with this type of deposit are spodumene (Figures 2, 3 and 4), petalite and lepidolite.



Figure 3: Very coarse spodumene from the Wekusko Lake pegmatite field



Figure 4: Lithium mineralization (spodumene + quartz association) from the Tanco pegmatite

Lithium-bearing Brines in Manitoba

The Phanerozoic Williston Basin in southwestern Manitoba has a complex groundwater system with multiple aquifers and a wide range of salinities. Manitoba and Saskatchewan share the same system of regional aquifers characterized by an eastward and upward flow of deep saline groundwater. Comprehensive data from eastern Saskatchewan show economic lithium concentrations in some of these aquifers, therefore similar potential may exist in Manitoba.

A hydrologic divide separates fresh and saline groundwater in southwestern Manitoba, where brines occur in the deeper aquifers west of the divide (Figure 5). Manitoba has a number of brine sources:

- **Oilfield brines (petrobrines):** wastewater brines produced from oil and gas operations
- **Deep saline brines:** untapped brines in formational aquifers
- **Brine springs:** saline brines upwelling at surface (e.g., west of Lake Winnipegosis)
- **Salt solution:** brines derived from salt solution operations in the Prairie Evaporite

Current exploration in the west indicates good potential for lithium brines in deep aquifers within Devonian-aged formations, particularly the Duperow Formation.

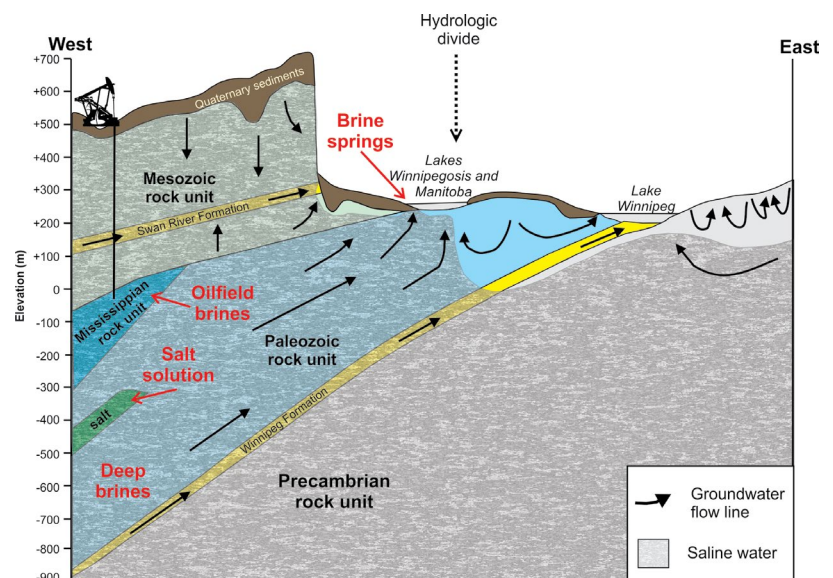


Figure 5: West to east cross-section through southern Manitoba showing generalized groundwater salinity distribution and flow in Phanerozoic rock units

Selected Occurrences of Li-bearing Pegmatites in Manitoba

Deposit/occurrence	Ownership	Hostrock	Main commodity	Mineralogy	Resource* or significant results
Paleoproterozoic Trans-Hudson orogen (Wekusko Lake pegmatite field)					
Zoro Lithium property	Foremost Lithium	Pegmatite	Li, Ta	Spd, CGM, Grt, Tur, Brl, Ap	1.1 Mt @ 0.91% Li ₂ O (inferred)
Thompson Brothers Lithium Project	Snow Lake Lithium Ltd.	Pegmatite	Li	Spd, Brl, Ap	9.1 Mt @ 1.00% Li ₂ O (indicated)
Archean Superior province (Cat Lake–Winnipeg River pegmatite field)					
Lithium One project (Silver Leaf)	New Age Metals Inc.	Pegmatite	Li, Be, Nb, Ta	Spd, Brl, Cst, Mic, Ap, Mnz	199 t Spd, 109 t Lpd (past-production)
Tanco	Tantalum Mining Corporation of Canada Ltd.	Pegmatite	Li, Rb, Cs, Be, Ta	Spd, Pet, Lpd, Tur, Brl, Pol, CGM, Ap	~1000 t Pol ore; ~130 000 t Spd ore (2022 production)
Irgon	QMC Quantum Minerals Corp.	Pegmatite	Li	Spd, Grt, Tur, Ap, CGM	1.1 Mt @ 1.51% Li ₂ O
Lithium Two project (Eagle)	New Age Metals Inc.	Pegmatite	Li	Spd, Tur, Brl, CGM	0.5 Mt Spd @ 1.4% Li ₂ O
Archean Superior province (Oxford–Stull domain)					
Red Cross Lake	W.C. Hood	Pegmatite	Li, Cs, Rb	Lpd, Amb, Brl, Pol, CGM	Up to 2.86% Cs, 1.29% Rb, 1.26% Li
Gods Lake (Godslith)	Vision Lithium Inc.	Pegmatite	Li	Spd, Lpd, Ap, Brl	4.4 Mt @ 1.27% Li ₂ O

* Resources are historical and pre-date NI 43-101; users should verify critical information

ABBREVIATIONS: Mt, million tonnes; t, tonnes

MINERAL ABBREVIATIONS: Amb, amblygonite; Ap, apatite; Brl, beryl; CGM, columbite group minerals; Cst, cassiterite; Grt, garnet; Li-Ms, lithian muscovite; Lpd, lepidolite; Lph, lithiophilite; Mic, microlite; Mnz, monazite; Pet, petalite; Pol, pollucite; Spd, spodumene; Tlp, triphylite; Tur, tourmaline

Mining, Oil and Gas Industry Overview

- \$3.4 billion in estimated value of production, a 45% increase since 2021
- \$1.7 billion in real value added, accounting for approximately 2.6 per cent of the province's real GDP and 4.3 per cent of all domestic merchandise exports
- Direct employment of approximately 3480 people, with an additional 2035 individuals employed by sector support activities
- 2023 estimated mineral exploration and deposit appraisal spending intentions at \$163.8 million
- 225 new wells drilled in 2022

Source: Natural Resources Canada



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manitoba.ca/minerals

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