In Both the Selkirk & Na'Cho N'Y'AK Dun FN final agreements, Ddhaw Ghro is a Habitat Protection Area with an objective to "conserve & protect important fish & wildlife habitat for the benefit of all yukon People."

006251

~~Executive Summary~~

Introduction

Introduction and land status

Interim protected

A map notation designating McArthur Wildlife Preserve (#10-21) in what is now Ddhaw Ghro Special Management Area (SMA) discouraged extensive exploration programs in the area since 1972. In 1974, the same area was proposed as an International Biological Program (IBP) site. The area was selected as a Special management area for the Selkirk and Na'Cho N'Y'Ak Dun First Nations **(Figure 1)**. The Special Management Area became ~~withdrawn from disposition~~ since 1997 for a period of three years. The area contained no active quartz or placer claims, or crown grants at the time of withdrawal. Land withdrawal was recently renewed through August 2005, or the completion of a management plan. The management plan will make recommendations regarding permanent land withdrawals.

Habitat Protection Area

in

may

The SMA is located in the south-central part of Yukon Plateau North Ecoregion, which is currently not represented by a YPAS Goal 1 protected area. Depending upon the final management regime, a southerly extension of Ddhaw Ghro may be considered under YPAS for representation of Yukon Plateau North and Yukon Plateau Central Ecoregions **(Figure 2)**.

Is this for sure? or is this JM wish list?

& don't want to legitimize the idea of expansion & goal 1 representation

Field work carried out by YTG

In the summer 2000, Anna Fonseca and Daniele Heon spent six days in the area between Grey Hunter Creek and Sideslip Creek, in the southeastern portion of Ddhaw Ghro SMA. Work included 1:20,000 scale mapping, prospecting, and collection of samples for geochemical analyses, fossil dating, and petrographic studies. All wildlife sightings were recorded on a 1:50,000 scale topographic map.

In August 2001, Anna Fonseca and Kel Sax spent 10 days mapping (1:50,000 scale) and sampling the area adjacent to the contacts of McArthur Batholith in map sheet 105M/3.

Location, access, and physiography

Habitat Protection Area

Ddhaw Ghro Special Management Area consists of 1610 km^2 in central Yukon. The SMA occupies the southeastern portion of Mayo map sheet (105M), southwestern corner of McQuesten map sheet (115P), and northwestern corner of Glenlyon map sheet (105L). The northwestern corner of Dhaw Ghro SMA is a densely vegetated area adjacent to the Klondike Highway, and approximately 25 km south of Stewart Crossing.

Access is by helicopter from Mayo (approximately 75 km).

Ddhaw Ghro SMA roughly outlines the high ridges of McArthur Range, immediately northeast of Tintina Trench. Nogold Creek marks the northern boundary of the SMA.

Exploration history

Mineral exploration in the southeastern Mayo map sheet dates as far back as 1929, when Treadwell Yukon CL prospecting party claimed to discover the "Lost Wernecke Copper" (MINFILE # 105M 043) a large tonnage, low grade copper deposit in the McArthur Mountains. Treadwell Yukon did not stake the area, and copper showings were never found, despite regional exploration programs by Atlas EL in 1969 and United Keno Hill ML in 1970. In the early 1980s, Anaconda conducted a regional exploration project for copper targets, but staked no claims in the area that now consists the SMA.

Exploration by individuals and companies from the 1920s to the 1970s resulted in the identification of the following intrusive-related mineral occurrences: Sideslip (MINFILE # 105M 039, staked as early as 1950, but certainly in 1969 by Atlas EL); Great Horn (MINFILE # 105M 040, staked in 1971 by Great Horn Mg Syndicate Inc.); Ram (MINFILE # 105M 041, staked in 1966 by Kerr Addison ML); Hotspring (MINFILE # 105M 042, staked in 1966 by H. Mauthner); and Friesen (MINFILE # 105M 051, discovered in 1970 by United Keno Hill ML, and staked in 1972 by E. Woolven and E. Friesen, and again in 1974 by G. Van Bibber).

In 1992, Placer Dome conducted heavy mineral concentrate collection in the SMA area during a regional exploration program for Fort Knox type (intrusive-hosted) gold targets.

In 1996 and 1997, Viceroy Resources conducted a regional exploration program in the McArthur Wildlife Preserve. The company generated a significant target in the headwaters of Nogold Creek, near Sideslip mineral occurrence. Withdrawal of the SMA land from disposition late in the 1997 field season terminated Viceroy's exploration program.

Geology

Regional Setting

Most of Ddhaw Ghro SMA lies within Selwyn Basin. Roots (1996) mapped Mayo map sheet (105M) at 1:100,000 scale, and compiled the maps at 1:250,000 scale. Gordey and Makepeace (2000) produced a digital compilation of the geology of the Yukon, from which geology of Ddhaw Ghro SMA is shown in **Figure 3.**

Late Proterozoic through Siluro-Devonian easterly-derived sediments deposited in Selwyn Basin. In mid-Paleozoic time, Nogold basin opened along a NW-SE-trending axes, on the northern part of Ddhaw Ghro SMA, where Hyland Group sediments were re-worked and re-deposited. In Devonian time, westerly- and northwesterly-derived Earn Group dark coloured turbidites deposited upon Selwyn Basin strata (Gordey, 1992). Mesozoic deformation produced NW-SE-trending, SE-plunging folds, and NE-verging thrusts in the southern part of Mayo map sheet (Roots, 1996). Intrusion of McArthur Batholith took place at 90-95 Ma (Roots, 1996). Magmatism post-dated the penetrative deformation, and produced wide contact metamorphic aureoles that overprinted penetrative fabrics. Starting in the Eocene, dextral movement along Tintina Fault juxtaposed basinal rocks of Ddhaw Ghro SMA (to the northeast) to Yukon-Tanana rocks of continental arc affinity (to the southwest).

Geology Ddhaw Ghro SMA

Sedimentary rocks in the southeastern portion of the SMA were critical for the identification of structural and stratigraphic relationships, because the area exposes the transition from rocks that suffered intense metasomatism in the contact aureole of McArthur Batholith to their unaltered counterparts to the southwest. 1:50,000 scale geological compilation Ddhaw Ghro SMA (**Figure 4)** includes results of mapping during the 2000 and 2001 field seasons, and previous work compiled by Gordey and Makepeace (2000). Structures, alteration and mineralization in the northwestern part of the map are controlled by the intrusion of McArthur Batholith. Intensely

jointed, muscovite-biotite-quartz-monzonite is ubiquitous, but biotite-quartz-monzonite and pegmatitic dikes are common. Mesocratic enclaves **(Plate 1)** are common, particularly along the margins of the batholith. McArthur Batholith contains large pendants reaching over 2 km diameter. Rocks forming northeastern-most pendant are resistant, rusty-weathering, pervasively hornfelsed quartz-arenite, siltstone, and shale.

Figure 5 shows the interpreted stratigraphic column for Ddhaw Ghro SMA.

Sedimentary rocks east of Grey Hunter Creek consist of a folded and thrust-imbricated sequence of Duo Lake Formation (dark grey to black chert, shale, and limestone, and minor tan-weathering, medium grey-brown subarkosic wacke) and Steel Formation (orange-weathering, bioturbated, wispy laminated calcareous shale) of Road River Group, and Portrait Lake Formation (blue-black weathering, dark grey to black arkosic wacke and shale) of Earn Group.

In the southeast part of the SMA, a conspicuous, fault-bounded, maroon-weathering, olive green shale **(Plate 2)** up to 12 m thick, and traced for a strike length of over 2 within Duo Lake Formation rocks was previously interpreted as Narchilla Formation of Hyland Group. Although Hyland Group rocks may be present locally in the area as thin thrust sheets, these rocks are here interpreted as part of Roots' (1996) provisional Nogold unit. A resistant, white-weathering black limestone **(Plates 3, 4)** that hosts skarn mineralization in several locations was previously correlated with Rabbitkettle Formation (Roots, 1996). Mapping to the southwest shows that this unit is laterally continuous for several kilometres, hosts several skarn showings, and is stratigraphically underlain and overlain by dark grey to black chert and shale of Road River Group.

Coarse- to fine-grained sedimentary rocks in the south-central and southwestern part of the SMA were mapped by Bostock (????) as the "Grit Unit" and by Roots (1996) as Yusezyu Formation of Hyland Group. Although the rocks are visually similar to Yusezyu Formation (or Grit Unit), they are stratigraphically overlain, underlain, and interbedded with dark grey to black shale of Road River Group **(Plate 5)**, and record coarse-grained (or shallow) sedimentation during Road River deposition.

Figure 6

Structural Geology

Within the contact metamorphic aureole of McArthur Batholith, primary textures are strongly to pervasively overprinted by biotite-hornfels alteration.

Two phases of deformation produced two penetrative foliations **(Plate 6)**, EW- (1^{st} phase) and NW-trending (2^{nd} phase) folds, boudinaged competent beds and veins, and NNE-directed thrusting. Cross-section ABCD shows the interpreted structural style in the ridge northeast of Grey Hunter Creek. The contact between competent black limestone and incompetent dark grey shale of Duo Lake Formation is a plane of weakness along which thrust sheets appear to have nucleated during the second deformation event.

Mineralization

Sideslip (MINFILE # 105M 039) is described as containing mineralized skarn and porphyry dike float. During the 2000 field season, no mineralization associated with the batholith was found in the Sideslip area. The slope SE of where Sideslip mineral occurrence is currently mapped, has skarn alteration **(Plate 7)** with up to 2% pyrrhotite, developed in black limestone interbedded with dark gray shale, in the footwall of an interpreted thrust. Two float samples collected in 2000 assayed 9589 ppb Au and 1895 ppb Au.

Great Horn (MINFILE # 105M 040) is described as skarn in limy Triassic rock near contact with a Cretaceous intrusion. No signs of mineralization were found where the occurrence is plotted, but

garnet-skarn **(Plate 8)** and andalusite-bearing pegmatite veins **(Plate 9)** were located in black limestone on the steep north slopes of Black Ram Peak.

Ram (MINFILE # 105M 041) is described as claims staked on a spurious geophysical anomaly, and limy rocks in contact with a Cretaceous intrusion. Soil samples collected by Kerr Addison yielded background levels. Mapping and chip sampling in 2001 identified a series of rusty-weathering outcrops of chert, shale and grit of Road River Group over airborne magnetic highs, but no signs of mineralization or calcareous rocks.

Hotspring (MINFILE # 105M 042) is described as minor silver-lead-zinc mineralization in veins cutting Triassic limy rocks near the contact of a Cretaceous intrusion. No geological investigation was carried out by YTG, because the mineral occurrence is in Selkirk First Nation Category A settlement land.

Friesen (MINFILE # 105M 051) is described as two skarns in limy Triassic rocks near a Cretaceous intrusion and molybdenite specks in dikes cross-cutting the intrusion. Mapping and sampling in 2001 located pyrite-pyrrhotite-skarn hosted in folded black limestone of Road River Group **(Plate 10)**.

Alteration and contact metamorphism

Contact metamorphism is the most ubiquitous alteration in the SMA, and its effects often extend beyond a kilometer of batholith contacts. Biotite, andalusite, and kyanite +/- staurolite are the most common contact metamorphic assemblage in siliciclastic rocks **(Plate 11)**, whereas garnet and andalusite are common minerals in the chilled margins of the batholith.

Quartz-Feldspar-muscovite-tourmaline pegmatitic veins and quartz-tourmaline veins cross-cut intrusive contacts. Bull quartz is common, and locally has crystalline quartz and rare malachite stains.

Geochemistry

Field work targeted to explain the significant anomalies in the regional geochemical survey (RGS). Not all geochemical targets were visited. A conspicuous tungsten anomaly in the south-central part of the SMA was not followed-up on, and remains unexplained.

Mineral Assessment

Regional context

In the regional mineral potential map of Selwyn Basin, the bulk of Ddhaw Ghro SMA is in a tract that ranks in the highest category of mineral potential **(Figure ??)**.

Detailed mineral potential map

A detailed mineral assessment of Ddhaw Ghro SMA took place in Whitehorse, on September 19th and 20th. **Figure ???** Shows the resulting mineral potential map of Ddhaw Ghro SMA.

Methodology

The study area was divided into sixteen tracts, each representing a package of rocks that is either fault-bounded, or constitutes a unique domain with respect to lithological, geochemical or geophysical characteristics. McArthur Batholith formed the largest tract.

Four panelists were chosen for their expertise in the geology and mineral deposit models pertinent to the Study Area: Carl Schulze (currently in the Nunavut Government), Gerry Carlson (Copper Ridge Exploration), Richard Hall (consultant), and Doug Brownlee (consultant). The assessment lasted two days. After examining and discussing all the geoscientific information available for each tract the panelists decided upon a list of deposit models pertinent to the tract, and filled in evaluation forms for likelihood of new discoveries of the median tonnage for each deposit type in the tract. The forms were utilized to maintain the focus on mineral deposit models and explorability of the tract, and reduce personal biases, not for statistical analyses. At the end of the second day, the panelists ranked the tracts unanimously, from lowest to highest mineral potential.

relative

Limitations

Mineral potential maps portray the best estimation at the time of the assessment. Since we are assessing a hidden resource, it is important to realize that the geological knowledge base is in a constant state of growth, and mineral deposits may one day be found in rocks that we once thought to have ~~low~~ lower potential.

Results and conclusions

The final rank, from highest to lowest mineral potential is as follows: tract # 9 (highest), 3, 8, 15, 14, 13, 11, 12, 6, 5, 7, 10, 4, 2, 1 (lowest).

The mineral potential map displays the relative mineral potential within the SMA. The mineral potential of the highest-ranking tract is due to the presence of known showings and the results of mapping and sampling programs by Viceroy Resources and YTG. The most significant mineral deposit types applicable to Ddhaw Ghro SMA are intrusive-related mineralization such as Carlin-type, skarn, manto, etc. The northeastern and eastern parts of the SMA show the highest mineral potential, and if excluded from future land withdrawals as a single block, the area may attract the immediate attention of the exploration industry.

Recommendations for future work

Three areas of research are recommended to better constrain the mineral deposit types applicable to Ddhaw Ghro SMA:

1) Field work to follow-up on an intense tungsten anomaly in the southeastern part of the SMA (tract ???)
2) Microprobe analyses of contact metamorphic equilibrium assemblage to provide depth of emplacement of McArthur Batholith, from which potential to host significant tungsten deposits may be inferred.
3) Petrological mapping of the batholith, to define phases that have potential for hosting different deposit types.

Acknowledgements

Charlie Roots provided invaluable information and maps, was always ready to share his expertise and give excellent advice and new ideas on geology and field conditions of the Mayo map sheet. Rick Diment and Carl Schulze provided good accounts of the exploration history in southeastern Mayo area. Trans North provided safe transportation. Daniele Heon and Kel Sax assisted in the fieldwork phase. Shirley Abercrombie, Rod Hill, and Monique Shoniker performed the diplomatic and administrative services that allowed fieldwork to proceed.

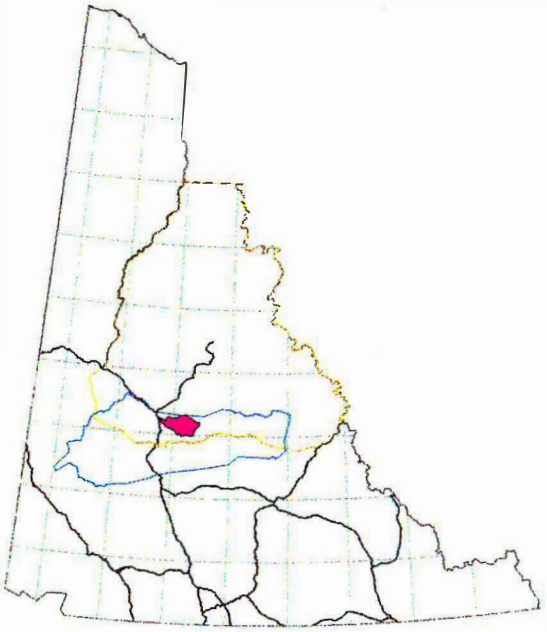

Figure 1. Map of Yukon showing traditional territories of Selkirk and Na'Cho N'Y'Ak Dun First Nations, and Ddhaw Ghro SMA.

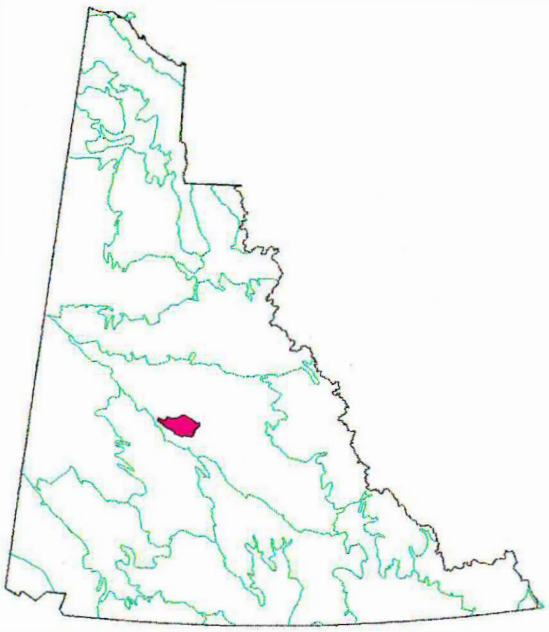

Figure 2. Map of Yukon Ecoregions showing Ddhaw Ghro SMA in southcentral part of Yukon Plateau North Ecoregion.

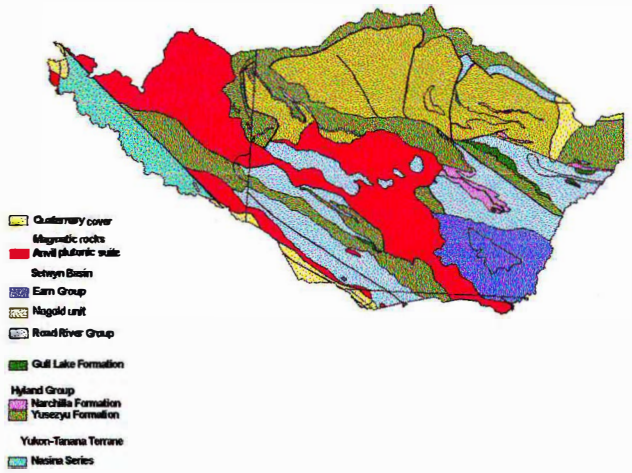

Figure 3. Simplified geology of Ddhaw Ghro SMA (from Gordey and Makepeace, 2000).

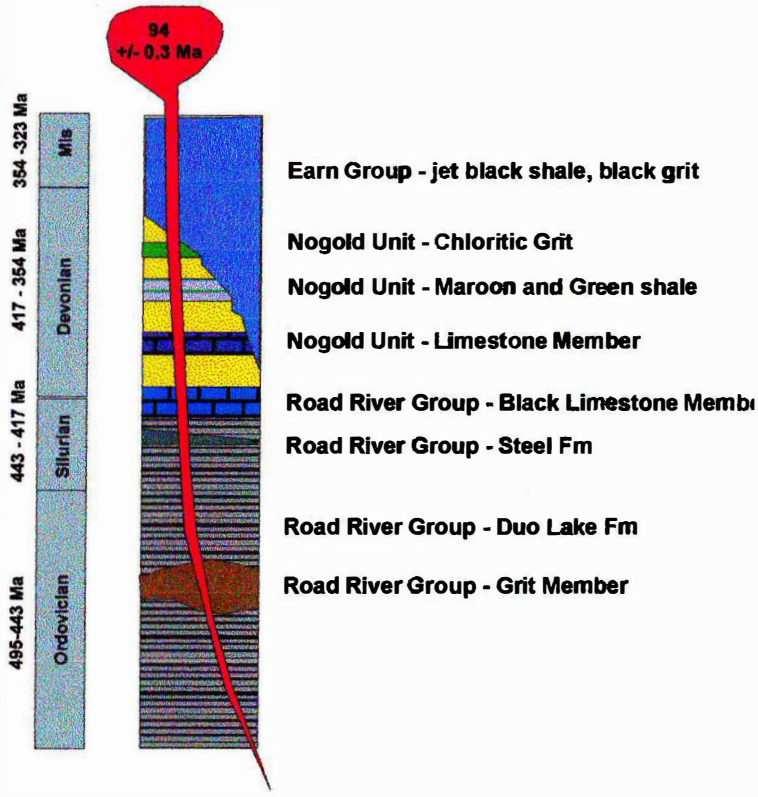

Figure 5. Stratigraphic column for Selwyn Basin rocks in Ddhaw Ghro SMA.

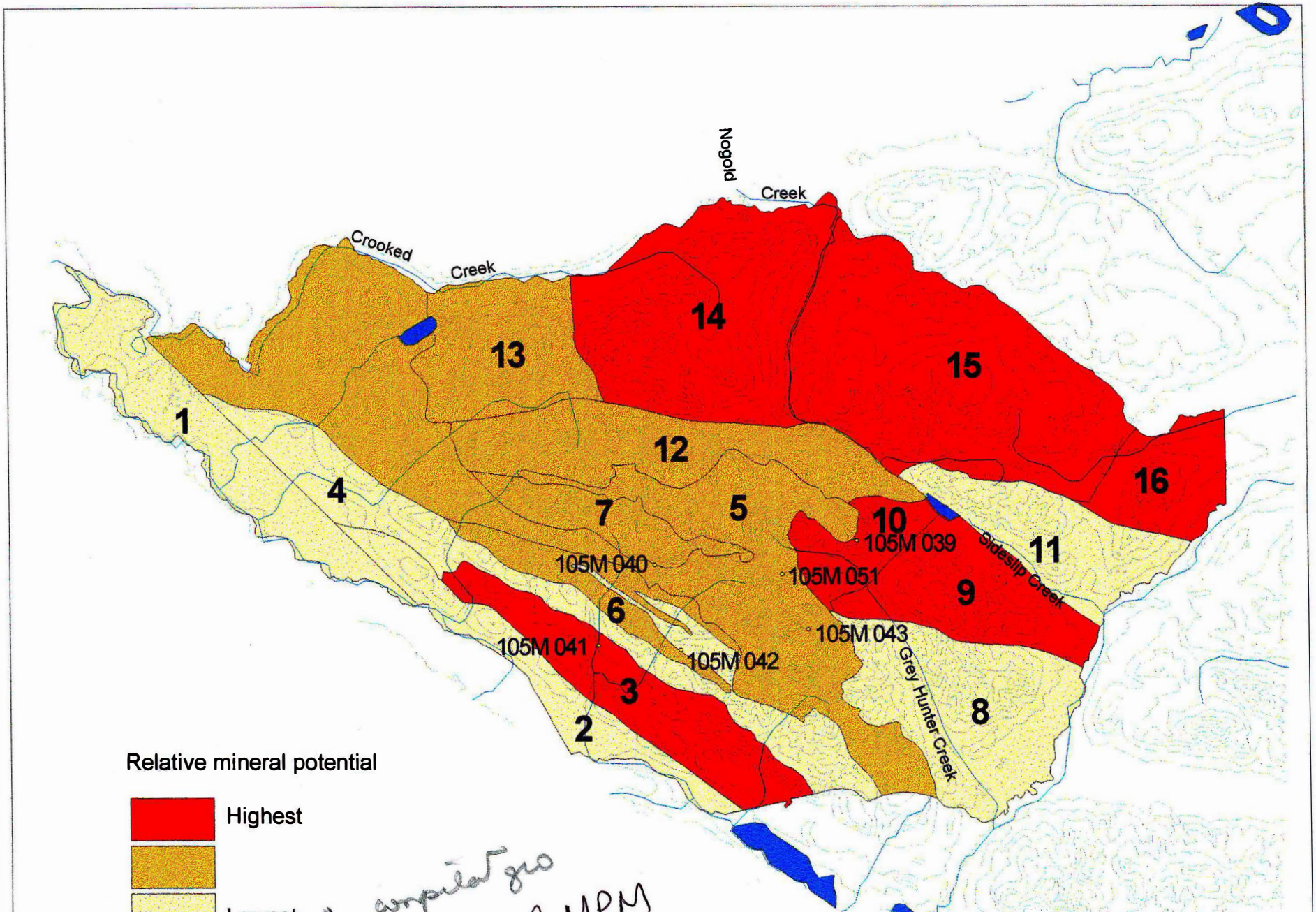

Fig 4- amphibolite geo

Fig 7 = Regional MPM (SB)

Figure 8 Mineral potential map of Ddhaw Ghro SMA.

Fig 9: area to be excluded

Photo I. Remains of a Canadian bomber plane that crashed northeast of Black Ram peak in 1957.

Plate I. Mesocratic, fine-grained enclaves along the margin of McArthur Batholith.

Plate 2. Light green shale interpreted as part of the provisional Nogold unit.

Plate 3. Resistant, white-weathering black limestone in Road River Group.

Plate 4. Limestone concretions along the upper contact of the black limestone member of Road River Group.

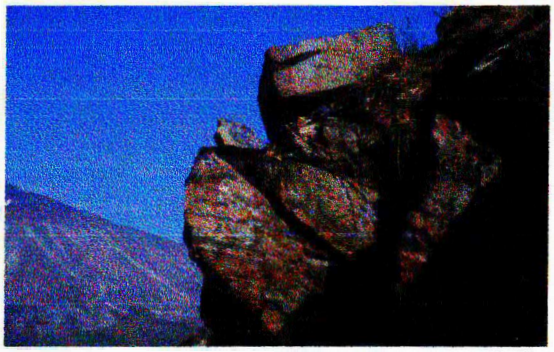

Plate 5. Interbedded sandstone and dark grey to black shale of Road River Group.

Plate 6. Cross-cutting relationships between first and secod phase foliations are observed away from the contact metamorphic aureole.

Plate 7. Skarn bands in black limestone. Sideslip MINFILE occurrence (105M 039).

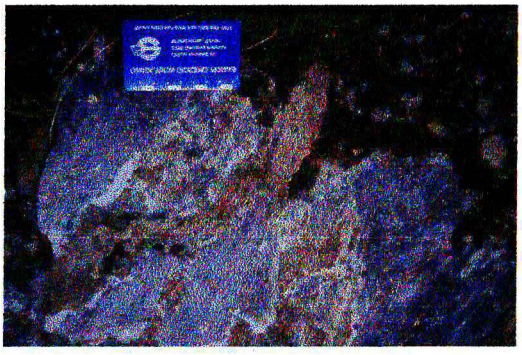

Plate 8. Garnet-skarn in black limestone. Great Horn MINFILE occurrence (105M 040).

Plate 9. Pegmatite vein with anomalous tantalum levels (27 ppm).
Great Horn MINFILE occurrence (105M 040).

Plate 10. White skarn bed in folded black limestoneFriesen MINFILE occurrence (105M 051).

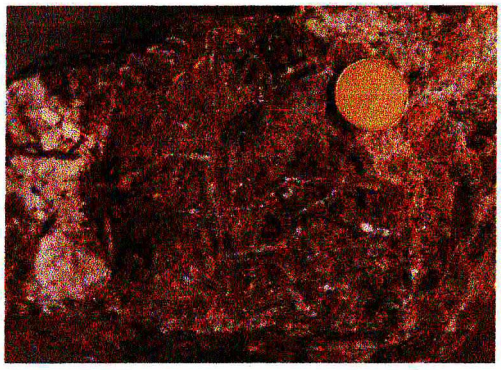

Plate 11. Kyanite laths in contact metamorphic aureole.

Appendix I

Mineral deposit models applied to each tract

Tract 1
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Kuroko-type VMS
Tintina Gold Belt type
Sn-veins
Epithermal (High Sulfidation)
Sn-skarn
W-skarn
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: Very little geoscientific data is available for this tract, which is the only portion of Ddhaw Ghro SMA south of Tintina Trench. Initially, the experts were reluctant to estimate mineral potential at all. Evaluations of potential were based on geochemical data and rock types beyond (to the south) of this tract.

Tract 2
Au-quartz veins
Cu-Au-quartz veins
Polymetallic veins
Tintina Gold Belt type
Sn-veins
Epithermal (High Sulfidation)
W-Sn-stockwork

Tract 3
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Tintina Gold Belt type
Sn-veins
SEDEX
Sn-skarn
W-skarn
Stratiform barite
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: Intrusive rocks are sparse, but Bostock's map shows a long strip of granite (possibly extrapolated on the basis of small outcrops). Farther west a stock intrudes Earn Group shale and

"Kalzas" crinoidal limestone. Also to the west, the Cave showing has 19% Zn in massive sulphide-barite lenses.

Tract 4
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Tintina Gold Belt type
Sn-veins
Sn-skarn
W-skarn
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Tract 5
Au-quartz veins
Cu-Au-quartz veins
Polymetallic veins
Tintina Gold Belt type
REE-stockwork
W-Sn-stockwork

Note: Heavy mineral concentrates collected by Placer Dome in 1992 yielded anomalous Au (20 to 80 ppb) and erratic W (18 to 91 ppm) along the eastern contact of McArthur Batholith.

Tracts 6 and 7
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
REE-skarn
Sn-skarn
W-skarn
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: tracts # 6 and # 7 were evaluated together.

Tract 8
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
SEDEX

Sn-skarn
W-skarn
Stratiform barite
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: The tract includes a strong, NW-trending and bifurcating magnetic high. There may be a Nick-type signature in the northern part of the tract. There may be a fault along Grey Hunter Creek, connected to the fault transecting Nogold Hills to the North (where a geochemical anomaly is prominent).

Tract 9
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
SEDEX
Sn-skarn
W-skarn
Stratiform barite
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: There may be volcanic rocks in the tract.

Tract 10
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
SEDEX
Sn-skarn
W-skarn
Stratiform barite
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Tract 11
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type

Sn-veins
SEDEX
Sn-skarn
W-skarn
Stratiform barite
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Tract 12
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
Sn-skarn
W-skarn
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: Heavy mineral concentrates collected by Placer Dome in 1992 are slightly elevated in Au (5 to 66 ppb), Bi, and As (9 to 86 ppm).

Tract 13
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
Sn-skarn
W-skarn
REE-skarn
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Tract 14
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
Sn-skarn
W-skarn
W-Sn-stockwork
Cu-skarn

Pb-Zn-skarn

Note: An inferred fault offsets an ENE-trending magnetic low feature.

Tracts 15 and 16 (joined)
Au-quartz veins
Au-skarn
Carlin
Cu-Au-quartz veins
Polymetallic veins
Polymetallic mantos
Tintina Gold Belt type
Sn-veins
Sn-skarn
W-skarn
Besshi-type VMS
W-Sn-stockwork
Cu-skarn
Pb-Zn-skarn

Note: Sn is elevated along an ENE-trending magnetic low feature trending off the intrusion.