Advanced Explorations Inc.

ROCHE BAY MAGNETITE PROJECT
ENVIRONMENTAL BASELINE STUDIES 2006
MARINE AND AQUATIC RESOURCES

1740183.005

September 2007

CREATING AND DELIVERING BETTER SOLUTIONS

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EXECUTIVE SUMMARY

Advanced Explorations Inc. (AEI) is considering the development of the Roche Bay magnetite project, believed to be one of the world's largest undeveloped magnetite deposits. The Roche Bay project is located at Latitude 68˚26' North; Longitude 82˚46' West, approximately 65 km southwest of Hall Beach on the Melville Peninsula. The project site is situated adjacent to naturally deep tidewater with 20+ metre water depths. In February 2007, AEI signed a joint venture agreement with Roche Bay plc to undertake the required work to complete feasibility studies to develop Roche Bay's extensive magnetite iron deposits in this area.

In 2006, EBA Engineering Consultants Ltd. (EBA) was retained by Roche Bay plc (now Advanced Explorations Inc.) to complete a baseline study of the marine and aquatic resources at the Roche Bay Magnetite Project. The baseline Marine and Aquatic Resources field studies took place during the period August 18-24, 2006.

The baseline studies included an assessment of four lakes and five streams within the Roche Bay project area. The lakes and streams were surveyed for fisheries resources, field physical water quality parameters and habitat characteristics. Inter-tidal and sub-tidal marine habitats were assessed in the vicinity of the proposed deep sea dock. Water samples were also collected for chemical and physical properties and are reported in a separate EBA baseline study report (EBA report in prep. 2007).

The most significant waterbodies in the project area connect the lake and stream system to the sea on the north side of the proposed project site at the base of the escarpment. Lake 1 (Irqalugarjuit Lake) is the largest and only named lake in the Roche Bay project area. Lake trout (*Salvelinus namaycush*), and a population of overwintering Arctic char (*S. alpinus*) inhabit the lake. Lake 1 is characterized by numerous shallow rocky shoals, and includes two islands. With a maximum recorded water depth of 7.5 m and good water quality, Lake 1 provides suitable fish habitat.

Lake 2 is located upstream of Lake 1 and is within the Roche Bay project proposed tailings area. Although Lake 2 is considerably smaller than Lake 1, it also provides fish habitat for lake trout and Arctic char. With a maximum recorded water depth of 5.5 m and good water quality, Lake 2 provides suitable fish habitat. Lake 3 is one of many small shallow lakes located on the peninsula within the Roche Bay project area. The shallow water depth of 1.0 m suggests this lake freezes to the bottom and does not support fish. No fish were captured here.

Lake 4 is one of the larger lakes located in the northwest area in the vicinity of the A and B ore bodies. This lake connects a series of small lakes that drain the escarpment and eventually flow into Lake 2. Lake 4 was the only lake on the escarpment that was surveyed. Lake 4 water quality was good and the maximum recorded water depth was 7.5 m. Rocky substrates and shoals in this lake appeared to provide good fish habitat. One Arctic char was captured in Lake 4. This fish is presumed to be part of a small land-locked population of char found in some of the waterways on the escarpment.

Stream sites 1, 2 and 3 connect the surface water drainage system that flows down from the escarpment through Lakes 1 and 2 toward the sea. While these three sites all varied in width, depth, they all provided ample water flow and rocky substrates to support fish. All three sites were being

used as rearing areas for juvenile lake trout. From stream site S1 upstream to Lake 1, deep water areas exist which permit the passage of mature char that were observed in this area. At the time of the survey, water flow through stream site S2, which connects Lake 1 and Lake 2, was insufficient to permit the passage of mature fish. No char were observed in stream S2. However the char found in Lake 2 indicate that these fish can move through stream S2 during higher flow periods.

Stream sites 5 and 6 were surveyed along the coast line below the peninsula. Both streams exhibited steep gradients as they descend down from the escarpment above. Stream S5 was considered to be ephemeral, while stream S6 had considerable flow with various pools and falls. Fish presence was not observed at either of the stream sites sampled.

An inter-tidal and sub-tidal marine survey was conducted in the area of the proposed dock. Three transects were conducted and all were similar in nature. The ice scour zone included the entire inter-tidal area and approximately the first 10 m of distance below the high tide mark. This area was characterized by bare angular cobbles and gravels with no observable surface marine life growth. The inter-tidal area was characterized by bivalve (clam) shells scattered on the shoreline and macro algae (seaweeds) washed up from other areas. Sub-tidally, below the ice scour zone, epi-benthic marine life was sparse. Small clouds of mysid shrimp (krill) were observed swimming in the water column. On the seafloor, several green macro algae species were common, as were sea stars, snails and nudibranchs (sea slugs), isopods, and various bottom-feeding sculpin species. Below the ice scour zone, the steep bank dropped down to a gently-sloped sandy seafloor.

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1.0 INTRODUCTION

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The Roche Bay project baseline marine and freshwater aquatic studies were conducted by EBA Project Biologist, Tim Abercrombie, M.Sc., R.P.Bio. and EBA Environmental Scientist, Jamie Slogan, M.Sc., R.P.Bio., Mr. Rick Hoos, M.Sc., R.P.Bio., a Principal Consultant and senior marine biologist with EBA, managed the overall baseline studies program.

1.1 SCOPE OF WORK

The objectives of the 2006 Marine and Aquatic Resources environmental baseline studies was to evaluate existing fish and fish habitat conditions within the Roche Bay study area. The Marine and Aquatic Resources program was comprised of the following components:

Lakes

- Fish Sampling to determine Presence, Relative Abundance, Distribution and Species Composition;
- Fish Meristics (Biological Characteristics);
- Fish Tissue Metals;
- Fish Aging;
- Fish Habitat Characteristics; and
- Physical Water Quality properties – (temperature, dissolved oxygen, specific conductance, pH).

Streams

- Fish Sampling to determine Presence, Relative Abundance, Distribution and Species Composition;
- Fish Habitat Characteristics; and
- Physical Water Quality properties – (temperature, dissolved oxygen, specific conductance, pH).

Marine

- Inter-tidal Survey; and
- Sub-tidal Dive Survey.

2.0 ENVIRONMENTAL SETTING

2.1 PHYSICAL DESCRIPTION

The Roche Bay project area is located approximately 65 km southwest of Hall Beach on the Melville Peninsula in Foxe Basin, Nunavut (Figure 1). The project area occurs within a region of polar semi desert. The terrain of the project area is generally barren and has more exposed rock than the surrounding area further inland. The specific Roche Bay project area consists of a plateau, peninsula and escarpment.

The Precambrian plateau terrain where the mineral resource exists consists mainly of Precambrian rock, with some areas of dwarf shrub and dwarf shrub-lichen association, as well as some dwarf shrub-heath moss and sedge meadow associations. The Roche Bay peninsula is an area of raised limestone beaches alternating with ponds and areas of cushion plant lichen, cushion plant-sedge-moss, and sedge meadow associations. The escarpment is the area where the peninsula rises up to the plateau. This area also includes the terrain around Irqalugarjuit Lake (Lake 1), and an adjacent area of wet sedge-meadow association.

2.2 WILDLIFE

Rough-legged hawks and snowy owls occur seasonally within the Roche Bay project area. Peregrine falcons have been documented but are rare. Black guillemots, glaucous gulls, herring/Thayer's gulls, Sabine's gulls, and Arctic terns all occur within the project area. Waterfowl in the Roche Bay area include snow geese, Canada geese, brant geese, common eider, king eider, and oldsquaw.

Due to the scarcity of preferred vegetation types, caribou are relatively rare in the project area. Arctic fox and arctic ground squirrel are common on the peninsula, polar bear are rare and no bear dens exist. Ringed seals are the only common marine mammals in Roche Bay. Outside Roche Bay in Foxe Basin, bearded seals, walrus, beluga whales, narwhals and bowhead whales are more common.

3.0 METHODOLOGY

3.1 STUDY AREA

The study area is represented by an area of approximately 15 km^2, the extent of the acquired Quickbird Imagery. All marine and aquatic resources field studies were conducted within this area.

3.2 SAMPLING LOCATIONS

Aquatic sampling occurred in 4 lakes and 5 streams within the study area. Figure 2 presents an overview of all of the sampling locations. The few larger water bodies in the study area connect the lake and stream system to the sea on the north side of the site at the base of the escarpment. Lake 1 (Irqalugarjuit Lake) sampling locations are shown in Figure 3. Lake 2 sampling locations are shown in Figure 4. Lake 3 sampling locations are presented in Figure 5. Lake 4 sampling locations are presented in Figure 6.

3.3 LAKE SURVEYS

3.3.1 Fish Sampling

Fisheries resource sampling took place in four lakes that were previously identified by Borealis Exploration (1982) as being lakes understood to be used by Arctic char (*Salvalinus alpinus*) and lake trout (*Salvalinus namaycush*). The lakes sampled were those that had the greatest potential to be affected by the proposed development of the Roche Bay project.

The larger size-classes of fish were collected from each lake sampled using two experimental monofilament gillnet gangs. In each lake a floating gillnet was positioned near shore at the surface (floating) and a sinking gillnet was positioned offshore on the bottom. Gillnet deployment locations within each lake are shown in Figures 3-6. Each net was comprised of six gillnet panels with mesh sizes of 25 mm, 76 mm, 51 mm, 89 mm, 38 mm and 64 mm stretched. Gillnets were deployed using a 4.2 m (14') aluminum boat with a small outboard engine. Boats were transported to sample lakes by ATV and kamotiq. Nets were strategically placed on each lake by considering the lakes morphology and shoreline habitat characteristics. Once deployed, gillnets were left to fish overnight. Fish captured alive from the gilllnets were released after taking length and weight measurements. Dead fish were sampled for liver and tissue analysis, and fish aging structures, up to a maximum of ten fish per species per lake in accordance with DFO permit requirements. All fish collected were enumerated and identified to species. Scott and Crossman (1973) was used as the primary reference. Relative abundance, distribution and species composition of fish populations were analyzed for each lake. Appendix A includes meristics for fish collected by gill net. Appendix B included fish aging data.

Catch rates were calculated using a fishing effort of 12 hrs/net/unit catch area of 100 m^2 (i.e. 12 x 100 m^2 = Catch per Unit Effort or CPUE) (Appendix C). Additional data collected included the set and pull date and time, orientation, water depth, weather and GPS location using a Garmin 76 hand-held.

3.3.1.1 Biological Characteristics

Fish data collection included fork length (measured between the tip of the head to the fork of the tail fin) (mm), weight (g), sex, maturity, visible parasites and lesions (Appendix A). A sub-sample representing existing fish population age classes from lakes within the study area was determined by submitting pectoral fin clips which were preserved by drying. Aging structures were removed from a sub sample of approximately ten individual specimens per species. A total of 30 fin age structures samples were submitted to North South Consultants Inc. (Winnipeg, Manitoba) for age analysis. Fish aging results are presented in Appendix C. A summary of fish species composition and biological data are presented in Table 1.

3.3.1.2 Tissue Metals

Selected fish specimens from sample sites were retained for the determination of dorsal muscle and liver tissue metals content. Dorsal muscle tissue and liver tissue were removed from the fish and put into labelled whirl-pak sample bags. Tissue samples were kept frozen onsite from the time of collection, until the time of submission for analysis. ALS Laboratory Group (ALS) of Edmonton, Alberta analyzed the tissue samples using procedures consistent with the requirements of the appropriate government agencies (i.e. CAEAL certified). Table 2 (and Appendix D) presents the fish tissue metals lab analysis results. A brief outline of the method follows:

> Prior to analysis, fish tissues were prepared in a clean environment dedicated to the project. Analysis was carried out as soon as possible after sample submission. For tissue metals analysis, samples were homogenized either mechanically or manually prior to digestion. The hotplate digestion involves the use of nitric acid followed by repeated additions of hydrogen peroxide. Analytical analysis was by atomic absorption spectrophotometry (EPA Method 7000 series), inductively coupled plasma – mass spectrometry (EPA Method 6020), and /or inductively coupled plasma – optical emission spectrophotometry (EPA Method 6010B). The digested portion was analyzed by atomic emission mass spectrophotometry (ICPMS), to obtain the required detection limit for each element (arsenic, cadmium, copper, lead, zinc, silver, tellurium and mercury).

3.3.2 Habitat Characterization

Lake shoreline habitat conditions (vegetation and substrates) were documented around the lake perimeters surveyed.

3.3.3 Field Physical Water Quality Sampling

The physical water quality of the lakes was assessed in the field by recording water temperature, dissolved oxygen (mg/L and %), specific conductivity (µS/cm), pH and turbidity. Water parameters were taken at two points within each lake sampled. The locations of in situ water quality sampling locations within each lake are indicated in Figures 3-6. Water temperature, dissolved oxygen and specific conductance were measured using a YSI Multi-Function Meter (+/-1.0% saturation). The pH was measured using a Hanna HI 991300 portable pH meter. Values were measured at (0-1990 (µS/cm) and (+/- 0.1 pH units). Water temperature, dissolved oxygen, and specific conductance, were taken at a deep point in each lake and recorded at the surface and at 1.0 m depth intervals to the bottom. Water column pH was recorded at one depth approximately 10 cm below the water surface. The physical water quality data are presented in Table 3.

Water transparency in lakes was measured to the nearest 0.1 m using a 20 cm diameter Secchi disk. Depth was also measured (as best possible) at two locations in lakes with attempt to survey the deepest points and marked with GPS.

3.4 STREAM SURVEYS

EBA undertook freshwater fish community and fish habitat characterization of selected streams that could potentially be impacted by the proposed Roche Bay project. Five stream sites were sampled. Stream sampling sites sampled are presented in Figure 7.

3.4.1 Fish Sampling

For the purposes of fish presence sampling, a battery powered backpack electrofisher (Smith-Root LR-24) was employed at each of the five streams in the Roche Bay project area. The number of seconds fished (effort), voltage, frequency and pulse width were recorded. The distance fished at each sampling site was recorded with a hip-chain and the area sampled was estimated. A summary of the electrofishing results is presented in Appendix E.

For consistency and safety, electrofishing was performed using consistent levels of effort proceeding upstream. Collected fish were placed in a half-filled bucket of water. After electrofishing, the unit was turned off, electrofisher settings and effort (in seconds) was recorded, and the captured fish were processed and released. All fish captured through electroshocking, were released alive after identification. Due to the abundance of fish captured and time constraints, accurate lengths and weights of fish captured through electrofishing were not obtained.

Fish collection focused on the presence or absence of fish species and numbers and incorporated the use of British Columbia Resource Inventory Committee (RIC) Standards for stream surveys as defined in the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures (RIC, 1998).

3.4.2 Habitat Characterization

Fish habitat characterization for streams was carried out as per the Reconnaissance (1:20,000) Fish and Fish Habitat Inventory Standards and Procedures (Stream Survey's) (RIC, 1998). Basic habitat unit types such as pool, riffle, run, cascade, etc., were identified and noted within each stream surveyed. Stream channel morphology was defined using percent habitat within each sampling site; measurements or estimates of wetted width, depth, slope and substrate composition were assessed. In addition, the composition of cover provided by overstream vegetation (OSV), undercut banks (UCB), instream large woody debris (LWD), pools and boulders were visually estimated. Data were recorded on stream cards and photo-documented. Streams habitat assessment data are presented in Appendix F.

3.4.3 In Situ Water Quality Sampling

As in the lakes, the physical water quality in streams was assessed in the field by recording water temperature, dissolved oxygen (mg/L and %), specific conductivity (µS/cm), pH. In situ water quality was undertaken at each stream site indicated in Figure 2. Water temperature, dissolved oxygen and specific conductance were measured using a YSI Multi-Function Meter (+/-1.0% saturation). Water pH was measured in the field using a Hanna HI 991300 Portable pH meter. Values were measured at (0-1990 (µS/cm) and (+/- 0.1 pH units). Water quality sampling was conducted where water depth and flow was sufficient to permit submersion of the instruments. Streams water quality data are presented in Appendix F.

3.5 MARINE SURVEY

A key component of the proposed Roche Bay development project is a floating dock potentially anchored with piles. The current proposed location of marine development is off the most southerly point of the peninsula where there is sufficient water depth for moorage of large vessels. Baseline marine habitat conditions within the marine footprint and zone of influence of the project were assessed during the 2006 field program. The marine survey location is presented in Figure 8. Table 4 presents the Roche Bay marine inter-tidal and sub-tidal survey data.

3.5.1 Inter-tidal Survey

A ground-based survey was conducted in the inter-tidal area around the proposed marine facility. Three transects were completed running perpendicular to the shoreline. One transect was located on a centre point in the middle of the proposed dock area and the other two transects were positioned 100 m on either side of the centreline. All transects were located with GPS and the coordinates recorded. Transects extended from the water's edge to approximately 30 m onshore or the high-high tide mark where upland vegetation began to develop. The same transects were continued as the sub-tidal survey. Rocks in the inter-tidal area were over-turned, marine species recorded and substrates photo documented.

3.5.2 Sub-tidal Survey

An underwater survey of the sub-tidal zone of the area around the proposed marine facility was completed from the shoreline to approximately 17 m (55 ft) depth below sea level. The survey was undertaken by EBA's Work Safe BC commercial certified dive team comprising two marine biologists/ecologist and a suitably qualified assistant. The survey was supported by boat.

Three transects were completed extending perpendicular to the shoreline to a distance of 100 m out from the shoreline. One transect was located on a centre point in the middle of the proposed dock area and two transects were positioned 100 m on either side. Transects were located with GPS and the coordinates recorded. The same transects used for the inter-tidal survey were continued as the sub-tidal survey.

Marine life observed along each transect was recorded with an underwater video camera and the position, identification and abundance of all life observed along each transect was recorded on waterproof paper.

3.6 QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Strict quality assurance/quality control procedures were adhered to during the Roche Bay environmental baseline sampling program. Sampling methodology followed accepted professional/ scientific practices.

QA/QC procedures for the field components of the aquatic biota baseline study are necessary to maintain a high degree of data quality. The following is a list of the main procedures adapted from Environment Canada (1993).

- all personnel involved in field procedures are qualified for the tasks undertaken and all work will be supervised by a qualified Professional Biologist (R.P. Bio.);
- all sampling is consistent throughout the baseline study;
- all samples are collected following the most appropriate method and sample quality will be maintained to the highest standard;
- sampling equipment is the most appropriate for the particular habitat, and should be in good work order;
- all samples are labelled appropriately with the site reference, date collected, and sample type;
- all samples are preserved with the appropriate preservative/fixative;
- field personnel maintain detailed field notes for project reference;
- field personnel follow appropriate safety guidelines for conducting fieldwork; and
- all samples will be shipped in the appropriate containers following the appropriate shipping guideline.

Quality Assurance measures for fish tissue analysis include analysis of digest blanks and certified reference tissues.

3.7 EMERGENCY RESPONSE CAPABILITIES

All personnel operating equipment such as boats, electrofishers, deploying nets, dissecting fish, etc., have a considerable amount of academic and professional experience, with the use of such equipment in the practice of their discipline of fisheries science. All crew working in the field program have a minimum of a valid Level 1 Emergency First Aid ticket. During field studies, the fisheries team was equipped with a radio for contact with other survey teams and the Roche Bay exploration camp. Crew members kept bear repellent in their possessions at all times and were familiar with other local natural hazards in the project area.

4.0 RESULTS

The following section presents the results of the 2006 Roche Bay Marine and Aquatic Resources studies.

4.1 LAKE SURVEYS

Four lakes were surveyed within the Roche Bay Project Area. Lakes were sampled for fisheries resources, habitat characteristics and field physical water quality properties. Figures 3-6 illustrate the sampling locations within the lakes sampled.

4.1.1 Fish Sampling

This section discusses the biological characteristics of fish collected in surveyed lakes during the summer of 2006.

4.1.1.1 Fish Habitat Requirements

The following section summarizes the habitat requirements for the two most important fish species present in the Roche Bay study area. The information presented here is primarily derived from Scott and Crossman (1973) and the review of habitat stability reports produced by the U.S. Department of the Interior, Fish and Wildlife Service for Lake Trout (1984).

Lake Trout (*Salvelinus namaycush*)

Lake trout are widely distributed in northern North America. Lake trout are also common in many other parts of the world where they have been introduced. Lake trout are fresh water fishes.

The spawning period for lake trout typically occurs between the months of October and November in northern Canadian lakes. Spawning normally occurs at water depths between 2 m and 10.0 m in shoal substrates consisting of boulders and large cobbles (6 to 30 cm), with large interstitial spaces mixed with small cobbles and gravels. The size and depth of spaces (5 to 10 cm) must be large enough to allow for optimal water circulation and oxygen supply for fish embryos, as well as sufficient protection from predation. Lake trout prefer clean substrate and shoal areas exposed to direct current and wave action and at depths

where eggs are not susceptible to freezing. Spawning is triggered by both water temperature and light. Spawning generally occurs when lake temperatures fall below 7.8°C and during periods just after dark, with spawning activity increasing during moonless nights. Egg deposition ranges from 400 to 1200 eggs per pound of female (Scott and Crossman 1973).

The diet of lake trout consists of a broad range of prey including freshwater sponges, large invertebrates (chironomids, small clams and crayfish), small fish (sculpins, chub, whitefish and burbot) and small mammals including mice and goslings. Foraging activity occurs primarily in open water along rocky shorelines near drop-offs.

Arctic Char (*Salvelinus alpinus*)

Arctic char have a wide spread distribution in inshore marine waters, lakes and streams in the northern hemisphere. Arctic char can be anadromous, or confined to freshwater (land locked) but do not usually range too far inland except in larger rivers.

Char may be exceedingly colorful when spawning, as was the case during late summer sampling at the Roche Bay project site. In arctic waters, char spawn in autumn, usually in September or October, over gravel or rocky shoals in lakes or in quiet pools in rivers at depths of 3-15 feet (1.0-4.5m). Although the males establish and guard territories, the nest or redd is prepared by the female who uses her caudal fin, paddle-like to clear debris from the site. Actual spawning takes place during the day at temperatures around 4°C (Scott and Crossman 1973).

A spawning female is usually attended by one male during deposition and fertilization of the eggs. Males usually mate with more than one female. Anadromous females usually carry 3000-5000 eggs. Females spawn every second of third year. The eggs develop buried in the gravel, over the winter, exposed to temperatures of 0°C to 2.2°C. The eggs are killed at temperatures above 7.8°C. Hatching is thought to occur around April 1, but emergence from the gravel probably does not take place until breakup of the ice about mid-July. At this time fry are about 25 mm in length. Young anadromous char move out of the rivers and downstream to the sea when 150-200 mm long.

Arctic char may be either anadromous moving downstream to the sea in spring, returning in the autumn, or they may remain permanently in freshwater. Anadromous Arctic char that overwinter in lakes begin to run to the sea before of during breakup, usually completing the run by the end of July and returning in the autumn of the same year. The young fish in the run are the last to move downstream or upstream. Char cannot leap like salmon and rely on rising water and/or tides and to surmount obstacles. Arctic char are able to utilize any food items that appear in their habitat.

4.1.1.2 Biological Characteristics

Lake 1

Lake 1 (Irqalugarjuit Lake) exhibited the greatest abundance of fish of the four lakes surveyed. However species diversity was limited to two species; only lake trout and Arctic

char were captured. Arctic char accounted for 58.3% of the total catch, while lake trout accounted for 41.7%. In total, the floating gill-net captured two lake trout, and thirteen Arctic char. The sinking gill-net captured thirteen lake trout, and eight Arctic char, resulting in a total catch of 36 fish.

Mean length measurements for Arctic char collected from Lake 1 was 64.7 cm and ranged from 51.0 cm to 85.0 cm. Mean weight was 3078.6 g and ranged from 1400 g to 6400 g. Mean age was 11 years and ranged from 8 to 14 years. The majority of Arctic char captured in the gill nets were in spawning condition. All fish captured alive were released. The stomach contents of Arctic char that had died in the nets were all empty.

Mean length measurements for lake trout collected from Lake 1 was 53.0 cm and ranged from 42.0 cm to 60.5 cm. Mean weight was 1439.3 g and ranged from 700 g to 2050 g. Mean age was 11 years ranging from 7 years to 14 years. Lake trout captured were a mix of mature and immature fish. Stomach contents of lake trout that had died during in the nets were exclusively krill. Fish species composition and biological data are presented in Table 1. Meristics for fish collected by gillnet are included in Appendix A.

Lake 2

Lake 2 also exhibited an abundance of fish and the same two species: lake trout and Arctic char. Arctic char accounted for 68.8% of the total catch, while lake trout accounted for 31.2%. In total, the floating gill-net captured only two lake trout, and one Arctic char. The sinking gill-net captured five lake trout, and ten Arctic char, resulting in a total catch of 16 fish.

Mean length measurements for Arctic char collected from Lake 2 was 70.1 cm and ranged from 52.0 cm to 84.0 cm. Mean weight was 3718 g and ranged from 700 g to 6000 g and mean age was 10 years ranging from 7 -15 years. All of the Arctic char captured in the gill nets were in spawning condition. All fish captured alive were released. Stomach contents of Arctic char that died in the nets were all empty.

Mean length measurements for lake trout collected from Lake 2 was 53.7 cm, ranging from 48.0 cm to 62.0 cm. Mean weight was 1370 g ranging from 950 g to 2100 g and mean age was 10 years ranging from 7 to 15 years. Lake trout captured were primarily mature and fish. The stomach contents of lake trout that had died in the nets were empty except for the single immature fish that had been captured. This fish that was observed to have insects and larvae in its stomach. Fish species composition and biological data are presented in Table 1. Meristics for all fish collected by gillnet are included in Appendix A

Lake 3

No fish were captured in Lake 3.

Lake 4

Only a single Arctic char was captured in the gill-nets set in Lake 4, which was located on the plateau of the escarpment. This fish measured 53.5 cm in length, weighed 1700 g and was aged at 16 years. This was the oldest fish aged from the three lakes which were fish-bearing. The Arctic char was mature and its stomach was empty. Fish species composition and biological data for this fish are presented in Table 1. Meristics for all fish collected by gillnet are included in Appendix A

4.1.1.3 Tissue Metals

Lake 1

From Lake 1, seven lake trout, and ten Arctic char, were analyzed for concentrations of arsenic, cadmium, copper, lead, mercury and zinc in muscle and liver tissue.

The highest observed levels of arsenic were observed in the muscle tissues of several Arctic char (2.23, 1.54, 1.19 mg/kg). Cadmium levels were generally low and many cases below detection limits. In all cases the cadmium levels were higher in liver tissue than in muscle tissue. The highest value of 0.71 mg/kg was recorded in the liver tissue of AC19. Copper levels were highest in liver tissues of Lake trout. Values of 34.9 mg/kg, 33.5 mg/kg, 28.1 mg/kg were recorded in LT7, LT3 and LT6 respectively. Lead levels were low in all tissues and all fishes with most being below detection limits. Mercury concentrations were also low in Lake 1 fish. The highest concentrations were recorded in the liver tissue of AC10 (0.36 mg/kg) and LT1 (0.35 mg/kg). No concentration was above the restrictive consumption level of 0.5 ppm (wet weight) (Health and Welfare Canada, 2002). Zinc levels were slightly elevated, with the highest values of 38.2 mg/kg, 36.1 mg/kg, 35.9 mg/kg recorded in liver tissues of LT1, AC14, and LT3. Fish tissue metals lab analysis data are presented in Table 2 and Appendix D.

Lake 2

From Lake 2, five lake trout, and seven Arctic char, were analyzed for concentrations of arsenic, cadmium, copper, lead, mercury and zinc in muscle and liver tissue.

The highest observed levels of arsenic were observed in the muscle (1.88 mg/kg) and liver (1.25 mg/kg) tissue of one Arctic char (AC5). Most other values were low. Cadmium levels were generally low and in many cases below detection limits. In all cases the cadmium levels were higher in liver tissue than in muscle tissue. The highest value of 0.68 mg/kg was recorded in the liver tissue of AC8. Copper levels were higher in Lake 2 than in Lake 1 and were highest in liver tissues of Arctic char. Values of 70.4 mg/kg, 57.6 mg/kg, 43.6 mg/kg were recorded in AC8, AC5 and AC8 respectively.

As in Lake 1, lead levels were low in all tissues and all fishes. Mercury concentrations were considerably higher in Lake 2 fish than Lake 1 fish. The highest concentrations were recorded in the liver tissues of LT1, LT2, LT3 and LT4. LT1, LT3 and LT4 had mercury levels in muscle tissue (0.58 mg/kg, 0.59 mg/kg, and 0.69 mg/kg respectively) above

restrictive consumption levels of 0.5 ppm (wet weight) (Health and Welfare Canada, 2002). Zinc levels were slightly elevated, with the highest values of 41.2 mg/kg, 40.6 mg/kg, 39.4 mg/kg recorded in liver tissues of AC7, LT2, and AC8. Fish tissue metals lab analysis data are presented in Table 2 and Appendix D.

Lake 3

No fish were captured in Lake 3 thus no tissue metals levels could be reported.

Lake 4

For the single Arctic char captured in Lake 4 the only notable metal concentrations were mercury levels of 0.67 mg/kg in muscle and 1.35 mg/kg liver. These elevated mercury concentrations are above restrictive consumption levels of 0.5 ppm (wet weight) (Health and Welfare Canada, 2002) and are likely due to the relatively old age of this particular fish. The tissue metals lab analysis data for this fish are presented in Table 2 and Appendix D.

4.1.2 Habitat Characterization

The following section presents the results of fish habitat surveys conducted on lakes within the Roche Bay study area, during the field studies undertaken in the summer of 2006.

4.1.2.1 Lake 1

An assessment of shoreline habitat features for Lake 1 (Irqalugarjuit Lake) was completed on August 18, 2006. Lake 1 is illustrated in Photos 3-9; Appendix A.

The shoreline of Lake 1 in all areas examined consisted of fine sediment or gravels with boulders. Riparian vegetation found in the area included grasses, mosses, lichens and dwarf willow sedge meadow. The escarpment slopes down to the east side of the lake through which several defined channels flow down from the escarpment into the lake. Many low lying areas around the lake shoreline are saturated. Schools of juvenile trout (young-of-year and 15-25 cm size class) trout were observed along calm, covered areas along the shoreline, and between boulders. Many shallow shoal areas exist in Lake 1, particularly at the south end of the lake. Two small islands with extensive shoals occur at the south end of the lake. Birds observed on Lake 1 include, gulls, Arctic Tern, large flocks of Snow Geese at the north end, Common Loons, and Canada Geese.

The inlet to Lake 1 is from Lake 2, to which it is connected by a stream at the south end of the lake. Where the stream enters Lake 1 it is has two separate channels. The stream is fairly steep (3-4 m between lakes) but there are no significant falls or barriers. The inlet stream is approximately 7-12 m wetted width. The inlet stream is 100% boulders with 50% cover of green algae. Flow was considered average consisting of 90% riffle and 10% small pools. Riffle depth was 10-15 cm and pool depth was 15-20 cm. Numerous juvenile trout were observed in the inlet stream.

The outlet of Lake 1 drains into a small pond at the north end of the lake before flowing into the sea. The outlet stream has considerable gradient and is primarily riffle habitat through boulders and large cobbles. Filamentous green algae covers a considerable portion of the boulders. Where the stream enters the small pond the stream becomes deeper with pools, and small cobbles and gravel substrate. Downstream of the pond toward stream site 1 numerous adult Arctic char in spawning condition and juvenile trout were observed in pools and calm water area.

4.1.2.2 Lake 2

An assessment of shoreline habitat features for Lake 2 was completed on August 19, 2006. Lake 2 is illustrated in Photos 10-15; Appendix A.

Lake 2 is small and more-or-less round in shape. In most areas around the lake shoreline substrate is 60-80% gravel or soft sediment and fines with 20-40% boulders. A small sandy beach-like area exists on the east side of the lake. No obvious shoals exist and depth gradually increases toward the centre of the lake. Water depth in Lake 2 was deeper than anticipated at 5.5 m. This depth provides adequate oxygen for overwintering lake trout. Juvenile lake trout were observed in many areas along the shoreline of the lake. The escarpment borders the west side of the Lake and a small hill borders the east side.

The principle inlet to the lake is located at the south end of the lake near the Roche Bay project exploration camp. The inlet stream flows down from the escarpment towards Lake 2. The inlet is braided with two main channels at the inlet to the lake. Both channels had a wetted width of 2-3 m, 70% pools with depths of 40-50 cm and 30% riffles with 15-20 cm depth. Substrate is 80% small cobbles and gravel and 20% boulders. In slower moving water boulders have green algae growth. Large schools of juvenile trout were observed. An additional smaller inlet with a single defined channel flows down from the escarpment into the west side of the lake. Some juvenile trout (2-6 cm in length) were also observed in this inlet stream. Further upstream the stream is crossed by an ATV trail. A common loon was observed on the lake during the survey.

The outlet stream from Lake 2 is at the north end of lake. The outlet is also the inlet stream to Lake 1. At the outlet the stream is 15- 20 m of wetted width, pool-like with 80% small and large cobble and 20% boulders. Immediately downstream the gradient increases, depth decreases to 10-15 cm, with 100% riffles. Further downstream there are more boulders. Approximately 10% of boulders were covered with filamentous green algae. Juvenile trout were observed in the outlet stream during the survey period.

4.1.2.3 Lake 3

An assessment of shoreline habitat features for Lake 3 was completed on August 21, 2006. Lake 3 is illustrated in Photos 16-19; Appendix A.

Lake 3 is a small lake more-or-less circular in shape. There are no apparent inlet or outlet streams. Two wetland areas occur at the east end of the lake. Shoreline substrates are 70-90% gravel and cobbles with 10-30% boulders. Approximately 10-15 m offshore substrate is soft and silty with 0-10% boulders. Some areas of submerged sedge and moss occur along the shoreline. Naturally derived flotsam was observed collecting on the east end of the lake – the direction of the prevailing wind. Water depth increases consistently to the deepest portion of the lake, which was approximately 1 m. This shallow depth would not provide overwintering capacity for fish. No shoals occur in Lake 3. Upland areas around the lake are largely flat and riparian vegetation is sedge/moss tundra.

4.1.2.4 Lake 4

An assessment of shoreline habitat features for Lake 4 was completed on August 20, 2006. Lake 4 is illustrated in Photos 20-26; Appendix A.

Lake 4 is located on the escarpment toward the north end of the ore bodies. Lake 4 is more-or-less round with a finger-like bay at the south end. An escarpment borders the east side of the lake and all other shoreline is flat or gently sloped. The north and west side drops down to the peninsula below. Most shoreline substrate is 60% cobble and 40% boulders. There are some isolated areas of finer and soft sediments. The deepest part of the lake (7-8 m) is located on the west side of the lake below the steep escarpment. All other sides of the lake are fairly shallow and gradually increase in depth. No distinctive shoals exist in Lake 4. The many areas of cobble shoreline provide suitable rearing habitat for lake trout. Small areas of submerged sedge/moss occur along the shoreline. In the deepest part of the lake, sediments are soft and fine. No fish were observed along the shoreline.

The Lake 4 inlet and outlet stream are close in proximity at the south end of the lake. The outlet stream is 80% boulders and 20% cobbles. It is wide (30-40 m) and shallow (5-20 cm). Water is slow moving (still) with a few small riffles. One small patch of water sedge and small amounts of submerged moss and sedge were observed to be present in this area. Approximately 10% of boulders are covered in filamentous green algae. No fish were observed in the Lake 4 outlet stream. Approximately 200-300 m downstream from the outlet, two small lakes/ponds are separated by a wide slow flowing stream.

The inlet stream to Lake 4 lies immediately east of the outlet to the lake. Substrates in the outlet are 90% boulders and 10% cobbles. Immediately upstream of the inlet several deep pools (80 cm) were observed to be used by juvenile trout (4-8 cm). Approximately 10% of boulders were covered with green algae. Upstream a series of pools are separated by small falls which eventually meet the outlet of another small lake. An additional small inlet stream was observed draining down from the escarpment on the west side of the lake.

4.1.3 Field Physical Water Quality Sampling

Field physical water quality sampling data from two locations in each of the lakes are described below and presented in Table 3. Water quality sampling locations in the lakes sampled are shown in Figures 3-6. Due to their relatively shallow and exposed condition, the water column of all of the lakes sampled were well mixed and oxygenated with no discernable thermoclines.

4.1.3.1 Lake 1

Water column temperatures at location 1 in Lake 1 ranged from 11.7°C at the surface to 11.6°C at a depth of 5 m. Water column DO levels ranged from 9.90 mg/L at the surface to 9.87 mg/L at a depth of 5 m. Specific conductivity values ranged from 179.0 µS/cm at the surface to 179.6 µS/cm at a depth of 5 m. The pH at the surface was recorded at 7.65 and Secchi depth was recorded at 4.4 m. The maximum bottom depth was measured at 5.5 m.

Water column temperatures at location 2 in Lake 1 ranged from 11.6°C at the surface to 11.5°C at a depth of 7 m. DO levels ranged from 9.59 mg/L at the surface to 9.56 mg/L at a depth of 7 m. Specific conductivity values ranged from 179.0 µS/cm at the surface to 180.2 µS/cm at the depth of 7 m. The pH at the surface was recorded at 7.32 and Secchi depth was recorded at 4.5 m. The maximum water depth was measured at 7.5 m.

4.1.3.2 Lake 2

The water column temperature at location 1 in Lake 2 was 10.1°C at the surface through a depth of 5 m. DO levels ranged from 10.14 mg/L at the surface to 10.08 mg/L at a depth of 5 m. Specific conductivity values ranged from 132.7 µS/cm at the surface to 135.5 µS/cm at a depth of 5 m. The pH was not recorded and Secchi depth was recorded at the maximum depth of 5.5 m.

The water column temperature at location 2 in Lake 2 was 10.1°C at the surface through to a depth of 5 m. DO levels ranged from 10.22 mg/L at the surface to 10.06 mg/L at a depth of 5 m. Specific conductivity values ranged from 90.0 µS/cm at the surface to 133.2 µS/cm at a depth of 5 m. The pH at the surface was not recorded and Secchi depth was recorded to the maximum water depth of 5.5 m.

4.1.3.3 Lake 3

The water column temperature at location 1 in Lake 3 was 8.9°C at the surface and at a depth of 0.5 m. The DO level was 11.60 mg/L at the surface and 10.92 mg/L at 0.5 m. Specific conductivity ranged from 202.7 µS/cm at the surface and 203.2 µS/cm at 0.5 m. The pH was not recorded and Secchi depth was recorded at the maximum water depth of 1.0 m.

The water temperature at location 2 in Lake 3 was 8.9°C at the surface and 9.0°C a depth of 0.5 m. The DO level was 10.80 mg/L at the surface and 10.84 mg/L at a depth of 0.5 m.

Specific conductivity ranged from 201.5 µS/cm at the surface and 201.4 µS/cm at a depth of 0.5 m. The pH at the surface was not recorded and Secchi depth was recorded to the maximum water depth of 1.0 m.

4.1.3.4 Lake 4

The water column temperature at location 1 in Lake 4 was 9.9°C at the surface through to a depth of 5 m. DO levels ranged from 9.41 mg/L at the surface to 8.65 mg/L at a depth of 5 m. Specific conductivity was 115.7 µS/cm at the surface and at a depth of 5 m. The pH was not recorded and Secchi depth was recorded to the maximum depth of 5.3 m.

The water column temperature at location 2 in Lake 4 was 9.9°C at the surface through to a depth of 8 m. DO levels ranged from 9.52 mg/L at the surface to 8.24 mg/L at a depth of 8 m. Specific conductivity ranged from 9.52 µS/cm at the surface to 133.2 µS/cm at a depth of 8 m. The pH at the surface was not recorded and Secchi depth was recorded at 7.5 m. Maximum depth recorded was 8.3 m.

4.2 STREAM SURVEYS

4.2.1 Habitat Characterization

The habitat assessments of various streams within the Roche Bay study area were conducted between August 18 to 23, 2006. The assessment sites were designated as Stream Sites 1 through 5 as illustrated in Figure 7. Stream sites S1, S2 and S3 were located on either side of Lakes 1 and 2. Sites S4 and S5 were located near the shoreline toward the south of the site. Stream habitat assessment data are presented in Appendix F. Photos 27-38 illustrate the stream sampling sites.

4.2.1.1 Stream Site 1 (S1)

This north east flowing watercourse is located downstream of the confluence of the outlet of a small, un-named lake which drains Lake 1 and a high flow stream that flows down from the escarpment. The stream occurs within a well-defined channel consisting of 50% riffles and 50% small pools. Side channels represent 20% of the water flow. The substrate consisted of 10% fines, 20% small gravel, 30% large gravel, 20% small cobbles, 10% large cobbles and 10% boulders. The average wetted width of this reach was 19.3 m with an average riffle depth of 41 cm and an average pool depth of 101 cm. Cover amounted to approximately 60%, which consisted of 90% pools and 10% boulders. Riparian vegetation was tundra consisting predominantly of sedge (*Carex* sp.), mosses with willows (*Salix* sp.) in some areas and small cobbles in other areas. During the survey, several Arctic char were observed thrashing in shallow water and breaking the water surface in pools. Photos 27-29 show stream site S1.

4.2.1.2 Stream Site 2 (S2)

Site S2 is the connecting stream between the outlet of Lake 2 and the inlet to Lake 1. The stream occurs within a well-defined channel consisting of 70% riffles and 30% small pools. No side channels occur. The substrate consisted of 10% small gravel, 10% large gravel, 30% small cobbles, 30% large cobbles and 20% boulders. The average wetted width of this reach was 20.5 m with an average riffle depth of 10-25 cm and an average pool depth of 25-35 cm. Cover amounted to approximately 60%, which consisted of 45% pools and 45% boulders and 10% instream vegetation (submerged sedge, moss and willow). Riparian vegetation was tundra consisting predominantly of sedge (*Carex* sp.), moss with willows (*Salix* sp.) Stream site S2 provides good quality lake trout rearing habitat. Photos 30-32 show stream site S2.

4.2.1.3 Stream Site 3 (S3)

Site S3 is located at the base of the escarpment and flows into Lake 2. There are several channels and a wide rocky channel with cutbanks which indicate that site S3 experiences high water flows during freshet and storm conditions. Water flow consisted of 70% riffles and 30% small pools. The substrate consisted of 15% small gravel, 20% large gravel, 30% small cobbles, 20% large cobbles and 15% boulders. The average wetted width of this reach was 9.1 m with an average riffle depth of 10-20 cm and an average pool depth of 30-40 cm. Cover amounted to approximately 30%, which consisted of 50% pools and 40% boulders and 10% instream vegetation (green algae). Riparian vegetation was tundra consisting predominantly of sedge (*Carex* sp.), moss with willows (*Salix* sp.) Upstream of site S3 a waterfall appears to present a barrier to upstream fish movement. However, during the survey juvenile lake trout were observed downstream from S3. Photos 33-34 show stream site S3.

4.2.1.4 Stream Site 4 (S4)

Site S4 is the furthest south of the stream sites surveyed. S4 lies on a steep gradient flowing down the escarpment into the sea. There are several channels and a wide rocky channel with cutbanks indicating that site S4 experiences high water flows during freshet and storm conditions. Water levels were low during the survey. Water flow consisted of 40% riffles and 60% small pools. The substrate consisted of 10% large gravel, 10% small cobbles, 20% large cobbles and 60% boulders. The average wetted width of this reach was 9.1 m with an average riffle depth of 4 cm and an average pool depth of 12 cm. No cover was provided. Riparian vegetation consisted predominantly of sedge (*Carex* sp.), mosses with willows (*Salix* sp.) The considerable gradient and low flow at the time of survey indicates that S3 is likely an ephemeral drainage stream and is not represent good fish habitat. Photos 35-36 show stream site S4.

4.2.1.5 Stream Site 5 (S5)

Site S5 is located north of the project area and is also on a steep gradient flowing down the escarpment into the sea. There were two principle channels. Water flow in both channels was strong during the survey. Water flow consisted of 70% riffles and 30% small pools. The substrate consisted of 20% large gravel, 20% small cobbles, 20% large cobbles and 40% boulders. The average wetted width of this reach was 7.1 m with an average riffle depth of 10-20 cm and an average pool depth of 40-50 cm. Cover was approximately 40% consisting of 70% deep pools and 30% boulders. Riparian vegetation consisted predominantly of mosses with willows (*Salix* sp.) The gradient up the escarpment at S5 is considerable however water flow was strong and adequate for fish movement. Pools provide good fish habitat but small falls between pools may present a barrier to fish. Photos 37-38 show stream site S5.

4.2.2 Fish Sampling

Fish sampling by electrofishing was conducted at stream sites S1-S5 from August 18-22, 2006. A summary of electrofishing efforts is provided in Appendix E. Figure 7 shows the stream sites within the Roche Bay study area. Site S3 was an additional site not originally included in the work plan and time constraints prevented electrofishing. At site S4, there was not sufficient water depth to conduct electrofishing.

4.2.2.1 Stream Site 1 (S1)

At Site S1, 86 fish were captured during an electrofishing effort of 697 seconds over approximately 100 m of stream. Approximately 10% of fish captured were removed from the stream and were identified as juvenile lake trout. The remaining 90% were observed to react to the electrofishing but were not removed from the stream. All fish were captured in deeper pools and slower flowing side channels. The lake trout measured ranged from 2-20 cm in length.

4.2.2.2 Stream Site 2 (S2)

At Site S2, 124 fish were captured during an electrofishing effort of 454 seconds over approximately 100 m of stream. Approximately 10% of fish captured were removed from the stream and were identified as juvenile lake trout. The remaining 90% were observed to react to the electrofishing but were not removed from the stream. Most fish were captured in deeper pools and slower flowing side channels. Approximately 90% of the lake trout measured ranged from 10-20 cm in length and 10% ranged from 4-6 cm in length.

4.2.2.3 Stream Site 3 (S3)

Site S3 was an additional site not originally included in the work plan and time constraints prevented electrofishing. However, it was noted that schools of juvenile lake trout were observed downstream of site S3.

4.2.2.4 Stream Site 4 (S4)

At site S4, there was not sufficient water depth to conduct electrofishing. Small pools were closely examined for signs of fish presence and none were found.

4.2.2.5 Stream Site 5 (S5)

At Site S5, no fish were captured or observed during an electrofishing effort of 356 seconds over approximately 100 m of stream. Electrofishing was conducted wherever there was sufficient water depth and included deeper pools and slower flowing side channels.

4.2.3 Field Physical Water Quality Sampling

Physical water quality parameters measured during the field studies of streams in the Roche Bay area are summarized in this section. Water quality parameters recorded include water temperature, dissolved oxygen, specific conductivity, and pH. The sample locations are shown in Figures 7. The physical water quality data collected presented in Appendix F. All stream sites sampled were well oxygenated with water temperatures typical of this time of the year, with near neutral pH and relatively low specific conductivity values.

4.2.3.1 Stream Site 1 (S1)

Physical water quality parameters were recorded at site S1 during the stream survey. On August 18, 2006 the stream water temperature was 9.3 °C. Dissolved oxygen was 10.77 mg/L and 93.1% saturated. Specific conductivity was 171.5 µS/cm and pH was 7.39.

4.2.3.2 Stream Site 2 (S2)

Physical water quality parameters were recorded at site S2 during the stream survey. On August 19, 2006 the stream water temperature was 10.2 °C. Dissolved oxygen was 9.24 mg/L and 81.0% saturated. Specific conductivity was 138.7 µS/cm and pH was 7.67.

4.2.3.3 Stream Site 3 (S3)

Physical water quality parameters were recorded at site S3 during the stream survey. On August 19, 2006 the stream water temperature was 8.4 °C. Dissolved oxygen was 10.25 mg/L and 87.4% saturated. Specific conductivity was 147.4 µS/cm and pH was not measured.

4.2.3.4 Stream Site 4 (S4)

Physical water quality parameters were recorded at site S4 during the stream survey. On August 22, 2006 the stream water temperature was 5.5°C. Dissolved oxygen was 9.75 mg/L and 76.8% saturated. Specific conductivity was 113.7 µS/cm and pH was 7.42.

4.2.3.5 Stream Site 5 (S5)

Physical water quality parameters were recorded at site S5 during the stream survey. On August 22, 2006 the stream water temperature was 6.9°C. Dissolved oxygen was 11.15 mg/L and 91.5% saturated. Specific conductivity was 113.7 µS/cm and pH was 7.42.

4.3 MARINE SURVEY

A key component of the Roche Bay Marine and Aquatic Resources field studies program was to complete a marine survey in the area of the proposed dock facility. The marine survey consisted of three marine transects. Transects were established perpendicular to the shoreline and extended approximately 100 metres offshore and 30 m onshore. Figure 8 shows the location of the marine transects that were established and surveyed. The data collected are presented in Table 4. Photos 39-61 are representative of the main observations recorded during the marine survey. A video record of the dive survey was taken and is included as a DVD in Appendix G of this report.

4.3.1 Inter-tidal Survey

Transect 1 was surveyed on August 22, 2006. The inter-tidal and onshore components of the transect length extended 24 m shoreward from the low tide mark. The substrate in the inter-tidal area consisted primarily of flat angular cobbles. Below the cobbles were coarse gravels. Four metres from the high water mark a band of red macro algae had been washed up and lined the shoreline. Bivalve shells were also sparsely scattered on the shoreline. Eight metres above the high water line, patches of grasses began to appear among the cobbles. Goose droppings and feathers were observed towards the upper end of Transect 1.

Transect 2 was surveyed on August 22, 2006. The inter-tidal and onshore components of the transect length extended 24.5 m shoreward from the low tide mark. Similar to Transect 1, the substrate in the inter-tidal area of Transect 2 consisted primarily of flat angular cobbles. Below the cobbles were coarse gravels and sand. Two metres from the water mark a band of red macro algae had been washed up and lined the shoreline. From four metres to 20 metres along the transect, the shoreline sloped upward and the bank began at 24.5 metres. This area was sandy with 60% cover of flat angular cobbles on top. Bivalve shells were also sparsely scattered on the shoreline. Twenty metres from the water line, patches of grasses began to appear among the cobbles. Goose droppings and feathers were observed toward the upper end of Transect 2.

Transect 3 was surveyed on August 23, 2006. The inter-tidal and onshore components of the transect length extended 33 m shoreward from the low tide mark. The substrate in the inter-tidal area consisted of sandy patches with gravel and flat angular cobbles. Six metres from the water mark a band of red macro algae had been washed up and lined the shoreline. From four metres to 21 metres along the transect, the shoreline sloped upward. No distinct bank existed. This area was sandy with flat angular cobbles on top. Bivalve shells were also sparsely scattered on the shoreline. Thirty-three metres from the water line, patches of grasses began to appear among the cobbles. As with the other two transects, goose droppings and feathers were observed toward the upper end of Transect 3.

4.3.2 Sub-tidal Survey

The sub-tidal component of Transect 1 was surveyed on August 22, 2006. The transect length was 96 m offshore from the high tide mark to a depth of 44 ft (13.4 m). The largest portion of the transect (96 m to 35 m) occurred on a gently sloping sub-tidal sand flat. The seafloor sediment in this area of the transect consisted of soft silty sand, with a widespread mat of green algae. Marine life observed included various sea stars (*Solaster endeca; Crossaster papposus*) and brittle stars (*Ophiocten sericeum*), macro algae washed in from other areas, large isopods (*Munnopsurus giganteus*), and mysids (pelagic krill). Snails and nudibranchs (sea slugs) as well as jelly fish (*Phacellophora camschatica*) were also common. Various sculpin species (likely Great sculpin (*Myoxocephalus polyacanthocephalus*) or buffalo sculpin (*Enophrys bison*) as well as several smaller species including northern sculpin (*Icelinus borealis*) were observed. At 35 m along the transect, the seafloor sloped steeply upward to a depth of 10 ft (3 m). Marine life on this bank consisted of small benthic organisms and algae over a sandy, silty substrate. Above the top of the bank the substrate changed to flat angular cobbles on gravel with no visible epifauna (marine life living on the surface) being observed.

The sub-tidal component of Transect 2 was also surveyed on August 22, 2006. The transect length was 98 m offshore from the high tide mark at a depth of 50ft (15.2 m). Similar to that observed at Transect 1, the largest portion of Transect 2 (98 m to 32 m) was located on a gently sloping sub-tidal sand flat. The seafloor sediment in this area of the transect consisted of soft silty sand, with a widespread mat of green algae. Marine life observed included the same sea stars and brittle stars, macro algae washed in from other areas, the large isopods and mysids (large pelagic krill) found at Transect 1. Snails and nudibranchs (sea slugs) as well as jelly fish were also common. Various sculpin species (likely Great sculpin or buffalo sculpin (*Enophrys bison*) as well as several smaller species including northern sculpin were observed. At 35 m along the transect, the seafloor sloped steeply upward to a depth of 15ft (4.6 m). The bank at this depth harboured various small benthic organisms and algae over a sandy, silty substrate. Above the top of the bank, the substrate changed to flat angular cobbles on gravel with visible epifaunal marine life being observed.

The sub-tidal component of Transect 3 was surveyed on August 23, 2006. The transect length was 96 m offshore from the high tide mark at a depth of 55ft (16.8 m). As observed at Transects 1 and 2, the largest portion of Transect (98 m to 56 m) was located on a gently sloping sub-tidal sand flat. The seafloor sediment in this area of Transect 3 consisted of soft silty sand, with a widespread algal mat layer. Marine life included the same sea stars and brittle stars, macro algae washed in from other areas, large isopods and mysids (large pelagic krill) observed at Transect 1. Snails and nudibranchs (sea slugs) as well as jelly fish were also common. Various sculpin species (likely Great sculpin or buffalo sculpin as well as several smaller species including northern sculpin were observed. At 56 m along the transect, the seafloor sloped steeply upward to a depth of 25ft (7.6 m). The bank at this depth harboured various small benthic organisms and large macro algae over a sandy, silty substrate. Above the top of the bank the substrate changed to flat angular cobbles on gravel with no visible epifaunal marine life being observed.

5.0 DISCUSSION

In general the fresh water and marine fisheries resources of the Roche Bay project area were found to be typical of generally undisturbed (by human activity) areas of the eastern Arctic coastal zone.

5.1 LAKE SURVEYS

The most significant water bodies connect the lake and stream system to the sea on the north side of the site at the base of the escarpment.

Lake 1 (Irqalugarjuit Lake), is the largest and only named lake in the area. Lake trout and a population of over-wintering Arctic char inhabit and use this lake. The lake is characterized by numerous shallow rocky shoals, including two islands. With a maximum recorded water depth of 7.5 m and good water quality this lake provides suitable fish habitat. Another small lake is located downstream and to the north of Lake 1 connected by a stream. While this lake was not surveyed, it would accommodate char moving upstream to Lakes 1 and 2, and may provide over-wintering habitat if it has sufficient depth.

Lake 2 is located upstream of Lake 1 and is within the Roche Bay project proposed tailings area. Although Lake 2 is considerably smaller than Lake 1, it also provides fish habitat for lake trout and Arctic char. With a maximum recorded water depth of 5.5 m and good water quality this lake provides suitable fish habitat.

Lake 3 is one of many small shallow lakes on the peninsula of the project area. The shallow water depth of 1.0 m suggests that this lake freezes to the bottom and does not support fish. No fish were captured here.

Lake 4 is one of the larger lakes located in the northwest area in the vicinity of the A and B ore bodies. This lake connects a series of small lakes that drain the escarpment and eventually flow into Lake 2. Lake 4 was the only lake on the escarpment that was surveyed. Lake water quality was good and the maximum recorded water depth was 7.5 m. The rocky substrates and shoals in this lake appeared to provided good fish habitat. One Arctic char was captured in Lake 4. This fish is presumed to be part of a small land-locked population of char found in some of the waterways on the escarpment.

5.2 STREAM SURVEYS

Stream sites 1, 2 and 3 connect the surface water drainage system that flows down from the escarpment through Lakes 1 and 2 toward the sea. While these three sites all varied in width, depth, they all provided ample water flow and rocky substrates to support fish. All three sites were being used as rearing areas for juvenile lake trout. From stream site S1 upstream to Lake 1, deep water areas exist which permit the passage of mature char that were observed in this area. At the time of the survey, water flow through stream site S2, which connects Lake 1 and Lake 2, was insufficient to permit the passage of mature fish. No char were observed in stream S2. However the char found in Lake 2 indicate that these fish can move through stream S2 during higher flow periods.

Stream sites 5 and 6 were surveyed along the coast line below the peninsula. Both streams sites exhibited steep gradients as they descend down from the escarpment above. Stream S5 was considered to be ephemeral, while stream S6 had considerable flow with various pools and falls. Fish presence was not observed at either of the stream sites sampled.

5.3 MARINE SURVEY

An inter-tidal and sub-tidal marine survey was conducted in the area of the proposed dock. Three transects were conducted and all were similar in nature. The ice scour zone included the entire inter-tidal area and approximately the first 10 m of distance below the high tide mark. This area was characterized by bare angular cobbles and gravels with no observable surface marine life growth. The inter-tidal area was characterized by bivalve (clam) shells scattered on the shoreline and macro algae (seaweeds) washed up from other areas. Sub-tidally, below the ice scour zone, epi-benthic marine life was sparse. Small clouds of mysid shrimp (krill) were observed swimming in the water column. On the seafloor, several green macro algae species were common, as were sea stars, snails and nudibranchs (sea slugs), isopods, and various bottom-feeding sculpin species. Below the ice scour zone, the steep bank dropped down to a gently-sloped sandy seafloor.

6.0 CLOSURE

This report describes results of fieldwork completed in August 2006 for the Marine and Aquatic Resources for the Roche Bay Magnetite Project. The fieldwork and analyses were conducted according to generally accepted standards and scientific practices and EBA guidelines. No warranty is made, either expressed or implied.

EBA trusts this report provides Roche Bay with sufficient baseline information to proceed with the acquisition of preliminary approvals, licenses and/or permits, as required by federal and territorial regulatory agencies for mine developments. If you have any questions or comments, please contact EBA at (604) 685-0275.

Respectfully submitted,
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TABLES

Table 1. Fish Species Composition and Biological Data

September 2007

Species	Data		Lake			All Lakes
			Lake 1	Lake 2	Lake 4	
Arctic char	Length Data	Number of Fish Sampled	21	11	1	33
		Mean Length (cm)	64.7	70.1	53.5	62.8
		Maximum Length (cm)	85.0	84.0	53.5	85.0
		Minimum Length (cm)	51.0	52.0	53.5	51.0
		Standard Deviation	9.5	9.09		0.28
	Weight Data	Number of Fish Sampled	21	11	1	33
		Mean Weight (g)	3079	3718	1700	2832
		Maximum Weight (g)	6400	6000	1700	6400
		Minimum Weight (g)	1400	700	1700	700
		Standard Deviation	1279.6	1424.65		102.58
	Age Data	Number of Fish Sampled	10	7	1	18
		Mean Age	11	10	16	13
		Maximum Age	14	12	16	16
		Minimum Age	8	8	16	8
		Standard Deviation	7.46	1.72		4.06
Lake trout	Length Data	Number of Fish Sampled	14	5		19
		Mean Length (cm)	53.0	53.7		53.4
		Maximum Length (cm)	60.5	62.0		62.0
		Minimum Length (cm)	42.0	48.0		42.0
		Standard Deviation	6.02	5.22		0.57
	Weight Data	Number of Fish Sampled	14	5		19
		Mean Weight (g)	1439	1370		1405
		Maximum Weight (g)	2050	2100		2100
		Minimum Weight (g)	700	950		700
		Standard Deviation	449.01	454.97		4.22
	Age Data	Number of Fish Sampled	7	5		12
		Mean Age	11	10		10
		Maximum Age	14	15		15
		Minimum Age	7	7		7
		Standard Deviation	3.02	3.13		0.08
Total Number of Fish Sampled for Length (Per Site)			35	16	1	52
Total Number of Fish Sampled for Weight (Per Site)			35	16	1	52
Total Number of Fish Sampled for Age (Per Site)			17	12	1	30

Note:
No fish were captured at Lake 3

Table 2. Fish Tissue Metals

Lake	Fish Code		Arsenic (As)	Cadmium (Cd)	Copper (Cu)	Lead (Pb)	Mercury (Hg)	Zinc (Zn)
		Dection Limits	0.05	0.01	0.05	0.02	0.01	0.5
		Tissue Type						
Lake 1	LT1	Muscle	0.11	<0.01	0.39	<0.02	0.31	6.5
		Liver	0.07	0.43	25.1	<0.02	0.35	38.2
Lake 1	LT2	Muscle	0.06	<0.01	0.42	<0.02	0.24	5.7
		Liver	0.07	0.06	12.6	<0.02	0.19	29.7
Lake 1	LT3	Muscle	0.10	<0.01	0.37	<0.02	0.27	8.2
		Liver	0.11	0.08	33.5	<0.02	0.27	35.9
Lake 1	LT4	Muscle	0.19	0.09	0.36	<0.02	0.27	4.9
		Liver	0.27	0.17	15.5	<0.02	0.31	28.8
Lake 1	LT5	Muscle	0.14	<0.01	0.39	0.03	0.12	5.4
		Liver	0.25	0.04	8.91	<0.02	0.12	25.4
Lake 1	LT6	Muscle	0.30	<0.01	0.49	<0.02	0.25	7.0
		Liver	0.21	0.13	28.1	0.02	0.20	33.0
Lake 1	LT7	Muscle	0.12	<0.01	0.30	0.02	0.24	6.3
		Liver	0.33	0.12	34.9	0.02	0.19	32.1
Lake 1	AC7	Muscle	0.78	<0.01	0.71	<0.02	0.05	5.1
		Liver	0.38	0.18	1.05	<0.02	0.06	15.9
Lake 1	AC8	Muscle	1.19	<0.01	0.59	<0.02	0.04	5.6
		Liver	0.85	0.11	9.10	<0.02	0.05	19.0
Lake 1	AC10	Muscle	<0.05	<0.01	0.30	0.03	0.17	5.6
		Liver	<0.05	0.41	9.12	<0.02	0.36	28.5
Lake 1	AC11	Muscle	<0.05	<0.01	0.34	<0.02	0.16	6.9
		Liver	<0.05	0.23	16.3	0.04	0.31	25.6
Lake 1	AC12	Muscle	1.16	<0.01	1.21	<0.02	0.05	5.7
		Liver	0.50	0.32	10.6	<0.02	0.04	26.2
Lake 1	AC14	Muscle	0.70	<0.01	0.85	0.14	0.05	6.5
		Liver	0.69	0.39	20.0	<0.02	0.08	36.1
Lake 1	AC15	Muscle	2.23	0.02	1.01	<0.02	0.07	7.4
		Liver	0.60	0.49	1.28	<0.02	0.13	16.4
Lake 1	AC17	Muscle	1.54	<0.01	0.92	<0.02	0.04	6.4
		Liver	0.59	0.27	4.01	<0.02	0.04	21.0
Lake 1	AC18	Muscle	1.00	<0.01	0.59	<0.02	0.05	6.0
		Liver	0.35	0.15	4.81	<0.02	0.04	19.3
Lake 1	AC19	Muscle	0.93	<0.01	0.50	<0.02	0.10	4.9
		Liver	0.93	0.71	10.4	<0.02	0.13	22.1
Lake 2	LT1	Muscle	0.25	<0.01	0.44	0.03	0.58	8.7
		Liver	0.07	0.04	12.1	<0.02	0.21	32.5
Lake 2	LT2	Muscle	0.20	<0.01	0.56	<0.02	0.41	6.7
		Liver	0.07	0.13	26.2	<0.02	0.64	40.6
Lake 2	LT3	Muscle	0.59	<0.01	0.46	0.03	0.59	6.7
		Liver	0.17	0.17	27.4	0.03	1.05	32.0
Lake 2	LT4	Muscle	0.12	<0.01	0.48	0.05	0.69	6.3
		Liver	0.11	0.36	28.2	<0.02	1.06	25.8
Lake 2	LT5	Muscle	0.09	<0.01	0.41	<0.02	0.36	5.4
		Liver	0.08	0.07	13.1	<0.02	0.19	24.6
Lake 2	AC1	Muscle	1.20	<0.01	0.83	<0.02	0.11	5.7
		Liver	0.31	0.11	1.12	<0.02	0.06	16.2
Lake 2	AC4	Muscle	0.78	<0.01	0.67	<0.02	0.10	3.6
		Liver	0.69	0.32	22.3	0.08	0.10	27.1
Lake 2	AC5	Muscle	1.88	<0.01	0.71	<0.02	0.08	5.1
		Liver	1.25	0.43	57.6	<0.02	0.14	38.2
Lake 2	AC6	Muscle	1.04	<0.01	0.47	<0.02	0.04	4.6
		Liver	0.26	0.29	1.48	<0.02	0.05	18.5
Lake 2	AC7	Muscle	1.14	<0.01	0.89	<0.02	0.04	4.5
		Liver	0.55	0.33	70.4	<0.02	0.06	41.2
Lake 2	AC8	Muscle	0.98	<0.01	0.76	<0.02	0.03	4.0
		Liver	0.75	0.68	43.6	0.03	0.07	39.4
Lake 2	AC9	Muscle	<0.05	<0.01	0.55	<0.02	0.14	6.3
		Liver	<0.05	0.17	28.9	<0.02	0.22	23.1
Lake 4	AC1	Muscle	0.07	<0.01	0.50	<0.02	0.67	10.5
		Liver	0.07	0.11	9.57	<0.02	1.35	22.7

All unit expressed as mg/kg
AC= Arctic char
LT= Lakce trout

Table 3. Lake Water Quality Data

Lake 1	Sample Date: 18/08/2006					
Sample Depths (m)	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Salinity (ppt)	Specific Conductivity (µs/cm)	pH
Location 1 (L1WQ1)	Secchi Depth: 4.4 m	Max. Depth: 5.5 m				
surface	11.7	9.90	88.3	0.1	179.0	7.65
1	11.7	9.47	87.4	0.1	179.0	
2	11.6	9.68	90.4	0.1	179.1	
3	11.6	9.79	90.2	0.1	179.2	
4	11.6	9.54	88.6	0.1	179.4	
5	11.6	9.87	90.7	0.1	179.6	
Location 2 (L1WQ2)	Secchi Depth: 4.5 m	Max. Depth: 7.5 m				
surface	11.6	9.59	89.0	0.1	179.9	7.32
1	11.6	9.53	87.0	0.1	179.8	
2	11.6	9.46	89.5	0.1	179.9	
3	11.6	9.56	89.8	0.1	179.9	
4	11.5	9.57	88.5	0.1	179.9	
5	11.5	9.42	86.4	0.1	180.0	
6	11.5	9.46	86.6	0.1	180.1	
7	11.5	9.56	88.0	0.1	180.2	

Lake 2	Sample Date: 19/08/2006					
Sample Depths (m)	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Salinity (ppt)	Specific Conductivity (µs/cm)	pH
Location 1 (L2WQ1)	Secchi Depth: 5.5 m (to bottom)	Max. Depth: 5.5 m				
surface	10.1	10.14	90.7	0.1	132.7	
1	10.1	9.99	89.1	0.1	133.0	
2	10.1	10.02	89.4	0.1	132.9	
3	10.1	9.94	88	0.1	133.5	
4	10.1	10.11	89.9	0.1	133.5	
5	10.1	10.08	88.7	0.1	133.5	
Location 2 (L2WQ2)	Secchi Depth: 5.5 m (to bottom)	Max. Depth: 5.5 m				
surface	10.1	10.22	89.3	0.1	90.0	
1	10.1	9.75	88.0	0.1	133.2	
2	10.1	9.95	89.5	0.1	133.2	
3	10.1	10.02	87.5	0.1	133.3	
4	10.1	9.97	86.5	0.1	133.3	
5	10.1	10.06	88.3	0.1	133.3	

Table 3. Lake Water Quality Data

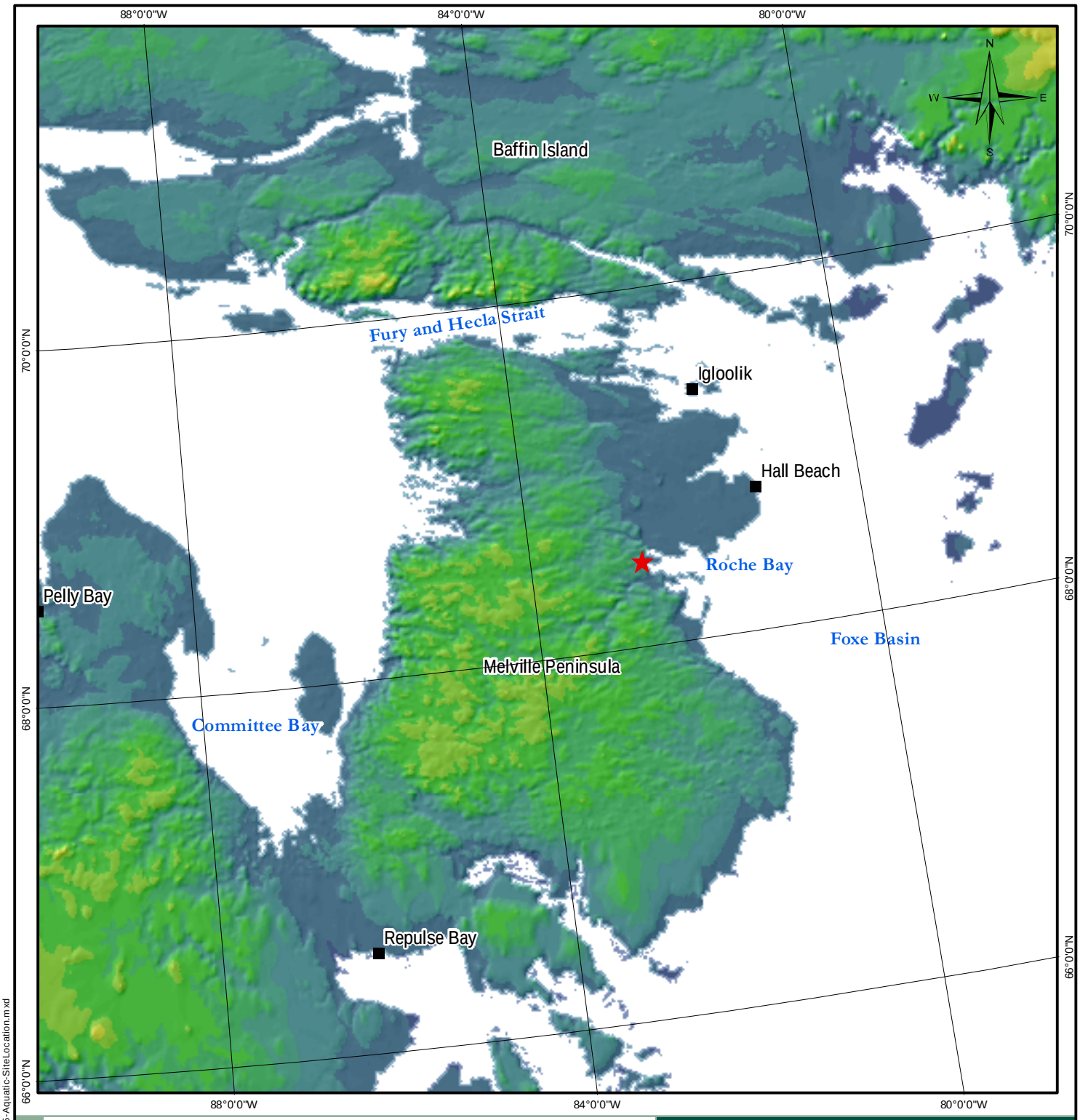
Lake 3	Sample Date: 21/08/2006					
Sample Depths (m)	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Salinity (ppt)	Specific Conductivity (µs/cm)	pH
Location 1 (L3WQ1)	Secchi Depth: 1.0 m (to bottom)	Max. Depth: 1.0 m				
surface	8.9	11.60	95.6	0.1	202.7	
0.5	8.9	10.92	94.4	0.1	203.2	
Location 2 (L3WQ2)	Secchi Depth: 1.0 m (to bottom)	Max. Depth: 1.0 m				
surface	8.9	10.80	94.6	0.1	201.5	
0.5	9.0	10.84	94.3	0.1	201.4	

Lake 4	Sample Date: 20/08/2006					
Sample Depths (m)	Water Temperature (degrees C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (%)	Salinity (ppt)	Specific Conductivity (µs/cm)	pH
Location 1 (L4WQ1)	Secchi Depth: 5.3 m (to bottom)	Max. Depth: 5.3 m				
surface	9.9	9.41	84.5	0.1	115.7	
1	9.9	9.16	79.1	0.1	115.7	
2	9.9	8.88	81.1	0.1	115.7	
3	9.9	9.14	79.6	0.1	115.9	
4	9.9	8.72	78	0.1	115.7	
5	9.9	8.65	79.6	0.1	115.7	
Location 2 (L4WQ2)	Secchi Depth: 7.5 m	Max. Depth: 8.3 m				
surface	9.9	9.52	84.0	0.1	115.8	
1	9.9	9.46	84.6	0.1	115.8	
2	9.9	8.62	76.6	0.1	115.8	
3	9.9	8.66	75.8	0.1	115.8	
4	9.9	9.13	80.8	0.1	115.7	
5	9.9	8.86	76.4	0.1	115.8	
6	9.9	9.35	75.7	0.1	115.8	
7	9.9	8.61	74.9	0.1	115.9	
8	9.9	8.24	71.8	0.1	115.8	

Table 4. Marine Intertidal and Subtidal Survey Data

Transect	Section	Transect Length (m)	Distance (m)	Visibility (m)	Water Depth (ft)	Substrate	Biological Observations
T1	**Survey Date 22 August 06**						
	Subtidal	96	96-61	10	44.00	flat soft botton, silty-sand, light algal matt	various sea stars, unrooted rockweed, large and small sculpins, giant isopods, large pelagic krill
			61-47	10	30.00		isopod exoskeletons, large kelps, nudibranchs, jelly fish
			47	10	28.00		similar life with less abundance
			35	10	22.00	bottom of steep slope, soft silty-sand, light algal matt	small benthic organisms and algaes
			25	10	10.00	top of steep slope, soft silty-sand, light algal matt	small benthic organisms and algaes
			15	10	8.00	bouders and cobbles with gravel underneath	no marine life
			0	10	0.00	bouders and cobbles with gravel underneath	no marine life
	Intertidal		high water mark - 4			sand and gravel, and flat angular cobbles on top	
			4 - 5.5			sand with gravel and flat angular cobbles on top	band of dried red macroalgae, some pieces of kelp, sparse bivalve shells
			5.5 - 8			bank slopes gently shoreward, sand with gravel and flat angular cobbles on top	sparse bivalve shells
			8 - 24			shoreline slopes gently shoreward, 100% sand with 60 % cover flat angular cobbles on top	upland vegetation, grass patches, goose droppings and feathers
T2	**Survey Date 22 August 06**						
	Subtidal	98	98 - 46	10	50.00	flat soft botton, silty-sand, light algal matt	unkown bivalve siphon holes, rockweed, macroalgaes (unrooted bull kelp and ribbon kelp), jelly fish, large sculpins, snails, chiton.
			46	10	45.00	flat soft botton, silty-sand, light algal matt	purple and green sculpins
			32		25.00	bottom of steep slope, soft gravel-sand, light algal matt	small benthic organisms and algaes
			22	10	15.00	top of steep slope, soft gravel-sand, light algal matt	small benthic organisms and algaes
			0	10	0.00	cobbles on gravel and sand	no marine life
	Interdial		high water mark - 2.5			sand and gravel	
			2-4			sand with gravel and flat angular cobbles on top	band of dried red macroalgae, some pieces of kelp, sparse bivalve shells,
			4-20			bank slopes gently shoreward, sand with gravel and flat angular cobbles on top	sparse bivalve shells
			20			shoreline slopes gently shoreward, 100% sand with 60 % cover flat angular cobbles on top	upland vegetation, grass patches, goose droppings and feathers
			24.5			bank begins	
T3	**Survey Date 23 August 06**						
	Subtidal	96	96	10	55.00	flat soft botton, silty-sand, light algal matt	unkown bivalve siphon holes, macroalgaes (unrooted bull kelp and ribbon kelp), patches of microalgal matt, small sculpins, bivalve shells, various seastars
			56	10	55.00	bottom of slope, rocky substrate	rooted sugar kelp covering most of slope, rockweed, snails, sponges
			44	10	25.00	top of slope, cobles on gravel gently sloping toward shoreline	80% agal cover, large sculpin
			16	10	12.00	cobbles slope toward shoreline	no marine life
	Intertidal		high water mark - 6			sand and gravel	
			6 - 21			sand with gravel and flat angular cobbles on top	band of dried red macroalgae, some pieces of kelp, sparse bivalve shells
			21 - 33			shoreline slopes gently shoreward, sand with gravel and flat angular cobbles on top	sparse bivalve shells
			33 upland			shoreline slopes gently shoreward, sand with gravel and flat angular cobbles on top	upland vegetation, grass patches, goose droppings and feathers

FIGURES



LEGEND

- Settlement
- Site Location

NOTES

Base data source:
ESRI DATA and Maps

Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Site Location Map

PROJECTION	DATUM
Canadian Lambert Conf. Conic	NAD83

Scale: 1:3,000,000

50 25 0 50

Kilometres

EBA Engineering Consultants Ltd.

FILE NO.
1740183-005-Aquatic-SiteLocation

PROJECT NO.	DWN	CKD	REV
1740183.005	MEZ	TA	0

OFFICE	DATE
EBA-VANC	August 27, 2007

Figure 1

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433109

438109

7596437

7591437

S1

L1WQ2

L1WQ1

Lake 4

L4WQ2

L4WQ1

Lake 1
Irqalugarjuit
Lake

A and B Ore Body

S2

L2WQ1

L2WQ2

Lake 2

S3

L3WQ1

L3WQ2

Lake 3

Conveyor Belts

S5

S4

T1

T2

T3

T1

T2

T3

N

W

E

S

Legend

- Water Quality Sampling Locations
- Camp
- Transect Locations
- Proposed Dock Location
- Stream Sampling Locations
- Gill Net Locations
- Conveyor Belts
- Proposed Tailings Pond Area
- Ore-Body

Transects

- Intertidal
- Subtidal

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Overview of Marine and Aquatic Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:35,000 (1 0 0.5 Kilometers)		
FILE No: 1740183-005-Aquatic-Stations		DATE: June 27, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 2
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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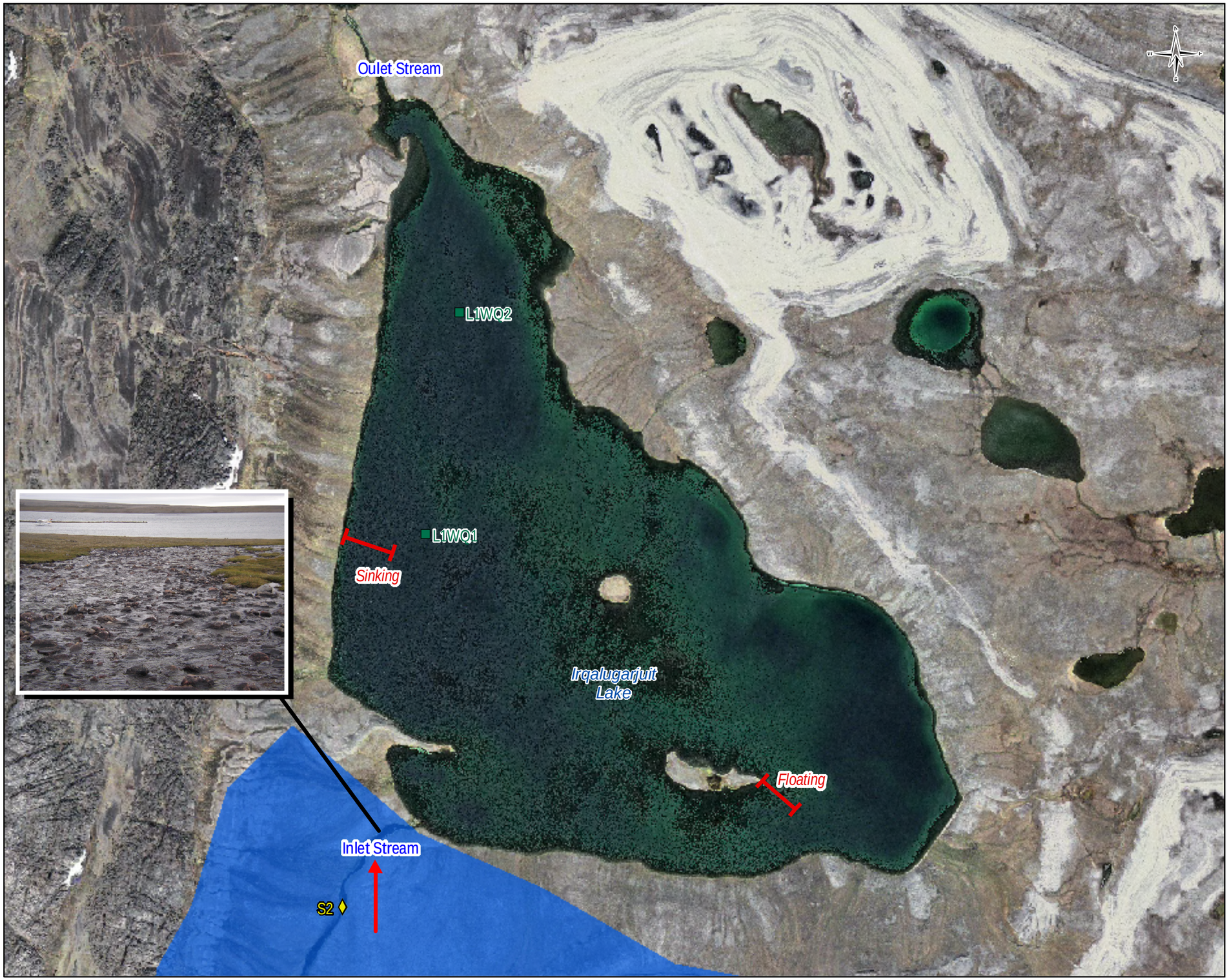

Legend

- Water Quality Sampling Locations
- Stream Sampling Locations
- Gill Net Locations
- Proposed Tailings Pond Area

Base data sources:

Quickbird Imagery (August 2006)

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Marine and Aquatic Fisheries

Lake 1 Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:10,000 (200 100 0 200 Meters)		
FILE No: 1740183-005-Aquatic-Stations-Lake1		DATE: June 29, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 3
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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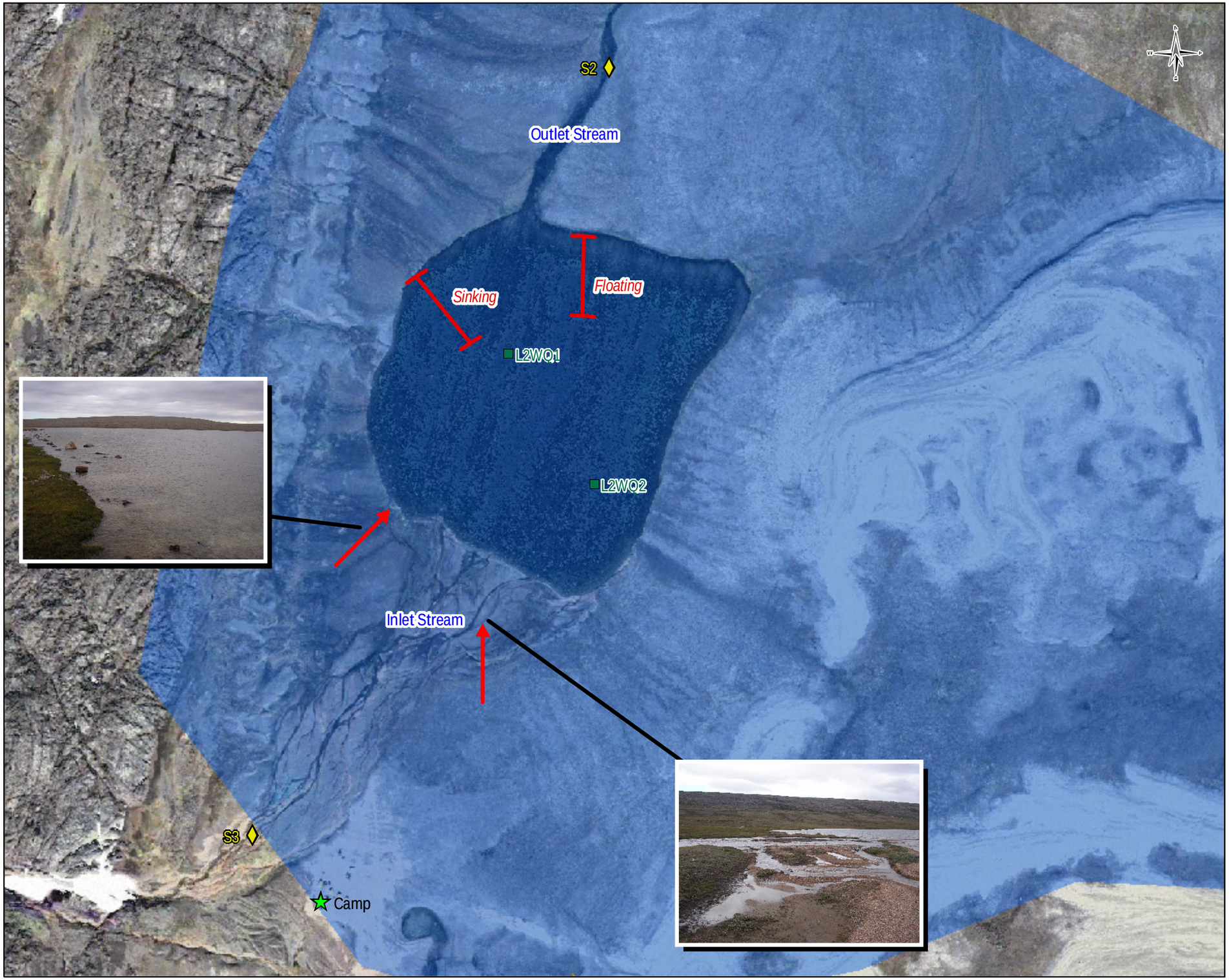

Legend

- Water Quality Sampling Locations
- Stream Sampling Locations
- Camp
- Gill Net Locations
- Proposed Tailings Pond Area

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Lake 2 Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:5,000 (0 50 100 200 Meters)		
FILE No: 1740183-005-Aquatic-Stations-Lake2		DATE: June 29, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 4
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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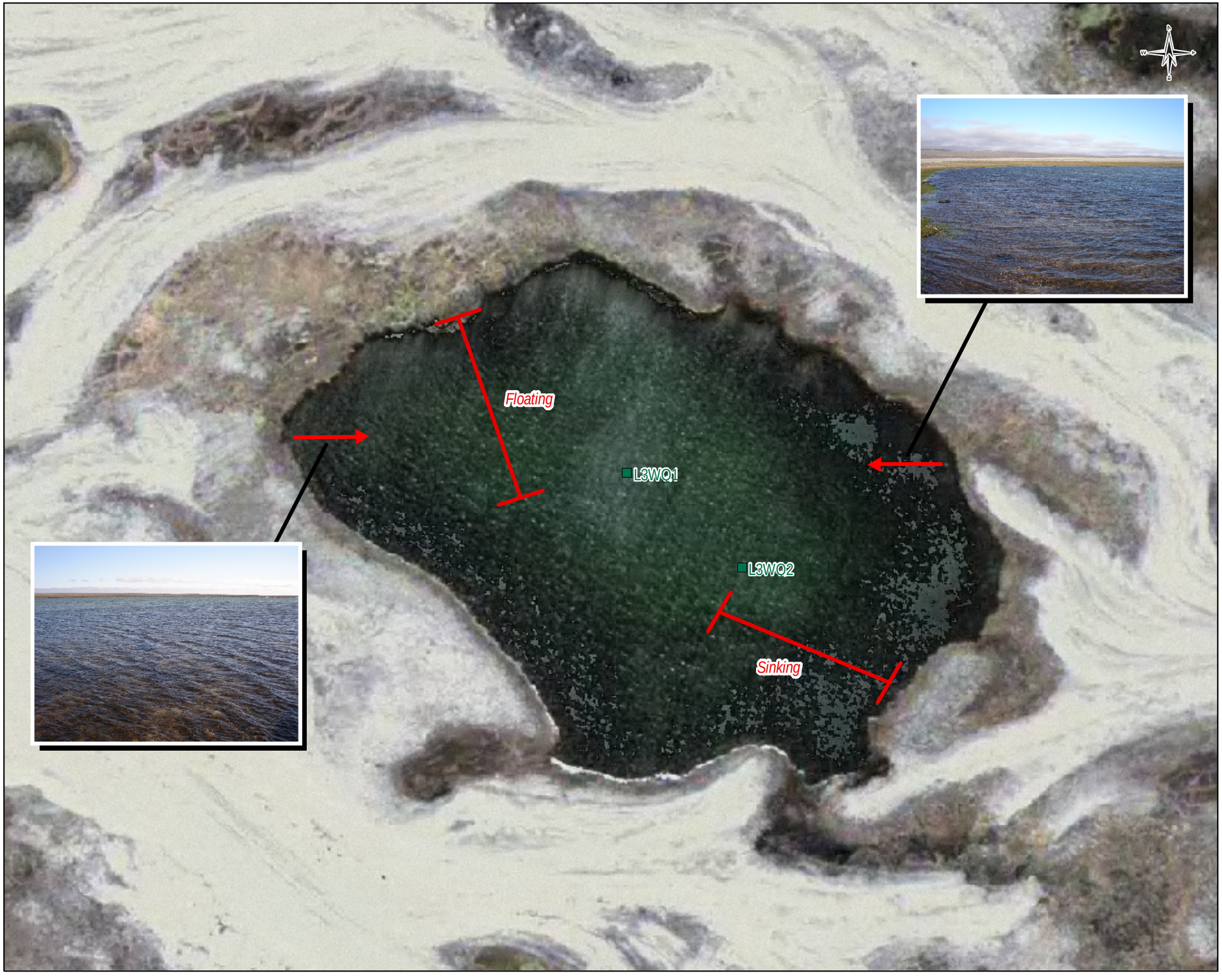

Legend

- Water Quality Sampling Locations
- Gill Net Locations

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Lake 3 Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:2,000 (0 25 50 100 Meters)		
FILE No: 1740183-005-Aquatic-Stations-Lake3		DATE: June 29, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 5
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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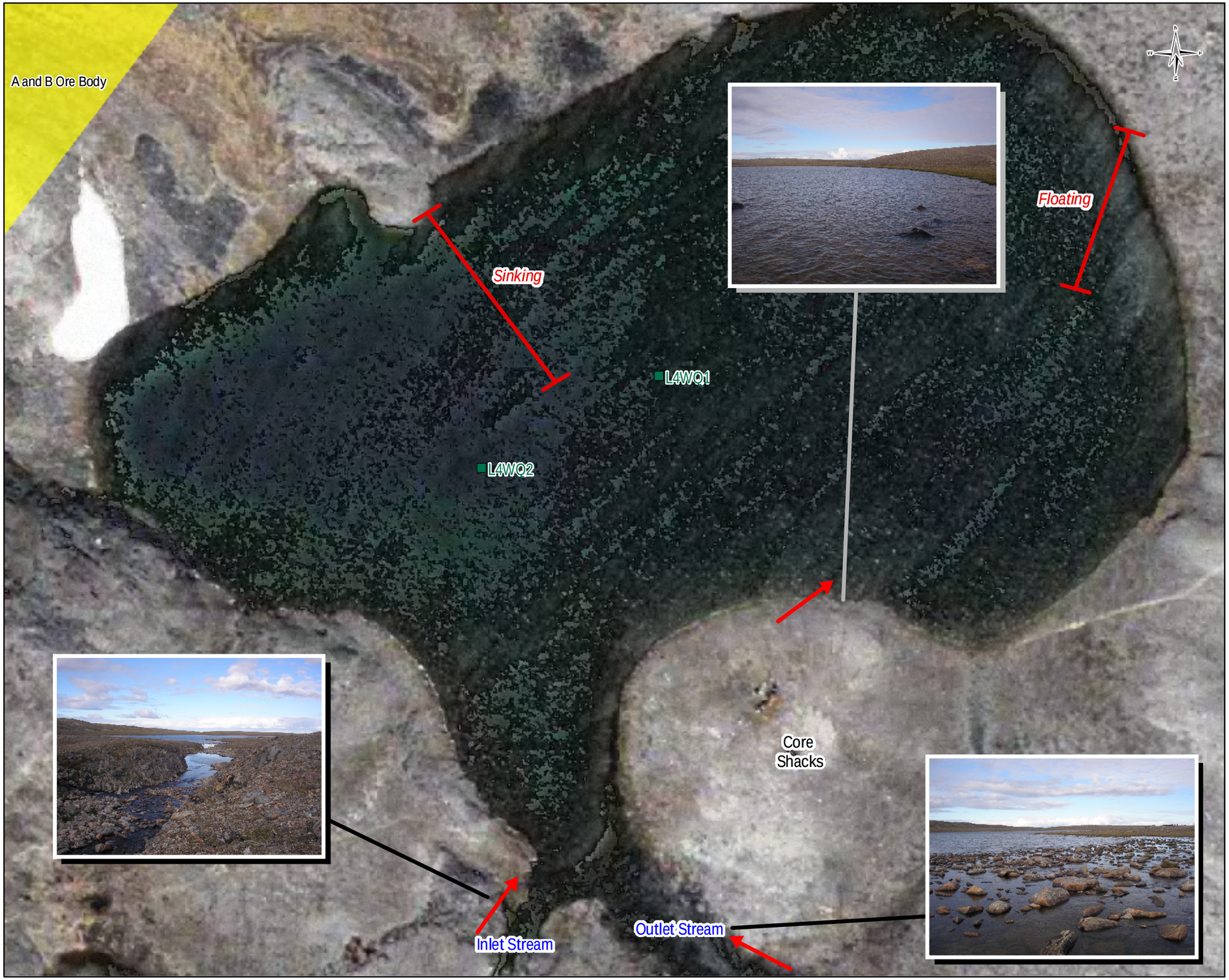

Legend

- Water Quality Sampling Locations
- Gill Net Locations
- Ore-Body

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Lake 4 Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:2,000 (0 25 50 100 Meters)		
FILE No: 1740183-005-Aquatic-Stations-Lake4		DATE: June 29, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 6
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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433109

438109

7596437

7591437

S1

Lake 4

Lake 1
Irqalugarjuit
Lake

A and B Ore Body

S2

Lake 2

S3

Lake 3

Conveyor Belts

S5

S4

Legend

- Camp
- Proposed Dock Location
- Stream Sampling Locations
- Conveyor Belts
- Proposed Tailings Pond Area
- Ore-Body

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Stream Sampling Locations

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:35,000 (1 0 0.5 Kilometers)		
FILE No: 1740183-005-Stream-Sampling		DATE: July 3, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 7
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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Legend

- Transect Locations
- Proposed Dock Location
- Conveyor Belts

Transects

- Intertidal
- Subtidal

Base data sources:

Quickbird Imagery (August 2006)

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Roche Bay Environmental Baseline Studies 2006
Marine and Aquatic Fisheries

Marine Transects

PROJECTION: UTM Zone 17	DATUM: NAD83	EBA Engineering Consultants Ltd.
Scale: 1:4,000 (0 50 100 200 Meters)		
FILE No: 1740183-005-Aquatic-Stations-Transects		DATE: June 29, 2007
JOB NO: 1740183-005	REVISION NO: 0	Figure 8
OFFICE: EBA-VAN	DRAWN: MEZ / CHECK: TA	

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PHOTOGRAPHS

Photo 1
Roche Bay Camp during August 2006 field studies.

Photo 2
Boat used to conduct lake surveys.

Photo 3
Filamentous algae cover in Lake 1 inlet stream.

Photo 4
Lake 1 and inlet stream.

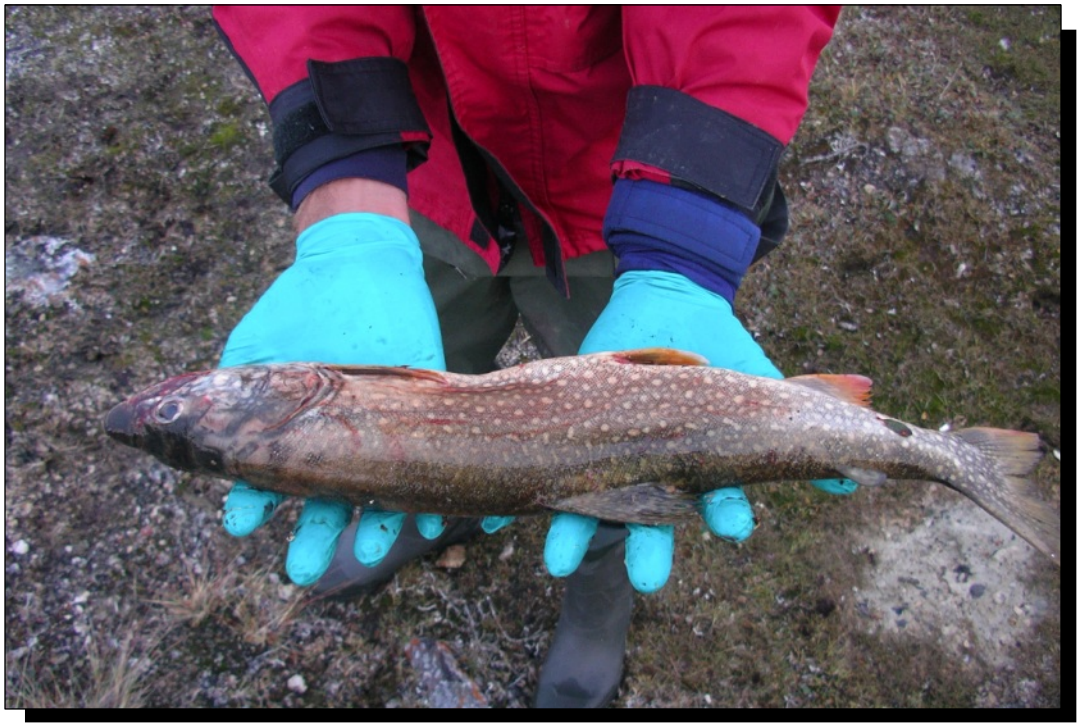

Photo 5
Lake trout captured from Lake 1.

Photo 6
Retrieving gill netting from Lake 1.

Photo 7
Lake 1 outlet stream looking upstream.

Photo 8
Spawning Arctic char from Lake 1.

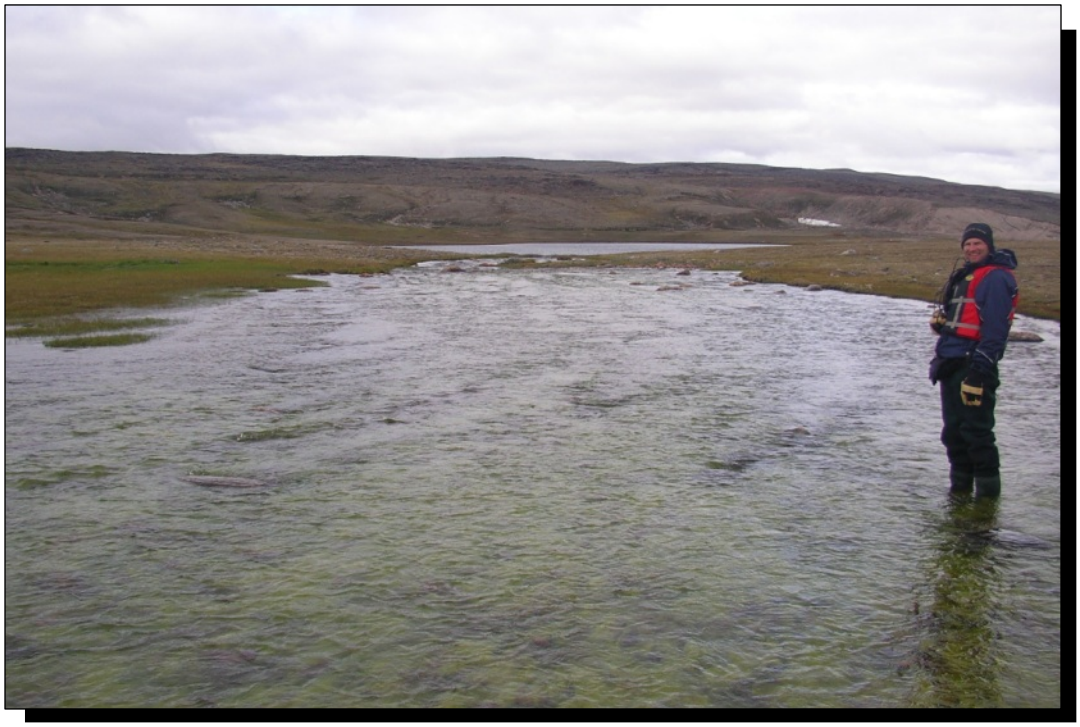

Photo 9
Lake 1 outlet stream.

Photo 10
Lake 2 shoreline.

Photo 11
Fish captured from Lake 2.

Photo 12
Spawning Arctic char captured from Lake 2.

Photo 13
Principal inlet stream to Lake 2.

Photo 14
Principal outlet stream from Lake 2.

Photo 15
Secondary inlet stream to Lake 2.

Photo 16
Lake 3 looking east.

Photo 17
Transport of boat by Kamotiq to Lake 3.

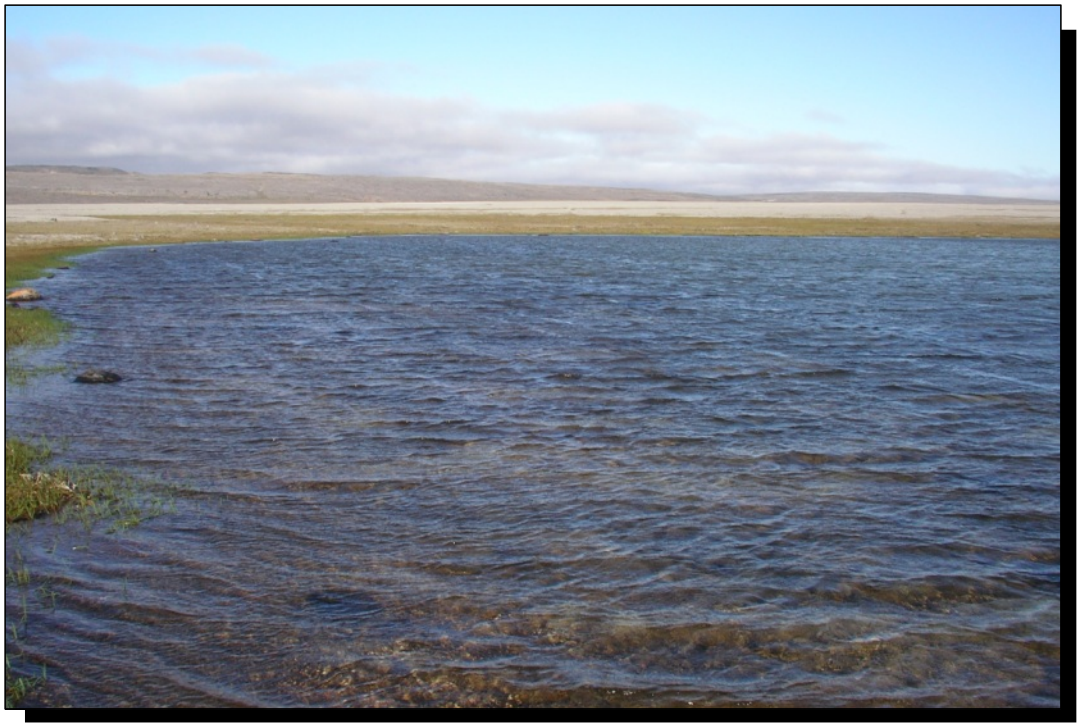

Photo 18
Lake 3 looking west.

Photo 19
Lake 3 looking west.

Photo 20
Equipment setup at Lake 4.

Photo 21
Transport of field gear on ATVs.

Photo 22
Lake 4 looking north.

Photo 23
Lake 4 inlet stream and pools.

Photo 24
Lake 4 inlet stream.

Photo 25
Lake 4 outlet stream looking north.

Photo 26
Arctic char captured in Lake 4.

Photo 27
Stream site S1 looking downstream.

Photo 28
Stream site S1 looking upstream.

Photo 29
Electroshocking at Stream site S1.

Photo 30
Stream site S2 looking downstream.

Photo 31
Stream site S2 looking upstream.

Photo 32
Juvenile Lake trout captured at Stream site S2.

Photo 33
Stream site S3 looking downstream.

Photo 34
Stream site S3 looking upstream toward escarpment.

Photo 35
Stream site S4 looking downstream toward ocean.

Photo 36
Stream site S5 pools looking upstream.

Photo 37
Stream site S4 looking upstream up escarpment.

Photo 38
Stream site S5 looking downstream toward ocean.

Photo 39
Proposed dock location from air.

Photo 40
Marine survey area.

Photo 41
Intertidal transect T1 looking west.

Photo 42
Intertidal transect T2 looking east.

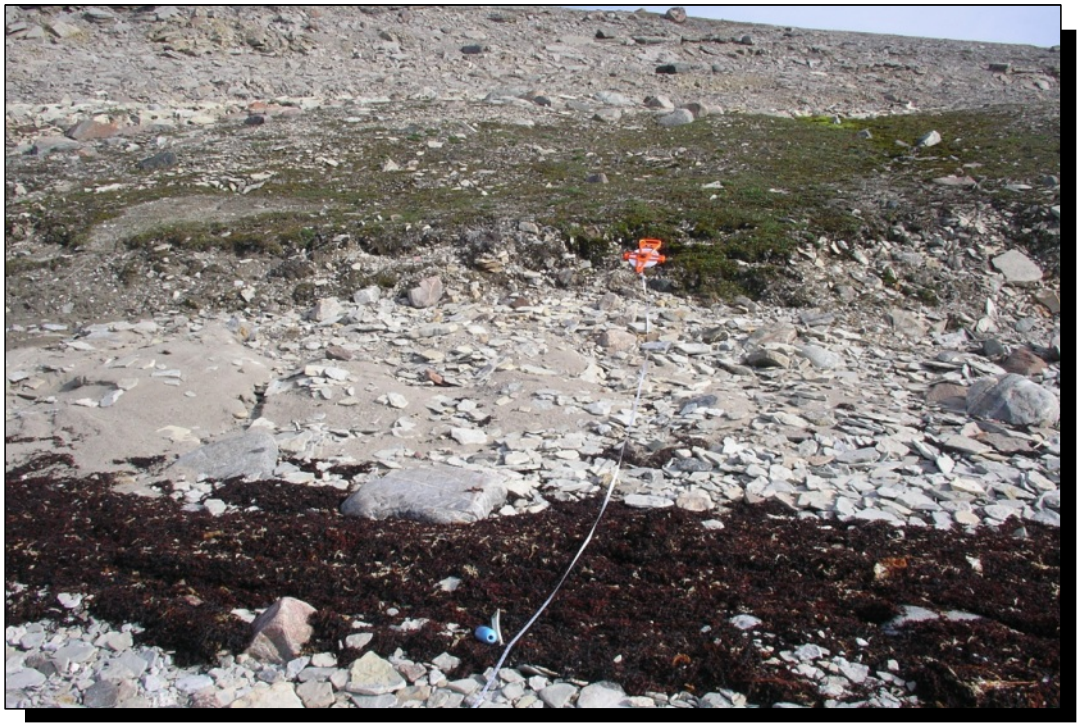

Photo 43
Intertidal transect T1 looking onshore.

Photo 44
Intertidal transect T2 looking offshore.

Photo 45
Intertidal transect T3 looking offshore.

Photo 46
Intertidal transect T3 looking east.

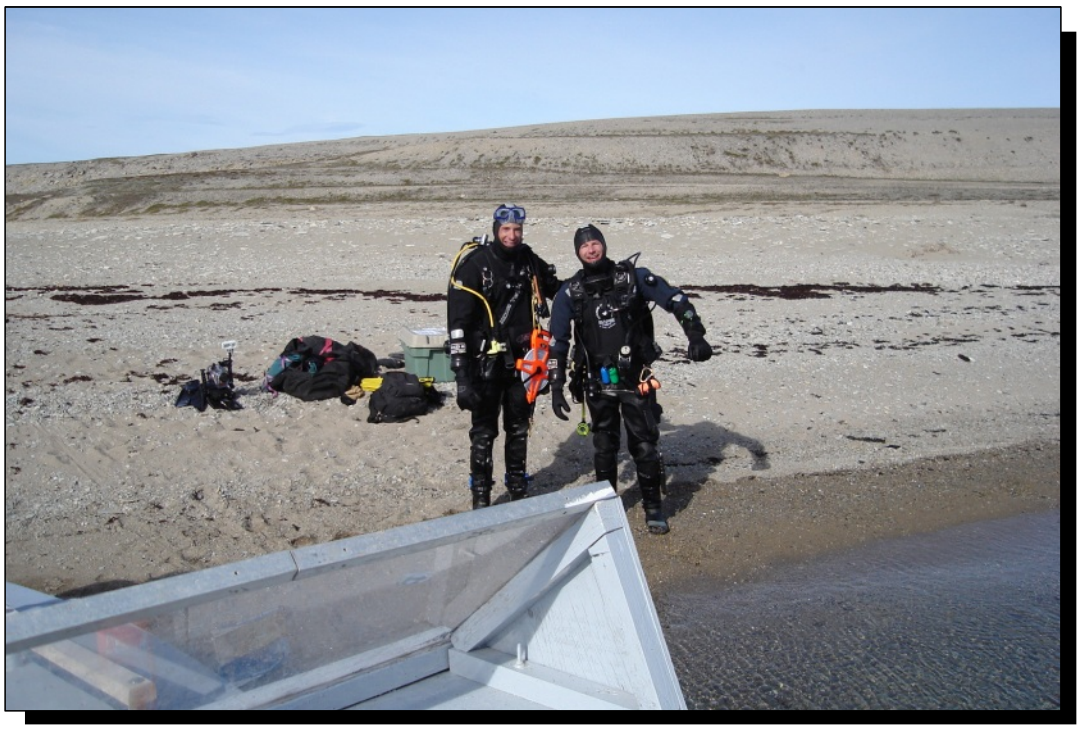

Photo 47
EBA divers before diving.

Photo 48
Boat and gear in preparation for dive survey.

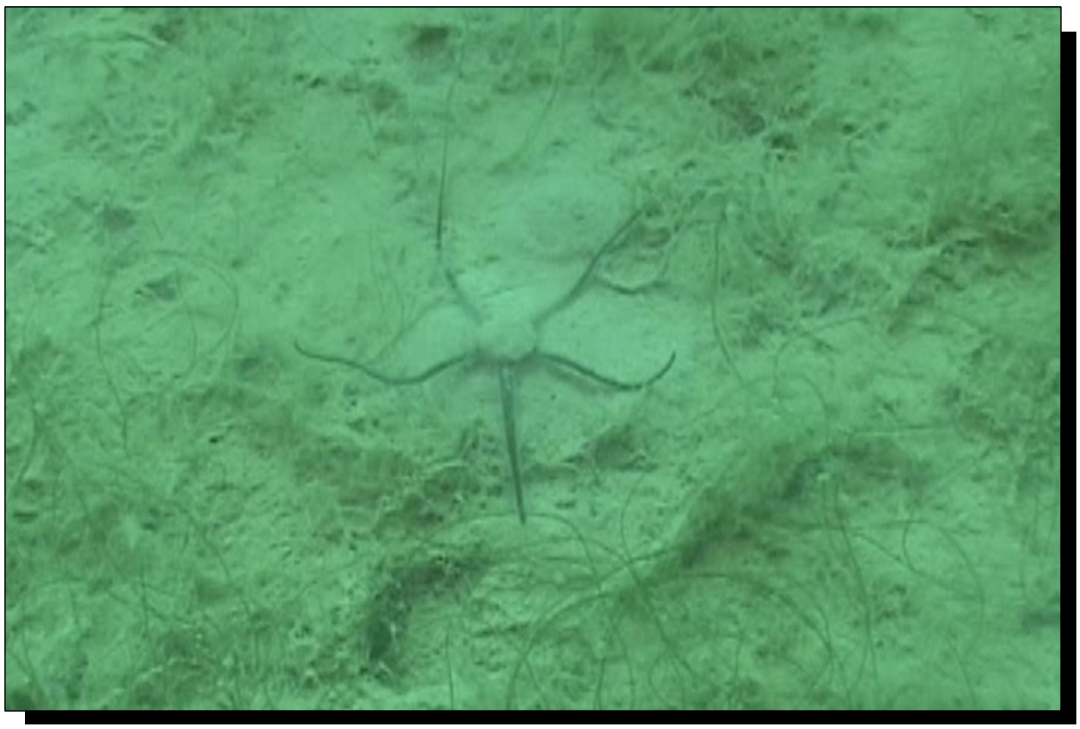

Photo 49
Brittlestar observed along T1.

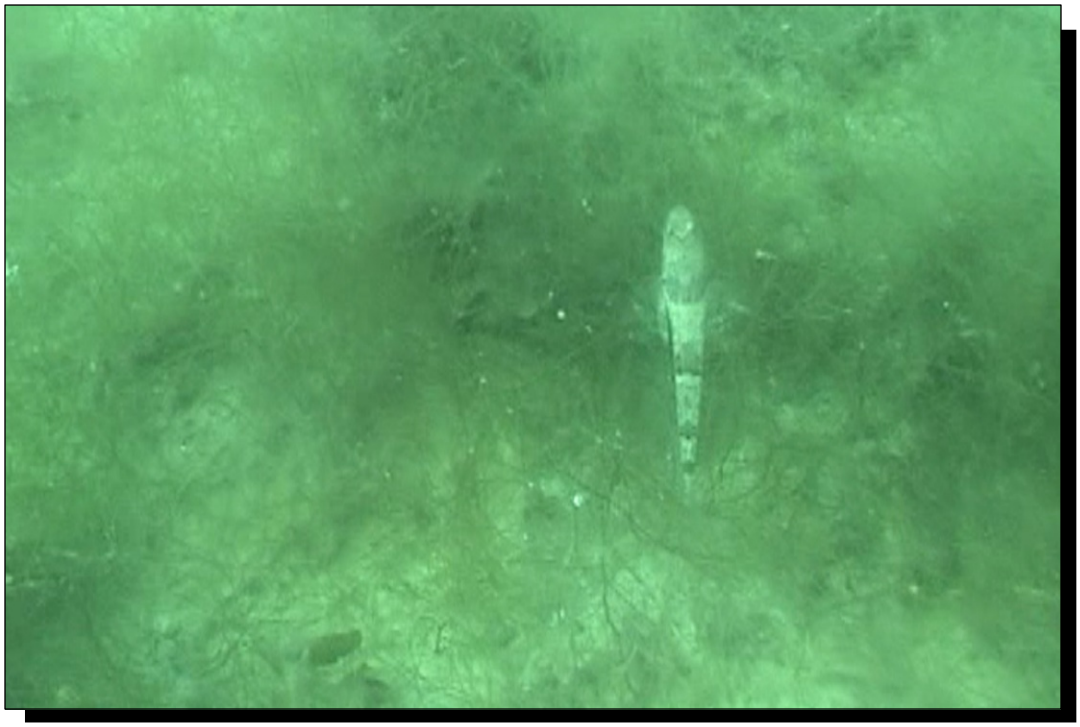

Photo 50
Sculpin species observed along T1.

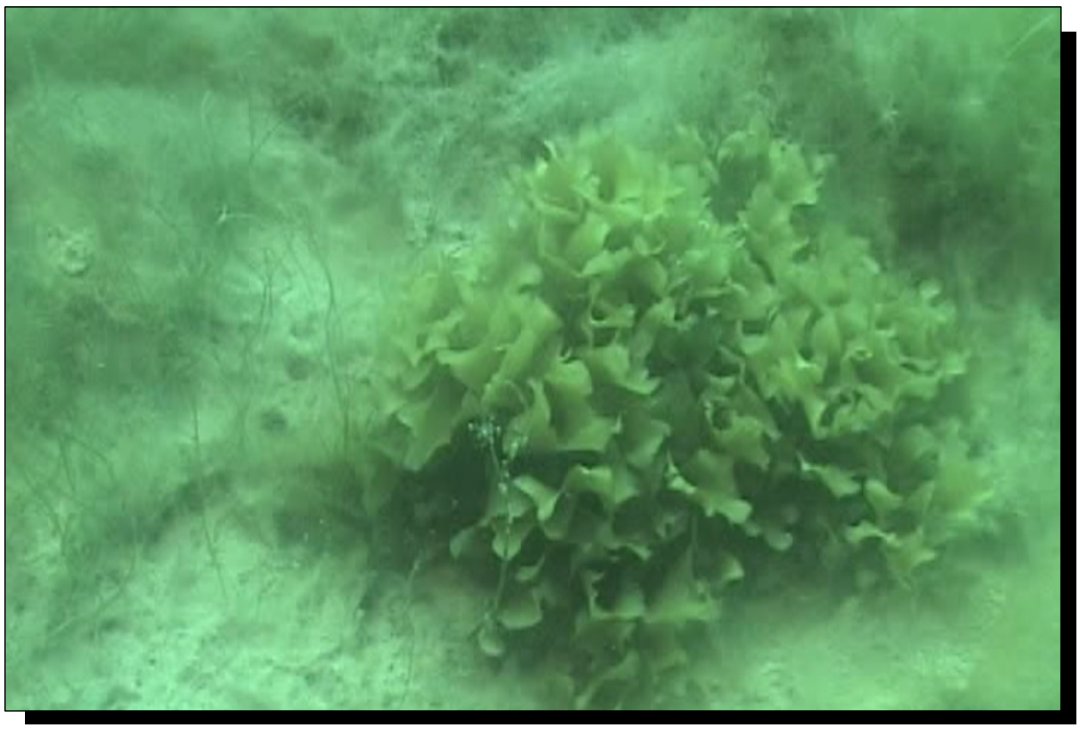

Photo 51
Various green algae species on seafloor at T1.

Photo 52
Cobble substrates near shore along T1.

Photo 53
Jellyfish observed along T2.

Photo 54
Isopod.

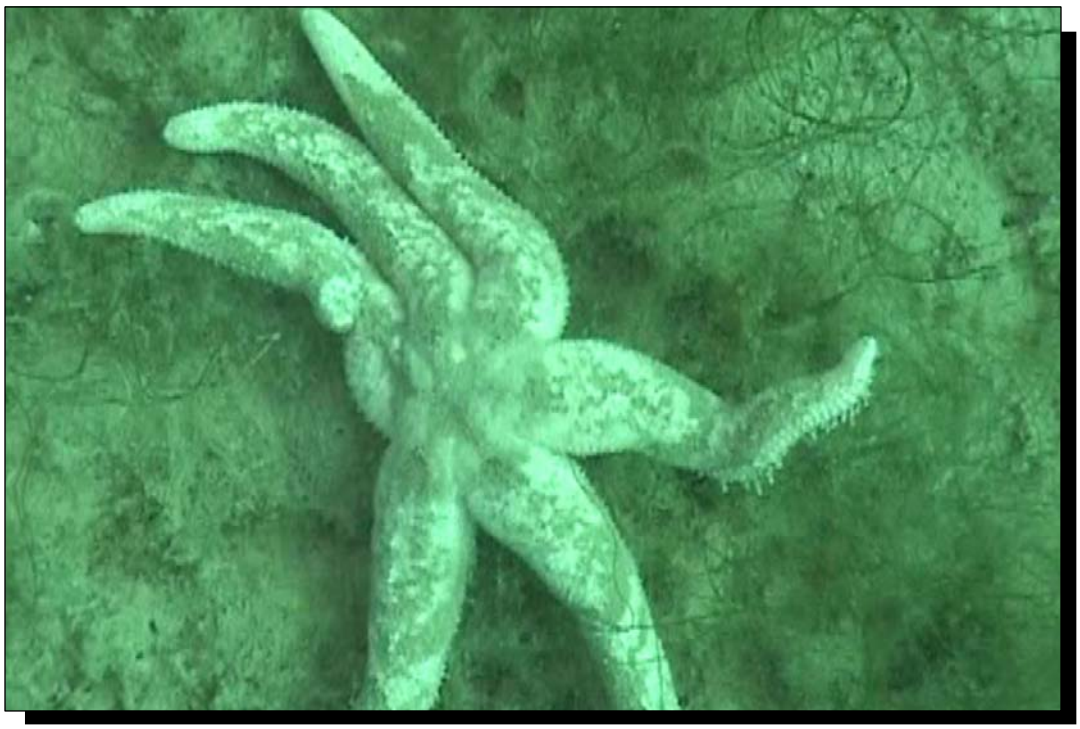

Photo 55
Starfish observed along T2.

Photo 56
Mysids observed along T2.

Photo 57
Macroalgaes observed along T3.

Photo 58
Starfish observed along T3.

Photo 59
Bivalve siphon hole and brittlestar observed along T3.

Photo 60
Snail observed along T3.

Photo 61
Slope along T3.

Photo 62
Large Sculpin observed along T3.

APPENDIX

APPENDIX A MERISTICS FOR FISH COLLECTED BY GILL NET

Appendix A. Meristics for Fish Collected by Gill Net

Lake 1

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age (years)	Tissue Sample	Comments
8/18/2006	Floating	AC1	Arctic char	70.5	4000	F	spawn				live release
8/18/2006	Floating	AC2	Arctic char	73.5	4400	F	spawn				live release
8/18/2006	Floating	AC3	Arctic char	75.6	4250	F	spawn				live release
8/18/2006	Floating	AC4	Arctic char	63.5	3000	F	spawn				live release
8/18/2006	Floating	AC5	Arctic char	62.0	3150	F	spawn				live release
8/18/2006	Floating	AC6	Arctic char	67.5	3200	F	spawn				live release
8/18/2006	Floating	AC7	Arctic char	64.7	2800	F	spawn	X	10	X	empty stomach
8/18/2006	Floating	AC8	Arctic char	69.5	4000	M	mature	X	9	X	empty stomach
8/18/2006	Floating	AC9	Arctic char	59.0	2100	F	spawn				live release
8/18/2006	Floating	AC10	Arctic char	54.6	1550	F	immature	X	14	X	empty stomach
8/18/2006	Floating	AC11	Arctic char	51.6	1400	F	immature	X	14	X	empty stomach
8/18/2006	Floating	AC12	Arctic char	61.0	2600	F	spawn	X	12	X	empty stomach
8/18/2006	Floating	AC13	Arctic char	53.8	1500	F	immature				live release
8/18/2006	Floating	LT1	Lake trout	55.5	1700	M	mature	X	14	X	empty stomach
8/18/2006	Floating	LT2	Lake trout	50.0	1300	M	immature	X	7	X	empty stomach
8/18/2006	Sinking	AC14	Arctic char	85.0	6400	M	mature	X	13	X	empty stomach
8/18/2006	Sinking	AC15	Arctic char	78.0	4800	F	spawn	X	13	X	empty stomach
8/18/2006	Sinking	AC16	Arctic char	51.0	1800	F	immature				live release
8/18/2006	Sinking	AC17	Arctic char	69.0	3600	F	spawn	X	8	X	empty stomach
8/18/2006	Sinking	AC18	Arctic char	59.0	2200	F	spawn	X	9	X	empty stomach
8/18/2006	Sinking	AC19	Arctic char	75.0	3700	F	spawn	X	11	X	empty stomach
8/18/2006	Sinking	AC20	Arctic char	58.0	2000	F	spawn				
8/18/2006	Sinking	AC21	Arctic char	57.0	2200	F	spawn				
8/18/2006	Sinking	LT3	Lake trout	60.5	2050	F	mature	X	14	X	empty stomach
8/18/2006	Sinking	LT4	Lake trout	58.0	2050	M	spawn	X	13	X	empty stomach
8/18/2006	Sinking	LT5	Lake trout	42.0	750	M	immature	X	7	X	krill in stomach
8/18/2006	Sinking	LT6	Lake trout	58.5	1750	F	mature	X	12	X	krill in stomach
8/18/2006	Sinking	LT7	Lake trout	56.5	1000	F	mature	X	11	X	krill in stomach
8/18/2006	Sinking	LT8	Lake trout	57.0	1800	F	mature				empty stomach
8/18/2006	Sinking	LT9	Lake trout	54.5	1300	M	mature				eggs in stomach
8/18/2006	Sinking	LT10	Lake trout	50.5	1300	F	mature				empty stomach
8/18/2006	Sinking	LT11	Lake trout	52.0	1600	F	spawn				empty stomach
8/18/2006	Sinking	LT12	Lake trout	58.4	1800	F	mature				krill in stomach
8/18/2006	Sinking	LT13	Lake trout	42.0	700	M	immature				
8/18/2006	Sinking	LT14	Lake trout	47.0	1050	M	immature				krill in stomach
8/18/2006	Sinking	LT15	Lake trout								escaped from net

Lake 2

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age (years)	Tissue Sample	Comments
8/19/2006	Floating	AC1	Arctic char	64.0	3100	F	spawn	X	9	X	empty stomach
8/19/2006	Floating	LT1	Lake trout	53.5	950	M	mature	X	9	X	empty stomach
8/19/2006	Floating	LT2	Lake trout	51.0	1200	F	mature	X	8	X	empty stomach
8/19/2006	Sinking	AC2	Arctic char	82.0	5300	F	spawn				live release
8/19/2006	Sinking	AC3	Arctic char	71.0	3500	F	spawn				live release
8/19/2006	Sinking	AC4	Arctic char	84.0	6000	M	spawn	X	12	X	empty stomach
8/19/2006	Sinking	AC5	Arctic char	72.5	4500	M	spawn	X	12	X	empty stomach
8/19/2006	Sinking	AC6	Arctic char	68.5	3500	F	spawn	X	12	X	empty stomach
8/19/2006	Sinking	AC7	Arctic char	73.5	4500	M	spawn	X	11	X	empty stomach
8/19/2006	Sinking	AC8	Arctic char	74.5	4100	M	spawn	X	8	X	empty stomach
8/19/2006	Sinking	AC9	Arctic char	52.0	700	F	spawn	X	9	X	empty stomach
8/19/2006	Sinking	AC10	Arctic char	61.0	2600	F	spawn				
8/19/2006	Sinking	AC11	Arctic char	68.0	3100	F	spawn				
8/19/2006	Sinking	LT3	Lake trout	62.0	2100	M	mature	X	15	X	empty stomach
8/19/2006	Sinking	LT4	Lake trout	54.0	1500	M	mature	X	9	X	empty stomach
8/19/2006	Sinking	LT5	Lake trout	48.0	1100	F	immature	X	7	X	insects and larvae

Lake 4

Net Out DD/MM/YY	Gillnet	Fish Number	Species	Fork Length (cm)	Weight (g)	Sex	Maturity	Age Structure Sample	Age (years)	Tissue Sample	Comments
8/20/2006	Sinking	AC1	Arctic char	53.5	1700	M	mature	X	16	X	empty stomach

APPENDIX

APPENDIX B FISH AGING DATA

Appendix B. Roche Bay Fish Aging Data

Location	Date Collected	Sample #	Age	Comments
Lake 1	8/18/2006	LT 1	14	
Lake 1	8/18/2006	LT 2	7	
Lake 1	8/18/2006	LT 3	14	poor
Lake 1	8/18/2006	LT 4	13	
Lake 1	8/18/2006	LT 5	7	
Lake 1	8/18/2006	LT 6	12	
Lake 1	8/18/2006	LT 7	11	
Lake 1	8/18/2006	AC 7	10	
Lake 1	8/18/2006	AC 8	9	
Lake 1	8/18/2006	AC 10	14	
Lake 1	8/18/2006	AC 11	14	
Lake 1	8/18/2006	AC 12	12	
Lake 1	8/18/2006	AC 14	13	
Lake 1	8/18/2006	AC 15	13	poor
Lake 1	8/18/2006	AC 17	8	
Lake 1	8/18/2006	AC 18	9	
Lake 1	8/18/2006	AC 19	11	
Lake 2	8/19/2006	LT 1	9	
Lake 2	8/19/2006	LT 2	8	
Lake 2	8/19/2006	LT 3	15	
Lake 2	8/19/2006	LT 4	9	
Lake 2	8/19/2006	LT 5	7	
Lake 2	8/19/2006	AC 1	9	
Lake 2	8/19/2006	AC 4	12	
Lake 2	8/19/2006	AC 5	12	
Lake 2	8/19/2006	AC 6	12	
Lake 2	8/19/2006	AC 7	11	
Lake 2	8/19/2006	AC 8	12	
Lake 2	8/19/2006	AC 9	9	
Lake 4	8/20/2006	AC 1	16	poor

APPENDIX

APPENDIX C GILL NET CATCH AND CATCH PER UNIT EFFORT

Appendix C. Roche Bay Fish Sampling: Gillnet Catch and Catch-per-Unit-Effort

Lake	Gillnet	Date In	Time In	Date Out	Time Out	Total Set Time (Hours)	Lake Trout	Arctic Char	Total Net Catch
Lake 1	Floating	18-Aug-06	10:30	18-Aug-06	17:30	7	2 **1.57**	13 **10.18**	15 **11.75**
	Sinking	18-Aug-06	11:30	18-Aug-06	20:00	8.5	13 **8.38**	8 **5.16**	21 **13.54**
Lake 2	Floating	19-Aug-06	12:00	19-Aug-06	17:30	5.5	2 **1.99**	1 **1.00**	3 **2.99**
	Sinking	19-Aug-06	12:30	19-Aug-06	18:00	5.5	3 **2.99**	10 **9.97**	13 **12.96**
Lake 3	Floating	21-Aug-06	11:00	21-Aug-06	18:30	7.5	0 **0.00**	0 **0.00**	0 **0.00**
	Sinking	21-Aug-06	11:30	21-Aug-06	19:00	7.5	0 **0.00**	0 **0.00**	0 **0.00**
Lake 4	Floating	20-Aug-06	13:00	20-Aug-06	18:00	5	0 **0.00**	0 **0.00**	0 **0.00**
	Sinking	20-Aug-06	13:30	20-Aug-06	18:30	5	0 **0.00**	1 **1.10**	1 **1.10**
						Fish Totals:	20	33	**53**

Note:

Gillnet CPUE values (bolded) represent the number of fish captured per gillnetting unit (number of fish/100m^2 per 12 hr period).

APPENDIX

APPENDIX D FISH TISSUE METALS LAB ANALYSIS

ANALYTICAL REPORT

EBA ENG CONSULTANTS LTD
ATTN: STEVE MOORE
201- 4916 49 STREET
PO BOX 2244
YELLOWKNIFE NT X1A 2P7

Reported On: 26-JUN-07 02:38 PM
Revision: 1

Lab Work Order #: **L431957** **Date Received:** **12-SEP-06**

Project P.O. #:
Job Reference: 1740183.005
Legal Site Desc:
CofC Numbers:

Other Information:

Comments:

RON MINKS
Director, Western Canada Operations

For any questions about this report please contact your Account Manager:

CATHERINE EVARISTO-CORDERO

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-1 AC1-LAKE 4-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	0.11		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	9.57		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	1.35		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	22.7		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-2 AC1-LAKE 4-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.50		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.67		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	10.5		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-3 LT1-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.04		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	12.1		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.21		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	32.5		0.5	mg/kg		20-NOV-06	JGP	R467505
L431957-4 LT1-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.25		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.44		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.03		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.58		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	8.7		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-5 LT2-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.13		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	26.2		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.64		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	40.6		0.5	mg/kg		20-NOV-06	JGP	R467505

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-6 LT2-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.20		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.56		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.41		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.7		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-7 LT3-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.17		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	0.17		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	27.4		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.03		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	1.05		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	32.0		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-8 LT3-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.59		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.46		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.03		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.59		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.7		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-9 LT4-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.11		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	0.36		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	28.2		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	1.06		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	25.8		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-10 LT4-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.12		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.48		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.05		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.69		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.3		0.5	mg/kg		05-NOV-06	JGP	R462975

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-11 LT5-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.08		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	0.07		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	13.1		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.19		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	24.6		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-12 LT5-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.09		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.41		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.36		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.4		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-13 AC1-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.31		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.11		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	1.12		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.06		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	16.2		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-14 AC1-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.20		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.83		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.11		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.7		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-15 AC4-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.69		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.32		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	22.3		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	0.08		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.10		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	27.1		0.5	mg/kg		11-NOV-06	JGP	R466347

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-16 AC4-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.78		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.67		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.10		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	3.6		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-17 AC5-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.25		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.43		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	57.6		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.14		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	38.2		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-18 AC5-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.88		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.71		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.08		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.1		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-19 AC6-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.26		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.29		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	1.48		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.05		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	18.5		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-20 AC6-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.04		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.47		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.04		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	4.6		0.5	mg/kg		04-NOV-06	JGP	R462975

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-21 AC7-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.55		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.33		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	70.4		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.06		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	41.2		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-22 AC7-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.14		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.89		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.04		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	4.5		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-23 AC8-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.75		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.68		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	43.6		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	0.03		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.07		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	39.4		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-24 AC8-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.98		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.76		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.03		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	4.0		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-25 AC9-LAKE 2-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		18-NOV-06	JGP	R467117
Cadmium (Cd)	0.17		0.01	mg/kg		18-NOV-06	JGP	R467117
Copper (Cu)	28.9		0.05	mg/kg		18-NOV-06	JGP	R467117
Lead (Pb)	<0.02		0.02	mg/kg		18-NOV-06	JGP	R467117
Mercury (Hg)	0.22		0.01	mg/kg		18-NOV-06	JGP	R467117
Zinc (Zn)	23.1		0.5	mg/kg		18-NOV-06	JGP	R467117

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-26 AC9-LAKE 2-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.55		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.14		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	6.3		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-27 LT1-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.43		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	25.1		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.35		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	38.2		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-28 LT1-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.11		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.39		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.31		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	6.5		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-29 LT2-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.07		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.06		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	12.6		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.19		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	29.7		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-30 LT2-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.06		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.42		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.24		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	5.7		0.5	mg/kg		04-NOV-06	JGP	R462975

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-31 LT3-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.11		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.08		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	33.5		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.27		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	35.9		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-32 LT3-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.10		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.37		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.27		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	8.2		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-33 LT4-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.27		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.17		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	15.5		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.31		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	28.8		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-34 LT4-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.19		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	0.09		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.36		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.27		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	4.9		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-35 LT5-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.25		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.04		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	8.91		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.12		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	25.4		0.5	mg/kg		11-NOV-06	JGP	R466347

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-36 LT5-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.14		0.05	mg/kg		04-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		04-NOV-06	JGP	R462975
Copper (Cu)	0.39		0.05	mg/kg		04-NOV-06	JGP	R462975
Lead (Pb)	0.03		0.02	mg/kg		04-NOV-06	JGP	R462975
Mercury (Hg)	0.12		0.01	mg/kg		04-NOV-06	JGP	R462975
Zinc (Zn)	5.4		0.5	mg/kg		04-NOV-06	JGP	R462975
L431957-37 LT6-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.21		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.13		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	28.1		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.20		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	33.0		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-38 LT6-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.30		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.49		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.25		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	7.0		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-39 LT7-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.33		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.12		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	34.9		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.19		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	32.1		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-40 LT7-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.12		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.30		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.24		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.3		0.5	mg/kg		05-NOV-06	JGP	R462975

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-41 AC7-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.38		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.18		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	1.05		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.06		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	15.9		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-42 AC7-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.78		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.71		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.05		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.1		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-43 AC8-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.85		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.11		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	9.10		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.05		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	19.0		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-44 AC8-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.19		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.59		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.04		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.6		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-45 AC10-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.41		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	9.12		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	<0.02		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.36		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	28.5		0.5	mg/kg		11-NOV-06	JGP	R466347

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-46 AC10-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.30		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.03		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.17		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.6		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-47 AC11-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		11-NOV-06	JGP	R466347
Cadmium (Cd)	0.23		0.01	mg/kg		11-NOV-06	JGP	R466347
Copper (Cu)	16.3		0.05	mg/kg		11-NOV-06	JGP	R466347
Lead (Pb)	0.04		0.02	mg/kg		11-NOV-06	JGP	R466347
Mercury (Hg)	0.31		0.01	mg/kg		11-NOV-06	JGP	R466347
Zinc (Zn)	25.6		0.5	mg/kg		11-NOV-06	JGP	R466347
L431957-48 AC11-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	<0.05		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.34		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.16		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.9		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-49 AC12-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.50		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.32		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	10.6		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.04		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	26.2		0.5	mg/kg		20-NOV-06	JGP	R467505
L431957-50 AC12-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.16		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	1.21		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.05		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	5.7		0.5	mg/kg		05-NOV-06	JGP	R462975

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-51 AC14-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.69		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.39		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	20.0		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.08		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	36.1		0.5	mg/kg		20-NOV-06	JGP	R467505
L431957-52 AC14-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.70		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.85		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	0.14		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.05		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.5		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-53 AC15-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.60		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.49		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	1.28		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.13		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	16.4		0.5	mg/kg		20-NOV-06	JGP	R467505
L431957-54 AC15-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	2.23		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	0.02		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	1.01		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.07		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	7.4		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-55 AC17-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.59		0.05	mg/kg		20-NOV-06	JGP	R467505
Cadmium (Cd)	0.27		0.01	mg/kg		20-NOV-06	JGP	R467505
Copper (Cu)	4.01		0.05	mg/kg		20-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		20-NOV-06	JGP	R467505
Mercury (Hg)	0.04		0.01	mg/kg		20-NOV-06	JGP	R467505
Zinc (Zn)	21.0		0.5	mg/kg		20-NOV-06	JGP	R467505

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Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	By	Batch
L431957-56 AC17-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.54		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.92		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.04		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.4		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-57 AC18-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.35		0.05	mg/kg		21-NOV-06	JGP	R467505
Cadmium (Cd)	0.15		0.01	mg/kg		21-NOV-06	JGP	R467505
Copper (Cu)	4.81		0.05	mg/kg		21-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		21-NOV-06	JGP	R467505
Mercury (Hg)	0.04		0.01	mg/kg		21-NOV-06	JGP	R467505
Zinc (Zn)	19.3		0.5	mg/kg		21-NOV-06	JGP	R467505
L431957-58 AC18-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	1.00		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.59		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.05		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	6.0		0.5	mg/kg		05-NOV-06	JGP	R462975
L431957-59 AC19-LAKE 1-LIVER								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.93		0.05	mg/kg		21-NOV-06	JGP	R467505
Cadmium (Cd)	0.71		0.01	mg/kg		21-NOV-06	JGP	R467505
Copper (Cu)	10.4		0.05	mg/kg		21-NOV-06	JGP	R467505
Lead (Pb)	<0.02		0.02	mg/kg		21-NOV-06	JGP	R467505
Mercury (Hg)	0.13		0.01	mg/kg		21-NOV-06	JGP	R467505
Zinc (Zn)	22.1		0.5	mg/kg		21-NOV-06	JGP	R467505
L431957-60 AC19-LAKE 1-MUSCLE								
Sampled By: NOT PROVIDED								
Matrix: TISSUE								
Arsenic (As)	0.93		0.05	mg/kg		05-NOV-06	JGP	R462975
Cadmium (Cd)	<0.01		0.01	mg/kg		05-NOV-06	JGP	R462975
Copper (Cu)	0.50		0.05	mg/kg		05-NOV-06	JGP	R462975
Lead (Pb)	<0.02		0.02	mg/kg		05-NOV-06	JGP	R462975
Mercury (Hg)	0.10		0.01	mg/kg		05-NOV-06	JGP	R462975
Zinc (Zn)	4.9		0.5	mg/kg		05-NOV-06	JGP	R462975

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Preparation Method Reference(Based On)	Analytical Method Reference(Based On)
AS-FAUNA-ED	Tissue	Arsenic (As)	EPA 200.3	EPA 6020
CD-FAUNA-ED	Tissue	Cadmium (Cd)	EPA 200.3	EPA 6020
CU-FAUNA-ED	Tissue	Copper (Cu)	EPA 200.3	EPA 6020
HG-FAUNA-ED	Tissue	Mercury (Hg)	EPA 200.3	EPA 6020
PB-FAUNA-ED	Tissue	Lead (Pb)	EPA 200.3	EPA 6020
ZN-FAUNA-ED	Tissue	Zinc (Zn)	EPA 200.3	EPA 6020

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.

Chain of Custody numbers:

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA		

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in environmental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency. The Laboratory control limits are determined under column heading D.L.
mg/kg (units) - unit of concentration based on mass, parts per million.
mg/L (units) - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
UNLESS OTHERWISE STATED, SAMPLES ARE NOT CORRECTED FOR CLIENT FIELD BLANKS.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

Catherine Evaristo-Cordero
ALS Environmental
Environmental Division
9936 67 Avenue
Edmonton AB
Canada T6E 0P5
Phone: 1 780 413 6079
Fax: 1 780 437 2311

L43195 7

7 September 2006

Hi Catherine,

As discussed in our recent phone conversation, please analyze the enclosed the fish tissue samples for the following metals:

- Arsenic,
- Cadmium,
- Copper,
- Lead,
- Mercury, and
- Zinc.

The project reference number to be put on all correspondence and invoices is **1740183.005**.

Should you have any questions, please contact Tim Abercrombie, EBA Vancouver, 9th Floor, Oceanic Plaza, 1066 West Hastings Street, Vancouver, B.C. (604-685-0017; tabercrombie@eba.ca), or Steve Moore, EBA Engineering Consultants Ltd., PO Box 2244, 201, 4916 - 49 Street, Yellowknife, Northwest Territories, (867-766-3728; smoore@eba.ca).

Thank you,

Steve Moore
Wildlife Biologist / Environmental Scientist

cPotts
12 Sep 06
11:01

Letter-ALS.doc

APPENDIX

APPENDIX E STREAM ELECTROFISHING SUMMARY

Appendix E. Roche Bay Streams Electrofishing Summary

Location	Station 1 (S1)	Station 2 (S2)	Station 3 (S3)	Station 4 (S4)	Station 5 (S5)
Date	18-Aug-06	23-Aug-06	19-Aug-06	21-Aug-06	22-Aug-06
Time	1630	1700	1400	1630	2000
Distance Fished (m)	100	100			100
Settings	30 Hz, 12%, 350V	30 Hz, 12%, 350V			30 Hz, 12%, 350V
Effort (s)	697	454			356
Species / Stage	juvenile Lake trout	juvenile Lake trout			
Number Recorded	86	124			
Length (cm)	2 - 20	10-20 (90%) and 4-6 (10%)			
Additional Comments	All fish captured in deeper pools and slower flowing side channels. Approx 10% of fish were captured and positively identified, 90% were observed in the stream.	Most fish captured in deeper pools and slower flowing areas. Approx 10% of fish were captured and positively identified, 90% were observed in the stream.	Schools of juvenile trout observed downstream of S3. Electroshocking not conducted due to time constraints.*	Not sufficient water flow to conduct electrofishing. Small pools examamined closely for signs of fish, none observed.	Elecrtofishing conducted in pools and other areas with sufficient depth. No fish captured or observed.

Notes:

Due to safety, time and equipment constraints, individual fish were not processed for length and weight.

*S3 was an additional site not in the original work plan. Time constraints prevented electrofishing at S3.

APPENDIX

APPENDIX F STREAMS HABITAT ASSESSMENT

Appendix F. Roche Bay Streams Habitat Assessment

Location	Station 1 (S1)	Station 2 (S2)	Station 3 (S3)	Station 4 (S4)	Station 5 (S5)
Date	18-Aug-06	19-Aug-06	19-Aug-06	22-Aug-06	22-Aug-06
Time	1630	1700	1400	1930	2000
UTM Coordinates (17W)	433487	433057	432596	432476	432434
	7598921	7596076	7595083	7591166	7592260
Substrate	10% fines, 20% small gravel, 30% large gravel, 20% small cobbles, 10% large cobbles, 10% boulders	10% small gravel, 10% large gravel, 30% small cobbles, 30% large cobbles, 20% boulders	15% small gravel, 20% large gravel, 30% small cobbles, 20% large cobbles, 15% boulders	10% large gravel, 10% small cobbles, 20% large cobbles, 60% boulders	20% large gravel, 20% small cobbles, 20% large cobbles, 40% boulders
Avergae Wetted Width (m)	19.3	20.5	9.1	9.1	7.1
Average Channel Width (m)	46.7	22	32	17.6	11.7
Average Pool Depth (cm)	101	25-35	30-40	12	40-50
Average Riffle Depth (cm)	41	10-25	10-20	4	10-20
Percent Pool	50	30	30	60	30
Percent Riffle	50	70	70	40	70
Percent Side Channel	20	0	10	50	0
Gradient	medium	medium	medium	high	high
Percent Cover	60	60	30	0	40
Cover Component	90% deep pool, 10% boulder	45% deep pool, 45% boulder, 10% instream vegetation	50% deep pool, 40% boulder, 10% instream vegetation		70% deep pool, 30% boulder
D.O. %	93.1	81	87.4	76.8	91.5
D.O. (mg/L)	10.77	9.24	10.25	9.75	11.15
Temperature (°C)	9.3	10.2	8.4	5.5	6.9
Specific Conductivity (µS/cm)	171.5	138.7	147.4	113.7	121.2
pH	7.39	7.67		7.42	
Salinity	0.1	0.1	0.1	0.1	0.1
Riparian Veg	sedge, moss, willow	sedge, moss, willow	sedge, moss, willow	sedge, moss, willow	moss, willow
Instream Vegetation	none	submerged sedge, moss and willow, 40-60% green algae cover on boulders	green algae cover on boulders in slower moving water	none	green algae cover on boulders in slower moving water
Observed Habitat Value	good	good	good	poor	good
Comments	Several Arctic char were observed thrashing in shallow water and breaking water surface in pools	Ideal lake trout rearing habitat	Upstream waterfall from escarpment likely barrier to fish movement. Evidence of large flows during freshet: wide flood plain multiple channels, some cutbanks	Very steep gradient barrier to fish passage. Not sufficient water flow for fish presense. Stream banks indicate very high water flow during freshet. Bars between channels are vegetated.	Gradient is steep up escarpment. Water flow is good and pools could provide good fish habitat. Small falls may be barrier to fish movments. At mouth to bay, stream has two channels.

Notes:
Additional data can be found in Appendix E

APPENDIX

APPENDIX G SUB-TIDAL MARINE SURVEY DVD