Geologic setting and mineralization potential of the southwestern Whitesail Lake map-area (93E) a preliminary assessment

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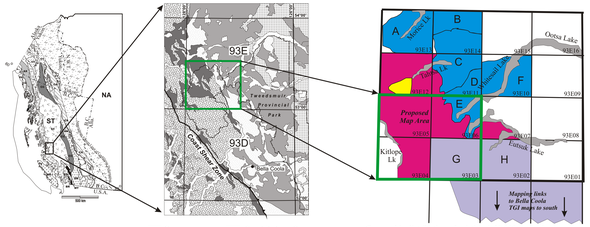
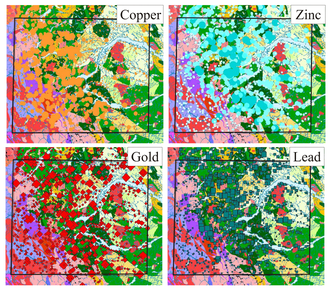
ABSTRACT

Regional mapping and economic assessment in the Whitesail Lake map-area (93E) was extended to the west and northwest (93E/04, /05, /06) in 2005 by a combined research team from the University of Wisconsin-Eau Claire, the Geological Survey of Canada and the University of British Columbia. This is an ongoing projected sponsored by *Geoscience BC* designed to improve understanding of the geologic evolution and economic mineral potential of the west-central portion of the Coast Mountains (52-54'N).

The field study area contains Jurassic and Cretaceous volcanic and sedimentary successions on the western edge of Stikinia, with volcanogenic massive sulfide mineralization potential and Jurassic to Eocene plutonic bodies along the eastern margin of the Coast Plutonic Complex that are known hosts for a variety of porphyry deposits. Lower to Middle Jurassic Hazelton Group strata comprise a thick (> 4 km), bimodal volcanic succession consisting of basaltic and basaltic-andesite flows and associated volcanogenic strata interbedded with and overlain by rhyolitic tuff, lapilli tuff, tuff breccias, tuffaceous sedimentary rocks and associated rhyolitic domes. Spectacular exposures of a mineralized Layered Mafic Intrusion (LMI) exposed on Chatsquot Mountain and the ridges immediately to the southeast and northwest of the main massif form an important component of the regional volcanic stratigraphy. Typical compositional layers are less than 1m thick with clinopyroxene (cpx)-rich gabbro (80% cpx) alternating with more plagioclase-rich layers; subordinate ultramafic layers include magnetite olivine-rich rocks, apparent cumulate layers. Plutonic rocks are widespread in the study area and range in age from possibly Early Jurassic to Eocene.



Geographic distribution of existing 1:50,000 geologic maps in the Whitesail Lake map area, and the extent of proposed map area. Blue areas were mapped by BCGS teams (ca 1985-1990); yellow area is thesis map of van der Heyden (1982); purple area was mapped by Bella Coola TGI project in Bella Coola area (93D; 2001-2003), and 93E/2/3 were mapped under auspices of Rocks to Riches program (2004)



Regional stream sediment elemental anomoly maps for the Whitesail Lake map area. For each element, the relative size of the sample point indicates elemental abundance. Note strong concentration of anomolies along western edge of Mesozoic volcanic assemblages, west of Eutsuk and Whitesail Lakes, within and adjacent to the proposed map area (modified from BC EMPR, 1986).

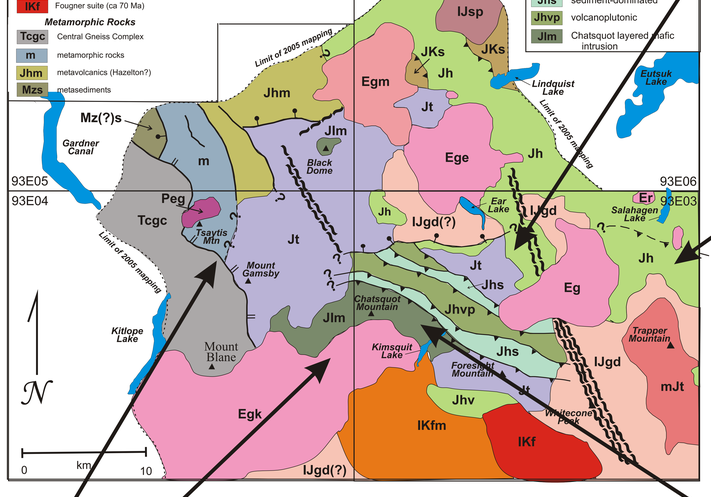
PRINCIPAL OBJECTIVES

The primary objective of this investigation is detailed geologic mapping (1:50,000) and economic mineral assessment of the eastern Coast Plutonic Complex and western Stikinia in the southwestern and western Whitesail Lake map-area (including parts of 93E04, 05, 06, 12).

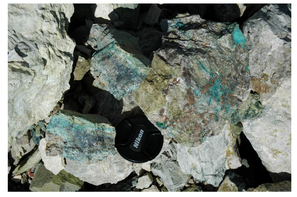
Stream sediment geochemistry, MINFILE data and detailed geologic mapping farther north in Whitesail Lake map-area, and to the south (eastern Bella Coola map-area), indicate potential for volcanogenic massive sulphide, Cu±Mo±Au porphyry, and Ni-Cu-Cr-PGE mineralization.

Detailed geologic mapping, systematic geochemistry, geochronology, petrology and economic mineral evaluation will constrain the distribution of and controls on potential economic mineralization in the region.

The eastern half of the Kitlope Lake (93E/04) 1:50,000 map-area is underlain by a distinctive series of strongly ductiley-deformed upper amphibolite to granulite facies quartzofeldspathic gneisses assigned to the Central Gneiss Complex. High grade rocks of the Central Gneiss Complex are structurally overlain by lower grade volcanic and plutonic rocks of western Stikinia across a low angle, east-dipping extensional shear zone referred to as the Central Gneiss Detachment (eastern boundary detachment (Rusmore et al., 2005). The high metamorphic grade of the Central Gneiss Complex precludes significant mineralization, and the extensional shear zone probably marks the western edge of economic mineralization in the southern Whitesail Lake map area.

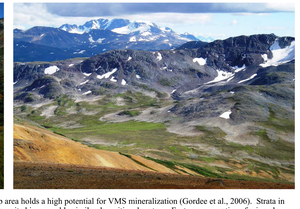


Potential Mineralization Target:
Post-depositional mineralization within Hazelton Group



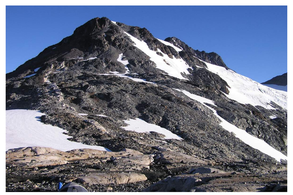
A thick, steeply-eastward-dipping succession of metavolcanic strata assigned to the Hazelton Group is found in the Mount Irma area. The volcanic strata consist of strongly-deformed massive andesites, andesite breccias, and associated agglomerates that exhibit significant alteration at discrete intervals within the succession (photo on left). The package is locally intruded by rhyolitic dykes of presumed Tertiary(?) age, which exhibit pronounced sulfide mineralization along their margins (photo on right).

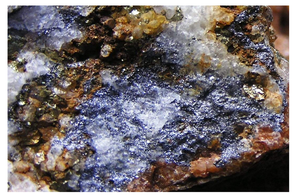
Potential Mineralization Target:
Volcanogenic Massive Sulphide mineralization with Hazelton Group (Eskay-type)



Previous work suggests the Hazelton Group in the southern Whitesail Lake map area holds a high potential for VMS mineralization (Gordee et al., 2006). Strata in this area are coeval with mineralized strata in the Eskay Creek region, and were deposited in a roughly similar depositional system. Features suggestive of mineral potential include the presence of a synvolcanic extensional structure and the linear arrangement of extrusive felsic domes in the Rivers Peak/Mount Preston; evidence for shallow water, submarine deposition, as indicated by fossil assemblages, sedimentary structures and pillow lavas; the occurrence of stratiform pyrite within tuffaceous mudstones at Tesla Mountain as well as widespread semi-conformable epidote alteration that may reflect a buried subvolcanic intrusion; and the presence of known Middle Jurassic syngenetic (e.g., Nifty) and epigenetic mineral occurrences in the area (Gordee et al., 2006, Mortensen, 2006).

Potential Mineralization Target:
Cu+Mo+Au porphyry mineralization associated with Tertiay intrusions





Coarse-grained, locally porphyritic, Paleocene and Eocene granitic plutons rocks typically have sharp intrusive contacts with adjacent country rock, with locally extensive (10's m) variably mineralized intrusive breccias. The photograph on the left shows a sharp intrusive boundary between the Kitlope pluton and the Chatsquat layered mafic intrusion. Sulphide mineralization, primarily Cu and Mo, is locally evident along some intrusive boundaries. The character of potential porphyry targets will be examined in detail during the course of this investigation.

Potential Mineralization Target:
PGE mineralization associated with Layered Mafic Intrusion

Layered mafic intrusion on the flanks of Chatsquot Mountain (photo on right). Compositional banding typically consists of variable proportions of olivine,pyroxene, plagioclase and magnetite and ranges in composition from ultramafic magnetite-olivine websterites to anorthositic gabbro. Typical compositional layers are less than 1m thick with clinopyroxene (cpx)-rich gabbro (80% cpx) alternating with more plagioclase-rich layers that distinctly weather to a lighter color (photo on left). Subordinate ultramafic layers include magnetite olivine-rich rocks, apparent cumulate layers, which weather to a distinctive rusty brown, knobby surface. Some pyroxene rich compositional layers (cpx-gabbro) near the southwestern contact have substantial chalcopyrite (or Cu-Ni sulfide) mineralization both as disseminated stratiform sulfides and sulfide veins. Preliminary geochemistry indicates elevated Cu and Ni values.

ONGOING RESEARCH

- Extend mapping to north to evaluate mineralization potential Mesozoic volcanic successions and plutonic bodies of western Stikina east of the Central Gneiss Complex
- Extend mapping to the east, in order to complete documentation of the age, geochemistry, depositional setting and mineralization potential of the southernmost extent of the Hazelton Group
- Complete geochronologic analysis of all major volcanogenic and plutonic units
- Comprehensive geochemical assessment of magmatic bodies throughout the study area
- Completion of metallogenic assays of potential economic mineralization prospects
- Development of a comprehensive model of the tectonic evolution of the southern and western portions of the Whitesail Lake map area
- Detailed geologic analysis of potential economic targets in the study area, including:
  - PGE potential of Chatsquot layered mafic intrusion
  - VMS potential of southernmost Hazelton Group
  - intrusion related post-depositional mineralization of Hazelton Group
  - Cu+Mo+Au potential of Tertiary intrusions

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