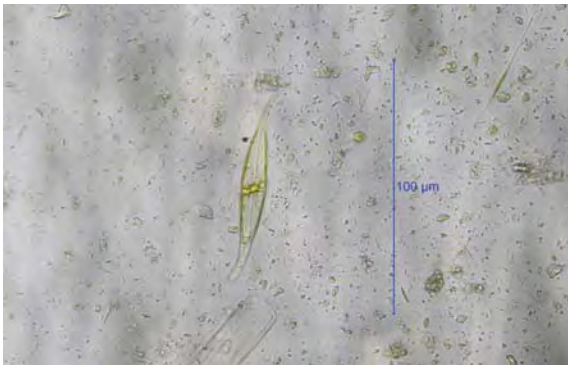
Appendix V5-10A

Doris North Gold Mine Project: 2010 Roberts Bay Jetty Fisheries Authorization Monitoring Report

Hope Bay Mining Ltd.

DORIS NORTH GOLD MINE PROJECT
2010 Roberts Bay Jetty Fisheries Authorization Monitoring Report

NEWMONT™
NORTH AMERICA



Rescan™ Environmental Services Ltd.
Rescan Building, Sixth Floor - 1111 West Hastings Street
Vancouver, BC Canada V6E 2J3
Tel: (604) 689-9460 Fax: (604) 687-4277

December 2010

DORIS NORTH GOLD MINE PROJECT

2010 ROBERTS BAY JETTY FISHERIES AUTHORIZATION MONITORING REPORT

December 2010
Project #1009-002-19

Citation:

Rescan. 2010. *Doris North Gold Mine Project: 2010 Roberts Bay Jetty Fisheries Authorization Monitoring Report*. Prepared for Hope Bay Mining Limited by Rescan Environmental Services Ltd.: Vancouver, British Columbia.

Prepared for:

NEWMONT™
NORTH AMERICA

Hope Bay Mining Limited

Prepared by:

Rescan™
Engineers and Scientists

Rescan™ Environmental Services Ltd.
Vancouver, British Columbia

Executive Summary

Rescan™
Engineers and Scientists

Executive Summary

The Doris North Project is located approximately 125 km southwest of Cambridge Bay, Nunavut, on the south shore of Melville Sound. As part of the Doris North Mine infrastructure, a rock jetty was constructed in early July 2007 at the south end of Roberts Bay for barge loading and off-loading.

The jetty was constructed perpendicular to shore and measured 95 m in length, varying in width from 5.3 to 35 m. The construction of the rock structure resulted in the alteration and/or loss of 0.176 ha of fish habitat. To compensate, four underwater rock reefs (or shoals), each measuring 31.25 m long by 12 m wide and spaced approximately 19 m apart, were constructed west of the jetty in 2008. The four compensation shoals were equivalent to 0.150 ha of fish habitat. In combination with the below high-water sideslope area of the jetty (0.164 ha) which would provide additional habitat for fish and invertebrates, the net gain of fish habitat was equivalent to 0.138 ha.

Authorization for the construction of the jetty in Roberts Bay was granted from Transport Canada and the Fisheries and Oceans Canada (DFO) in June 2007. The Fisheries Authorization granted for the construction of the jetty addresses three conditions for monitoring in Roberts Bay;

- the implementation of a sediment transportation and deposition monitoring program;
- a photographic record of construction activities (*completed in 2008*); and
- implementation of a fish habitat monitoring program.

The fish habitat monitoring program was developed to monitor the stability and successful use of fish habitat compensation structures, specifically the jetty and shoals in Roberts Bay. As part of this program, the following components were sampled at the constructed compensation shoals in Roberts Bay and in naturally-occurring shoals in the Reference Bay: periphyton biomass (as chlorophyll *a*), cell density and taxonomic composition; benthic invertebrate density and taxonomic composition; fish community composition and Catch-Per-Unit-Effort (CPUE); and macroalgae community composition and percent cover.

This report summarizes the second year of the fish habitat monitoring program and the third year of the sediment transportation and deposition monitoring program. It is submitted as part of the obligations under Section 5 of the Authorization for Works or Undertakings Affecting Fish Habitat granted by DFO (DFO File No: NU-02-0117).

For the sediment transportation and deposition monitoring program, bathymetric comparisons of Roberts Bay pre-construction and Year-3 post-jetty construction showed similar patterns to what was observed during Year-2 post-jetty comparisons. Changes in bed elevation in Roberts Bay were observed to the north and east of the jetty. Other observations with respect to change in bed elevation may be related to variability of detailed data for that area or steepness of slope.

For the fish habitat monitoring program, year-2 monitoring results confirmed that periphyton and benthic invertebrate communities have established themselves on the compensation shoals in Roberts Bay. Periphyton assemblages were similar between sites, numerically dominated by cyanobacteria and diatoms. The filamentous cyanobacterium, *Anabaena cylindrica*, was the most abundant species in both Roberts Bay and Reference Bay shoals. Although there were some differences in benthic invertebrate abundance and community composition between the compensation and reference shoals, most of the

taxonomic groups that were present at the reference shoals were also observed at the compensation shoals. In both Roberts Bay and Reference Bay, the benthic invertebrate community composition was dominated by amphipods. *Lagunogammarus setosus* was the dominant species at the reference shoals, and *Lagunogammarus setosus* and *Ischyrocerus anguipes* were the most abundant species at the compensation shoals.

From minnow trap and crab trap efforts, a total of 19 fish from two species were captured at the Roberts Bay shoals while 26 fish from four species were captured at the Reference Bay shoals. The jetty, which was only sampled during the July sampling period, yielded a total of 16 fish from two species. Young-of-the-year snailfish were also captured in benthos samples collected from Roberts Bay and Reference Bay. Dominant species varied between sites but remained consistent between sampling periods. Overall, saffron cod and fourhorn sculpin were the dominant species by number for the shoal habitat and side-slopes of the jetty in Roberts Bay. In Reference Bay, fourhorn sculpin dominated the catch.

Snorkel surveys of the compensation structures showed that the shoals appeared to be structurally stable as there were no signs of rock instability. The jetty, specifically the toe of the jetty, continued to show signs of instability as rock material was being scoured away. The jetty walls contained small sections devoid of larger materials and dominated by loose gravel material. In these sections, the gravel material often reached downwards towards a less acute section where larger rocks were often piled up. Modifications to the jetty are planned for the winter of 2011/2012 and are authorized under the Fisheries Authorization for Works or Undertakings Affecting Fish Habitat granted by DFO (DFO File No: NU-10-0028).

Visual surveys of the biota inhabiting the shoals produced comparable results between Roberts Bay and Reference Bay. Various genera of algae, invertebrates and fish were identified to inhabit and/or utilize the compensation and reference structures. Macro-algae were visually more plentiful on the shoals of Reference Bay. This is to be expected given that the compensation structures in Roberts Bay are new habitat and the natural succession of the algal communities is expected to take several years.

Invertebrates of the Order Euphausiacea were the most abundant invertebrate observed throughout the visual surveys conducted in both Roberts Bay and Reference Bay. This shrimp-like crustacean plays a key role in marine food webs as it is known to be a main prey item to many marine vertebrates.

Various species of adult, juvenile and young-of-the-year fish were observed during snorkel surveys in Roberts Bay and Reference Bay. The young-of-the-year fish were the most plentiful fish observed on the compensation structures during early summer snorkel surveys in Roberts Bay. Their abundance shows that the structures provide shelter and/or a food source for fish.

Year-2 of the required fish habitat monitoring program for the compensation features in Roberts Bay continued to show enhancement success as defined in the Doris North No Net Loss Plan. Primary and secondary producers have established themselves on the rock shoals and the side-slopes of the jetty and multiple genera of fish have been observed using the rock shoal and jetty area.

Table of Contents

Rescan™
Engineers and Scientists

DORIS NORTH GOLD MINE PROJECT
2010 ROBERTS BAY JETTY FISHERIES AUTHORIZATION MONITORING REPORT

Table of Contents

List of Figures

FIGURE **PAGE**

List of Tables

TABLE **PAGE**

List of Plates

PLATE **PAGE**

List of Appendices

1. Introduction

1. Introduction

1.1 OVERVIEW

The Doris North Project is located approximately 125 km southwest of Cambridge Bay, Nunavut, on the south shore of Melville Sound (Figure 1.1-1). As part of the Doris North Mine infrastructure, a rock jetty was constructed at the south end of Roberts Bay for barge loading and off-loading.

Authorization for the construction of a jetty in Roberts Bay was granted to Mirarmar Hope Bay Mining Ltd. (MHBL) by Transport Canada and the Department of Fisheries and Oceans (DFO) in June 2007. Hope Bay Mining Limited (HBML), a wholly owned affiliate of the Newmont Mining Corporation, purchased the Doris North Project from MHBL in December 2007. With the purchase, HBML assumed the Fisheries Authorization and its obligations from MHBL on the Doris North Project.

The Fisheries Authorization granted for the construction of the jetty addresses three conditions for monitoring in Roberts Bay;

- the implementation of a sediment transportation and deposition monitoring program;
- a photographic record of construction activities (*completed in 2008*); and
- implementation of a fish habitat monitoring program.

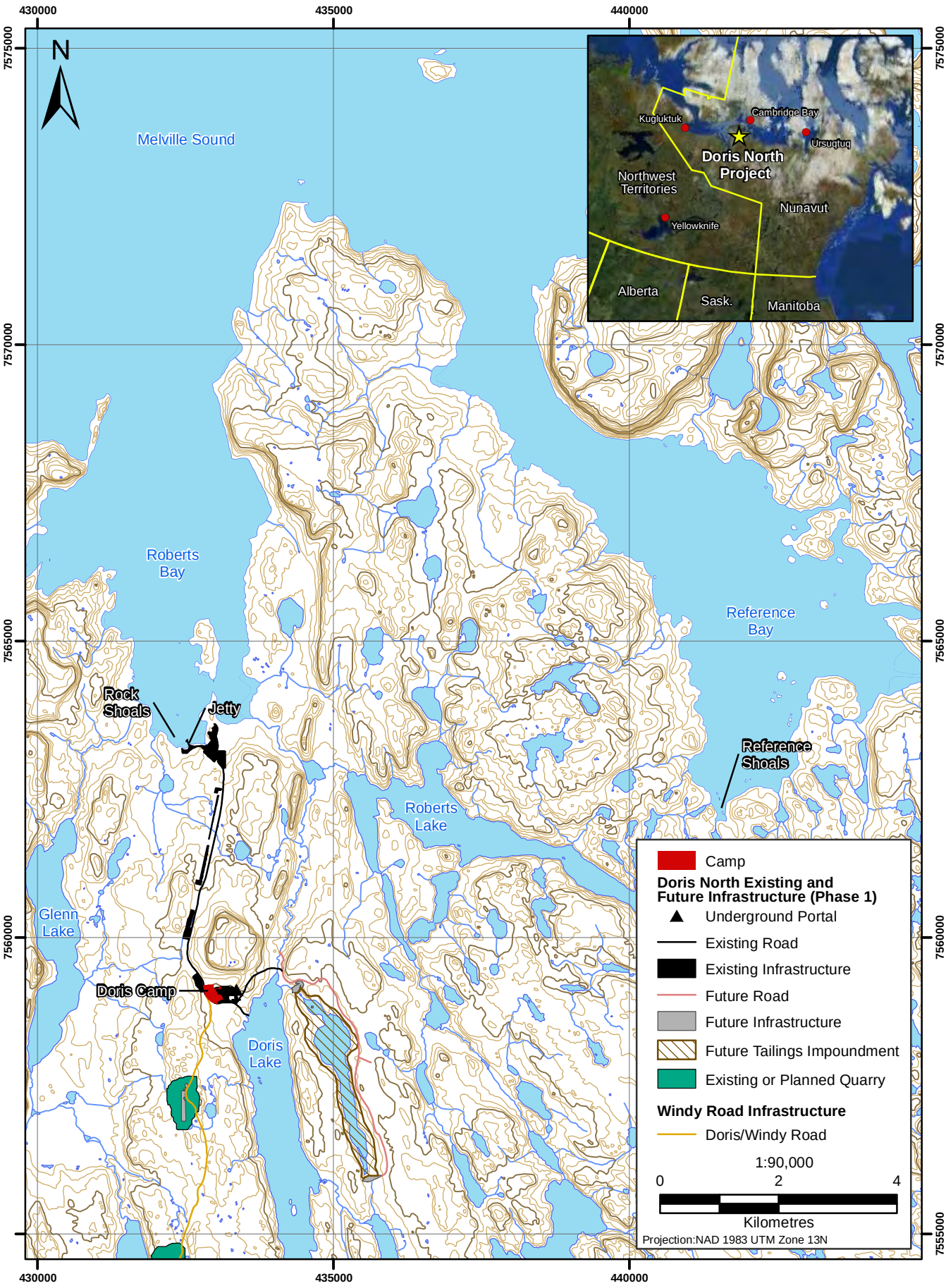
Under Section 35(2) of the Fisheries Act, any project or activity that causes a "harmful alteration, disruption or destruction of fish habitat" (HADD) requires authorization from DFO. Fish habitat is defined by the Fisheries Act as those parts of the environment "on which fish depend, directly or indirectly, in order to carry out their life processes".

This report is intended to fulfill obligations specified in the authorization granted to construct a jetty in Roberts Bay to accommodate barge shipments to the mine (DFO File No: NU-02-0117). The following summarizes the results of the second year of the fish habitat monitoring program and the third year of the sediment transportation and deposition monitoring program. Rescan (2009) reported the results of the first year of fish habitat monitoring and the second year of the sediment transportation and deposition monitoring programs. This report is submitted as part of the obligations under Section 5 of the issued Authorization for Works or Undertakings Affecting Fish Habitat granted by DFO for the Doris North Project (DFO File No: NU-02-0117). The Authorization is included in Appendix 1.1-1.

1.1.1 Compensation Structures

A barge landing jetty was constructed at the south end of Roberts Bay in early July 2007, once ice had melted off the shore. Geotextile material was initially placed on the silt/clay substrate prior to placement of run-of-quarry rock. The rock structure was constructed perpendicular to shore and measured 95 m in length, varying in width from 5.3 to 35 m. Refer to Golder (2007) for construction design and detailed drawings of the "as-built" jetty.

Due to settling and erosion, repairs to the jetty were conducted in September 2008 (Golder 2008).



NEWMONT The Gold Company

Figure 1.1-1

Doris North Project Study Area, 2010

Rescan Engineers & Scientists

The construction of the jetty resulted in the alteration of a clay and silt tidal flat by the addition of rock substrate. The area adversely affected by the construction of the jetty was 0.176 ha. In order to compensate for the altered and lost fish habitat, four underwater rock reefs (or shoals) were constructed in 2008. The four rock shoals were constructed to the west of the jetty and each measured 31.25 m long by 12 m wide. The shoals were placed approximately 19 m apart in depths ranging from one to three meters (Golder 2007). The shoals were constructed with an irregular surface by placing piles of rock on the ice prior to spring thaw. The shoals melted through the ice surface and settled into place by mid-August 2008.

The four compensation shoals are equivalent to 0.150 ha of fish habitat (Golder 2007). In addition, the side slope area of the jetty provided 0.164 ha of habitat for fish and invertebrates below high-water. In the end, the 0.176 ha of lost habitat was offset by a net gain of fish habitat equivalent to 0.138 ha. These compensation shoals were intended as habitat for benthic invertebrates, Arctic char, lake trout, coregonids, and sculpin (Golder 2007).

1.2 DFO AUTHORIZATION

The original Authorization for jetty construction issued in 2007 indicated that fish habitat monitoring programs were to begin in 2008. However, Newmont issued a request to DFO to postpone the 2008 fisheries monitoring program due to the continued settling of the compensation shoals. The request was granted, and the 2007 Authorization was modified and re-issued in 2008. The monitoring requirements and schedule stated in the 2008 Authorization are as follows:

5.1. The approved monitoring plan shall be implemented in the following years: 2009, the year prior to mine construction, Year of mine construction, Year-2 of mine operation, Year-2 of active mine post-closure (i.e., year prior to jetty lowering to below high water level), Year-1 post lowering of jetty, and Year-2 post lowering of jetty. The detailed Monitoring Plan shall include, but not be limited to, the following:

5.1.1. The stability and successful utilization of all compensation features shall be assessed according to the schedule in 5.1 above.

5.1.2. If at any time during the monitoring period, compensation features are not functioning as intended, measures shall be identified to reduce the risk of future failure and additional compensation shall be created to meet the No Net Loss guiding principle using an adaptive management approach.

5.2. A photographic record of before, during and after construction, showing that all works and undertakings have been completed according to the approved Plan and conditions of this Authorization, shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans, Fish Habitat Management, Eastern Arctic Area, on or before, December 31, 2008 and according to the schedule in 5.1 above.

Completed December 2008 (Golder 2008).

5.3. A written report summarizing the above mentioned results shall be submitted to the Iqaluit, NU office of the Department of Fisheries and Oceans – Fish Habitat Management, Eastern Arctic Area on, or before, December 31, 2008 and according to the schedule in 5.1 above.

Completed December 2008 (Golder 2008)

5.4. The effects of the jetty on nearshore sediment transport shall be monitored during the following years: 2008, 2009, Year of mine constriction, Year-2 of mine operations, Year-2

active mine post-closure (i.e., year prior to jetty lowering to below high water level), Year-1 post-lowering of jetty.

The construction monitoring, photographic record, and 2008 sediment transport study report were submitted to DFO in 2008 to fulfill Sections 5.2, 5.3, and 5.4 (Golder 2008). The 2009 sediment transport and fisheries compensation monitoring program report was submitted to DFO in 2009 to fulfill Sections 5.1, 5.3 and 5.4 (Rescan 2009).

The 2010 monitoring program fulfils the requirement to monitor during the year of mine construction, as stated in Sections 5.1 and 5.4 of the Fisheries Authorization (DFO File No: NU-02-0117). The next time that the monitoring programs will be carried out will be in 2013 (Year-2 of mine operation), as operations are anticipated to start in 2012. Hence, no monitoring of the compensation shoals or jetty is anticipated for 2011 or 2012 as part of the Fisheries Authorization granted by DFO in 2008.

Additionally, construction and compensation monitoring programs will be implemented as part of the Fisheries Authorization granted for the Doris North Jetty Improvements planned for the winter of 2011/2012 (DFO File No: NU-10-0028; Appendix 1.1-2). Construction monitoring will be provided in the winter of 2011/2012 before, during and after modifications of the jetty in Roberts Bay. The compensation monitoring program will be implemented in the following years, which allows for the shoals to settle prior to monitoring: 2013 – Year-1 after construction; 2014 – Year-2 after construction; and Year-3 of monitoring in 2015. At mine closure, the monitoring and reporting requirements of the original authorization (DFO File No: NU-02-0117) will be adhered to for the jetty improvements work and compensation.

1.3 OBJECTIVES

The objectives of the 2010 monitoring program were as follows:

1. To comply with the required "Year of Mine Construction" monitoring, as outlined in the Fisheries Authorization;
2. To carry out the sediment transportation and deposition monitoring program, which included:
    - characterizing deposition changes from sediment transport along the Roberts Bay shoreline adjacent to the jetty; and,
    - documenting the general state and stability of the compensation structures in Roberts Bay.
3. To carry out the fish habitat monitoring program, which included:
    - recording the establishment of primary and secondary producers at the four compensation shoals in Roberts Bay and compare to natural shoals in Reference Bay; and,
    - recording fish presence on the compensation structures in Roberts Bay and natural shoals in Reference Bay.

2. Methods

2. Methods

2.1 SEDIMENT TRANSPORT AND DEPOSITION

A bathymetric survey of southern Roberts Bay was conducted in 2010 to compare to bathymetric maps constructed in previous years, specifically prior to jetty construction (2006) and the years following jetty construction (Golder 2008; Rescan 2009). Monitoring conducted in 2010 fulfilled the requirement to monitor during the year of mine construction, as outlined in the Fisheries Authorization (DFO File No: NU-02-0117).

A bathymetric survey of the area in Roberts Bay adjacent to the compensation shoals and jetty was performed on July 26 and 27, 2010. Depth measurements were made with a digital echo sounding system that consisted of a BioSonics DTX scientific echo sounder with a 6.7°, 201 kHz transducer, a computer to control the sounder and record data, and a Garmin GPSmap 182 differential GPS to geo-code data as they were collected (Table 2.1-1). The map datum used for all sampling and analysis was NAD83. The transducer was mounted on a pole, pointed downward, with its face 56 cm below the water surface. During the survey, an electronic monitor continuously measured and recorded the water level at the jetty to allow correction of soundings for tidal influences.

Table 2.1-1. Acoustic System Specifications for Collection of Bathymetric and Bottom Type Data from Roberts Bay, 2010

Category	Variable	Value
Echo Sounder	type	BioSonics DTX
Transducer	type	BioSonics split-beam
	sound frequency	201 kHz
	nominal beam angle	6.7°
	depth of transducer face	0.40 m
Settings	pulse width	0.4 msec
	transmit power level	low (-10.3 dB)
	data collection threshold minimum data range	-100 dB 0.5 m
	time varied threshold	40 log R
DGPS	ping rate type	5 pps WAAS-differential[1]
	datum	NAD83
Other	transecting speed	1.4–1.9 m/s

[1] *A WAAS satellite signal was received during sampling with typical nominal position accuracy of 2 to 3 m.*

Soundings were made continuously as the boat moved along transects at 1 to 2 m/s. A depth calibration performed during the survey using a target suspended at known distances 2 to 8 m below the transducer showed an error of ≤ 0.6% (range of values = -0.6 to 0.5%, or -0.1 to 3.8 cm deviation from known depths). During the shoals and jetty survey, nominal position accuracy of the GPS (indicated by the instrument) was 2 to 3 m.

After the survey, digital data files were processed using Myriax Echoview software to track the bottom, measure water depths, and create ASCII files of depths and geo-coordinates. Depth computations in

Echoview adjusted sound velocity using average water column values of 10.8°C, pH 7.9, and a salinity of 21.1 ppt. These measurements were taken by CTD probe in Roberts Bay for unrelated periodic water quality monitoring on August 15, 2010. Depths in Echoview output files were corrected for the depth of the transducer face below the water surface and for aquatic plants where present (i.e., reported depths are to the substrate rather than to the top of plants).

Additional bathymetry line transects were conducted to fill in the gaps of any data that could not be collected using the above-noted technique due to a combination of shallow water depths and unfavourable weather conditions. Where possible, the boat was used to travel a straight transect from east to west along the southern portion of Roberts Bay. Where boat access was not possible, water depths were measured by wading. A meter stick and GPS were used to manually read and record water depths every 5 to 20 m.

All data collected during the bathymetric surveys were corrected for tide effects and were referenced to an onshore benchmark (Table 2.1-2). The standardized data were imported into ArcGIS software to create the bathymetric maps. Displacement between depth data from the manual and echo sounding surveys were approximately 5–20 m and 0.25 m, respectively. To minimize interpolation effect on the more widely distributed data and avoid excessive grouping of closely spaced data, values interpolated from a Triangulated Irregular Network created using 3D Analyst were used to supplement the more widely spaced manual survey data with points at a minimum of every 7.5 m. These interpolated points were combined with the manual survey depth data, the echo sounding survey data, depths from sampling done near the jetty and compensation shoals and a shoreline (based on SRK CAD file Jetty As-built Plan and Sec.dwg). This data was used in a Topo to Raster tool in the Spatial Analyst extension to create a grid of 1 m by 1 m cells and produce a map of predicted depths. For bathymetric comparisons between years, the digital elevation models for the bathymetry of the years in question were subtracted from one another using the raster calculator in the spatial analysis extension of ArcGIS. Outputs were divided into 0.25 m classes to represent change in depths.

Table 2.1-2. Benchmark and Tide Gauge Location and Elevation, Doris North Project, 2010

Location	UTM Coordinates (Zone 13 NAD 83)		Elevation (m)
Benchmark	432337 E	7563181 N	1.180
Tide Gauge	432212 E	7563352 N	-0.922

Detailed comparisons of the results of the 2010 bathymetric survey with those of 2006, 2008 and 2009 for specific areas, such as the compensation structures, were conducted to assess sediment transport and deposition in the Roberts Bay area. Bathymetric data from 2006 and 2008 was provided by Golder Associates. Some manual depth from 2010 (nearshore) were excluded from 2006 and 2008 comparison maps because the area was not covered during bathymetric surveys conducted during those years. Nearshore data was included for 2009 and 2010 bathymetric comparisons.

2.2 FISH HABITAT MONITORING

The Doris Jetty fish habitat compensation structures were monitored for fish use as specified by the Doris North Project "No Net Loss" Plan (Golder 2007). The 2010 monitoring program met the outlined requirements for the year of mine construction, as outlined in the Fisheries Authorization (DFO File No: NU-02-0117).

Shoals constructed for fish habitat compensation west of the Doris Jetty were monitored using a Control/Impact design. The constructed shoals and rip-rap along the sideslope of the jetty are

classified as the impacted study area (Plate 2.2-1). Meanwhile, a control study site was established in Reference Bay in 2009, based on two conditions; (1) the site was a good representation of the habitat of the jetty and constructed shoals (i.e., similar substrate and depth), and (2) it would not be impacted by future mining activities (Figure 1.1-1; Plate 2.2-2).

Plate 2.2-1. Aerial view of constructed shoals in Roberts Bay, Doris North Project (2009).

The control and impact sites were assessed for fish use twice during the open water season in 2010. The first assessment took place from July 9 to 23, when the ice first thawed. The second assessment took place from August 20 to 31, during the summer growing season. Each sampling period captured different life-stages of the species that use the marine environment.

2.2.1 Primary and Secondary Producers

The colonization of the four compensation shoals and reference shoals was assessed by measuring the recruitment of primary and secondary producers. Both periphyton and benthic macroinvertebrates are fundamental components of marine food webs, specifically as food for marine fish.

2.2.1.1 Periphyton

Periphyton samples were obtained using submerged 10 cm x 10 cm Plexiglas plates affixed to an artificial substrate sampler (Plate 2.2-3). Two Plexiglas plates were affixed to each artificial sampler and five replicate samplers were submerged at each of the four compensation shoals and reference shoals (Figures 2.2-1 and 2.2-2). Samplers were immersed for 46 to 51 days. They were deployed between July 11 and 12, 2010, and retrieved between August 26 and 30, 2010.

Plate 2.2-2. Aerial view of reference shoals in Reference Bay, Doris North Project (2009).

Plate 2.2-3. Artificial substrate sampler with attached periphyton Plexiglas plates submerged on a shoal in the Reference Bay, Doris North Project (2009).

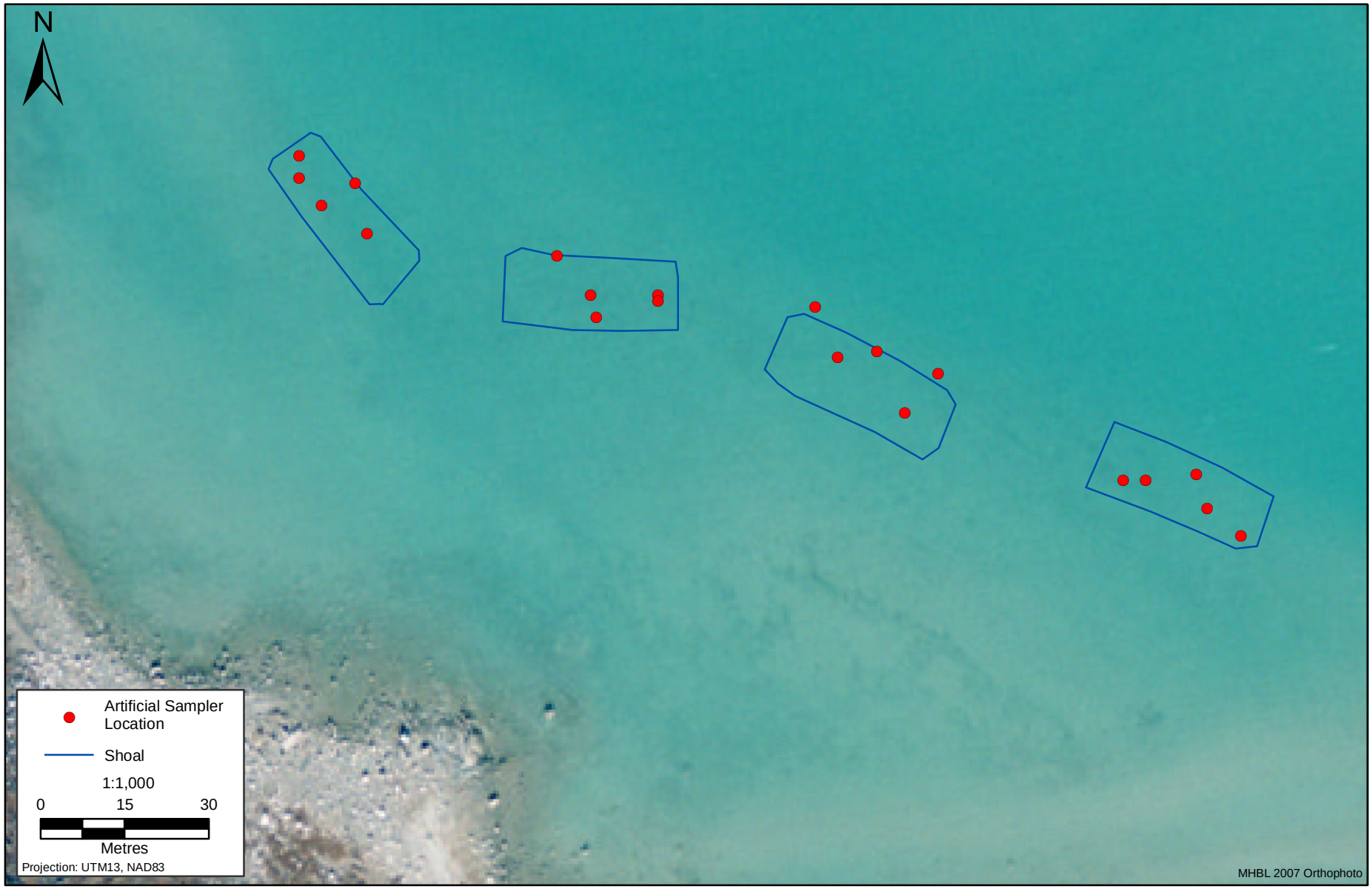


Figure 2.2-1

NEWMONT NORTH AMERICA

Periphyton and Benthic Invertebrate Sampling Sites in Roberts Bay, Doris North Project, 2010

Figure 2.2-1

Rescan Engineers & Scientists

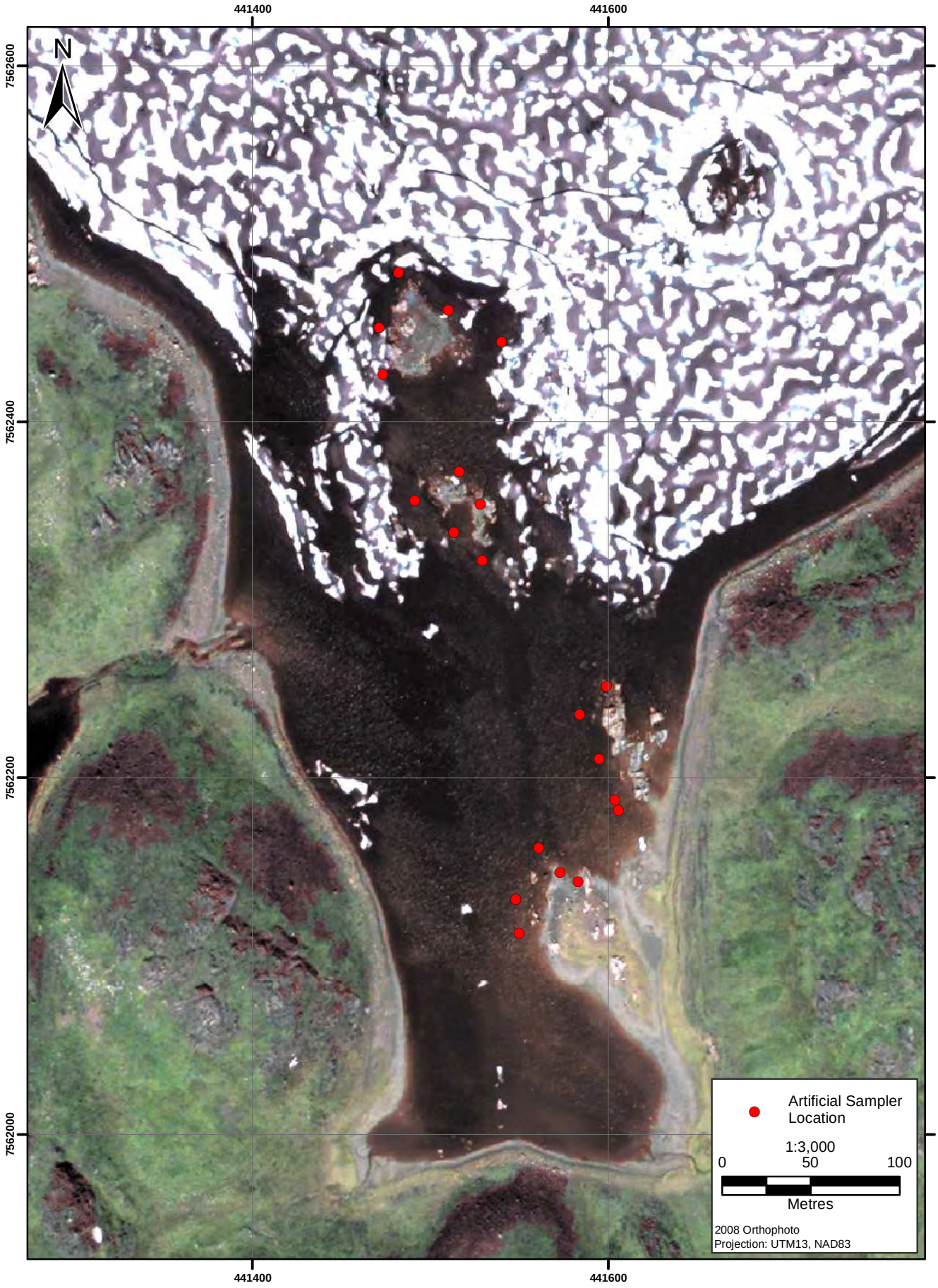


Figure 2.2-2

Periphyton and Benthic Invertebrate Sampling Sites in Reference Bay, Doris North Project, 2010

NEWMONT NORTH AMERICA

Rescan Engineers & Scientists

Periphyton biomass (as chlorophyll *a*), density, and taxonomic composition were measured from samples collected from the Plexiglas plates. Periphyton was collected from 50% (50 cm^2) of a plate's surface for biomass estimation (as chlorophyll *a*); the remaining 50% of the plate's surface was discarded. From the second Plexiglass plate, the entire surface (100 cm^2) was collected for taxonomic identification and density estimation.

Biomass and taxonomy samples were collected and processed by gently scraping the appropriate portion of each plate with a plastic scrapper. Using filtered salt water (Pall Corporation 47 mm cellulose ester filters with 0.45 micron porosity), the collected periphyton was rinsed into labelled plastic jars. Chlorophyll a samples were filtered onto Pall Corporation 47 mm cellulose ester filters (0.45 micron porosity) using a vacuum filtration apparatus. Filters were then folded, wrapped in foil and kept in an ice packed cooler till they could be frozen back at camp. All biomass samples were sent to ALS Environmental Services (Vancouver, BC) for analysis. Taxonomy samples were preserved in the field with Lugol's Iodine to a weak tea colour and sent to EcoAnalysts (Moscow, Idaho, USA) for identification and enumeration.

Periphyton biomass was expressed as the weight of chlorophyll a per area of plate scraped (g chl *a*/cm^2), while periphyton density was expressed as the number of cells per are of plate scraped (#/cm^2).

2.2.1.2 Benthic Invertebrates

Benthic macroinvertebrate communities ("benthos") were sampled concurrently with periphyton, using artificial substrate samplers (Plate 2.2-3). The samplers consisted of a cylindrical cage which was 30 cm long and 17 cm in diameter that was approximately 50% filled with rocks of similar size (large gravel and small cobble); therefore, differences is substrate surface size are assumed to be minimal. Rocks used were collected from the shoreline (above the high-tide mark) of the area in which they were deployed. The samplers were placed on the shoals (5 replicates per shoal) in Roberts Bay and at the Reference Bay (Figures 2.2-1 and 2.2-2). Samplers were immersed for 46 to 51 days. They were deployed between July 11 and 12, 2010, and retrieved between August 26 and 30, 2010.

Immediately prior to the artificial samplers being retrieved, a 20 L bucket was submerged below the water's surface. Samplers were retrieved off the bottom substrate and placed in the water-filled bucket prior to being pulled out of water and onto the boat. This minimized the potential of any invertebrates in the sampler being dislodged when breaking the surface of the water. The cage and rocks of each sampler were rinsed in a bucket with filtered (500 µm) salt water. Benthic invertebrate samples were sieved onto a 500 µm mesh, placed in a 500 mL plastic jar and preserved in a 10% buffered formalin-seawater solution. The jars were labelled, sealed and sent to Columbia Science (Courtenay, BC) for identification and enumeration. Benthos abundance was expressed as the number of organisms per trap.

2.2.1.3 Fish Community

The compensation structures in Roberts Bay and reference shoals in Reference Bay were sampled for fish during July and August 2010. The fish community at the jetty was only sampled during the July sampling period because increased barge activity at the jetty compromised personal safety and gear integrity in late August. Each site was sampled using a combination of minnow traps and crab traps. Gillnets and long lines were not used in 2010 because this gear does not directly sample fish use of the structures. Table 2.2-1 shows the sampling dates and effort for the compensation structures in Roberts Bay and the reference shoals in Reference Bay.

Table 2.2-1. Sampling Dates and Effort for Fish Community Surveys Conducted in Roberts Bay and Reference Bay, Doris North Project, 2010

Location	Site	Date	Number of Minnow Traps	Number of Crab Traps
Roberts Bay	Shoal	July 17–19	60	12
Roberts Bay	Shoal	Aug 23–25	60	12
Roberts Bay	Jetty	July 17–19	30	15
Reference Bay	Shoal	July 12, 14, 15	60	12
Reference Bay	Shoal	Aug 28–30	60	12

All sampling was done from either an aluminum 5.8-m long boat with a 70-horsepower outboard engine or a flat-bottom aluminum 5.4-m long landing craft equipped with an 80-horsepower outboard motor. The UTM of each gear set was recorded with a handheld GPS. Average depths at which gear was fished were recorded with a depth sounder. The times of installation and retrieval of each gear were recorded.

Minnow Traps

Minnow traps were used to sample juvenile and small forage fish. The minnow traps consisted of two 6.3 mm galvanized metal mesh cylinders measuring 42 cm long and 23 cm in diameter, both having a 2 cm diameter opening. The cylinders were locked together using a clip attached to a rope and buoy. Each minnow trap was baited with a small amount of dry, commercial crab bait.

Minnow traps were placed on the substrate of the constructed structures and on the reference shoals. Traps were left to soak overnight and retrieved the following day. Figures 2.2-3 to 2.2-7 show the position of minnow traps set in Roberts Bay and Reference Bay.

Crab Traps

Crab traps were used to sample large-bodied invertebrates (e.g., crabs, isopods) but also captured fish. The crab trap consisted of a collapsible, spring-loaded rectangular stainless steel frame with mesh netting and two gate style entrances. When open, the trap measured 30 cm x 42 cm x 80 cm. The trap gate measured 22 cm (horizontal) by 8 cm (vertical). Each trap was attached to a rope and buoy and baited with a piece of raw fish and a small amount of dry crab bait in a bait box fastened inside the trap.

Traps were placed on the substrate of the constructed structures and on the reference shoals. Traps were left to soak overnight and retrieved the following day. Figures 2.2-3 to 2.2-7 show the position of crab traps set in Roberts Bay and Reference Bay.

2.2.1.4 Sample Processing

Captured fish were immediately placed in a water-filled plastic tub until they could be processed and released. All fish were assigned a unique sample number, identified to species, measured for fork length to the nearest 1 mm and weighed to the nearest 0.1 g with an electronic scale. Fish were also sampled for aging structures (i.e., scales and fin rays). Scales were collected below the posterior margin of the dorsal fin on the left side of the fish using the tip of scalpel blade. Two to three rays of the left pelvic fin were collected with clippers. Aging structures were placed in envelopes, labelled with the site, date, species and sample number and shipped to North Shore Environmental Services (Thunder Bay, ON) for age analysis. All fish were immediately released back into the water alive.

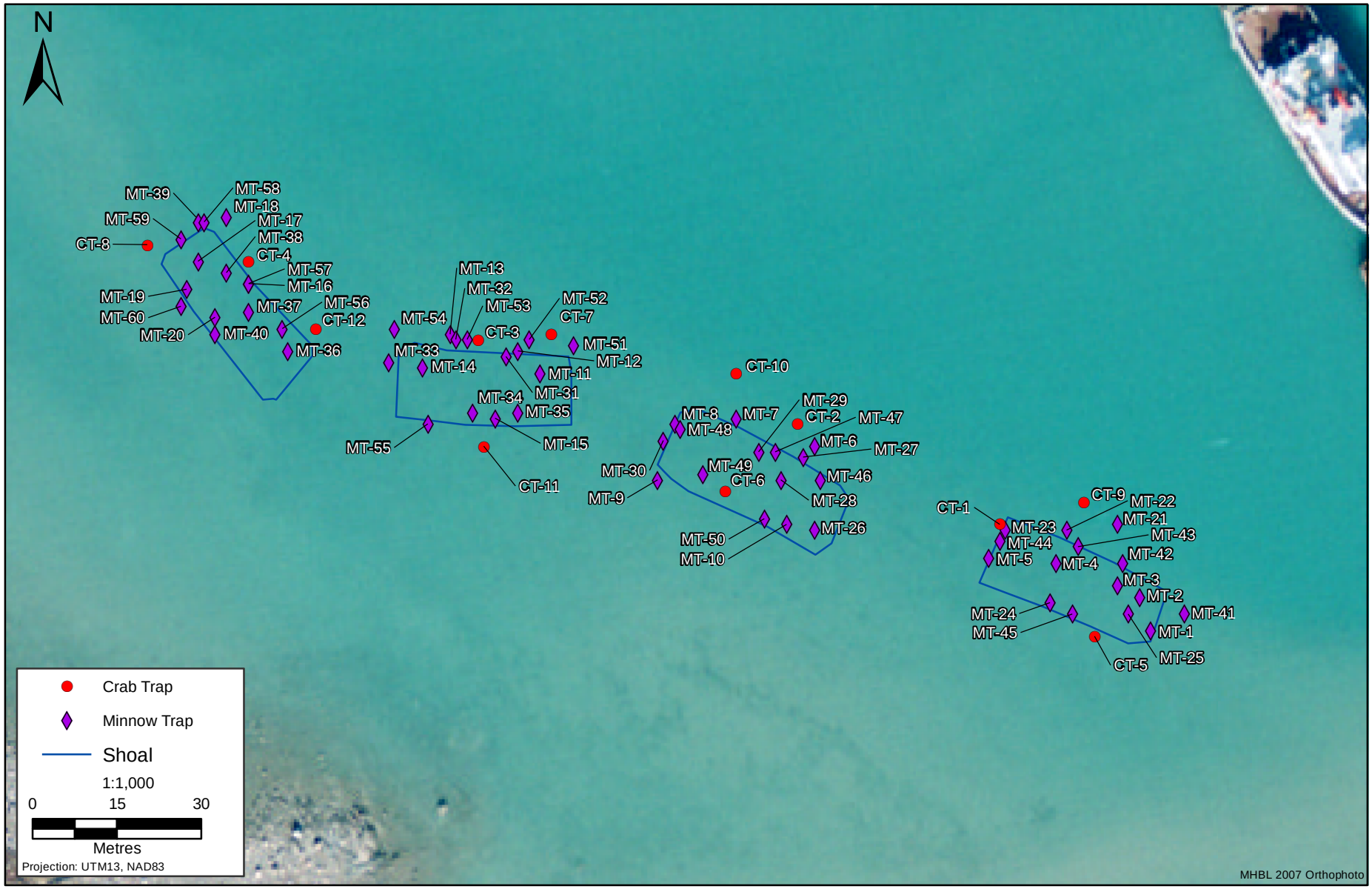


Figure 2.2-3

NEWMONT The Gold Company

Minnow Trap and Crab Trap Locations in Roberts Bay during the July Fish Community Survey of the Compensation Shoals, Doris North Project, 2010

Figure 2.2-3

Rescan Engineers & Scientists