Canada

THE TECTONIC EVOLUTION OF THE TALTSON MAGMATIC ZONE: A RECONNAISSANCE STUDY

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LEGEND

UM Not compiled

Q Quaternary: Early post-glacial deposits include westerly trending eskers locally interrrupted by sand planes in the central region, northerly trending dunes of fine wind-blown sand in the southeastern regions, and fine gray silt up to a few metres thick in the western region. A sample of buff-coloured, finely laminated silt from the lower valley of Trudel Creek (which flows into the Taltson River) contains a mixture of pre-Pleistocene and late Pleistocene spores. Glacial striae and scattered chatter marks suggest ice flow ~265° across most of the study area. Near Great Slave Lake some divergence of striae to the north suggests drawdown in this direction.

MESOPROTEROZOIC (1600 Ma to 1000 Ma)

m{dbM Mackenzie diabase dyke swarm: medium- to coarse-grained, unmetamorphosed, well-developed chilled margins, strongly magnetic, typically 20 to 50 m wide, trending 320 to 340°; U-Pb (baddeleyite) 1267 ± 3 Ma crystallization age (#1, dated outside of map area). Note: in this compilation Mackenzie dykes have not been differentiated from the Sparrow dyke swarm.

PALEOPROTEROZOIC (2500 Ma to 1600 Ma)

p{grT Thekulthili Stock: syenogranite; coarse-grained to potassium-feldspar megacrystic, massive, unfoliated; minor minerals include muscovite, biotite, chlorite and epidote; large zoned zircons, monazite, apatite, magnetite and fluorite are common accessories. U-Pb (zircon) 1813 ± 5 Ma crystallization age (#2). Post-tectonic Taltson magmatic zone.

p{dbS Sparrow dyke swarm: dark grey to greenish, unfoliated, chilled margins, some margins are sheared; dykes vary from few millimetres to 50 m, but most are less than 2 m wide. Smaller dykes are aphanitic to microlitic or porphyritic, larger dykes are diabasic to gabbroic; amygdules filled with quartz, chlorite, carbonate, and locally epidote; trend 320° ± 15° and dip steeply. Differentiated from Mackenzie swarm by their low aerogmagnetic response. U-Pb (baddeleyite) 1827 ± 4 Ma crystallization age (#3). Note: in this compilation Sparrow dykes have not been differentiated from the Mackenzie dyke swarm.

NONACHO BASIN CLASTIC ROCKS

> 1827 Ma crosscutting Sparrow dyke & < 1935 Ma sinistral mylonite that cuts the Natael granite

Nonacho Group consists of coarse to fine clastic sediments and represents a sequence of talus-alluvial-fan, braided-stream, pond, beach, fan-delta and lacustrine rocks. It comprises of three megacycles, and is divided into six successive units: 1) basin initiation with a fining upward megacycle, Hjalmar and Tronka Chua fomations; 2) basal lacustrine sediments followed by coarsening upwards sandstone and conglomerate, Chief Nataway and Newshethdezza fomations (the latter not identified in current map area); and 3) final fining upwards megacycle representing tectonic quiescence as the basin recovered from the second cycle,Thekulthili and Taltson fomations. Metamorphism is absent or of lower greenschist grade. This sedimentary sequence lies unconformably on Nonacho Basement Complex blocks and gneiss (APgnN); movement, deformation and associated mylonitization of these blocks are believed to younger than the Natael granite (pPgrN). Descriptions based largely on Aspler, 1985a.

p{NcTa Taltson Formation: clastic rocks; interbedded units of arkose, pebble conglomerate, sandstone, siltstone and red pelite; graded beds, slump features, troughs, ripple marks and crossbeds observed locally; pebbles predominantly granitic with minor quartzite, sandstone, and conglomerate pebbles.

p{NcTh Thekulthili Formation: predominantly milky quartz and quartz arenite monomictic or polymictic conglomerate, interbedded with siltstone, sandstone and arkose; pebble- to boulder-sized clasts of granite, quartzite, mudstone, siltstone, sandstone, mafic volcanic, and gneiss; local crossbedding and channel infill features.

p{NcCN Chief Nataway Formation: predominantly fine-grained clastic rocks with conglomerate beds. Slate with laminations and layering of alternating dark grey-green with buff or light grey; strong fissile fabric parallel to foliation; often folded; arenite to argillite, purple, locally cut by obliquely-oriented sand dykes. Conglomerate beds of predominantly granitic clasts, with amphibolite and paragneiss clasts; clasts commonly 3-7 cm in diameter, reaching up to15 cm in size.

p{NcTC Tronka Chua Formation: predominantly arenite, arkose, with polymictic and monomictic conglomerate beds (up to 15%); pink, tan to green-grey, with local purple hematite staining; folded and crenulated; bedding common, local graded beds, some sand volcanoes observed. Clasts mostly granitic, with some volcanic and quartz cobbles, clasts up to 25 cm.

p{NcH Hjalmar Formation: basal breccia/conglomerate, interlayered with bands of mudstone, shale and siltstone. Angular fragments and lenses to rounded cobbles of granite, minor quartz pebbles, sedimentary and mafic clasts up to 30 cm; grey - green chloritic shale-slate to pink sandy matrix; bedding often not well defined.

Late Taltson granitoid rocks

p{grBT Benna Thy monzogranite: 15 km elongate north-south body; grey to white, medium-grained, chlorite monzogranite; retrograded muscovite; local pyroxene; foliated and sheared with local megacrystalline zones and banded gneiss. U-Pb (monazite) 1906 ± 3 Ma crystallization age and minimum age for regional sinistral shear, maximum age for dextral shear (#4).

p{grOF Othikethe Falls monzogranite: gneissic, foliated to lineated, leucocratic, medium-grained; similar to Slave monzogranite but is almost devoid of characteristic Slave-paragneiss inclusions; part of the pluton is megacrystic. U-Pb (zircon) 1926 ± 3 Ma crystallization age (#5).

p{grN Natael granite: north-south, elongate body, medium-grained, equigranular, white to pink or grey monzogranite, commonly muscovite-biotite-bearing; locally margins intruded by muscovite-bearing pegmatite dykes; foliation moderately to steeply east dipping; biotite-amphibolite facies sillimanite-muscovite inclusions; intrude tourmaline-bearing Rutledge River paragneiss at Hill Island Lake; U-Pb (monazite) 1935 ± 3 Ma (#7) and U-Pb (zircon) 1934 ± 2 Ma (#6), both crystallization ages.

p{grAL Arch Lake K-feldspar megacrystic granite to syenogranite gneiss; monazite, hercynite and garnet-bearing. Distinguished from Konth batholith by magnetite-bearing series signature. Possibly younger than Konth batholith as Arch Lake granite appears to cross cut Konth granite aeromagnetic trends near Pilot Lake. U-Pb (zircon, monazite) 1938 ± 3 Ma crystallization age (#8) and U-Pb (monazite) ca. 1935 Ma age (Berman & Bostock, 1997).

p{gnSK Mixed gneiss: north-south gneissic zone, east of Thubun and O'Connor Lakes, comprising of Slave and Konth granite protoliths.

p{grK Konth granite: S-type ilmenite series, syenogranite to monzogranite, potassium- feldspar megacrystic batholith; salmon pink varying to grey to white; subhorizontal to steeply dipping foliation, megacrysts commonly up to 2 cm, locally to 5 cm; minor amounts of garnet and altered cordierite, medium-fine grained biotite and fine-grained muscovite, locally sillimanite, andalusite, corundum ± chlorite ± epidote; rare orthopyroxene; trace amounts of ilmenite, monazite, apatite, rutile, anatase and locally magnetite and uraninite. Abundant inclusions of Rutledge River Basin pelitic to psammitic rocks, Slave granite rafts and screens, as well as minor amounts of metagabbro, metabasites to orthopyroxene-bearing intermediate rocks. Exposed contacts with Slave granite are conformable and interveined. The Konth batholith is divided into 4 zones characterized by foliation: northwest zone - moderate eastward dips and less-developed foliation, U-Pb (monazite) 1935 +3/-1 Ma emplacement age (#9); east zone - vertical foliation, U-Pb (monazite) 1936 +2/-1 Ma emplacement age (#10); central zone - near vertical north-south foliation, common large inclusions of granulite facies metasediment, U-Pb (zircon) 1929 +10/-6 Ma emplacement age (#11); and south-western zone with near-horizontal foliation, U-Pb (monazite) 1938 +3/-1 Ma emplacement age (#12).

p{grG Gagnon granite: chlorite-biotite-epidote-muscovite-quartz monzonite varying to granodorite and locally to granite; monazite common; buff weathering pink to grey-white; texturally variable, fine- to coarse-grained and megacrystic, includes pegmatite phases; unfoliated exept near contacts; inclusions limited to amphibolite and hornblende diorite occuring along southeast margin. Southern older phase, megacrystic biotite-hornblende monzogranite, U-Pb (zircon, monazite) 1940 ± 8 Ma crystallization age (#13), and younger phase, fine- to medium-grained equigranular biotite-chlorite granite, U-Pb (zircon) 1882 +7/-6 Ma crystallization age (#14).

Middle Taltson granitoid rocks

p{gnD Deskenatlata granodiorite mixed gneiss: occuring as irregular gneissic zones within the granodiorite. Western zones: most gneiss are mixed with or contain inclusions of metabasite-amphibolite and granodiorite, with minor granite; inclusions up to 40% and showing varying degrees of recrystallization and deformation. Eastern zones: mixed Slave and Deskenatlata gneiss and Rutledege paragneiss.

p{gnSD Mixed gneiss: Comprising of Slave 'type' granite and Deskenatlata granodiorite protoliths; mainly occuring between east side of Deskenatlata and west side of Slave granite plutons.

p{grS Slave 'type' granite: Biotite quartz monzogranite varying locally to granodiorite or syenodiorite; grey, white, buff or pink; equigranular to slightly megacrystic, medium grained; containing minor to trace garnet, cordierite and aluminous spinel; trace minerals - monazite, apatite, zircon, and magnetite ± ilmenite; locally ± orthopyroxene ± sillimanite ± andalusite ± corundum. Low magnetic susceptibility S-type signatue typical of ilmenite series granite. Foliated but locally almost massive. Orthopyroxene bearing sample from western Slave granite U-Pb (monazite) 1955 ± 2 Ma intrusion age (#16).

Early Taltson granitoid rocks

p{gdD Deskenatlata granodiorite: heterogeneous plutonic complex consisting of pale buff-grey, medium- to coarse-grained, equigranular to potassium feldspar-megacrystic, largely unfoliated poikiolitic biotite granodiorite; locally hornblende-rich reaching hornblende diorite; often inter-mixed with varied granitoid phases showing textural and colour variations; mafic minerals commonly replaced by chlorite; titanite and zircon are common with rare apatite; Rutledge River paragneiss inclusions occur within eastern margin, and contain orthopyroxene; often intruded by granitoid pegmatite and aplite dykes. Foliation weak or absent in central and western areas, well foliated to the east. U-Pb (zircon) 1986 +2.4/-2.0 Ma intrusion age (#17).

Rae Interface granitoid rocks

p{mgBLC Berrigan Lake mafic gneiss complex: occurs as three lenticular bodies (41 km, 23 km and 23 km in length and ~ 4 km wide); is disontinuously preserved along the most western margin of the Berrigan Lake block of the Nonacho Basement domain. Consists of lenticularly banded medium- to fine-grained, hornblende-plagioclase gneiss with common amphibolite, less common monomineralic hornblende, and fine-grained, plagioclase-rich lenticular inclusions; interbanded with quartz-rich gneiss and layers to lenses of granitic, locally garnet-bearing, protomylonite. Local bands of medium-grained gabbroic anorthosite and hornblende metagabbro. Contains quartz and plagioclase, often hornblende, biotite and potassium feldspar, chlorite-epidote and actinolite; may contain up to 20% orthopyroxene. Anorthosite U-Pb (zircon) 1956 ± 3 Ma intrusion age (#15).

p{grR Rae granite: distinctive potassium megacrystic granite to granodiorite to augen gneissic bodies located in a discontinuous 200 km linear north-south zone hosted predominantly by the gneissic Taltson basement complex. Well foliated to lineated ± hornblende ± biotite, variably altered to chlorite-epidote; may include local amphibolitic inclusions and schlieren; contacts often conformable or gradational with foliation in adjacent mixed gneiss. Yatsore Lake augen gneiss U-Pb (zircon) 2270 ± 4 Ma crystallization age (#18).

p{gbT Thoa gabbro, gabbroic anorthosite: occurs as three seperate bodies, Hill Lake area. Largest body 7 by 2 km, medium-fine to coarse-grained; massive to foliated, dark green weathering, varying from hornblendite, hornblende metagabbro to anorthositic metagabbro; coarser feldspathic phases contain grey to white plagioclase; pyroxene remnants rarely preserved; biotite is locally abundant; ± garnet ± pyrrhotite; intruded by mafic dykes. U-Pb (zircon) 2340 ± 7 Ma emplacement minimum age (#19).

p{grBL Borrowes Lake augen granite: highly altered, gneissic and typically sheared, hornblende-rich; K-feldspar megacrysts up to 4cm, with hornblende rims up to 2.5 cm thick. U-Pb (zircon) 2436 ± 12 Ma crystallization age (#20).

KEY to LEGEND CODES

Example codes: APgrN (age / rock type / rock name / formation); pPNcTC (age / group / rock type / rock name / formation)

age: mP Mesoproterozoic; pP Paleoproterozoic; AP Archean/Proterozoic

group: N Nonacho basin clastic rocks (pPNc)

rock type		rock name / formation			
am	amphibolite	AL	Arch Lake	T	Taltson basement complex (gnT)
c	clastic rock	BL	Borrowes Lake	T	Thekulthili Stock (grT)
cg	conglomerate	BLC	Berrigan Lake Complex	T	Thoa (gbT)
db	diabase	BT	Benna Thy	Ta	Taltson Formation
dr	diorite	D	Deskenatlata	TC	Tronka Chua Formation
fd	felsic dyke	CN	Chief Nataway Formation	Th	Thekulthili Formation
fv	felsic volcanic	G	Gagnon		
gb	gabbro	H	Hjalmar Formation		
gd	granodiorite	HL	Hill Island		
gn	gneiss	K	Konth		
gr	granite	M	Mackenzie (dbM)		
grgd	granite-granodiorite	M	Mama Moose (pgM)		
gu	granulite	N	Natael (grN)		
mb	marble	N	Nonacho basement gneiss complex (gnN)		
mg	mafic gneiss	OF	Othikethe Falls		
ms	metasedimentary assemblage	R	Rae (grR)		
my	mylonite	R	Rutledge River (pgR)		
mybr	mylonite to brecciated rocks	S	Sparrow (dbS)		
mym	mylonite to migmitite	S	Slave (grS)		
pg	paragneiss	SD	Slave / Deskenatlata mixed		
q	quartzite	SK	Slave / Konth mixed		
sc	schist				

Geochronology in legend text: #1 - 33 refer to geochronology table, Sheet 1; references in text, refer to "References", Sheet 2.

Metasedimentary rocks

No stratigraphic order implied; overlapping geochronology data, coupled with varying degrees of metamorphism and variable metasedimentary assemblages reflecting possible facies changes make regional correlations problematic.

Uncorrelated clastic rocks (presumed Paleoproterozoic age)

p{q Quartzite: possibly correlated with units further to the west (Buffalo Terrane?), exposed at Taltson River, western margin of Deskenatlata granodiorite; white weathering, clean, unstratified, purplish white quartzite containing clusters or single pebbles of white quartz, purple-white quartzite and rare grey flinty quartzite. Local pebble lenses dip west.

p{cg Conglomerate, uncorrelated, Star Lake, Kidder Lake, and Hill Island localities possibly Nonacho outliers; polymictic conglomerate, predominantly granite and white vein quartz pebble, with local concentrations of fine-grained mafic igneous pebbles as well as siltstone chips; rounded and angular pebbles in sandy, chloritic and sheared matrix; beds commonly 10 cm inches thick but some granite blocks reaching 60 cm. Local graded beds and scour marks.

p{c Clastic rocks: uncorrelated, some outliers possibly Nonacho, east of Hill Island; sandstone, quartzite to conglomerate, with minor greywacke and siltstone beds. Grey-green, green, buff, cream, and pink. Pebbles up to 5- 7 cm common, local rare occurrences of clasts up to 30 cm. Pebbles predominantly quartz, sandstone and siltstone, with some feldspar shards. Local crossbedding, graded beds, laminations and rhythmic layering. Slate horizons, locally schistose or, strongly lineated

HILL ISLAND METASEDIMENTARY ASSEMBLAGE
(> 1934 ± 2 Ma Natael Granite emplacement)

p{msHL Hill Island metasedimentary assemblage: predominantly bedded laminated mudstone to massive siliceous siltstone several metres thick, ± tourmaline. Local graded beds suggest turbidite deposition; minor coarse-grained sandstone layers, up to 1 metre with common feldspar grains; local iron sulfide-bearing mudstones, and garnet-bearing calcareous siltstone arranged in boudin-like lenses or concretions parallel to bedding. Abrupt top reversals and rare exposed fold noses suggesting near-isoclinal folding. Sporadic presence of cordierite and absence of identified alumino silicates suggests rocks have reached amphibolite facies and may reflect potassium metasomatism related to Natael granite emplacement at the southern end of the belt. Greywacke U-Pb (zircon) 2133.8 ± 8 maximum age of depostion, west side of Hill Island Lake.

p{scHL Hill Island schist: discontinuous north-south 40 km long belt of muscovite-chlorite-biotite-quartz-plagioclase schist with local garnet, andalusite, and staurolite; local sillimanite proximal to mylonite zones; more northern schists are less deformed and are lithologically similar to the greywacke-mudstones to the west of Hill Island Lake (pPmsHL).

RUTLEDGE RIVER BASIN

Pelitic to quartzitic paragneiss was deposited in the Early Proterozoic Rutlegde River Basin which closed after the emplacement of 2.44-2.27 Ga granites in the western Rae Province (Bostock and van Breemen, 1994); closure was followed by high-grade metamorphism that preceded but was unrelated to, the Taltson granites. Local graded beds are the only recognizable sedimentary structures. Minor amounts of calc-silicate rocks, bands of mafic volcanic rocks, and rare marble are also present (Thubun Lakes). Sillimanite ± andalusite + cordierite + potassium feldspar indicate the minimum grade attained was upper amphibolite facies, while local assemblages of quartz-plagioclase-orthopyroxene show that regionally lower granulite facies was reached. In the Rutledge Lake area two granulite facies paragneiss suites, the Mama Moose and the Rutledge River were recognized by Culshaw (1984). The Mama Moose is characterized by discontinuous positive aeromagnetic anomalies that crudely define a narrow belt projecting southward from Rutledge Lake suggesting that these rocks are regionally significant, and represent two temporally distinct stratigraphic (potentially allochthonous) units or a possible facies contrast related to the margin of a minor volcanic belt (Mama Moose complex) within the regional paragneiss (Rutledge Lake complex).

p{pgR Rutledge River paragneiss: fine- to medium-grained, severely deformed, banded- to rarely-bedded paragneiss unit characterized by pelitic, quartzitic or calcsilicate zones within biotite - quartz - feldpar gneiss. Commonly amphibolite grade, but ranging from greenschist facies (Hill Island) to locally granulite. Occurring predominatnly as tectonic rafts, screens, and segments within Taltson granitoid plutons, sporadically within the Taltson Basement Complex, and rarely within the Nonacho Basement complex. Distinguished from Nonacho Group sedimentary rocks by metamorphic grade, absence of sedimentary features, and location as the two metasedimentary packages have not been observed in contact with each other. Interlayered often with minor mafic volcanic and calc-silicate rocks as well as granitic layers. Sillimanite - K-feldspar - cordierite assemblages widespread ± garnet ± andalusite; ± orthopyroxene in more mafic components; rusty weathering common and in places disseminated iron sulphides form gossan zones. Characteristic syngenetic tourmaline throughout the study area may be correlative to the tourmaline-rich on-strike sediments of the Waugh Lake Group, northeastern Alberta. Paragneiss, Thubun Lake U-Pb (zircon) 2153.4 ± 1.3 Ma to 2044.4 ± 1.5 Ma population providing maximum age of deposition (#26); second population U-Pb (zircon) 1904.7 ± 1.2 Ma (#27), U-Pb (monazite) 1904.4 ± 1.0 Ma (#28) , and 1906.9 ± 1.1 Ma (#28), providing minimum age of deposition / oldest metamorphic growth. Quartzite band within paragneiss,Tsu Lake U-Pb (zircon) 2142.7 ± 2.4 Ma to 2059.8 ± 2.3 Ma population (#29), interpreted as maximum age of deposition.

p{pgM Mama Moose paragneiss: a discontinuous 225 km long belt of migmatite to banded gneiss; commonly upper amphibolite-granulite facies with quartz - K-feldspar - cordierite - sillimanite - biotite - magnetite assemblages, garnet not common, rare plagioclase, trace green hercynite, corundum exsolution textures observed; tourmaline and graphite are absent; characteristically dark fresh surface. Commonly interleaved with orthopyroxene-bearing metabasite, rarely with granitic bodies. U-Pb (zircon) 2152.5 ± 1.1 Ma maximum age of deposition with ca. 2133 Ma as best estimated age based on population cluster (#22); U-Pb (zircon, monazite) 2079.6 ± 1 Ma minimum age of deposition (and oldest dated metamorphic growth) (#25); U-Pb (monazite, zircon) ca 2077 (#23) to 2056 (#24) Ma age of metamorphic crystal growth or monazite closure temperature after peak of granulite facies metamorphism.

ARCHEAN? - PALEOPROTEROZOIC

(Stratigraphic order not implied; uncorrelated rocks of various ages)

0{fd Felsic dyke: diorite to granodiorite dyke, locally pegmatitic, often contains mafic schlieren, plagioclase sometimes stained pink, ± chlorite; trending 10°, ~ 5 km long, located in Nonacho basement rocks west of Taltson Lake.

0{fv Felsic volcanic: quartz - feldspar - chlorite schist with volcanic banding (compositional variations) and channel fill features preserved; rusty zones with possible garnet; at least 2km in length; at times remnant poikioblastic texture visible; quartz is flattened; absence of boudins. Mapped as single occurrence in Slave batholith.

0{am Amphibolitic bodies of varying ages and compositions; massive to well-foliated to gneissic; occurs throughout map area, includes amphibolitic to dioritic and quartz dioritic gneiss, northern Thubun Lakes area.

0{mb Marble, calcareous siltstone: laminated and interlayered; grey, white to pink marble and calcareous grey siltstone with local biotite-tremolite-chlorite rich bands; strongly folded, local epidote nodules, crystalline actinolite and garnet. Thubun Lake area.

0{gb Metagabbro: small bodies - largest up to 2 km, medium-grained, granular, slightly foliated and lineated, variable proportions of plagiosclase, hornblende and orthopyroxene ± biotite; undetermined age; occuring near Deskenatlata Lake, Pilot Lake, and Hill Island areas.

0{dr Diorite: quartz, biotite and hornblende metadiorite, grading into gabbro; undetermined age. Occuring as widely distributed single, irregular shaped bodies, commonly 100-200 metres, or as elongated bodies up 7.5 km, in northern Slave granite. Smaller bodied diorites comprise mafics up to 30%, with mafic rich zones or schlieren (up to 75%); more gabbro-rich bodies contain pyroxene; often chloritized; dark grey, to grey-green; fine- to medium-grained; foliated, generally intrudes surrounding granitic rocks and often crosscut by granitic dykes. Elongate bodies are fine- to medium-grained, pink to tan to dark grey, massive to strongly foliated, with flattened quartz; variable mafic content with biotite ± hornblende up to 15%.

0{gd Granodiorite: undifferentiated and uncorrelated; includes the porphyritic to xenolithic, biotite-hornblende, foliated and locally chloritized granodiorite bodies east and southeast of Hill Island and an agmatitic, foliated leucogranite to granodiorite, locally chloritic and xenolithic, fault-bounded block north east of Fort Smith.

0{gr Granite: undifferentiated and uncorrelated; includes granite to monzogranite to syenogranite; pink to white, medium- to coarse-grained, locally porphyritic to xenolithic, weakly foliated bodies east, and south east of Hill Island as well as the amazonite-rich occurrences at Portman Lake, the Nonacho unfoliated, fine-grained granite to quartz monzogranite, and the northern Taltson, Great Slave Lake Shear Zone, massive to strongly foliated, fine- to coarse- grained granite to monzogranite bodies. Syenogranite outcrop east of Hill Island and north of Salmon Lake, representative of many small granitotid bodies, UPb (zircon) age 2394 ± 2 Ma (#33).

0{grgd Granite to granodiorite: undifferentiated granitoid bodies; mixed and gradational units of granite (APgr) to granodiorite (APgd), east and southeast of Hill Island.

0{gn Mixed gneisses: Hetrogeneous gneiss, augen gneiss, masssive- to weakly-foliated, meso to leucocratic, ranging to strongly-foliated meso to melanocratic gneiss with many xenoliths. Some recognizable protoliths (megacrystic granitoids); includes Hill Island mixed gneiss with mafic remnants.

0{gu Granulite: granitic to tonalitic granulite to granulite-grade gneissic bodies of uncertain protolith; occuring as small bodies and inclusions (up to 6.5 km); quartz, plagioclase, hypersthene and ilmenite-magnetite bearing, ± biotite ± K-feldspar, rarely garnet; medium- to medium-fine grained; occurs within and along the margins of the late Taltson granites and isolated occurrences in Hill Lake and Vandyck Lake area and also includes the charnokitic granite at Rutledge Lake.

0{my Mylonite: pink, grey to brownish, sometimes white or greenish, aphanitic rocks with smeared-out quartz lenses that contain rounded and locally rotated K-feldspar clasts. May be finely banded; quartz veining often present proximal to faults. Amphibolite inclusions and shlieren locally present in mylonite margins. Smaller zone contacts are sharp, contacts between mylonite and adjacent gneiss or granite are often undefined or gradational. Present in Nonacho cobbles. Sheared monzogranite, eastern edge of shear zone, east of Benna Thy Lake, U-Pb (zircon) 2334 +22/-18 Ma age of emplacement, providing maximum age for major sinistral shear (#30).

0{mybr Mylonitized to brecciated granitic rocks: buff-grey, grey-green to pink mylonite with recognizeable granitic protolith, also includes banded and augen granitic gneiss; often brecciated; pink bands of fine-grained granite common; pink to white feldspar lenses usually 2-4 mm, lenses and stringers of white quartz; thin whispy mafic bands (predominantly biotite), often chloritized; sugary texture. Includes Great Slave Lake Shear Zone, northern Taltson magmatic zone, and Lady Grey Lake mylonites, Hill Island brecciated granite and gneiss as well as a distinct unit of augen gneiss, west shore Star Lake.

0{mym Mafic to granitic, gneissic migmatite: includes major amphibolite bands and smaller bodies of metagabbro, as well as minor metasediments. At Gagnon Lake, inclusion melanges bearing rounded anorthosite and metamorphosed ultramafic xenoliths lithologically similar to the Berrigan Lake complex, and at Dempsey and Vandyck Lake, agmatitic and gneissic migmatite.

ARCHEAN - PALEOPROTEROZOIC

Rae Interface (boundary between Taltson Magmatic zone and western Rae Province)

0{gnN Nonacho Basement Gneiss Complex / Domain: defined as predominantly Paleoproterozioc with recorded Archean inheritance, resting upon and/or comprising of re-worked fault blocks of Rae Province upon which the remnants of the Nonacho Group lie unconformably, or by which the Nonacho Gp lies in fault contact with; to the west bound by the Allan Shear zone, and to the east by a regional north-south trending aeromagnetic discontinuity. Includes the Nonacho, Berrigan and Yatsore blocks which are thought to have moved as a largely sinistral, westward fault array, into the eastern margin of the TMZ during a later pahse of Slave-Rae indentation. Consists of remnants of massive, foliated or banded, medium-to fine-grained plagioclase-rich, hornblende diorite to quartz diorite, inclusions and/or schlieren of amphibolite, medium-grained, foliated- to massive- granitoid rocks with varying composition from granodiorite to granite and often charnokitic; perthitic microcline present in granitoid rocks in varying proportions and may form megacrysts up to 2 cm within gneiss. Greenschist facies epidote, chlorite and sometimes muscovite are accompanied locally by prehnite and carbonate, and more rarely, pumpellyite; trace zircon and apatite. Intruded by small bodies and dykes of aplite and pegmatite. Notable absence of regional paragneiss (pPpgM and pPpgR). Quartz diorite gneiss U-Pb (zircon) age 2400 ± 10 Ma south of Thekulthili Lake (#31); agmatitic phase, granodioritic body, intruding mafic rocks, west of Taltson Lake, U-Pb (zircon) 2294 ± 5 Ma age of emplacement (#32).

0{gnT Taltson Basement Complex: Defined as predominantly Paleoproterozioc with recorded Archean inheritance, resting upon and / or comprising of re-worked complexly deformed fault blocks of Rae Province, shear-bound by the Allan Shear zone-west, the Yatsore block-north, the Tazin shear zone-northeast, a regional north-south trending aeromagnetic discontinuity-east, and to the south deformed by Leland, Allan, and Colin Lake shear zones. Granitoid to dioritic igneous rocks and mixed gneiss with zircon ages ranging from Archean to 2300 Ma, interlayered with mylonite, paragneiss (pPpgR) and minor biotite-hornblende gneiss. Slightly to strongly foliated, altered, and display variable northerly trends; locally up to granulite facies, with sillimanite - cordierite - K-feldspar ± garnet; orthopyroxene is found in mafic rocks. Contains early Rae granitic augen gneiss (pPgrR, Yatsore Lake) 2270 ± 4 Ma (#18).

anticline — syncline — overturned syncline — overturned synform — fault — major shear

MARGINAL NOTES

INTRODUCTION

The Taltson Magmatic zone project was conceived in 1978 to provide modernized reconnaissance geological background to assist prospecting for uranium that had recently expanded northwestward from the Uranium City area as a result of increased interest in uranium for fission powered electricity generation. At that time, the western margin of the Churchill Province had not been generally recognized as a Paleoproterozoic plate margin, the Thelon-Taltson tectonic zone.

The Paleoproterozoic Taltson Magmatic zone (TMZ) comprises a magmatic arc of some 200 km in width that extends roughly 700 km southward from the Great Slave Lake shear zone (GSLSZ) to the Snowbird tectonic zone (Fig. 1). Only its northeastern 20 percent is free of Paleozoic and Pleistocene cover. The northern extension of TMZ, the ThelonTectonic zone, deformed and offset by the Slave-Rae collision, extends north to Prince of Wales Island forming a magmatic arc of approximately 1700 km strike-length (Hoffman, 1988a). To the east, beyond this present study, lies the Archean - Paleoproterozoic western Rae Province, referred to in this synthesis as the 'Internal Rae Province (IRP). It is separated from the TMZ by a north - south zone called the Taltson - Rae Interface (T-RI). The three north-south zones, TMZ, T-RI, and IRP are shown in Figure 2 in red.

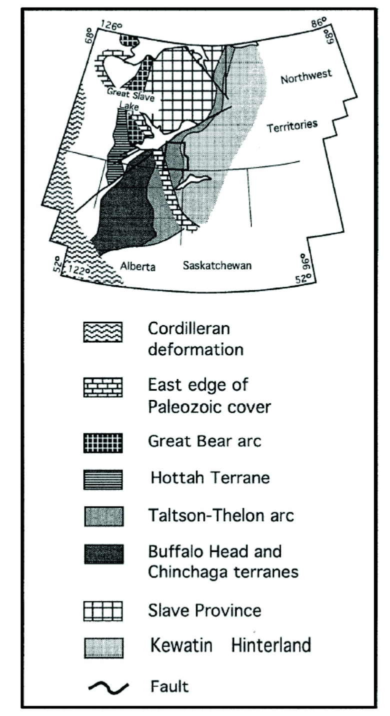

Figure 1. Regional tectonic map of northwestern North America (Berman and Bostock, 1997, after Hoffman, 1988a)

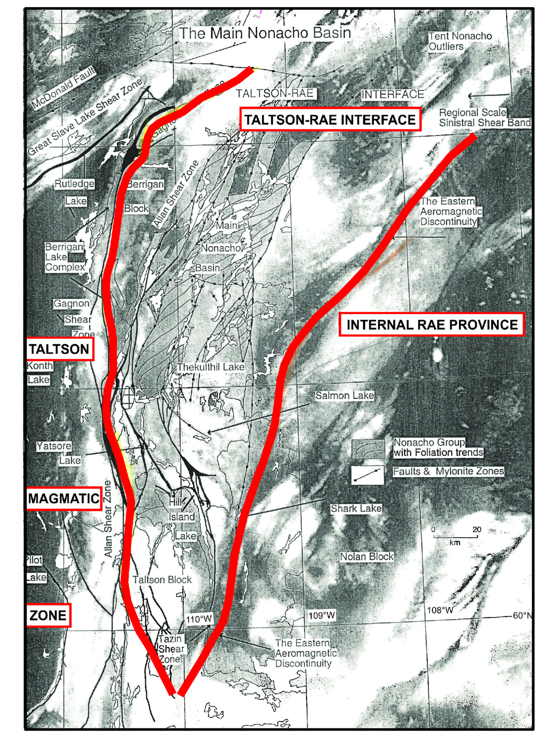

Figure 2. Tectonic map of the Taltson Magmatic Zone, Taltson-Rae Interface and the eastern Rae Province (upublished figure, Bostock)

The project involved the reconnaissance (1:250,000 scale) mapping of the northern part of TMZ and its eastern margin (T-RI) with the Rae Province, north of 60°N. The initial summer's field work (1979) was conceived as a regional familiarization year that would also provide a basis for future plans. Two 2-man camps, each equipped with inflatable rubber boats, were based on a succession of lakes and moved every week by float plane. In the summers of 1980, 1981 and the second half of 1985, the Precambrian rocks of the Fort Smith (75D), Little Buffalo River (85H) and part of Fort Resolution (85A) were mapped. With the aid of helicopter set-outs, ground traverses were run east-west across the regional strike at 4 to 8 km intervals. Boats were also used to cover lake shore where the best exposures were typically available. This provided optimal representative coverage. In 1983, 1985 and 1986 through to 1989, and 1991, field mapping procedures reverted to two man fly camps, with minor helicopter reconnaissance, and the Taltson Lake sheet (75E), the southeast corner of the Snowdrift sheet (75L) and a western part of the Hill Island Lake sheet (75C) were completed. Field work benefited substantially through cooperative field camps with S. Hanmer in 1983 and subsequent field excursions in 1985 and 1986 during which Bostock was introduced to the modern use of kinematic indicators. In 1997 a helicopter was used to collect a suite of geochronology samples, primarily in the north-south Arch Lake granite-Gagnon granite corridor (Fig. 3).

BEDROCK GEOLOGICAL OVERVIEW

The Taltson Magmatic zone's boundaries were initially defined by Ross et al., (1991) on the basis of aeromagnetic patterns and the study of samples recovered from drilled oil-well bottoms. Some TMZ features are not well exposed but are distinguishable on the accompanying aeromagnetic map (Fig. 2). The TMZ north of 60° N (this synthesis) can be divided into three roughly north-south chronological segments (TMZ map, Sheet 1): 1) the early Taltson western wedge-shaped ca. 1986 Ma Deskenatlata granodiorite, 2) a middle Taltson N-S trending Slave-type foliated ca. 1955 Ma monzogranite, and 3) which is in turn intruded by a number of Late Taltson granitoid bodies - the largest being the central Konth batholith (ca. 1938 Ma) and ...

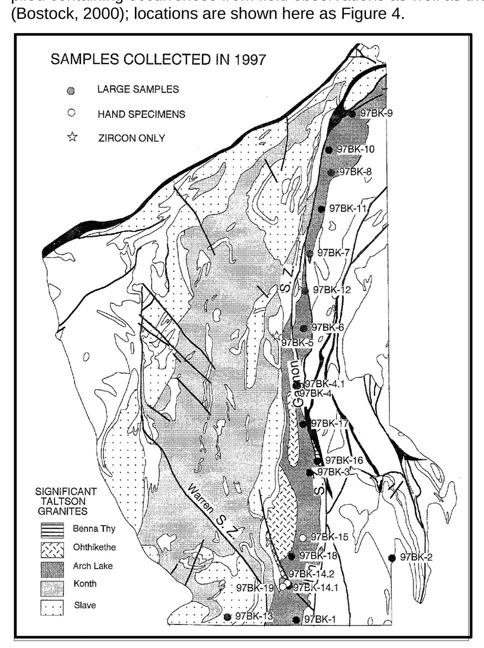

Figure 3. Geochronology samples taken in northern Taltson Magmatic Zone (Bostock, unpublished)

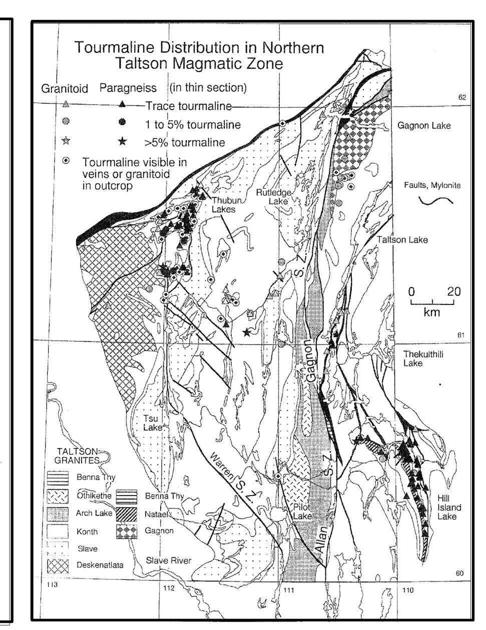

Figure 4. Tourmaline distribution in northern Taltson Magmatic Zone along NW-SE belt (Bostock, 2000).

SURFICIAL GEOLOGICAL OVERVIEW

SCOPE OF WORK and ACKNOWLEDGEMENTS

COMPILATION PROCESS

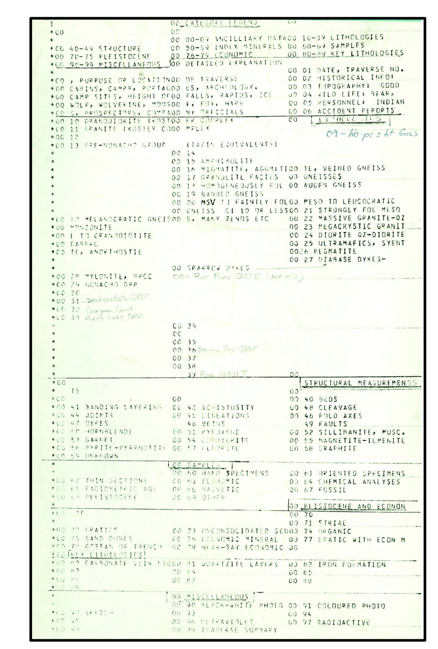

Figure 5. Legend / Code key numerical values

Figure 6. Field notebooks with descriptive observations and measurements coded according to Legend/ Code key numerical values.

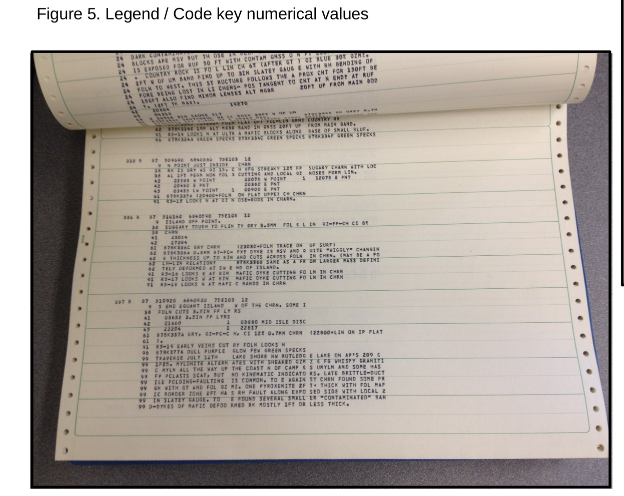

Figure 7. Computer printout from database.

MAP SYNTHESIS AND RELATED PROBLEMS

LEGEND SYNTHESIS

SOURCES / PREVIOUS MAPPING IN THE TALTSON MAGMATIC ZONE

REFERENCES

OPEN FILE 7683

Natural Resources Canada / Ressources naturelles Canada