South Nechako Basin and Cariboo Basin Lake Sediment Geochemical Survey (Parts of NTS 092N, O, P; 093A, B), Central British Columbia[1]

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KEYWORDS: Nechako Basin, Cariboo Basin, mineral exploration, geochemistry, multi-element, lake sediment, lake water, epithermal, gold, molybdenum, copper, porphyry deposit

INTRODUCTION

Within the mountain pine beetle (MPB) infestation area of central British Columbia there has been a significant gap in regional geochemical survey (RGS) coverage (Fig. 1). Although this 18 000 km^2 region was included in previous RGS stream sediment programs, subdued topography and poor drainage limited the availability of suitable stream sample sites. In fact, large parts of the surveyed areas have not been sampled. As a result, sampling had been limited to 385 stream sites and the average sample density was only one site every 47 km^2. In order to expand the first level sample density of this region, a total of 1370 lakes were sampled as part of the 2006 south Nechako Basin and Cariboo Basin lake sediment and water geochemical survey.

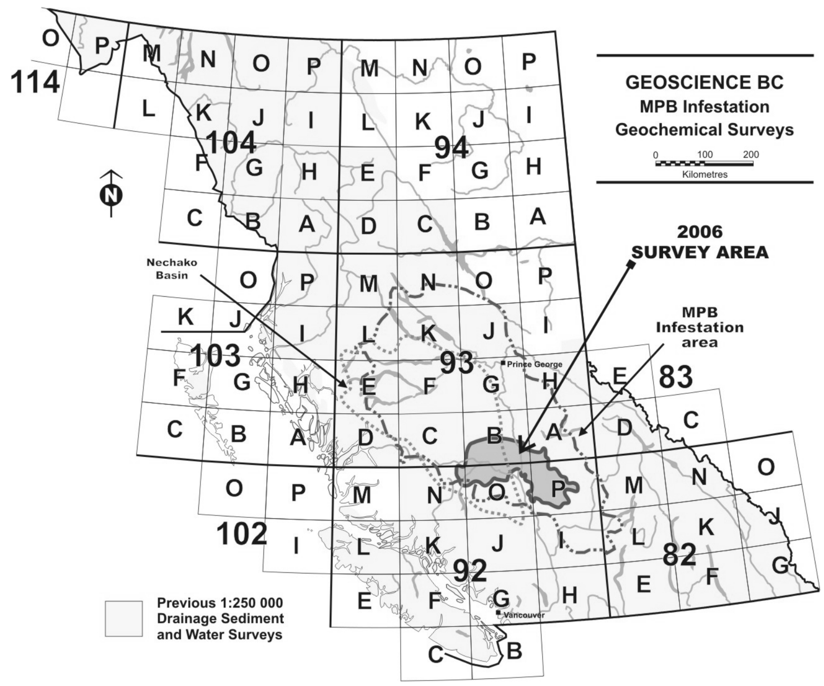

Figure 1. Location of survey area, central BC.

The results of this survey will provide access to new regional lake sediment and water geochemical information in an underexplored and geologically poorly understood region of the MPB infestation area. The work will significantly enhance existing geochemical information, and complement other ongoing geoscience initiatives and future projects. It also provides immediate economic opportunities to local service providers and potential long-term benefits from increased mineral and oil and gas exploration.

SURVEY AREA DESCRIPTION

Within the MPB infestation zone, the 2006 survey covers approximately 18 000 km^2 of the Nechako Basin, the Fraser River Basin and the Cariboo Basin (Fig. 2). Straddling highways 20 and 97, the project area extends southeast from Puntzi Lake to 70 Mile House and includes the larger communities of Williams Lake and 100 Mile House. The relatively subdued topography varies from exposed grasslands to rolling hills covered with pine and spruce forests. Opportunely, the upland surfaces of the plateau are dotted with over 11 000 lakes and ponds, including 6500 potential sample sites, ranging in size from 4000 to 400 000 m^2 (Fig. 3).

Extensive Tertiary to recent volcanic flows and thick glacial deposits cover much of the survey area. Underlying this material are Middle Jurassic to Tertiary marine and nonmarine sedimentary and lesser volcanic rocks. East of the project area, Late Triassic to Early Jurassic Cache Creek Group and Permian to Triassic Quesnel Terrane rocks can be found.

Within the survey area, the MINFILE database (MINFILE, 2006) lists only 12 metallic mineral occurrences. The most notable is a Cu±Mo±Au porphyry prospect named Newton (MINFILE 092O 050). Adjacent to the region are several significant porphyry deposits such as producing mines Mount Polley (MINFILE 093A 008) and Gibraltar (MINFILE 093B 012) plus developed prospects

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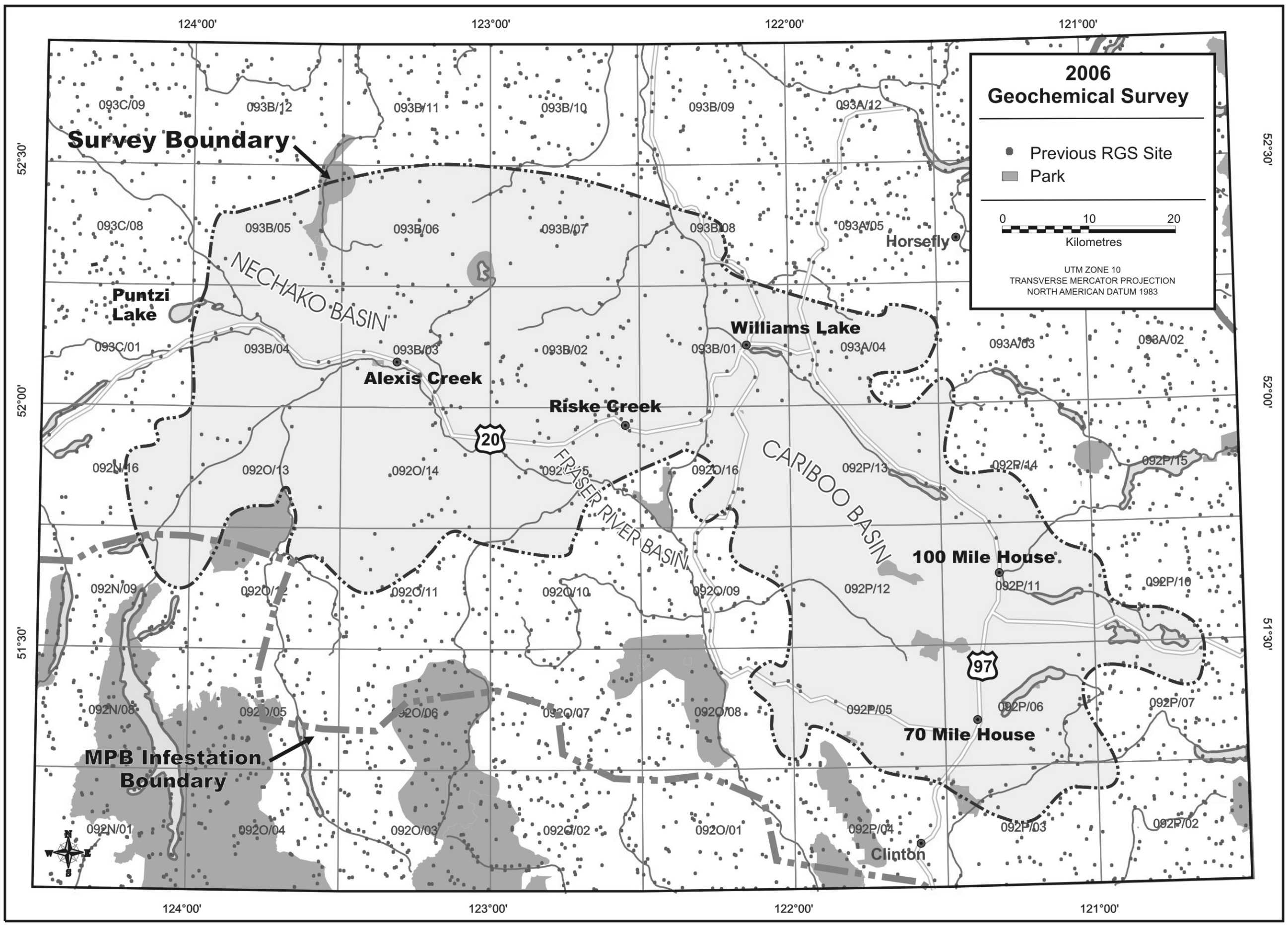

Figure 2. Detailed location map showing south Nechako Basin and Cariboo Basin survey area, central BC.

Prosperity (MINFILE 092O 041) and Frasergold (MINFILE 093A 150). Other local targets include polymetallic veins represented by the Pellaire developed prospect (MINFILE 092O 045) and epithermal precious metal deposits such as the Blackdome mine (MINFILE 092O 053) and skarn mineralization found at the Spout Lake developed prospect (MINFILE 092P 120).

SURVEY METHODS AND SPECIFICATIONS

Methods and specifications are based on standard lake sediment geochemical survey strategies used elsewhere in Canada for the National Geochemical Reconnaissance (NGR) program (Friske, 1991), as well as prior orientation studies and regional lake sediment surveys completed in BC (Cook, 1997; Jackaman, 2006).

Helicopter-supported sample collection was carried out in August 2006, during which 1445 lake sediment and water samples were systematically collected from 1370 sites. Average sample site density was one site per 13 km^2 over the 18 000 km^2 survey area. Field duplicate sediment and water samples were routinely collected in each analytical block of 20 samples.

Figure 3. Typical lake sample site located in southeastern Nechako Basin, central BC. The extent of mountain pine beetle kill can be seen by the number of orange to brown trees.

Lake sites were accessed using a float-equipped Bell Jet Ranger helicopter. The sampling crews collected sediment material with a torpedo-style sampler, and water samples were saved in 250 mL bottles. Samples were successfully collected from most of the lakes targeted in the survey area. However, some of the smaller ponds were not sampled due to poor sampling conditions, and samples were not collected from several very large and deep lakes. In general, lake bottom samples sent for analysis represent a 35 cm section of material obtained from below the water-sediment interface. Samples typically consisted of organic gels with varying amounts of inorganic sediment and organic matter. Field observations and site locations were recorded for each site.

TABLE 1. DETECTION LIMITS FOR SEDIMENT SAMPLES ANALYZED BY INDUCTIVELY COUPLED PLASMA MASS SPECTROMETRY (ICP-MS).

Element		Detection limit	Units
aluminum	Al	0.01	%
antimony	Sb	0.02	ppm
arsenic	As	0.1	ppm
barium	Ba	0.5	ppm
bismuth	Bi	0.02	ppm
cadmium	Cd	0.01	ppm
calcium	Ca	0.01	%
chromium	Cr	0.5	ppm
cobalt	Co	0.1	ppm
copper	Cu	0.01	ppm
gallium	Ga	0.2	ppm
iron	Fe	0.01	%
lanthanum	La	0.5	ppm
lead	Pb	0.01	ppm
magnesium	Mg	0.01	%
manganese	Mn	1	ppm
mercury	Hg	5	ppb
molybdenum	Mo	0.01	ppm
nickel	Ni	0.1	ppm
phosphorus	P	0.001	%
potassium	K	0.01	%
scandium	Sc	0.1	ppm
selenium	Se	0.1	ppm
silver	Ag	2	ppb
sodium	Na	0.001	%
strontium	Sr	0.5	ppm
sulphur	S	0.02	%
tellurium	Te	0.02	ppm
thallium	Tl	0.02	ppm
thorium	Th	0.1	ppm
titanium	Ti	0.001	%
tungsten	W	0.1	ppm
uranium	U	0.1	ppm
vanadium	V	2	ppm
zinc	Zn	0.1	ppm

After drying, each sample will be pulverized in a ceramic ring mill to approximately –150 mesh (100 m), and two analytical splits are extracted from the material. To monitor and assess accuracy and precision of analytical results, control reference material and analytical duplicate samples are routinely inserted into each block of 20 sediment samples. The sediment samples will be analyzed for base and precious metals, pathfinder elements and rare earth elements by instrumental neutron activation analysis (INAA) and inductively coupled plasma mass spectrometry (ICP-MS). Loss-on-ignition and fluorine will also be determined for sediment material. Fluoride, conductivity and pH will be determined for the water samples. A complete list of elements and analytical detection limits is provided in Tables 1 and 2.

RELEASE DETAILS

Reconnaissance-scale drainage sediment and water surveys are recognized as an important mineral exploration

TABLE 2. DETECTION LIMITS FOR SEDIMENT SAMPLES ANALYZED BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS (INAA), LOSS ON IGNITION (LOI) AND FLUORINE (F), AND FLUORIDE, CONDUCTIVITY AND PH OF WATER SAMPLES.

Analytical parameter		Detection limit	Units
antimony	Sb	0.1	ppm
arsenic	As	0.5	ppm
barium	Ba	50	ppm
bromine	Br	0.5	ppm
cerium	Ce	5	ppm
cesium	Cs	0.5	ppm
chromium	Cr	20	ppm
cobalt	Co	5	ppm
europium	Eu	1	ppm
gold	Au	2	ppb
hafnium	Hf	1	ppm
iron	Fe	0.2	%
lanthanum	La	2	ppm
lutetium	Lu	0.2	ppm
rubidium	Rb	5	ppm
samarium	Sm	0.1	ppm
scandium	Sc	0.2	ppm
sodium	Na	0.02	%
tantalum	Ta	0.5	ppm
terbium	Tb	0.5	ppm
thorium	Th	0.2	ppm
tungsten	W	1	ppm
uranium	U	0.2	ppm
ytterbium	Yb	2	ppm
sample weight	Wt	0.01	gm
fluorine	F	10	ppm
loss on ignition	LOI	0.1	%
pH	pH		
conductivity	CND	0.01	uS

tool. Results from these types of activities are directly responsible for follow-up mineral exploration that is valued in the millions of dollars and has been credited with the discovery of numerous mineral prospects. Results from the 2006 survey will stimulate mineral exploration by presenting new geochemical information for an underexplored area that is considered to have a high potential for future discoveries.

Survey results will be compiled into a traditional RGS-style data package that will include survey descriptions and details regarding methods; analytical and field data listings; summary statistics; sample location maps; and maps for individual elements. The publications will be released as PDF files on a CD and will include all raw digital data files used in the production process. The package will be made available to the public in the spring of 2007. At this time, the digital data will be available on the ministry's MapPlace website (BC Geological Survey, 2006).

ACKNOWLEDGMENTS

The authors wish to acknowledge J. Faulkner for his excellent helicopter flying abilities; L. Mitchell, S. Reichheld, E. Jackaman and E. Jackaman for their tireless contributions both on the ground and in the air; the many support services located in and around the Riske Creek, Puntzi Lake and 100 Mile House communities that contributed to the completion of the survey. R. Lett is thanked for his editorial comments and suggestions.

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