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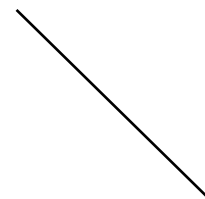
Report 261

The Geology and PGE Potential of the Peter Lake Domain, Saskatchewan

R.O. Maxeiner, J.E. Campbell, N. Rayner,
W.L. Slimmon, K. Ford, D. Corrigan, L. Heaman,
and L. Hulbert

2011

ALL FIGURES



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Figure A-01

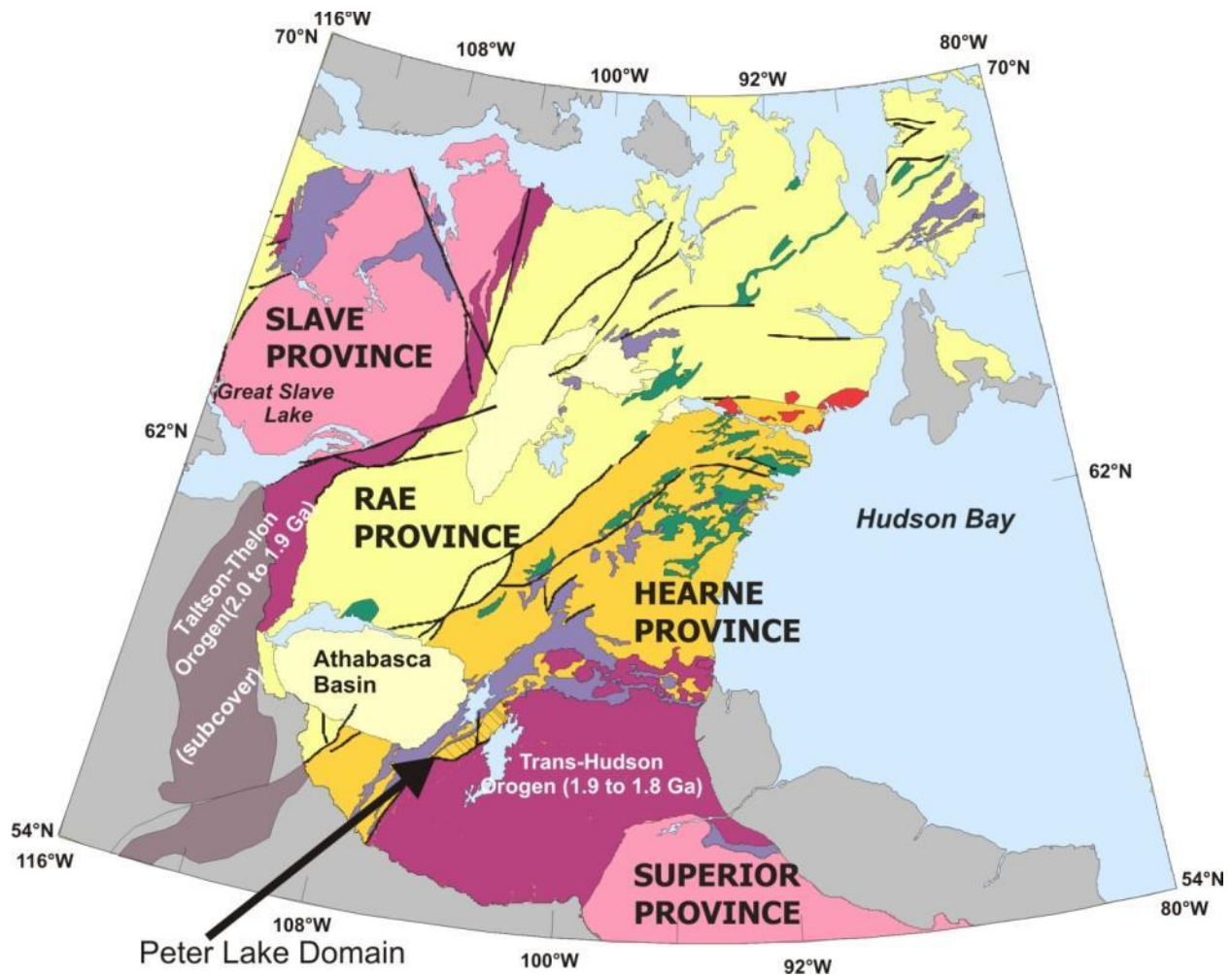


Figure A-01 – Geological provinces, lithotectonic domains, and major tectonic elements of the Precambrian Shield of north-central Canada.



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Figure D-02

Lewry <i>et al.</i> (1981) Ray and Wanless (1980)	Stauffer <i>et al.</i> (1981)	MacDougall (1988a)	Corrigan (2001)
<div>Wathaman Batholith (1.86 Ga)</div> <div>Campbell River Group</div>	<div>Wathaman Batholith</div> <div>(not in map area)</div>	<div>Wathaman Batholith</div> <div>(not in map area)</div>	<div>Wathaman Batholith (1.86 Ga)</div> <div>(not in map area)</div>
<div>Peter Lake Complex <div>younger syenogranitic to monzonitic suite (2.58 to 2.54 Ga)</div> <div>older dioritic to gabbroic suite</div> </div>	<div>Patterson Island diorite</div> <div>Swan River gabbroic rocks</div> <div>Lueaza River granitoids</div>	<div>Patterson Island diorite</div> <div>Swan River gabbroic rocks</div>	<div>Swan River Complex <div>Patterson Island syenite-monzonite</div> <div>Layered intermediate to ultramafic rocks (2.562 Ga)</div> </div>
<div>Parker Lake gneisses</div>	<div>Zengle Lake gneisses</div>	<div>(not in map area)</div>	<div>Complex <div>Felsic granitoids [2.64 to 2.61 Ga (Rayner <i>et al.</i>, 2005b)]</div> <div>Granitic to granodioritic orthogneiss</div> </div>
			<div>Peter Lake <div>Mafic metavolcanic rocks</div> </div>

Figure D-02 – Previous subdivisions of the Peter Lake Domain.



Figure D-03

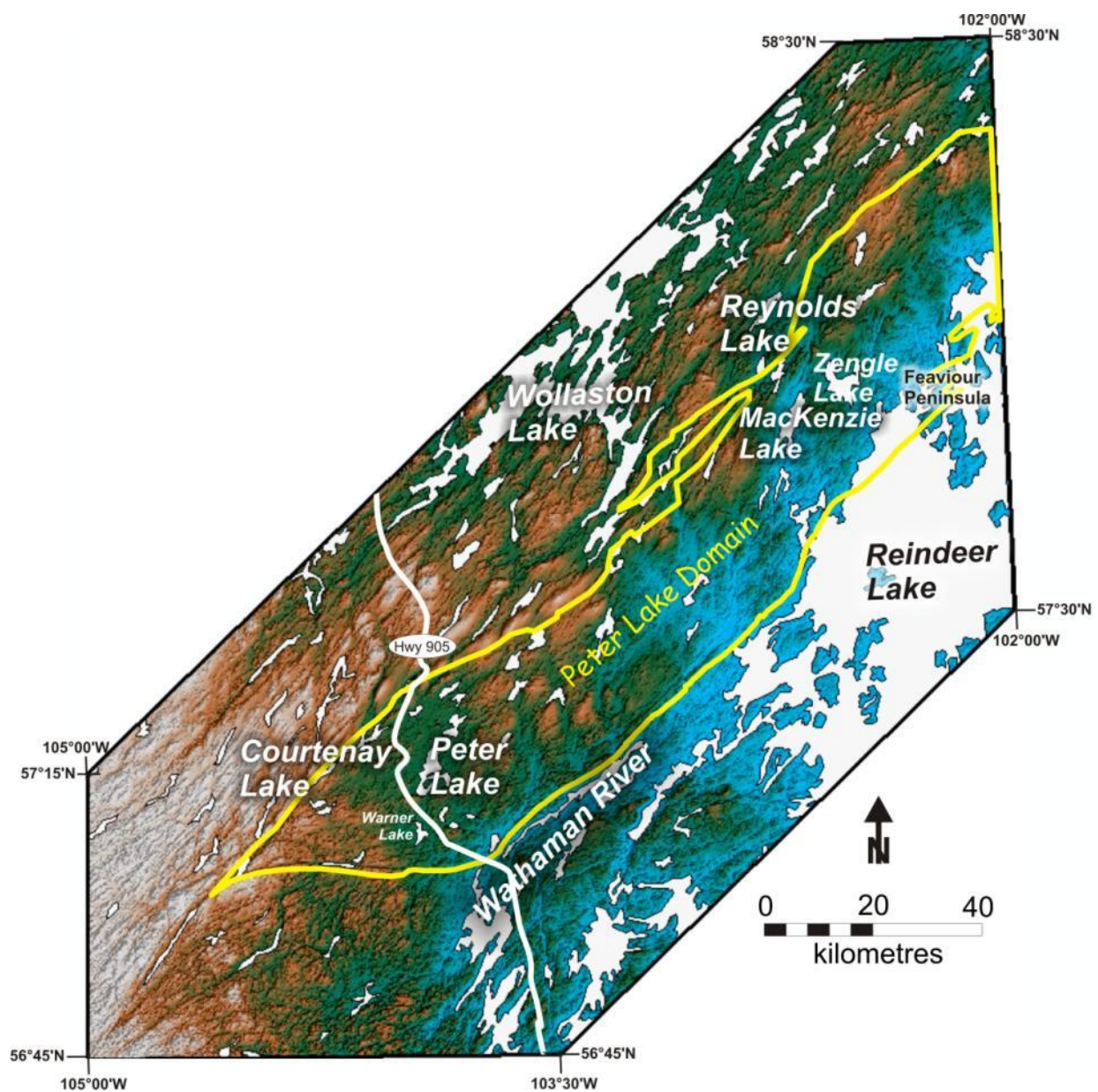


Figure D-03 – Digital elevation model of the Peter Lake Domain area.



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Figure: D-04

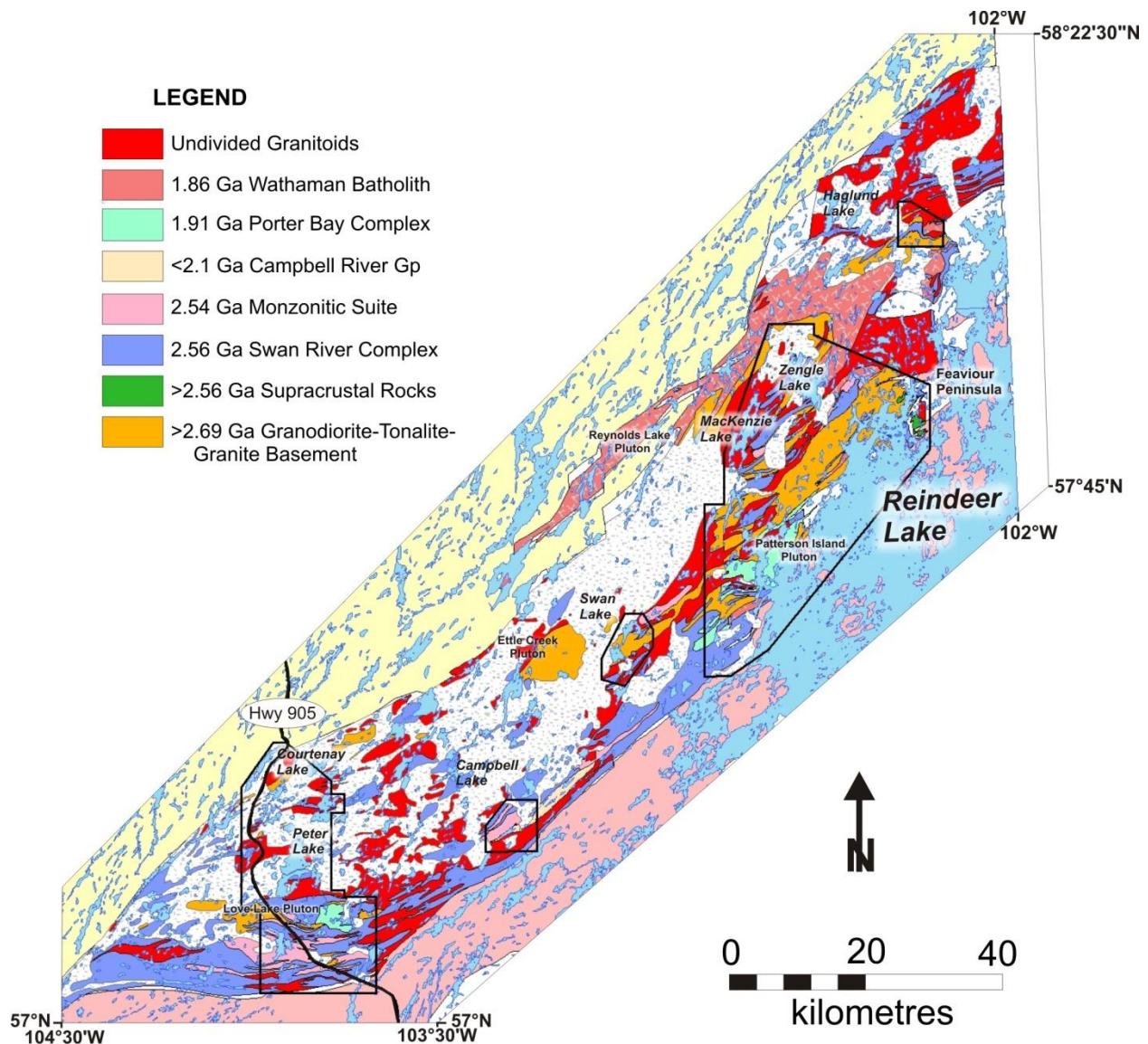


Figure D-04 – Compilation of the bedrock geology for the Peter Lake Domain area (1:1 000 000 scale) showing areas of Quaternary drift. Areas mapped in detail between 2002 and 2005 are outlined in black.



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Figure: D-05

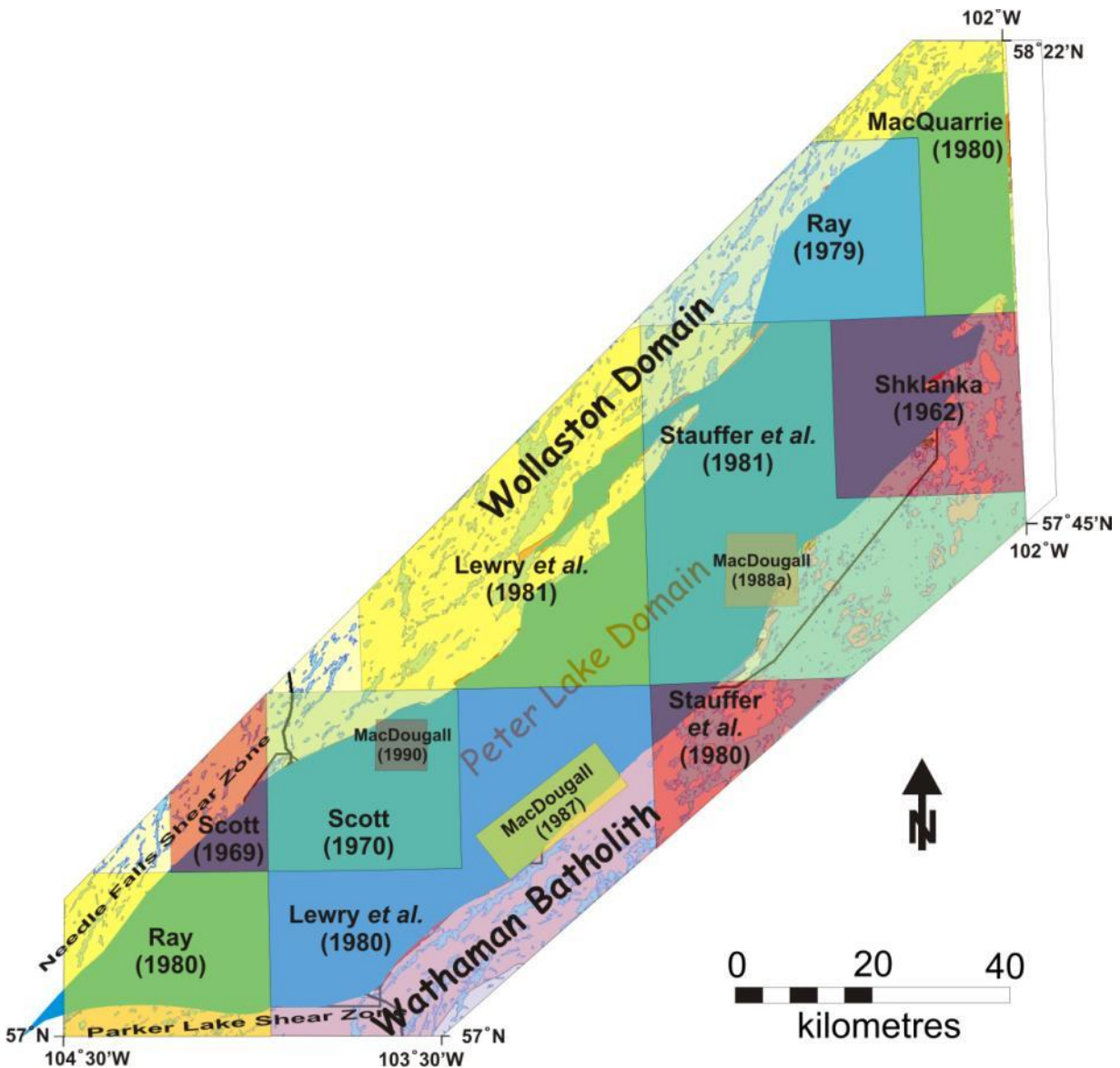


Figure D-05 – Location of previous bedrock maps and reports of the Peter Lake Domain.



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Figure: D-06

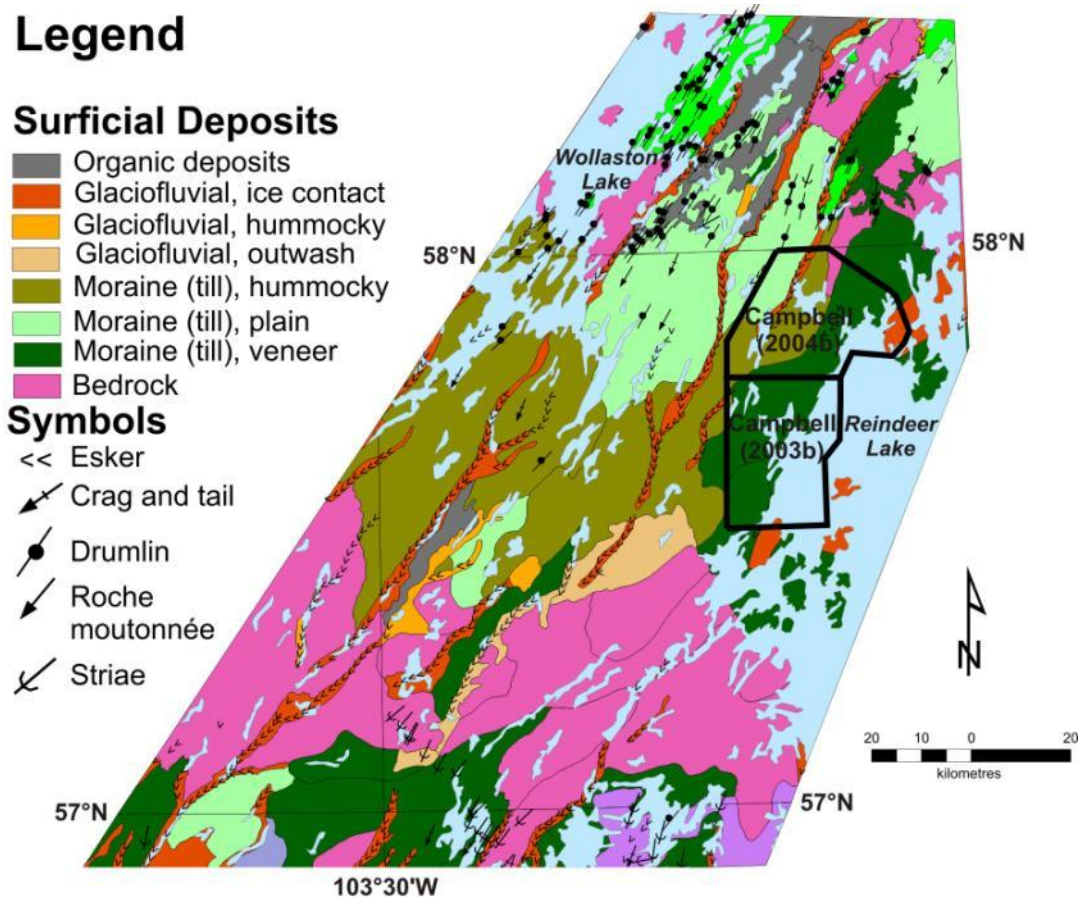


Figure D-06 – Surficial geology of the Peter Lake Domain area at a scale of 1:1 000 000 (Schreiner, 1984c). Areas mapped in detail between 2003 and 2004 are outlined in black.



Figure: D-07

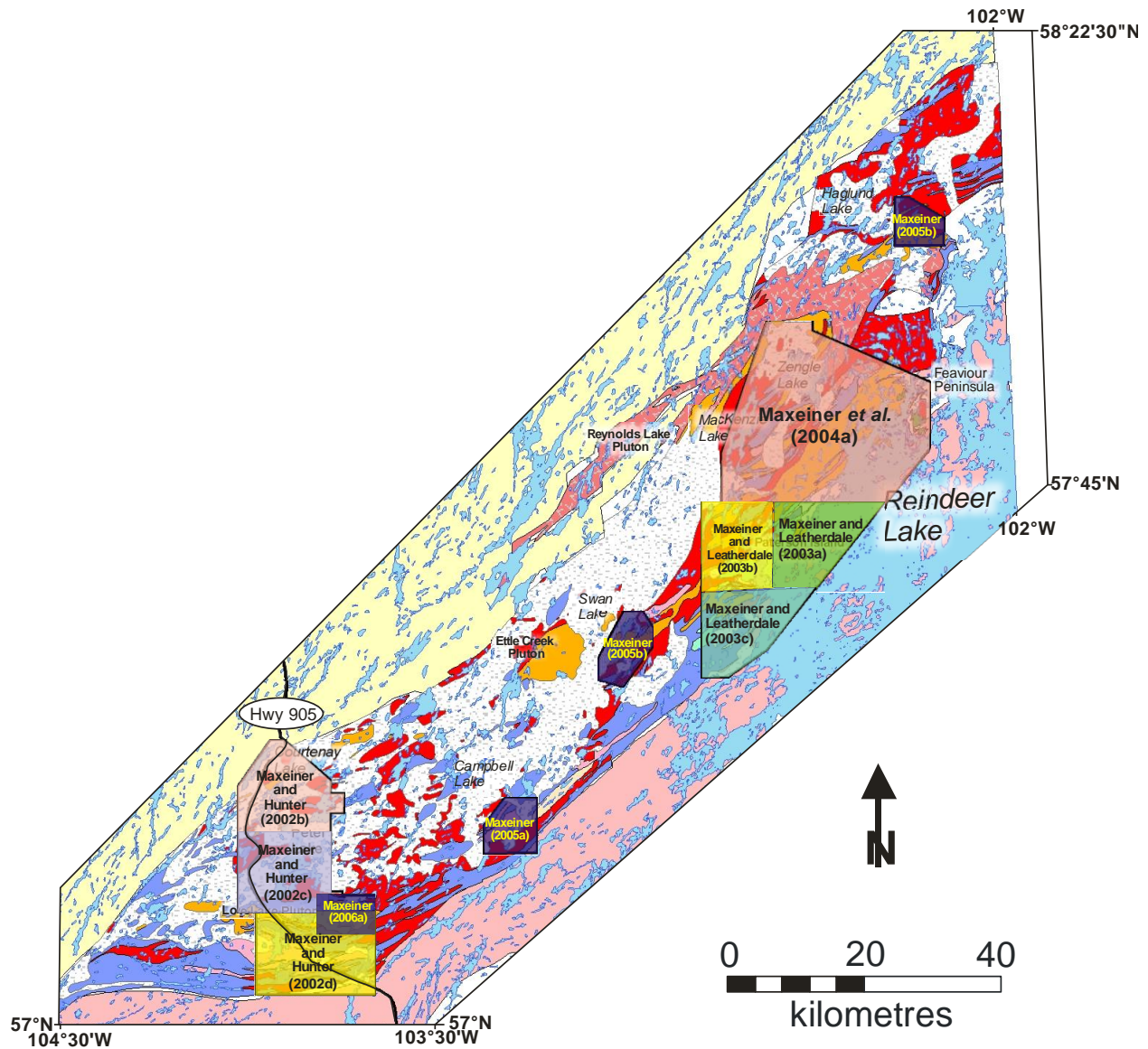


Figure D-07 – Location of bedrock geology maps by the Saskatchewan Geological Survey (2002 to 2006), Peter Lake Domain.



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Figure: D-08

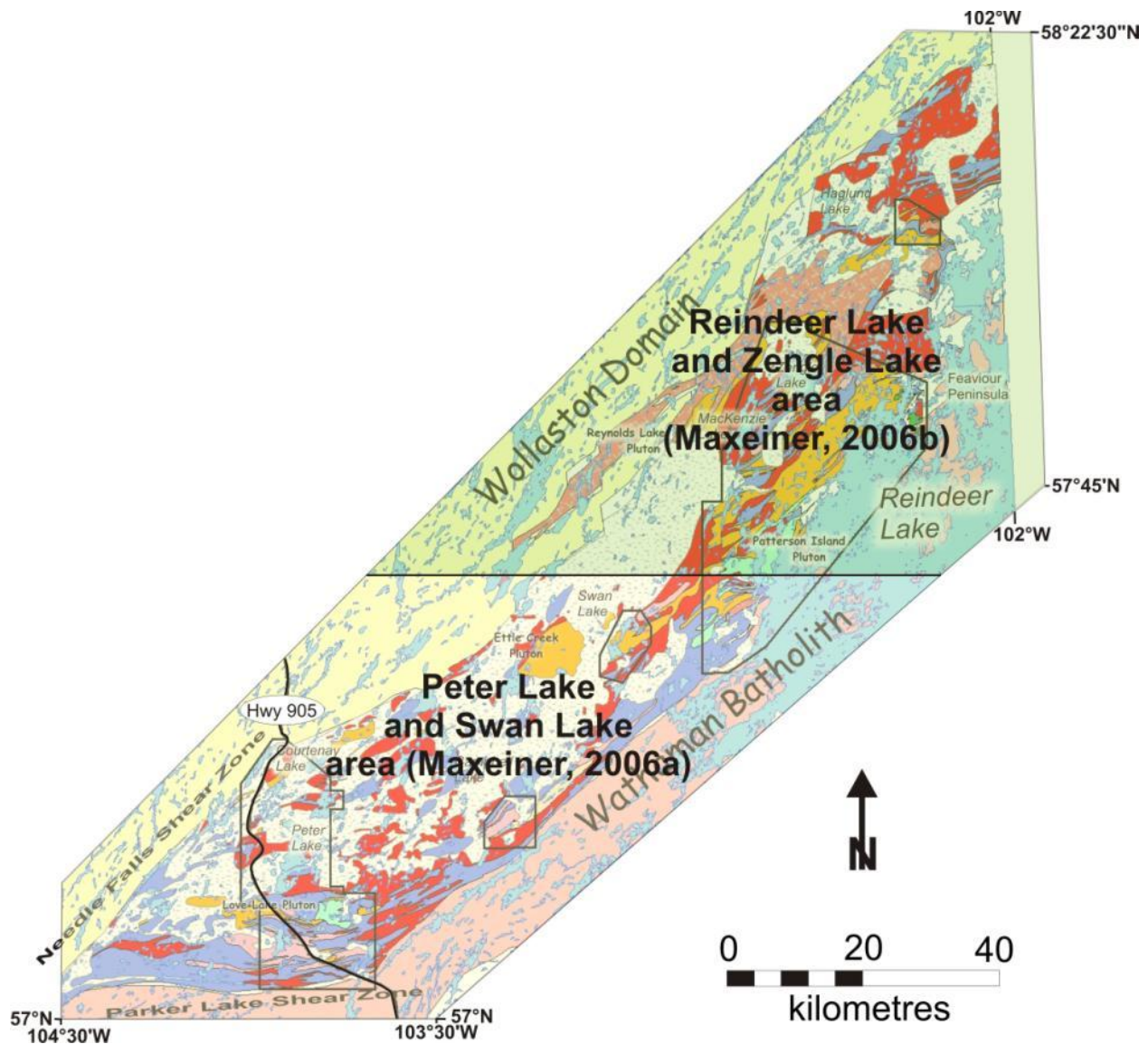


Figure D-08 – Outline of the bedrock geology compilations (1:100 000 scale) of the Peter Lake Domain.



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Figure: E-01

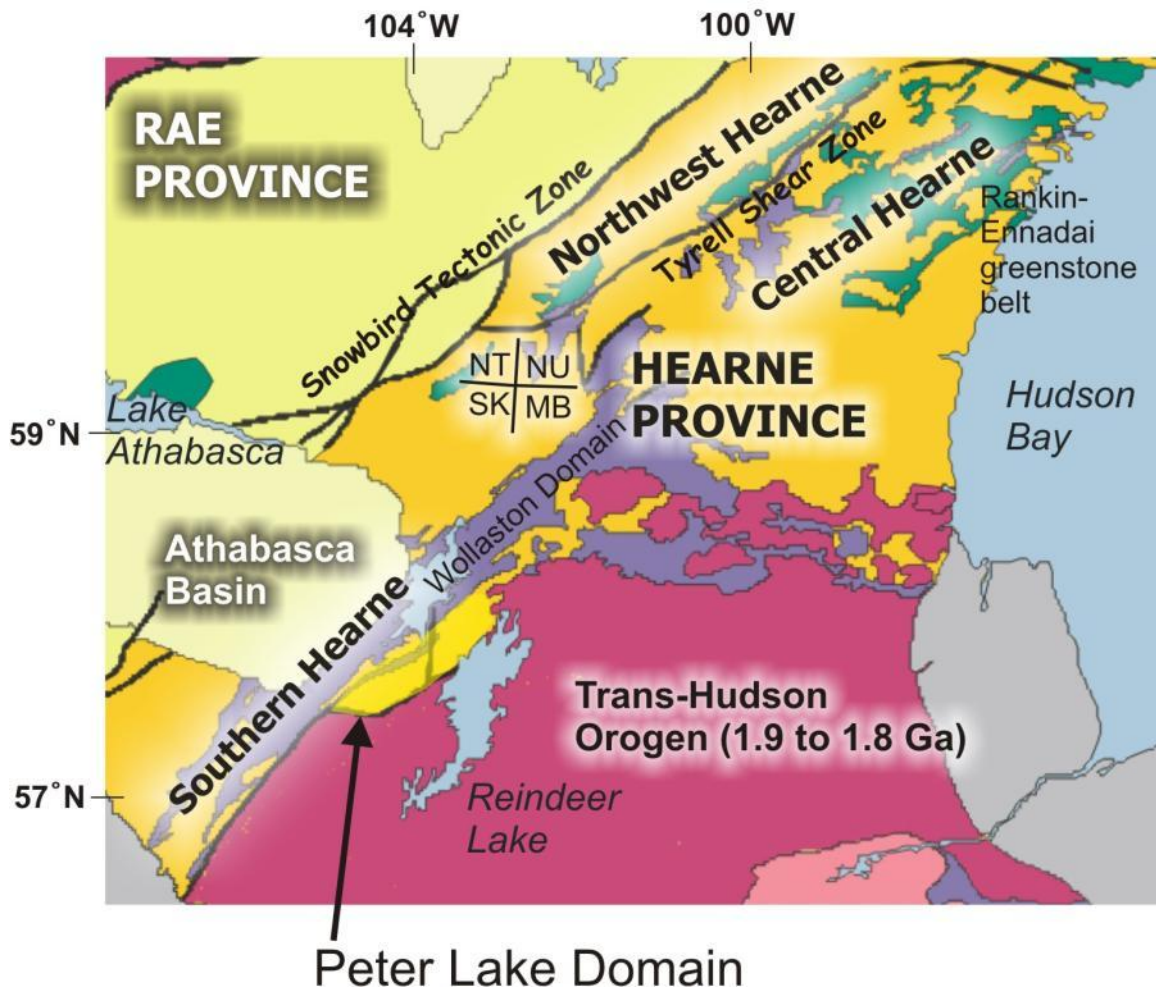


Figure E-01 – Major geological subdivisions and domains of northeastern Saskatchewan and the surrounding area.



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Figure: E-02

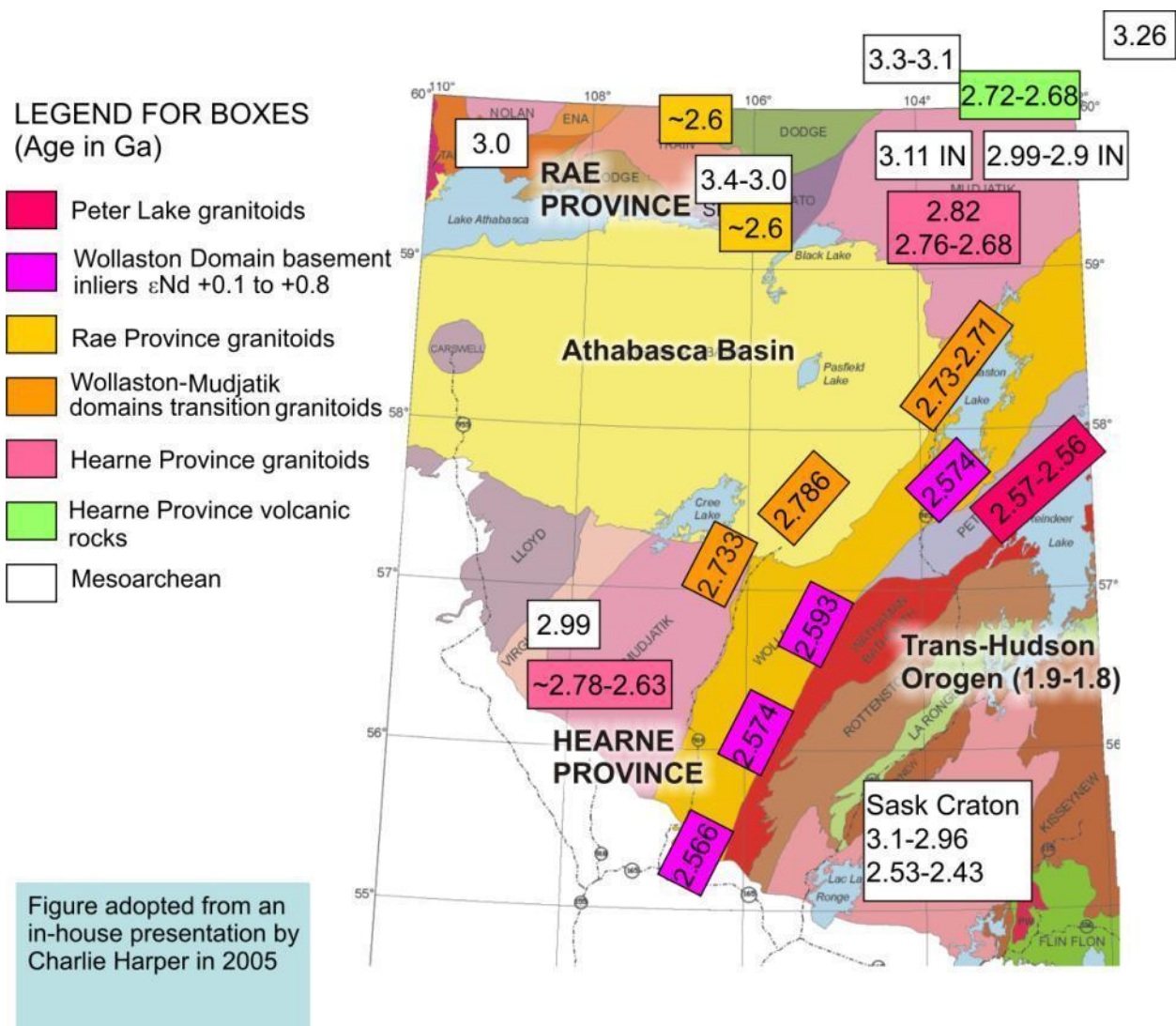


Figure E-02 – Archean ages in the Hearne Province and adjacent areas (C. Harper, pers. comm., 2005).



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Figure: E-03

Lithology	Wollaston Supergroup			Tectonic setting	Previous regional syntheses					
	Western Wollaston Domain (Yeo and Delaney, 2007)	Northeastern Wollaston Domain (Coombe, 1994)	Southeastern Wollaston Domain (Delaney, 1993)		Money et al. (1970)	Scott (1970)	Ray (1979)	Lewry & Sibbald (1980)	Thomas (1983)	Coombe (1994)
Calc-silicate rocks & marble	'Geikie River Group'	Hidden Bay Assemblage		Late foreland basin	Daly Lake Group	Daly Lake Group	Wollaston Group	Hidden Bay Assemblage	Quartzite - Amphib. Assemblage	Hidden Bay Assemblage
Calc-silicate bearing arkose		'Fraser Lakes Formation'	Causier Creek Formation							
Arkose, congl., wacke, & calc-silicate breccia		Rafuse Lake Formation								
Conglomerate & arkose		Janice Lake Fm. (< 1880 Ma, SH, zircon)	Unit A1							
Arkose & quartzite	Daly Lake Group	'Burbidge Lake Fm.' (< 1880 Ma, SH, zircon)		Early foreland basin	Daly Lake Group	Daly Lake Group	Wollaston Group	Upper Arkosic unit	Meta-Arkose Assemblage	Psammite unit
Arkose & psammopelite		'Roper Bay Formation'	Unit MS1/MS2							
Psammopelite & pelite		'Thomson Bay Formation'	Unit BS1/BS2							
Crd-Sil psammopelite & pelite		'Bole Bay Formation'								
Gar-Gph-Crd-Sil pelite & psammopelite +/- quartzite +/- marble +/- iron-formation		'Karin Lake Formation' (< 1880 Ma, SH, zircon)								
		'Compulsion River Group'	Spence Lake Formation	Passive margin	Meyers Lake Group	Souter Lake Group	Needle Falls Group	Lower Pelitic unit	Pelitic Assemblage	Pelitic unit
			George Lake Formation							
			Souter Lake Fm. (< 2367 Ma, SH, zircon)							
			Unit QC/Q1 (< 2533 Ma, SH, zircon)	Rift	Sandfly Lake Group	Courtenay Lake Group		Quartzite unit	Quartzite facies	Quartzite unit
			Courtenay Lake Group (2075 ± 2 Ma, H-Eu, zircon)							
								Lower Arkosic unit	Basal Assemblage	Needle Falls Group

Figure E-03 – Stratigraphic relationships within the Wollaston Supergroup (after Yeo and Delaney, 2007). Dark lines indicate inferred unconformities. All radiometric ages are for detrital zircons, except for basement ages and the Courtenay Lake porphyry, which are sensitive high-resolution ion microprobe (SHRIMP) ages. Abbreviations: Amphib., Amphibolite; Assembl.,



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Figure: E-04

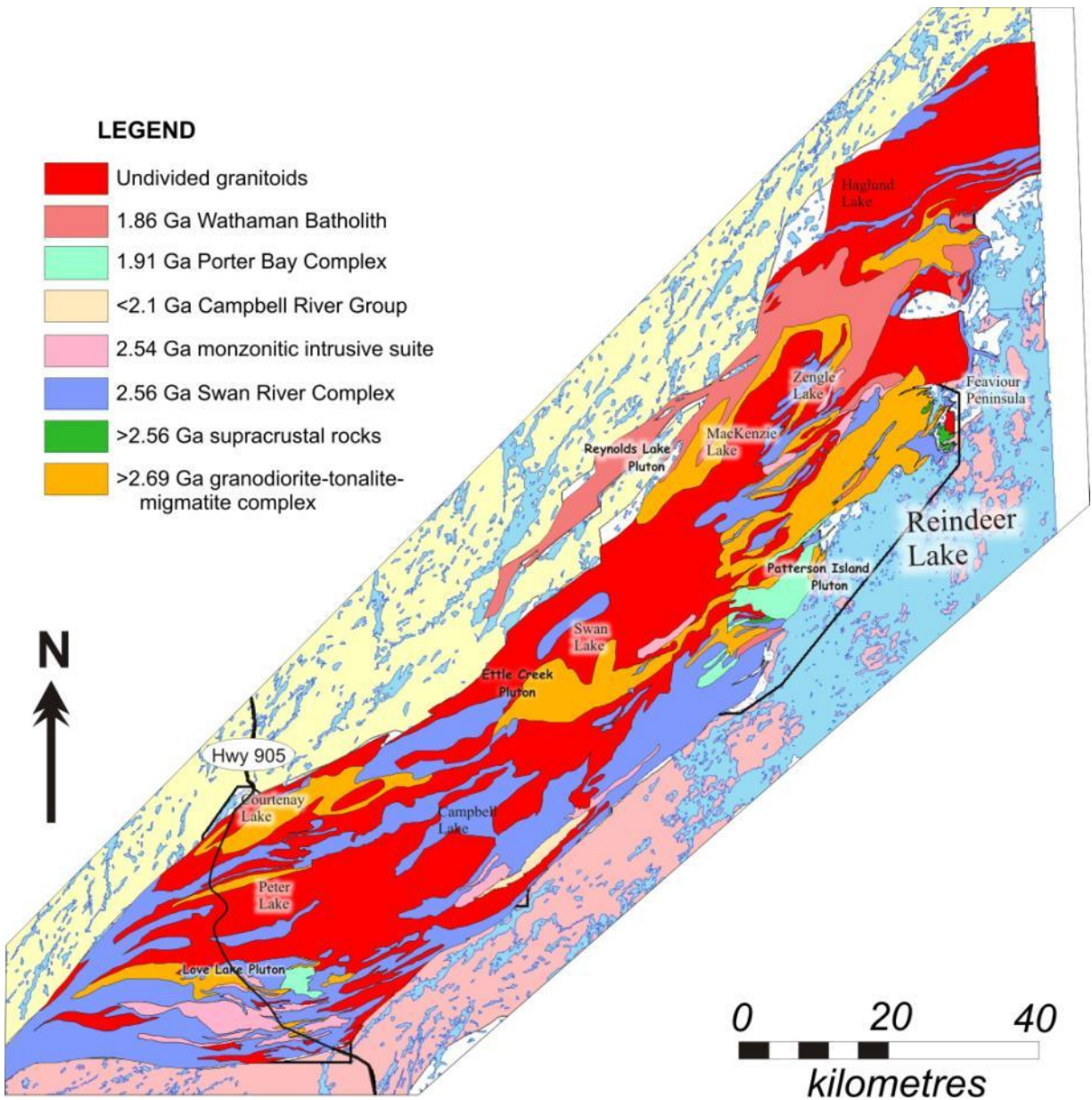


Figure E-04 – Bedrock geology of the Peter Lake Domain at a scale of 1:1 000 000.



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Figure: E-05

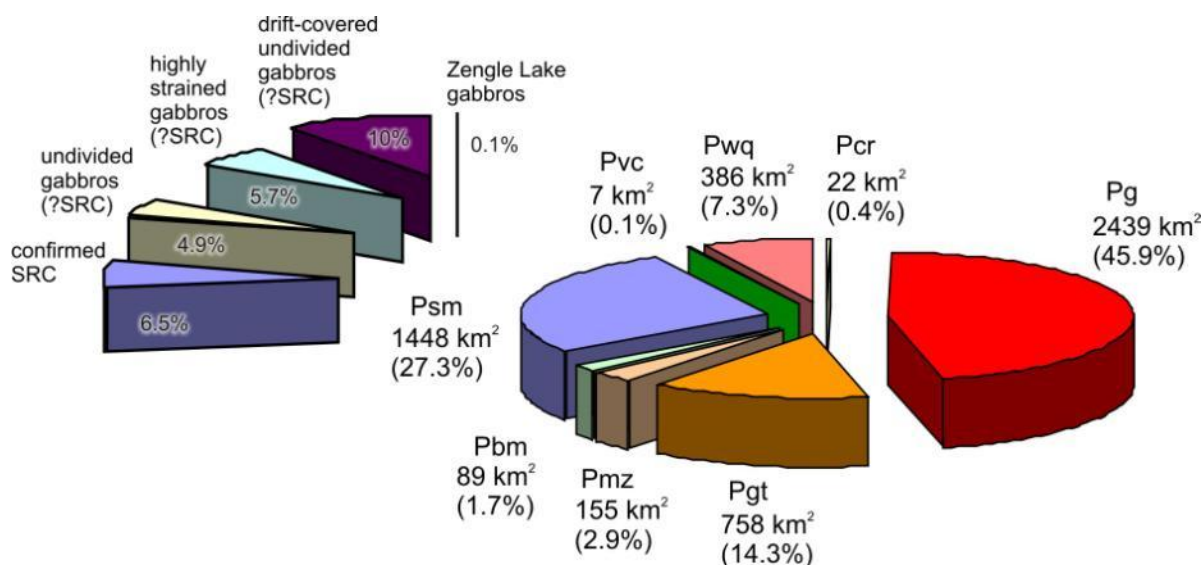


Figure E-05 – Relative proportions of the main subdivisions of the Peter Lake Domain at a 1:1 000 000 scale. Also included is a further subdivision of the Swan River Complex.

Abbreviations: Pbm, Porter Bay Complex; Pcr, Campbell River Group; Pg, undivided granitoids; Pgt, granodiorite-tonalite migmatite complex and Lueaza River granitoid suite; Pmz, monzonitic intrusive suite; Psm, Swan River Complex; Pvc, Archean supracrustal rocks; Pwq, Wathaman Batholith; and SRC, Swan River Complex.



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Figure: E-06

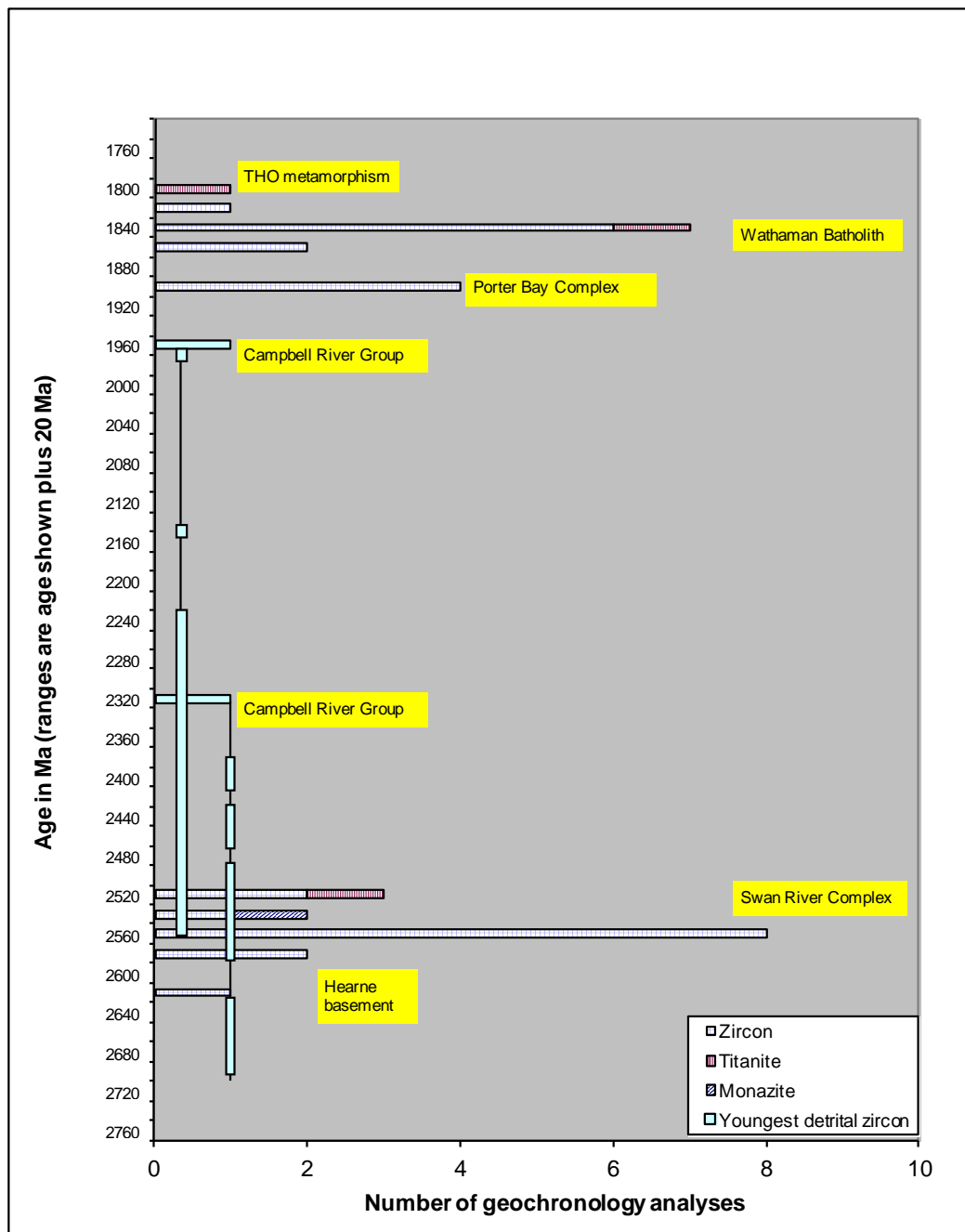


Figure E-06 – Age distribution of analyzed samples in the Peter Lake Domain.



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Figure: E-07

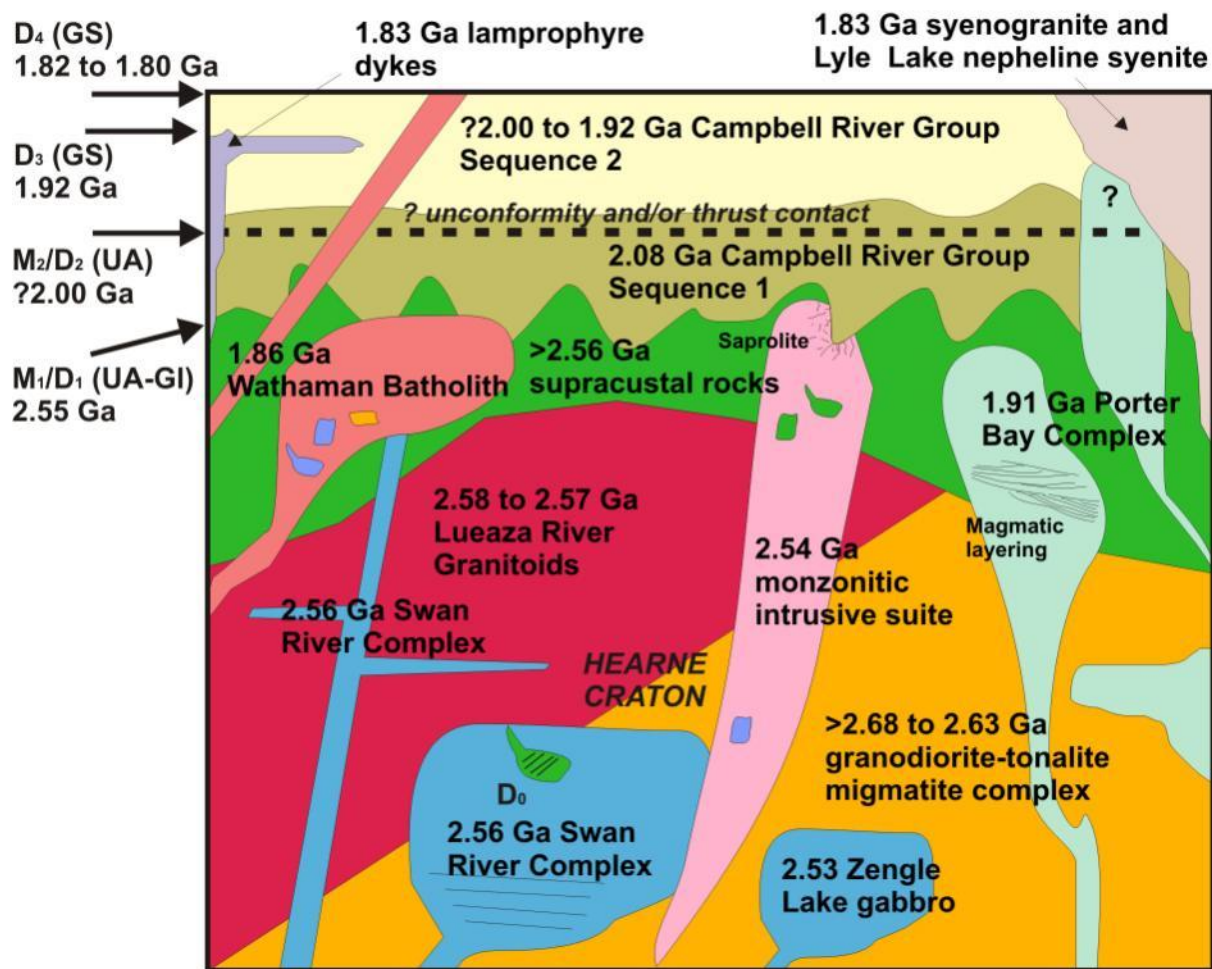


Figure E-07-PLD_New_Composite_Section-lowres – Composite section for the main subdivisions of the Peter Lake Domain.



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Figure: E-08

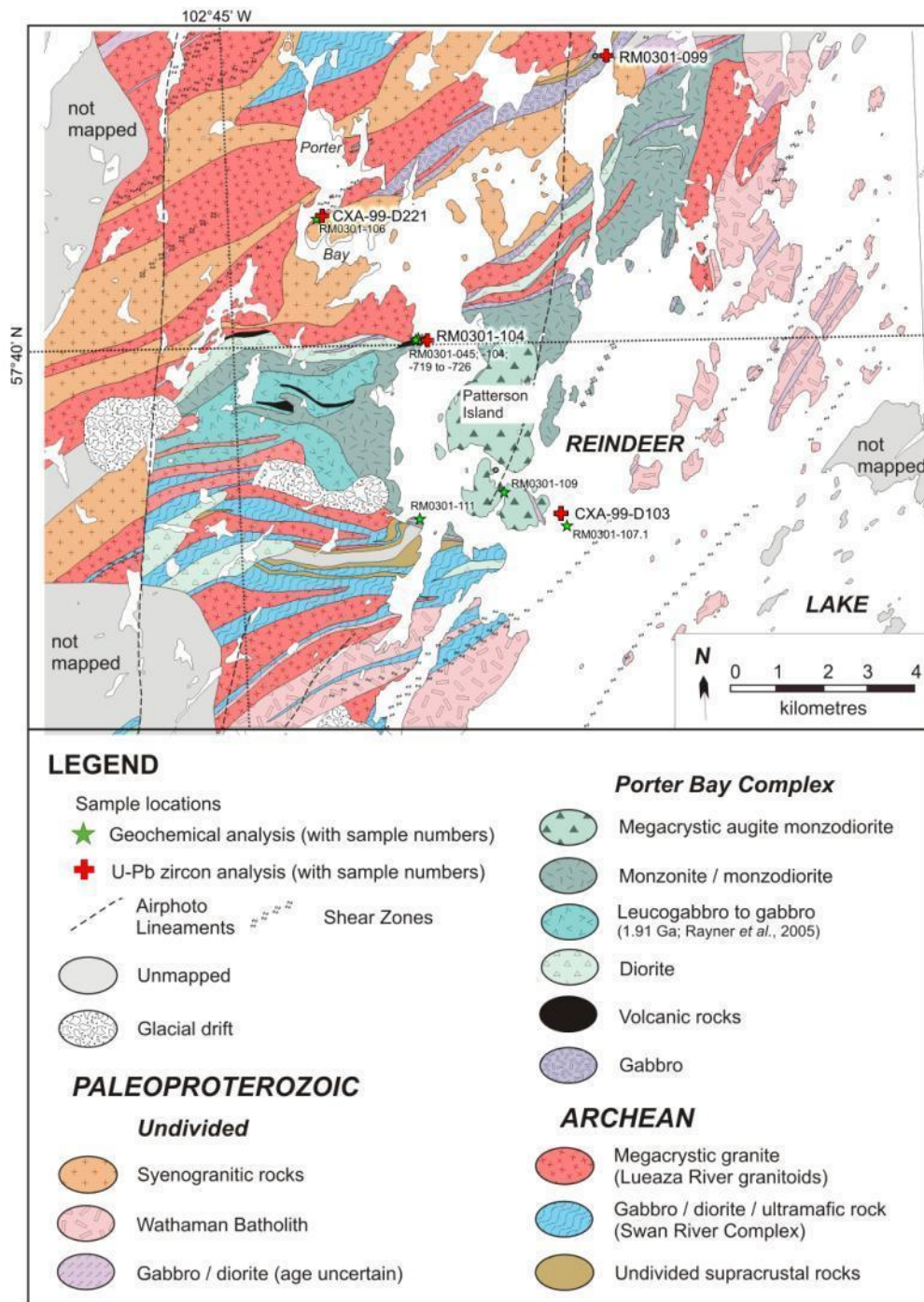


Figure E-08-Simp Geology PattersonIsland-lowres – Simplified geology of the Patterson Island area.



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Figure: E-09

Age (Ma)	Episode	Structure Developed	Metamorphism	Magmatism/ Sedimentation	Tectonic Context
1820-1805	D4	Open to close folds having west-northwest-dipping axial planes and north- to northeast-plunging fold axes	Retrograde	Granitic pegmatite and leucogranite	Collapse of Manikewan Ocean and terminal collision of Heame SASK and Superior cratons
1865-1855	?	?	?	Felsic and minor intermediate plutons	Continental-arc magmatism (Wathaman Batholith)
1917-1913	M3-D3	Tight east- to northeast-trending folds with axial-planar biotite, muscovite; fracture cleavage in Campbell River Group; internal fabric and folds within autoliths of 1.92 Ga Porter Bay Complex	Middle greenschist to lower amphibolite facies; recognized in Sequence 2 of the Campbell River Group	Intermediate to mafic plutons and minor volcanic rocks post-dating deposition of Sequence 2 of Campbell River Group	Continental-arc magmatism (Porter Bay Complex), marginal basin development (Sequence 2 of Campbell River Group), ?arc accretion
?age (?2000) <2075; >1917	M2-D2	Tight to isoclinal outcrop-scale folding of gneissosity and other planar tectonic fabrics; map-scale northwest-dipping and plunging tight to isoclinal fold	Upper amphibolite facies; affecting Sequence 1 of the Campbell River Group and underlying saprolitic granitoids, but not the 1.92 Ga Porter Bay Complex	?	?Arc accretion; shortening and tectonic thickening
2075	?	?	None	Bimodal volcanism; rift and passive margin sedimentation (Sequence 1 of Campbell River Group)	Rifting
?2549	M1-D1	Gneissic fabric in granodiorite complex; <i>lit-par-lit</i> leucosome; rootless isoclinal folds; northwest-trending fabric in Swan Lake Gabbro may indicate northeast-southwest shortening?	Regional peak metamorphism (upper amphibolite to granulite)	2.54 Ga monzonite-quartz monzonite	Regional collisional shortening and thickening or widespread contact metamorphism, induced by Swan River Complex magnetism
2562	?	?	?	Swan River Complex mafic plutons	?Rifting
>2562	D0	Layer-parallel schistosity in xenoliths contained within later 2.56 Ga Swan Lake Complex	?	Mafic and minor felsic volcanism; deposition of muddy sediments and banded iron formations	?

Figure E-09-Deformation-Metamorphism-PLD – Deformation and metamorphism in the Peter Lake Domain.



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Figure: F-01

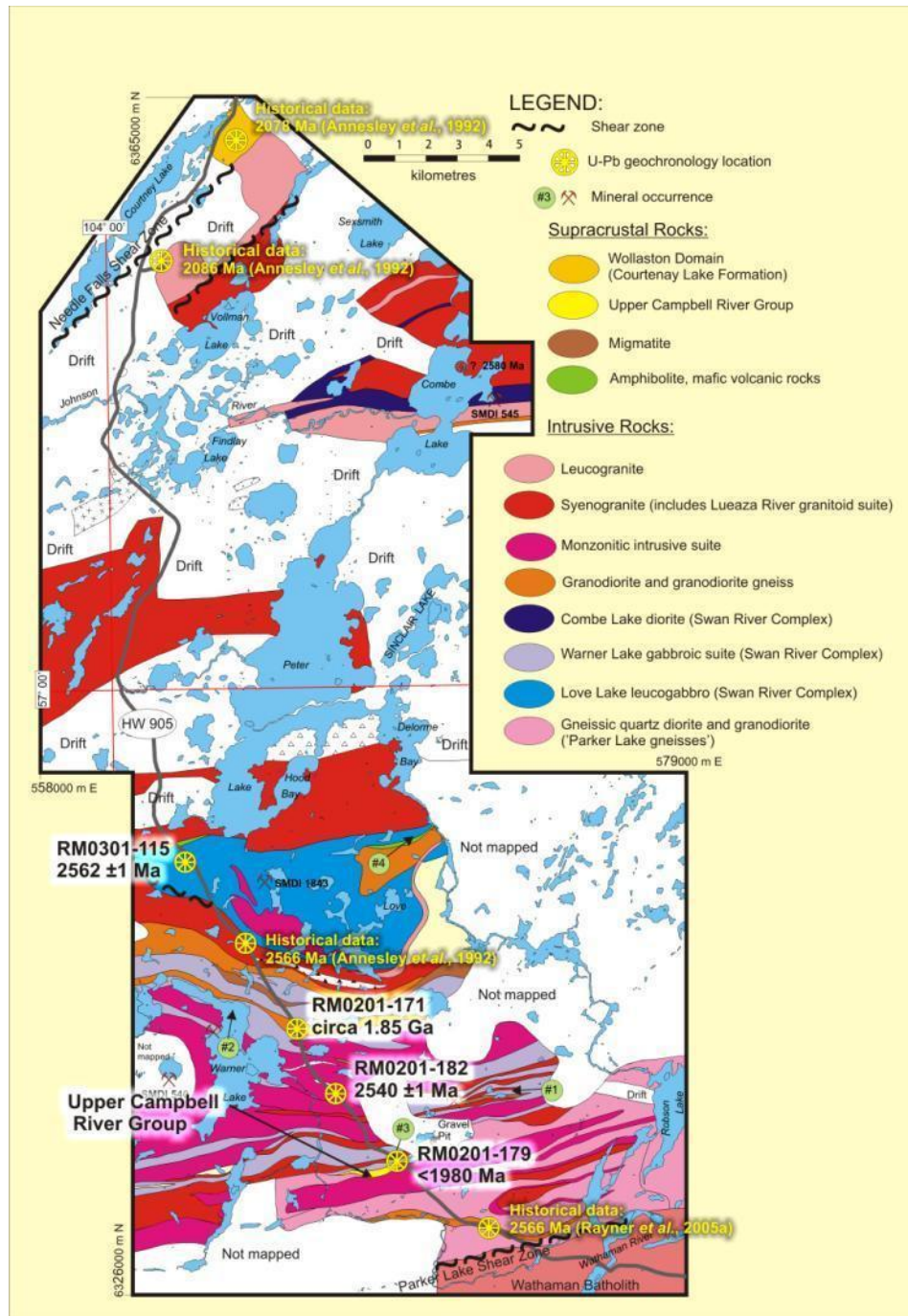


Figure F-01-geochron-Simp Geology HW905 – Simplified geology of the southwestern Peter Lake Domain, showing U-Pb geochronology sample locations (modified after Maxeiner and Hunter, 2002a).



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Figure: F-02

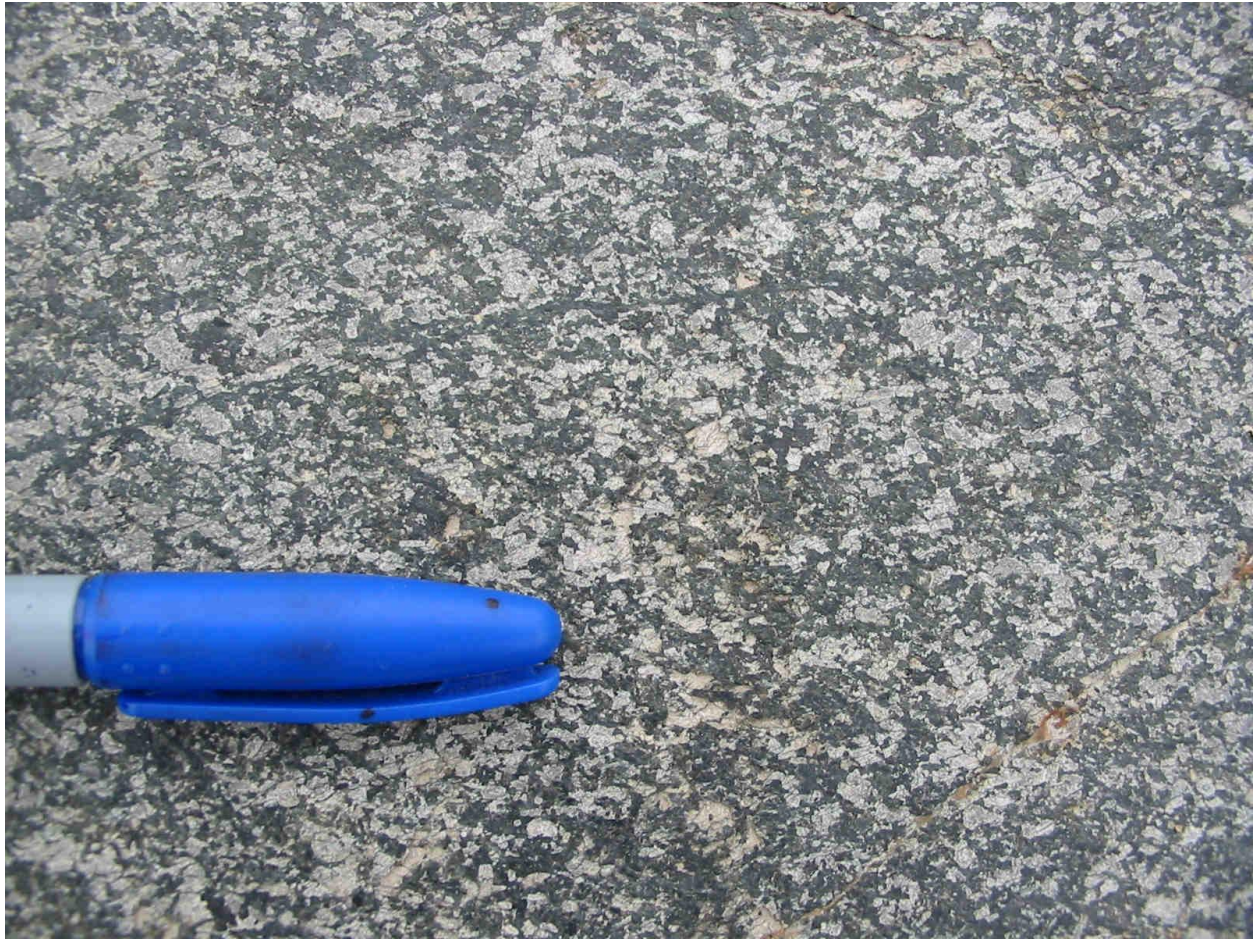


Figure F-02 – Gabbronorite, Love Lake leucogabbro, Swan River Complex (station RM02-8-ST8).



Figure: F-03

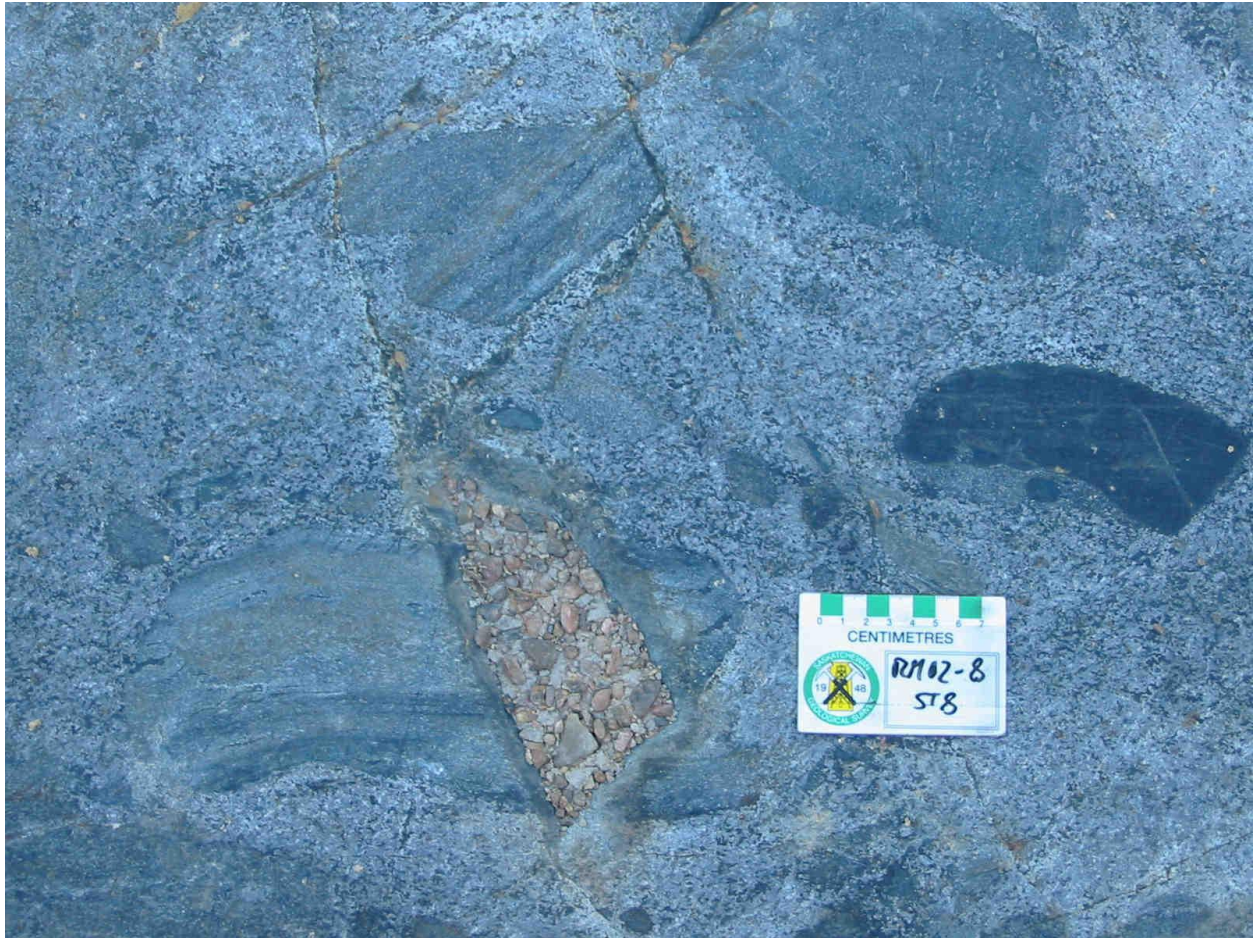


Figure F-03 – Foliated supracrustal xenoliths in gabbronorite, Love Lake leucogabbro, Swan River Complex (station RM02-8-ST8).



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Figure: F-04

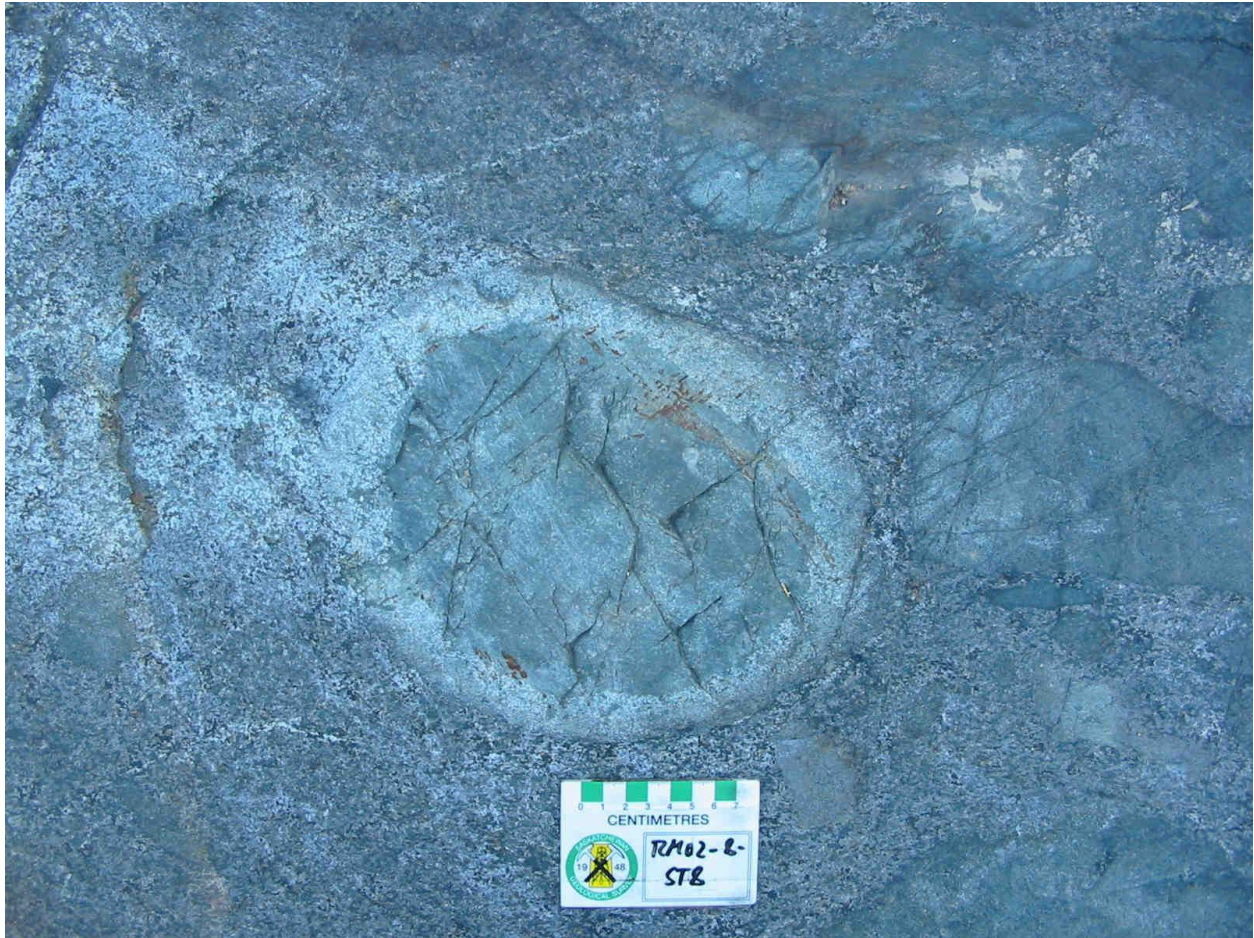


Figure F-04 – Ultramafic xenolith (with reaction rim) in gabbronorite, Love Lake leucogabbro, Swan River Complex (station RM02-8-ST8).



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Figure: F-05

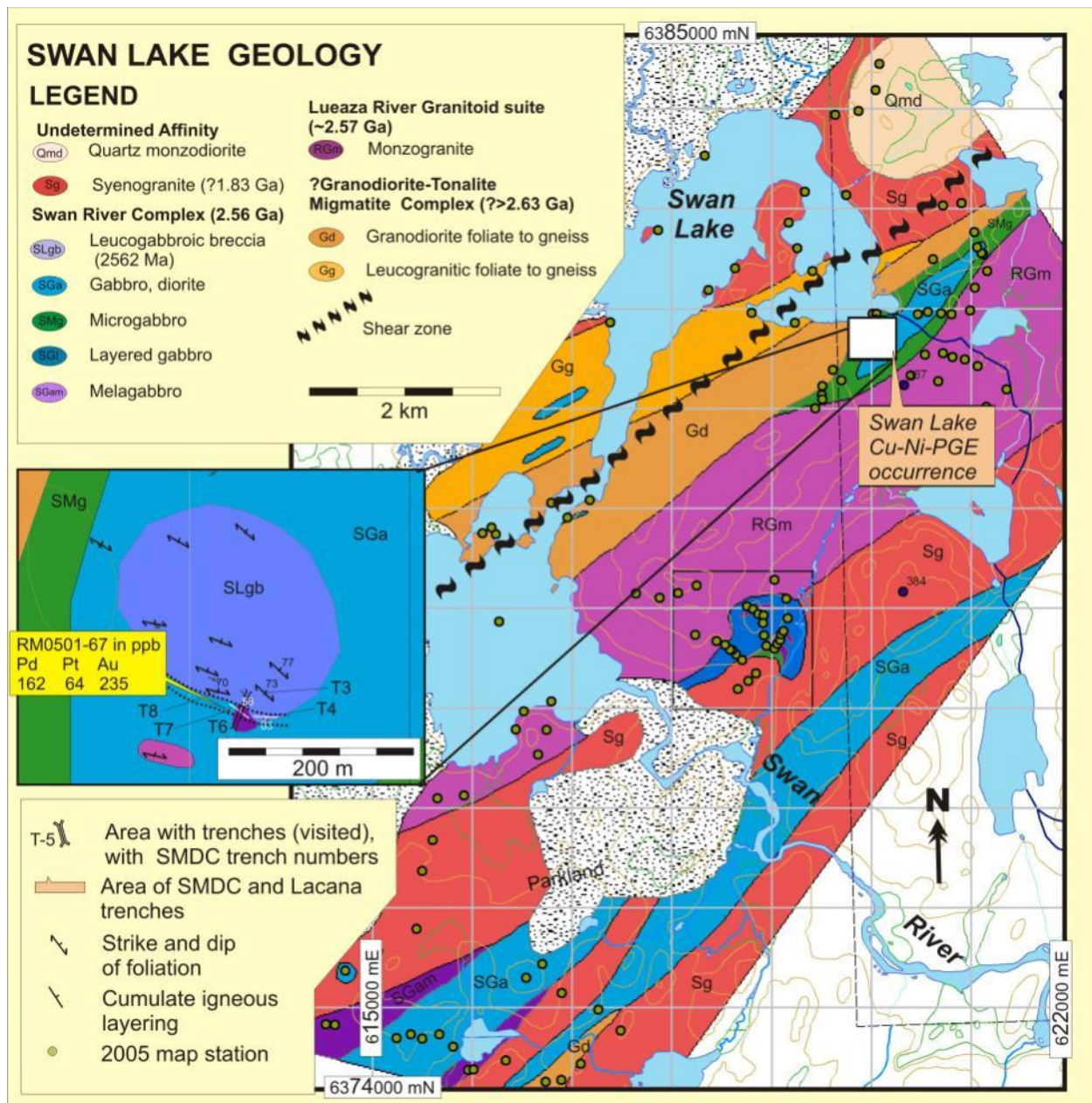


Figure F-05 – Simplified geology of the Swan Lake area, showing U-Pb geochronology sample location.



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Figure: F-06



Figure F-06 – Trench in central leucogabbroic zone of Swan Lake gabbro, Swan River Complex (station RM04-16-ST01).



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Figure: F-07



Figure F-07 – Coarse-grained to pegmatitic, massive, sulphide-bearing gabbro, central leucogabbroic zone of Swan Lake gabbro, Swan River Complex (station RM04-16-ST01).



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Figure: F-08

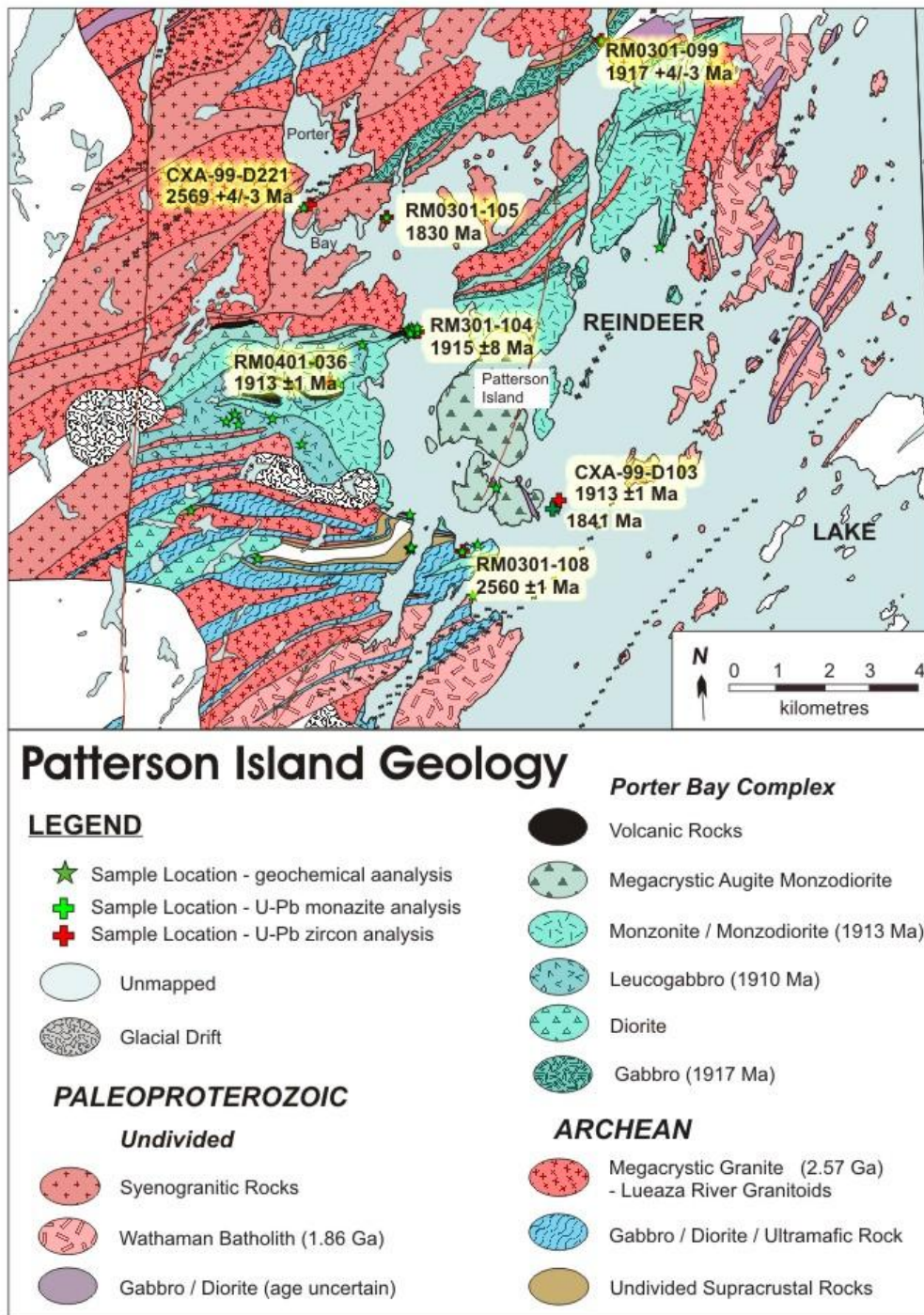


Figure F-08 – Simplified geology of the Patterson Island area, showing U-Pb geochronology sample locations.



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Figure: F-09



Figure F-09 – Wiley Bay leucogabbro, Swan River Complex (station RM03-10-ST10).



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Figure: F-10



Figure F-10 – Rhythmic igneous layering in Wiley Bay leucogabbro, Swan River Complex (station RM03-10-ST10).



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Figure: F-11



Figure F-11 – Xenolith in Wiley Bay leucogabbro, Swan River Complex (station RM03-10-ST10).



Figure: F-12

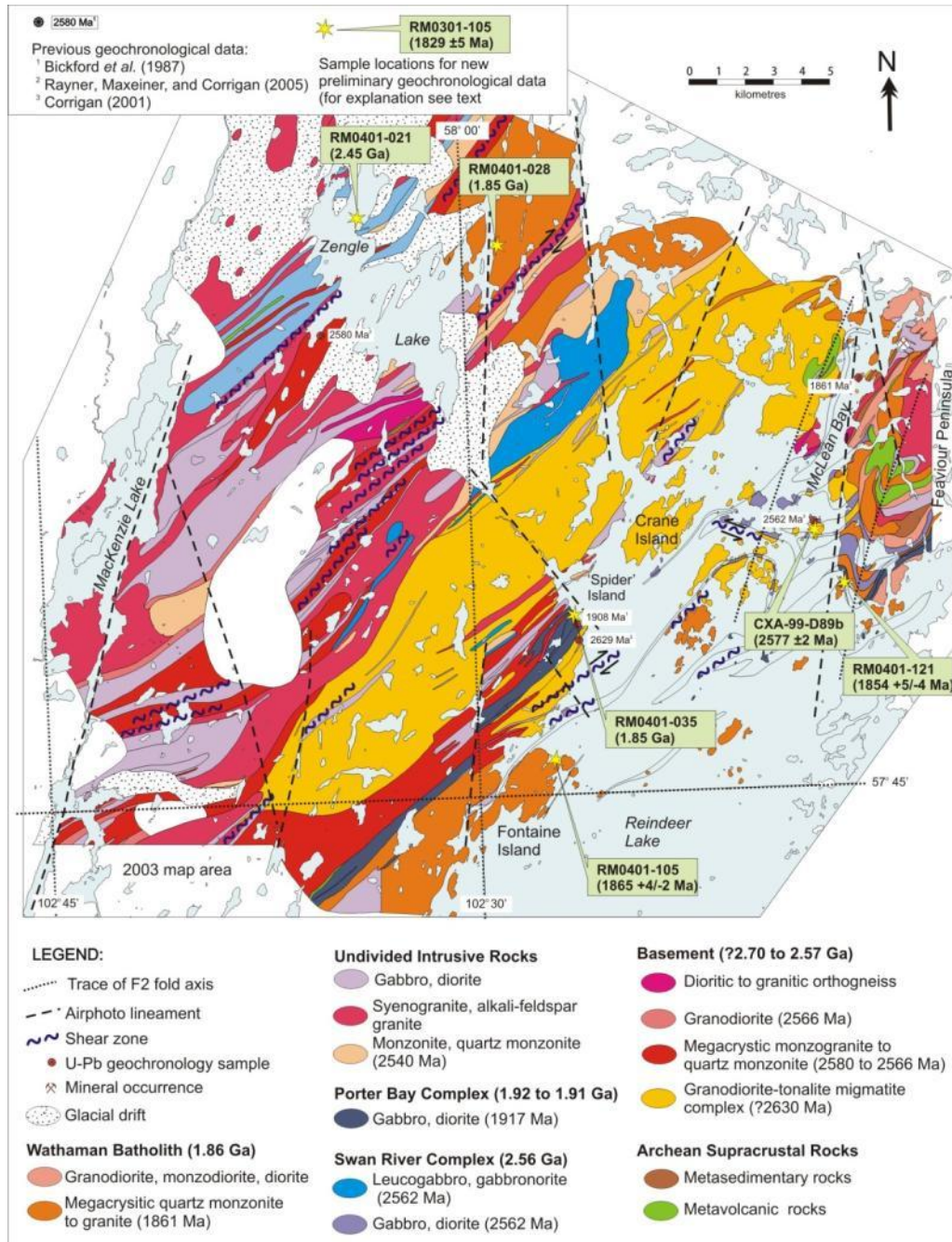


Figure F-12 – Simplified geology of the Zengle Lake area, showing U-Pb geochronology sample locations.



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Figure: F-13



Figure F-13 – Massive to weakly foliated, coarse-grained, ophitic Zengle Lake gabbro (station RM04-08-ST14).



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Figure: F-14



Figure F-14 – Cross-bedding in layered gabbro-anorthosite of the Porter Bay Complex gabbro (station RM03-28-ST08).



Figure: F-15



Figure F-15 – Layered anorthosite-diorite of the Porter Bay Complex gabbro (station RM03-35-ST01).



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Figure: F-16



Figure F-16 – Andesitic porphyry with vesicles, Porter Bay Complex (station RM03-13-ST01).



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Figure: F-17



Figure F-17 – Feldspar porphyry, Porter Bay Complex (station RM03-13-ST01).



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Figure: F-18



Figure F-18 – Outcrop of Patterson Channel (unofficial place name) hornblende-biotite leucogabbro, Porter Bay Complex (station RM03-29-ST09).



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Figure: F-19



Figure F-19 – Close-up of Patterson Channel (unofficial place name) hornblende-biotite leucogabbro, Porter Bay Complex (station RM03-29-ST09).



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Figure: F-20



Figure F-20 – Fontaine Island megacrystic monzogranite, Wathaman Batholith (station RM04-38-ST05).



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Figure: F-21

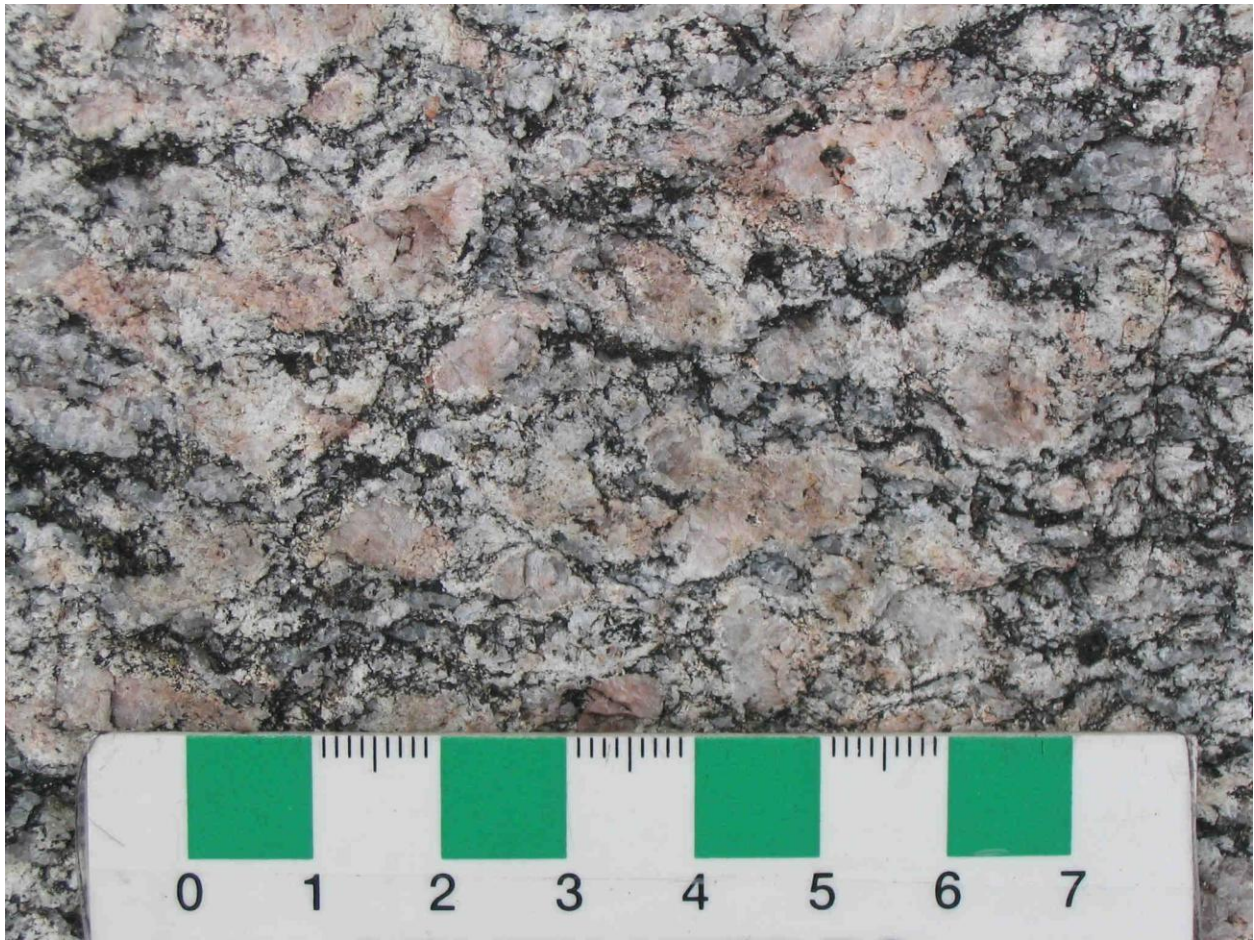


Figure F-21 – Close-up of Fontaine Island megacrystic monzogranite, Wathaman Batholith (station RM04-38-ST05).



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Figure: F-22



Figure F-22 – Megacrystic monzogranite, Reynolds Lake Pluton (station RM04-10-ST26).



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Figure: F-23



Figure F-23 – Xenolith of feldspathic psammite in megacrystic monzogranite, Reynolds Lake Pluton (station RM04-10-ST26).



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Figure: F-24



Figure F-24 – Rhythmic zebra layering in gabbro of the Wathaman Batholith, southwest of Crane Island (station RM04-21-ST04).



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Figure: F-25



Figure F-25 – Magnetite-rich quartz diorite of the Wathaman Batholith, southwest of Crane Island- (station RM04-14-ST06).



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Figure: F-26



Figure F-26 – Intermingled magnetite-rich quartz diorite and feldspar-phyric gabbro of the Wathaman Batholith, southwest of Crane Island; note mafic rind on the latter (station RM04-24-ST15).



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Figure: F-27



Figure F-27 – Zebra-layered gabbro-anorthosite of the Wathaman Batholith, southwest of Feaviour Peninsula (station RM04-31-ST23).



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Figure: F-28



Figure F-28 – Megacrystic monzodiorite of the Wathaman Batholith, southwest of Feavious Peninsula. (station RM04-31-ST24).



Figure: F-29

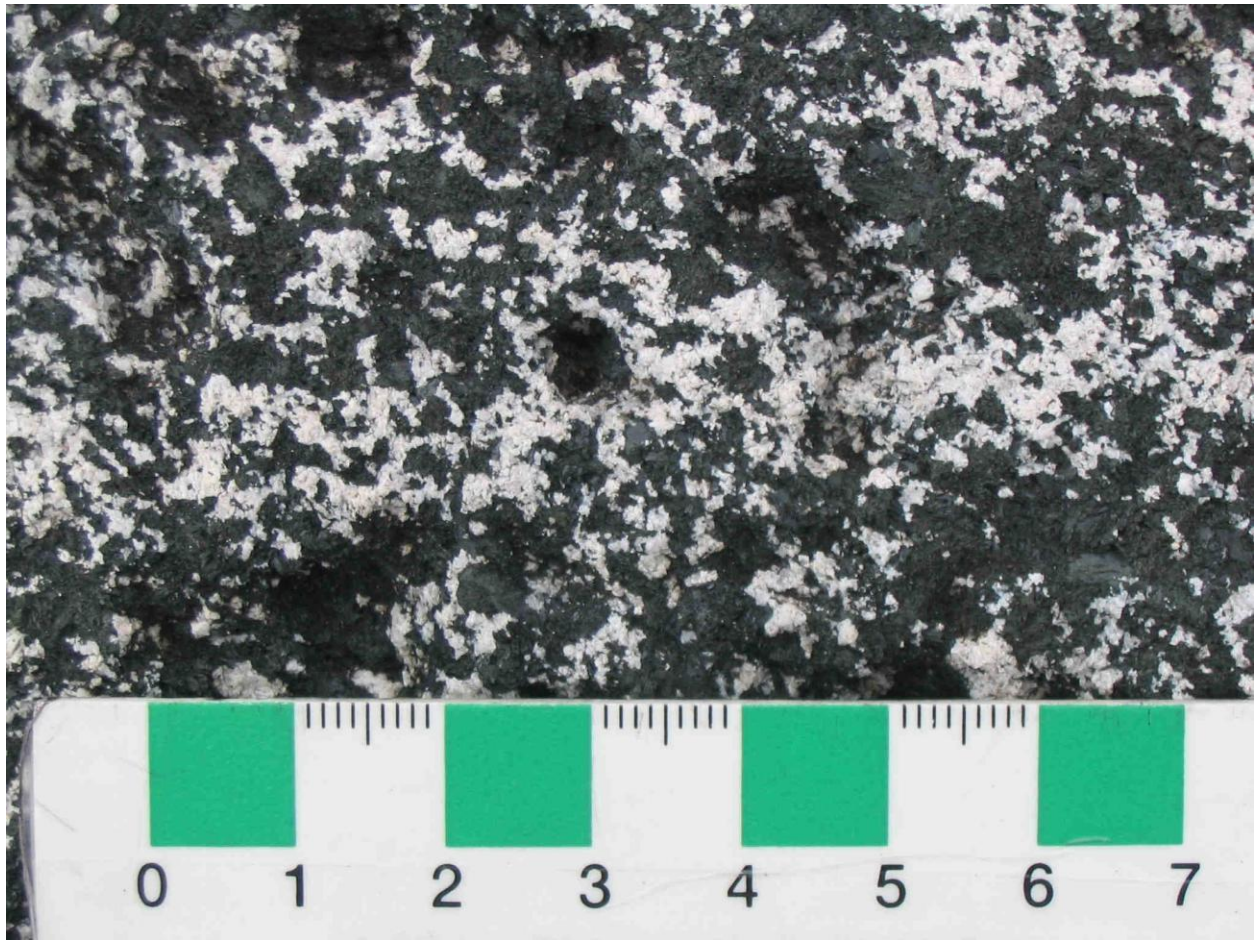


Figure F-29 – K-feldspar–megacrystic monzodiorite of the Wathaman Batholith, southwest of Feaviour Peninsula (station RM04-31-ST23).



Figure: F-30

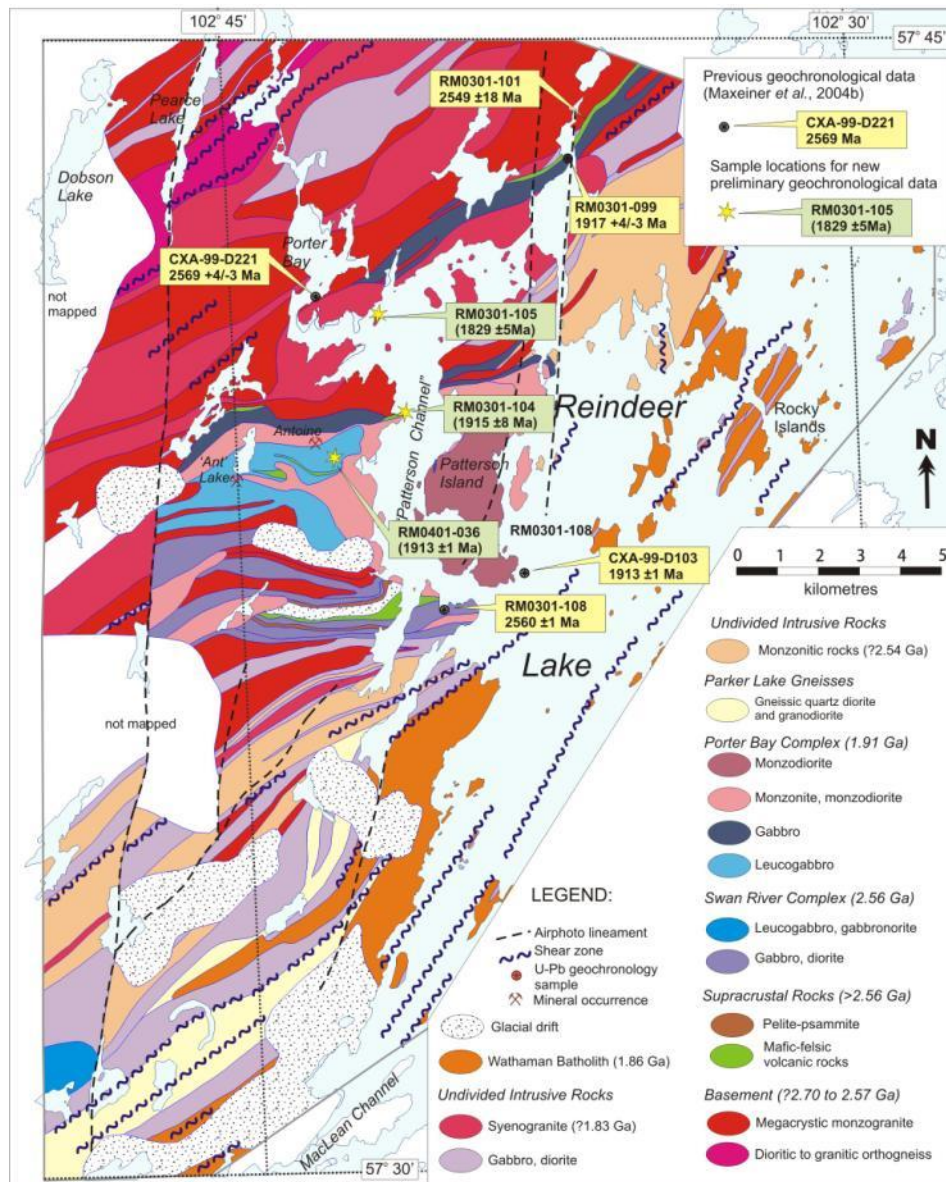


Figure F-30 – Simplified geology of the Patterson Island area, showing U-Pb geochronology sample locations (from Rayner et al., 2005a)



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Figure: F-31



Figure F-31 – Syenogranite from youngest plutonic unit in the Peter Lake Domain (station RM03-36-ST03).



Figure: F-32



Figure F-32 – Syenogranite (at top) intrudes variably recrystallized megacrystic Ettle Creek granite (station SL03-02-ST01).



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Figure: F-33

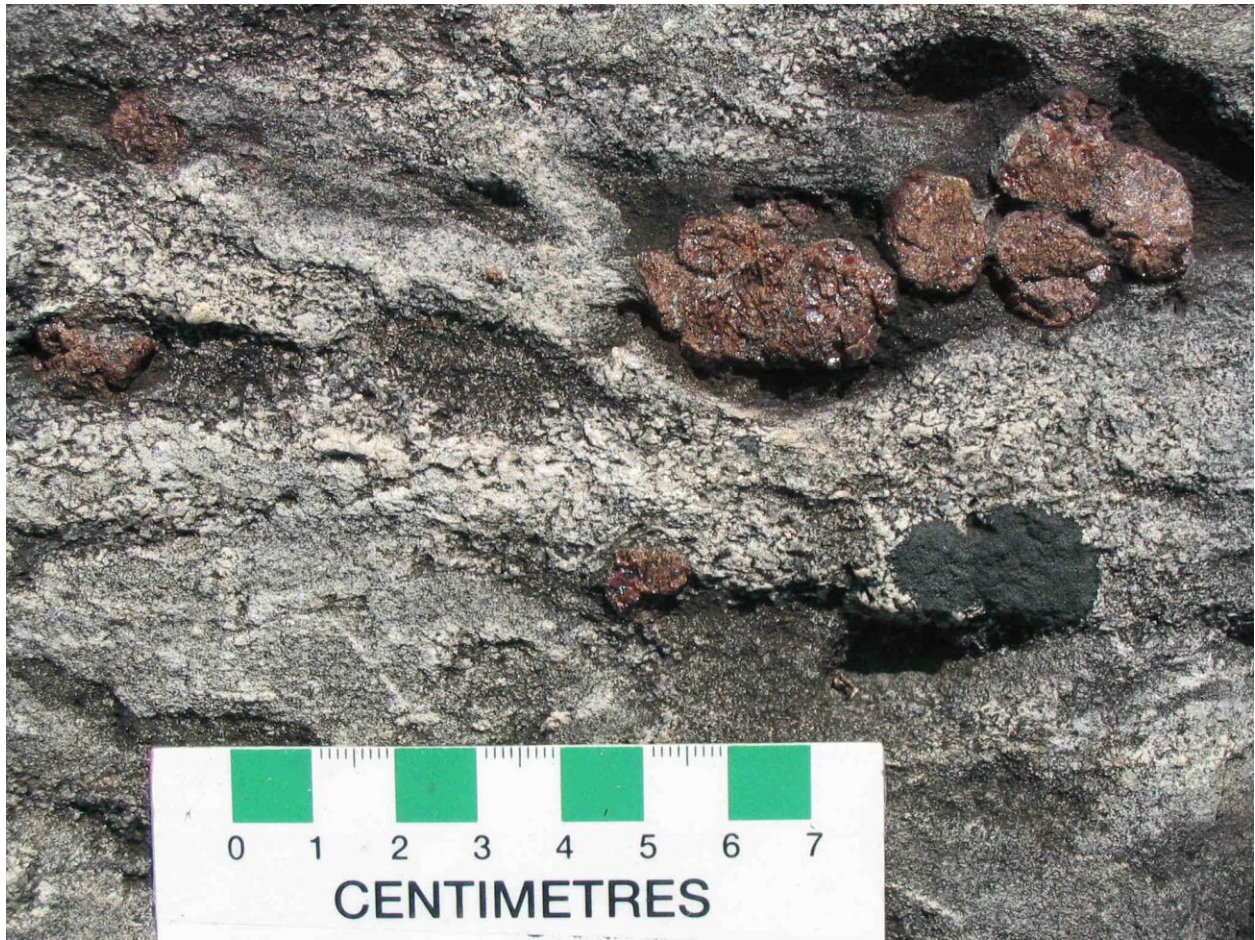


Figure F-33 – Garnets and tonalitic leucosome in upper amphibolite facies migmatitic pelite, north of Patterson Island (station RM03-28-ST02).



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Figure: F-34



Figure F-34 – Fragmental felsic volcanic rocks that are interlayered with the migmatitic pelite (station RM03-28-ST01).



Figure: F-35



Figure F-35 – Megacrystic monzonite from the monzonite intrusive suite at kilometre 114 of Highway 905 (station RM02-6-ST14).



Figure: F-36



Figure F-36 – Leucogranite cross-cutting the megacrystic monzonite of Figure F-35 (station RM02-6-ST14).



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Figure: F-37

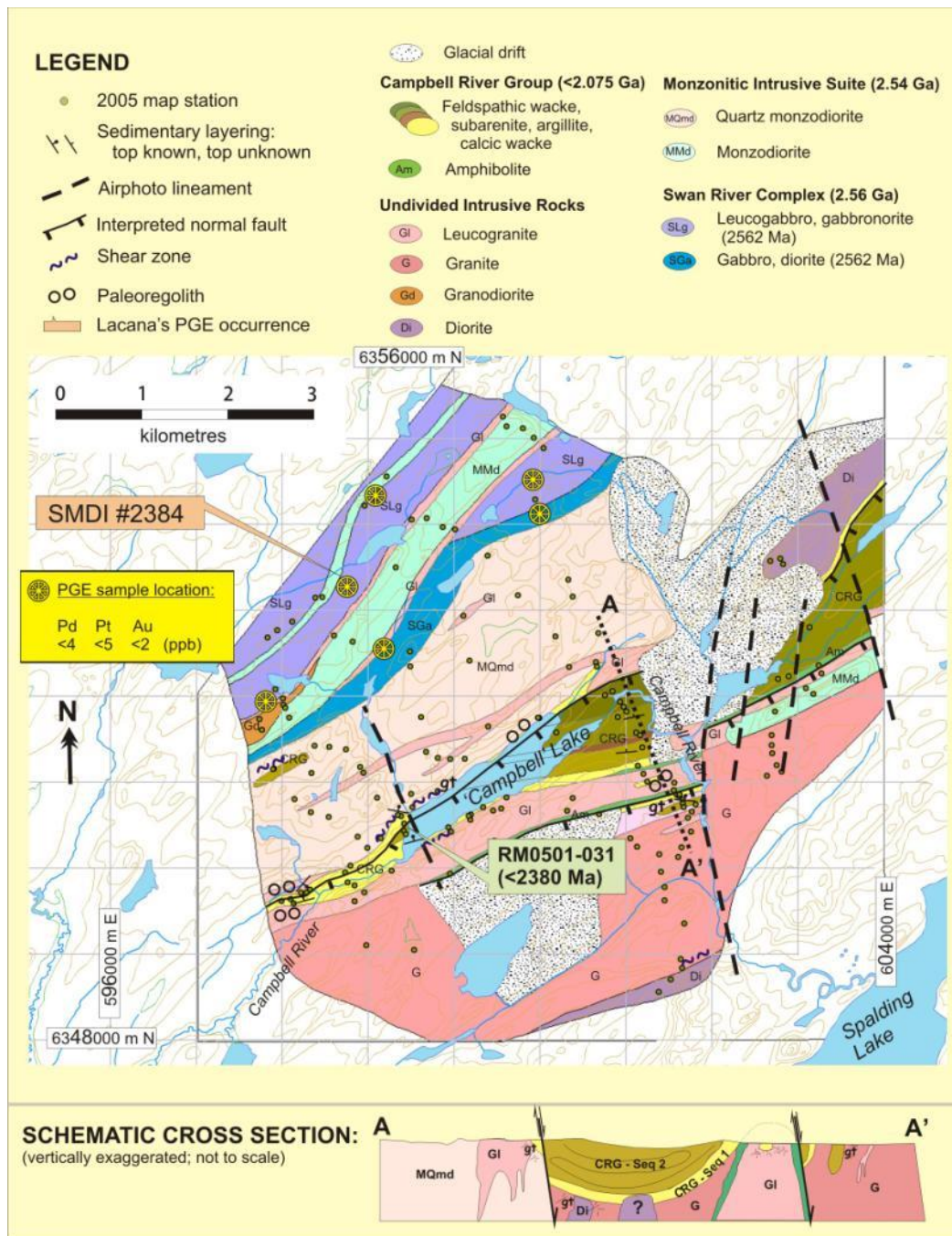


Figure F-37 – Simplified geology of the Campbell River area, showing U-Pb geochronology sample locations. Abbreviation: Lacana, Lacana Mining Corporation.



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Figure: F-38



Figure F-38 – Boulder conglomerate, lower sequence of the Campbell River Group (station RM05-16-ST13).



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Figure: F-39



Figure F-39 – Pink feldspathic arenite overlying the boulder conglomerate, lower sequence of the Campbell River Group (station RM05-17-ST06).



Figure: F-40



Figure F-40 – Calc-silicate nodule containing a rosette of green amphibole, pink feldspar, diopside, garnet, and quartz, in the pink felspathic arenite, lower sequence of the Campbell River Group- (station RM05-09-ST01).



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Figure: F-41



Figure F-41 – Cross-bedded subfeldsarenite from close to the stratigraphic base of the lower sequence of the Campbell River Group (station RM05-09-ST02).



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Figure: F-42



Figure F-42 – Ripple-laminated sequence of feldspathic arenite and argillite in unit 1, basal section of the upper sequence of the Campbell River Group (station RH02-16-ST4).



Figure: F-43



Figure F-43 – Blue quartz grains, up to 5 mm in diameter, in quartz arenite bed of unit 1, basal section of the upper sequence of the Campbell River Group (station RH02-16-ST7).



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Figure: F-44



Figure F-44 – Rippled foresets in unit 1, basal section of the upper sequence of the Campbell River Group.



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Figure: F-45

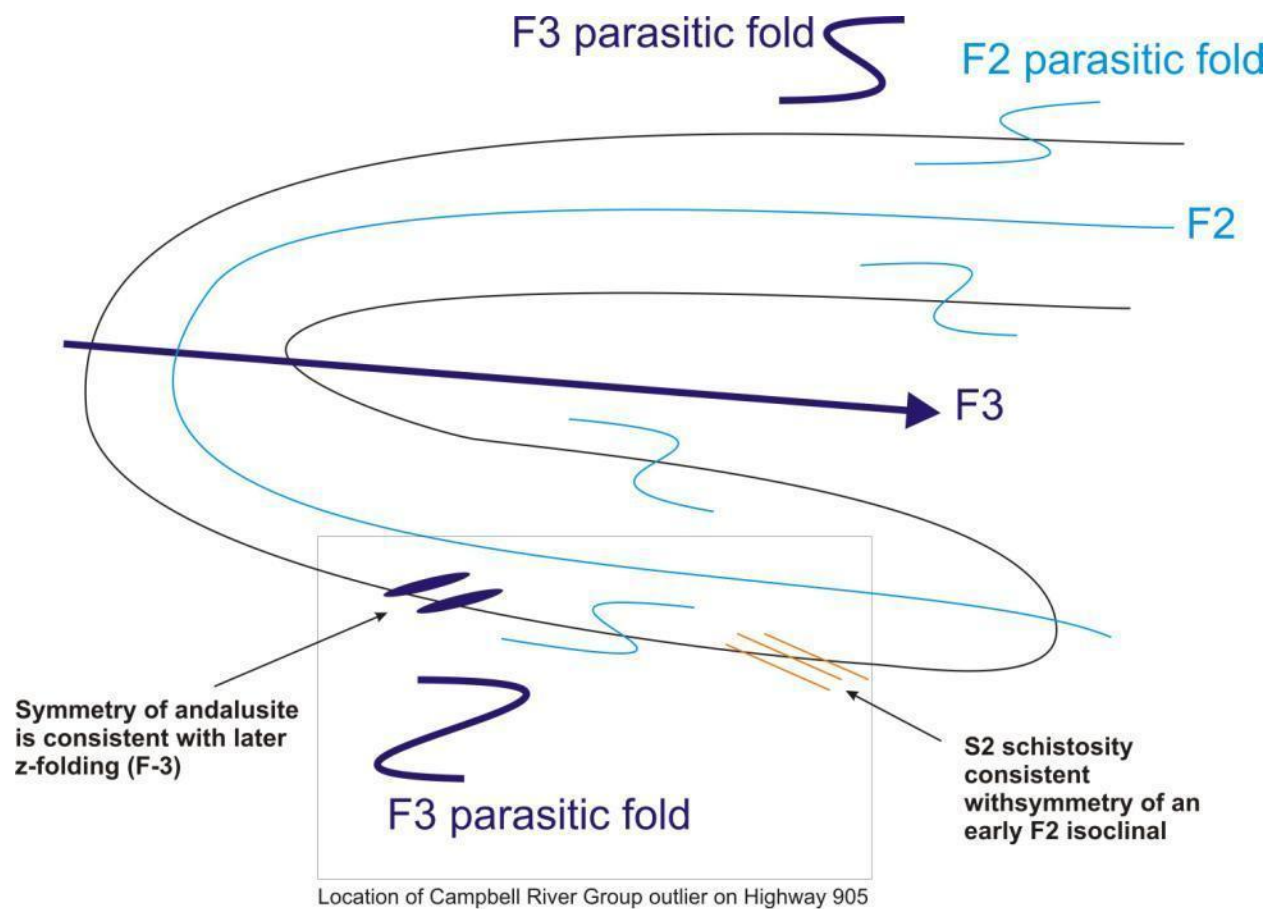


Figure F-45 – Structural schematic of the Campbell River Group.



Figure: F-46



Figure F-46 – Medium-grained, homogeneous granodiorite of the Wathaman Batholith, exposed along Highway 905 (station RM02-22-ST12).



Figure: G-01

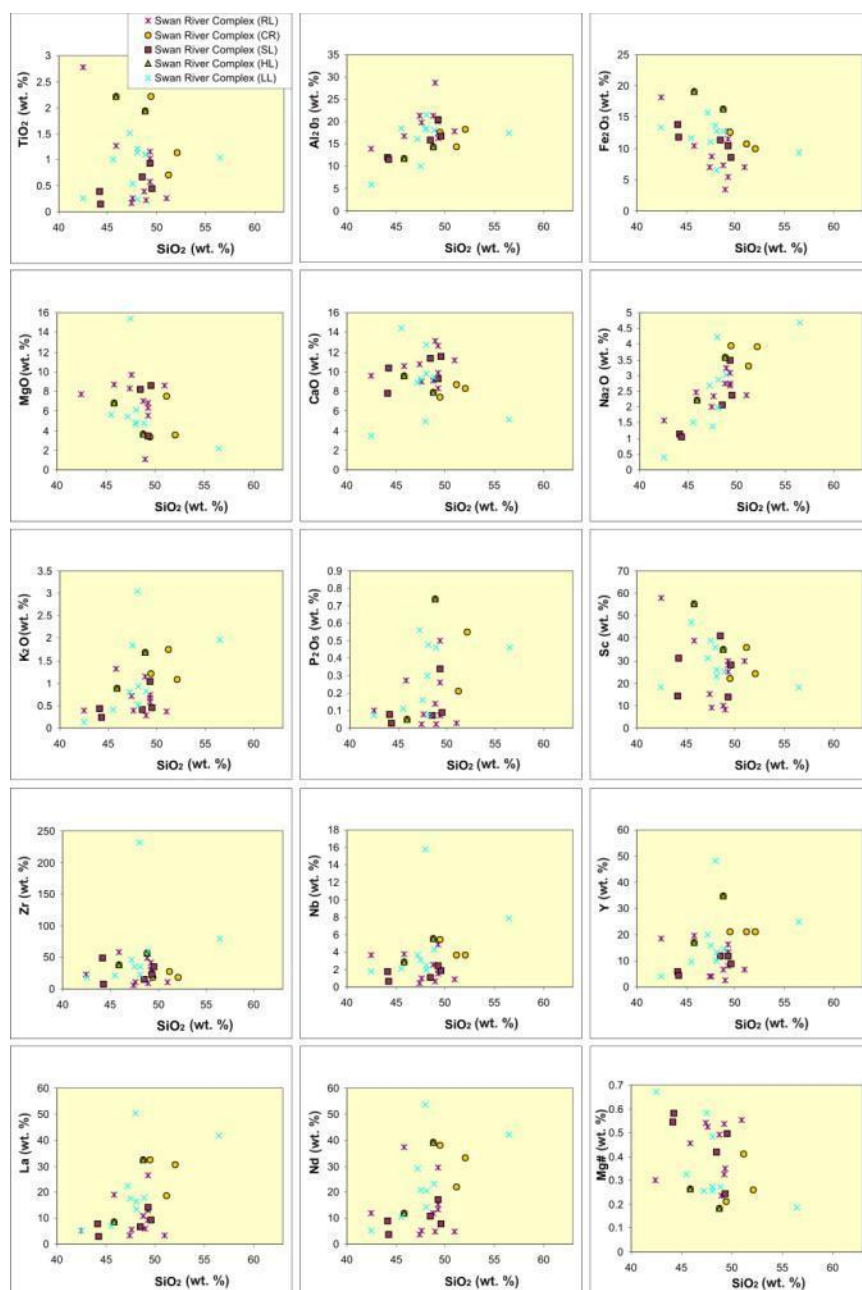


Figure G-01 – Harker plots of geochemical data from gabbros of the Swan River Complex. Abbreviations: RL, Reindeer Lake; CR, Campbell River area; SL, Swan Lake area; HL, Haglund East Lake area; and LL, the Love Lake Pluton exposed along Highway 905.



Figure: G-02

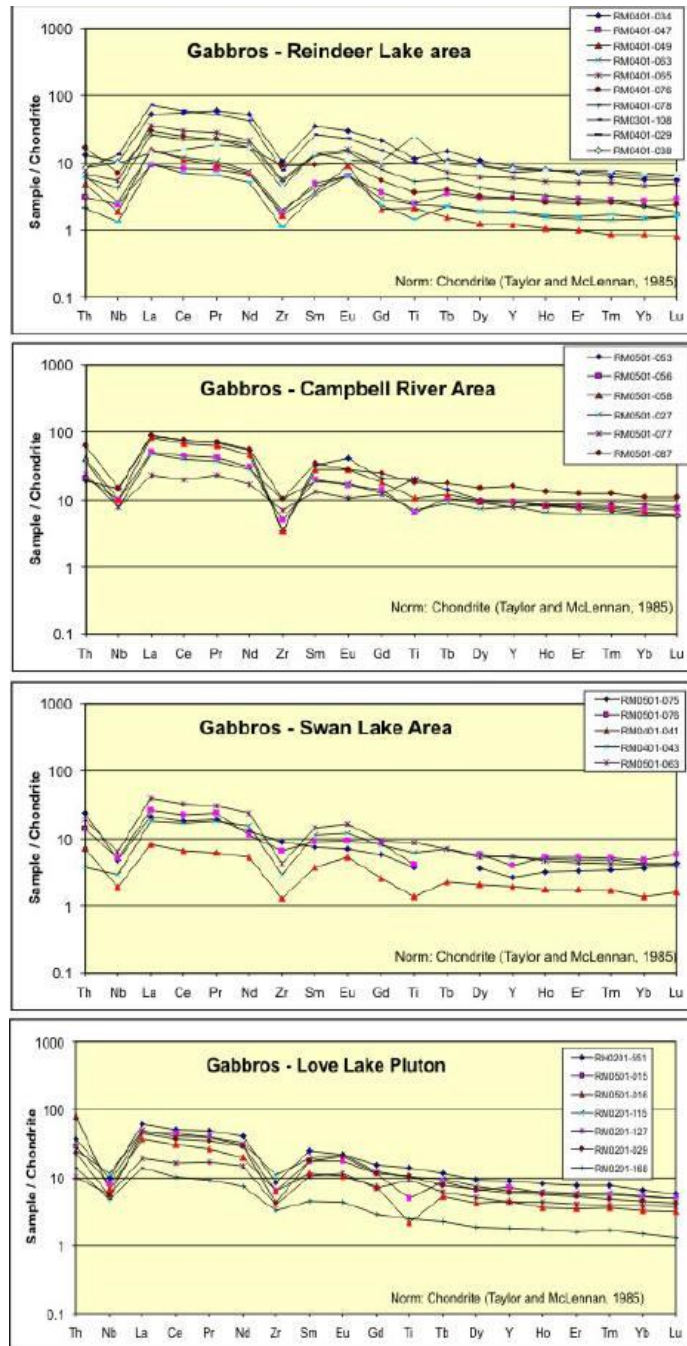


Figure G-02 – Chondrite-normalized spider diagrams of trace and rare earth element data for gabbros of the Swan River Complex. Chondrite values from Taylor and McLennan (1985).



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Figure: G-03

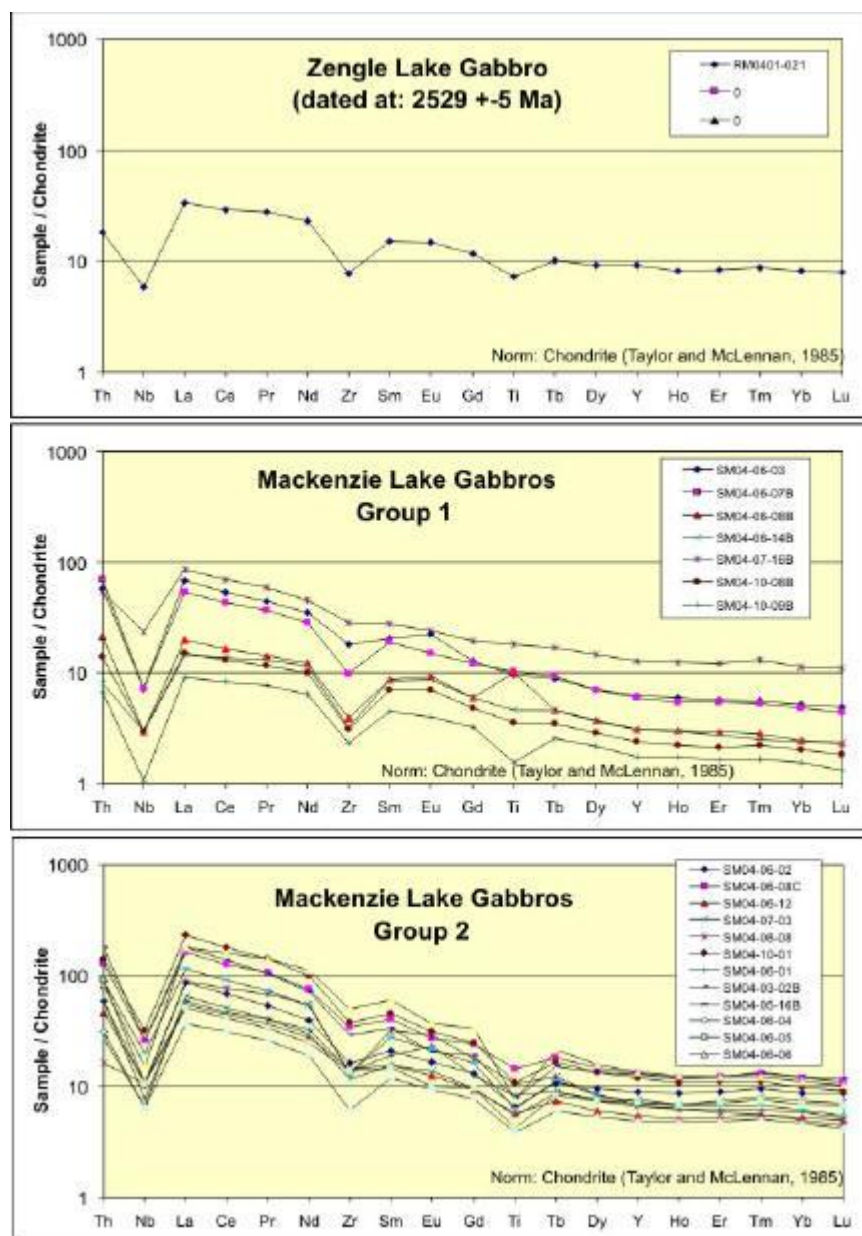


Figure G-03 – Chondrite-normalized spider diagrams of trace and rare earth element data for gabbros of the Peter Lake Domain. Chondrite values from Taylor and McLennan (1985).



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Figure: G-04

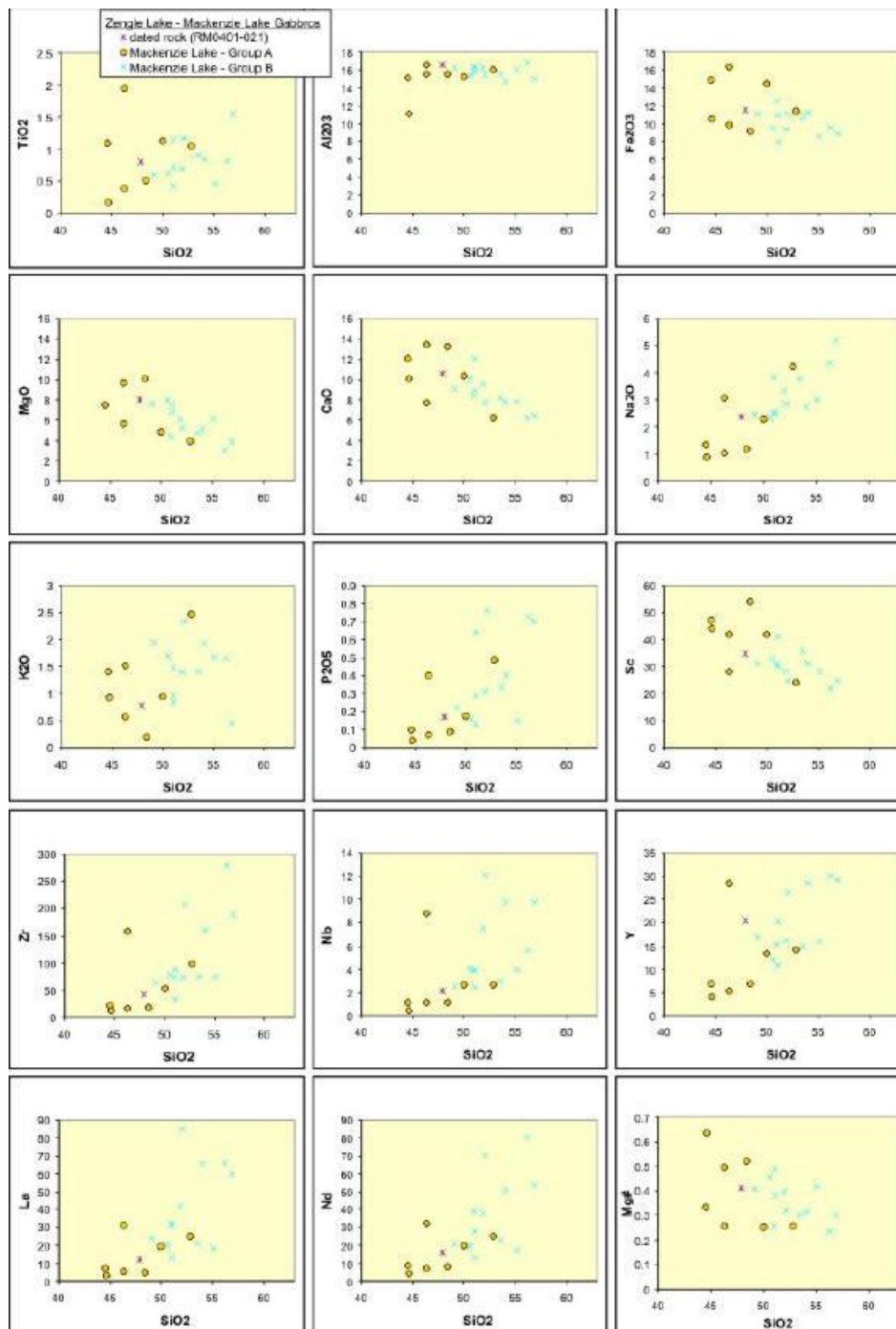


Figure G-04 – Harker plots of geochemical data from Zengle Lake and MacKenzie Lake gabbros.



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Figure: G-05

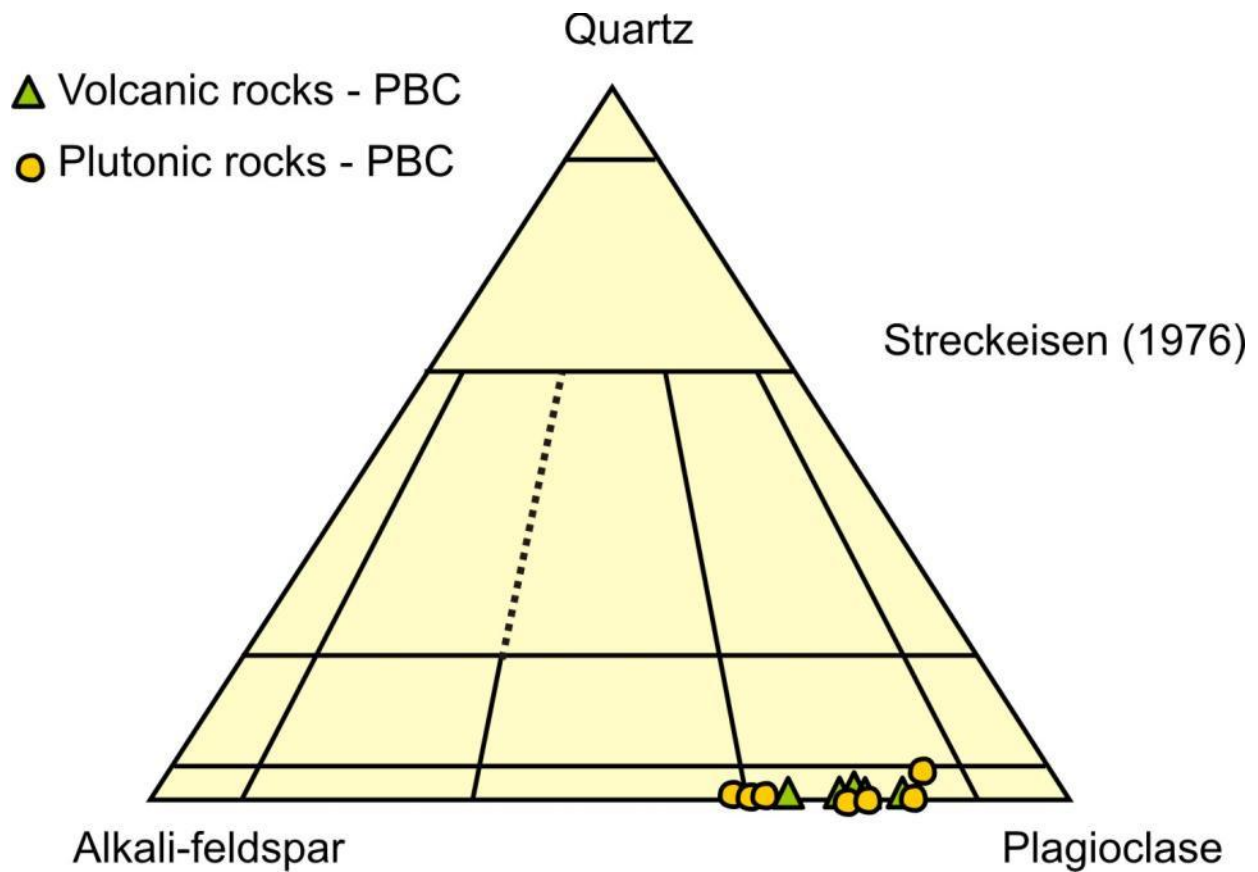


Figure G-05 – CIPW normative plot of volcanic and plutonic rocks from the Porter Bay Complex (PBC).



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Figure: G-06

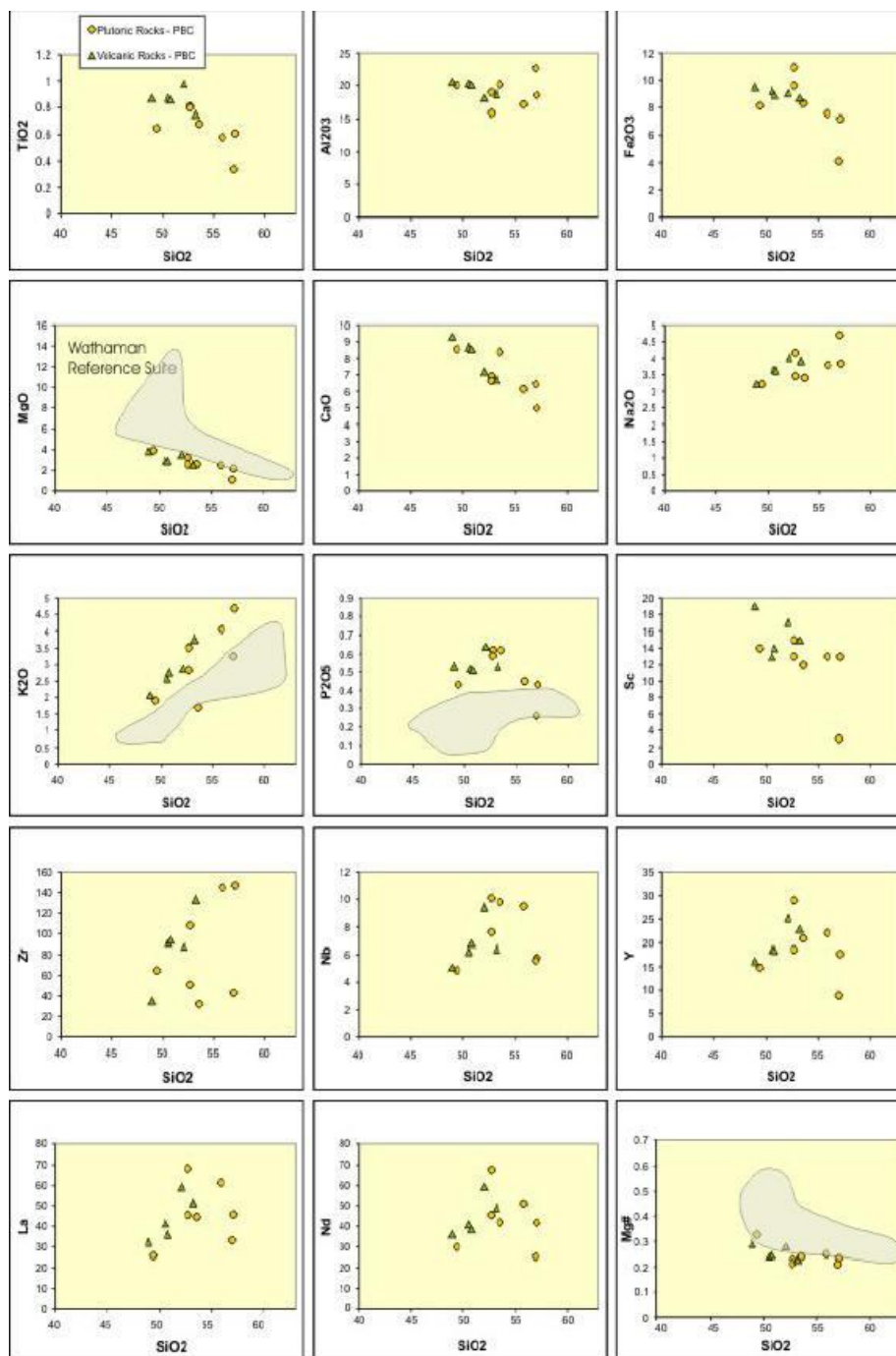


Figure G-06 – Harker plots of geochemical data from the Porter Bay Complex (PBC).



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Figure: G-07

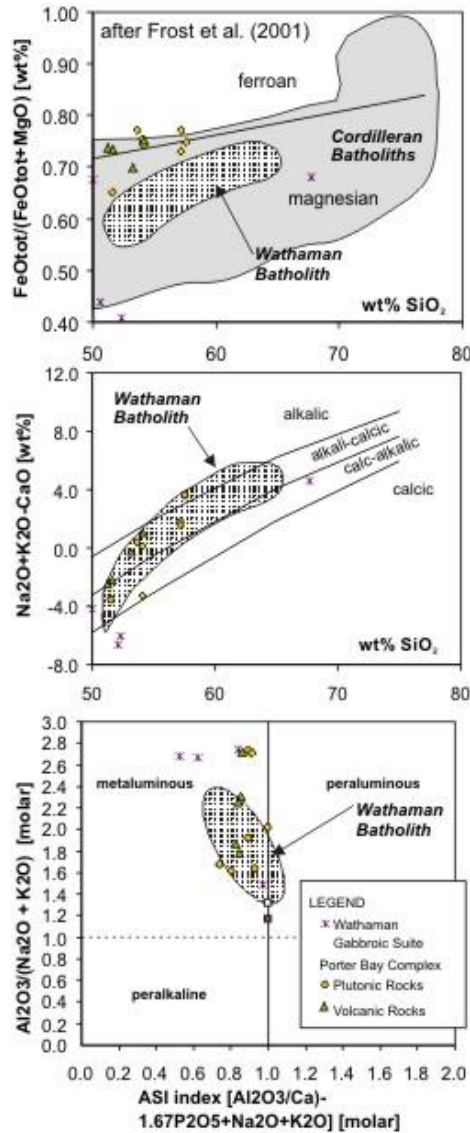


Figure G-07 – Geochemical plots of: a) Fe# versus SiO_2 , b) the modified alkali-lime index, and c) the aluminium saturation index ($\text{ASI} = \text{Al}/(\text{Ca}-1.67\text{P}+\text{Na}+\text{K})$). Plots are modified after a classification scheme for granitoids by Frost et al. (2001); data for Wathaman Batholith reference suite ($\text{SiO}_2 = 50$ to 65 wt. %) is from Fumerton et al. (1984; $n=6$), Meyer et al. (1992; $n=5$), and MacHattie (2001; $n=4$).



Figure: G-08

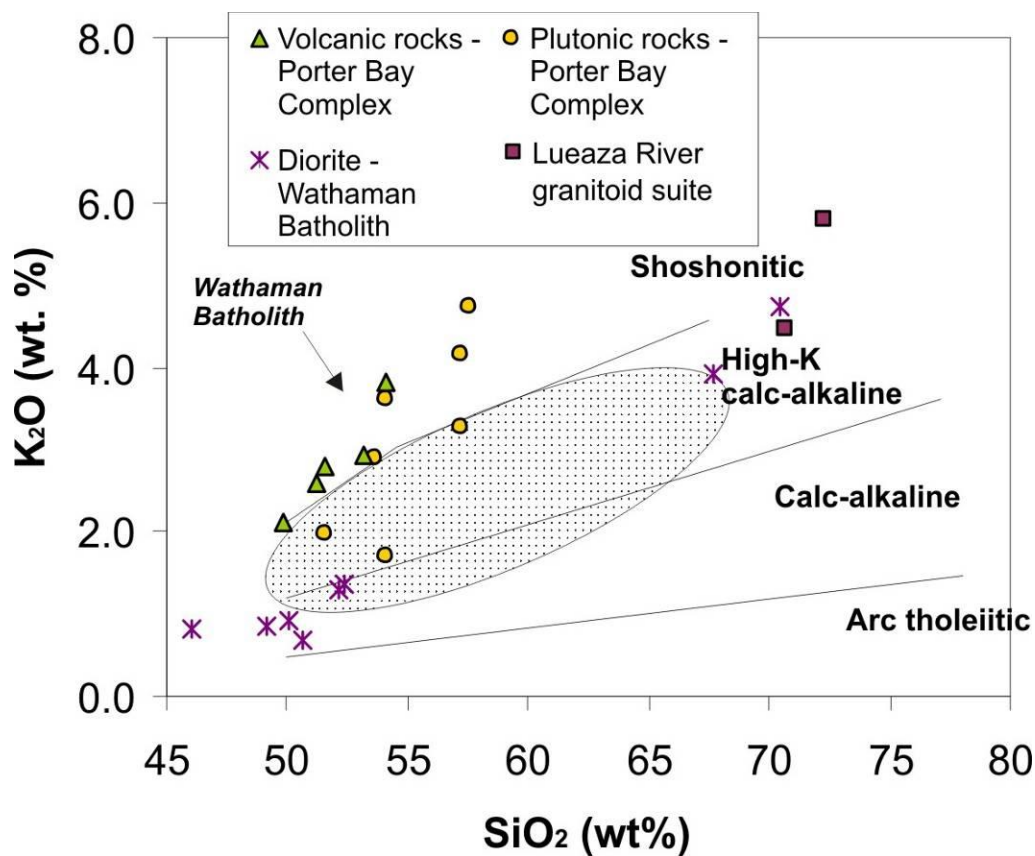


Figure G-08 – Plot of K_2O versus SiO_2 (modified after Peccerilo and Taylor, 1976) for plutonic and volcanic rocks of the Patterson Island Pluton–Porter Bay Complex.



Figure: G-09

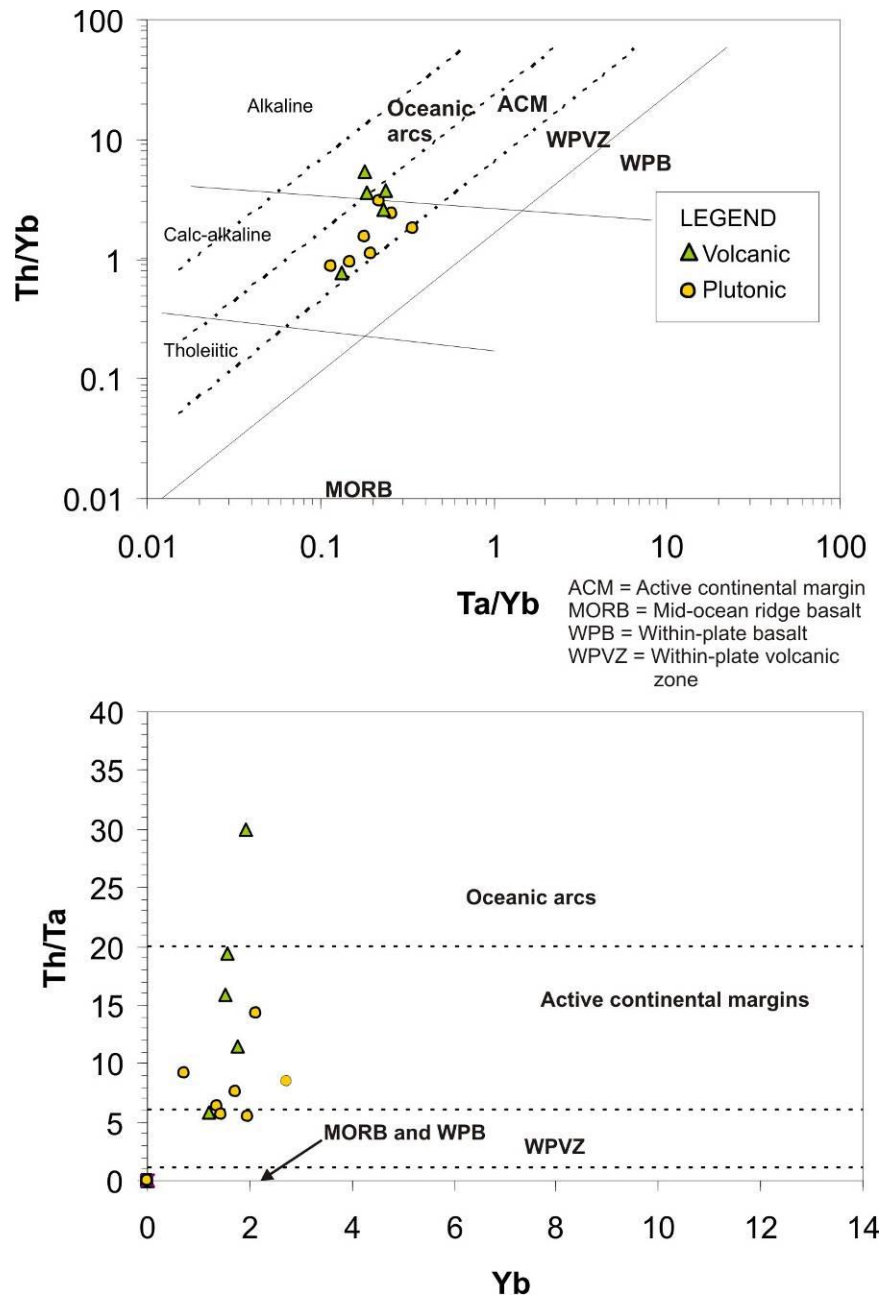


Figure G-09 – Geochemical diagrams of: a) Th/Yb versus Ta/Yb and b) Th/Ta versus Yb (Gorton and Schandl (2000) after Pearce (1982)) of the Porter Bay Complex. Abbreviations: ACM, active continental margin; MORB, mid-ocean ridge basalt; WPB, within-plate basalt; and WPVZ, within-plate volcanic zone.



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Figure: G-10

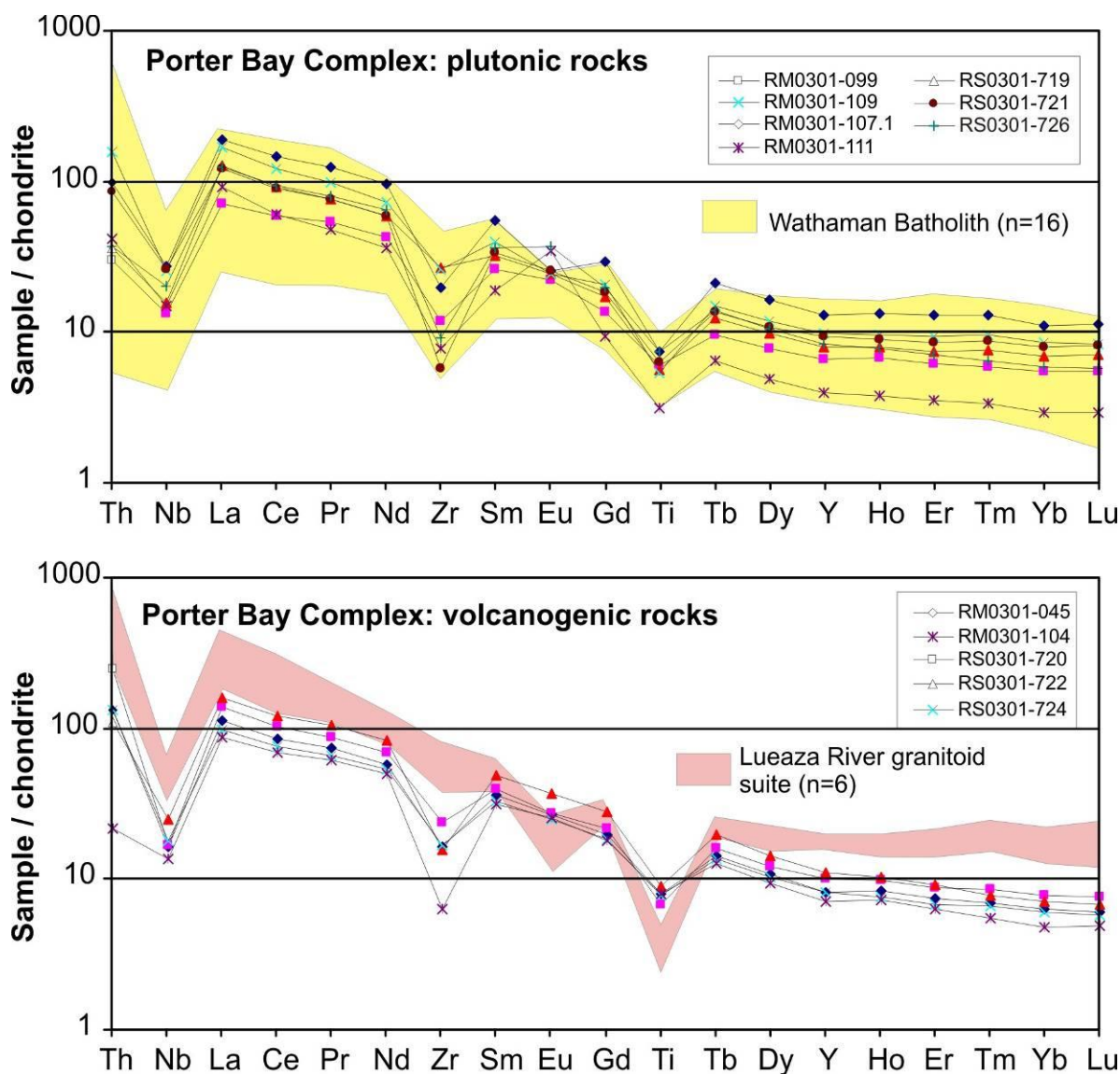


Figure G-10 – Chondrite-normalized spider diagrams of trace and rare earth element data for monzodiorite and gabbro of the Porter Bay Complex. Chondrite values from Taylor and McLennan (1985).



Figure: G-11

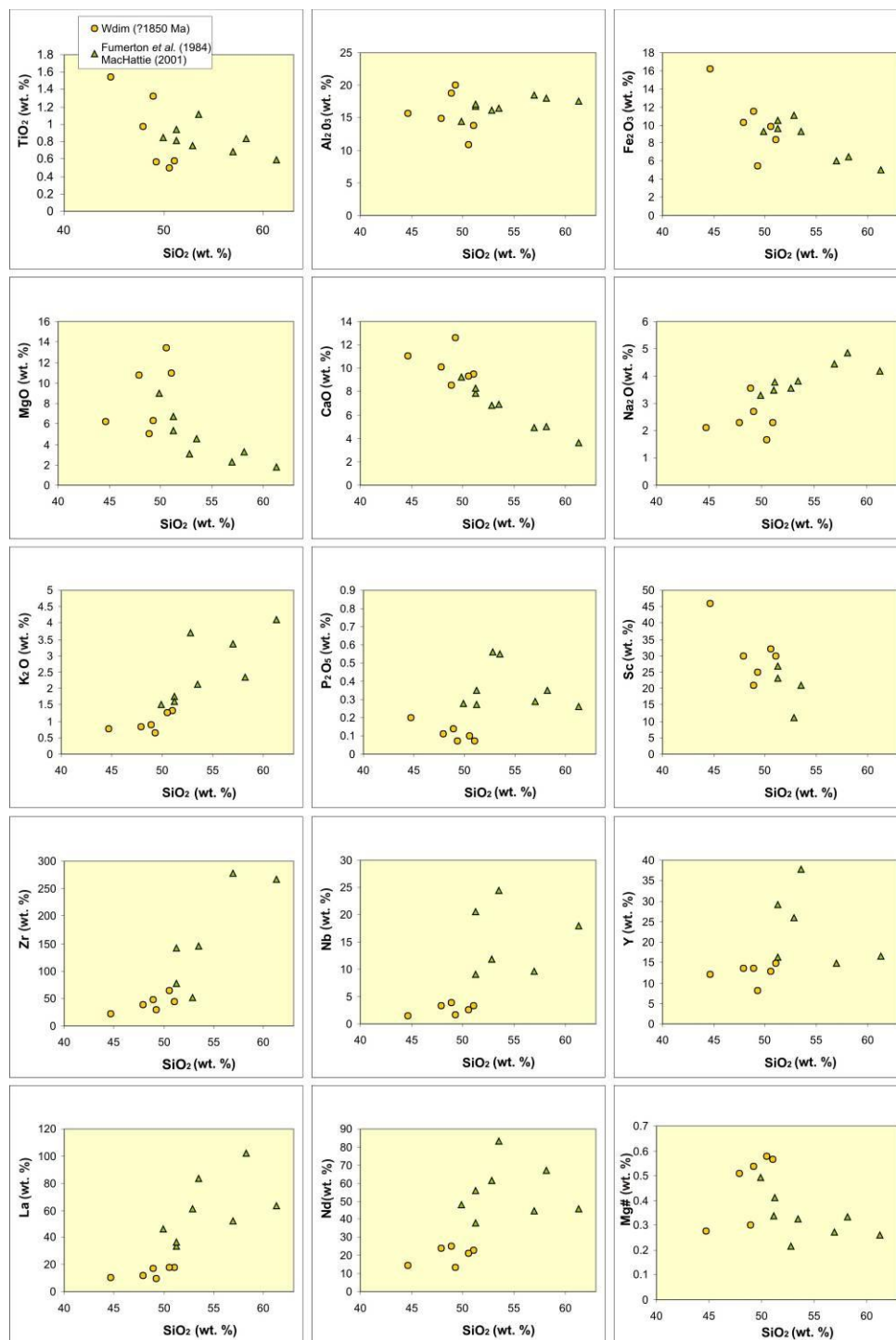


Figure G-11 – Harker plots of geochemical data from the Wathaman Batholith.



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Figure: G-12

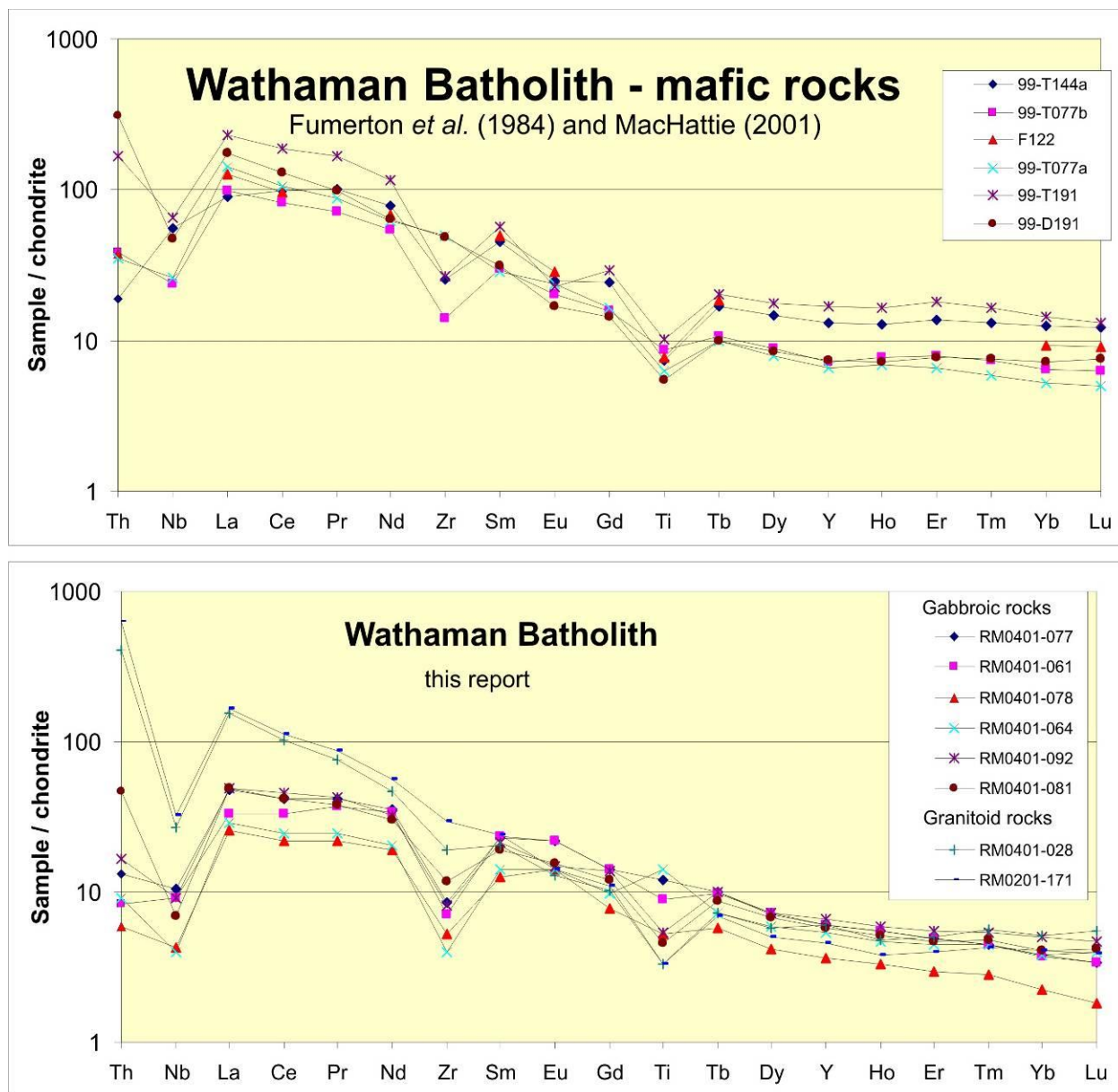


Figure G-12 – Chondrite-normalized spider diagrams of trace and rare earth element data for rocks of the Wathaman Batholith. Chondrite values from Taylor and McLennan (1985).



Figure: G-13

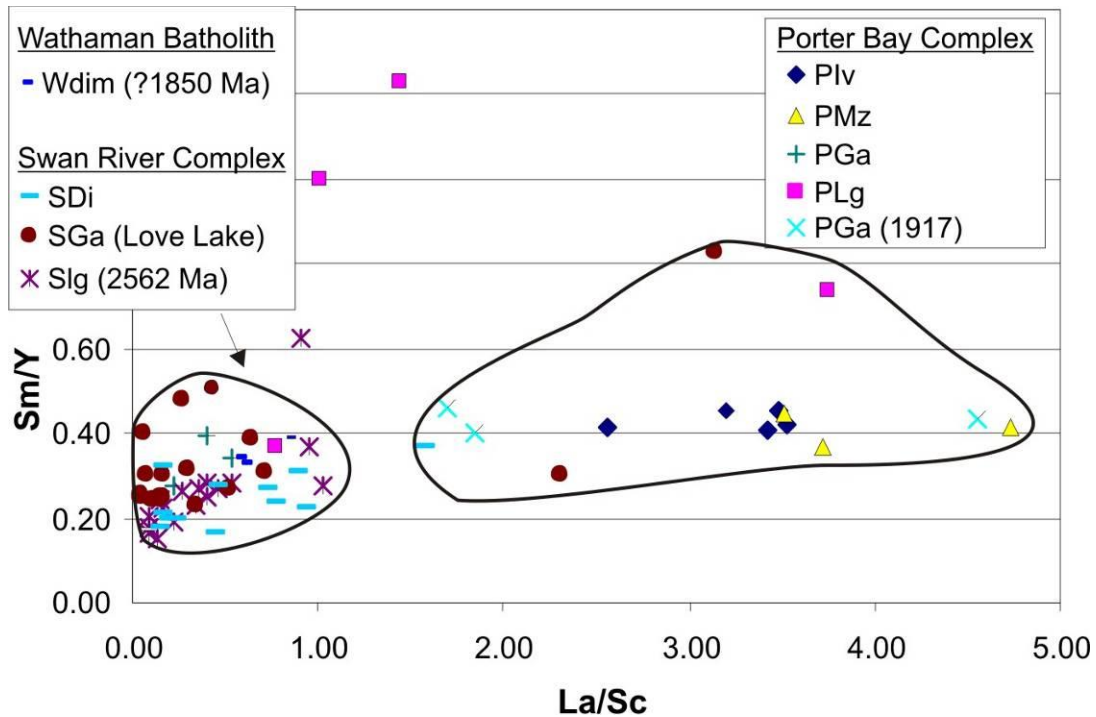


Figure G-13 – Plot of Sm/Y versus La/Sc for gabbroic rocks from the Porter Bay Complex and Swan River Complex. Abbreviations: Plv, Porter Bay Complex intermediate volcanic rocks; PMz, Porter Bay Complex monzonite; PGa, Porter Bay Complex gabbro; PLg, Porter Bay Complex leucogabbro; SDi, Swan River Complex diorite; SGa, Swan River Complex gabbro; SLg, Swan River Complex leucogabbro; and WDim, microdiorite of the Wathaman Batholith.



Figure: G-14

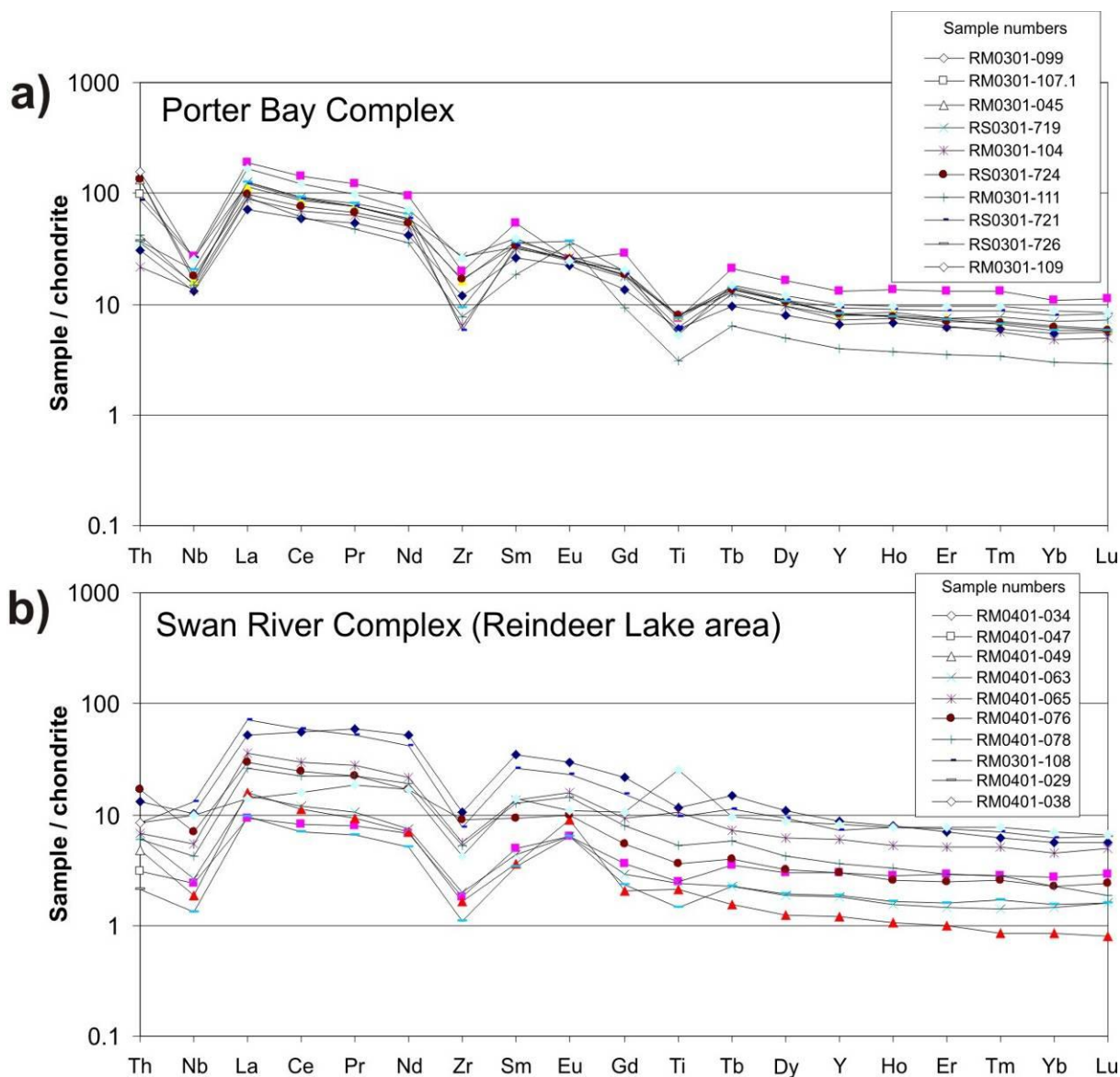


Figure G-14 – Chondrite-normalized spider diagrams of trace and rare earth element data for rocks of the Porter Bay Complex (a) and Swan River Complex (b). Chondrite values from Taylor and McLennan (1985).



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Figure: G-15

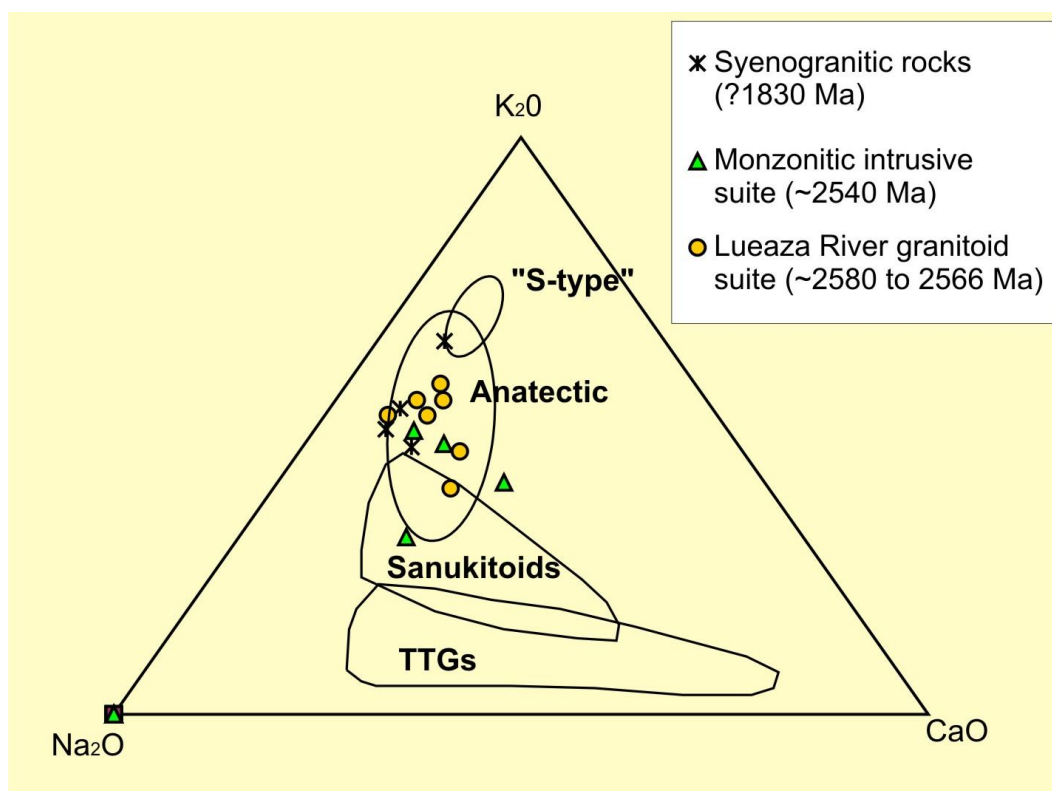


Figure G-15 – K₂O-Na₂O-CaO plot of granitoid rocks from the Peter Lake Domain. Fields for more than 500 late Archean granitoids from Moyen et al. (2003). Abbreviation: TTG, tonalite-trondhjemite-granodiorite.



Figure: G-16

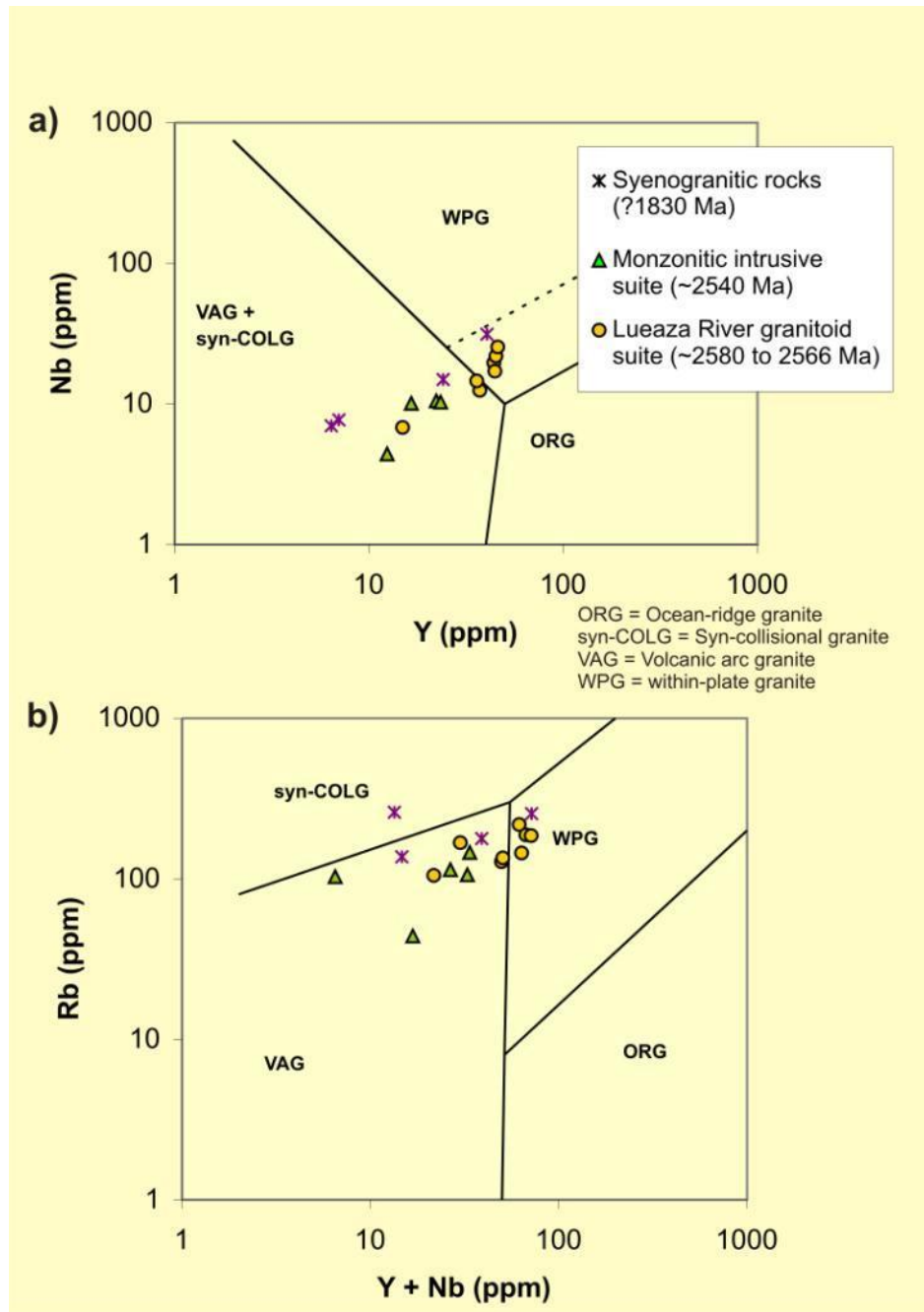


Figure G-16 – Tectonic classification diagram of Peter Lake Domain granitoid rocks. Fields from Pearce et al. (1984). Abbreviations: ORG, ocean-ridge granite; syn-COLG, syn-collisional granite; VAG, volcanic-arc granite; and WPG, within-plate granite.



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Figure: G-17

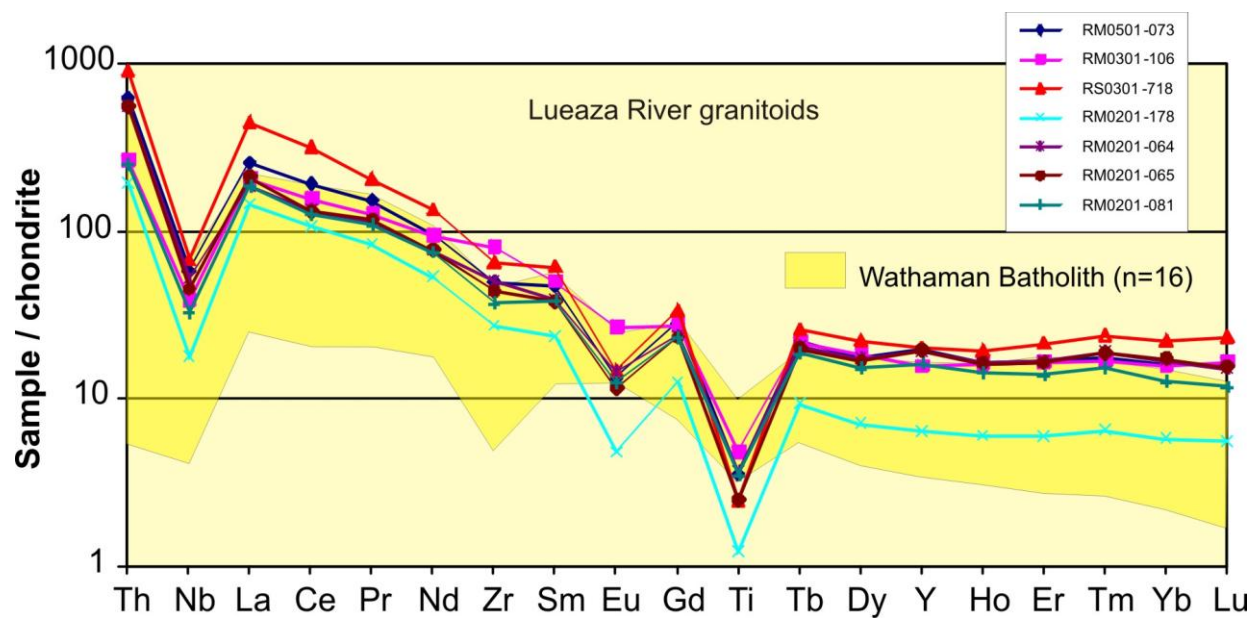


Figure G-17 – Chondrite-normalized spider diagrams of trace and rare earth element data for Lueaza River granitoid suite rocks. Chondrite values from Taylor and McLennan (1985).



Figure: G-18

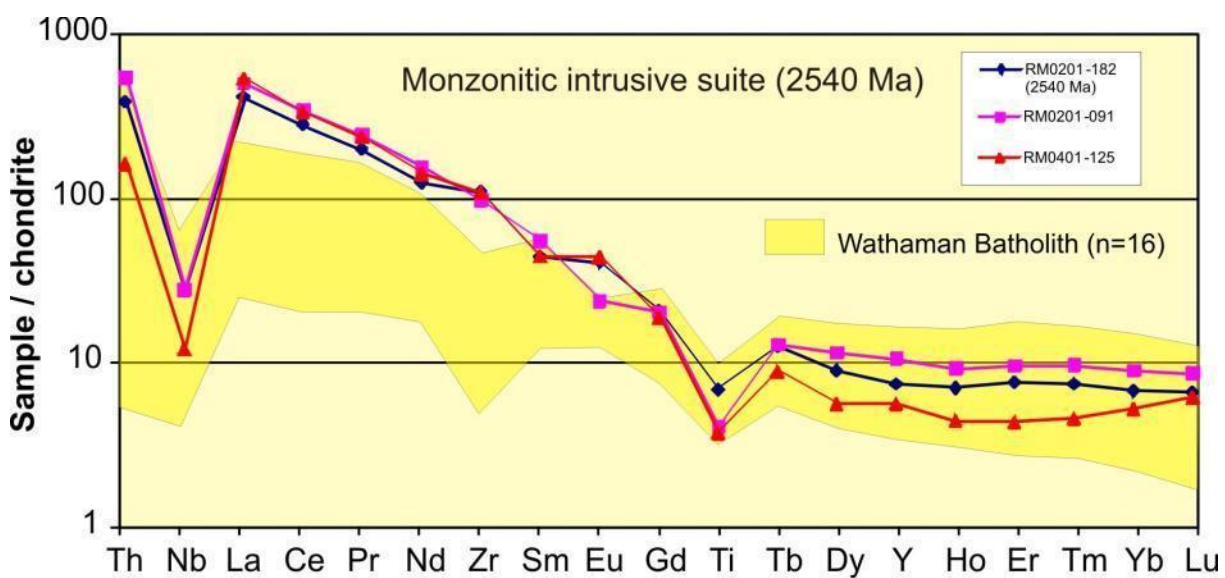


Figure G-18 – Chondrite-normalized spider diagrams of trace and rare earth element data for rocks of the monzonitic intrusive suite. Chondrite values from Taylor and McLennan (1985).



Figure: G-19

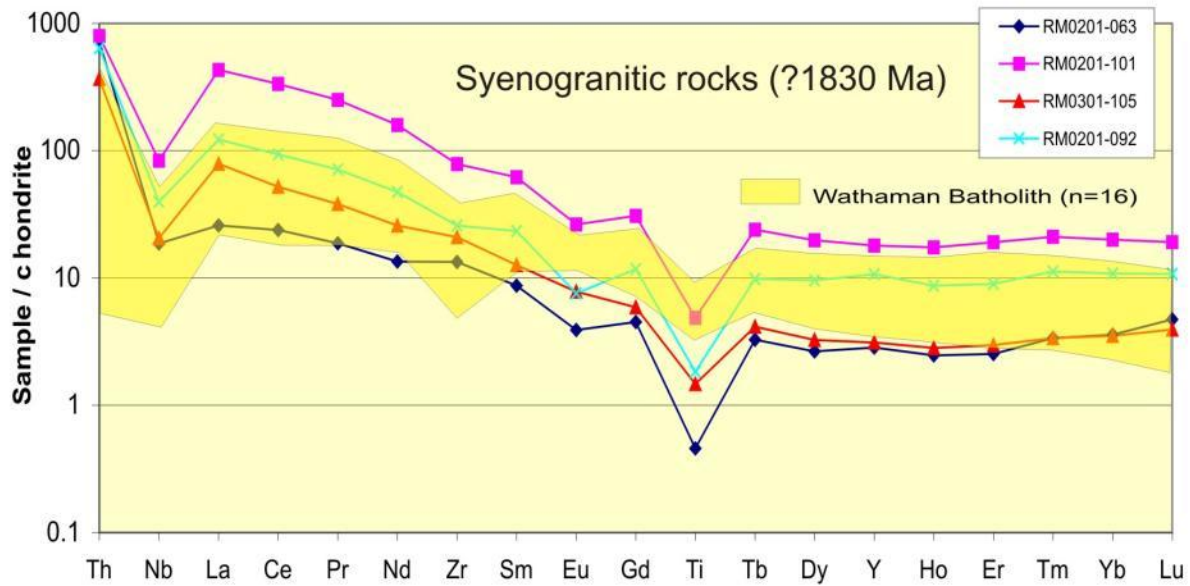


Figure G-19 – Chondrite-normalized spider diagrams of trace and rare earth element data for other intrusive rocks of the Peter Lake Domain. Chondrite values from Taylor and McLennan (1985).



Figure: G-20

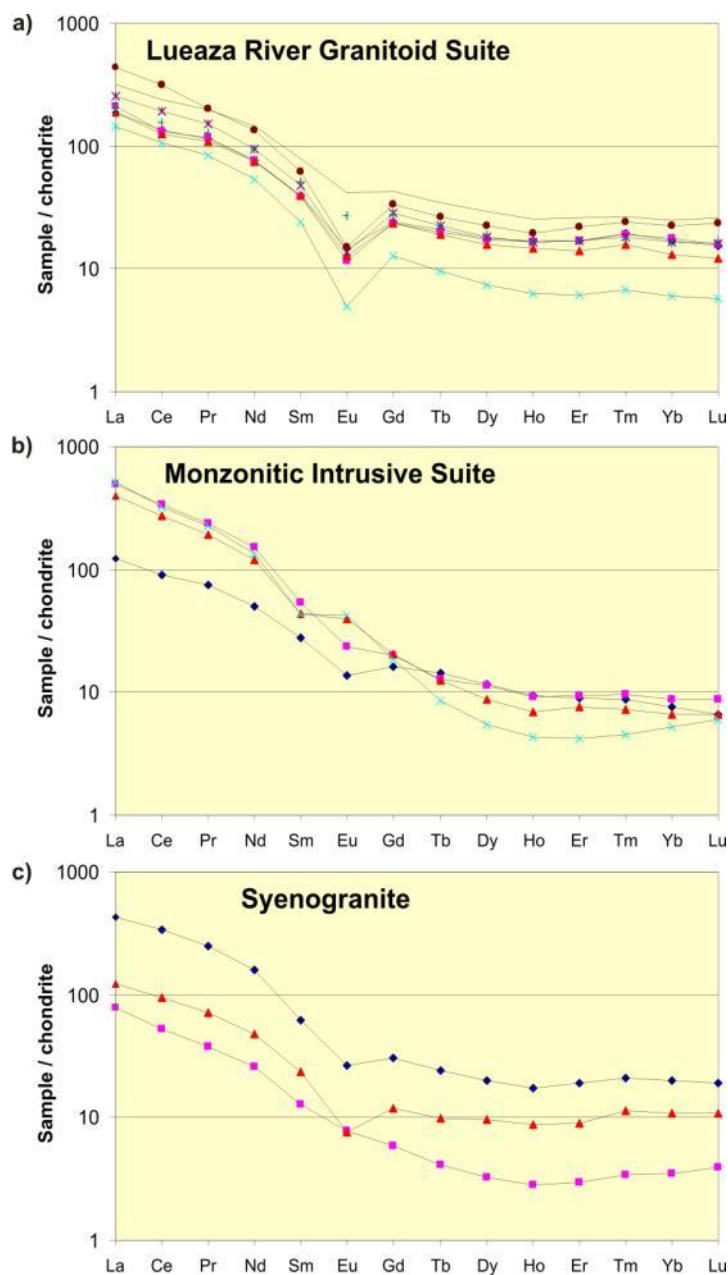


Figure G-20 – Chondrite-normalized spider diagrams of trace and rare earth element data for granitoid rocks of the Peter Lake Domain: a) Lueza River granitoid suite, b) monzonitic intrusive suite, and c) syenogranite (other intrusive rocks). Chondrite values from Taylor and McLennan (1985).



Figure: G-21

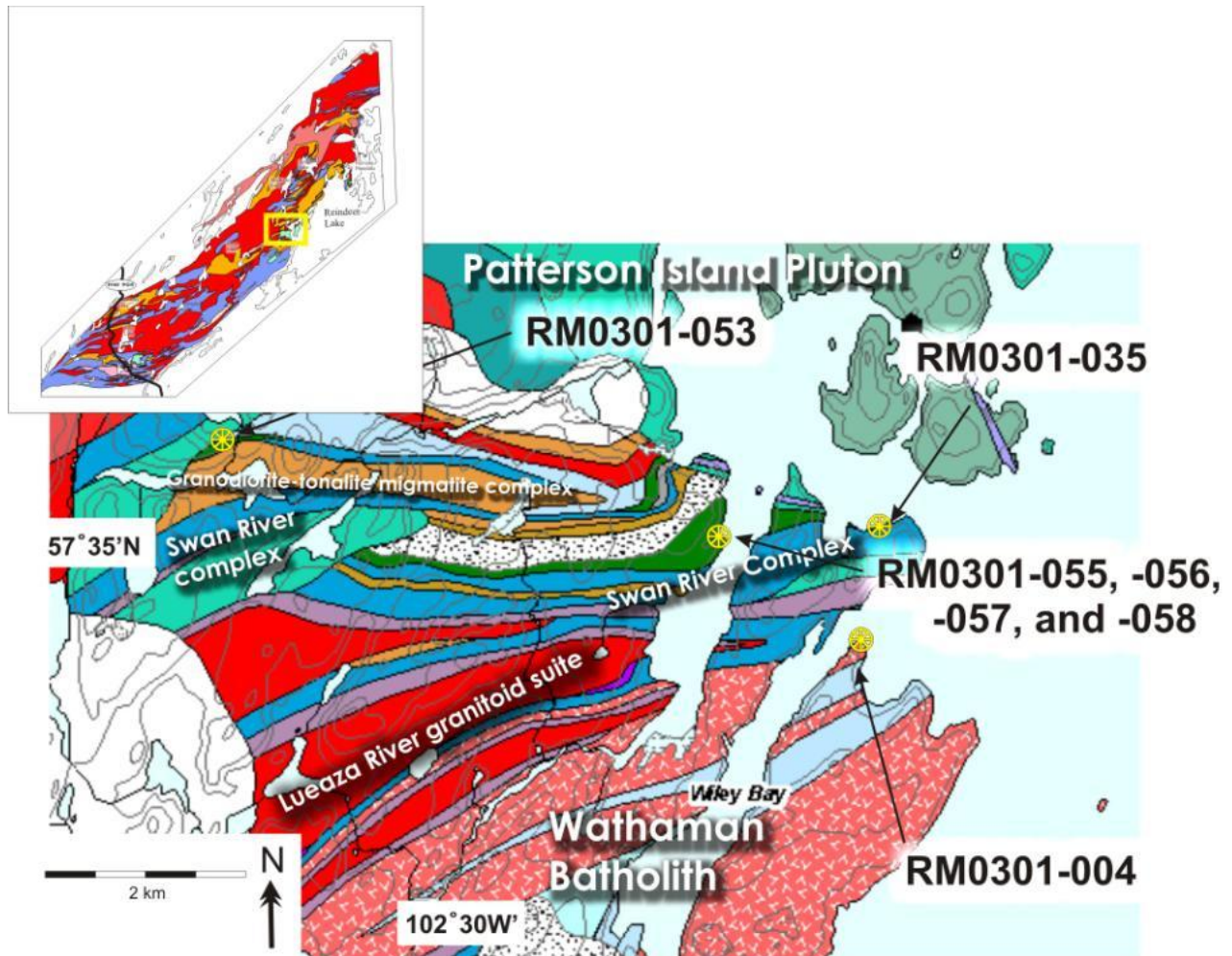


Figure G-21 – Simplified geology of the Patterson Island area, showing lithogeochemical sample locations.



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Figure: G-22

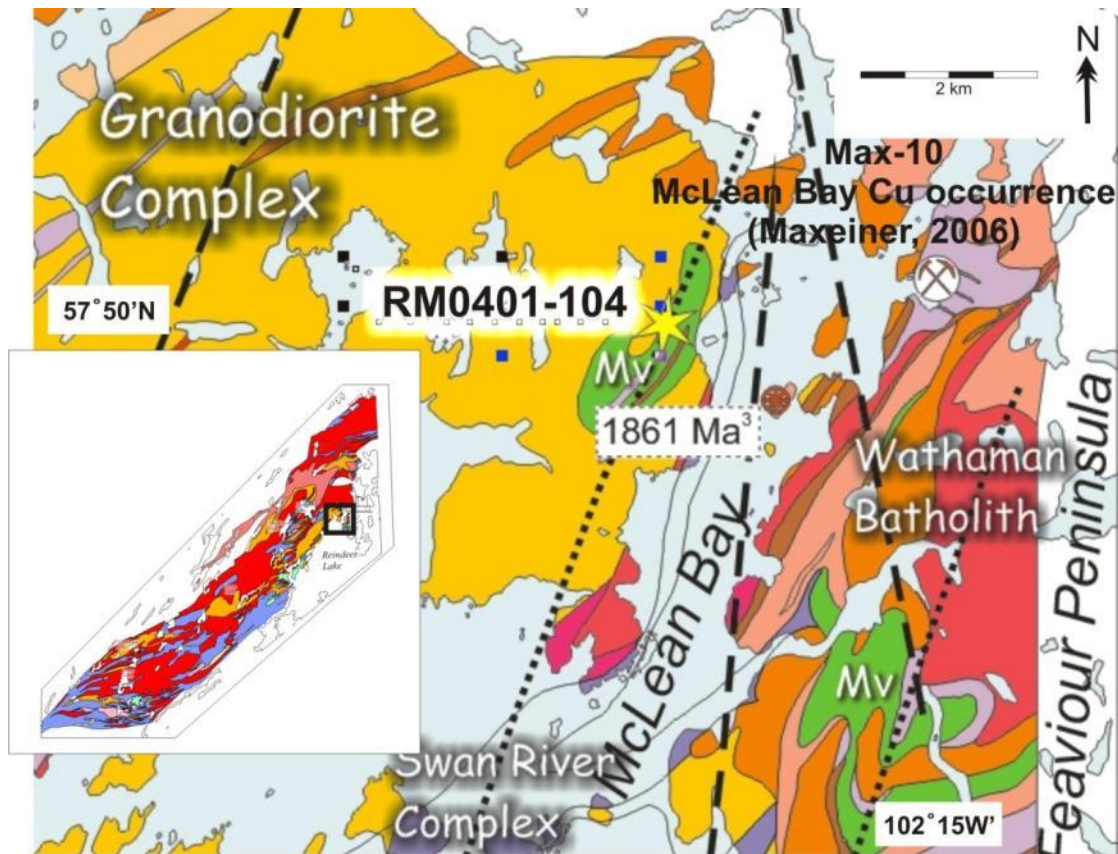


Figure G-22 – Simplified geology of the McLean Bay area, showing lithogeochemical sample locations.



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Figure: G-23

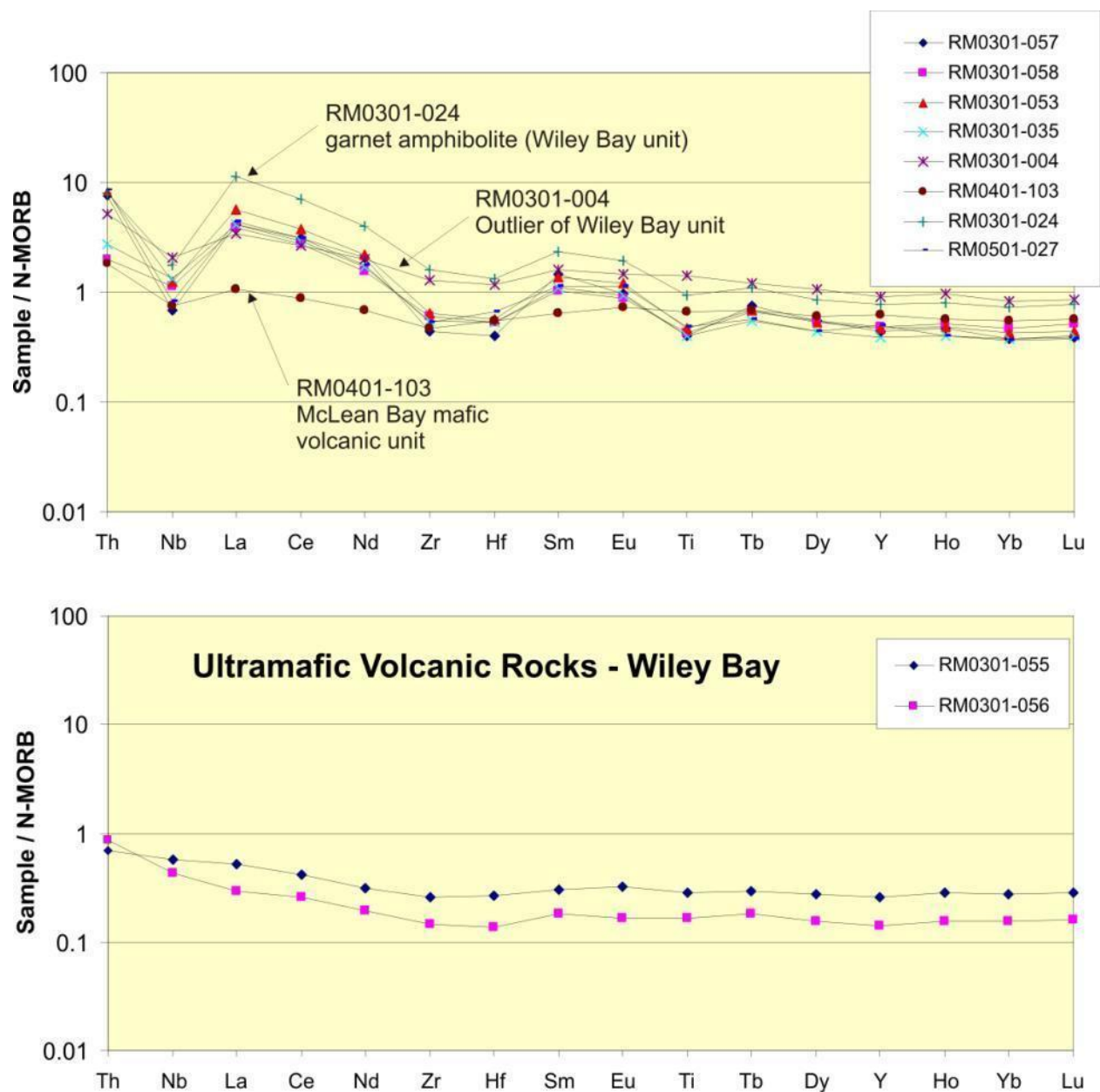


Figure G-23 – N-MORB–normalized spider diagrams of trace and rare earth element data for mafic-ultramafic rocks of the Peter Lake Domain: a) mafic and b) ultramafic rocks, Wiley Bay. N-MORB values from Hofmann (1988).



Figure: G-24



*Possible relict pillows in mafic volcanic rocks exposed in an unnamed bay west of Wiley Bay
(station RM03-18-ST16; sample location RM0301-057).*



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Figure: G-25



Figure G-25 – Porphyritic mafic dyke cutting the mafic volcanic rocks in Figure G-24 (station RM03-18-ST16; sample location RM0301-058).



Figure: G-26



Figure G-26 – Serpentinitized peridotite, interpreted as a postvolcanic intrusive sill (station RM03-18-ST16; sample location RM0301-056).



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Figure: G-27



Figure G-27 – More Fe-rich ultramafic rock, perhaps representing a different phase of the ultramafic rock pictured in Figure G-26 (station RM03-18-ST14; sample location RM0301-055).



Figure: G-28

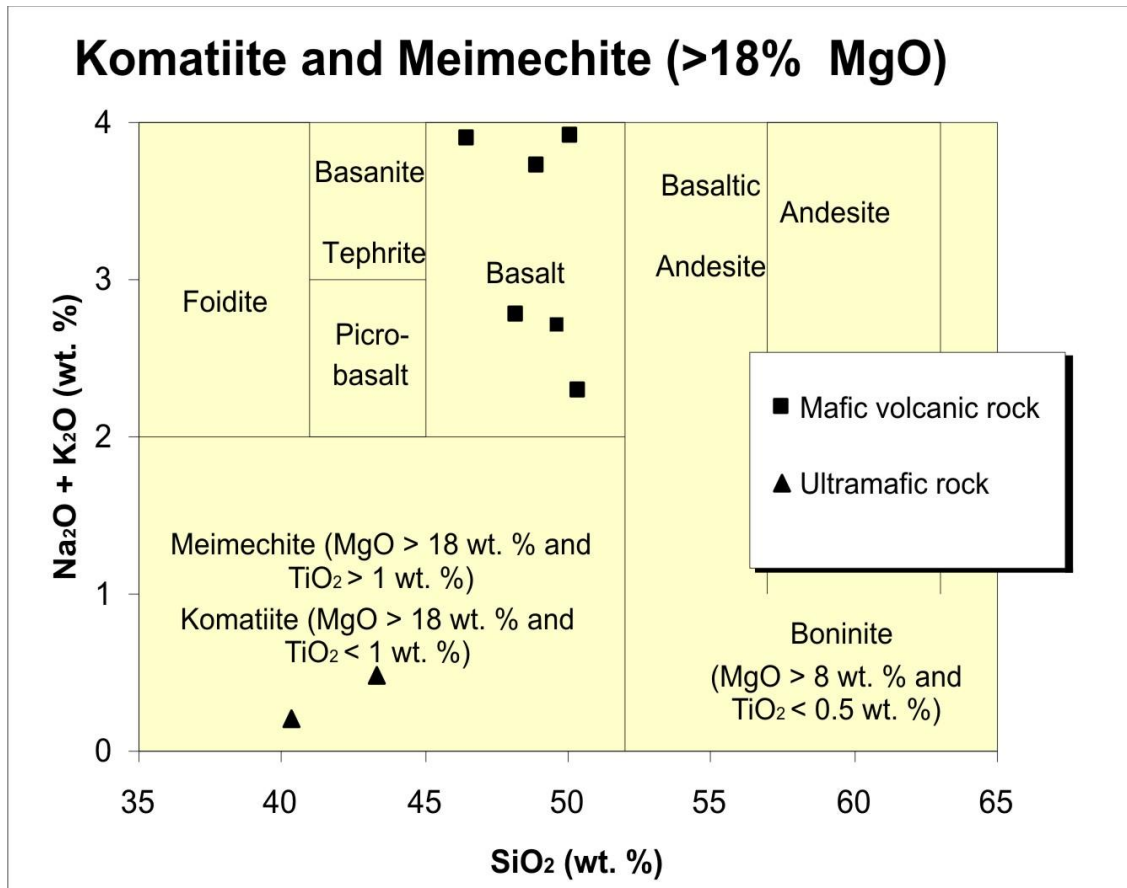


Figure G-28 – Classification diagram of ultramafic rocks after LeMaitre (1989). Triangles represent samples from the two ultramafic rocks; squares are from mafic volcanic rocks.



Figure: G-29

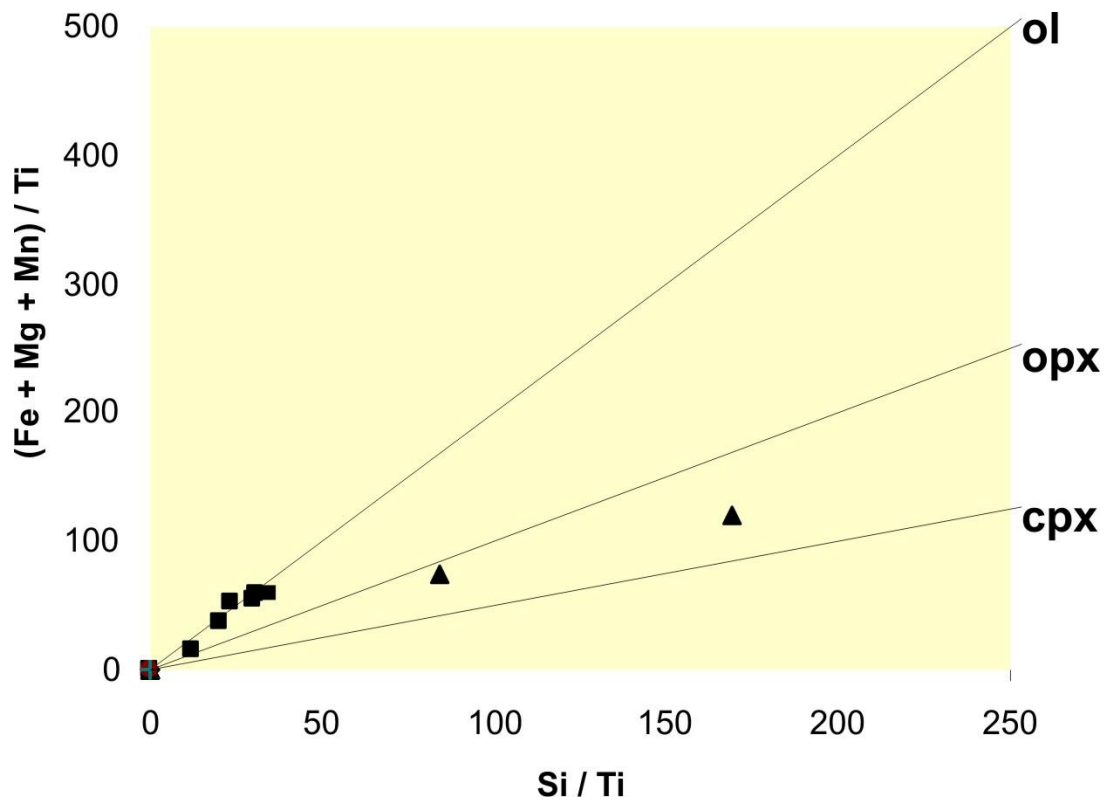


Figure G-29-Geochem-Mv-Pearce element – Pearce element ratio plot of data from the two Wiley Bay ultramafic units. Triangles represent samples from the two ultramafic rocks; squares are from mafic volcanic rocks.



Figure: G-30



Figure G-30 – Possible pillowed mafic volcanic rocks, showing highly stretched and flattened pillows, outlined by darker-coloured pillow selvages (station RM03-18-ST16).



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Figure: G-31

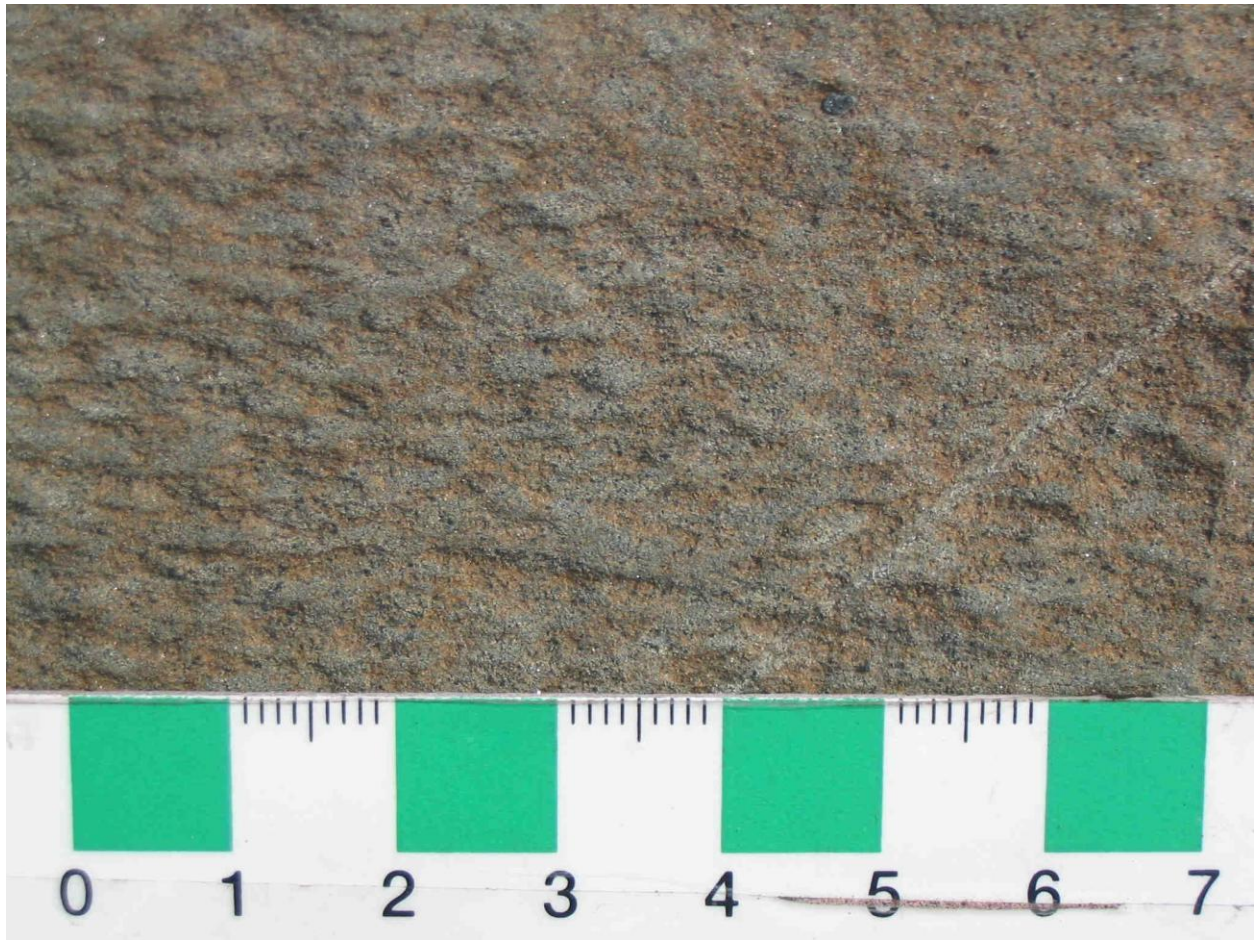


Figure G-31 – Close-up of serpentinitized peridotite, possibly showing original coarse-grained crystal outlines (station RM03-18-ST15).



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Figure: G-32

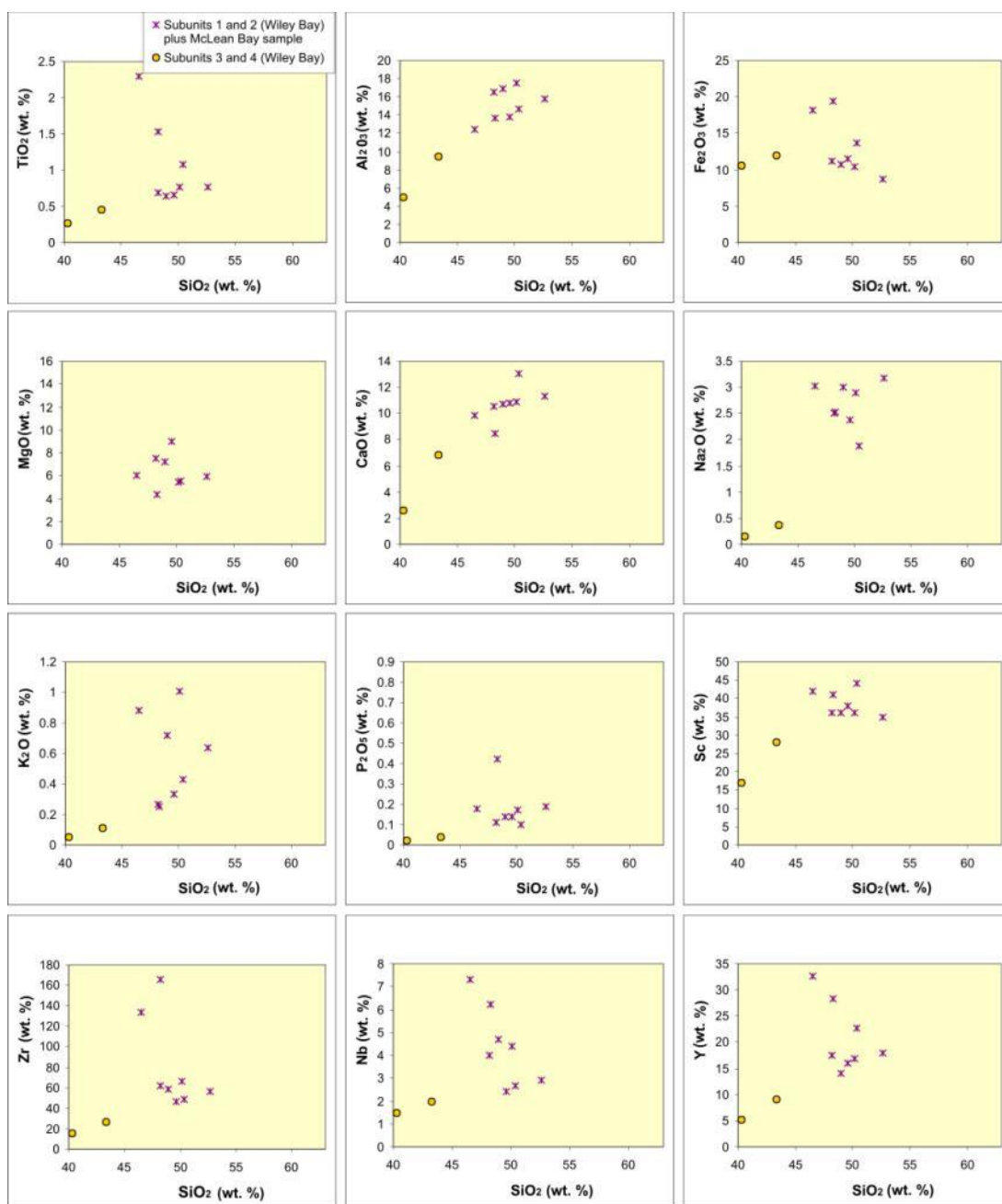


Figure G-32 – Harker plots of geochemical data from mafic volcanic rocks of the Peter Lake Domain.



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Figure: H-01

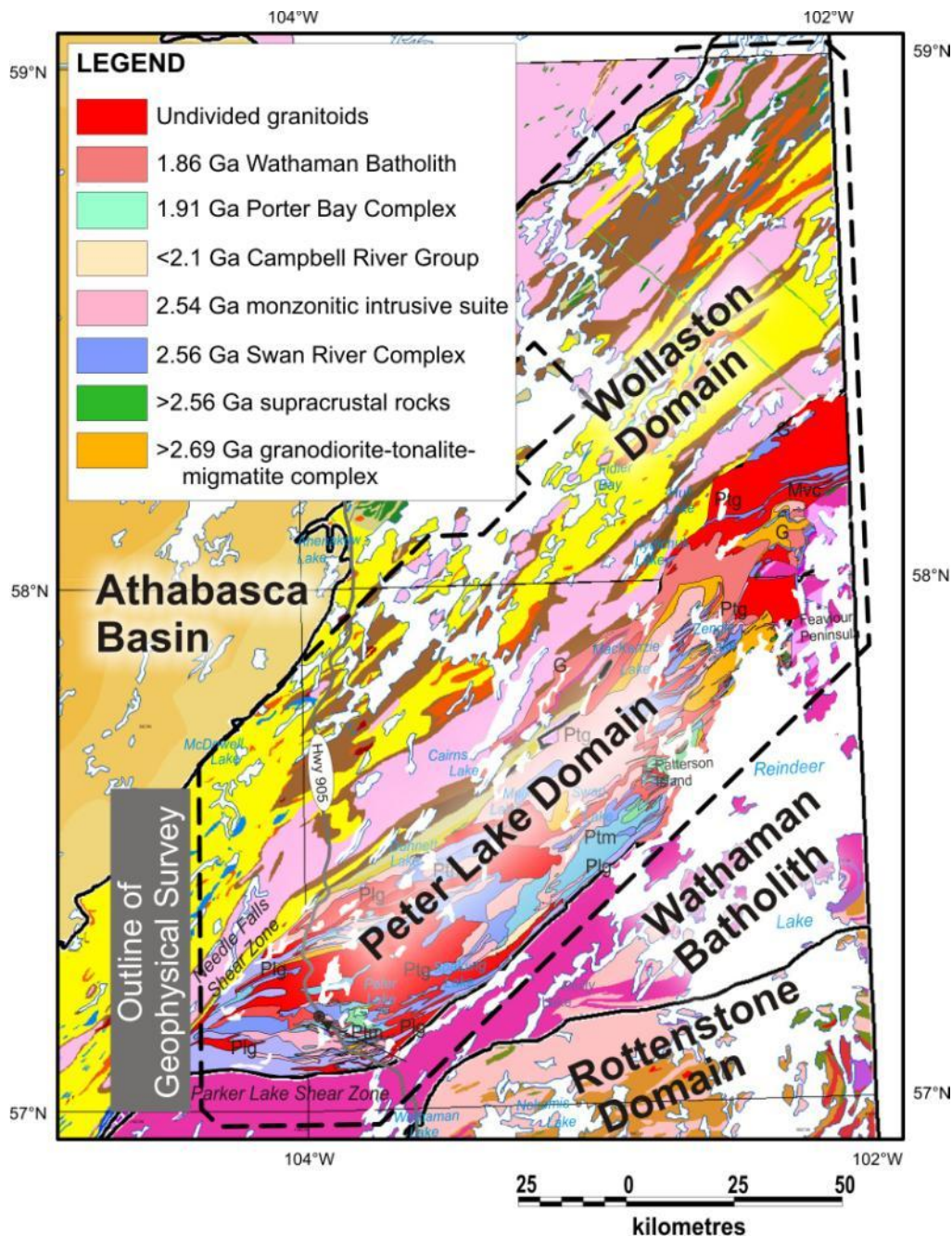


Figure H-01 – Outline of the 2003-2004 geophysical survey of the Peter Lake and Wollaston Lake areas.



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Figure: H-02

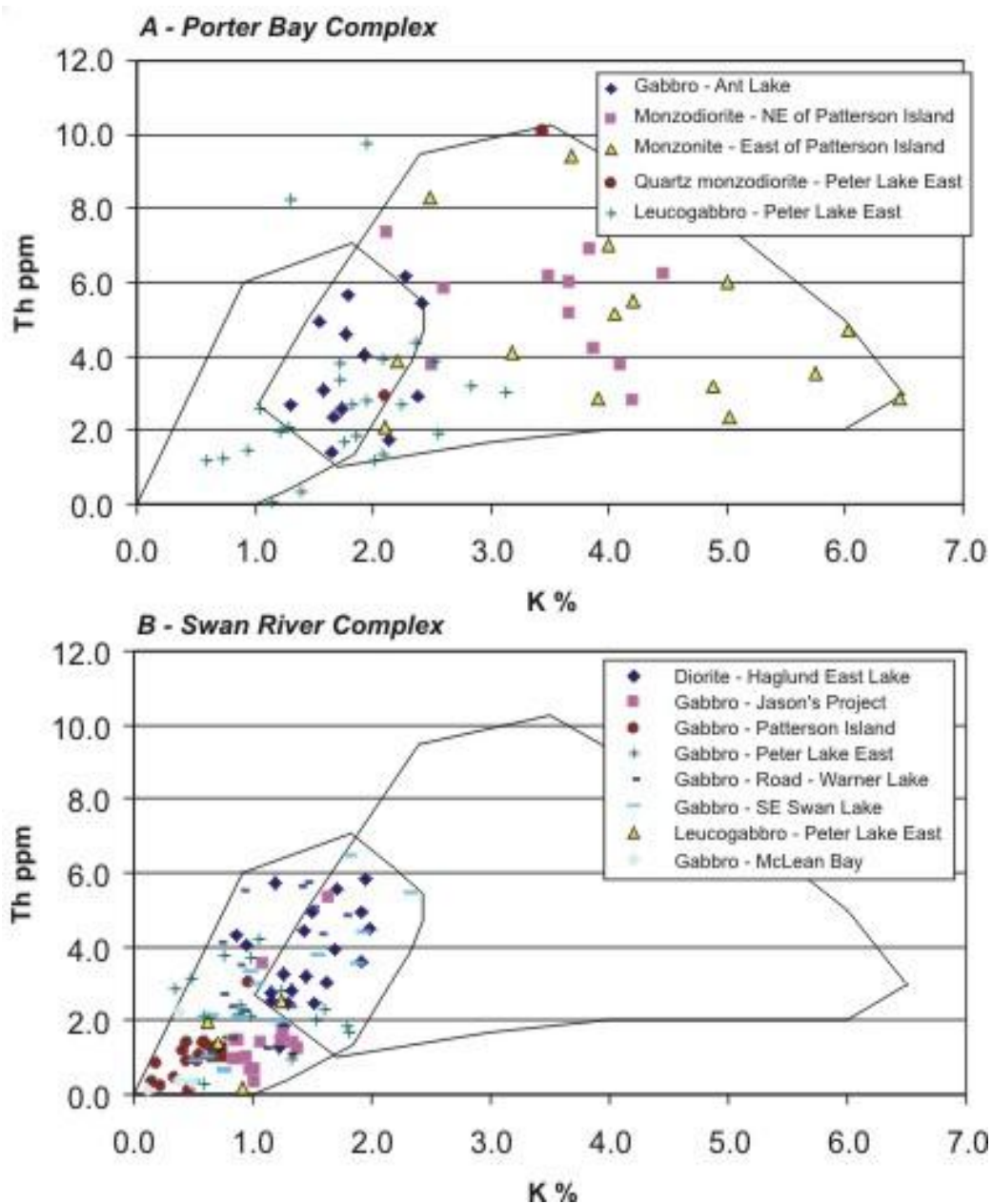


Figure H-02 – Radioactive element concentrations from ground gamma-ray spectrometric measurements of gabbroic, dioritic, and monzonitic rocks of the Porter Bay Complex (A) and Swan River Complex (B).



Figure: H-03

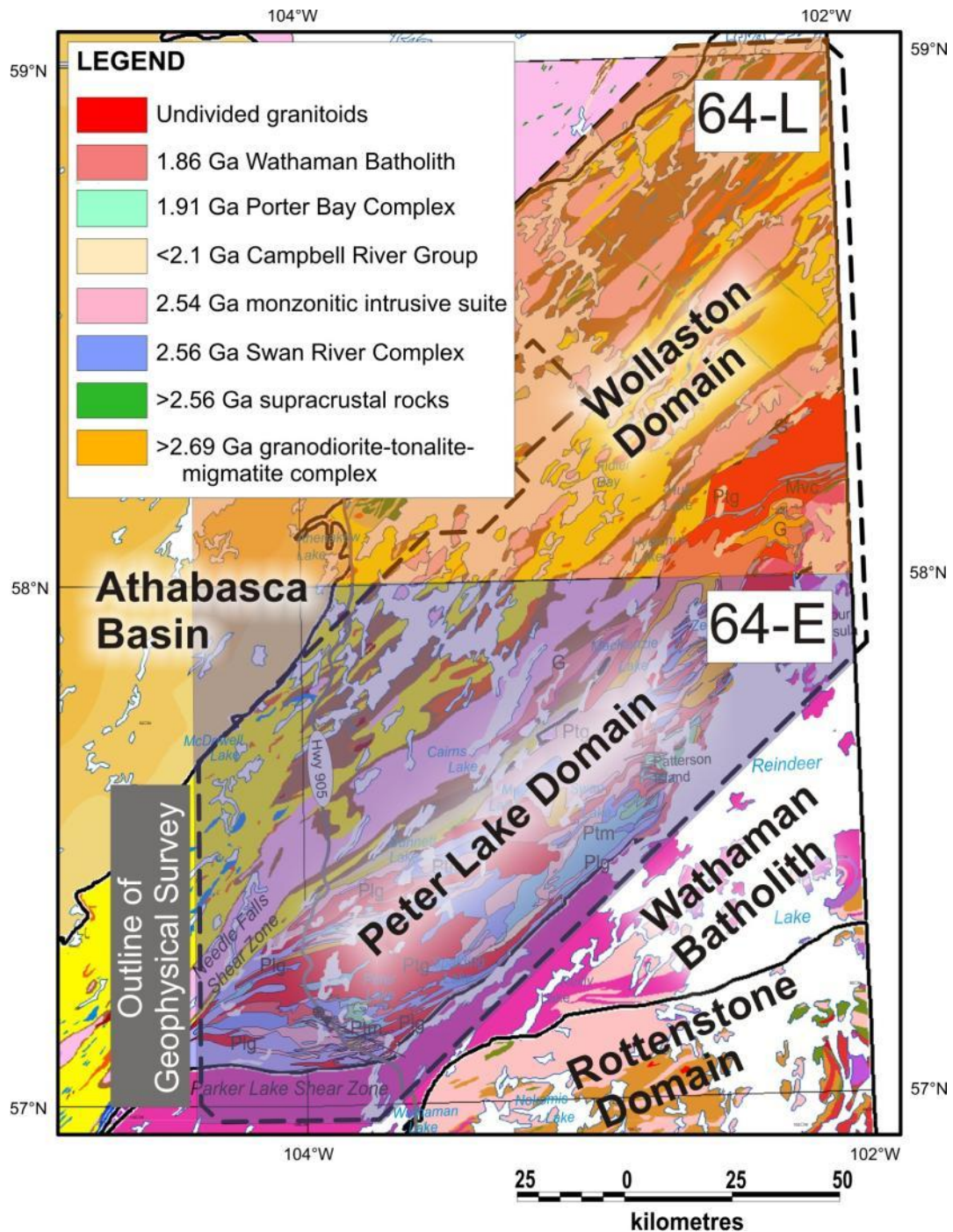


Figure H-03 – Area of the 2003-2004 geophysical survey of the Peter Lake and Wollaston Lake areas with links to the magnetic first vertical derivative maps (1:250 000 scale).



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Figure: H-04

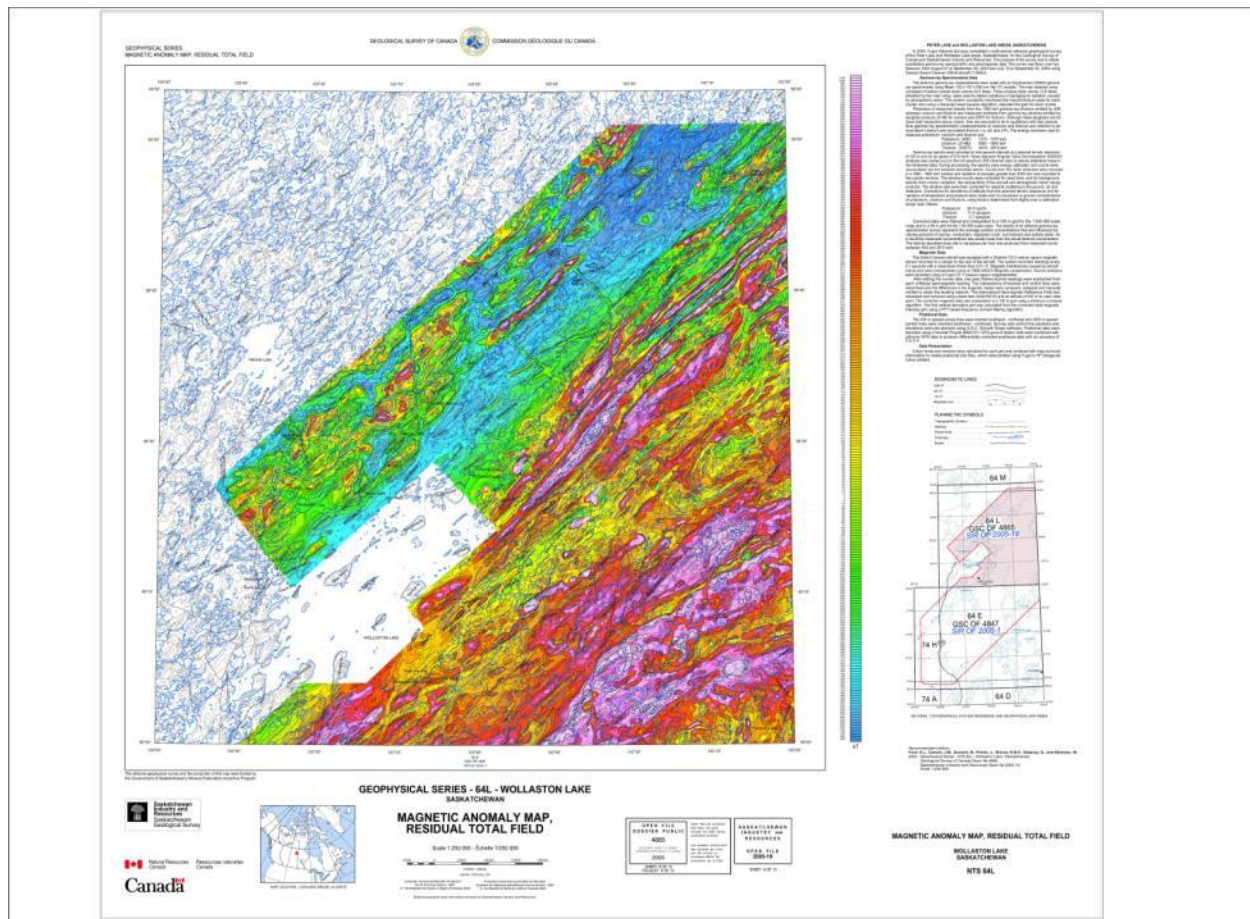


Figure H-04 – Magnetic anomaly map, residual total field, Wollaston Lake area; GSC Open File 4865-09.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-05

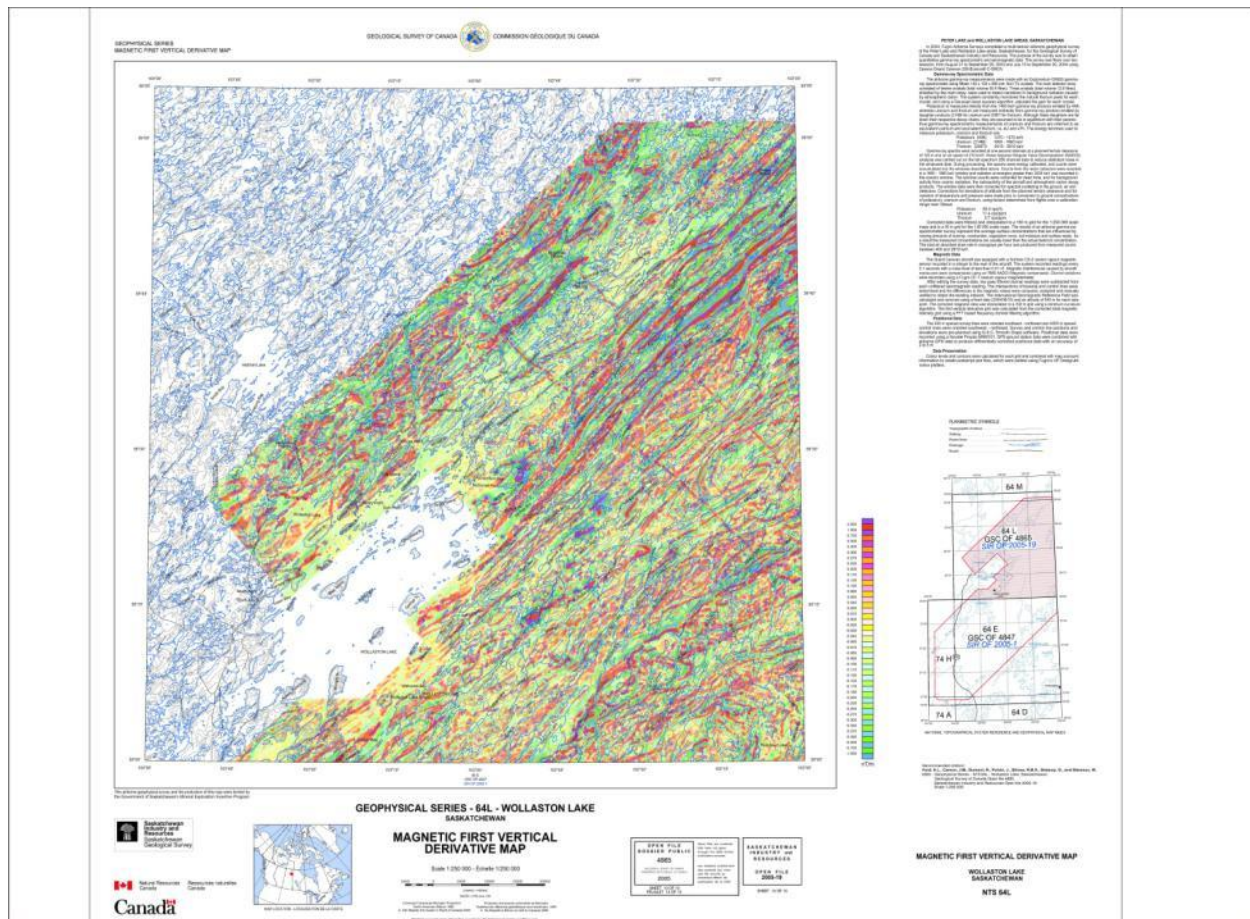


Figure H-05 – Magnetic first vertical derivative map, Wollaston Lake area; GSC Open File 4865-10.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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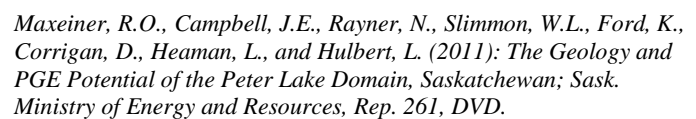


Figure: H-07

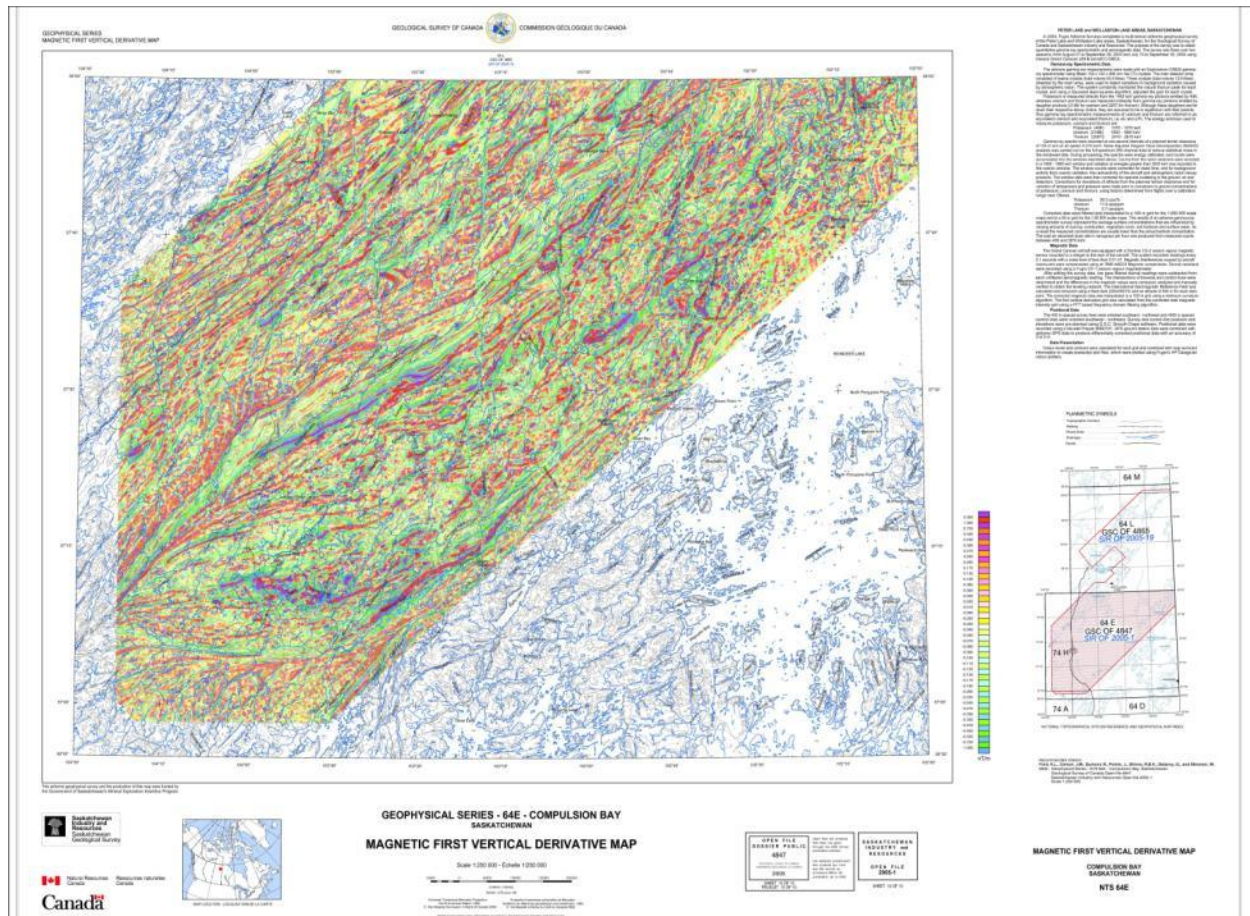


Figure H-07 – Magnetic first vertical derivative map, Compulsion Bay area GSC Open File 4847-10.

Original Size Map available at: [\Report_261\Doc\pdf-geophysics](#)



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Figure: H-08

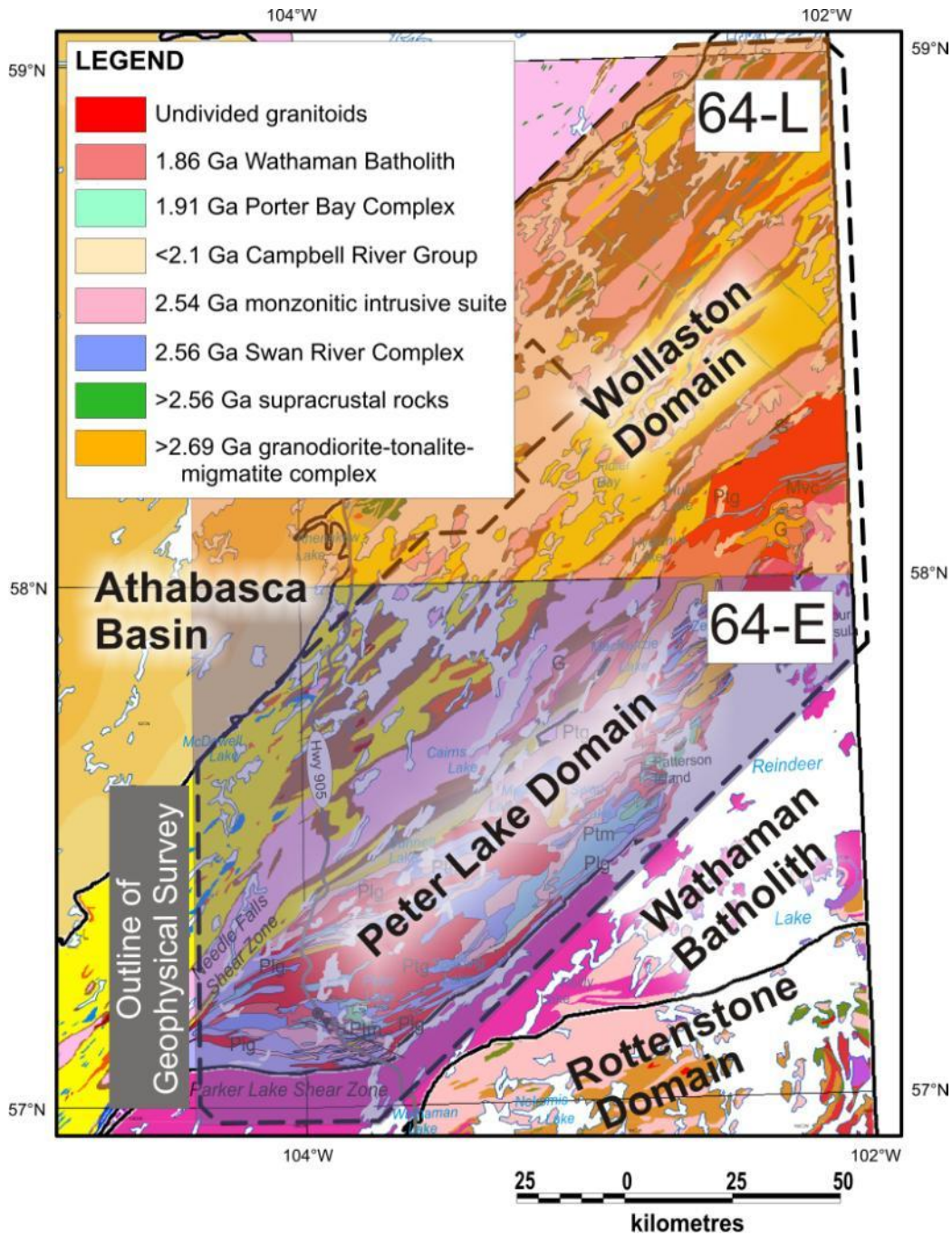


Figure H-08 – Area of the 2003-2004 geophysical survey of the Peter Lake Domain with links to the resultant ternary radioelement maps (1:250 000 scale).



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Figure: H-09

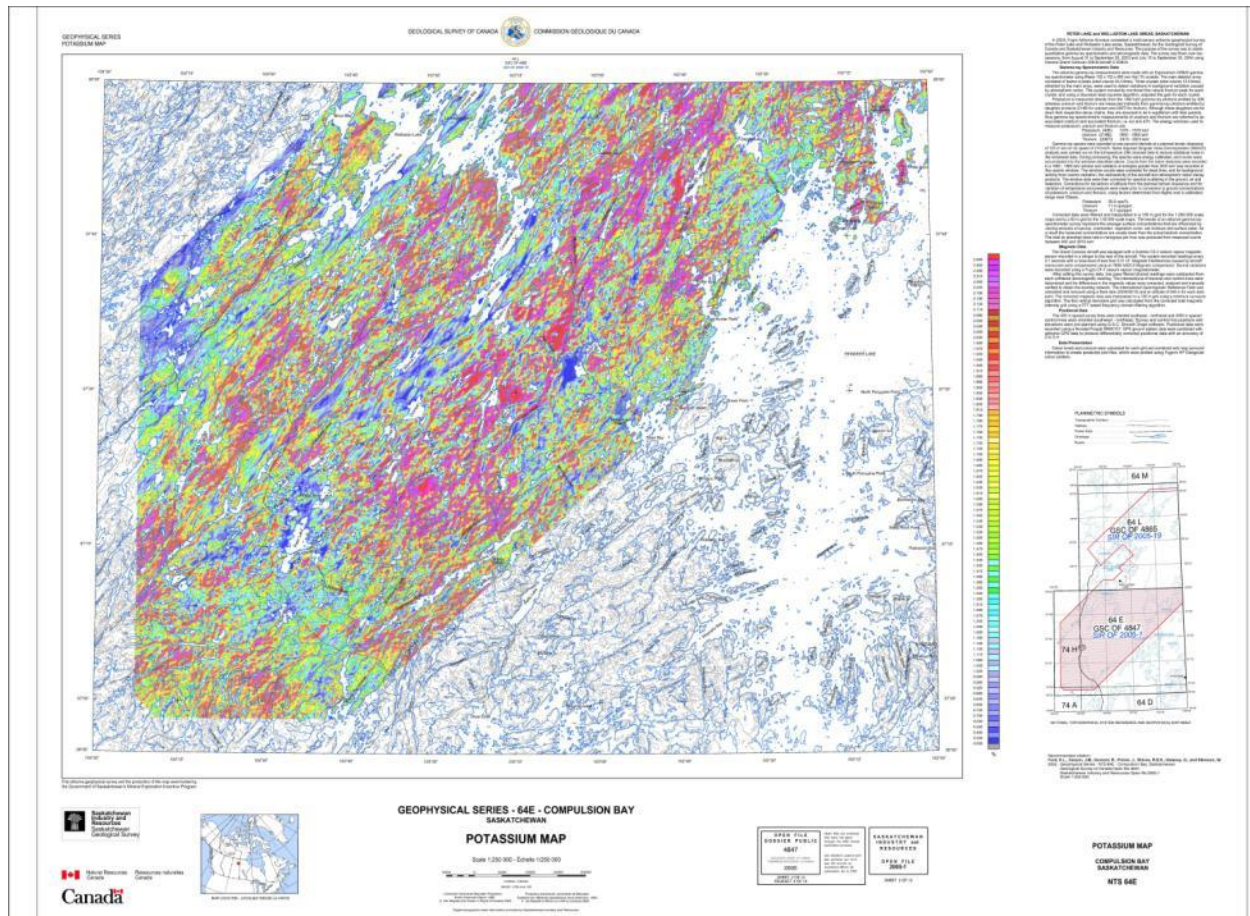


Figure H-09 – Potassium map, Wollaston Lake area; GSC Open File 4865-02.

Original Size Map available at: [\Report_261\Doc\pdf-geophysics](#)



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Figure: H-10

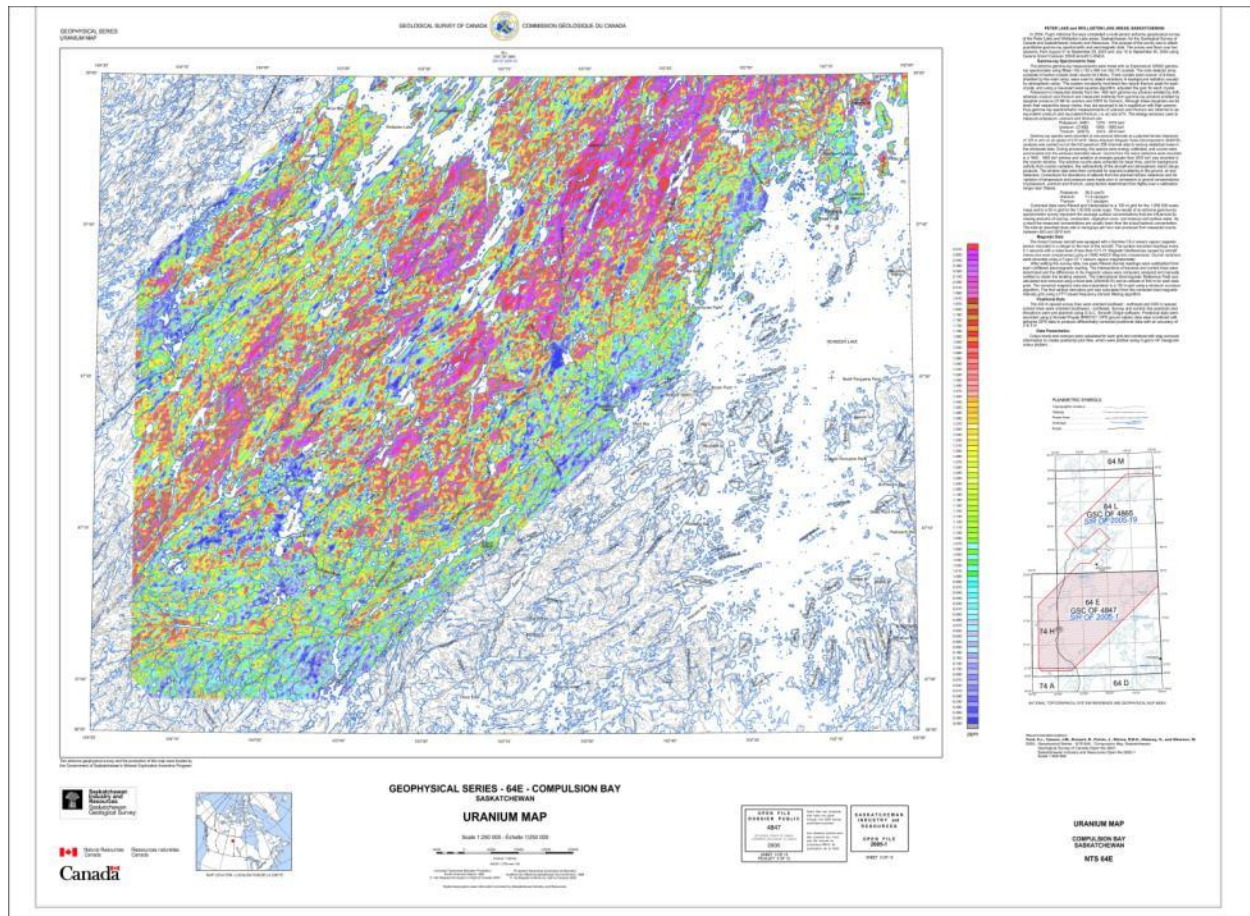


Figure H-10 – Uranium map, Wollaston Lake area; GSC Open File 4865-03.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-11

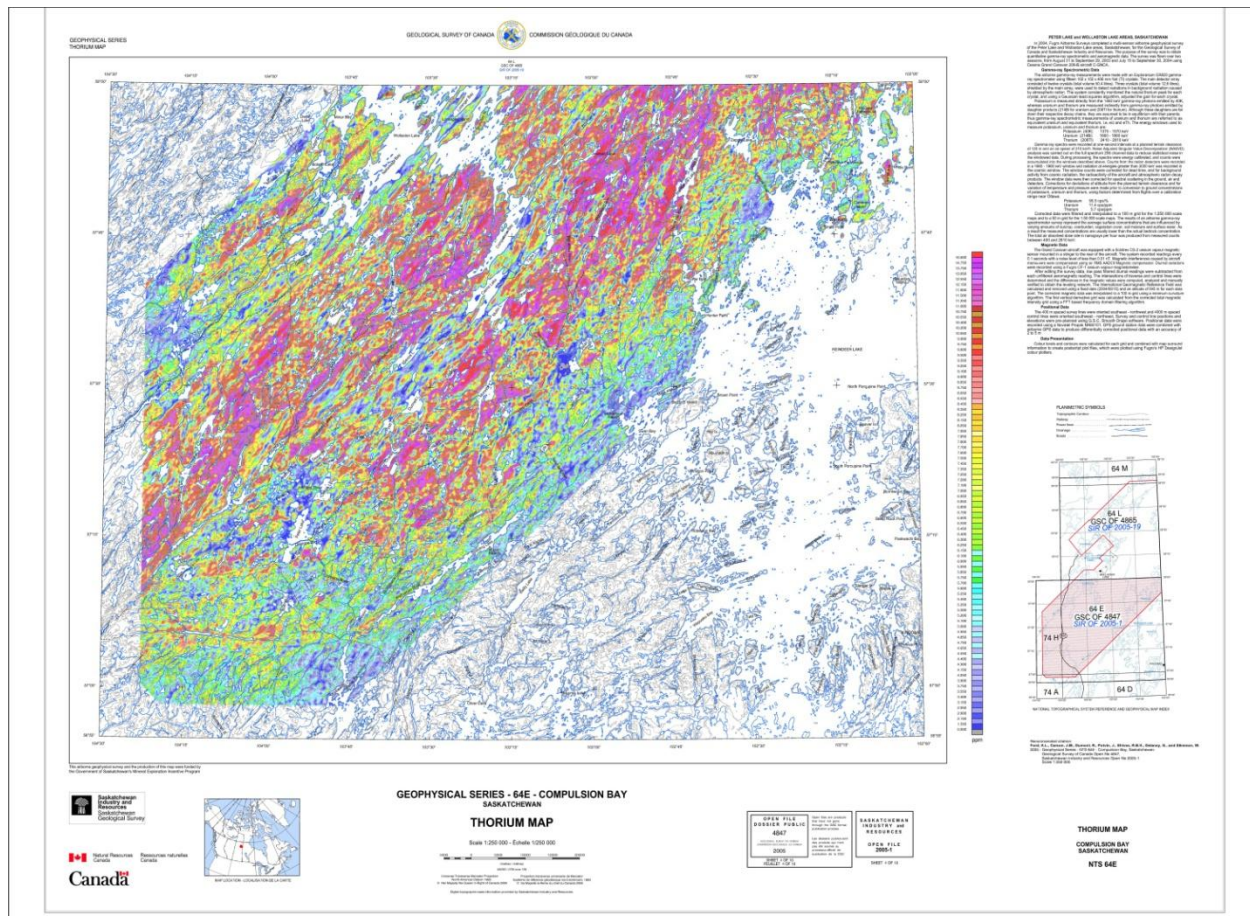


Figure H-11 – Thorium map, Wollaston Lake area; GSC Open File 4865-04.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-12

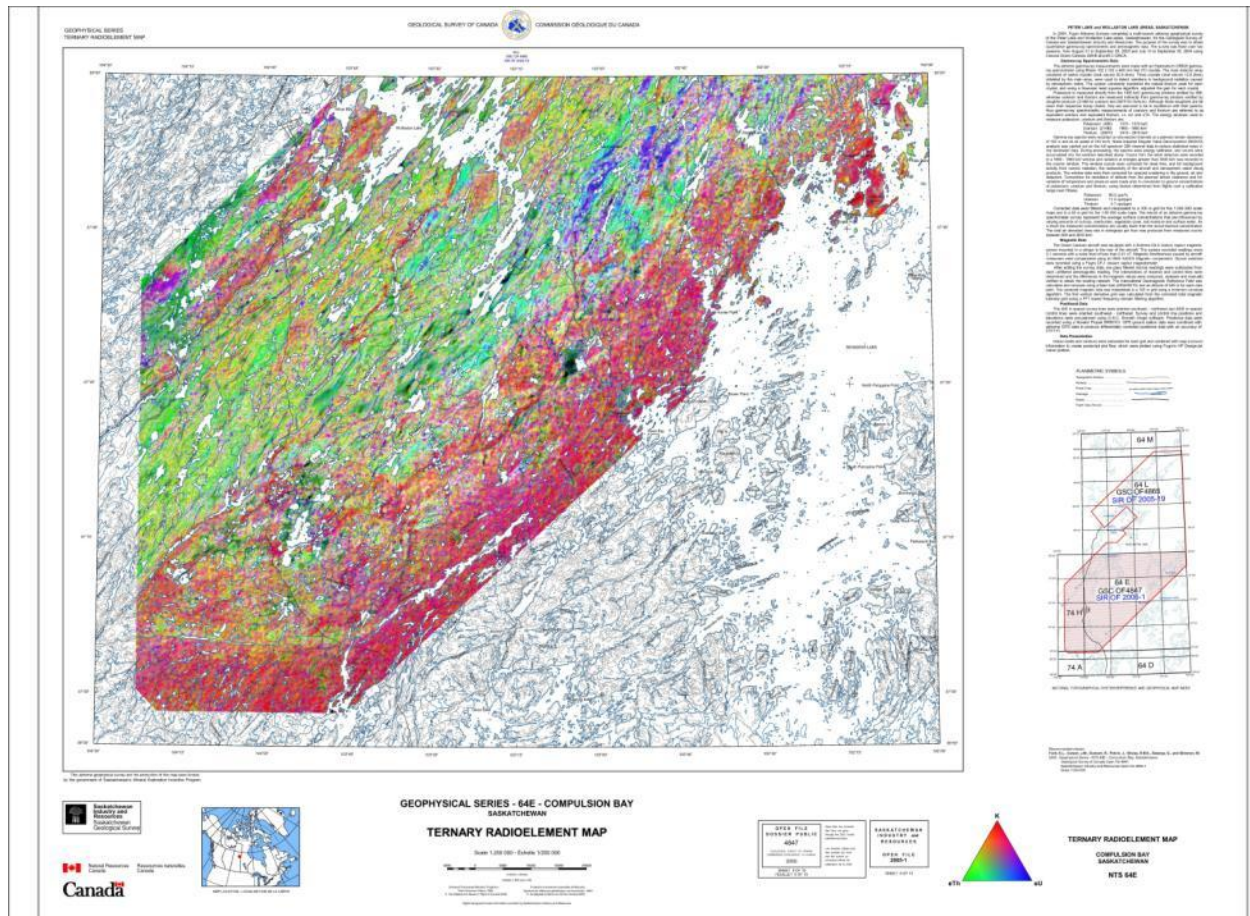


Figure H-12 – Ternary radioelement (K, eU, eTh) map, Wollaston Lake area; GSC Open File 4865-08.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-13

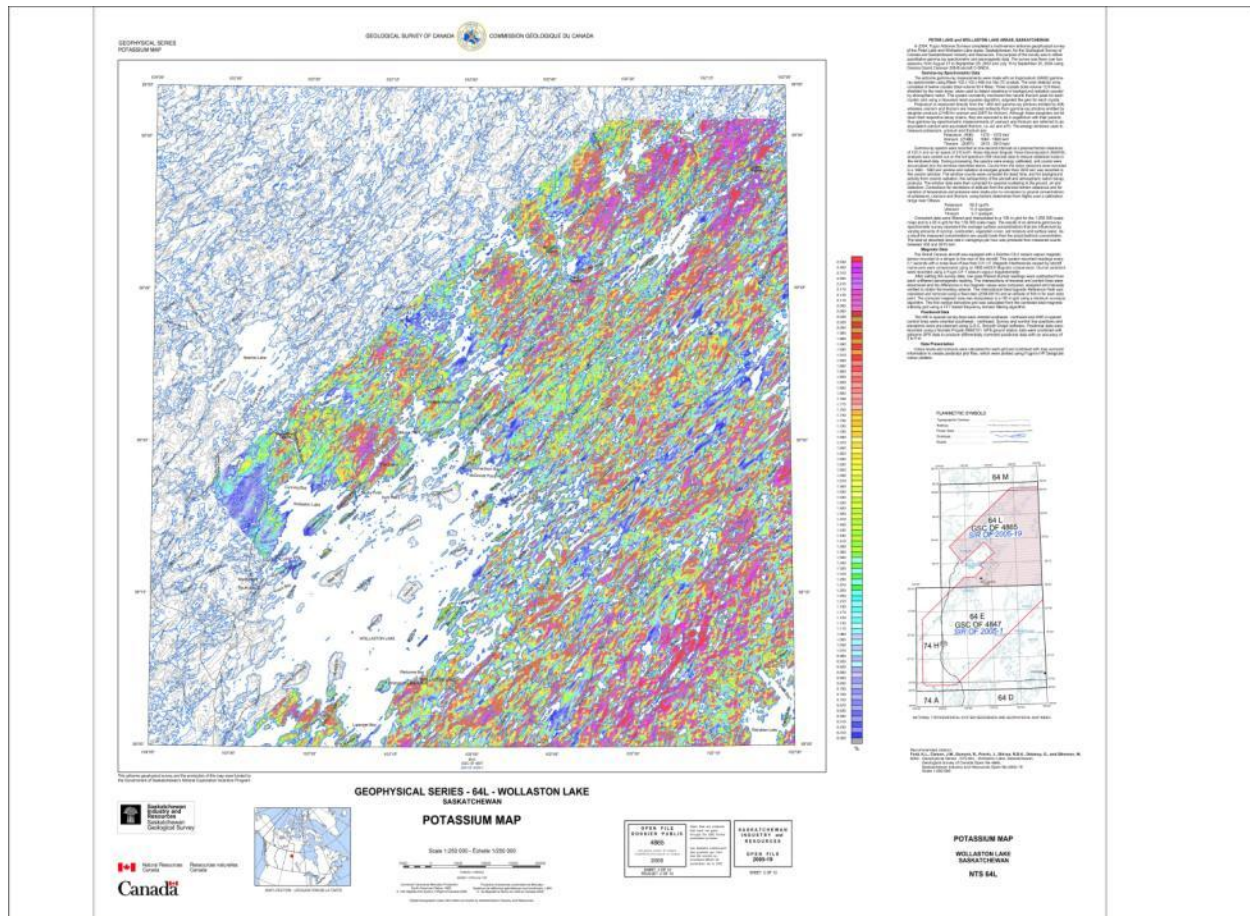


Figure H-13 – Potassium map, Compulsion Bay area; GSC Open File 4847-02.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-14

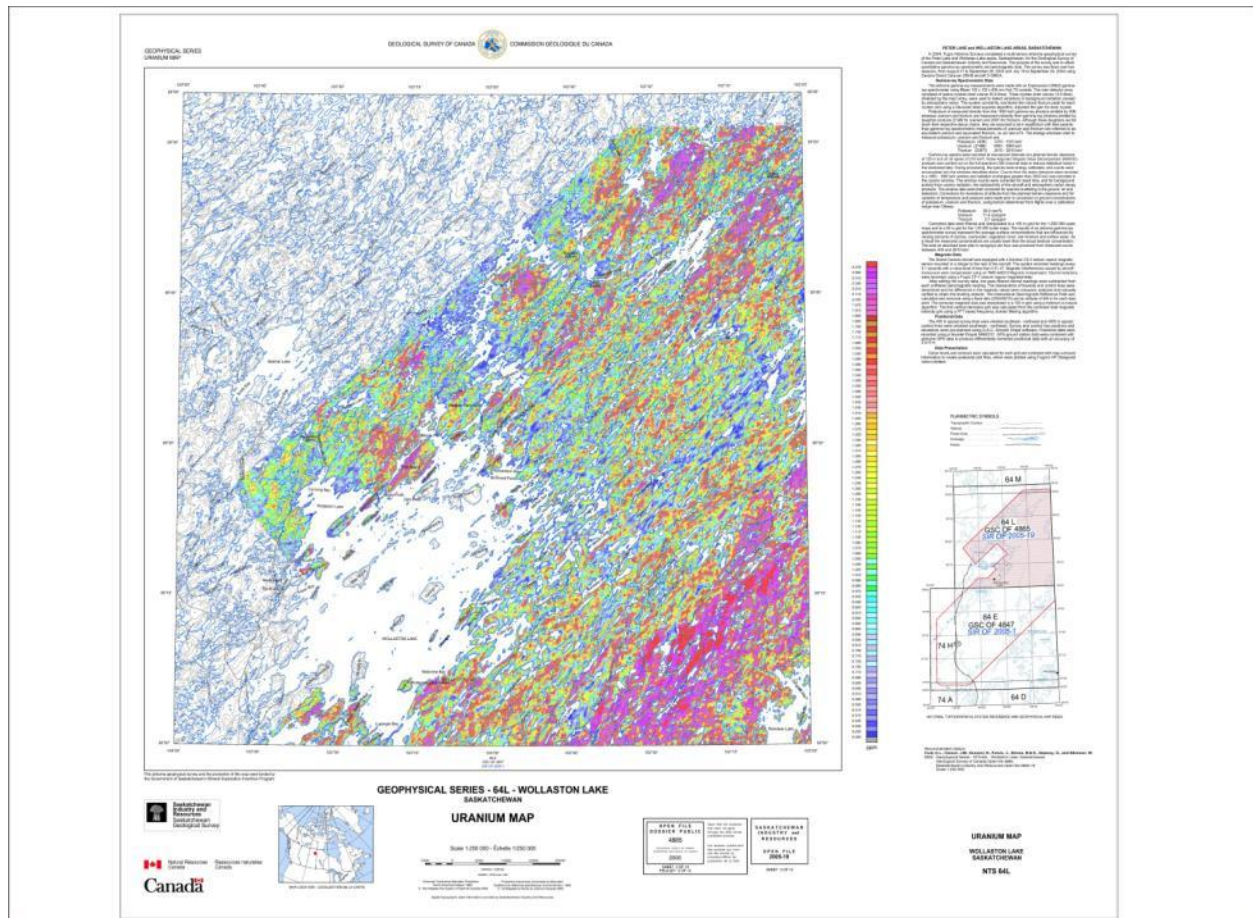


Figure H-14 – Uranium map, Compulsion Bay area; GSC Open File 4847-03.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-15

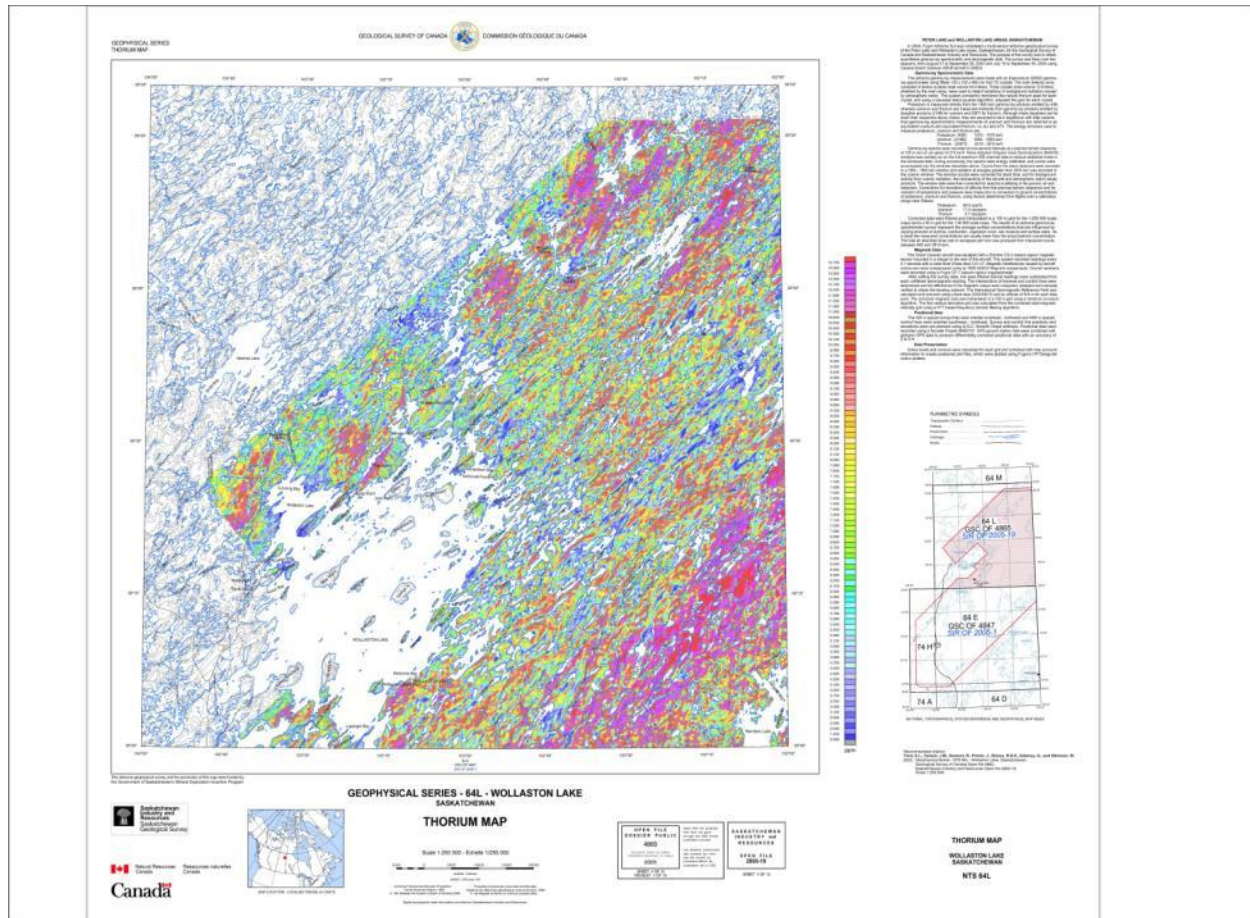


Figure H-15 – Thorium map, Compulsion Bay area; GSC Open File 4847-04.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-16

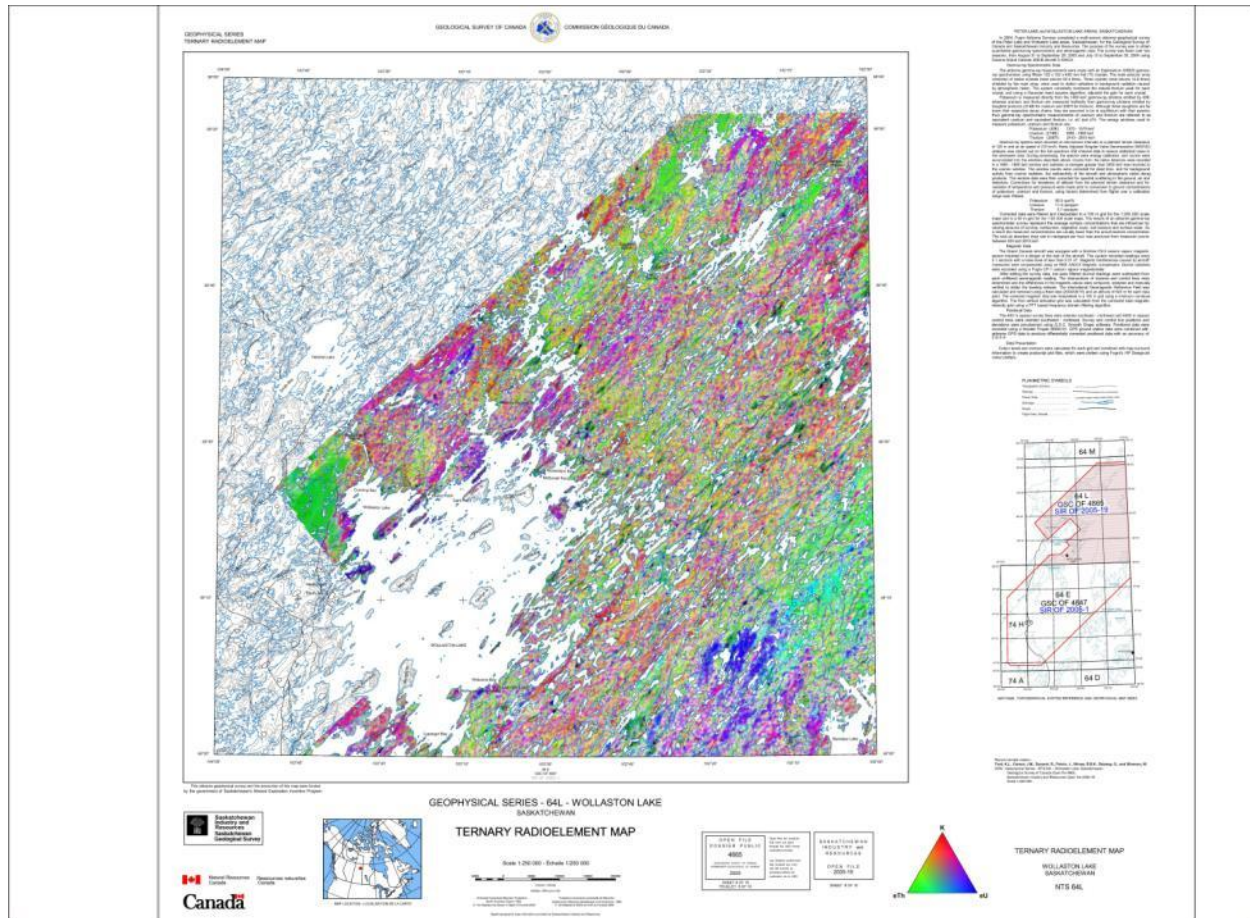


Figure H-16 – Ternary radioelement (K, eU, eTh) map, Compulsion Bay area; GSC Open File 4847-08.

Original Size Map available at: \Report_261\Doc\pdf-geophysics



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Figure: H-17

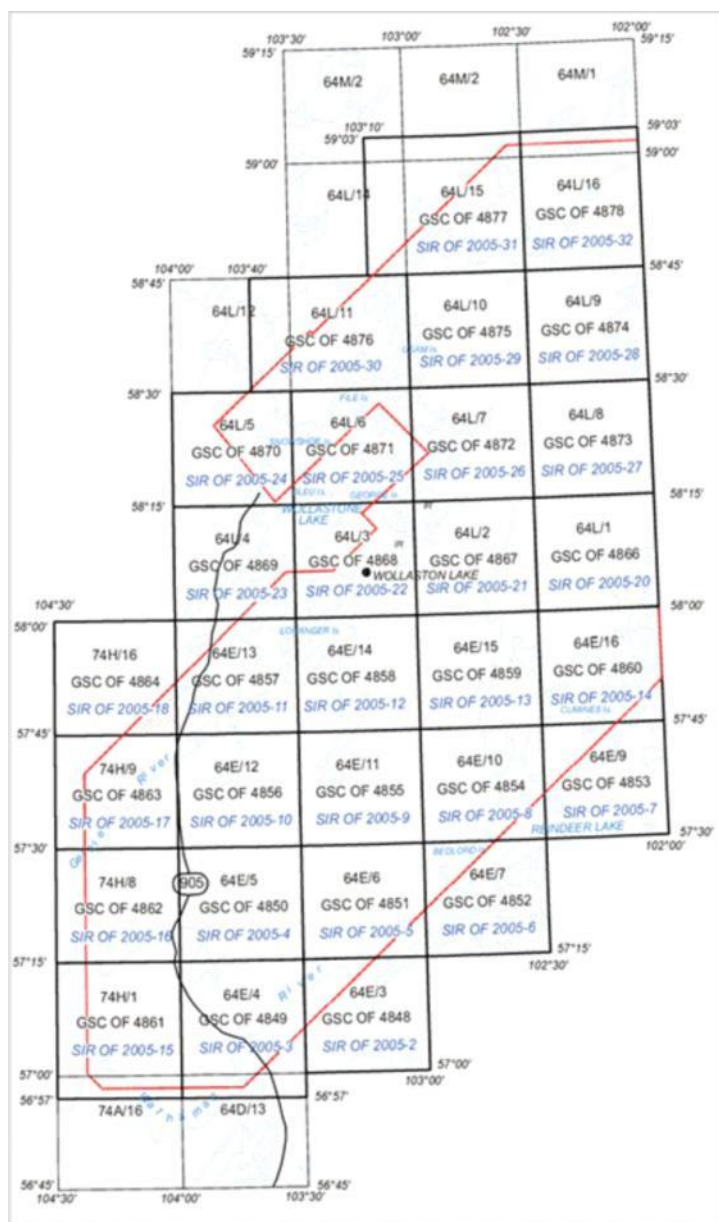


Figure H-17 – Areas of the individual 1:50 000 scale geophysical Open files, Compulsion Bay and Wollaston Lake areas (Ford et al., 2005c). Abbreviations: GSC, Geological Survey of Canada; OF, Open File; and SIR, Saskatchewan Industry and Resources.



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Figure: I-01

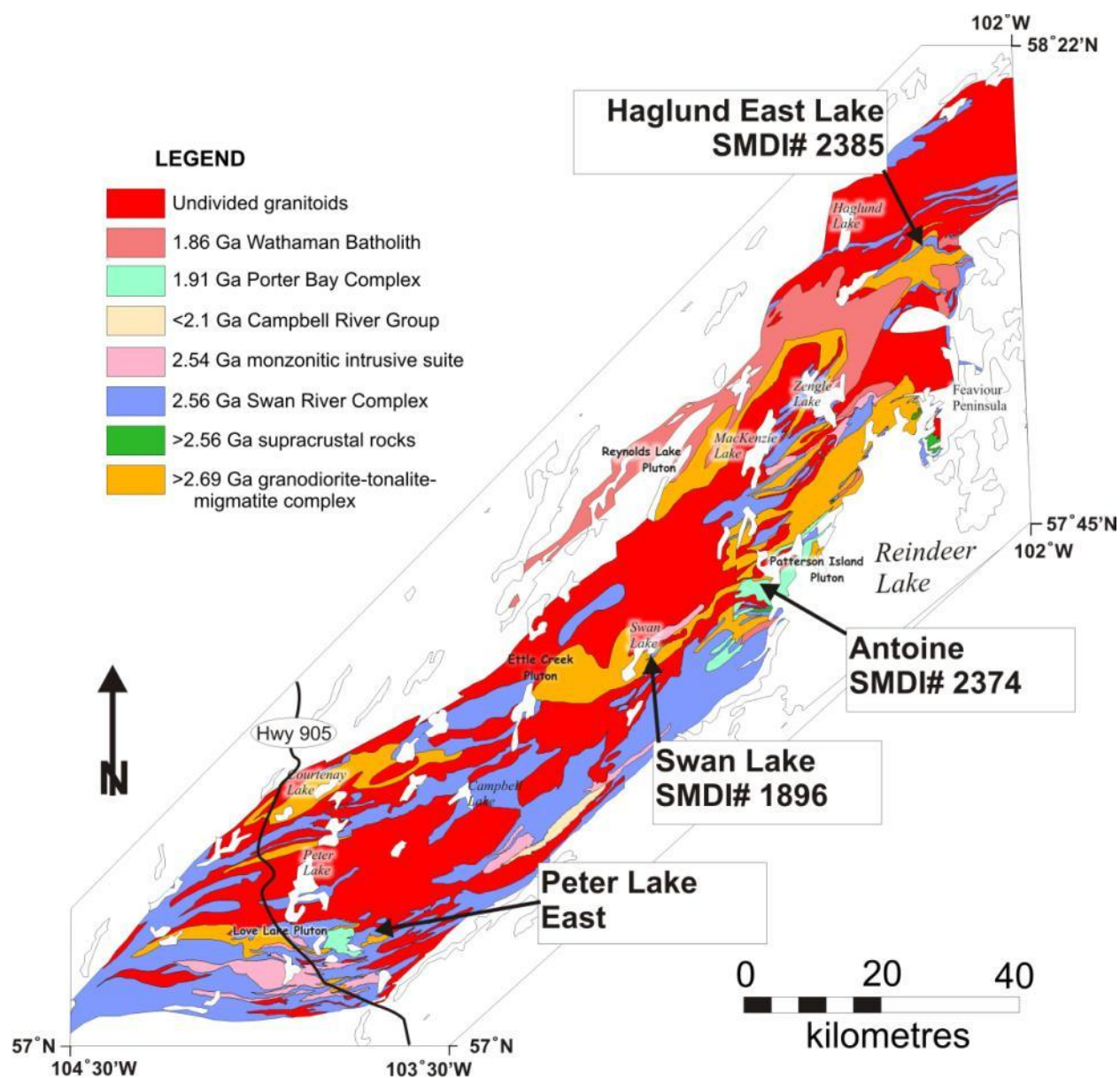


Figure I-01 – Locations of the most notable platinum-group-element occurrences in the Peter Lake Domain. Click on occurrence label to see photographs. Abbreviation: SMDI, Saskatchewan Mineral Deposits Index.



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Figure: I-02



Figure I-02 – Trench at the Haglund East Lake Cu occurrence, Haglund East Lake (unofficial place name) are (station RM05-30-ST04).



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Figure: I-03

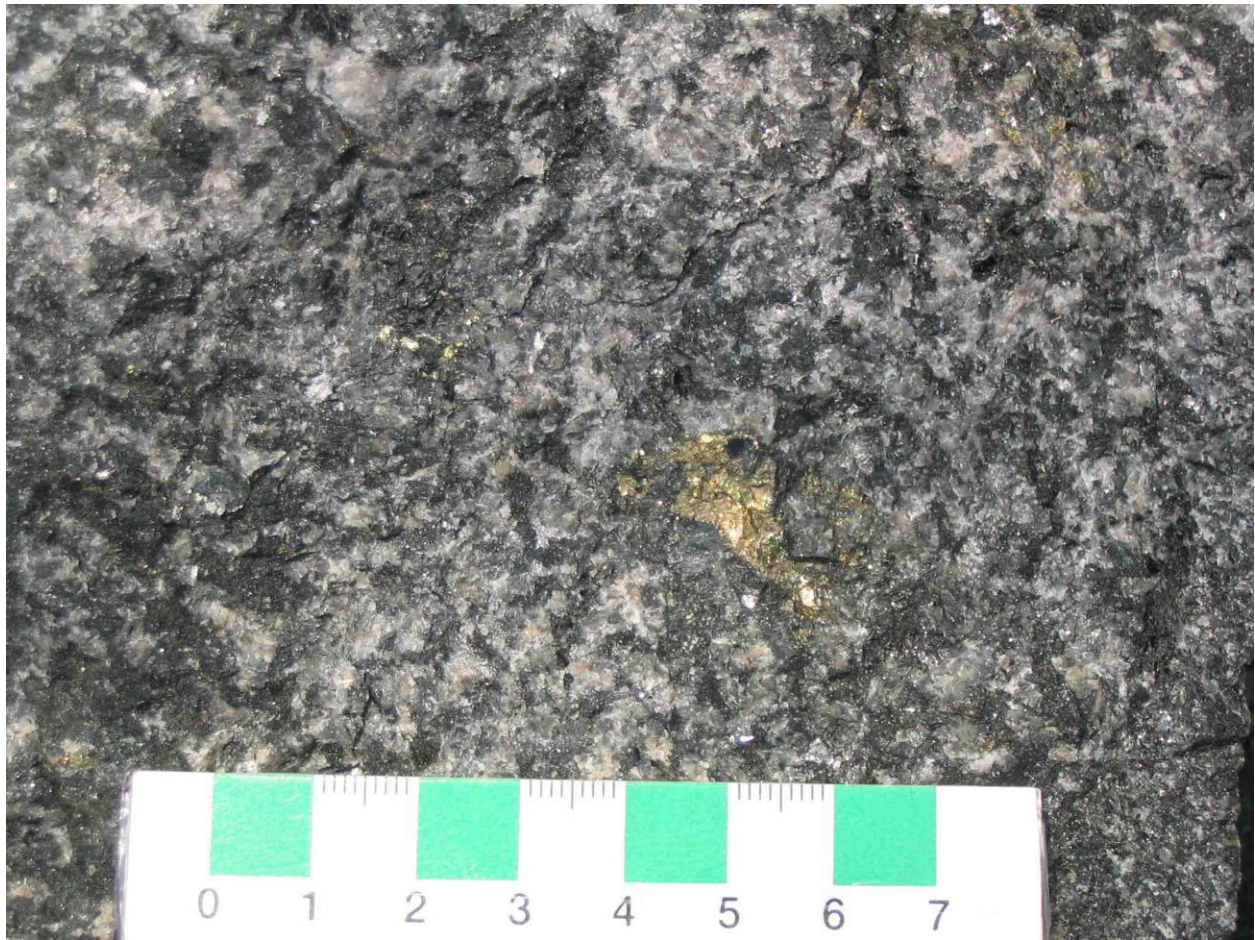


Figure I-03 – Disseminated magmatic sulphides in one of the trenches in the Ant Lake (unofficial place name) area (station RM03-27-ST04).



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Figure: I-04



Figure I-04 – Trench #6 at the Swan Lake Pt-Pd-Ni-Cu Showing (SMDI 1896; station RM05-19-ST18).



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Figure: I-05



Figure I-05– Large trench at the Korvin Lake Cu occurrence (SMDI 538; station RM05-05-ST16-PH13)



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Figure: I-06

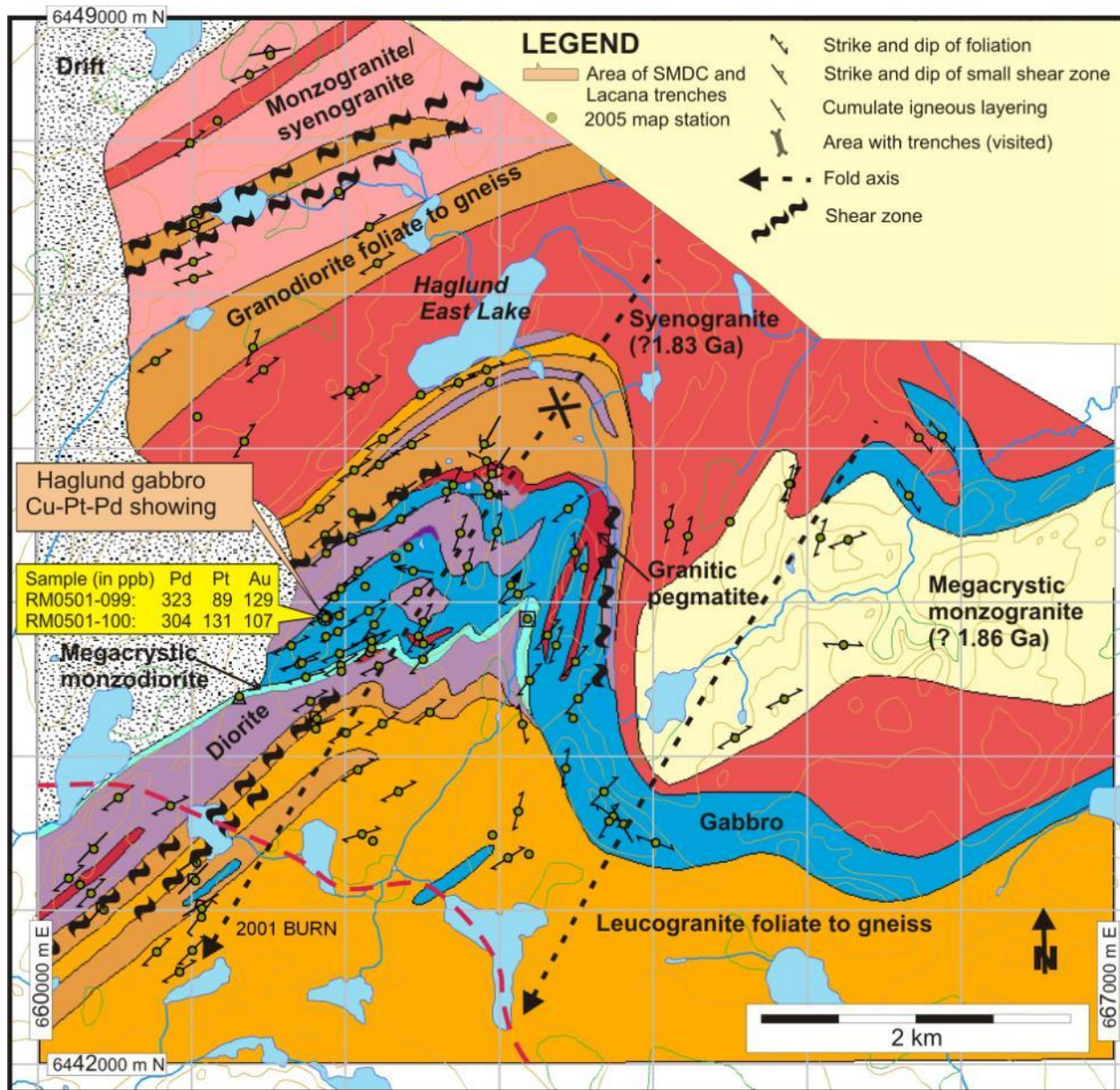


Figure I-06 – Simplified geology of the Haglund East Lake (unofficial place name) area.
 Abbreviations: Lacana, Lacana Mining Corporation and SMDC, Saskatchewan Mining and Development Corporation.



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Figure I-07

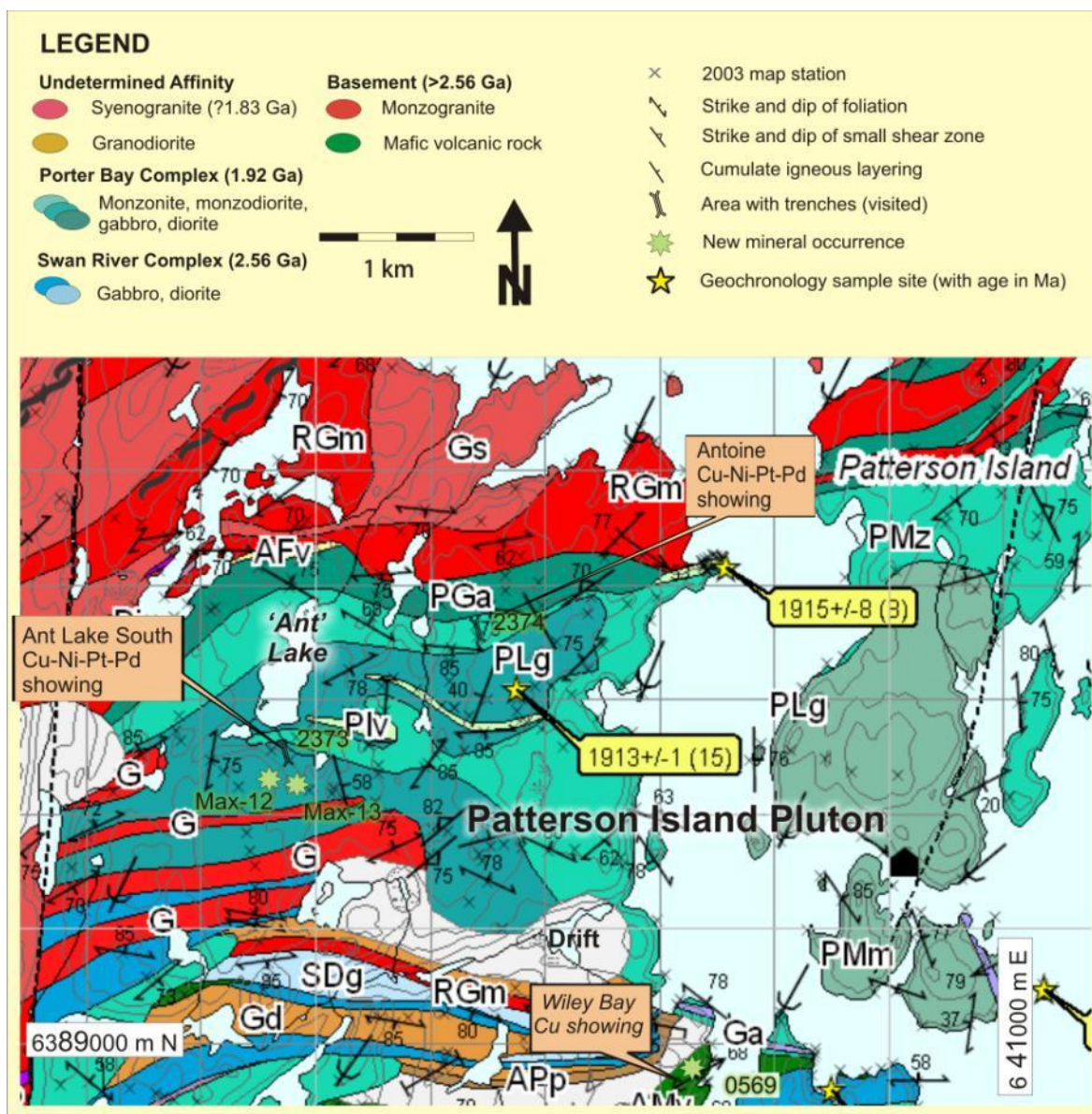


Figure I-07 – Simplified geology of the Ant Lake (unofficial place name) area.



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Figure I-08

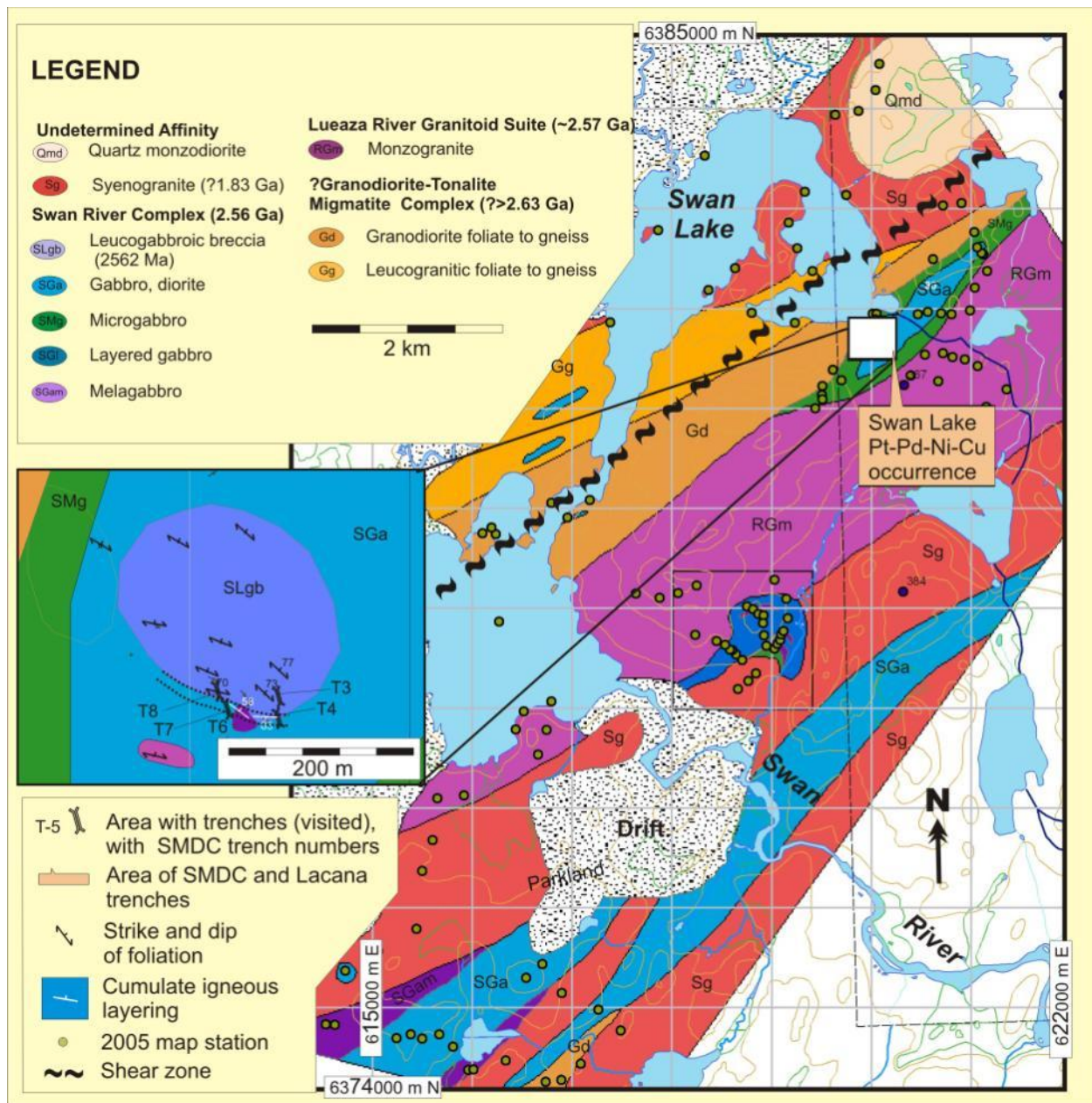


Figure I-08 – Simplified geology of the Swan Lake area; inset map illustrates the area around the Swan Lake Pt-Pd-Ni-Cu showing. Abbreviations: Lacana, Lacana Mining Corporation and SMDC, Saskatchewan Mining and Development Corporation.



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Figure I-09

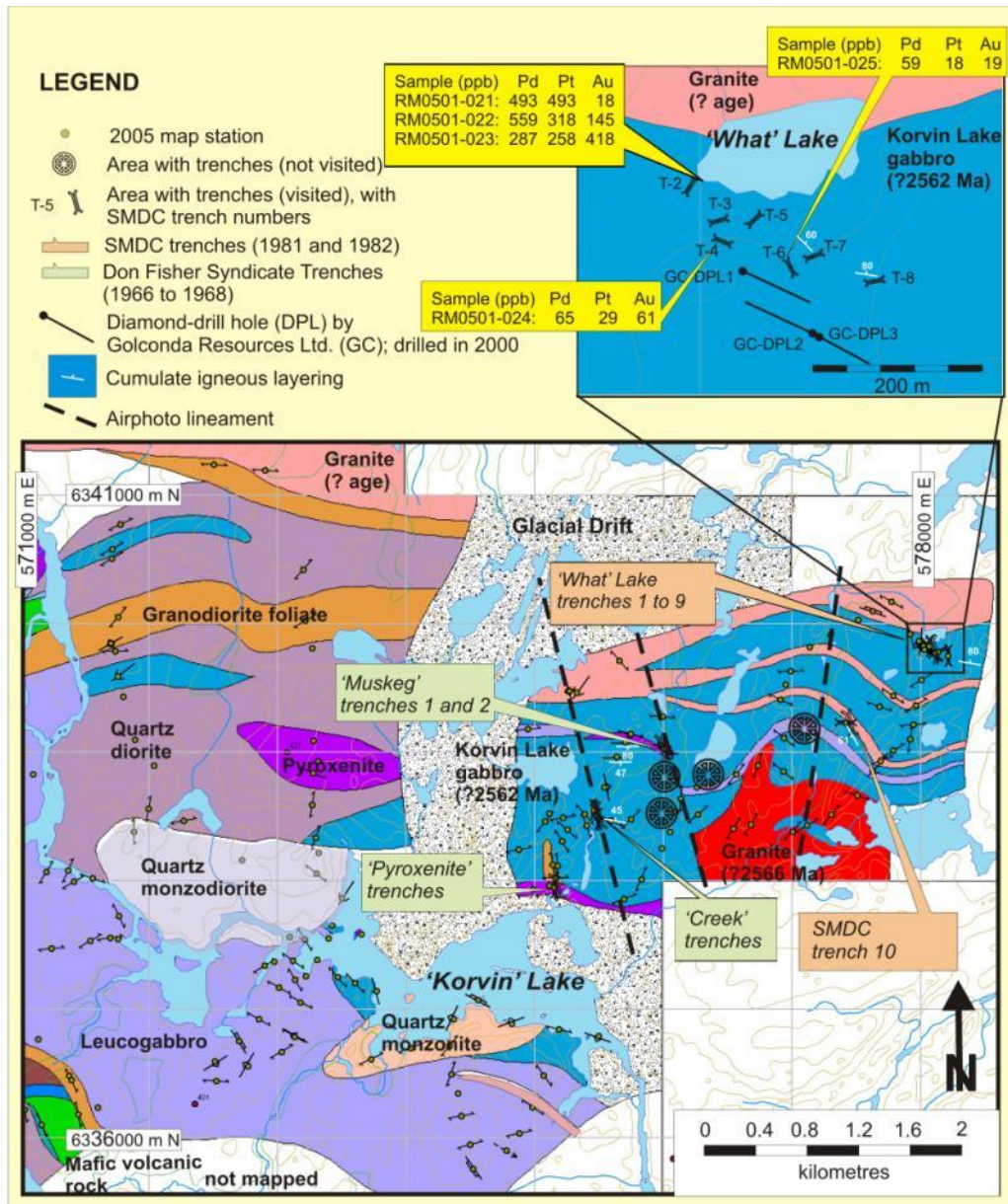


Figure I-09 – Simplified geology of the Korvin Lake (unofficial place name) area; inset map illustrates the area around What Lake (unofficial place name). Abbreviation: SMDC, Saskatchewan Mining and Development Corporation.



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Figure: I-10

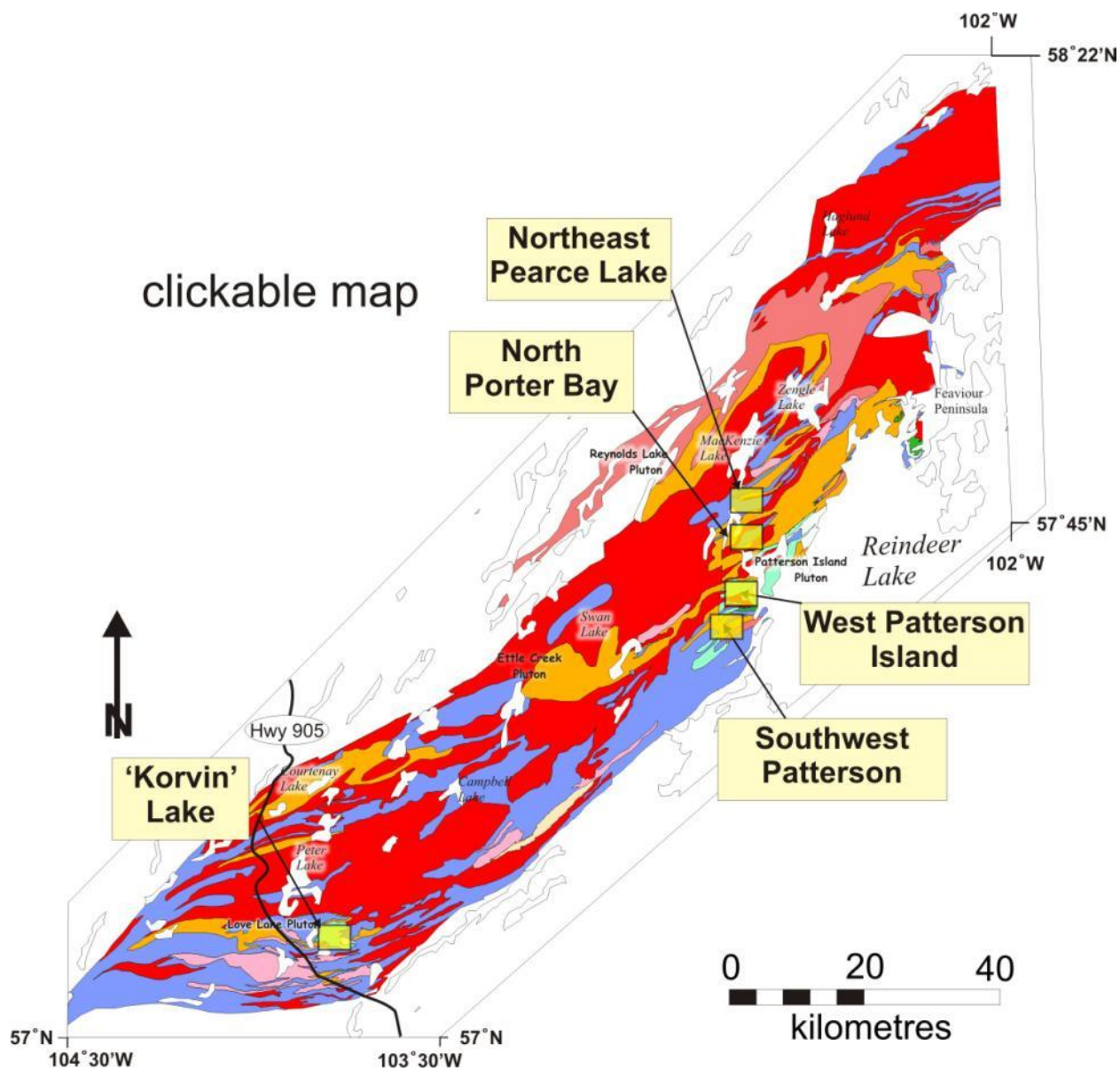


Figure I-10 – Location map of areas with potential for platinum-group-element mineralization, Peter Lake Domain. There are links to the individual map areas.



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Figure: I-11

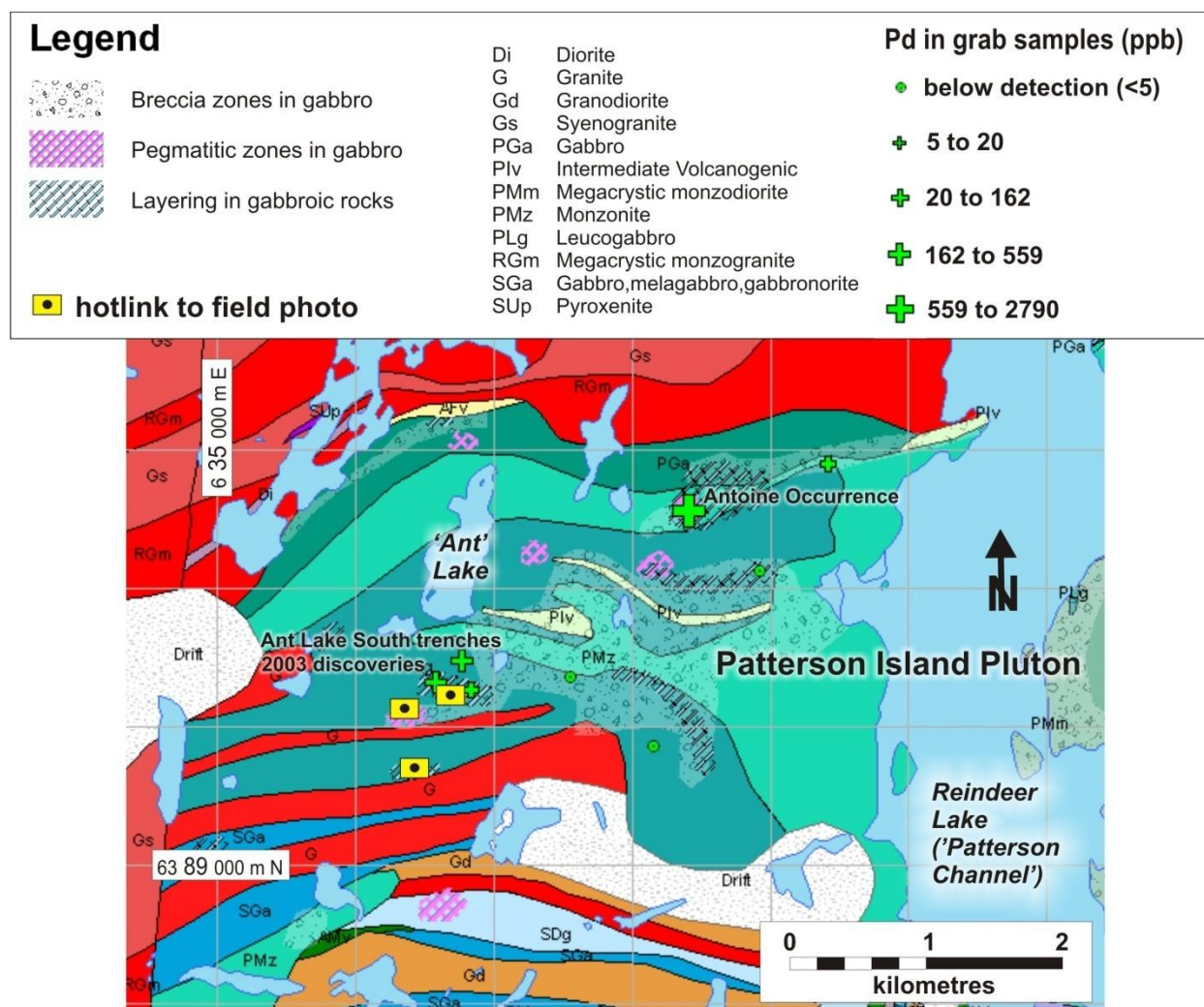


Figure I-11 – Area with potential for platinum-group-element mineralization, west of Patterson Island area.



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Figure: I-12

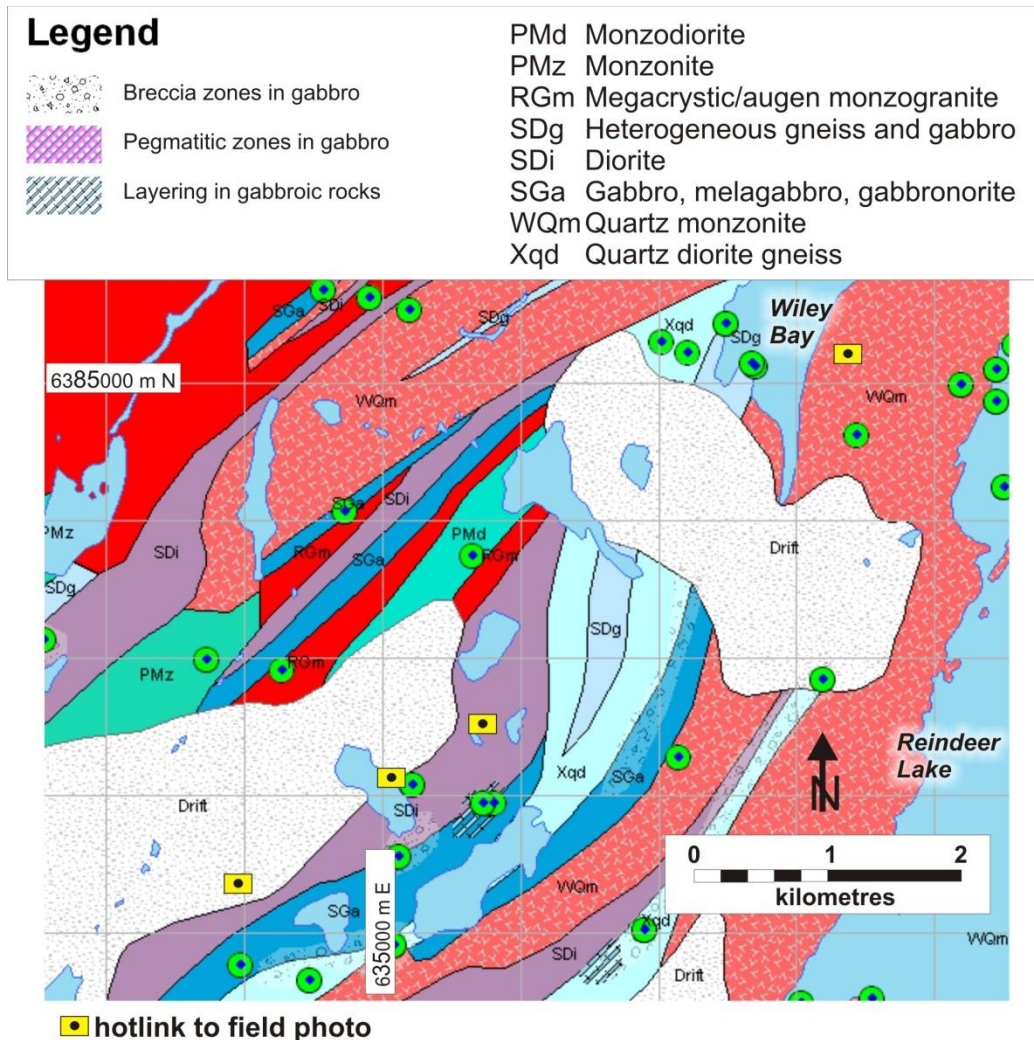


Figure I-12 – Area with potential for platinum-group-element mineralization, southwest of Patterson Island area.



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Figure: I-13

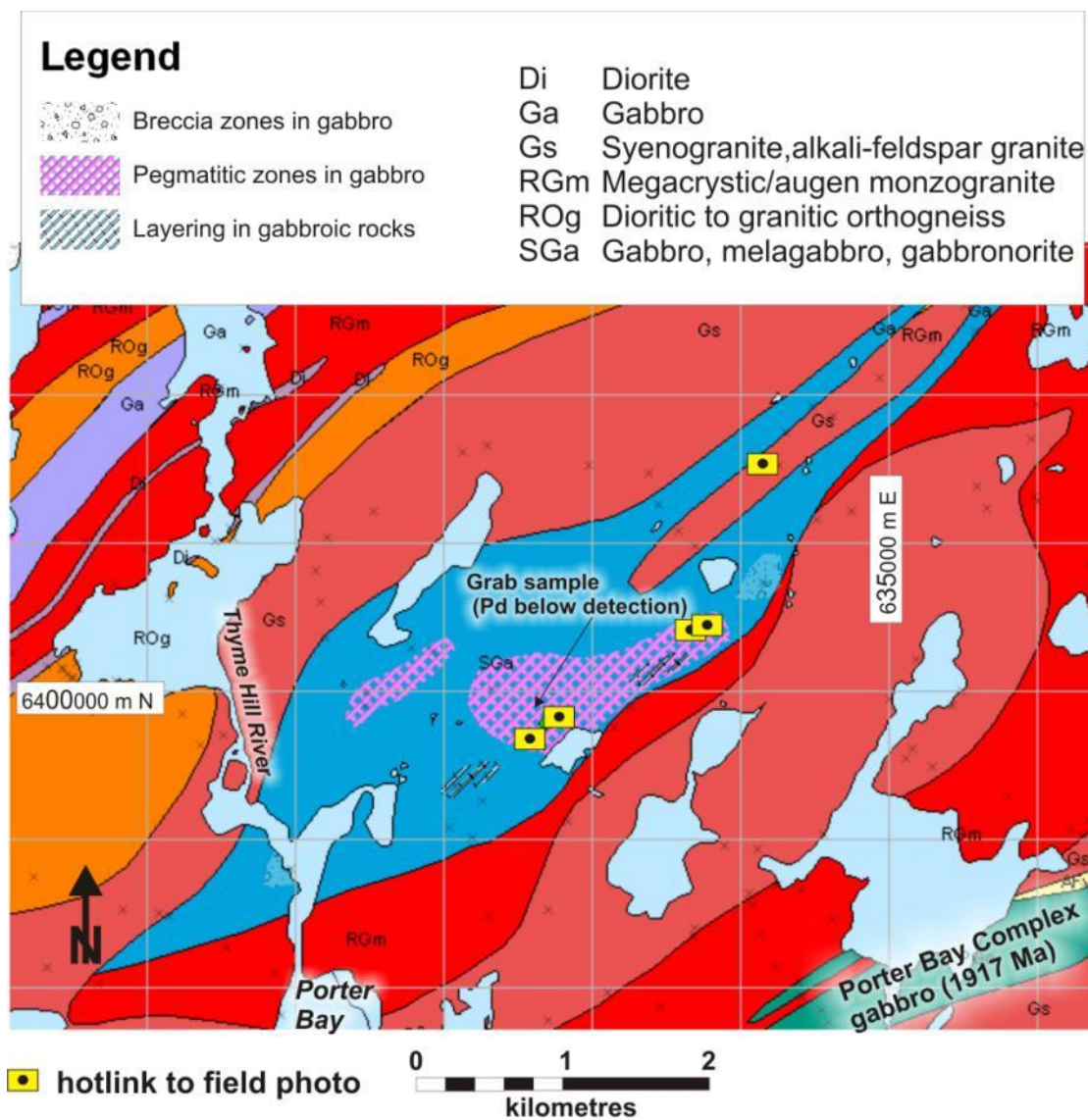


Figure I-13 – Area with potential for platinum-group-element mineralization, north of Porter Bay area.



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Figure I-14

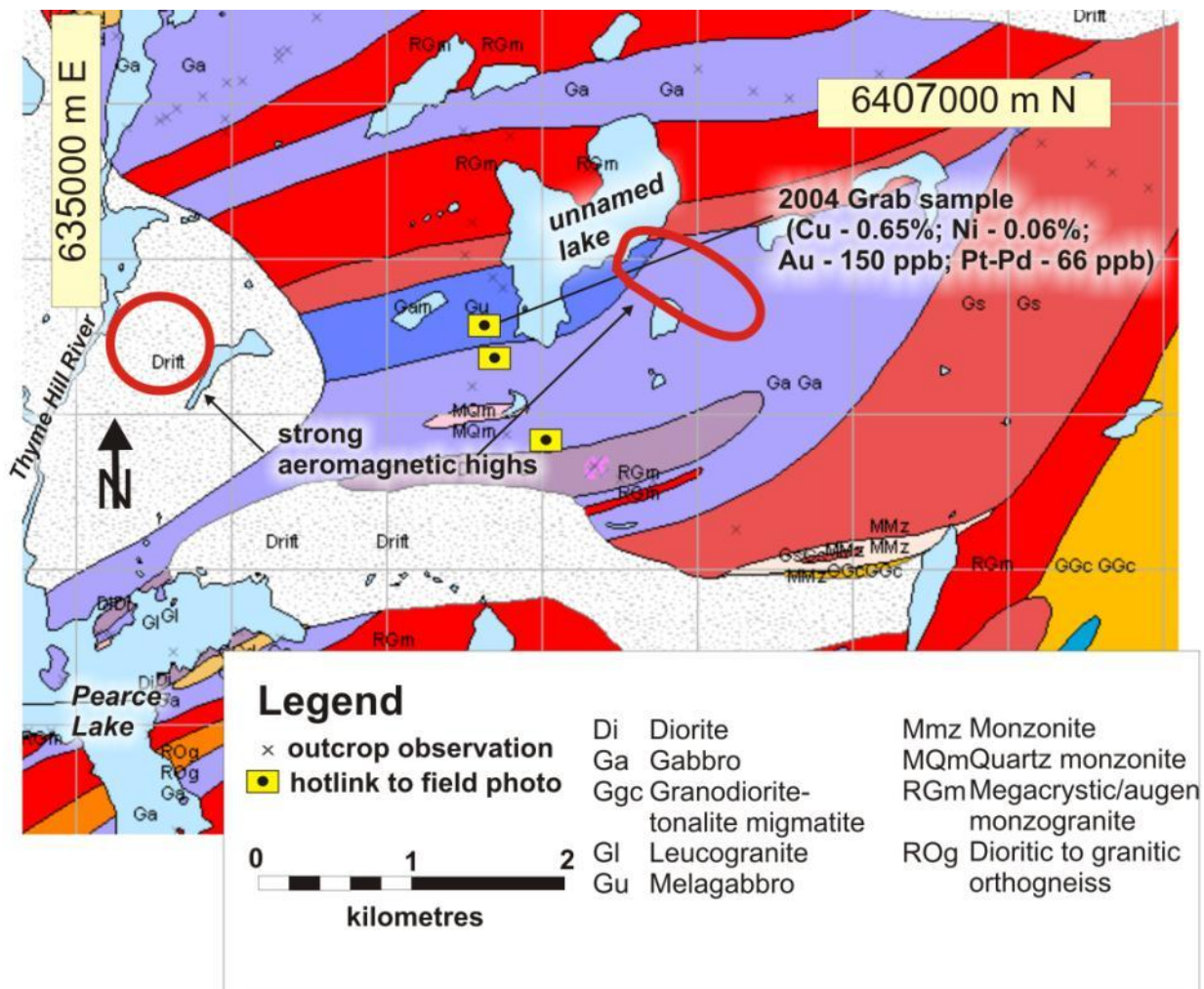


Figure I-14 – Area with potential for platinum-group-element mineralization, northeast of Pearce Lake area.



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Figure I-15

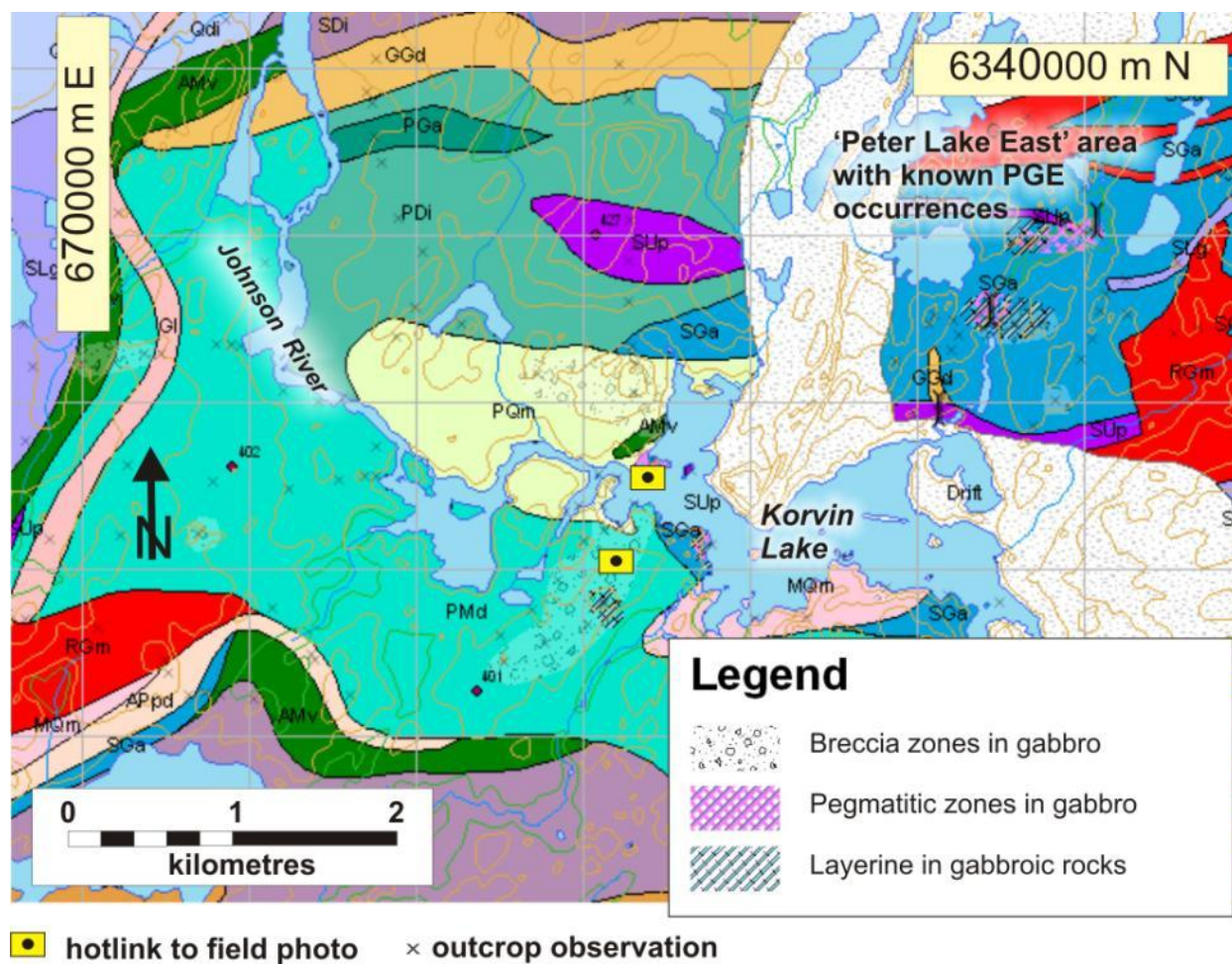


Figure I-15 – Area with potential for platinum-group-element mineralization, Korvin Lake (unofficial place name) area.



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Figure: J-01

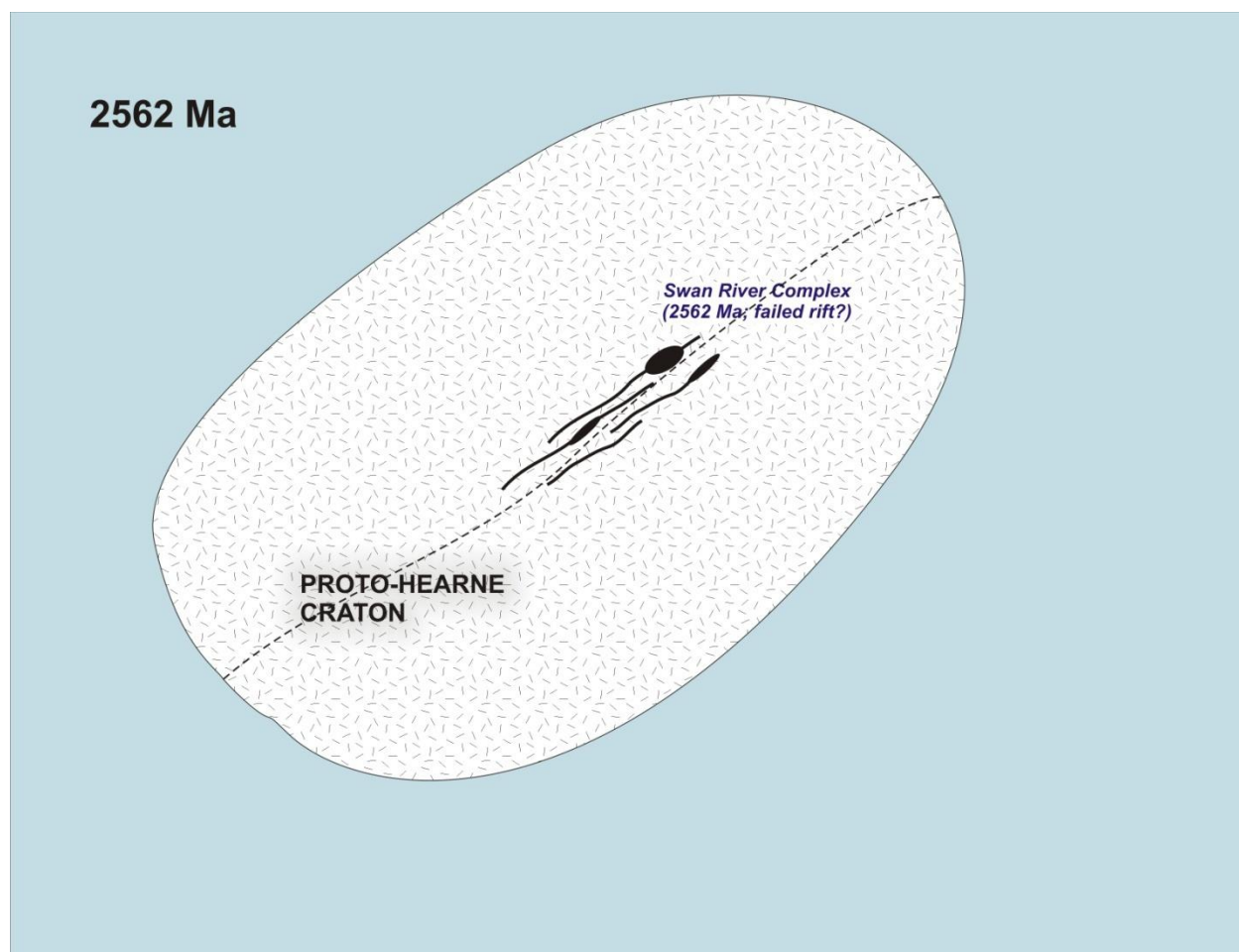


Figure J-01 – Plate tectonic ‘snapshot’ illustrating the environment of formation in the Peter Lake Domain area at 2562 Ma.



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Figure: J-02

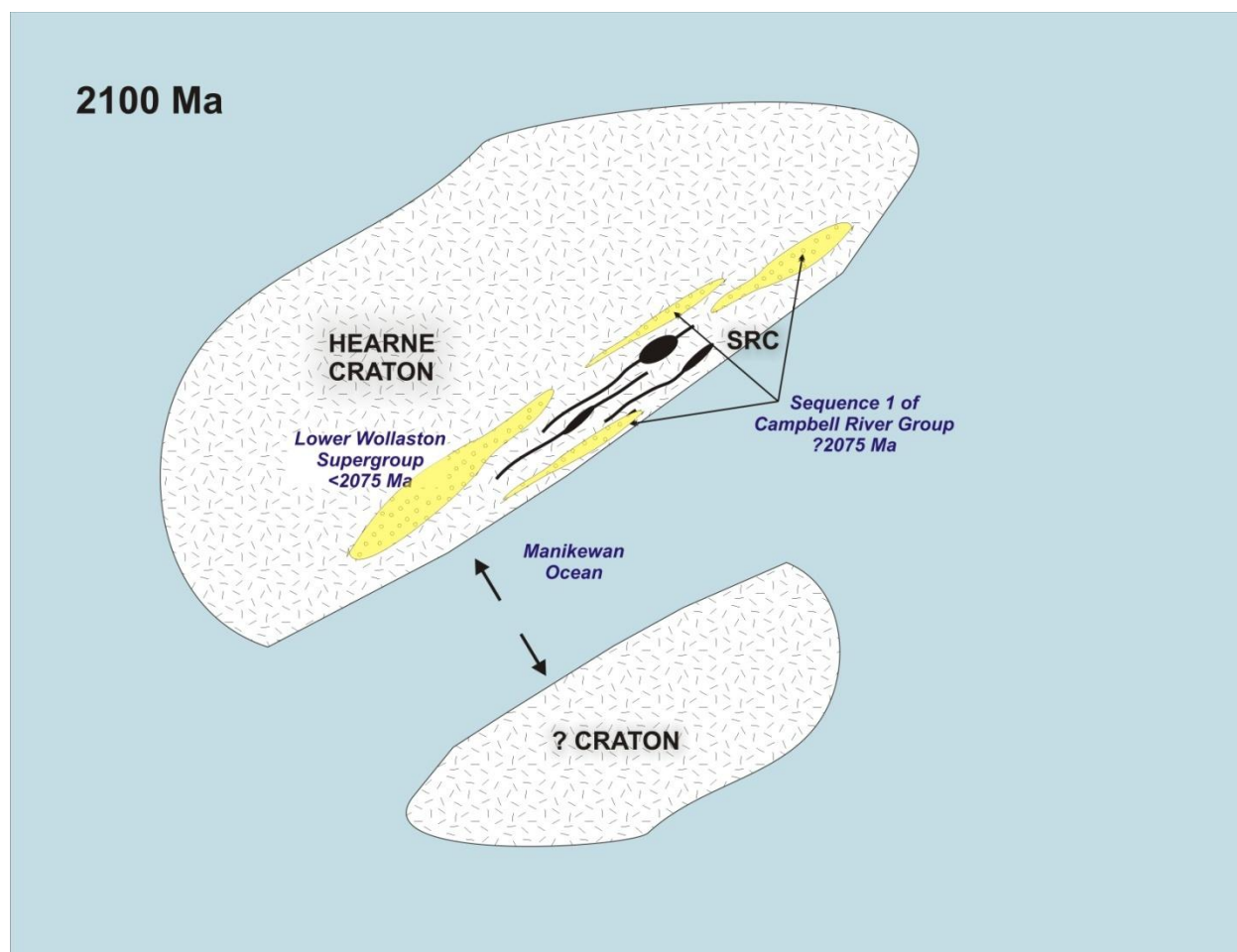


Figure J-02 – Plate tectonic ‘snapshot’ illustrating the environment of formation in the Peter Lake Domain area at 2100 Ma. Abbreviation: SRC, Swan River Complex.



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Figure: J-03

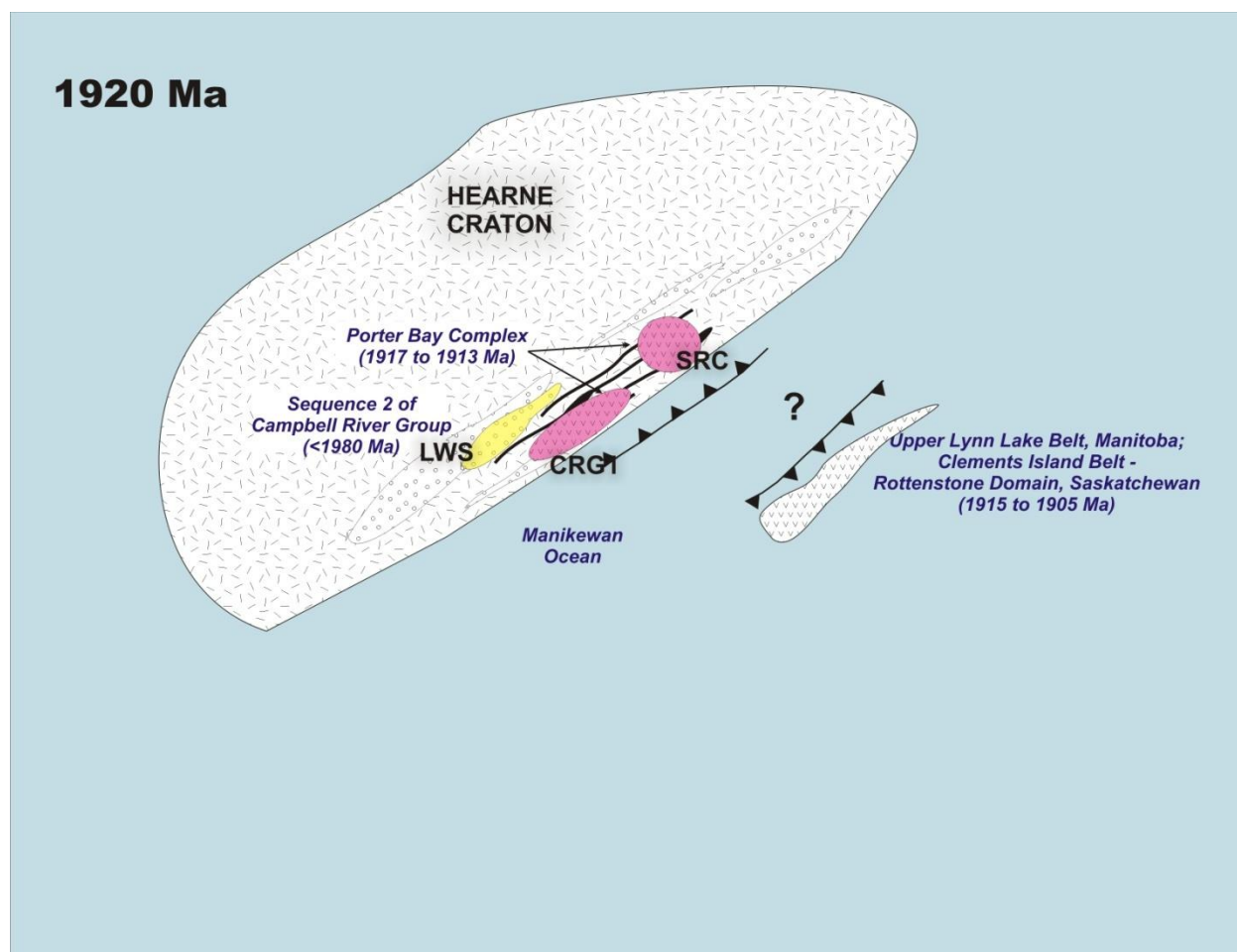


Figure J-03 – Plate tectonic ‘snapshot’ illustrating the environment of formation of assemblages in the Peter Lake Domain area at 1920 Ma. Abbreviations: CRG1, Campbell River Group, Sequence 1; LWS, Lower Wollaston Supergroup; and SRC, Swan River Complex.



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Figure: J-04

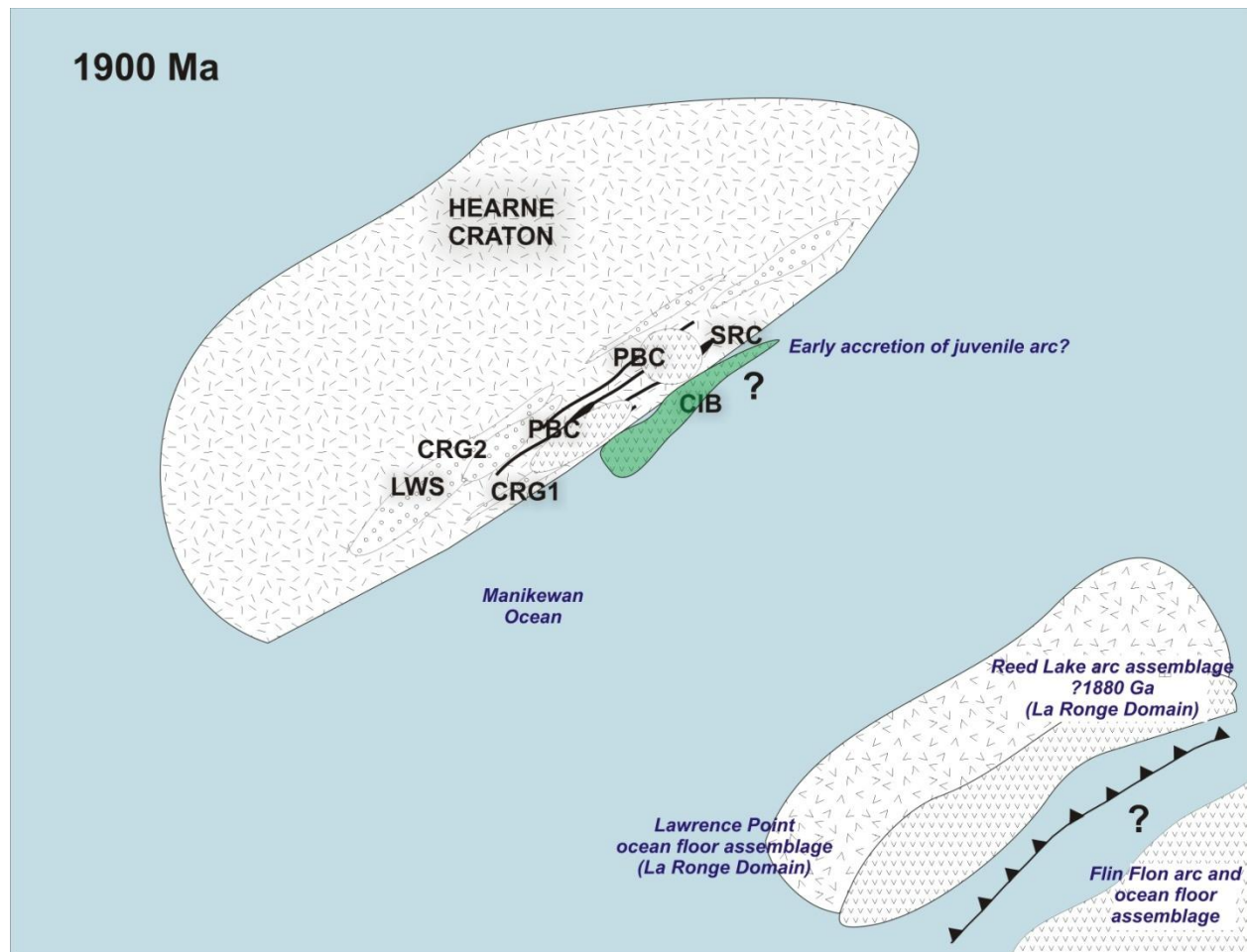


Figure J-04 – Plate tectonic ‘snapshot’ illustrating the environment of formation in the Peter Lake Domain area at 1900 Ma. Abbreviations: CIB, Clemments Island Belt; CRG1, Campbell River Group Sequence 1; CRG2, Campbell River Group Sequence 2; LWS, Lower Wollaston Supergroup; PBC, Porter Bay Complex; and SRC, Swan River Complex.



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Figure: J-05

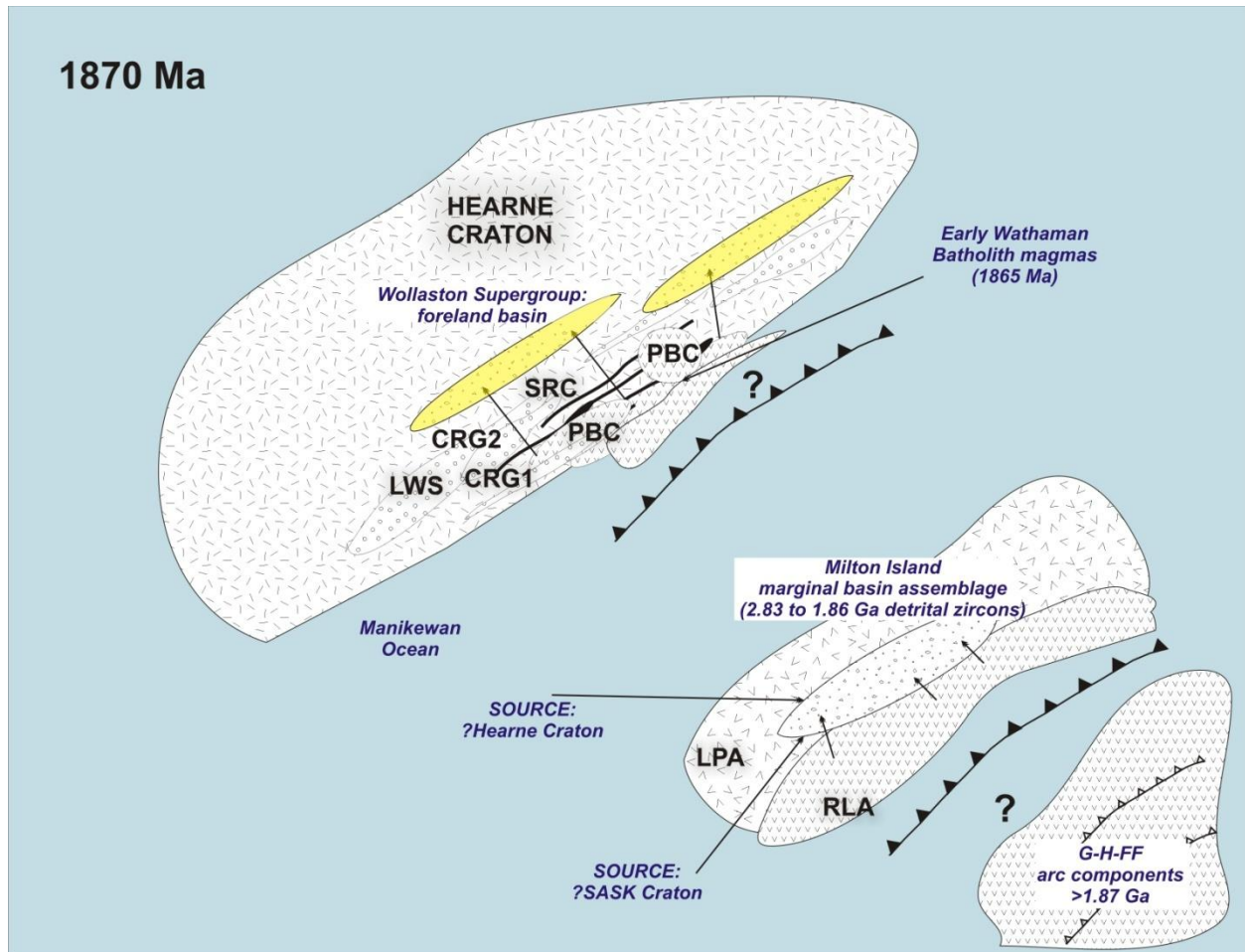


Figure J-05 – Plate tectonic ‘snapshot’ illustrating the environment of formation in the Peter Lake Domain area at 1870 Ma. Abbreviations: CRG1, Campbell River Group Sequence 1; CRG2, Campbell River Group Sequence 2; G-H-FF, Glennie-Hanson-Flin Flon; LPA, Lawrence Point assemblage; LWS, Lower Wollaston Supergroup; PBC, Porter Bay Complex; RLA, Reed Lake assemblage; and SRC, Swan River Complex.



Figure: J-06

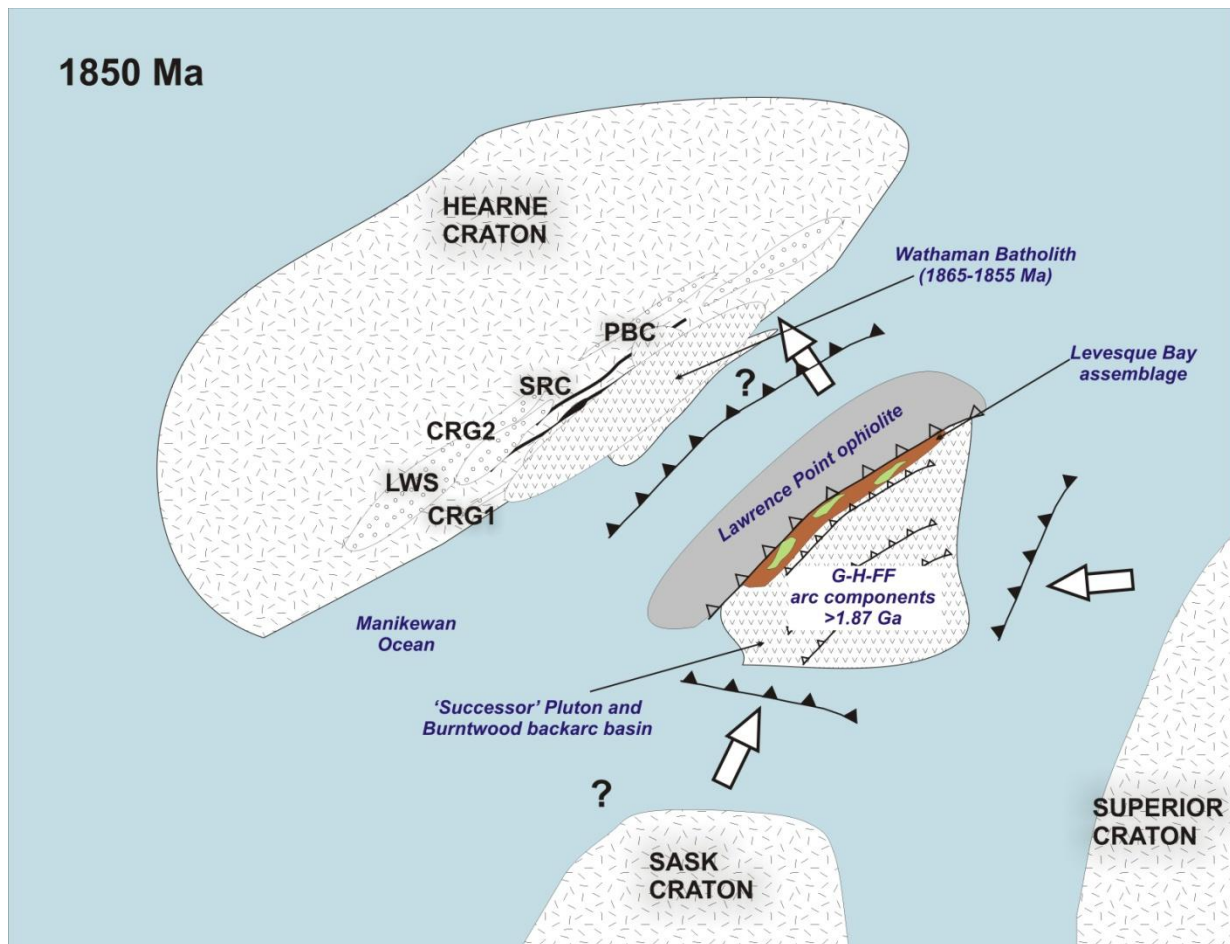


Figure J-06 – Plate tectonic ‘snapshot’ illustrating the environment of formation in the Peter Lake Domain area at 1850 Ma. Abbreviations: CRG1, Campbell River Group Sequence 1; CRG2, Campbell River Group Sequence 2; G-H-FF, Glennie-Hanson-Flin Flon; LWS, Lower Wollaston Supergroup; PBC, Porter Bay Complex; and SRC, Swan River Complex.



Figure: K-01

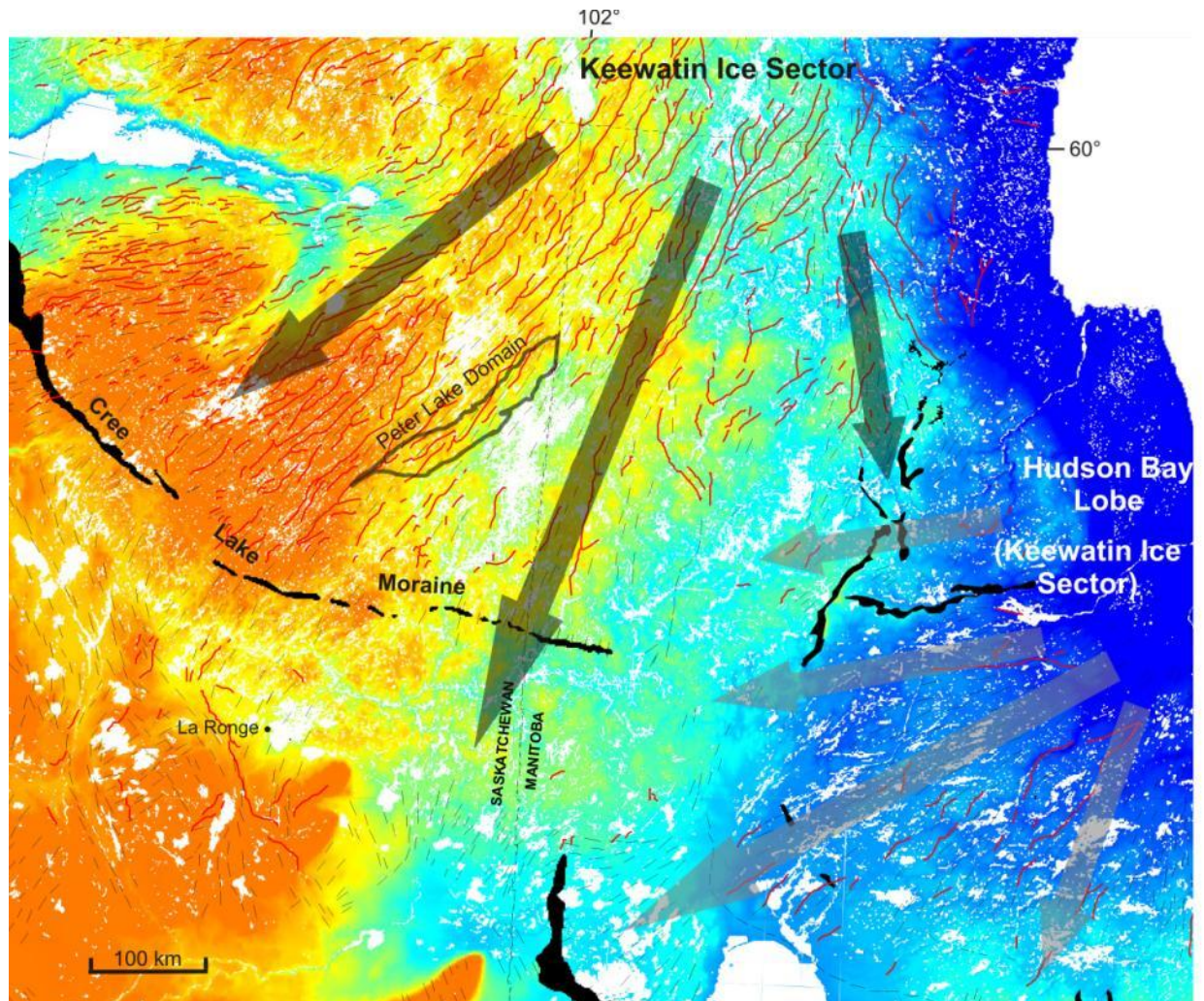


Figure K-01 – Regional ice flow in north-central Canada.



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Figure: K-02

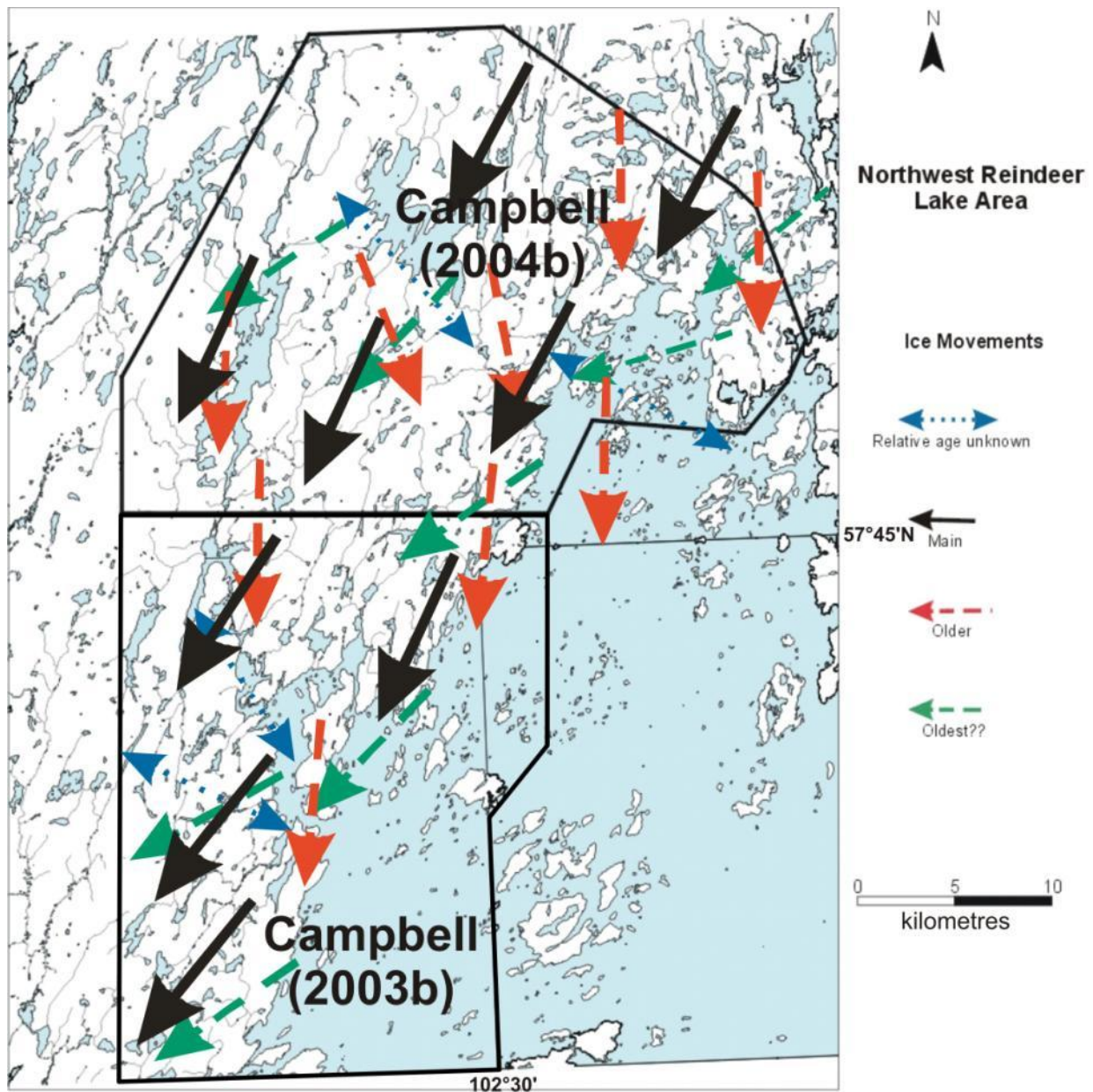


Figure K-02 – Regional ice-flow directions in the 2003-2004 surficial mapping areas. Directions compiled from detailed mapping of erosional ice-flow indicators and landform analysis.



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Figure: K-03

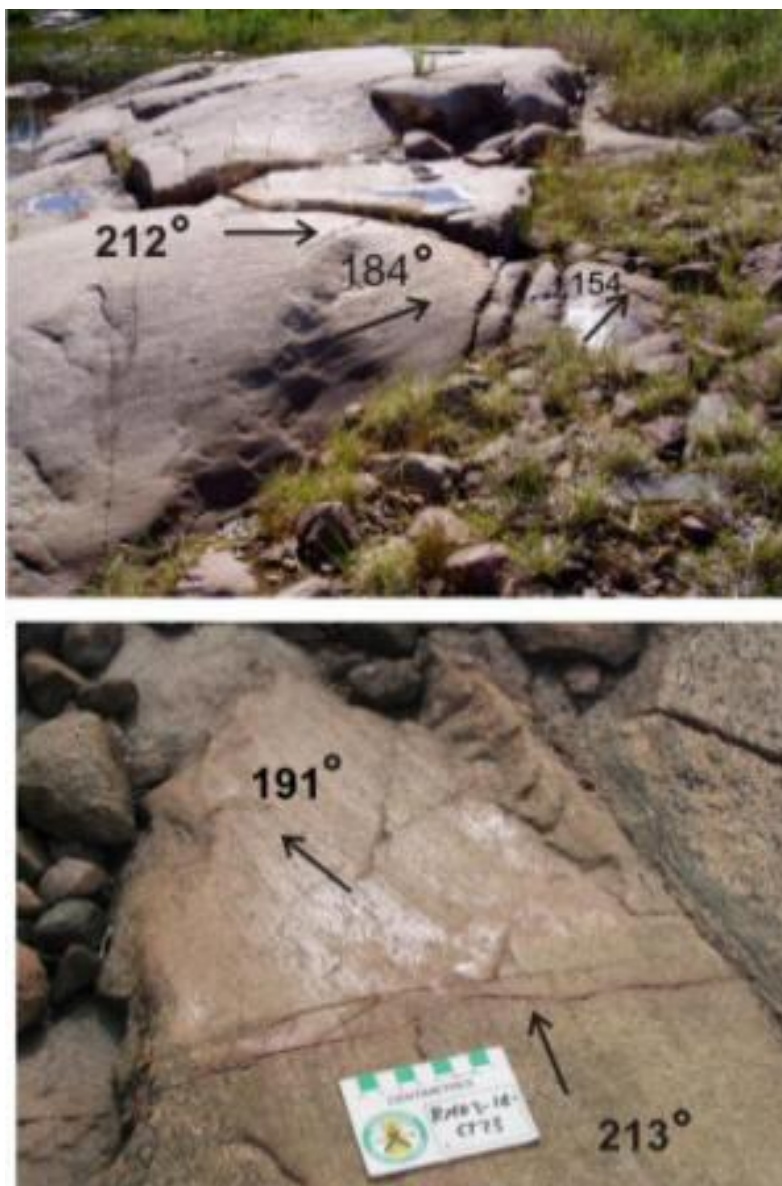


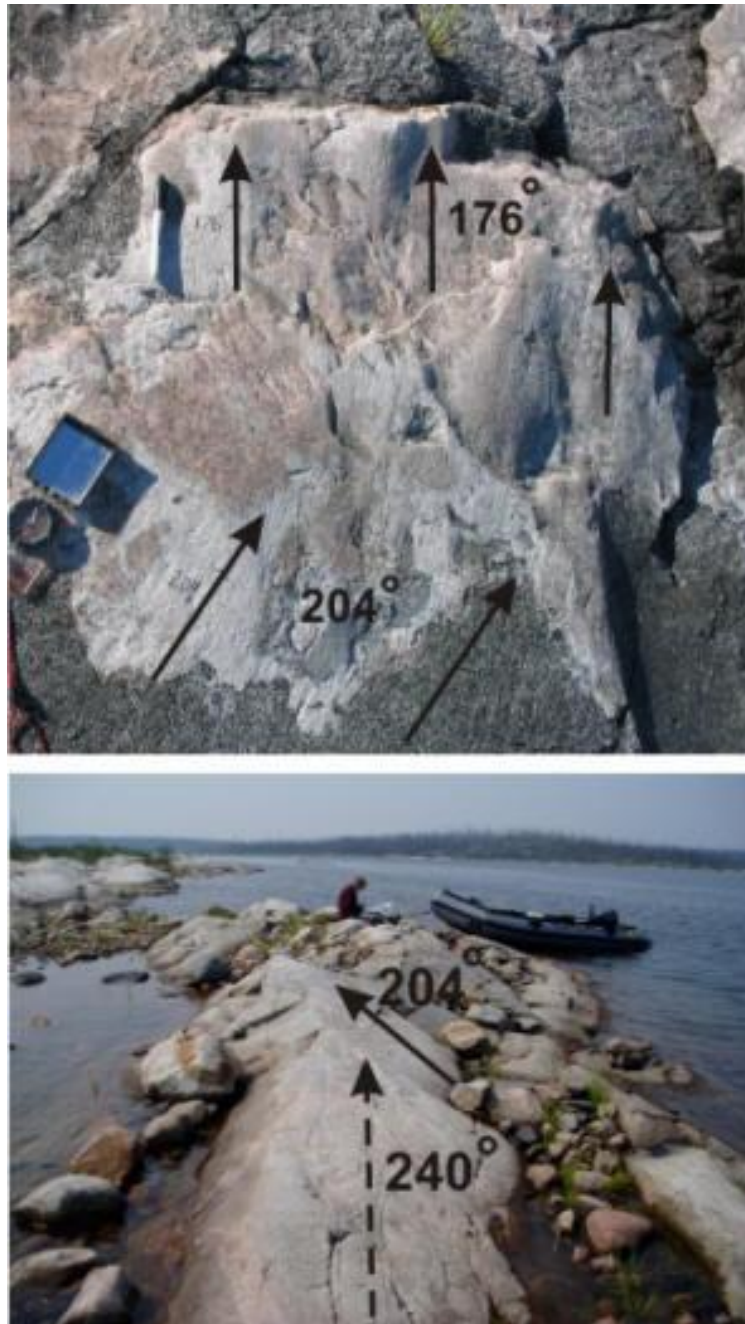
Figure K-03 – a) Three sets of striae preserved on a granitic outcrop, Porter Bay area, northwest Reindeer Lake and b) Two sets of striae preserved on a granitic outcrop, west of Wiley Bay, south of Patterson Island.



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Figure: K-04



*Figure K-04 – a) Two sets of striae preserved on an outcrop, northwest Reindeer Lake and
b) Two ice-flow directions recorded on remoulded outcrop, Reindeer Lake.*



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Figure: K-05



Figure K-05 – Unmetamorphosed sandstone (quartz arenite) erratic, south of Crane Island, Reindeer Lake.



Figure: K-6



Figure K-06 – Slightly deformed and metamorphosed clast-supported polymictic conglomerate erratic, Crane Island area, northwest Reindeer Lake (UTM 651827 m E, 6411138 m N).



Figure: K-07



Figure K-07 – Slightly deformed and metamorphosed matrix-supported polymictic conglomerate erratic, Crane Island area, northwest Reindeer Lake (UTM 660243 m E, 6412485 m N).



Figure: K-08



Figure K-08-RL – White, fine-grained quartzite erratic, Patterson Island area (UTM 646375 m E, 6396385 m N)



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Figure: K-09

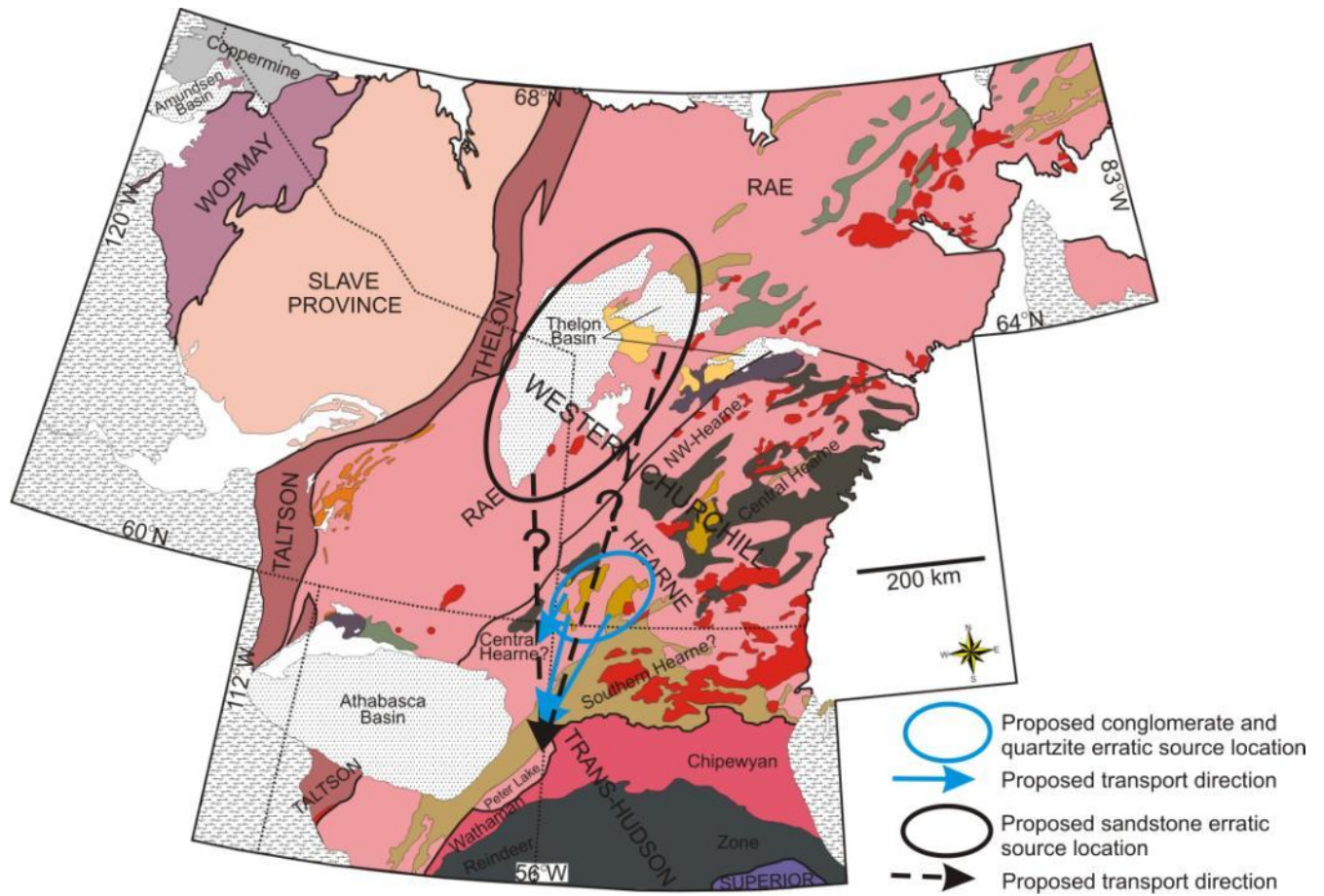


Figure K-09 – Proposed source locations of erratics found in the Reindeer Lake area.



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Figure: K-10



Figure K-10 – a) Aerial view of well-developed beaches of glacial Lake Agassiz above 410 m above sea level, south of Zengle Lake (UTM 643359 m E, 6416389 m N) and b) Ground view of the cobble beaches at approximately 425 m above sea level, south of Zengle Lake.



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Figure: K-11

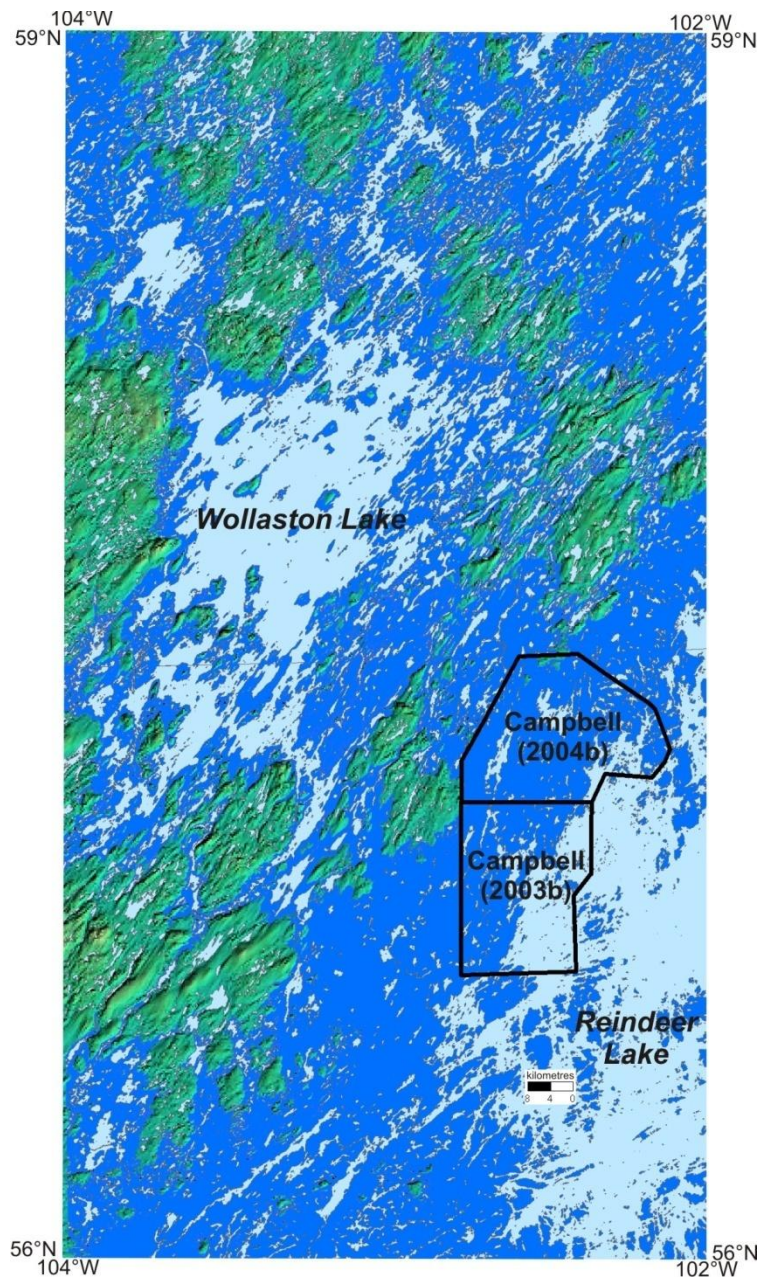


Figure K-11 – Representation of the Reindeer Lake–Wollaston Lake area with a water level at 420 m above sea level. Areas of dark blue represent terrain that would have been inundated by the proglacial lake in the area.



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Figure: K-12



Figure K-12 – Silty-sand to sandy till (UTM 650894 m E, 6412225 m N).



Figure: K-13



Figure K-13 – Ground view of silty-sand ground moraine, boulders are obscured by moss (UTM 638363 m E, 6387375 m N).



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Figure: K-14



Figure K-14 – Very sandy till of stagnant-ice moraine.



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Figure: K-15



Figure K-15 – Bouldery, sandy till of stagnant-ice moraine (UTM 642796 m E, 6423047 m N).



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Figure: K-16



Figure K-16 – Sand and gravel diamicton over silty-sand till.



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Figure: K-17



Figure K-17 – Sand and gravel diamicton terrain (UTM 648097 m E, 6418530 m N).



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Figure: K-18



Figure K-18 – Matrix-rich diamicton (UTM 635574 m E, 6410427 m N)



Figure: K-19



Figure K-19 – a) Boulder armoured surfaces (UTM 639482 m E, 6393697 m N) and b) Close-up of boulder lag and reworked till overlying silty-sand till.



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Figure: K-20



Figure K-20 – a) Streamlined landforms with steep, eroded sides interpreted to be remnants of a till plain carved by subglacial meltwater (UTM 648572 m E, 6421213 m N) and b) Ground view of boulder-armoured slope and top of streamlined landform, Porter Bay (UTM 635591 m E, 6398646 m N).



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Figure: K-21



Figure K-21 – Ice-contact glaciofluvial deposits in the northwest Reindeer Lake area: a) Zengle Lake esker system (UTM 647690 m E, 6433119 m N); b) ice-contact delta (UTM 652109 m E, 6416395 m N); c) hummocky ice-contact drift, west of Trapper Bay (UTM 652331 m E, 6416618 m N); and d) outwash sand plain (UTM 643045 m E, 6411482 m N).



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Figure: K-22

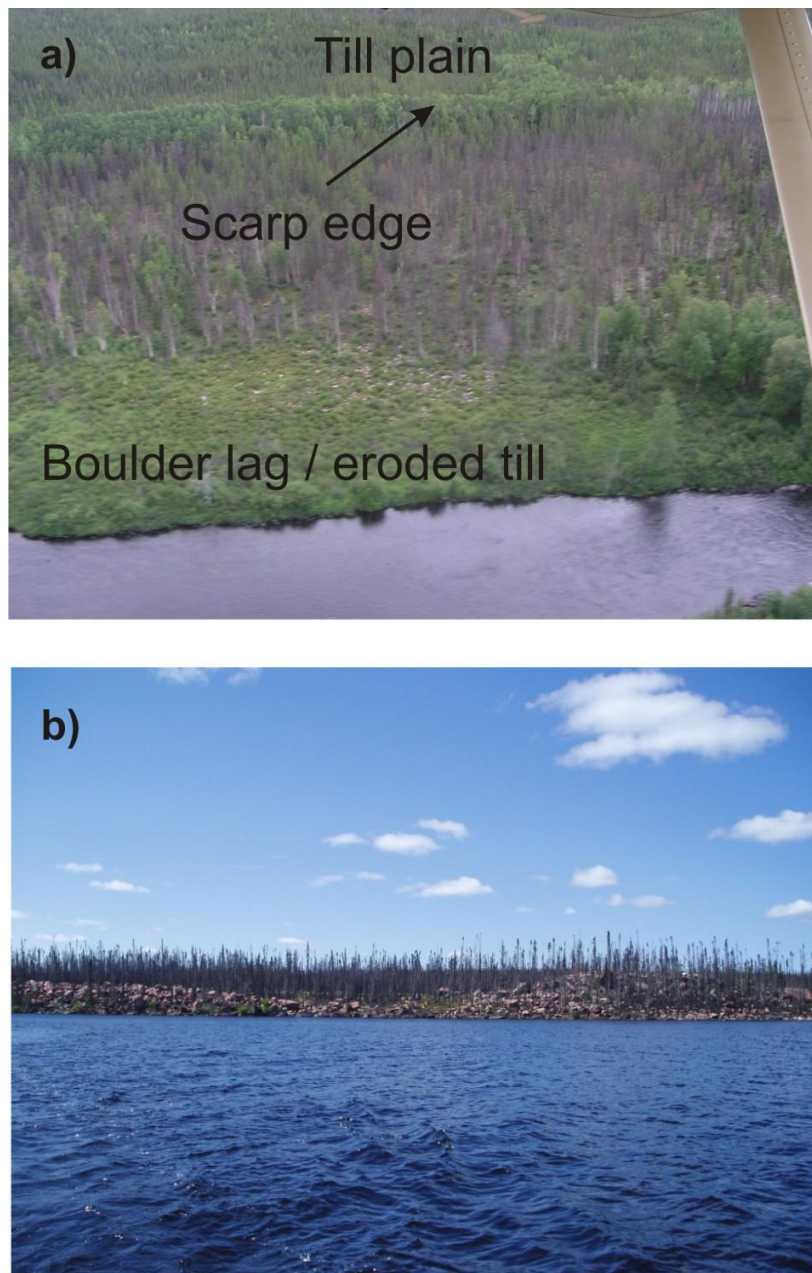


Figure K-22 – a) Thyme Hill River occupies a channel eroded into a till plain north of MacKenzie Lake (UTM 639208 m E, 6423722 m N) and b) Boulderly, hummocky ice-contact deposits along the southwest shore of MacKenzie Lake are dominated by large, subrounded monolithological boulders (UTM 633714 m E, 6410556 m N).



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Figure: L-01

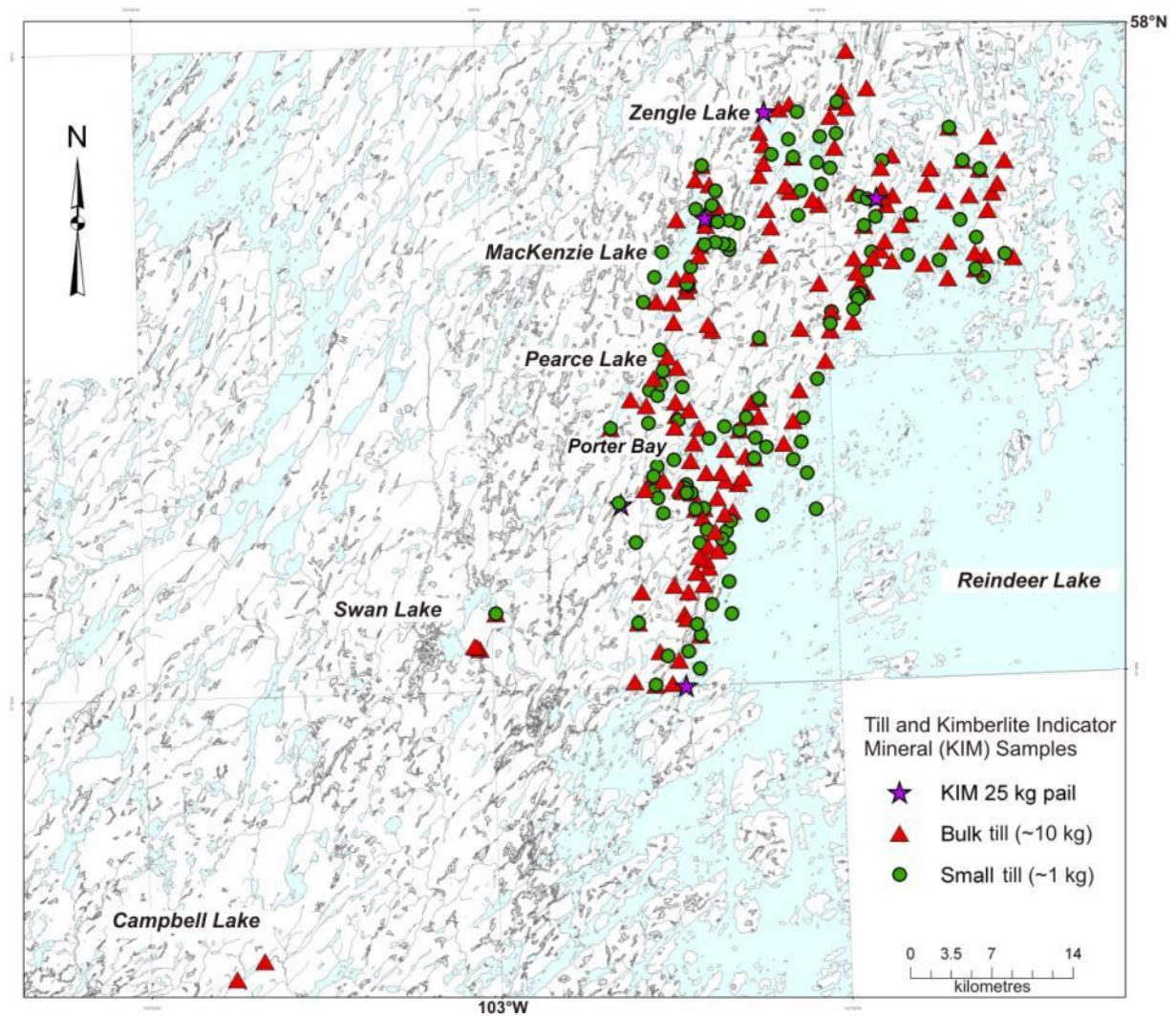


Figure L-01 – Location of till and kimberlite-indicator-mineral sample sites, Patterson Island and northwest Reindeer Lake area.



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Figure: L-02

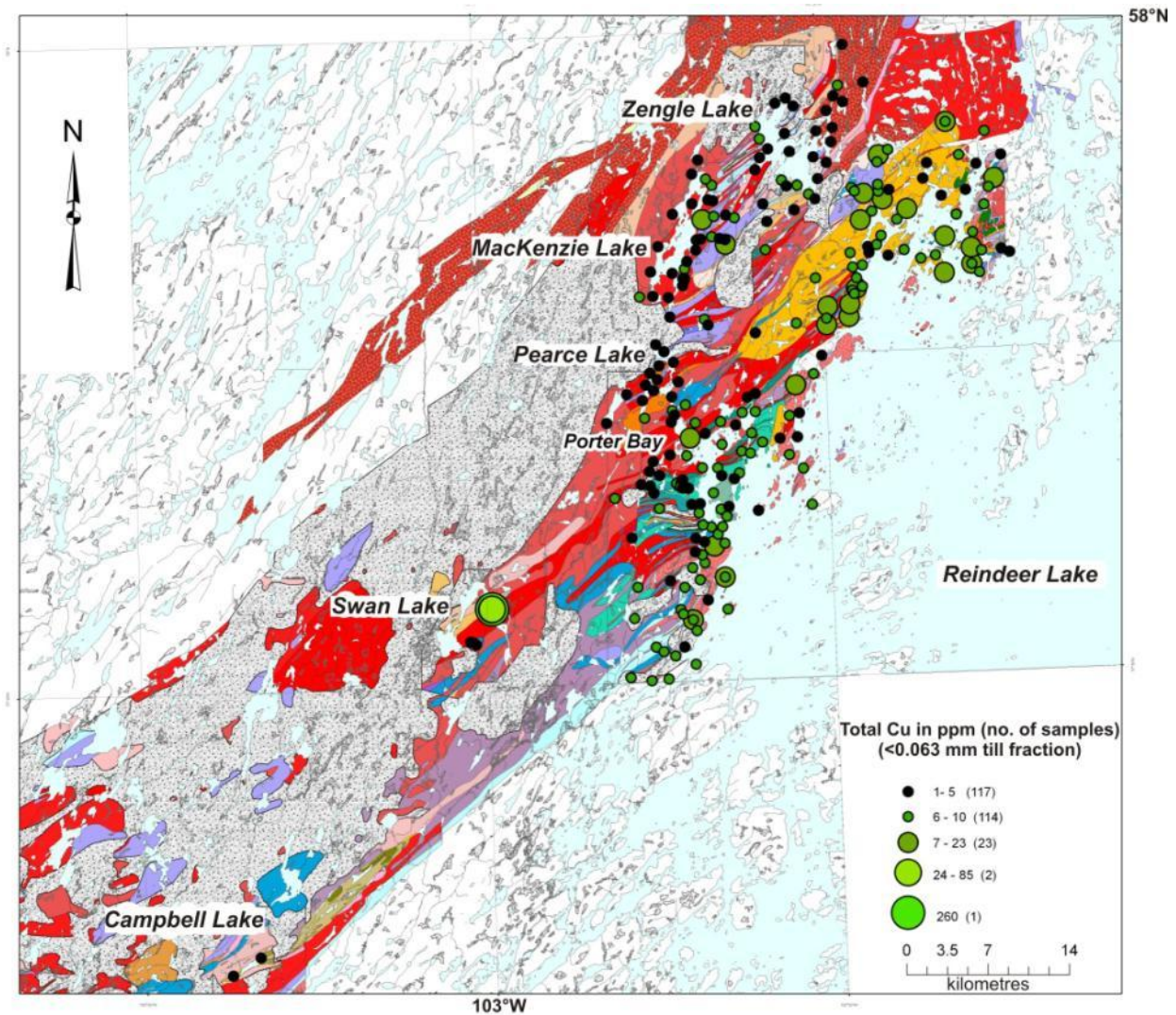


Figure L-02 – Near-total Cu concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-03

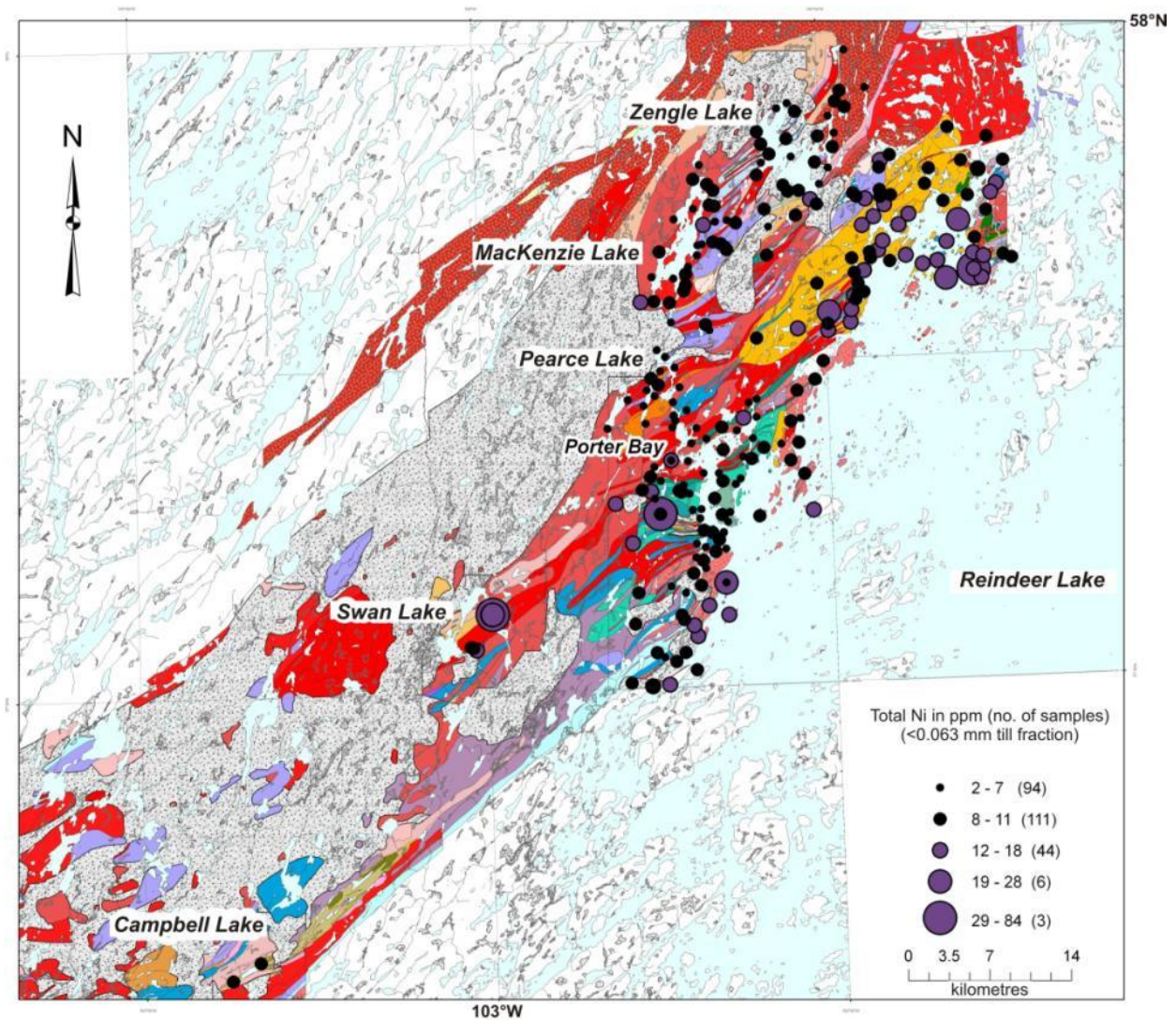


Figure L-03 – Near-total Ni concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-04

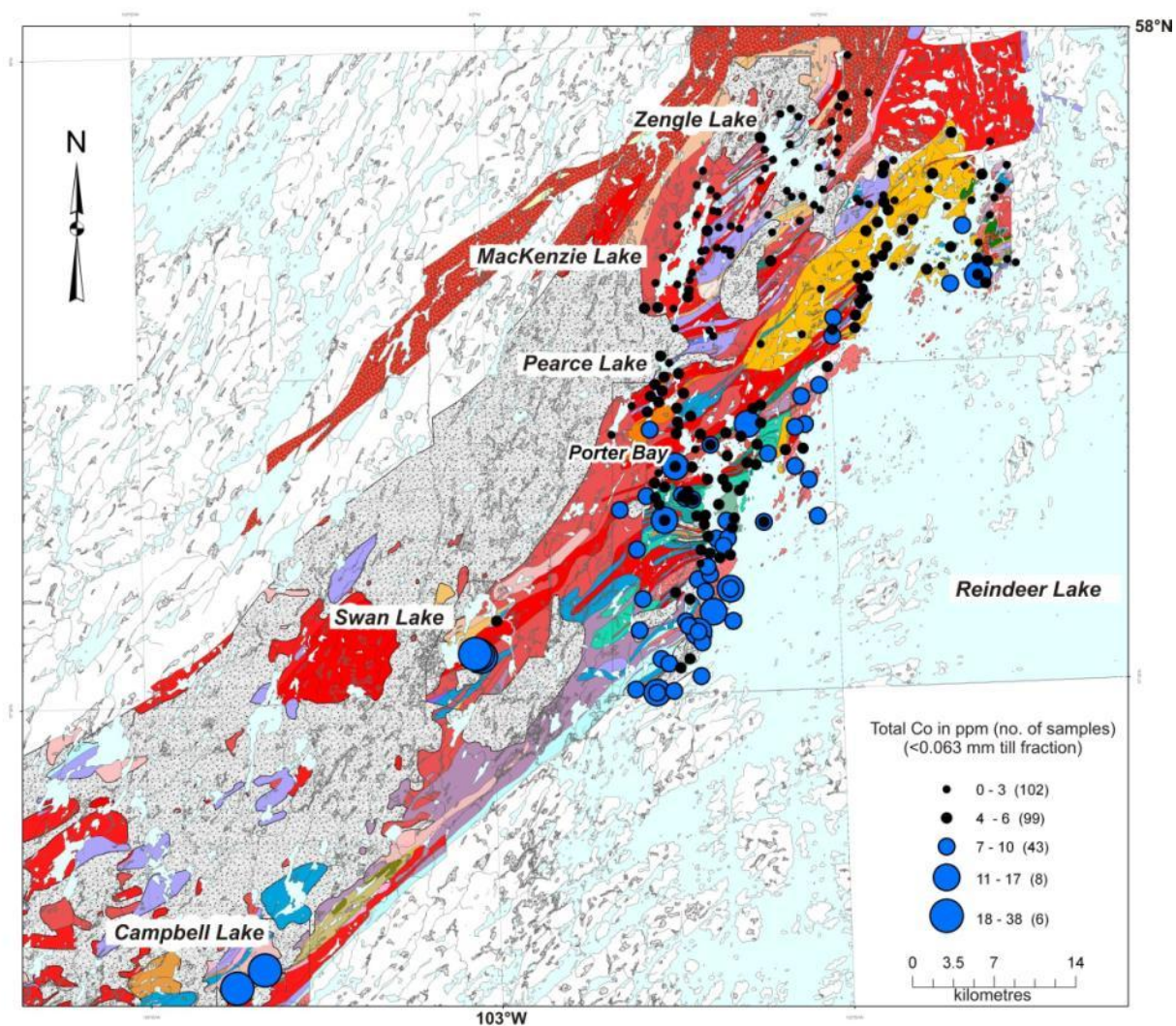


Figure L-04 – Near-total Co concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-05

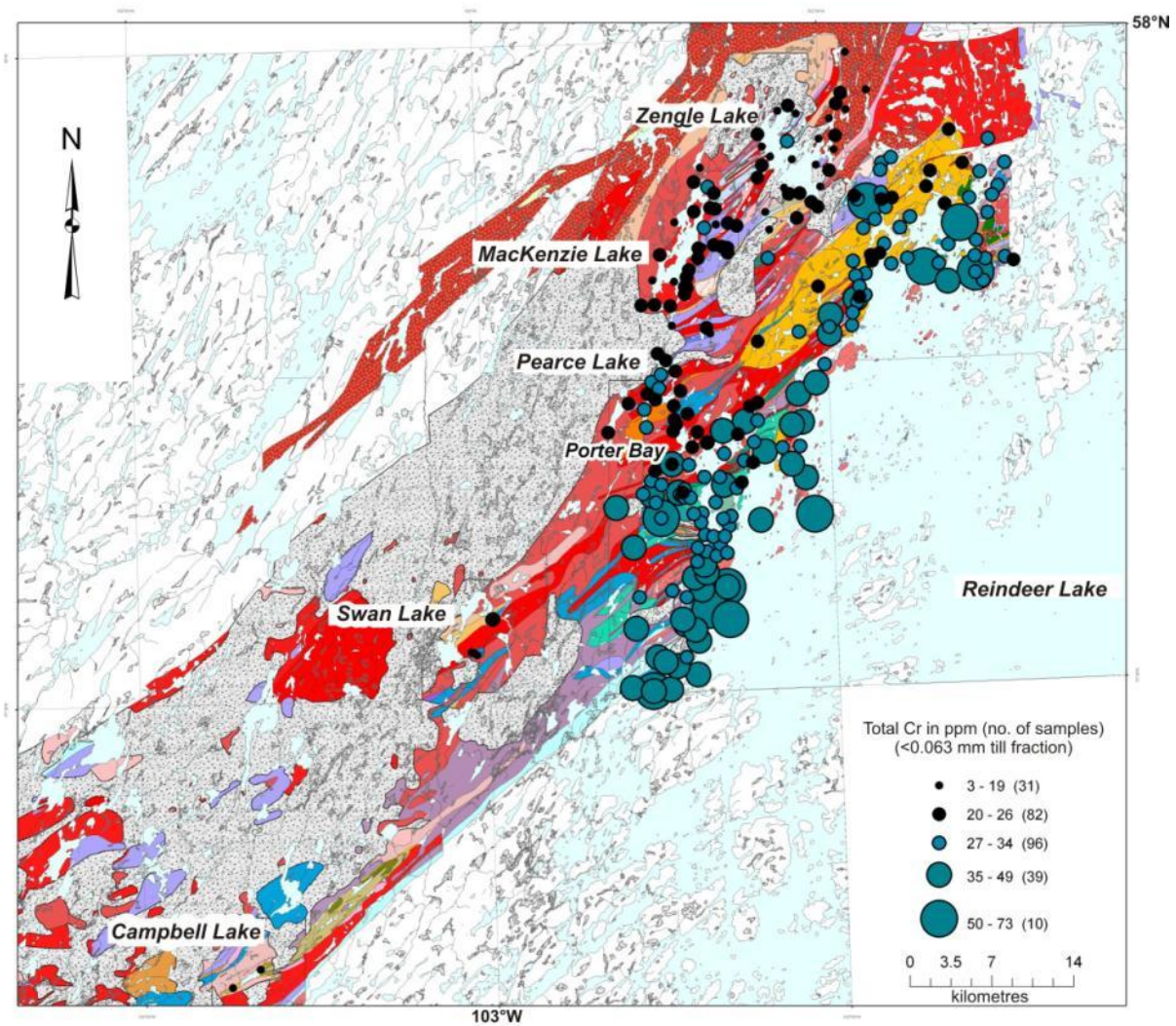


Figure L-05 – Near-total Cr concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-06

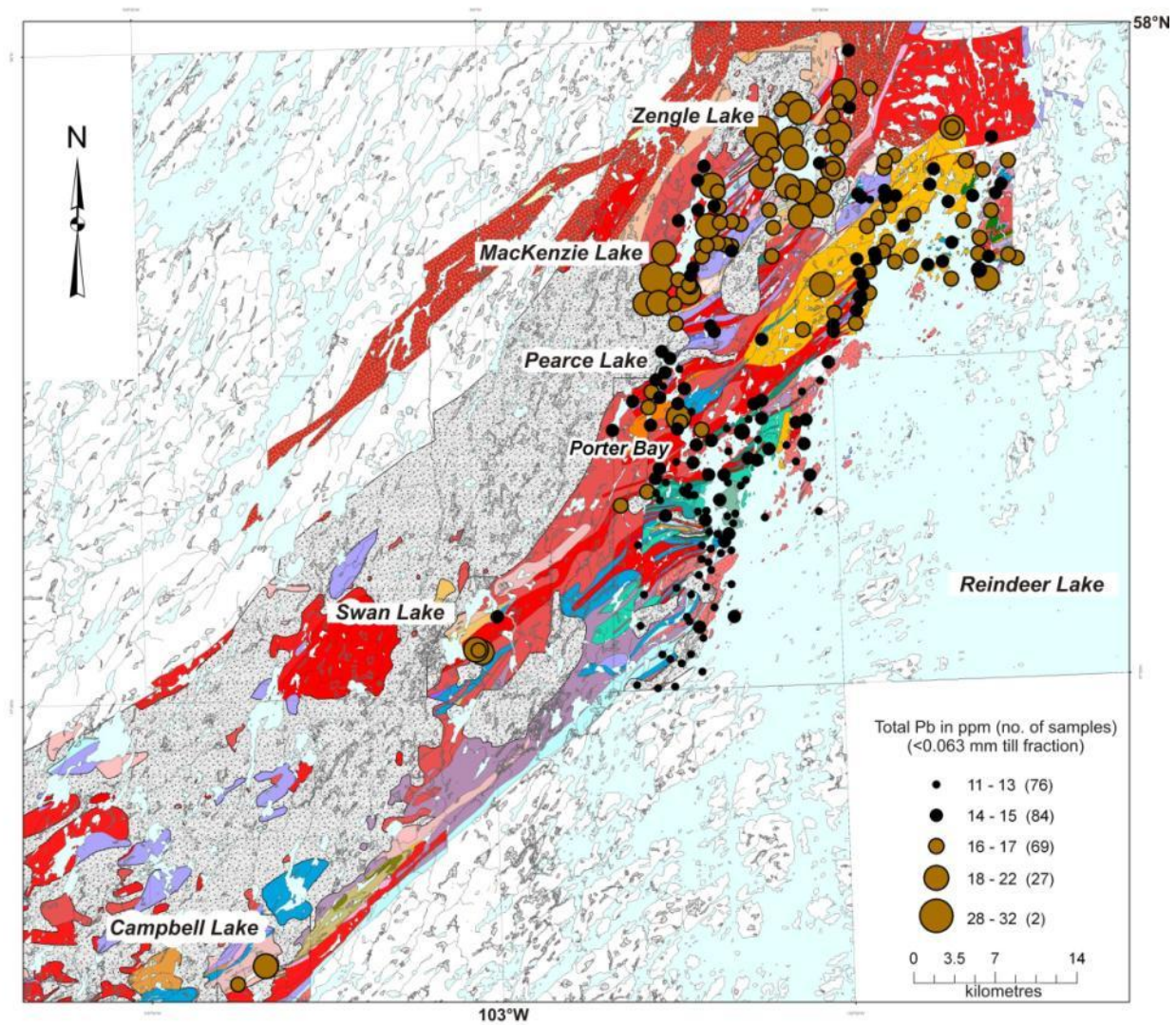


Figure L-06 – Near-total Pb concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-07

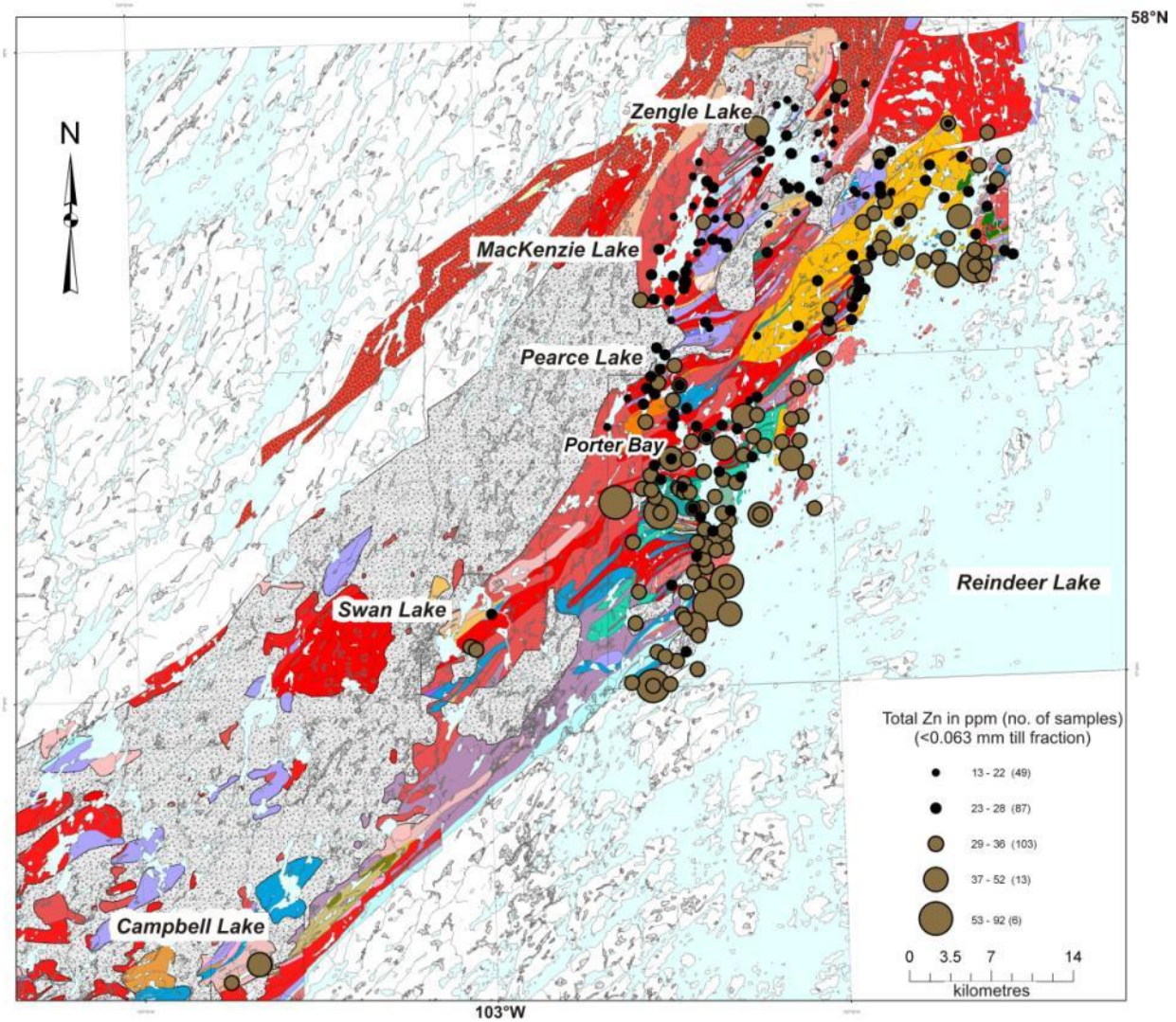


Figure L-07 – Near-total Zn concentrations in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-08

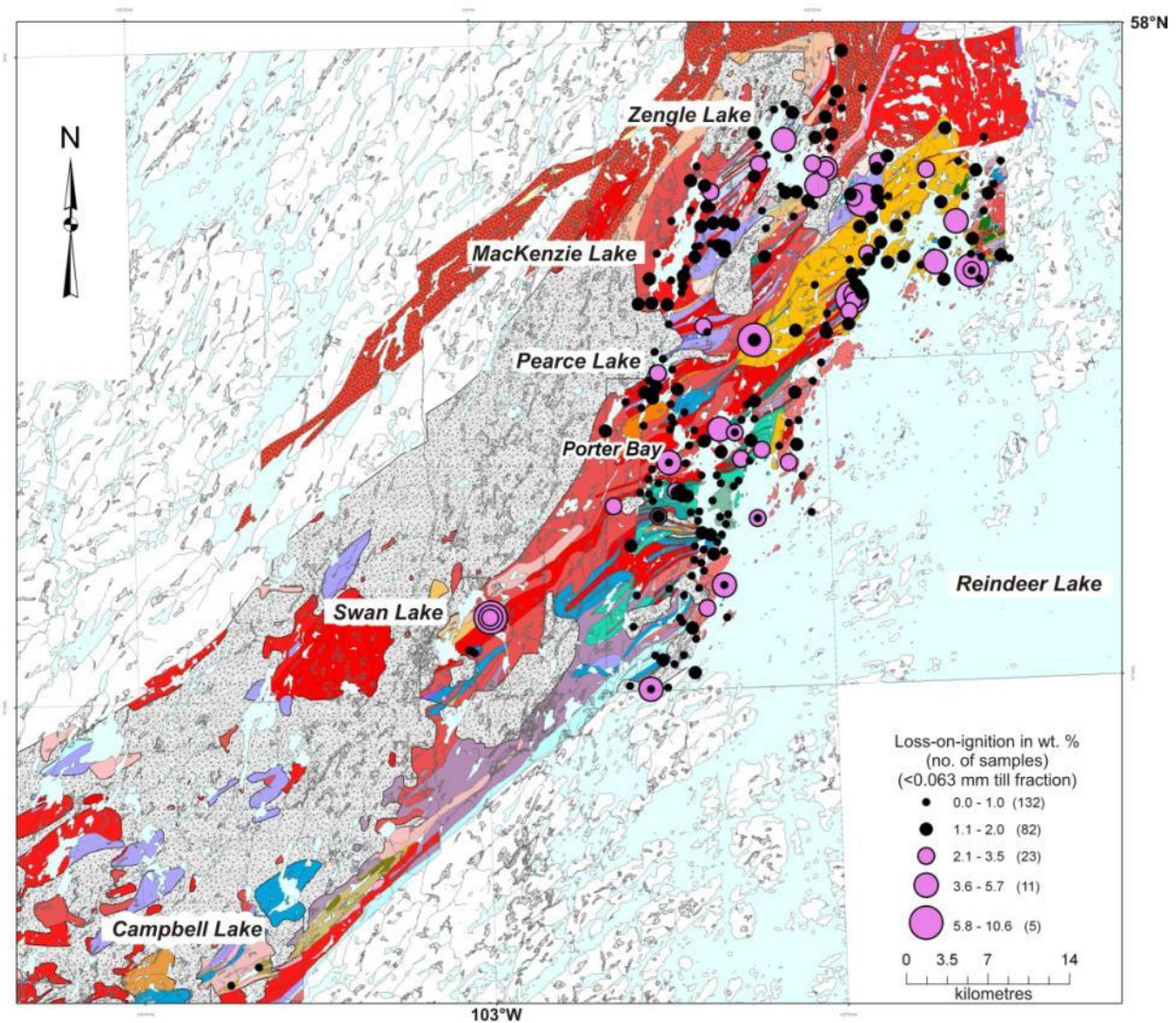


Figure L-08 – Loss-on-ignition content in the <0.063 mm size fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-09

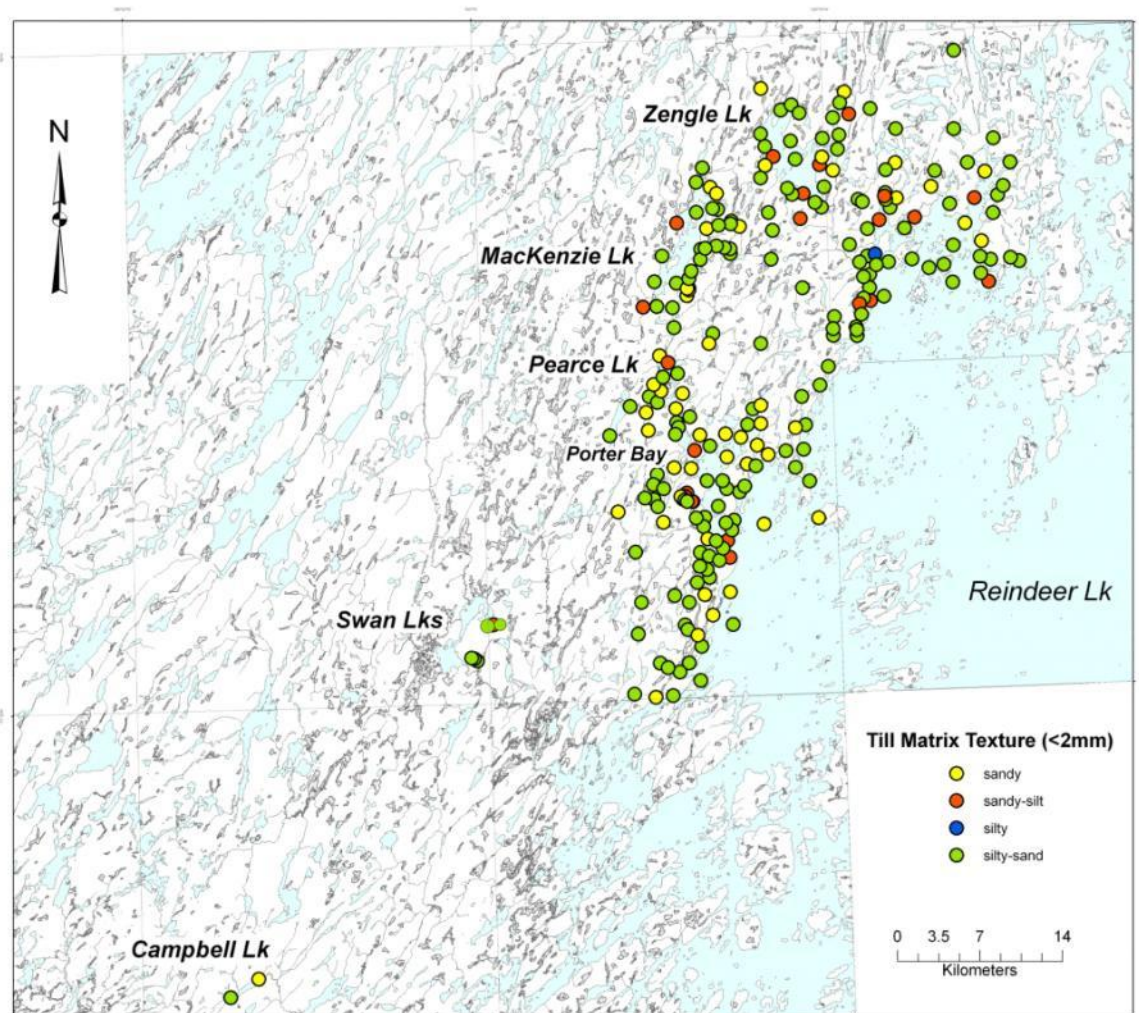


Figure L-09 – Matrix texture of till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-10

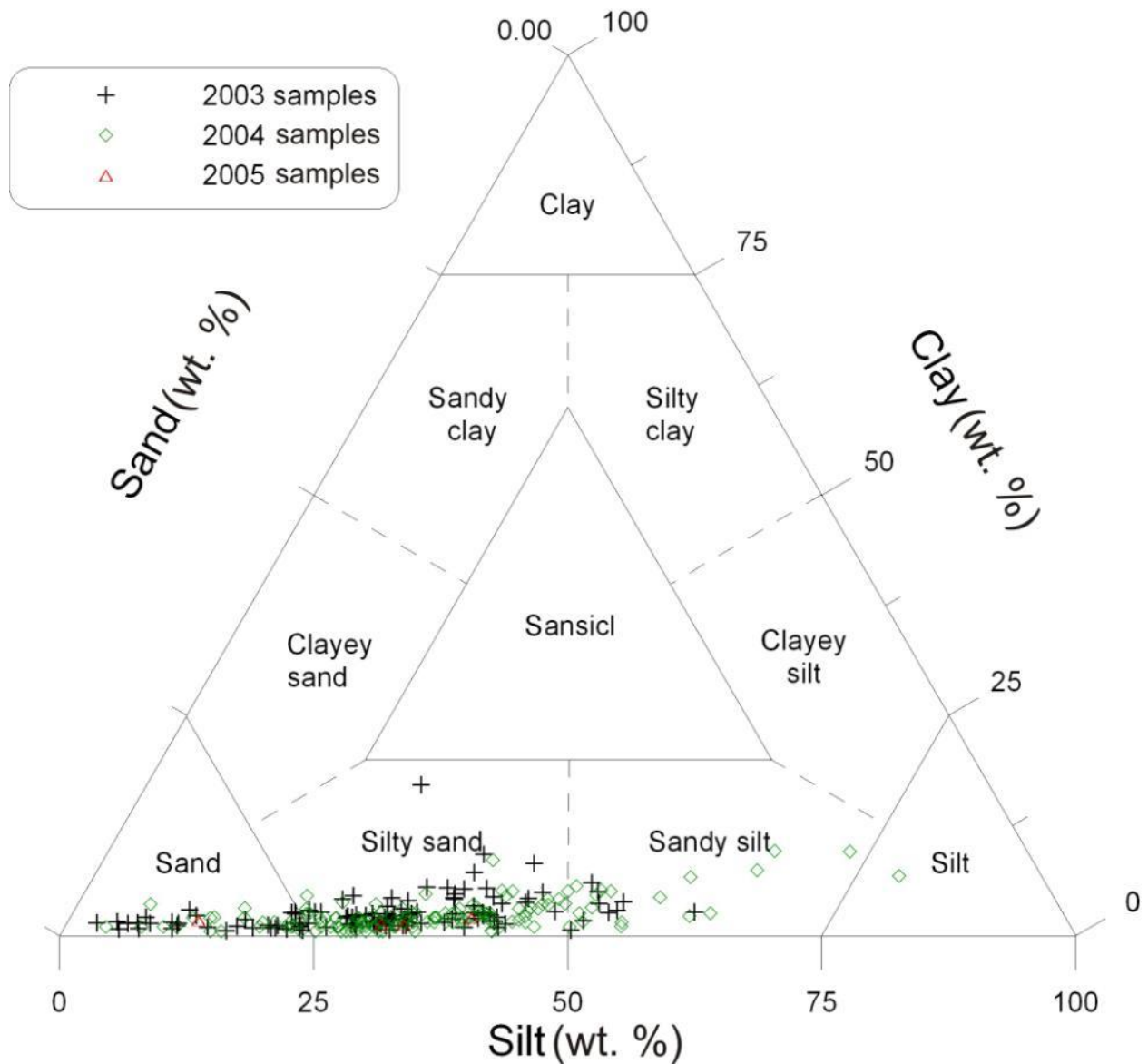


Figure L-10 – Matrix texture ternary plot for till samples. Patterson Island and northwest Reindeer Lake area.



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Figure: L-11

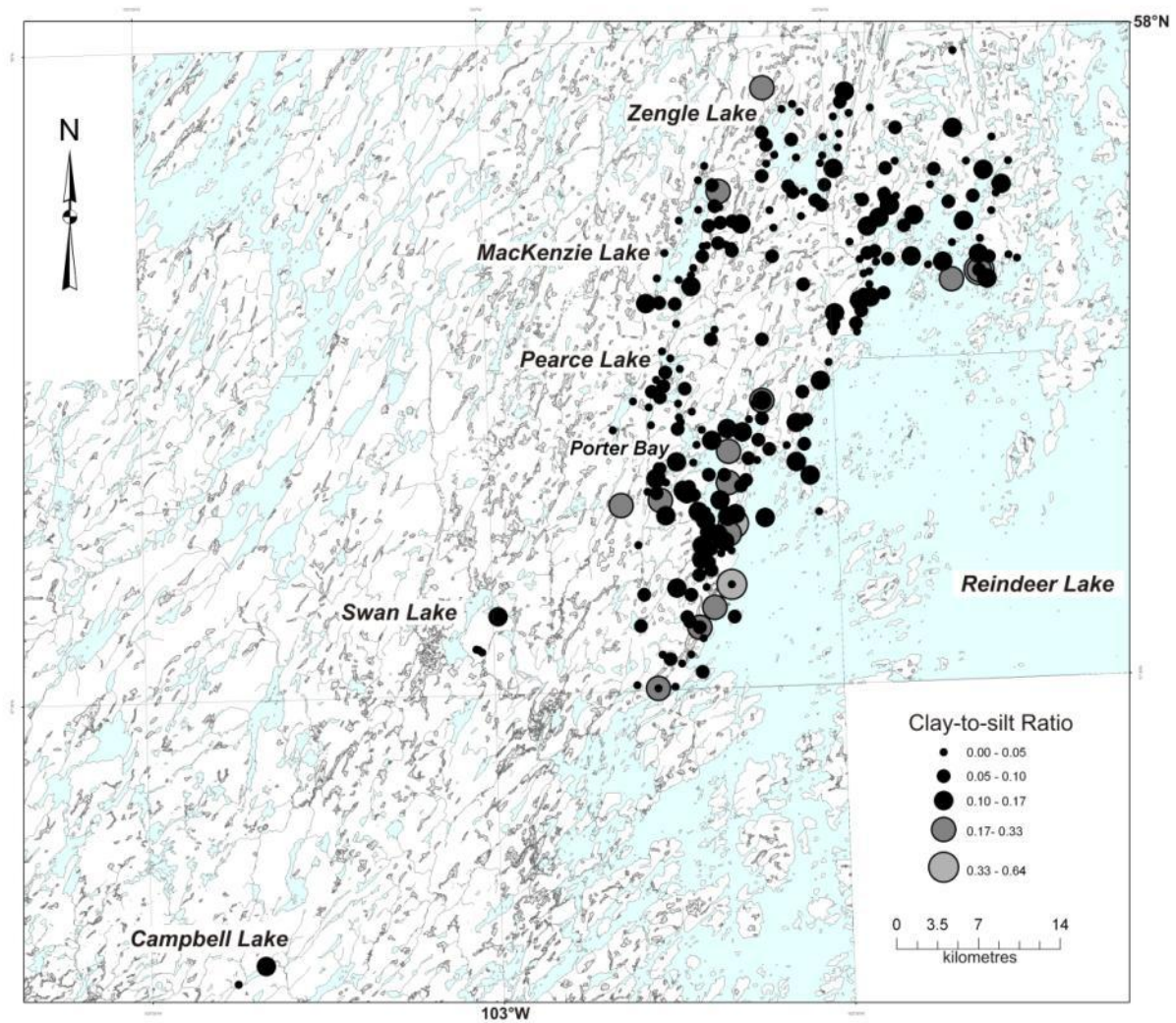


Figure L-11 – Clay to silt ratio in till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-12

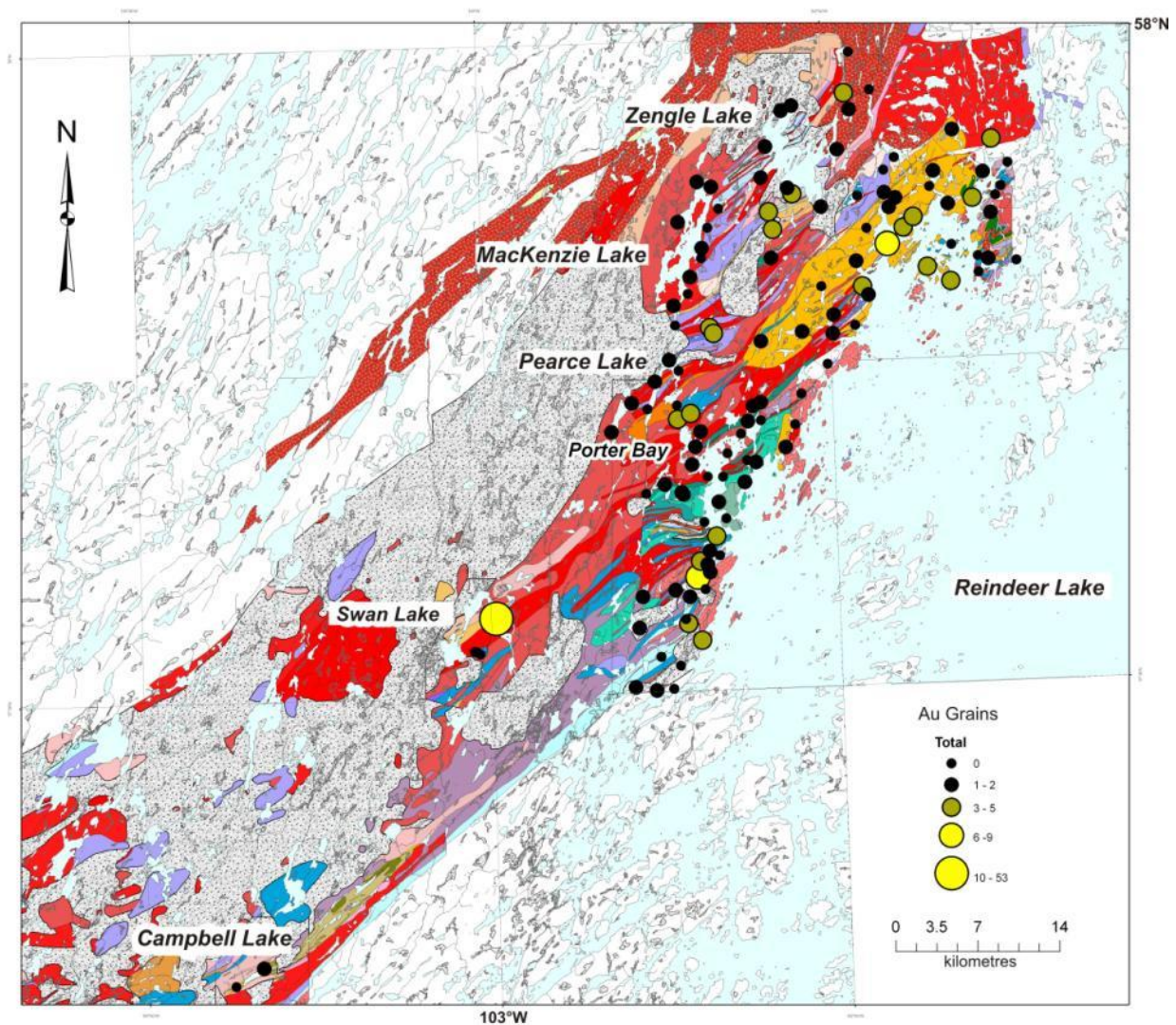


Figure L-12 – Gold grain counts in till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-13

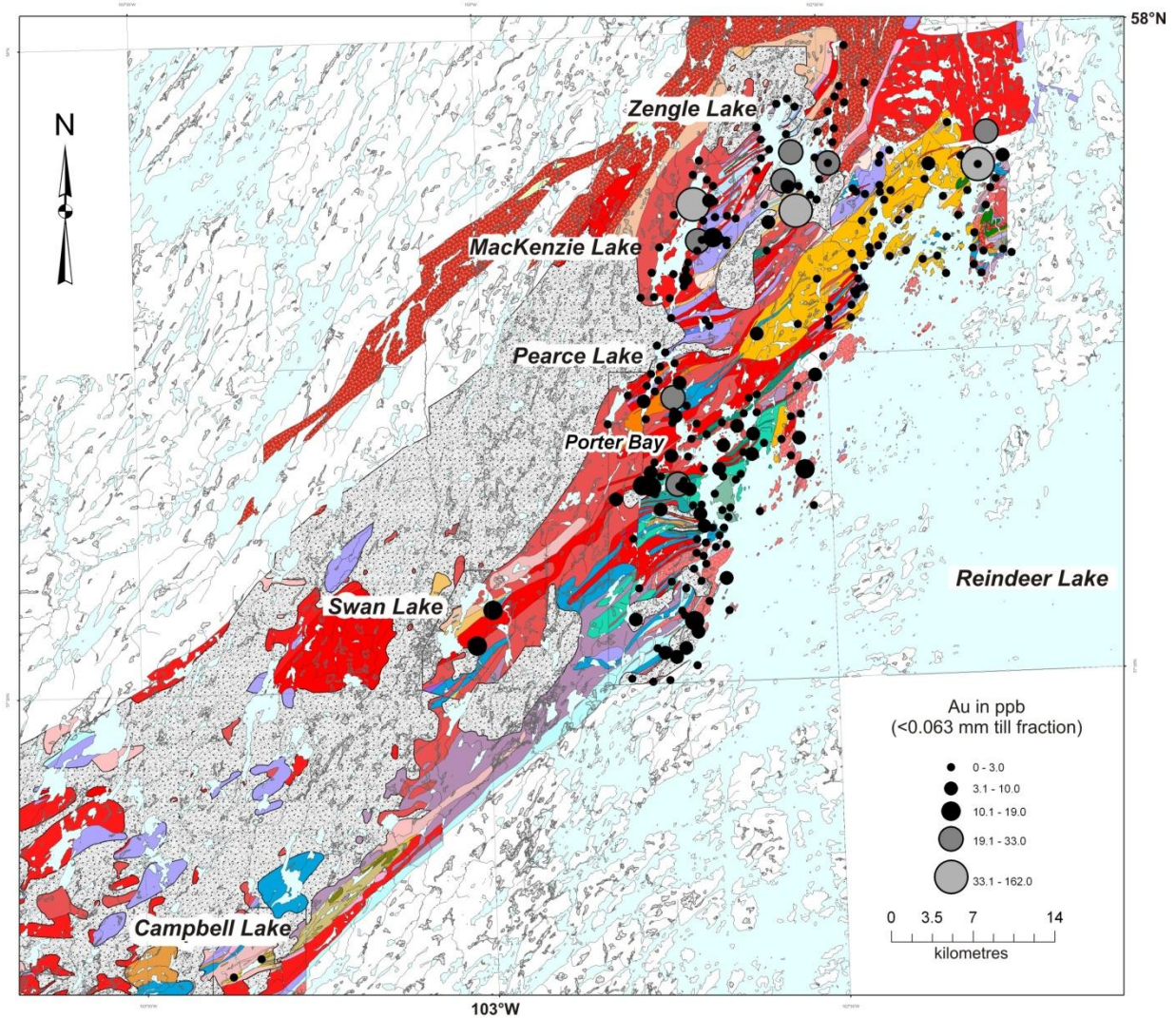


Figure L-13 – Gold concentrations in the fine fraction of the till samples, Patterson Island and northwest Reindeer Lake area.



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Figure: L-14

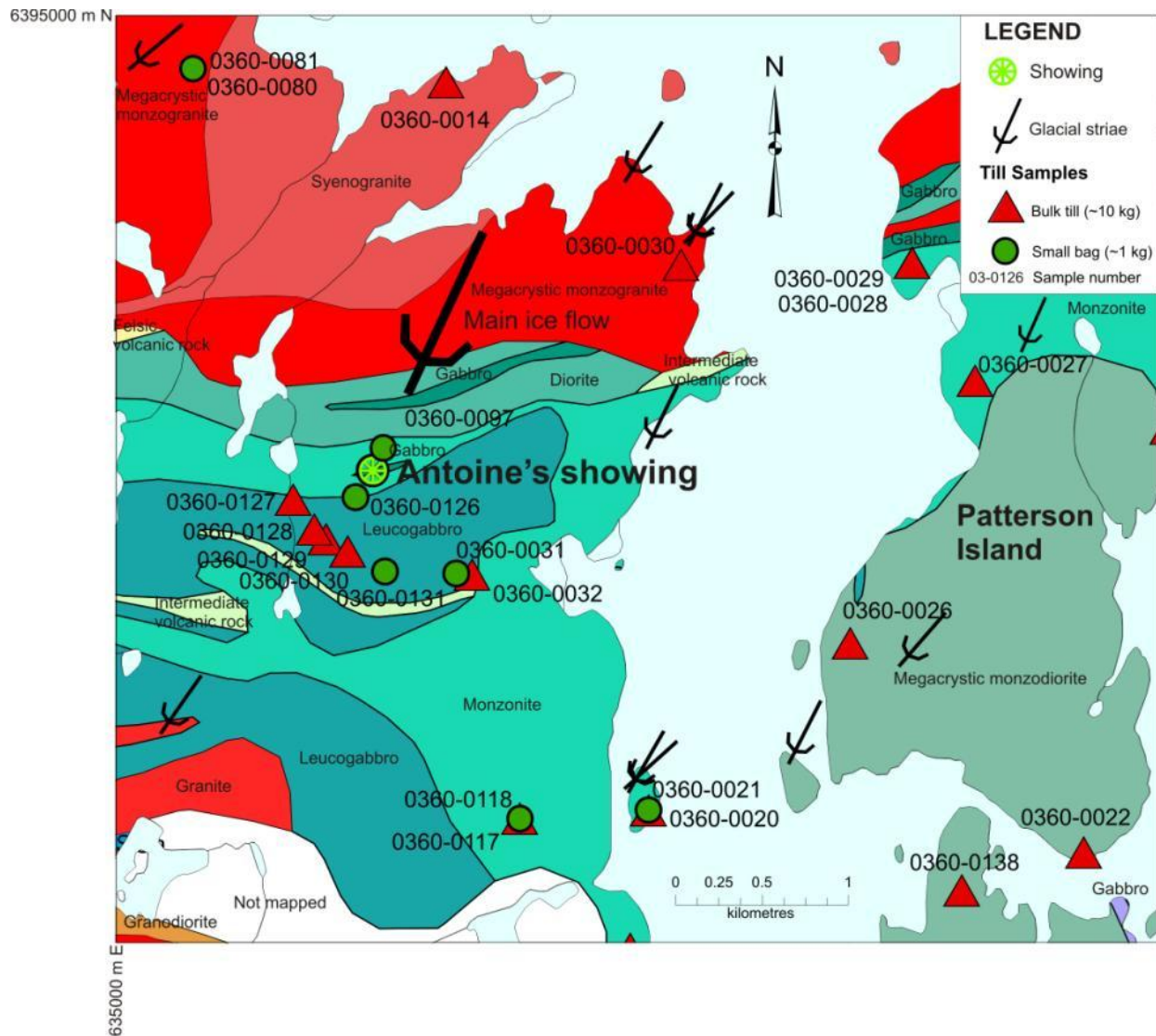


Figure L-14 – Location of sample sites, area surrounding the Antoine's Cu-Ni-Pt-Pd showing, Peter Lake Domain.



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Figure: L-15

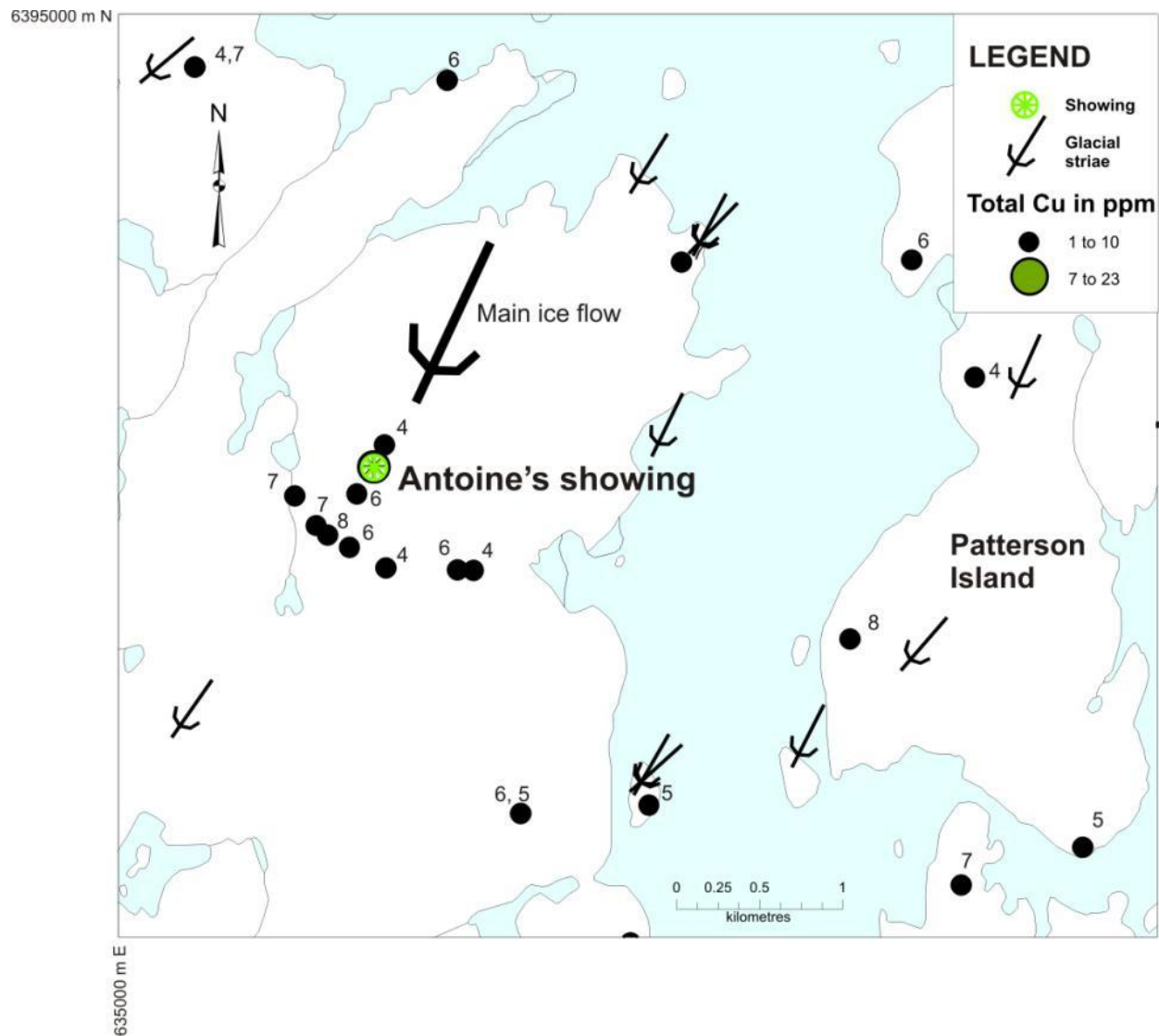


Figure L-15 – Copper concentrations in till samples, area surrounding the Antoine's Cu-Ni-Pt-Pd showing, Peter Lake Domain.



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Figure: L-16

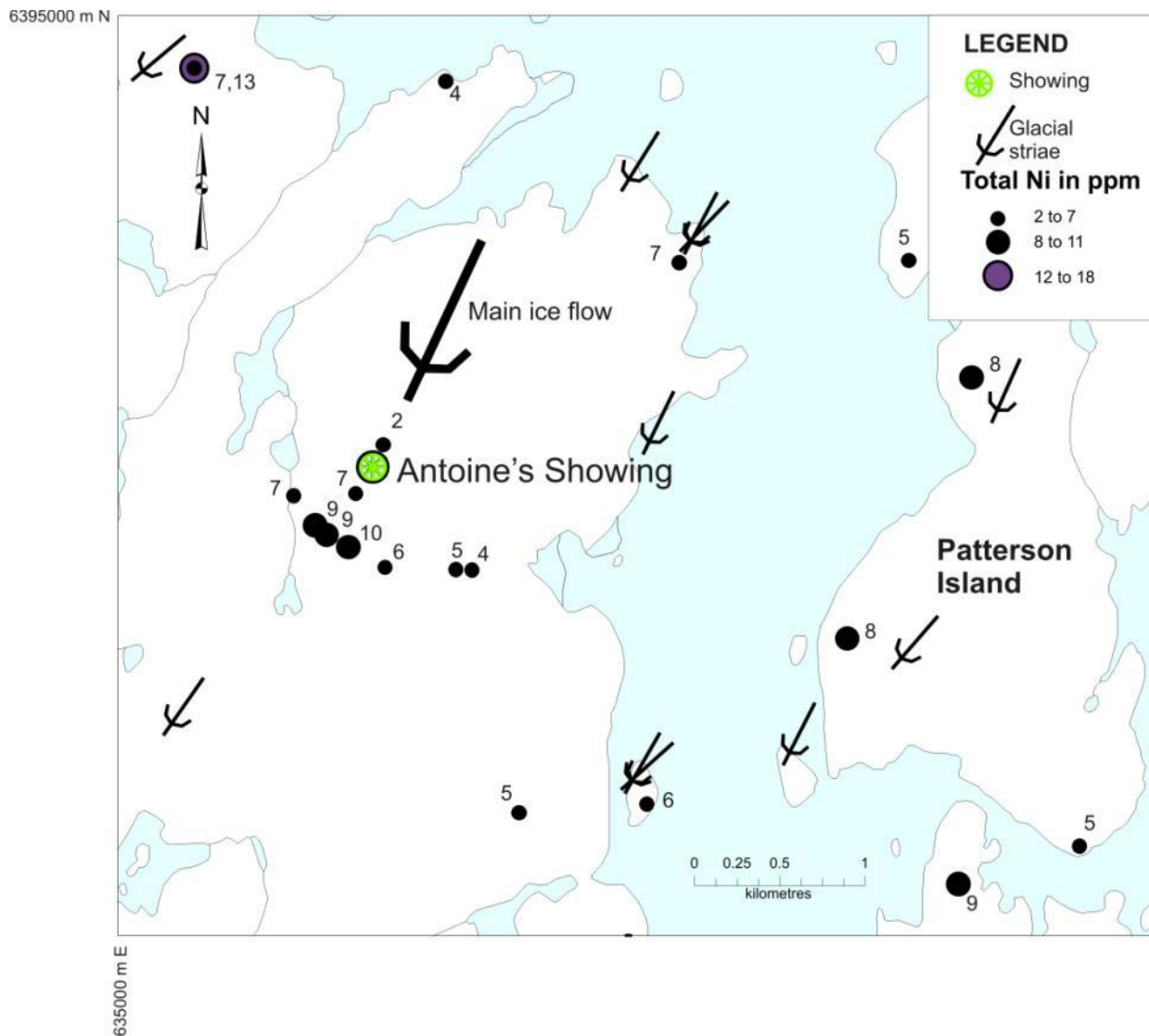


Figure L-16 – Nickel concentrations in till samples, area surrounding the Antoine's Cu-Ni-Pt-Pd showing, Peter Lake Domain.



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Figure: L-17

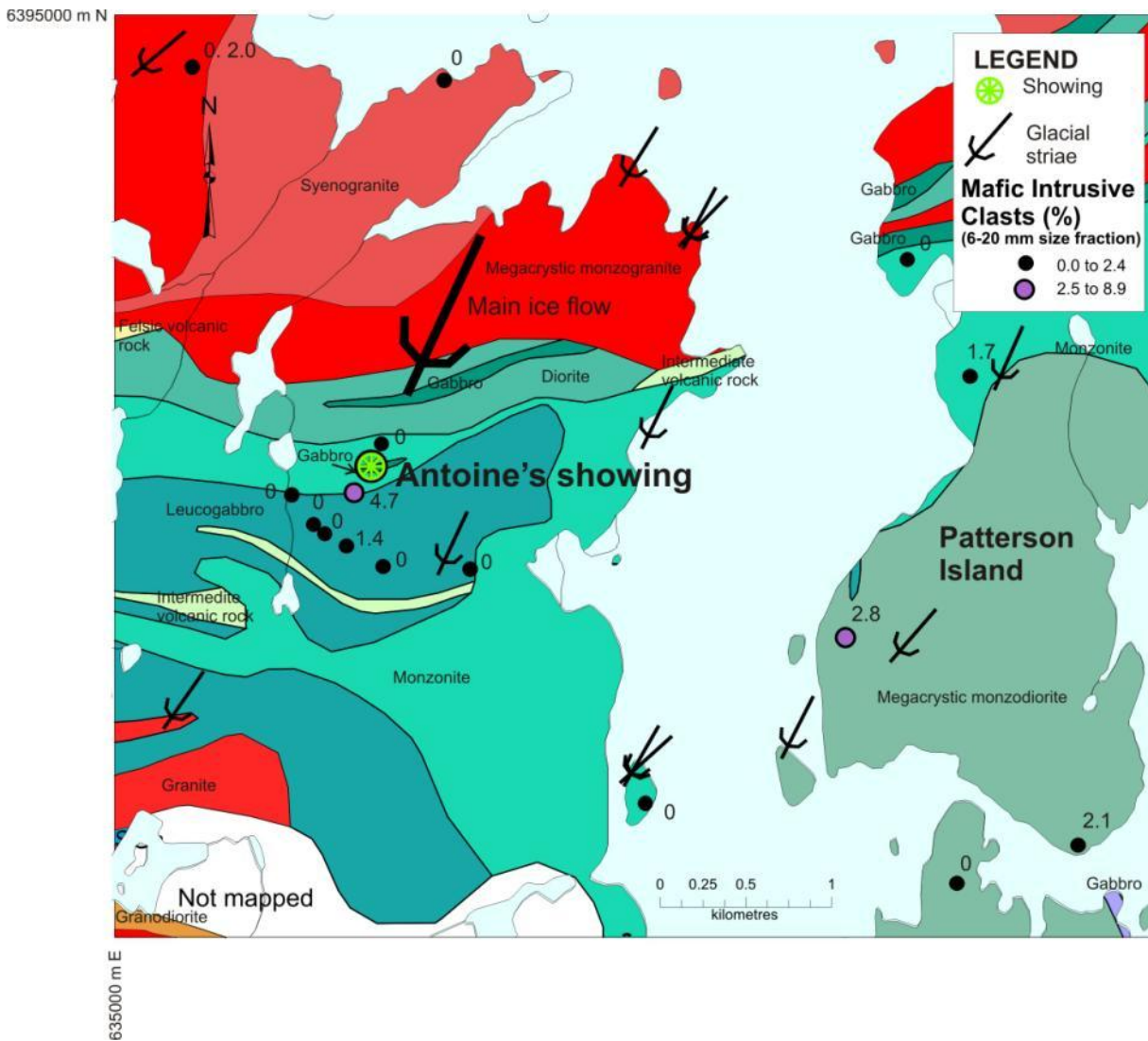


Figure L-17 – Mafic intrusive pebble content in till samples, area surrounding the Antoine's Cu-Ni-Pt-Pd showing, Peter Lake Domain.



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Figure: L-18

Leucogabbros, diorites, gabbros



Figure L-18 – Mafic intrusive clasts of sample 0360-0130, near the Antoine's Cu-Ni-Pt-Pd showing, Peter Lake Domain.



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