Natural Resources Ressources naturelles Canada MINERAL PROSPECTS (FROM YUKON MINFILE, 2005) COMMODITIES (MAJOR/MINOR/TRACE) Zn, Ag, Au / Cu, Ni, Pb / PROSPECT olymetallic Veins Ag-Pb-Zi Cu+/-Ag Quartz Veins Porphyry Mo (Low F-Type Au-Quartz Veins THISTLE SHOWING Polymetallic Veins Ag-Pb-Zn+/-Au - / Cu, Zn, Ag, Pb, Au 105D 010 CARCROSS KNOB HILL Cu+/-Ag Quartz Veins NARES UNKNOWN WABONA SHOWING Polymetallic Veins Ag-Pb-Zn+/ SHOWING Cu+/-Ag Quartz Veins FINGER 105D 016 LATREILLE SHOWING Ag, Cu, Au, Mo / - / As, Au Porphyry Cu-Mo-Au Ag, Au / Pb, Cu / Ag, As, Pb, Au Au-Quartz Veins Au, Ag / Zn, Pb, Sb 105D 022 SKUKUM CREEK ithermal Au-Ag-Cu: High Sulphidatio DRILLED PROSPEC Cu, Au / Ag / -MORNING Stibnite Veins & Dissemination Ag, Au / -PORTER Au, Ag, Sb / -Polymetallic Veins Ag-Pb-Zn+/-Au BECKER-COCHRAN Stibnite Veins & Dissemination Sb, Au, Ag / Cu, Pb, Ni, Ag, Zn Au, Ag, Pb, Zn / Zn TALLY-HO Epithermal Au-Ag-Cu: High Sulphi Ag, Au / Cu, Pb 05D 033 MT. STEVENS DRILLED PROSPECT Ag, Au / Pb, Zn, Cu Au, Pb, Ag / Au, C Cu+/-Ag Quartz Veins 105D 036 GOLD HILL DRILLED PROSPEC Au-Quartz Veins Au, Ag / -GOLD REEF Polymetallic Veins Ag-Pb-Zn+/-Au Au, Ag / Cu, Pb / MT. BUSH SHOWING Ag, Pb, Au / Cu, Z FIXED CARBON, coal / -105D 042 WHITEHORSE COAL OPEN PIT PAST PRODUCER DRILLED PROSPEC Gabbroid Cu-Ni-PGE Porphyry Mo (Low F-Type) Pb, Ag, Zn / Au / INGRAM SHOWING Polymetallic Veins Ag-Pb-Zn+/-A Au-Quartz Veins UNKNOWN Cu / Au, W, Ag, Pb, Cu, Mo UNKNOWN Pb, Ag, Zn / Au / olymetallic Veins Ag-Pb-Zn+/-Au IDERGROUND PAST PROF Cu, Ag, Au / MAGNETITE, Mo / TREMAR DRILLED PROSPECT POLAR Cu / Sb, Mo Cu, Au, Mo / GRONK Cu+/-Ag Quartz Veins Cu / Au, Ag Cu, Au / Ni, W, Co, asbesto Gabbroid Cu-Ni-PG LAVALEE SHOWING Ultramafic-hosted asbesto asbestos / Ni, Cr / ANOMALY RAILROAD ANOMALY UNKNOWN Unknown MCINTYRE UNKNOWN DRILLED PROSPECT 105D 076 JACKSON Cu, Au / Bi, Ag / Pb, Mo ANOMALY Zn / Fe, Bi / -Pb-Zn Skarn SHOWING WAGON UNKNOWN 105D 084 MONKEY UNKNOWN UNKNOWN UNKNOWN Unknown UNKNOWN Cu+/-Ag Quartz Veins Ag, Cu, Pb, Au / Zn / Au-Quartz Veins 105D 092 OPULENCE SHOWING Stibnite Veins & Disseminat Au / Sb / -BOBO UNKNOWN UNKNOWN UNKNOWN 105D 096 MOSQUITO Unknown

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RESORT

FISH LAKE

BERESFORD

MIDGETT

WESTARM

DRYBONE

GAMMON

NELSON

TAKHINI

105D 164 SCAR DRILLED PROSPECT

ROOTS

MAJI

SEYBOLD

DUNDALK

BRONCO

MT. BYNG

RIP-RAP

GRUMPY

GILLAIM

105D 176 MT. MICHIE

105D 110 GURTEEN

105D 122 STYBA

ymetallic Veins Ag-Pb-Zr

Polymetallic Veins Ag-Pb-Zn+/-Au

Au-Quartz Veins

Cu+/-Ag Quartz Veins

Cu Skarn

Pb-Zn Skarn

Unknown

Unknown

orphyry Mo (Low F-Type

Pb-Zn Skarn

Unknown Cu Skarn

Unknown

Unknown

olymetallic Veins Ag-Pb-Zn-

Au-Quartz Veins

Epithermal Au-Ag: Low Sulphidation

Unknown

Unknown

Polymetallic Veins Ag-Pb-Zn+/-Au

Unknown

Polymetallic Veins Ag-Pb-Zn+/-Au

Cu+/-Ag Quartz Veins

Unknown Au-Quartz Veins

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Au-Quartz Veins

Au-Quartz Veins

pithermal Au-Ag-Cu: High Sulphidatio pithermal Au-Ag-Cu: High Sulphidatio

Cu+/-Ag Quartz Veins

Cu Skarn

Polymetallic Veins Ag-Pb-Zn+/-A

Polymetallic Veins Ag-Pb-Zn+/-

Volcanogenic Massive Sulphide - type not deter

Pb, Au, Cu, Ag, Zn / Cu, Au, Pb, Mo, 7

Au, Ag / Cu

Au, Ag / Pb / -

Cu, Ag / Au / -

Cu, Au / Mo /

Zn, Pb, Ag / Cd, Cu, W /

Ag, Pb, Zn /

Au, Ag / -

Ag, Au / Pb, Cu, Zn /

Ag, Au / Pb, Zn, Cu

Pb, Ag / U, Ti, La, CERIUM, Au

Cu, Ag, Zn, Pb / Pb, Mo, Ag / -

Au, Ag / Ag, Cu, Pb, Zn /

Ag / Cu, Au, Pb /

Ag, Pb / - / Cu, W

Cu, Au, Ag / - ,

Au, Cu, Ag / Pb + Zr

Zn, Ag, Au, Cu, Sb /

Au, Ag / Zn, Pb / -

Au, Ag / Pb / F

INTRODUCTION The Whitehorse area has seen prospecting and mining since the late 1890's, ever since gold-seekers passed through the area en route to the Klondike. The first recorded geological work was that by G.M. Dawson in 1887 preceding the gold rush. Up to the 1940's a number of other studies focussed on specific mineral camps (Wheeler, 1961a). It was not until fieldwork by Wheeler in the late 1940's and early 1950's that a regional scale map (1:253,440) and a geological description of the Whitehorse area was produced (Wheeler, 1961a.b). Since Wheeler's time, over half of the area has been re-examined by Hart (1997, 2003a, 2003b) and Hart and Hunt (2003a, 2003b) who described the geological setting of the area's mineral occurrences within a framework of geological mapping at 1:50,000 scale. The present map is a compilation from these sources, as indicated in Figure 1. GEOLOGICAL HISTORY

DESCRIPTIVE NOTES

Whitehorse map area is underlain by rocks of mid-Paleozoic to Miocene age reflecting a diverse and complex geological history. Its older elements include Paleozoic metamorphic rocks (Yukon-Tanana and Stikine terranes), upon which was constructed an island arc and east-flanking basin (Stikinia) in the Triassic and Jurassic (Fig. 2). Oceanic rocks of the Cache Creek terrane were obducted above this basin, known as the Whitehorse Trough, along west-directed thrusts in the mid-Jurassic. A final compressional event is evidenced by northwest-trending folds and west-directed thrusts of Early Cretaceous age. Post-tectonic magmatic activity was widespread and long-lived, including episodes of early-to mid-Cretaceous, Late Cretaceous, Paleogene and Neogene age. The following description places the various rock units, keyed to the legend, into this tectonic framework.

The oldest rocks in the area consist of late Proterozoic-Paleozoic siliceous metasedimentary rocks, gneiss and marble of Yukon-Tanana terrane (Nisling assemblage, PPN), dominantly exposed in the southwest part of the map area. A small area of metamorphic rocks assigned to the terrane (Snowcap(?) assemblage of Colpron (2006), DMs) also occurs in the north- easternmost corner. In contrast, metamorphosed mafic igneous rocks, rather than siliceous metasedimentary rocks, dominate the oldest parts (Upper Paleozoic) of Stikine terrane (Takhini assemblade. uPT). Relationships between these metamorphic units, which have a complex Paleozoic metamorphic and structural history, and to the Mesozoic arc (Stikinia) built upon them are obscured by widespread igneous intrusion and cover (Fig. 1). Components of the Stikinian arc are represented by the Lewes River and Laberge Groups and coeval Late Triassic-Early Jurassic plutonic suites. The oldest exposed parts of this arc (Lewes River Group) are Middle and Upper Triassic

mafic volcanics (Joe Mountain (mTLJ), Sheldon Creek (uTLS), Povoas (uTLP) formations) and coeval dioritic intrusions

(Stikine Plutonic Suite, LTgs). The volcanics interfinger with, and are overlain by arc-derived volcanogenic sandstones

(Aksala formation, Casca member, uTLAC) that in turn interfinger with and are capped by Upper Triassic carbonate reefs

(Aksala formation, Hancock member, uTLAH). The carbonate in turn interfingers with and is overlain by maroon

sandstone, siltstone and shale of possibly shallow-water origin (Aksala formation, Mandanna member, uTLAM). The Lower to Middle Jurassic Laberge Group comprises volcanogenic sediments shed easterly from the arc on submarine fan(s), including relatively fine clastic deposits (Richtofen formation, JLR), locally channelized and thick, sedimentary gravity flows of polymictic conglomerate (Richthofen formation, Conglomerate member, JLRc), and sandy mid-fan turbiditic deposits (generally Laberge Group undivided, JL). Magmatic portions of the Jurassic arc are

represented by granite and granodionte plutons (Long Lake Plutonic Suite, EJgL) and within the basin by extensive

disconformities are locally recognized (Hart and Radlof, 1990). Rocks of the oceanic Cache Creek terrane (Cache Creek Group) include massive limestone (Horsefeed Formation, CPCH), radiolarian chert (Kedahda Formation, CPCK), metabasite (Nakina Formation, CPCN) and variably serpentinized ultramafic rocks (CPCu ne thick massive carbonate is nterpreted as "atoll" buildups; its Tethyan faunas (e.g. Monger, 1974) have long marked the terrane as "exotic" in the Canadian Cordillera. The mafic volcanics and ultramafic rocks represent slices of ocean crust and mantle, and the ibbon chert pelagic deep sea deposits. OVERLAP UNITS PALEOZOIC AND MESOZOIC CRETACEOUS AND YOUNGER PLUTONIC CACHE CREEK

GEOLOGICAL SURVEY OF CANADA

VOLCANIC

Whitehorse map area

assemblages and major structures,

coeval and voluminous crystal tuff (Nordenskiold Dacite, JLN). The relationship between the Laberge Group and the

underlying Lewes River Group is problematic. In much of the region the contact is apparently conformable, although

NISLING ASSEMBLAGE

Although the Cache Creek Terrane was emplaced as a large, internally disrupted overthrust, young, steep northeast- and northwest-trending normal faults have broken the sheet and its footwall so that horsts of Stikine strata have locally popped up through the structurally overlying Cache Creek. The age mplacement of the Cache Cree Terrane is well constrained regionally as earliest Middle Jurassic (Aalenian) by cross-cutting igneous rocks, fossil ages of adiolarian cherts, isotopic ages for blueschist (southeast of the Whitehorse ea) and stratigraphic consideration kets et al, 1992; Mihalynuk et al, 004). The Nahlin Fault, a regional structure forming the western boundary of the Cache Creek terrane is likely a mid-Jurassic thrust related to Cache Creek

emplacement; the Crag Lake Fault may have originated as a related tear (Hart and Radloff, 1990). Dextral offset along YUKON-TANANA TERRANE Teslin Fault (Fig. 2, northeast corner) is

uncertain, but fault reconstructions show

pre-mid-Cretaceous time (Gabrielse,

COMMISSION GÉOLOGIQUE DU CANADA

SNOWCAP(?) ASSEMBLAGE it may have been more than 150 km in

1985. Fig. 9), with possible origins in the Jurassic. The Teslin Fault has been seismically imaged and interpreted as an easterly dipping structure penetrating to the mid-crust (Snyder et al, 2005; White et al, 2006) Γhe youngest, dominantly sedimentary unit in the region is the Jura-Cretaceous Tantalus Formation (uJΚτ). The chertdominated conglomerates and sandstones were deposited in environments ranging from fluvial to marine-deltaic Chert clasts were probably derived from the Cache Creek Group and the presence of metamorphic quartz, quartzite and nica suggest some detritus came from the Nisling assemblage (Hart and Radloff, 1990). Relations amongst the Tantalus Formation, older strata of the Whitehorse Trough and mid-Cretaceous magmatism (see

equivalents (Mount Nansen Group) overlie the older strata with angular unconformity. This deformation is best expressed as a west-vergent thrust fault, the lbex Fault, and associated northwest-trending Fish Lake Syncline (Fig. 1). hout marker horizons smaller scale folds are difficult to map, but dips of bedding typically range to 60 degrees. Cretaceous to Paleogene igneous rocks were intruded and erupted in four main episodes. The oldest of these is widespread early to mid-Cretaceous granite, quartz monzonite and granodiorite plutons of the Teslin (EKgT), /hitehorse (mKdW) and Mount McIntyre (mKqM) plutonic suites, distinguished by age and composition. Extrusive mi Cretaceous equivalents comprise at least three geographically separated felsic to intermediate volcanic piles of the Mount Nansen Group (Byng Creek, mKNB; Montana Mountain, mKNM; undivided volcanics northwest of Marsh Lake, mKNM). The second igneous episode consists of Late Cretaceous granite, granodiorite and diorite of the Prospector

Mountain Suite (LKP) that may have extrusive equivalents in the felsic to intermediate Open Creek Volcanics (uKO). The

third, largely extrusive episode formed the Late Cretaceous Carmacks Volcanics, a voluminous outpouring of

intermediate to mafic flows and tuffs in south-central Yukon. The last widespread igneous event consists of abundant

below) bracket the age of regional compressional deformation as Early Cretaceous. The Tantalus Formation overlies

older units disconformably, whereas mid-Cretaceous plutons intrude the deformed sedimentary rocks, and extrusive

granite, granodionite and miarolitic granite of the Paleogene Nisling Range Plutonic Suite (LPgN, LPqN) and coeval extrusive felsic volcanics of the Skukum Group (LEs). The youngest rocks in the area include numerous exposures of alkaline basalt flows grouped under the heading of Miles Canyon Basalt (MPMC). Isotopic ages indicate intermittent Neogene volcanic activity, with ages ranging from 2.4 to 8.4

The Whitehorse area is host to over 200 mineral occurrences. Although a few deposit types are terrane specific (e.g asbestos, chromite, listwanite-hosted gold in Cache Creek terrane), most are veins, skarns or porphyries related to extensive mid-Cretaceous to Tertiary igneous activity. Although occurrences are scattered, there are three main camps. including the Wheaton River district (drainage of Wheaton River), the Montana Mountain area, and the Whitehorse Copper Belt. The following descriptions of these camps are summarized from Hart and Radloff (1990). Mineralization in the Wheaton River district is dominated by gold-bearing quartz-sulphide veins (e.g. Mt. Skukum). Most

ECONOMIC FRAMEWORK

veins are mesothermal in character and carry pyrite, arsenopyrite, galena, or stibnite within a quartz ganque, but may also contain sphalerite, chalcopyrite, bornite and native gold. Several deposits in the district have epithermal characteristics including open space filling, crustiform white quartz, chalcedony, and calcite. These epithermal veins can be quartz-rich or sulphide rich. Ore minerals in the former include native gold or electrum, whereas the latter are dominated by argentiferous galena, chalcopyrite, chalcocite or pyrite with quartz and anhydrite in the gangue. The veins may not be directly associated with Eocene volcanic centres, but rather younger structures may have controlled their

About 20 polymetallic, gold-bearing quartz veins are hosted in the mid-Cretaceous Montana Mountain volcanic complex of the Mount Nansen Group (past producers include Venus and Arctic Caribou). The veins strike to the north-northeast and east-northeast and dip shallowly to the northwest. Early stage ribbon-banded quartz with arsenopyrite and pyrite along the vein margins is succeeded by coarsely crystalline, vuggy quartz and calcite with sphalerite, galena and native gold. Hart (1997) suggested the mid-Cretaceous Byng Creek volcanic complex may have potential for similar veins. Mid-Cretaceous intrusions formed Cu-Mo-W skarns hosted within Upper Triassic Lewes River Group carbonate (Hancock and Mandanna members). A group of 24 skarns known as the Whitehorse Copper Belt, hand-mined in the early 1900's, saw extensive production from 1967-1984 (e.g. Tenney, 1981). The largest and richest deposits are hosted in roof pendants or enclaves of carbonate rocks near the western margin of the Whitehorse pluton. Nondolomitic protoliths produced hedenbergite-garnet-idocrase-wollastonite skarns with chalcopyrite dominating a magnetite-poor assemblage. Dolomitic protoliths formed diopside-garnet-olivine skarns rich in bornite and with large masses of magnetite.

The Whitehorse Trough (Lewes River and Laberge Groups) has also been considered as a frontier basin for gas and possibly oil. On the basis of Rock-Eval data, coal rank, vitrinite reflectance and the colour of microfossils Lowey and Long (2006) rated various stratigraphic units as to source rock potential, maturation and whether oil- or gas-prone. They ndicated the most prospective areas for hydrocarbon exploration to be north of the Whitehorse area in more northerly parts of the trough (i.e. near Division Mountain, Tantalus Butte and Five Finger Rapids areas). Coal occurrences near Whitehorse were discovered in 1899 (Whitehorse Coal) and most recently examined through drilling and test-mining as late as 1988 (Deklerk and Traynor, 2005). Two seams of meta-anthracite, a lower one 3.3 m

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wide and an upper one at least 1.8 m wide occur within the Jura-Cretaceous Tantalus Formation.

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NEOGENE

PALEOGENE

CRETACEOUS

UPPER CRETACEOUS

LATE CRETACEOUS

MID-CRETACEOUS

EARLY CRETACEOUS

JURASSIC AND CRETACEOUS

A transect across northern Stikinia: geology of the northern Whitehorse map area, southern Yukon Ferritory (105D/13-16); Indian and Northern Affairs Canada, Exploration and Geological Services Division, Yukon Region, Bulletin 8, 113 p.

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minor volcanic ash.

LATE PALEOCENE TO EARLY EOCENE

NISLING RANGE PLUTONIC SUITE (~55 Ma)

maroon-weathering, sedimentary and epiclastic rocks.

(e.g. Folle Mountain stock, Perkins Peak plug).

MOUNT NANSEN GROUP (mKN, mKNB, mKNM)

minor(?) conglomerate, greywacke and argillite.

porphyry plugs, dykes, sills and breccias.

+ + granite, Jackson Creek granite, Annie Ned granite).

MIOCENE TO PLIOCENE

LOWER ECCENE

Unconsolidated silt, sand and gravel of glacial, fluvial, aeolian and lacustrine origins;

MILES CANYON BASALT: Dark red to brown weathering, columnar jointed olivine

SKUKUM GROUP (undivided): 1, Rhyolite, trachyte and andesite lava and breccias,

granitic agglomerate, tuff, lithic tuff, ignimbrite, boulder conglomerate, epiclastic

rocks, minor greywacke; orange weathering sucrosic quartz-feldspar porphyry

rhyolite, andesite and dacite dykes; 2, undifferentiated, intermediate to felsic,

subaerial volcanic rocks, maybe equivalent to Carmacks or Skukum groups.

LPgN: medium- to coarse-grained, hornblende-biotite granite and granodiorite, in

places with pink, megacrystic K-feldspar; (e.g. Carcross pluton, Penington granite).

with smokey quartz; alaskite (e.g. Crozier Creek granite, Ibex alaskite, Mt. McAuley

LPqN: Orange weathering, locally miarolitic, coarse grained, leucocratic, biotite granite

CARMACKS GROUP: Dark purple-green and grey-green, thickly bedded, augite- and

plagioclase-phyric, andesitic, dacitic and basaltic lava flows, lithic tuff and ash flows;

OPEN CREEK VOLCANICS: Cliff-forming, resistant, columnar-jointed, dark grey and

vitreous, quartz phyric, dacite flows with ash and lapilli tuff horizons; basal, recessive,

PROSPECTOR MOUNTAIN PLUTONIC SUITE (~78 Ma) (LKP, LKqP, LKgP)

LKgP: Dark grey weathering light grey, medium-grained, hornblende diorite, quartz diorite and lesser granodiorite; locally foliated (e.g. Wheaton Valley granodiorite).

LKqP: Pale pink weathering medium- to coarse-grained, biotite, quartz-rich granite;

white porphyritic alaskite and granite with plagioclase and quartz-eye phenocrysts

mKN: Undivided: rhyolite, dacite, andesite and basalt flows, breccias, and tuffs;

mKNB: BYNG CREEK VOLCANICS (~109 Ma): Aphyric and feldspar phyric, rhyolitic

to andesitic flows, flow breccia, and heterolithic breccia; local felsic lapilli tuff with

bomb-sized clasts; local flow-banded quartz-phyric rhyolite and quartz feldspar

mKNM: MONTANA MOUNTAIN FORMATION (~88-94 Ma): Massive to poorly

bedded, dark weathering, dark to pale green and maroon andesite and dacite flows,

autoclastic lithic tuff and epiclastic breccia, locally feldspar-phyric or with chlorite

orange-weathering, pink, medium- to coarse-grained, hornblende-biotite quartz

monzonite, granite and quartz syenite; orange weathering, medium-grained,

biotite-hornblende granite; (e.g. Cap Mountain , Byng Creek , M'Clintock Lakes,

WHITEHORSE PLUTONIC SUITE (~111 Ma): Dark or medium grey weathering

medium-grained biotite-hornblende granodiorite, tonalite and diorite; local weak

foliation; porphyritic biotite-hornblende granodiorite; mesocratic, strongly magnetic,

TESLIN PLUTONIC SUITE (~120 Ma): White- to pale grey-weathering, leucocratic, coarse-grained, equigranular, hornblende-biotite granite and granodiorite, sparsely

feldspar-hornblende felsite and hornblende granodiorite; (e.g. M'Clintock Lakes,

cattered intrusive rocks of likely Mesozoic age: recessive, dark grey-weathering

hornblende diorite; dark grey-weathering, medium-grained, chloritized, cataclastic

TANTALUS FORMATION: Massive to thickly bedded, chert pebble conglomerate

with recessive, poorly indurated, gritty sandstone and quartz sandstone with

CACHE CREEK TERRANE (EMPLACED ABOVE STIKINE TERRANE IN MID-JURASSIC)

interbedded dark grey shale; recessive weathering, highly fractured, high ash

quartz diorite orthogneiss; resistant, dark grey quartz monzonite and monzodiorite

hypersthere-hornblende diorite, quartz diorite and gabbro; (e.g. Whitehorse, Mt.

MOUNT McINTYRE PLUTONIC SUITE (~109 Ma): Light pinkish grey to

Mount M'Clintock and M'Clintock River plutons, Carbon Hill plug).

McNeil, Mt. Anderson and Cap Creek plutons, Ibex River gabbro).

feldspar porphyritic; numerous dykes to small bodies of leucocratic,

Mount M'Clintock and M'Clintock River plutons).

with common augite xenocrysts.

UPPER JURASSIC TO LOWER CRETACEOUS

anthracite to low volatile bituminous coal.

LKP: Undivided diorite, quartz diorite, granodiorite, granite, alaskite.

heterolithic breccia, debris flows, agglomerate and associated epiclastic rocks.

basalt flows, commonly amygdaloidal and vesicular; ultramafic xenoliths.

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LEGEND

STIKINE TERRANE

Undivided: shale, siltstone, sandstone, conglomerate, dacite tuff.

dark weathering, massive to finely laminated, locally flaggy, black mudstone and limy

CONGLOMERATE MEMBER: Resistant, orange-weathering, thick-bedded to massive, well-rounded, polymictic, clast-supported and less matrix-supported, cobble comglomerate with interbeds of pebbly sandstone, tuffaceous sandstone and greywacke; clasts are derived from Lewes River Group volcanic and

JURASSIC LATE EARLY JURASSIC K-feldspar; pink, K-feldspar megacrystic, hornblende granite to granodiorite; fine- to medium-grained acicular hornblende diorite, quartz diorite, tonalite and oligoclase

olivine diorite; (e.g. Alligator quartz monzonite, Fenwick Creek diorite, Bennet pluton).

LATE TRIASSIC STIKINE PLUTONIC SUITE (~215 Ma): Foliated, fine- to medium-grained hornblende quartz diorite to diorite with minor biotite; local, penetratively foliated, gabbroic hornblende orthogneiss; (e.g. Friday Creek diorite, Tally Ho leucogabbro)

mudstone, siltstone, sandstone, commonly calcareous; minor limestone. MANDANNA MEMBER: Red, purple, green and grey, medium bedded to massive, arkosic greywacke, mudstone and shale; finely laminated,

thickly bedded limestone with sparsely to densely fossiliferous bioclastic horizons; sooty black limestone, sandy limestone, siltstone and sandstone; tan dolostone; massive to poorly bedded, limestone conglomerate and breccia

gritty sandstone, conglomerate and hornfels. POVOAS FORMATION: Resistant, massive light to dark green weathering, dark green to black, augite phyric basalt and basaltic andesite flows, pillowed flows,

UPPER PALEOZOIC TAKHINI ASSEMBLAGE: uPT: Weakly sheared to strongly foliated and metamorphosed, greenschist, diorite gneiss, chlorite-augite-feldspar gneiss, amphibolite and amphibole gneiss; may include metamorphosed equivalents of

CARBONIFEROUS AND PERMIAN CACHE CREEK GROUP (CPCH, CPCK, CPCN, CPCu) HORSEFEED FORMATION: Massive to poorly bedded, medium-grained, recrystallized white to pale yellow limestone, crinoidal bioclastic limestone and mestone breccia; rare dolostone; local massive, dark green to brown, aphanitic and amygdaloidal basalt sills, dykes and flows.

KEDAHDA FORMATION: Resistant, well-bedded, grey, black, red and brown chert, with lesser cherty sandstone and siltstone; minor thin limestone beds and pillow lava. NAKINA FORMATION: Resistant, massive, dark weathering, altered, fine-grained, dark green metabasite with hornblende diorite with thin bands of grey, chert and

carbonate; irregular occurrences of ultramafic rock. Resistant, dark rusty to dunn brown weathering, strongly magnetic tectonized and serpentinized peridotite, dunite, and pyroxenite; serpentine breccia.

Fault, sense of movement uncertain (defined or approximate, assumed or extrapolated) . Fault, steeply dipping, barb on downthrown side (defined or approximate, assumed, extrapolated) . Fault, transcurrent, sinistral (defined) .

Geological contact (defined or approximate, assumed,

Fault, thrust, teeth on upper plate (defined or approximate, assumed, extrapolated) Bedding (inclined, vertical, overturned, top unknown) Schistosity, gneissosity, foliation (inclined) Primary magmatic flow fabric, igneous flow banding (inclined Flow surface, includes pillows (inclined) Mineral lineation, rodding (inclined) Fold Axis .

Geochronology data point (Breitsprecher and Mortensen, 2004)

WHEELER (1961) HUNT et al WHEELER (1961)HART and RADLOFF SOURCES OF INFORMATION

(1:50 000 NTS BOUNDARIES AND MAP NUMBERS INDICATED FOR REFERENCE)

LOWER TO MIDDLE JURASSIC LABERGE GROUP (JL, JLN, JLR, JLRc)

> NORDENSKIOLD DACITE: Blue-grey, green and maroon, coarse- and medium-grained, massive, crystal-rich dacite tuff and arkosic greywacke.

RICHTHOFEN FORMATION: Brown- to tan-weathering, recessive, well- and thin-bedded siltstone and sandstone, with interbedded siltstone-sandstone couplets; mudstone, locally with wispy brown laminae or limestone horizons.

sedimentary rocks, as well as Late Triassic plutons. (~177 Ma): Foliated hornblende quartz monzonite to granodiorite with white

EARLY JURASSIC LONG LAKE PLUTONIC SUITE (~183 Ma): Moderately recessive, grey-weathering, coarse-grained hornblende-biotite granite and granodiorite with pink K-feldspar megacrysts; some localities are strongly saussuritized or contain notable epidote; (e.g. Little River Batholith).

LEWES RIVER GROUP (uTLA, uTLAC, uTLAH, uTLAM, uTLP, uTLS, mTLJ) AKSALA FORMATION: Largely undivided Casca and Mandanna members;

hick-bedded arkosic sandstone; minor interbedded pebble conglomerate and HANCOCK MEMBER: Resistant, white to light grey weathering massive and

deposited as debris flows and fanglomerate. CASCA MEMBER: Dark-weathering, siliceous, wispy to finely laminated, thick-bedded, bioturbated siliceous siltstone; finely laminated, limey brown sandstone interlaminated with black muds and interbedded with sandy and gritty limestone; recessive weathering volcanogenic sandstone with siltstone, shale,

agglomerate and breccia; pillows with vesiculated rims, interpillow carbonate, epidote, calcite and chlorite alteration; minor well-indurated dark grey, greywacke, agglomerate, tuff, and associated epiclastic rocks with thin carbonate beds.

SHELDON CREEK FORMATION: Orange-weathering, resistant, light olive-green, locally pillowed and strongly silicified, andesitic and basaltic lava flows; locally with hyaloclasite and breccia. May be part of Joe Mountain Formation.

JOE MOUNTAIN FORMATION: Dark grey-weathering, fine-grained, feldspar and pyroxene-phyric, pillowed basalt flows and massive microdiorite; aphyric, pillowed basalt flows with calcite veining and pervasive weak chloritic alteration; massive, coarse-grained and locally pegmatitic, pyroxene gabbro and diorite; recessive, volcanogenic sandstone, siltstone, shale and gritty sandstone that includes limestone or limy beds, as well as massive, heterolithic, diamictite and conglomerate.

Povoas Formation, uPTc: Recessive, light grey-weathering, coarsely crystalline, massive dolostone and white sheared marble; minor calc-silicate rock and skarn.

YUKON-TANANA TERRANE SNOWCAP ASSEMBLAGE: Rusty brown to dark pink weathering, brown and grey, foliated quartzite and quartz-mica schist

PROTEROZOIC? AND PALEOZOIC NISLING ASSEMBLAGE: PPN: Resistant, rust weathering biotite-muscovite-quartz-feldspar schist, quartzite and micaceous quartzite; felsic ∠PPNC chlorite-biotite orthogneiss and rare amphibolite bands; minor white to dark-grey, granular marble, PPNc: Crystalline limestone.

> NOTE: FORMATIONS AND MEMBERS OF THE LABERGE AND LEWES RIVER GROUPS ARE INFORMAL

> > Author: S.P. Gordey

Compiled from previous works of J.O. Wheeler (1961), C.J.R. Hart (2003), C.J.R. Hart and J.A. Hunt (2003) and J.K. Radloff (1990) (See index map)

Digital cartography by R.B. Cocking, Data Dissemination Division (DDD) This map was produced from processes that conform to the DDD Publishing Services Subdivision Quality Management System, registered to the ISO 9001:2000 standard

Constructive review of this map provided by Maurice Colpron and Grant Lowey, Yukon Geological Survey

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

Digital base map from data compiled by Geomatics Canada, modified by DDD Mean Magnetic declination 2008, 23° 25' E, decreasing 22.3' annually. Readings vary from 23° 5' E in the southwest corner to 23° 45' E in the northeast corner of the map

Elevations in metres above mean sea level

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OPEN FILE 5640 **BEDROCK GEOLOGY** WHITEHORSE (105D) Scale 1:250 000/Échelle 1/250 000

Projection transverse universelle de Mercator

134°00′

136°00′

LOCATION MAP

Universal Transerve Mercator Projection North American Datum 1983 © Her Majesty the Queen in Right of Canada 2008

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