LEGEND

OVERLAPPING SUCCESSIONS

LOWER TERTIARY

iTv — basalt, rhyolite, terrestial clastic rocks

UPPER CRETACEOUS

uKOv — CARMACKS GROUP: basalt, agglomerate

UPPER CRETACEOUS

uKNv — MOUNT NANSEN GROUP: andesite to dacite flows, breccia and tuff; felsic lapilli tuff; rhyolite flows and domes

MIDDLE TO UPPER TRIASSIC

Ks — calcareous siltstone, sandstone, argillaceous limestone, bioclastic limestone, polymictic conglomerate
Table Mountain formation in Sylvester allochthon; Teh formation in Wolf Lake-Jennings River; Pht/cg in Teslin; unamed units in Glenlyon, Finlayson, Quiet Lake, and Dawson areas; Jones Lake Formation in NE Glenlyon, Tay River, Sheldon Lakes and Watson Lake

MESOZOIC INTRUSIVE ROCKS

LATE CRETACEOUS

LKg — granite (SEAGULL SUITE - ca. 95-98 Ma)

EARLY TO MID-CRETACEOUS

EKg — porphyritic granodiorite, granite (CASSIAR, WHITEHORSE SUITES - ca. 105-120 Ma)

MIDDLE JURASSIC

MJp — monzonite, syenite, granite (TESLIN CROSSING, BENNETT SUITES)

EARLY JURASSIC

EJg — granodiorite, monzodiorite, quartz monzonite, granite, syenite (AISHIHIK, LONG LAKE SUITES - ca. 185-200 Ma)

INTERMONTANE TERRANES

QUESNELLIA

UPPER TRIASSIC - JURASSIC

QN — SHONEKTAW FORMATION: augite-bearing greywacke, lesser siltstone and shale

CACHE CREEK TERRANE

CARBONIFEROUS - JURASSIC

CC — CACHE CREEK GROUP: oceanic assemblage of ultramafic, volcanic, carbonate rocks and ribbon chert

STIKINIA

UPPER JURASSIC - CRETACEOUS

uKT — TANTALUS FORMATION: chert-pebble conglomerate, gritty sandstone, shale, argillite, siltstone and coal

LOWER TO MIDDLE JURASSIC

JL — LABERGE GROUP: sandstone, shale, pebble and boulder conglomerate; includes the Nordenskiold dacite tuff

UPPER TRIASSIC

uTrLv — LEWES RIVER GROUP: augite- or plagioclase-phyric basalt, mixed clastic-carbonate assemblage; includes in part the Semenof formation of Tempelman-Kluit (1984)

MIDDLE TRIASSIC

mTrJp — JOE MOUNTAIN FORMATION: massive and pillowed basalt flows; hornblende gabbro and diorite

SEMENOF BLOCK

CARBONIFEROUS

CB — BOSWELL ASSEMBLAGE: mafic metavolcanic rocks (Moose formation), marble, siltstone, conglomerate, minor dacite breccia (Boswell formation)

PENNSYLVANIAN

Pxt — KELLY STOCK: foliated hornblende tonalite (ca. 307 Ma)

ROCK TYPE / LITHOFACIES SYMBOLS FOR PALEOZOIC ASSEMBLAGES

The following patterns are superposed on the colour fills for Paleozoic tectonic assemblages. They indicate distribution of rock types and/or lithofacies that are key to interpretations of their tectonic setting. Unpatterned regions are generally comprised of undivided metasedimentary rock units.

volcanic lithofacies — serpentinite, metagabbro

basinal lithofacies *(Finlayson assemblage)* — conglomerate

PERICRATONIC ASSEMBLAGES

SYNOROGENIC CLASTIC ROCKS

MIDDLE TO UPPER PERMIAN

PSL — SIMPSON LAKE GROUP: polymictic conglomerate, sandstone, siltstone, shale, minor basalt and rhyolite

YUKON-TANANA TERRANE

MIDDLE TO UPPER PERMIAN

Fk — KLONDIKE ASSEMBLAGE: felsic, calc-alkaline metavolcanic rocks and associated metasedimentary rocks; minor mafic metavolcanic rocks (ca. 264-252 Ma)

PgS — SULPHUR CREEK SUITE: variably foliated, K-feldspar augen granite, metaporphyry (ca. 264-252 Ma)
Sulphur Creek orthogneiss and Jim Creek pluton in Stewart River; porphyries in Finlayson; Ram stock in Wolf Lake; Nizi and Meek plutons in Sylvester allochthon

MIDDLE MISSISSIPPIAN TO LOWER PERMIAN

CPk — KLINKIT ASSEMBLAGE: mafic to intermediate calc-alkaline metavolcaniclastic and metavolcanic rocks; minor alkali metabasalt; marble; basal metaconglomerate
Klinkit Group, southern Yukon northern B.C.; Mc, Ml in Teslin; Little Salmon formation in Glenlyon; Money Creek and White Lake formations in Finlayson Lake, Frances Lake and Watson Lake areas; Division III, Sylvester allochthon

MIDDLE MISSISSIPPIAN

LMT — TATLMAIN SUITE: variably foliated to unfoliated granite, hornblende quartz diorite (ca. 336-340 Ma)
Tatlmain batholith, diorite and gabbro in Glenlyon; younger phase of Mt. Hazel pluton at Yukon-B.C. boundary

UPPER DEVONIAN TO LOWER MISSISSIPPIAN

DMF — FINLAYSON ASSEMBLAGE: mafic to felsic metavolcanic rocks of arc and back-arc affinities; carbonaceous pelite, metachert, minor quartzite; metavolcaniclastic rocks; marble
Grass Lakes and Wolverine Lake groups, Cleaver Lake, Waters Creek and Tutchitua River formations in Finlayson; Dms, DMm, part of DMg? in Stewart River; Nasina assemblage in Stewart River-Dawson; Drury, Pelmac and Little Kabas formations in Glenlyon; Omt, DMbs?, Mp, PMgs, PMGr, PMgrc, Pmga, PMh in Teslin; Smart River greenstone of Big Salmon Complex, Swift River Group, Ram Creek Complex, in Wolf Lake-Jennings River; Tower Peak assemblage in Quiet Lake

EARLY MISSISSIPPIAN

MSR — SIMPSON RANGE SUITE: foliated to strongly foliated, hornblende-bearing metagranodiorite, metadiorite and metatonalite; minor metagranite (ca. 345-355 Ma)

LATE DEVONIAN - EARLY MISSISSIPPIAN

DMGg — GRASS LAKES SUITE: foliated, K-feldspar-augen metagranite (ca. 357-365 Ma)

UPPER DEVONIAN AND OLDER

PS — SNOWCAP ASSEMBLAGE: polydeformed and metamorphosed quartzite, psammite, pelite and marble; amphibolite; intruded by Devonian-Mississippian calc-alkaline plutons of the Grass Lakes and Simpson Range suites
Snowcap complex in Glenlyon; Dorsey Complex, lower metasedimentary part of Big Salmon Complex in Wolf Lake-Jennings River; PDSq, PDSqc, Ps?, Pc? and PPn? in Teslin area; DMg, DMps, DMc in Stewart River; North River formation in Finlayson; Pns and Pm, Indian Mountain assemblage in Quiet Lake

SLIDE MOUNTAIN TERRANE

UPPER DEVONIAN TO PERMIAN

CPS — SLIDE MOUNTAIN ASSEMBLAGE: basalt; chert, argillite; chert-pebble conglomerate; gabbro; serpentinite
Division I + II, Sylvester allochthon; Fortin Creek group, Campbell Range and Gatehouse formations in Finlayson; Tummel greenstone in Glenlyon; Pmu, PMd in Teslin; Dawson-Clinton Creek mafic/ultramafic rocks

SYMBOLS

geologic contacts

fault; movement unknown

thrust fault

dextral strike-slip fault

normal fault

eclogite / blueschist occurrence (Mississippian / Permian)

MINFILE occurrence (deposit/past-producer, drilled prospect, showing/prospect)

road

NOTE: Details of the geology of Selwyn Basin, Cassiar Terrane, Quesnellia, Cache Creek Terrane, and Late Tertiary to Quaternary units are omitted from this map for clarity. They may be obtained from Gordey and Makepeace (2003) and Massey et al. (2005).

DESCRIPTIVE NOTES

The ***Yukon-Tanana Terrane (YTT)*** is a terrane of *peri-cratonic* affinity which occupies an intermediate position between continental margin rocks of Ancestral North America (Cassiar Terrane, Selwyn Basin) to the east and arc and oceanic terranes accreted in Mesozoic time to the west (Quesnellia, Stikinia and Cache Creek). It consists of polydeformed and metamorphosed Paleozoic metased-imentary and meta-igneous rocks which have isotopic and provenance ties to Archean and Proterozoic cratonic source regions, comparable to those of sedimentary strata from northwestern Canada, but whose paleogeographic evolution with respect to the Laurentian craton is enig-matic. The YTT is host to significant base metal occur-rences, including the Wolverine and Kudz Ze Kayah deposits in the Finlayson district, in the part of the terrane which lies northeast of Tintina Fault.

This compilation map is derived primarily from recent bedrock mapping programs of YTT by the Yukon Geological Survey (Finlayson Lake, Glenlyon areas), B.C. Geological Survey Branch (Jennings River and adjacent Atlin areas) and Geological Survey of Canada (Stewart River, Wolf Lake areas). These programs were undertaken between 1999-2003 under the auspices of the Ancient Pacific Margin NATMAP (National Mapping Program) project, one of whose aims was to improve the stratig-raphic and tectonic framework of YTT. These bedrock mapping programs were complemented by extensive new U-Pb geochronology, conodont biostratigraphy and lithogeochemistry, the details of which are presented in a series of papers edited by Colpron and Nelson (2006). These data have provided the basis for unravelling local stratigraphic relationships within YTT and the adjacent Slide Mountain Terranes, for developing the regional tectonostratigraphic framework of these terranes, and for defining a series of tectonic assemblages which constitute the regional units on the compilation map (see Colpron et al., 2006, and references therein). This compilation map also incorporates recent mapping of YTT in the Quiet Lake and Laberge areas, conducted as part of the supporting geoscience component of the Slave-Northern Cordillera Lithospheric Evolution (SNORCLE) transect of Lithoprobe, and additional new maps by the Yukon Geological Survey in the Watson Lake, Frances Lake, Tay River and Laberge areas. These maps are reinterpreted here within the context of the tectonostratigraphic framework developed for YTT. The tectonic assemblages defined in Colpron et al. (2006) are also extrapolated to adjacent map areas, for which bedrock maps predating the Ancient Pacific Margin NATMAP were previously compiled by Gordey and Makepeace (2003). As a result, interpretations of YTT geology in Teslin, Quiet Lake and McQuesten areas, amongst others, are tentative and remain to be verified in the field.

The YTT of Yukon and northern B.C. consists of four tectonic assemblages. A basal siliciclastic assemblage, the ***Snowcap assemblage***, is overlain by up to three uncon-formity-bounded volcanic and volcaniclastic successions of predominantly continental-arc character. These are the Upper Devonian to Lower Mississippian ***Finlayson assem-blage***, the mid-Mississippian to Lower Permian ***Klinkit assemblage***, and the Middle to Upper Permian ***Klondike assemblage***. Coeval chert, argillite and mafic volcanic rocks of oceanic character, the ***Slide Mountain assem-blage***, form a discontinuous belt along the eastern edge of YTT from northern B.C. to east-central Alaska. These rocks are part of the Slide Mountain Terrane. Immature fine-grained clastic rocks and polymictic conglomerate of Permian to Triassic age overlie tectonic assemblages of YTT and Slide Mountain Terranes, as well as miogeoclinal rocks of Selwyn Basin and Cassiar Terrane in Yukon and northern B.C.

The ***Snowcap assemblage*** consists predominantly of siliciclastic metasedimentary rocks that are interpreted to have originated along the distal continental margin of Ancestral North America, and subsequently rifted away in mid-Paleozoic time (Nelson et al., 2006). It is only con-strained to be older than the Late Devonian (Grass Lakes suite ca. 357-365 Ma) and Early Mississippian (Simpson Range suite ca. 345-355 Ma) plutons that intrude it. The overlying Upper Devonian to Early Mississippian ***Finlayson assemblage*** consists of metavolcanic and metasedimentary rocks of continental arc and back-arc affinities. Granite, granodiorite and tonalite plutons of the ***Grass Lakes and Simpson Range suites*** are in part coeval with voluminous volcanic strata of the Finlayson assemblage. Alkalic to tholeiitic volcanic rocks of back-arc affinity are mainly restricted to the Finlayson Lake district, northeast of Tintina Fault, but basinal lithofacies (carbon-aceous phyllite, chert) elsewhere in YTT may represent amagmatic extensions of the back-arc environment. Back-arc lithofacies of the Finlayson assemblage are host to the majority of syngenetic sulphide occurrences in YTT. Together, the Snowcap and Finlayson assemblages are the most widespread and characteristic tectonic assem-blages of YTT.

The Middle Mississippian to Early Permian ***Klinkit assem-blage*** unconformably overlies previously deformed rocks of the Snowcap and Finlayson assemblages. It includes inter-mediate to mafic metavolcaniclastic and metavolcanic rocks, a basal conglomerate and marble. Coeval granite to granodiorite plutons of the ***Tatlmain suite*** (ca. 336-340 Ma) occur locally southwest of Tintina Fault. Rocks of the Klinkit assemblage are invariably less deformed and meta-morphosed than underlying strata.

The ***Klondike assemblage*** underlies much of the Klondike region. It consists of Middle to Upper Permian calc-alkaline felsic and minor mafic metavolcanic rocks which are almost exclusively preserved in the Stewart River and Dawson areas. Comagmatic granitic plutons of the ***Sulphur Creek suite*** are most voluminous in Stewart River and south-western McQuesten areas, but are also represented as small intrusions throughout the terrane.

Oceanic rocks (chert, basalt, gabbro, serpentinite) of the Upper Devonian-Permian ***Slide Mountain assemblage***, the characteristic assemblage of the Slide Mountain Ter-rane, generally occur as fault-bounded panels that inter-vene between YTT and Ancestral North America (Cassiar Terrane, Selwyn Basin), but also locally stratigraphically onlap onto Lower Permian and older strata of YTT.

Collectively, rocks of YTT and Slide Mountain terranes record the evolution of an active continental margin along the western edge of Ancestral North America in mid- to late Paleozoic time (Nelson et al., 2006). Continental arc and back-arc magmatism of the Finlayson assemblage (and coeval Grass Lakes and Simpson Range suites) marks the Late Devonian-Early Mississippian onset of subduction-related tectonic activity in Yukon and northern B.C. Rifting in the back-arc environment subsequently led to sea-floor spreading and opening of an ocean, represented by the Slide Mountain assemblage, separating YTT from Ances-tral North America between Early Mississippian and Trias-sic time. Continued calc-alkaline arc magmatism of the Klinkit assemblage is interpreted to represent the mature stage of arc development in YTT. The late Paleozoic Klinkit assemblage has been correlated with similar late Paleozoic arc rocks of Quesnellia in B.C. (Nelson and Friedman, 2004).

The Middle Permian was a time of profound changes in the tectonic evolution of the YTT and Slide Mountain terranes. Calc-alkaline magmatism of the Klondike assemblage (and coeval Sulphur Creek suite) is interpreted to be the product of subduction of Slide Mountain lithosphere beneath YTT. Permian eclogites associated with this subduction zone occur locally along the eastern edge of YTT. Local occur-rences of Middle to Upper Permian synorogenic conglom-erate of the ***Simpson Lake group*** are interpreted as fore-arc deposits associated with subduction of Slide Mountain lithosphere. More widespread, generally finer grained syn-orogenic clastic deposits of Middle to Late Triassic age overlie the YTT and Slide Mountain terranes, and Ances-tral North American strata (Cassiar Terrane, Selwyn Basin) and may indicate proximity of these terranes by Late Trias-sic time.

Recent mapping of the Semenof Hills in Laberge and Glenlyon areas is also incorporated and highlighted on this map. ***Boswell assemblage*** consists of Upper Devonian-Lower Mississippian basalt and limestone (Moose forma-tion) and Pennsylvanian volcanic, volcaniclastic and sedi-mentary rocks (Boswell formation). These rocks were orig-inally part of Semenof block (Tempelman-Kluit, 1984), which included the Boswell formation and basalt, andesite and volcaniclastic rocks of the Semenof formation (inclu-ding rocks now assigned to Moose formation). The Semenof formation is now known to be of Late Triassic age (R.L. Simard and M. Colpron, unpublished data) and reas-signed to the Lewes River Group. In Laberge area, the Semenof formation unconformably overlies the Moose formation, thereby indicating that Boswell assemblage constitutes the local basement to Stikinia. In Glenlyon area, a Pennsylvanian pluton (Kelly stock) intrudes the older part of Boswell assemblage. Pennsylvanian detrital zircons in Triassic conglomerate overlying YTT and Slide Mountain Terranes suggests that they were contiguous with Boswell assemblage by Late Triassic time (Colpron et al., 2005).

Details of the geology of Selwyn Basin, Cassiar Terrane, Quesnellia, Cache Creek Terrane, and Late Tertiary and Quaternary units are omitted from this map for clarity. They may be obtained from Gordey and Makepeace (2003) and Massey et al. (2005). Mesozoic rocks of Stikinia, Creta-ceous plutons cross-cutting the various terranes, as well as overlapping Upper Cretaceous and younger volcanic and clastic strata are shown in black and white patterns.

The YTT has experienced penetrative deformation and metamorphism primarily in late Paleozoic to early Meso-zoic time. It is intruded by Early Jurassic, Early to mid-Cretaceous and Late Cretaceous granitic batholiths. The Early Jurassic suites are restricted to the accreted terranes and do not occur in rocks of Ancestral North America. Final juxtaposition of YTT to Ancestral North America likely oc-curred in Jurassic time, after deposition of Upper Triassic strata in the footwall of the Inconnu thrust but before intru-sion of Cretaceous plutons across the fault near Ross River. The region is dissected by a series of predominantly dextral strike-slip faults with displacement in Cretaceous to recent times, the most notable being the Tintina Fault which has displaced the northeast part of the combined YTT/ Slide Mountain Terranes by approximately 490 km to the southeast since Cretaceous time (Gabrielse et al., 2006).

The YTT is host to numerous and varied mineral occur-rences in Yukon (see Deklerk and Traynor, 2005). On this map, only syngenetic sulphide mineral occurrences (sed-imentary exhalative or volcanogenic massive sulphide types) are shown for YTT and Slide Mountain Terrane, and adjacent portions of Selwyn Basin and Cassiar Terrane; those with deposit or drilled prospect status are tabulated below. One notable exception is the Lucky Joe prospect in YTT of Stewart River area which was recently identified as a Mississippian intrusion-related occurrence (porphyry Cu-Au?); the only of its kind currently known in YTT. The maj-ority of syngenetic sulphide occurrences in YTT are hosted by back-arc facies of the Finlayson assemblage in the Finlayson Lake area. This district comprises all the major deposits currently known in YTT (Wolverine, Kudz Ze Kayah, GP4F, Fyre) and the only identified deposit in the Slide Mountain Terrane (Ice). Mid-Paleozoic syngenetic sulphide occurrences in Cassiar Terrane of the Pelly Mountains may have formed concurrently with the early stages of development of YTT. Past-producing deposits of the Anvil district near Faro are older and unrelated to the evolution of YTT.

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Any revisions or additional geological information known to the user would be welcomed by the Yukon Geological Survey.

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Yukon Geological Survey
Energy, Mines and Resources
Government of Yukon

Open File 2006-1

Tectonic assemblage map of Yukon-Tanana and related terranes in Yukon and northern British Columbia (1:1 000 000 scale)

compiled by

Maurice Colpron

SOURCES OF RECENT MAPPING

Other compilation sources as in Gordey and Makepeace (2003) for Yukon and Massey et al. (2005) for northern British Columbia.

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Selected Mineral Occurrences
Yukon MINFILE (Deklerk and Traynor, 2005)

DEPOSITS / PAST PRODUCERS

Clear Lake	105L 045	Zn-Pb-Ag sedex
Dy, Grizzly	105K 101	Zn-Pb-Ag sedex
Earlynn Creek	105C 017	Sedimentary Mn
Faro	105K 061	Zn-Pb-Ag sedex
Fyre	105G 034	Cu (Zn) Besshi VMS
GP4F	105G 143	Cu-Pb-Zn Kuroko VMS
Grum	105K 056	Zn-Pb-Ag sedex
Ice	105G 118	Cu (Zn) Cyprus VMS
Kudz Ze Kayah	105G 117	Cu-Pb-Zn Kuroko VMS
Lynx	105K 060	Zn-Pb-Ag sedex
Margerita	105K 055	Zn-Pb-Ag sedex
Wolf	105G 008	Cu-Pb-Zn Kuroko VMS
Wolverine	105G 072	Cu-Pb-Zn Kuroko VMS

B.C. MINFILE

DEVELOPED PROSPECTS

Ewen Barite	1040 050	Sediment-hotsed barite
Midway	1040 038	Zn-Pb-Ag sedex

The names of occurrences from Yukon-Tanana and Slide Mountain Terranes are shown in red.

Adamson, Ace	105K 034	Zn-Pb-Ag sedex
Airburst	105G 082	VMS
Alphabet	105L 039	Zn-Pb-Ag sedex
Argyle	105F 091	Zn-Pb-Ag sedex
Arnise	105F 028	Cu-Pb-Zn Kuroko VMS
Ark	105G 098	Cu-Pb-Zn Kuroko VMS
Area 18	105G 133	Cu-Pb-Zn Kuroko VMS
Beta	105K 036	Zn-Pb-Ag sedex
Bigtop	105C 021	VMS
Brujo, Ice	105F 073	Cu-Pb-Zn Kuroko VMS
Box, Mat	105F 021	Cu-Pb-Zn Kuroko VMS
Chaplin	105K 098	VMS
Chzenpoupjh, Fire	105F 071	Cu-Pb-Zn Kuroko VMS
Colt, Blue, Two	105K 074	Zn-Pb-Ag sedex
Convert	105K 143	Cu-Pb-Zn Kuroko VMS
Dave	105K 141	Cu-Pb-Zn Kuroko VMS
Dvonik	105G 094	Zn-Pb-Ag sedex
Ellen Creek	105G 135	Cu-Pb-Zn Kuroko VMS
Fargo	105K 010	Zn-Pb-Ag sedex
Fin	105K 047	Zn-Pb-Ag sedex
Fisher	105G 040	Cu-Pb-Zn Kuroko VMS
Flin	105G 077	Cu-Pb-Zn Kuroko VMS
Hachey	105L 030	Zn-Pb-Ag sedex
Hoole	105G 093	Zn-Pb-Ag sedex
Julia	105H 078	Cu (Zn) Besshi VMS
Kelly	105L 041	Zn-Pb-Ag sedex
Kulan	105K 057	Zn-Pb-Ag sedex
League	105G 130	Cu-Pb-Zn Kuroko VMS
Lobo	105L 017	Zn-Pb-Ag sedex
Lorna	105K 067	Zn-Pb-Ag sedex
Lucky Joe	1150 051	Cu-Mo-Au porphyry
Mickey, Bell	115C 116	Zn-Pb-Ag sedex
Mm	105F 012	Cu-Pb-Zn Kuroko VMS
Moni	105K 105	Zn-Pb-Ag sedex
Mor	105C 061	VMS
On	105G 139	Cu-Pb-Zn Kuroko VMS
Outette, Orre	105B 054	Zn-Pb-Ag sedex
Pack	105G 032	Cu-Pb-Zn Kuroko VMS
Ptsy	105G 056	Zn-Pb-Ag sedex
Puck	105G 131	Cu-Pb-Zn Kuroko VMS
Rad	105G 133	Cu-Pb-Zn Kuroko VMS
Rift	105G 126	Cu (Zn) Besshi VMS
Red Line	105G 124	Cu-Pb-Zn Kuroko VMS
Riviera	105G 026	Cu (Zn) Besshi VMS
Sb	105K 043	Zn-Pb-Ag sedex
Sea	105K 042	Zn-Pb-Ag sedex
Shrimp	105K 054	Zn-Pb-Ag sedex
St. Lucie	105K 049	Zn-Pb-Ag sedex
Tub, Fox	105F 035	Cu-Pb-Zn Kuroko VMS
Turn	105L 056	Zn-Pb-Ag sedex
Vermillion	105G 141	Cu-Pb-Zn Kuroko VMS
White Creek	105G 136	Cu-Pb-Zn Kuroko VMS

DRILLED PROSPECTS

1:250 000-scale topographic base data produced by CENTRE FOR TOPOGRAPHIC INFORMATION, NATURAL RESOURCES CANADA

Albers Equal Area Conic Projection
Standard Parallel 61°40'N and 68°N
Central Meridian 132°30'W
North American Datum 1983

SCALE 1:1 000 000

0 10 20 40 60 80 100
kilometres