REPORT

Mary River Project

2020 Milne Ore Dock Fish Offset Monitoring Report

Fisheries Act Authorization 14-HCAA-00525

Submitted to:

Fisheries and Oceans Canada
Fisheries Protection Program
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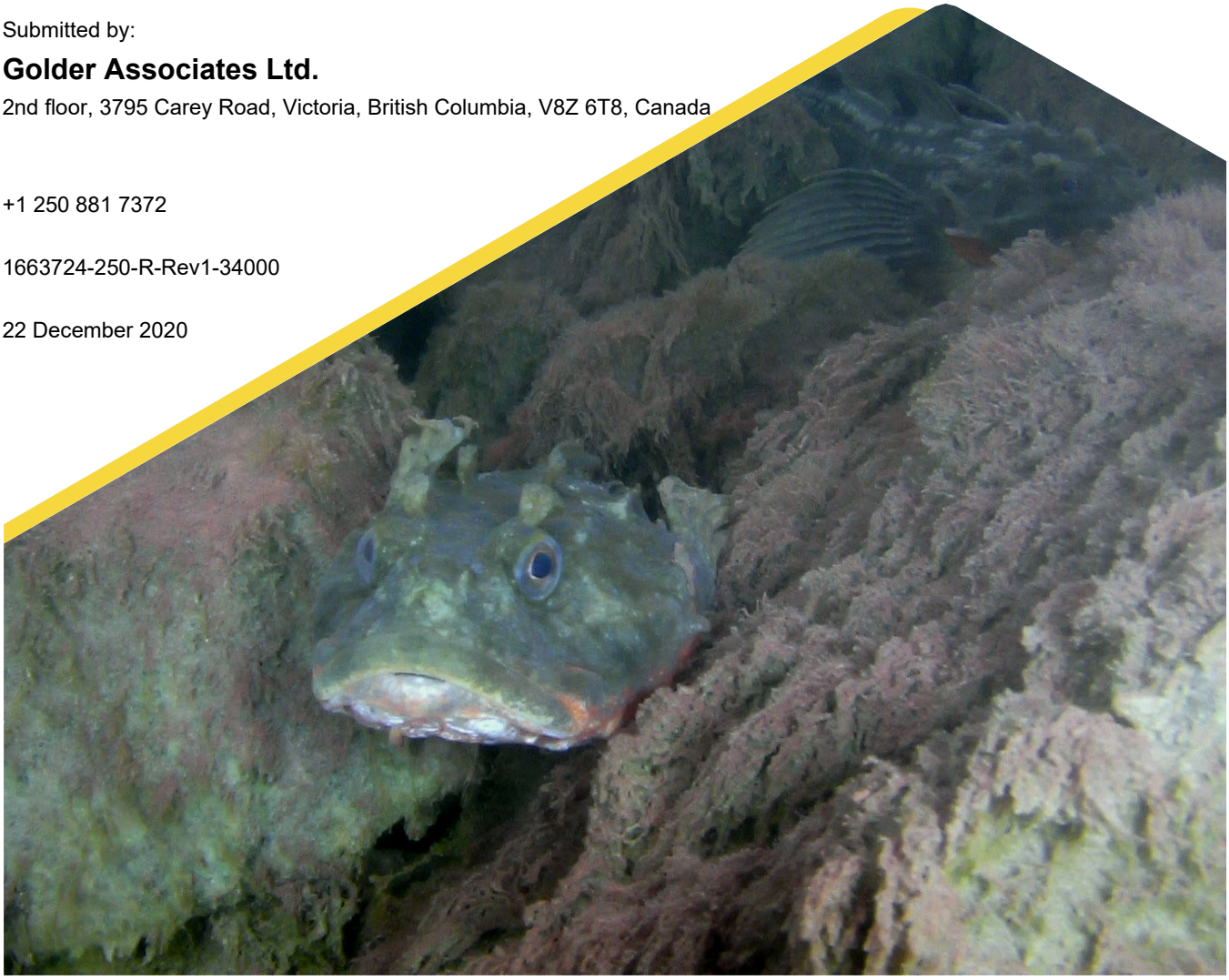


Distribution List

Fisheries and Oceans Canada

Executive Summary

The 2020 habitat offset monitoring program was designed to fulfill the final year of monitoring requirements under Sections 7.1 and 7.2 of *Fisheries Act* Authorization (FAA)# 14-HCAA-00525. Monitoring included the use of a remotely operated vehicle (ROV) with an underwater camera to document the types and percent cover of vegetation and invertebrates associated with the coarse rock substrate of the created offset habitat. The ROV was also used to evaluate the production of encrusting epifauna in the offset habitat, and to document the types and numbers of fish observed in the vicinity. A summary of the requirements and monitoring outcomes is provided in Table 1.

The coarse rock substrate was observed to be stable, with no indications of slumping or deterioration. Colonization of aquatic vegetation and benthic invertebrates was observed, with percent cover, species richness and abundances generally increasing over the monitoring period from 2015 to 2020, reflecting natural succession patterns. The continued presence of kelp and other perennial algae on the coarse rock substrate suggests the coarse rock is stable enough to provide sufficient habitat for the colonization and growth of large perennial and canopy forming aquatic vegetation species which, in turn, provide greater cover and habitat complexity for fish and invertebrates utilizing the habitat.

Fish association with the coarse rock habitat was also monitored using the ROV and supplemented by active fishing efforts. Over the monitoring period, increases in the number and diversity of associated fish, as well as observations of fish using the habitat for foraging and protection indicate the coarse rock substrate is functioning as fish habitat.

In the sixth and final year of monitoring for the Ore Dock offset habitat, macroalgal cover, invertebrate abundances and fish usage of the habitat were all determined to meet the permitted requirements. The offsetting measures are complete and functioning according to the prescribed criteria. Overall, the coarse rock offset is considered stable, high quality fish habitat that is functioning in accordance with conditions set out in FAA #14-HCAA-00525, and as designed in the Fish Offset Plan, such that contingency measures or modifications are not required.

Table 1: Outcome of Requirements under FAA# 14-HCAA-00525

FAA Requirement	Requirement Met (Yes/No)	Overall Outcome
6.1 - Coarse rock substrate will be placed around the perimeter of the ore dock and moorings at Milne Inlet to provide 6003 HEU of fish habitat.	Yes	Creation of fish habitat completed July 2015 and accepted by DFO (SEM 2015).
6.2 - All fish habitat offsetting measures shall be completed and functioning according to the criteria below by December 31, 2020. **6.2.1** - Coarse rock substrate will provide additional habitat for benthic invertebrates and fish species in Milne Inlet. **6.2.2** - Colonization of the rock substrate by algae and aquatic vegetation to provide a food source for benthic invertebrates and fish.	Yes	The coarse rock substrate is providing additional habitat and food sources for benthic invertebrates and fish species.
6.3 - If the results of monitoring as required in condition 7 indicate that the offsetting measures are not completed by the date specified in condition 6.2, the Proponent shall give written notice to DFO and put in place contingency measures specified in condition 6.5 and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and functioning as required by this authorization.	N/A	Written notice was not required, results of monitoring under Condition 7 indicate offset measures are complete.
6.4 - If monitoring identifies deterioration in the structure, plans will be developed to repair and reinforce these areas. Annual monitoring (drop camera) will be adjusted to include repaired locations and will continue for a period of three years following any repairs.	N/A	No deterioration of the structure was observed during monitoring
6.5 - If no quantifiable increase in use of the rock substrate by fish, benthic invertebrates or aquatic vegetation is detected by year 6 the following contingency measures will be undertaken.	N/A	A quantifiable increase in the colonization and use of the coarse rock substrate by fish, benthic invertebrates

FAA Requirement	Requirement Met (Yes/No)	Overall Outcome
6.5.1 - The Proponent will create an additional 6005 HEU of artificial reefs outside the zone of influence of the ore dock within Milne Inlet.		and aquatic vegetation was observed by Year 6. Contingency measures are not required.
6.6 - To ensure that the above offsetting contingency measures are functioning as intended the monitoring program described in Condition 7 shall be carried out.	Yes	The monitoring program described in Condition 7 was carried out from 2015 to 2020.
6.7 - Offsetting measures shall be left undisturbed, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.	Yes	No work, undertaking or activity has occurred that adversely disturbed or impacted the offsetting measures.
7.1.1 - During Year 1, 3 and 5 the integrity of the coarse rock substrate will be monitored using video surveys.	Yes	Integrity of the coarse rock substrate was monitored in Year 1, Year 3 and Year 5.
7.1.2 - During Year 2, 4 and 6, video surveys of the coarse rock substrate will be used to document the types and percent coverage of aquatic vegetation colonizing the substrate. Benthic invertebrates and fish will be identified and quantified.	Yes	Type and percent cover of colonizing aquatic vegetation was monitored in Year 2 and Year 4 and Year 6.
7.1.3 - The production of benthic invertebrates and the occurrence of fish larva will be monitored by setting artificial and natural substrate collection baskets in the vicinity of the coarse substrate.	Yes	Artificial and natural substrate was used to monitor benthic invertebrates and fish larvae in Year 4 and Year 5. †
7.1.4 - Continuous video monitoring of the rock substrate shall be undertaken to demonstrate the association of fish with the rock substrate.	Yes	Video monitoring demonstrated association of fish with the rock substrate.

†Settlement basket monitoring was not completed in Years 1, 2 or 3 due to insufficient colonization and loss of settlement baskets deployed in Year 1 (SEM 2016). Settlement baskets were not redeployed in 2019; therefore, results were not available for 2020.

Table of Contents

TABLES

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviations	Definition
Baffinland	Baffinland Iron Mines Corporation
Biologica	Biologica Environmental Services Ltd
CRA Fishery	Commercial, Recreational or Aboriginal Fishery
DFO	Fisheries and Oceans Canada
ERP	Early Revenue Phase
FAA	*Fisheries Act* Authorization
GPS	Global Positioning System
HEU	Habitat Equivalent Units
Indet.	Indeterminate
m^2	Square metres
MEEMP	Marine Environmental Effects Monitoring Program
Mtpa	Million Tonnes per Annum
NIRB	Nunavut Impact Review Board
ROV	Remotely Operated Vehicle
SEM	Sikumiut Environmental Management Limited
sp.	Species
The Project	Mary River Project
The Proponent	Baffinland Iron Mines Corporation
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland, the Proponent) is currently operating in the Early Revenue Phase (ERP) of the Mary River Project (the Project), an iron ore mine located in the Qikiqtani Region of Nunavut, Canada. Project Certificate No. 005, amended by the Nunavut Impact Review Board (NIRB) on 18 June 2020 (Amendment No. 03), authorizes the Company to mine up to 22.2 million tonnes per annum (Mtpa) of iron ore from Deposit No. 1. Of the 22.2 Mtpa, Baffinland is authorized to transport 6.0 Mtpa of ore by truck to Milne Port for shipping through the Northern Shipping Route using chartered ore carrier vessels until December 31, 2021 (Condition 179(a)).

During the environmental assessment for the Project, the proposed infilling of the marine environment resulting from construction of the Ore Dock at Milne Port was predicted to result in the permanent loss of 24,847 m^2 of marine fish habitat, or 6,003 Habitat Equivalent Units. It was subsequently determined by Fisheries and Oceans Canada (DFO) that the habitat loss associated with the Ore Dock placement would result in serious harm to fish that are considered part of a commercial, recreational or Aboriginal (CRA) fishery, or a permanent change to ecosystem productivity that supports such a fishery and, as such, offsetting measures would be required.

Baffinland submitted to DFO an application for an authorization under paragraph 35(2)(b) of the *Fisheries Act* for installation of the Ore Dock. DFO issued the *Fisheries Act* Authorization (FAA) (#14-HCAA-00525) for the Ore Dock on 30 June 2014 (Appendix A). The FAA required Baffinland to undertake monitoring and reporting of the structural stability and biological utilization of offsetting measures at the Milne Port Ore Dock, in accordance with Section 7 of the FAA, which states the following:

- 7.1 - The Proponent shall conduct monitoring of the habitat offsetting measures according to the approved schedule and criteria below:
  - 7.1.1 - During Year 1 (i.e., 2015), 3 and 5, the integrity of the coarse rock substrate will be monitored using video surveys (drop camera). All information will be geo-referenced and any slumping or other deteriorations will be documented and repaired as necessary.
  - 7.1.2 - During Year 2, 4 and 6 (i.e., 2020), video surveys (drop camera) of the coarse rock substrate will be used to document the types and percent coverage of the aquatic vegetation colonizing the substrate. Benthic invertebrates and fish recorded in the video will be identified and quantified.
  - 7.1.3 - The production of benthic invertebrates and the occurrence of fish larva will be monitored by setting artificial and natural substrate collection baskets in the vicinity of the coarse substrate.
  - 7.1.4 - Continuous video monitoring of the rock substrate shall be undertaken to demonstrate the association of fish with the rock substrate.
- 7.2 - The Proponent shall report to DFO that the offsetting works were conducted according to the conditions of this Authorization by providing the following:
  - 7.2.1 - Monitoring report shall be submitted to the DFO-Yellowknife Office by December 31 of each year monitoring is carried out.

Under Section 6 of the FAA, additional conditions applicable to Year 6, the final year of monitoring, included:

- 6.1 - Coarse rock substrate will be placed around the perimeter of the ore dock and moorings at Milne Inlet to provide 6003 HEU of fish habitat.
- 6.2 - All fish habitat offsetting measures shall be completed and functioning according to the criteria below by December 31, 2020.
  - 6.2.1 - Coarse rock substrate will provide additional habitat for benthic invertebrates and fish species in Milne Inlet.
  - 6.2.2 - Colonization of the rock substrate by algae and aquatic vegetation to provide a food source for benthic invertebrates and fish.
- 6.3 - If the results of monitoring as required in condition 7 indicate that the offsetting measures are not completed by the date specified in condition 6.2, the Proponent shall give written notice to DFO and put in place contingency measures specified in condition 6.5 and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and functioning as required by this authorization.
- 6.4 - If monitoring identifies deterioration in the structure, plans will be developed to repair and reinforce these areas. Annual monitoring (drop camera) will be adjusted to include repaired locations and will continue for a period of three years following any repairs.
- 6.5 - If no quantifiable increase in use of the rock substrate by fish, benthic invertebrates or aquatic vegetation is detected by year 6 the following contingency measures will be undertaken.
  - 6.5.1 - The Proponent will create an additional 6005 HEU of artificial reefs outside the zone of influence of the ore dock within Milne Inlet.
- 6.6 - To ensure that the above offsetting contingency measures are functioning as intended the monitoring program described in Condition 7 shall be carried out.
- 6.7 - Offsetting measures shall be left undisturbed, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

Monitoring the effectiveness of the Milne Port Ore Dock offset habitat began in 2015 (i.e., Year 1) and continued annually in accordance with monitoring requirements outlined in FAA #14-HCAA-00525. Additionally, marine biophysical monitoring has been conducted annually at Milne Port since 2014 as part of Baffinland's Marine Environmental Effects Monitoring Program (MEEMP). A summary of the habitat offset monitoring surveys performed since 2015 is presented in Table 2. Sikumiut Environmental Management Limited (SEM) conducted Year 1 (2015) and Year 2 (2016) of habitat offset monitoring on behalf of Baffinland, with results presented in Baffinland's annual fish offset monitoring reports (SEM 2015; 2017a). Golder Associates Ltd. (Golder) completed Year 3, Year 4 and Year 5 of habitat offset monitoring on behalf of Baffinland (Golder 2017; Golder 2018; Golder 2019). This report presents the results of the final year (i.e., Year 6) of monitoring completed as prescribed in the FAA undertaken by Golder in Milne Port during the shipping season of 2020. Habitat offset monitoring completed in Year 6 completes the monitoring conditions prescribed in the FAA, and contributes additional information related to observations of functional offset habitat in support of future offset monitoring in Milne Port. Additional

information related to fish presence in Milne Port will also be provided in the 2020 MEEMP technical data report, scheduled for delivery in March 2021. A more extensive overview of the regulatory context for the FAA is provided in SEM's 2016 habitat offset monitoring report (SEM 2017a).

Table 2: Summary of Offset Habitat Monitoring Activities Presented by Survey Year

Sampling Method	FAA Condition	Monitoring Year					
		1 (2015)	2 (2016)	3 (2017)	4 (2018)	5 (2019)	6 (2020)
Video Surveys							
Structural Integrity	7.1.1	√		√		√	
Vegetation (Presence)	7.1.2		√	√	√	√	√
Vegetation (Type, Coverage)	7.1.2		√		√		√
Benthic Invertebrate (Presence)	7.1.2		√	√	√	√	√
Benthic Invertebrate (Identification, Quantification)	7.1.2		√		√		√
Fish (Identification, Quantification)	7.1.2		√		√	√	√
Fish (Association with Habitat)	7.1.4	√	√	√	√	√	√
Artificial Substrate							
Benthic Invertebrate (Production)	7.1.3	*	*	*	√	√	**
Fish Larvae (Production)	7.1.3	*	*	*	√	√	**
Other Sampling Methods to Inform Productivity							
Active Fish Sampling (Identification, Quantification)	7.1.2		√	√	√	√	√
Zooplankton Tows (Fish Larvae)	7.1.3		√		√		√

* In 2015, offset monitoring was performed 34 days after completion of construction. Settlement substrates were deployed at this time to meet future monitoring requirements. Settlement basket monitoring was not completed in Years 2 or 3 due to insufficient colonization and loss of settlement baskets deployed in Year 1 (SEM 2016).
** In 2019, the settlement baskets were lost. Replacement settlement substrate was not available to deploy in time for retrieval in the 2020 program.

2.0 OBJECTIVE

In accordance with FAA #14-HCAA-00525, the objective of the 2020 Milne Port Ore Dock Fish Offset Monitoring Program was to complete the final year of habitat offset monitoring as prescribed by DFO, which included the following tasks:

- Documenting the types and percent cover of aquatic vegetation on the coarse rock substrate using video surveys, in addition to identification and quantification of the benthic invertebrates and fish species (FAA Condition 7.1.2).
- Monitoring the production of benthic invertebrates and the occurrence of fish larvae by setting artificial and natural substrate collection baskets in the vicinity of the coarse substrate (FAA Condition 7.1.3).
- Undertaking continuous video monitoring of the rock substrate to demonstrate the association of fish with the rock substrate (FAA Condition 7.1.4).

3.0 METHODS

Habitat offset monitoring was conducted from 30 July 2020 to 14 August 2020. The monitoring team consisted of seven Golder biologists, a dedicated vessel operator (Golder), and a remotely operated vehicle (ROV) technician (Ocean Dynamics). Field sampling was conducted from a 30-foot aluminum research vessel and a 16-foot inflatable boat based out of the Milne Port Facility. The following scientific data collection permits were obtained from the Nunavut and federal governments prior to the start of the monitoring program (Appendix B):

- DFO Licence to Fish for Scientific Purposes Permit #: S-20/21-1006-NU
- DFO Animal Use Protocol Permit # FWI-ACC-2020-41
- Nunavut Research Institute Scientific Research Licence # 02 065 20R-M

3.1 Aquatic Vegetation on Offset Habitat

Underwater video was collected along transects on the offset habitat to assess the types and percent cover of aquatic vegetation in accordance with Condition 7.1.2 of the FAA. For consistency, sampling methods used during the 2015 through 2019 video surveys were replicated to the extent possible, including monitoring along the same depth ranges monitored in previous years. Survey methodology changed in 2018 to include the use of a ROV for collection of underwater videos rather than a simple drop camera because it offers the advantage of maneuverability, allowing for greater control and collection of higher quality video footage during a video survey. Underwater video methodology remained the same in 2019 and 2020.

The underwater video system used for the survey consisted of a single high resolution video camera (NTSC with 3x optical zoom), capable of recording in standard and high definition, mounted on a lightweight Seamor Chinook 300F industrial-grade inspection ROV equipped with spotlights, integrated pressure/depth sensor and a magnetic compass (Figure 1, Appendix C, Photos 1 and 2). The video camera on the ROV was connected via umbilical to a video monitor set-up in the cabin of the 30-ft aluminum field vessel, where video data was recorded on an external hard drive. The ROV was operated by a subcontracted ROV technician (Andy Clark, Ocean Dynamics Inc.) using manual and automatic thruster, tilt, pitch and heading controls built into a top-side deck-mounted

control box. The video transects were georeferenced using the on-board navigational system (Raymarine Axiom Hybrid Touch Pro with Navioncs+ Bundle) to record a track throughout the full duration of the video survey and to mark relevant waypoints of notable observations. In a new addition to the program in 2020, a qualified marine scientist (Golder) experienced in the identification of Arctic marine biota worked alongside the ROV operator to guide to points and specimens of interest.

Figure 1: Photograph showing set-up of Seamor Chinook 300F ROV on deck of the research vessel used to undertake underwater video surveys at Milne Port (August 2020). Source: Jeff Reynolds 2020.

Between 30 July and 2 August 2020, ROV video surveys were conducted along two transects on the west side of the Ore Dock and three transects on the east side of the Ore Dock (Table 3; Figure 2). Deep transects were conducted along the boulder and sediment interface while shallow transects were conducted in the midwater of the offset habitat. Shallow and deep video transects on each side of the Ore Dock were conducted to:

- Record aquatic vegetation on the coarse rock habitat in shallow and deep locations.
- Characterize habitat conditions of the coarse rock substrate and areas immediately adjacent to the offset habitat.

Table 3: Ore Dock ROV Video Transect Locations

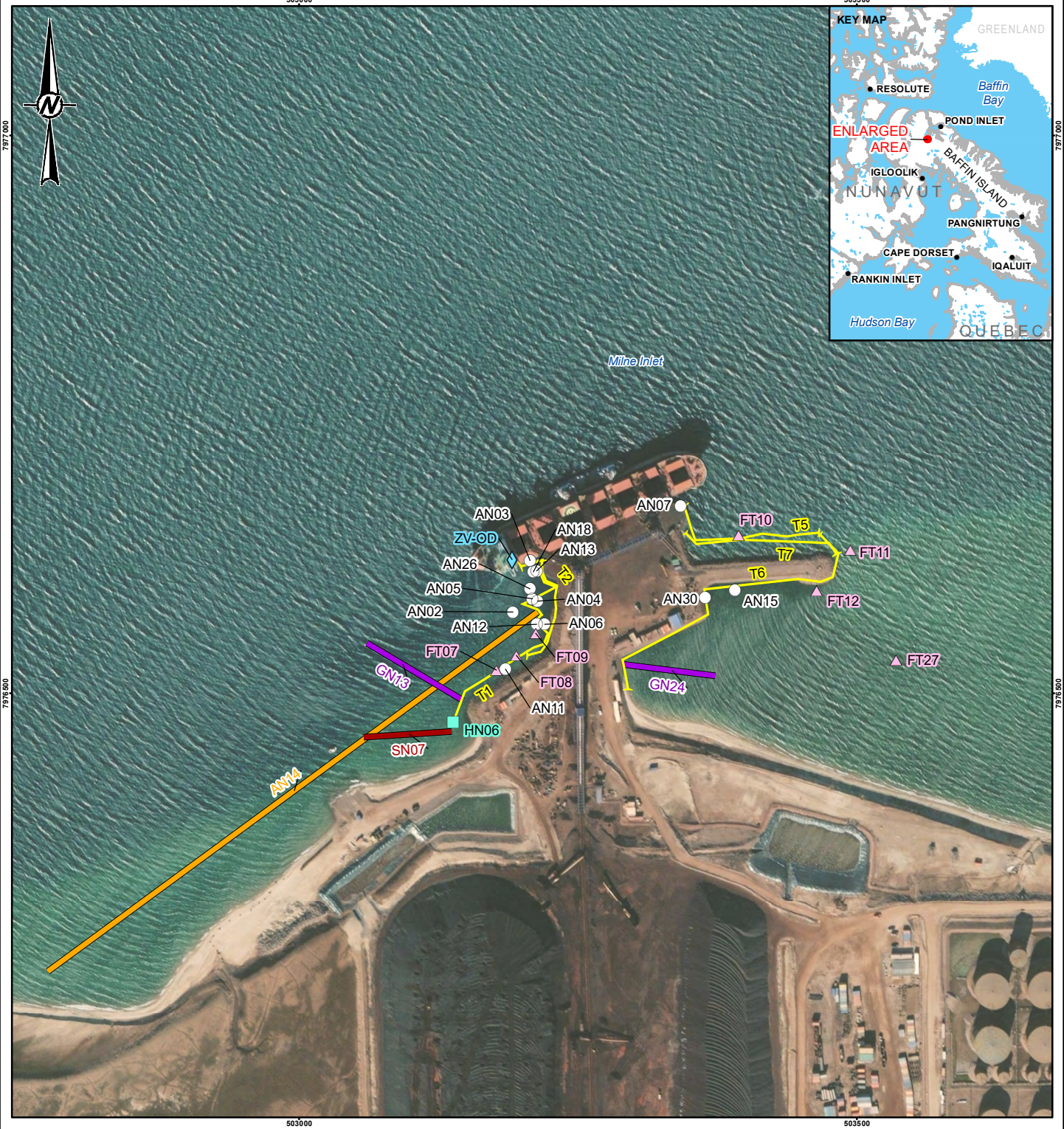
Location	Transect Name	Start / End	UTM Coordinates (Zone 17W)		Depth Range† (m)	Length of Video Recording (h:mm:ss)
			Easting	Northing		
West Side of Ore Dock	T1 – Deep	start	503199	7976615	0.1-15	2:09:03
		end	503138	7976474		
	T2 – Shallow	start	503199	7976615	1-10.3	1:10:54
		end	503205	7976535		
East Side of Ore Dock	T5 – Deep part 1	start	503347	7976675	0.2-9.4	1:19:46
		end	503467	7976644		
	T6 – Deep part 2	start	503475	7976504	0-1.5	1:56:20
		end	503467	7976644		
	T7 – Shallow	start	503346	7976651	0.5-4	0:29:37
		end	503480	7976625		

†Depths are measured by the ROV relative to the water surface.

Video data from the ROV transects were post-processed by a qualified marine scientist (Golder) to document the types and percent cover of the aquatic vegetation colonizing the coarse rock substrate. Substrate details were recorded, and representative photographs captured, approximately every minute and/or when a point or specimen of interest was observed. Taxa were counted individually by species where abundance (# of individuals) could easily be assessed. Encrusting (e.g. barnacles [Balanomorpha]) and aggregating taxa (e.g. opossum shrimp [(Mysida]) were assessed by broader abundance or percent cover (%) groupings. All organisms were considered alive during enumeration and percent cover estimations, which may lead to an overestimation of abundance for some organisms such as shelled invertebrates. Results of the video survey were interpreted and compared to the Year 2 data reported in 2016 by SEM (SEM 2017b) and the Year 4 data reported in 2018 by Golder (Golder 2018) to provide a high-level comparison of potential changes in the percent cover of aquatic vegetation over time.

During the video analysis, the following information was recorded:

- Aquatic vegetation percent cover, categorized as: <10%, 10-25%, 25-50%, 50-75% and >75%.
- Aquatic vegetation taxonomic groups, in addition to vegetation identified to the lowest practical taxonomic level
- Representative photographs of the substrate, aquatic vegetation taxa and examples of percent cover categories



LEGEND

FISHING EFFORT TYPES

- ANGLING
- FUKUI TRAPS
- HOOP NET
- ICHTHYOPLANKTON TOW

ROV TRANSECT PATH

PLANKTON TOW EFFORT TYPES

- ANGLING (TROLLING)
- GILL NETS
- SEINE NET

0 100 200

1:5,000 METRES

REFERENCE(S)

HYDROGRAPHY, POPULATED PLACE, AND PROVINCIAL BOUNDARY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. IMAGERY COPYRIGHT © 20190802 ESRI AND ITS LICENSORS. SOURCE: MAXAR VIVID. USED UNDER LICENSE, ALL RIGHTS RESERVED.
PROJECTION: UTM ZONE 17 DATUM: NAD 83

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
MARY RIVER PROJECT

TITLE **UNDERWATER VIDEO TRANSECT LOCATIONS FOR FISH HABITAT OFFSET MONITORING IN 2020 AT MILNE PORT ORE DOCK**

CONSULTANT
GOLDER

YYYY-MM-DD	2020-12-21
DESIGNED	NO
PREPARED	AA
REVIEWED	SR
APPROVED	SR

PROJECT NO.	CONTROL	REV.	FIGURE
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3.2 Fish and Invertebrates Associated with the Offset Habitat

The underwater video collected as part of aquatic vegetation surveys (Section 3.1) was also used to identify and enumerate marine fish and invertebrates utilizing, interacting, colonizing, or associating with the offset habitat in accordance with Conditions 7.1.2 and 7.1.4. Methodology for collection of the underwater video is provided in Section 3.1.

Video data from the ROV transects were post-processed by an experienced Golder marine biologist to provide a general overview of fish utilization of the offset habitat. The following information was recorded from the underwater video analysis:

- Fish identified to the lowest practical taxonomic level and quantified in relation to their location along the habitat as well as the utilization, interaction, colonization, or association with the offset habitat.
- Quantification of benthic and pelagic invertebrates associated with the coarse rock habitat, identified to the lowest practical taxonomic level, through two methods:
  - Enumeration of associated fauna where individuals could be counted
  - Abundance categorization for associated fauna with high densities
- Representative photographs of the benthic invertebrates and fish captured from the video footage.

A semi-qualitative approach was used to quantify species abundance in the underwater video analysis. A direct comparison of abundances to the 2016 and 2018 surveys was not possible for the following reasons:

- The 2016 Ore Dock monitoring, reported in SEM (2017), employed now obsolete underwater survey methodologies, which are not comparable to methodologies used in 2020; and,
- The 2018 Ore Dock monitoring underwater surveys, conducted by Golder, employ the same methodologies as in 2020; however, surveys follow a generalized track between a start and end waypoint, guided by depth, such that the exact same areas are not necessarily covered between years and thereby precluding quantitative comparisons of fish, marine invertebrates, and macroalgae abundance through time.

3.2.1 Fish Sampling

Consistent with previous years, fish sampling was undertaken in 2020 to identify fish presence in the offset habitat area, although this is not a specific monitoring requirement outlined in FAA #14-HCAA-00525. Fish and fish larvae sampling was conducted in Milne Port in the vicinity of the Ore Dock from 24 July 2020 to 20 August 2020 using both active (gill netting, angling, beach seine) and passive (Fukui traps, hoop nets) capture methods as part of the MEEMP surveys throughout Milne Port.

The western side of the Ore Dock generally has deeper water, is more sheltered from open water and vessel influence, and is more accessible during low tides compared to the eastern side. As a result, fishing efforts along the coarse rock habitat were largely focussed along the western side (Table 4, Figure 2). Fishing efforts at the Ore Dock were largely located directly at, or on, the coarse rock; however, some efforts took place on the adjacent habitat to monitor fish usage of the surrounding area. Following observations of schools of juvenile fish

near the Ore Dock, ichthyoplankton tows were performed along the Ore Dock to aid in identification of the observed species. Plankton samples were collected in a series of vertical tows using a 64 µm plankton net, preserved in 10% formalin and submitted to Biologica Environmental Services Ltd. for species identification.

Table 4: Fishing efforts on and associated with the coarse rock habitat on the Ore Dock, Milne Port in 2020

Effort Type	Western Ore Dock		Eastern Ore Dock	
	Count	Total Effort (hour:min)	Count	Total Effort (hour:min)
Angling	11	9:34	3	1:57
Fukui Traps	3	285:57	4	329:02
Gill Nets	1	5:30	1	3:20
Hoop Nets	1	89:00	0	N/A
Beach Seine	1	0:09	0	N/A
Total	**17**	**390:10**	**8**	**334:19**

3.3 Settlement Baskets and Plates

In accordance with Condition 7.1.3 of the FAA, settlement baskets were initially deployed by SEM in August 2016 on the west and east sides of the Ore Dock adjacent to the caisson, to be recovered and redeployed in subsequent years (Table 5). Settlement baskets were deployed in sets of three at each of the two locations. Each basket was filled with rocks similar to the type used on the offset habitat. In 2019, one set of the settlement baskets was determined to have been lost, presumably during the ice break-out. Due to a miscommunication in the field, the remaining settlement basket was not redeployed for retrieval in 2020. Replacement settlement baskets were not able to be sent to site in time to be deployed ahead of the planned retrieval date; therefore, no settlement substrates were able to be retrieved in 2020.

Table 5: Settlement Basket Recovery Locations

Location	Sample Name	UTM Coordinates (Zone 17W)		Redeployment Date	Retrieval Date	Comment
		Easting	Northing			
East Ore Dock	SBEO-1	503229	7976590	13 August 2018	29 August 2019	Was not redeployed
West Ore Dock	SBWO-1	503346	7976648	13 August 2018	-	Lost in 2018-2019

4.0 RESULTS

4.1 Aquatic Vegetation on Offset Habitat

Georeferenced underwater video collected along the Ore Dock transects was analyzed to identify potential changes in the structural integrity of the coarse rock apron placed around the Ore Dock as offset habitat. No evidence of movement or slumping of the coarse rock was observed in the 2020 video surveys. The placement of the coarse rock appeared to be unaltered and functioning as when constructed. Transects surveyed along the seafloor adjacent to the Ore Dock showed no evidence of loose or stray rocks.

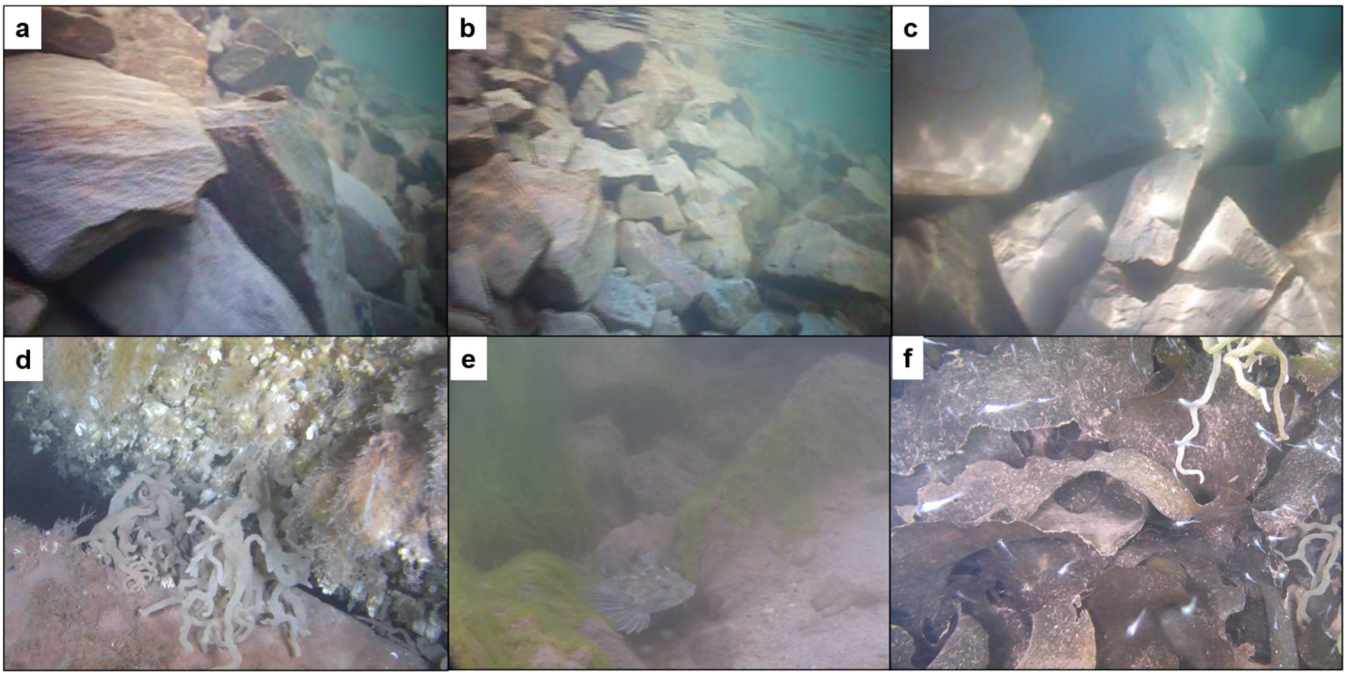


Figure 3: Comparison of the created coarse rock offset habitat following establishment in 2015 (photos a-c) and during the final monitoring year in 2020. Note establishment of invertebrate species such as sponges and barnacles (d), use of habitat by fish species (Fourhorn Sculpin, photo e) and the colonisation of canopy forming macroalgae species (sugar kelp, photo f).

In general, the overall percent cover of aquatic vegetation was relatively high throughout the offset habitat and comparable to, or greater than, the percent cover reported from previous monitoring years (Figure 3, Table 6, SEM 2016; Golder 2018). As noted in section 3.2, the comparative results to previous years were qualitative due to variations in the methodology, survey area, and availability of data. The types and distribution of aquatic vegetation, however, differed from what was observed in Years 2 and 4 of the habitat offset monitoring. Diversity of vegetation taxa was higher than in previous years, with nine new taxa observed in 2020 (Table 5, SEM 2016; Golder 2018). Percent cover of aquatic vegetation was observed to be relatively equal between the west and east sides of the Ore Dock, and the distribution of vegetation types varied spatially throughout the coarse rock substrate. These results are consistent with those found in previous survey years (SEM 2016; Golder 2018).

Sugar kelp (*Saccharina latissima*, identified as *Laminaria* sp. in 2018) was observed at <10% cover along T1 (8 - 10 m depth), >10-25% along T2 (7 – 10.5 m depth) on the west side of the Ore Dock and observed at

<10% cover along T5 (6 – 8 m depth) on the east side of the Ore Dock in 2020 (Figure 4, Appendix C, Photo 3). Kelp was localized to small spots in the deeper areas of the transects and areas of the transect farthest from shore. Kelp density appeared to be generally lower than in 2018 when kelp was last quantified, however spatial distribution was increased, with kelp present on three transects compared to one in 2018.

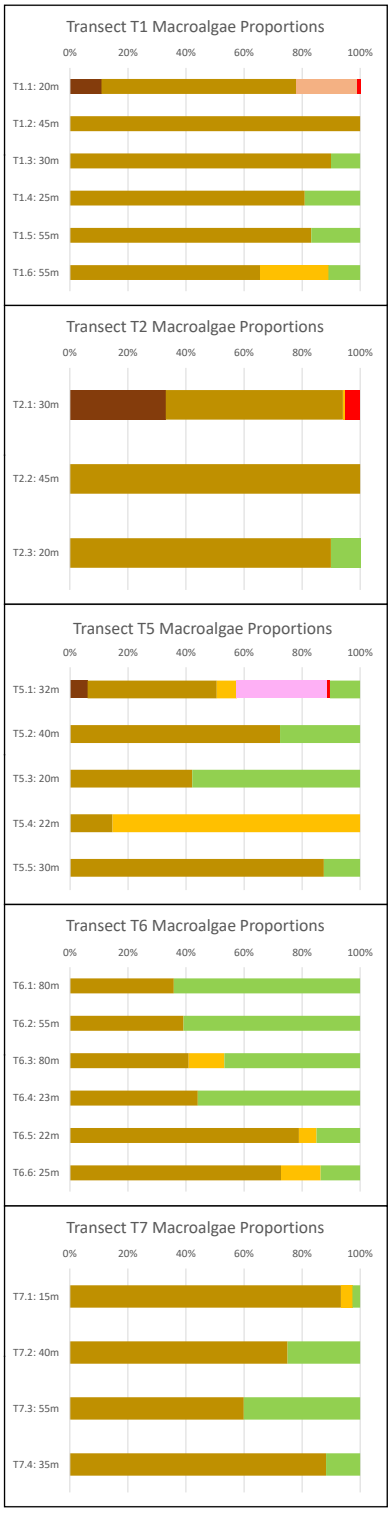
Brown filamentous algae of several species was relatively abundant on both sides of the Ore Dock. *Halosiphon tomentosus* was present on all transects and along the whole of each transect (Figure 4, Appendix C, Photo 4); *H. tomentosus* reached up to >25-50% (T2) on the west side of the Ore Dock and up to >10-25% (T5) on the east side, while *Battersia arctica* was seen only on T2 in very small patches between 10 to 11 m depth. An unknown brown filamentous algae (Phaeophycaea indet.) was present along the entirety of most transects, reaching up to >25-50% (T1) on the west side of the Ore Dock and up to >10-25% (T5 and 6; Figure 4, Appendix C, Photo 5) on the east side but was absent from T7. An epiphytic brown filamentous algae (*Pylaiella* sp., Figure 4, Appendix C, Photo 6), often associated with rockweed (*Fucus evanescens*), was observed at <10% cover only at T7. Rockweed was recorded reaching up to <10% cover on all five transects in shallow depths (>7 m); while its percent cover has not changed since 2018 along the west side of the Ore Dock, rockweed was quantified for the first time on the east side of the Ore Dock in 2020 (Figure 4). Sour weed (*Desmarestia* sp.) was present only at T1 at depth (7 – 12 m) in very low abundance (<10% cover), a reduction of what was recorded on both sides of the Ore Dock in 2018 (>25-50% to >50-75%) (Figure 4). The *Desmarestia* species observed on the Ore Dock are filamentous and were among the early colonizers observed on the coarse rock habitat in 2016 (SEM 2017). A transition from high cover of *Desmarestia* sp. to *F. evanescens* may be an indication of natural succession towards a canopy forming community.

Green algae (Chlorophyta indet.) was recorded in low abundance along the west and east sides of the Ore Dock at shallower depths (>7 m, Figure 4). Green algae was observed at <10% on both transects on the west side of the Ore Dock. On the east side, green algae was observed at sparse cover (<10%) along T5 and T7 and observed at somewhat dense cover (>25-50%) along T6 (Figure 4). While green algae was categorized as *Urospora* sp. in 2016 and 2018, its taxonomic identification has been brought back to phylum due to uncertainty in the identification. *Gracilaria* sp., a red filamentous algae, was observed for the first time in 2020 on both transects of the west side of the Ore Dock at sparse cover (<10%) and at depth (7 – 12 m, Figure 4). An unknown red filamentous algae was also newly observed in 2020 at sparse cover (<10%) at depths of 7 – 12 m on T1 of the west side and T5 of the east side of the Ore Dock (Figure 4). Two small patches of crustose coralline algae (CCA; Corallinales indet.) were observed on T5 on the east side of the Ore Dock (Figure 4).

Table 6: Aquatic Vegetation Percent Cover Recorded from ROV Video Transect Surveys of Milne Ore Dock Offset Habitat

Taxa	Common Name	Percent cover (%)†					Abundance Compared to 2018 Observations
		West Ore Dock		East Ore Dock			
		T1	T2	T5	T6	T7	
Chlorophyta indet.	**Green filamentous algae**	<10%	<10%	<10%	>25-50%	<10%	-
Saccharina latissima	**Sugar kelp**	<10%	>10-25%	<10%	-	-	Reduced cover in T1, but increased distribution.
Phaeophycaea indet.	**Brown filamentous algae**	>25-50%	>25-50%	>10-25%	>10-25%	-	-
Halosiphon tomentosus	**Brown filamentous algae**	>10-25%	>25-50%	>25-50%	>10-25%	>10-25%	-
***Battersia* spp.**	**Brown filamentous algae**	-	<10%	-	-	-	-
***Pylaiella* sp.**	**Epiphytic filamentous algae**	-	-	-	-	<10%	-
Desmarestia sp.	Sour weed	<10%	-	-	-	-	Reduced – Observed on all five transects in 2018
Fucus evanescens	Rockweed	<10%	<10%	<10%	<10%	<10%	Increased – Observed on only one transect in 2018
Rhotophyta indet.	**Red algae**	<10%	-	<10%	-	-	-
***Gracilaria* sp.**	**Red filamentous algae**	<10%	<10%	-	-	-	-
Corallinales indet.	**Crustose coralline algae**	-	-	<10%	-	-	-

†Aquatic vegetation percent cover was categorized as: <10%, >10 to 25%, >25 to 50%, >50 to 75% and >75%.Note: Newly observed taxa are bolded. Taxa information sources: ARMS 2020, WoRMS 2020, FishBase 2020, Golder 2018, Küpper et al. 2016



LEGEND

MACRO ALGAE SPECIES

- BROWN FILAMENTOUS ALGAE
- CRUSTOSE CORALINE ALGAE
- DESMARESTIA SP.
- FUCUS EVANESCENS
- GREEN FILAMENTOUS ALGAE
- RED FILAMENTOUS ALGAE
- SUGAR KELP

ROV TRANSECT PATH SEGMENT
MACROALGAE COVER

- < 10%
- > 10% - 25%
- > 25% - 50%
- > 50% - 75%
- > 75%

0 50 100
1:3,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 17 DATUM: NAD 83

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
MARY RIVER PROJECT

TITLE
MACROALGAE COVER HEAT MAP OF THE OFFSET HABITAT OF THE ORE DOCK FROM ROV REVIEW

CONSULTANT
GOLDER

YYYY-MM-DD	2020-12-21
DESIGNED	NO
PREPARED	AA
REVIEWED	SR
APPROVED	SR

PROJECT NO.	CONTROL	REV.	FIGURE
1663724	34000-04	0	4

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI A
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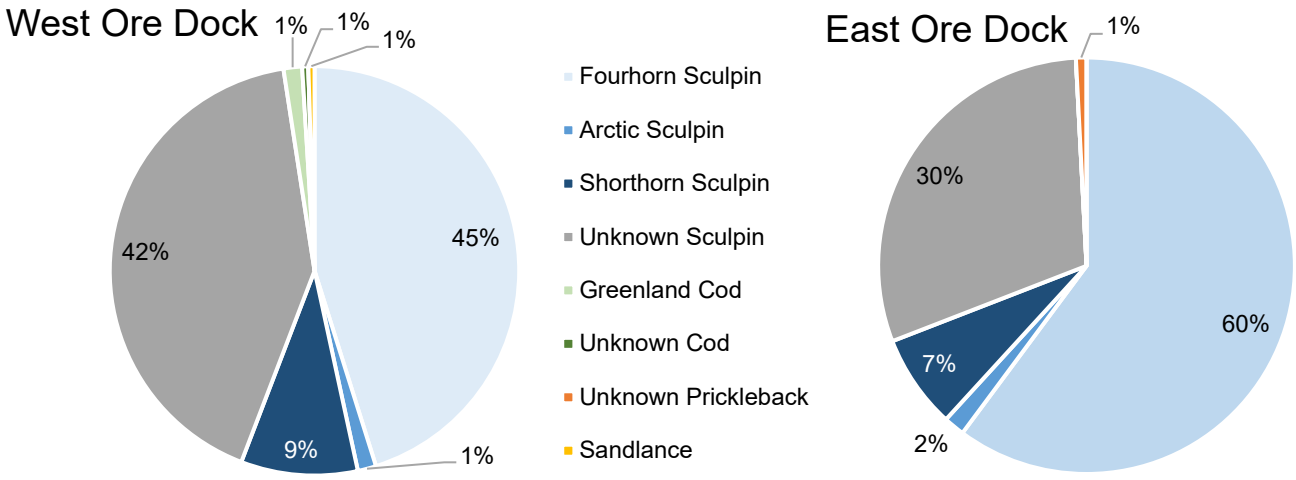
4.2 Fish and Benthic Invertebrates Associated with the Offset Habitat

4.2.1 Fish

Underwater video collected along transects on the east and west sides of the Ore Dock was reviewed to document the association of fish with the coarse rock in accordance with Conditions 7.1.2 and 7.1.4. Overall, a total of 328 fish were documented on the transect surveys (Table 6, Figures 4 and 5), comprising four families: Sandlance (Ammodytidae), Cod (Gadidae), Prickleback (Stichaeidae) and Sculpin (Cottidae). A total of 202 fish were identified to species level: 167 Fourhorn Sculpin (*Myoxocephalus quadricornis*), four Arctic Sculpin (*Myoxocephalus scorpioides*), 28 Shorthorn Sculpin (*Myoxocephalus scorpius*), three Greenland Cod (*Gadus ogac*), Appendix C, Photos 7 – 10). An additional 123 sculpin (Cottidae indet.), one cod (Gadidae indet.), one Sandlance (*Ammodytes* sp.*),* and one prickleback (Stichaeidae indet., Appendix C, Photos 11 – 14) could not be taxonomically identified to species level due to a combination of factors such as camera angle, camera movement, fish behaviour (using cover), and poor visibility due to high abundances of zooplankton and suspended sediment. The unknown cod is suspected to be either Arctic Cod (*Boreogadus saida)* or Polar Cod *(Arctogadus glacialis*) due to body morphology, markings, and colour.



Note: Percentages are rounded to the nearest whole number.

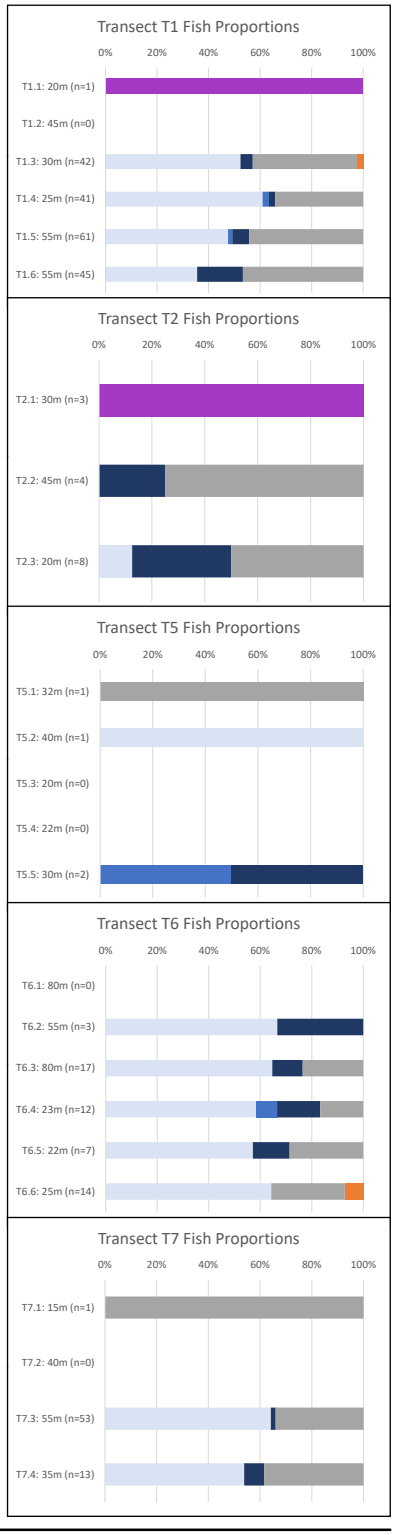
Figure 5: Fish species distributions between the west (N = 206) and east (N = 122) side of the Ore Dock from ROV review.

Table 7: Fish Taxa Observed on ROV Video Transect Surveys of Milne Ore Dock Offset Habitat, Observations not Corrected for Survey Effort

Taxa	Common Name	Abundance (# of fish)						Abundance in 2017, 2018 and 2019
		West Ore Dock		East Ore Dock			Total	
		T1	T2	T5	T6	T7		
***Ammodytes* sp.**	**Sandlance**	1	-	-	-	-	1	0, 0, 0
Gadus ogac	Greenland Cod	-	3	-	-	-	3	0, 3, 0
Gadidae indet.	Unknown Cod	1	-	-	-	-	1	3, 0, 5
Stichaeidae indet.	Unidentified Prickleback	-	-	-	1	-	1	0, 0, 2
Cottidae indet.	Unidentified Sculpin	79	7	1	12	24	123	3, 0, 13
Myoxocephalus quadricornis	Fourhorn Sculpin	92	1	1	32	41	167	0, 5, 4
Myoxocephalus scorpioides	**Arctic Sculpin**	2	-	1	1	-	4	0, 0, 0
Myoxocephalus scorpius	Shorthorn Sculpin	15	4	1	6	2	28	0, 1, 4
Total Count		**206**		**122**			**328**	**6, 9, 41**

Taxa information sources: ArcOD 2020, Golder 2019, Coad and Reist 2018, Golder 2018, Golder 2017

Note: Newly observed taxa are bolded.



LEGEND

FISH SPECIES

- ARCTIC SCULPIN
- COD
- FOURHORN SCULPIN
- OTHER SPECIES
- SHORTHORN SCULPIN
- UNKNOWN SCULPIN

ROV TRANSECT PATH SEGMENT

FISH ABUNDANCE

- < 5
- > 5 - 10
- > 10 - 20
- > 20 - 30
- > 30 - 40
- > 40 - 50
- > 50

0 50 100

1:3,000 METRES

REFERENCE(S)

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PROJECTION: UTM ZONE 17 DATUM: NAD 83

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
MARY RIVER PROJECT

TITLE
FISH ABUNDANCE HEAT MAP OF THE OFFSET HABITAT OF THE ORE DOCK FROM ROV REVIEW

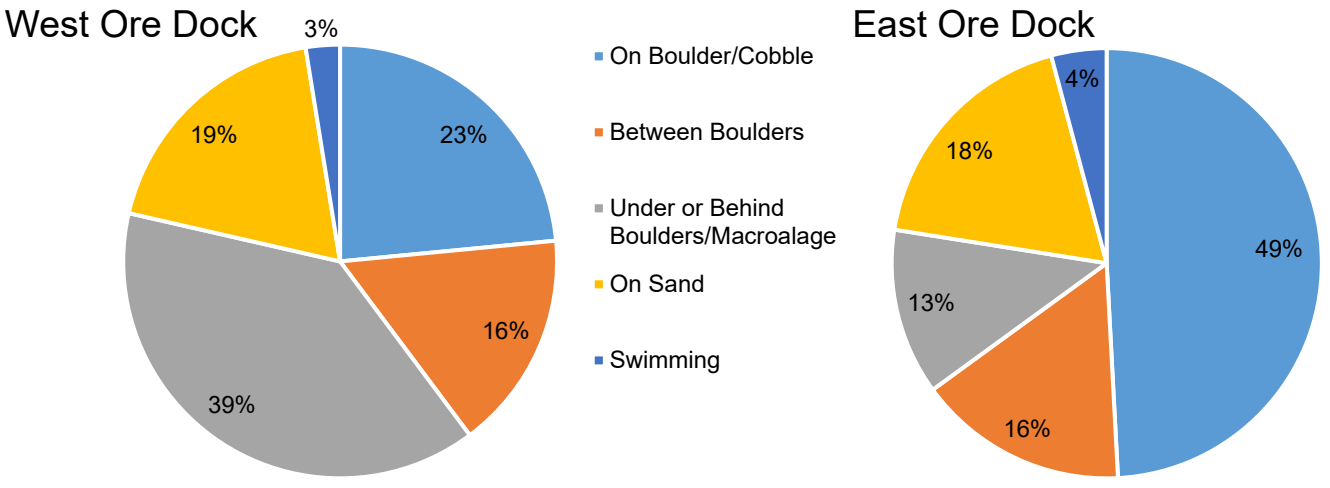
CONSULTANT
GOLDER

YYYY-MM-DD	2020-12-21
DESIGNED	NO
PREPARED	AA
REVIEWED	SR
APPROVED	SR

PROJECT NO.	CONTROL	REV.	FIGURE
1663724	34000-04	0	6

Sculpin were the most abundant fish observed (97% on the west side and 99% on the east side of the Ore Dock) and were more common on the west side of the Ore Dock (Table 6, Figure 4 and 5). Sculpin species abundance rankings were the same on both the west and east sides of the Ore Dock. Fourhorn Sculpin were the most abundant species observed on both sides of the Ore Dock (45% on the west side and 60% on the east side; Figure 4 and 5), followed by unknown sculpin (42% on the west side and 30% on the east side,: Figure 4 and 5), Shorthorn Sculpin (9% on the west side and 7% on the east side; Figure 4 and 5), and Arctic Sculpin (1% on the west side and 2% on the east side; Figure 4 and 5). Greenland Cod and an unknown cod were only observed on the west side of the Ore Dock and each represented 1% of the fish observed on the west side. One prickleback was observed on Transect T6 on the east side of the Ore Dock (1%) and one Northern sand lance was observed on Transect T1 on the west side of the Ore Dock (1%).

Notably, many sculpins were observed using the offset habitat and associated macroalgae for cover on Transect T1. Cod were also observed using coarse rock and macroalgae as habitat (Figure 7). The west and east sides of the Ore Dock saw differences in fish use of the offset habitat. The west Ore Dock had a more diverse spread of uses across the habitat, with 55% of the fish using the habitat for cover (16% between boulders and 39% under or behind boulders/macroalgae), 23% of fish resting on boulders/cobbles, and 19% of fish foraging on sand. Just under half the fish observed (49%) on the east Ore Dock were resting on boulders/cobbles. A relatively smaller proportion of fish were observed using the habitat for cover (29%), but the same proportion of fish between boulders was observed on both sides of the Ore Dock (16%). A similar proportion of fish were foraging on sand as on the west Ore Dock (18% vs 19%, respectively). The difference in fish habitat use may be due to the transitory nature of the fish on the east side, as nearly two-thirds of the east side is intertidal and the fish must move to deeper water to survive when the tide is low; therefore, the fish merely rest on boulders instead of establishing hiding places among the boulders. Moreover, much of the intertidal area consists of smaller cobbles instead of boulders, reducing the amount of accessibility underneath areas for cover.



Note: Percentages are rounded to the nearest whole number.

Figure 7: Fish offset habitat use on the west (N = 206) and east (N = 122) side of the Ore Dock from ROV review.

More fish were observed in the 2020 video surveys (n = 328) compared to 2019 (n = 41),2018 (n = 9) and 2017 (n = 6). In 2016, a large school of juvenile cod was observed and quantification was not made for these fish. While

observations of these schools was not repeated in subsequent ROV surveys, observations of juvenile and larval fish have continued to occur in the vicinity of the Ore Dock during other survey efforts. Survey effort between years (2017-2020) was similar such that fish presence in 2020 represents almost an eight-fold increase in the number of fish associated with the offset habitat compared to 2019 and an over a forty-fold increase compared to 2018, suggesting that fish are attracted to and using the offset habitat as intended. Cod and sculpin were recorded on the transect surveys during all four survey years (2017-2020) and prickleback were recorded on the transect surveys during survey years 2019 and 2020. Sandlance was recorded on the transect surveys for the first time in 2020.

In previous years, stationary and transect video were both used to satisfy the continuous video monitoring requirement outlined in Section 7.1.4 of the FAA. Longer-term continuous video surveillance of the coarse rock substrate was tested in 2018 as an alternative method for video monitoring to document the association of fish with the offset habitat and found to be sufficient; therefore, stationary video monitoring was not included as part of the 2019 and 2020 programs. Based on the number of fish observed during the 2019 and 2020 offset monitoring program and during previous monitoring years, the ROV video transect survey methodology is deemed sufficient to satisfy the continuous monitoring requirement outlined in Section 7.1.4 of the FAA.

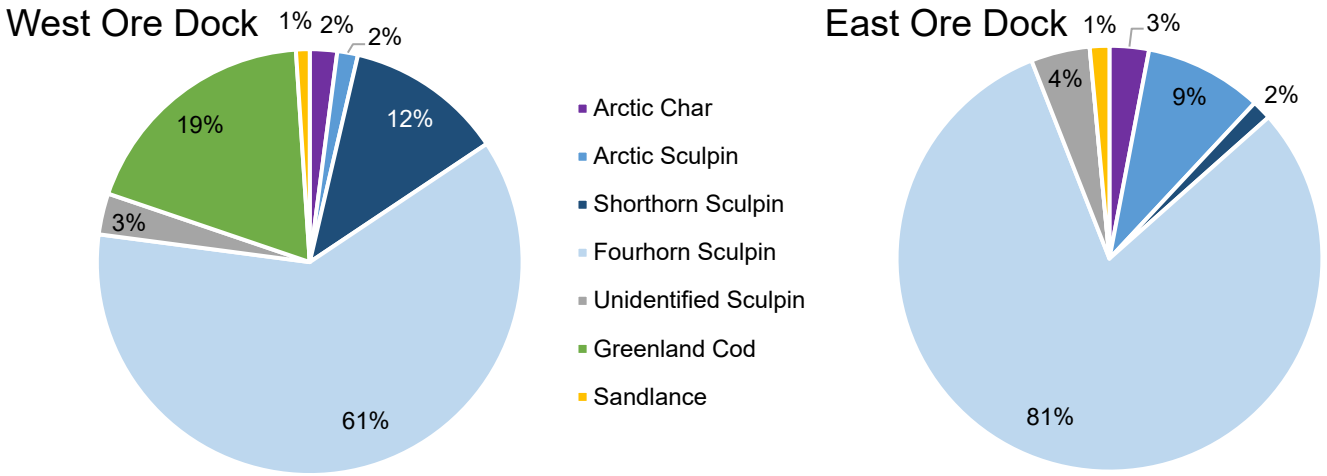
4.2.1.1 Active Fish Sampling

A total of 259 fish belonging to six Arctic species groups were captured during active fish sampling at locations on or adjacent to the coarse rock habitat on the Ore Dock in 2020. Consistent with observations in the ROV footage, fish captures were higher on the western side of the Ore Dock in most species (Table 8); however, this may reflect the higher effort on the western side rather than a habitat preference within these species. Fourhorn Sculpin (*M. quadricornis*) were the most numerous, comprising 66% of the total catch associated with Ore Dock offset habitat. Greenland Cod (*G. ogac*) were the second most common species caught (14% of the total catch), followed by Shorthorn Sculpin (*M. scorpius*) with 9% of the total catch.

Table 8: Fish associated with the coarse rock offset habitat captured during active fish sampling methods at Milne Port (2020, uncorrected for effort)

Common Name	Taxonomic ID	West	East
Arctic Char	*Salvelinus alpinus*	4	2
Arctic Sculpin	*Myoxocephalus scorpioides*	3	6
Shorthorn Sculpin	*Myoxocephalus scorpius*	23	1
Fourhorn Sculpin	*Myoxocephalus quadricornis*	118	54
Unidentified Sculpin	Cottidae indet.	6	3
Greenland Cod	*Gadus ogac*	36	0
Sandlance	*Ammodytes* sp.	2	1
Total		**192**	**67**

Fish catch was greater on the western side of the Ore Dock, compared to the eastern side (Table 8). Notably, species proportional representation differed between the two sides (Figure 8), indicating possible differences in habitat usage and preference. While Fourhorn Sculpin were the most numerous fish species on both sides of the Ore Dock, they comprised a much larger proportion of the total catch on the eastern side (81%) compared to the western side (61%). Shorthorn Sculpin were the third most common fish species captured on the western Ore Dock with 12% of the total catch, while representing less than 2% of the catch on the eastern side. Conversely, Arctic Sculpin were more common on the eastern side, representing 9% of the total catch, compared to 1.6% on the western side. Greenland cod were only captured on the western side of the Ore Dock, where they comprised approximately 19% of the total catch, reflecting observations in the ROV of cod presence on the western side.



Note: Percentages are rounded to the nearest whole number.

Figure 8: Fish Catch Proportional Representation in All Fishing Efforts on the West (N = 192) and East (N = 67) of the Ore Dock. Not corrected for effort, for all fishing methods.

No larval fish were caught in the ichthyoplankton tows; this may be due to incorrect mesh sizes, slow tow speeds, or the net being too short to contain the larval fish for the duration of the tow. However, larval fish were observed along the Ore Dock prior to when the ichthyoplankton tows could be conducted. Juvenile fish observed along the Ore Dock included unknown sculpin, cod and sandlance species individually and in large schools. Beach seine efforts along coarse rock habitat in other areas of the port contained juvenile sculpin that could not be identified to the species level.

4.2.2 Invertebrates

In addition to vegetation and fish, underwater video footage Ore Dock was reviewed for the purpose of identifying and quantifying invertebrates utilizing, interacting, colonizing, or associating with the offset habitat in accordance with Conditions 7.1.2. Overall, 28 different taxa of invertebrates, including 15 new taxa, were identified in the 2020 video surveys (Table 8, Figure 6), an increase from 12 taxa identified in each of the 2018 and 2019 ROV surveys.

Several taxa observed in 2018 and 2019 were not observed in the 2020 surveys, including Bryozoa (2018), Buccinidae (2018-2019), Euphausiacea (2018-2019), Amphipoda (2019), Crinoidea (2019), Pandalidae (2019), and Polyplacophora (2019). Bryozoa was recorded in sparse abundance on both sides of the Ore Dock in 2018 but was not observed again in 2019. Buccinidae was seen only once on the east side of the Ore Dock in 2018 and was present in 2019. Crinoid, Polyplacophora and Pandalidae were observed in very low abundance in 2019 and their absence in 2020 is not considered notable. Euphausiacea and Amphipoda were common in 2019, however, both taxa are highly motile or planktonic and were frequently observed in the area during MEEMP surveys in 2020, suggesting that their absence from the ROV footage may be a product of their motility.

In the 2020 video surveys, most invertebrates were observed on the west side of the Ore Dock on Transect T1 (Figure 6). Few invertebrates were recorded along Transects T6 and T7 on the east side of the Ore Dock and those observed were exclusively pelagic. The lack of invertebrates on Transect T6 is likely due to its location within a predominately intertidal area adjacent to soft sand, where sessile invertebrates would be exposed at low tide and likely would be limited depending on exposure tolerance. Further limitations to intertidal epifaunal colonizers could include seasonal ice scour, where tidal areas are more likely to be subjected to scour than deeper areas, resulting in higher turnover. While coarse rock epifaunal organisms maybe have been scarce, infaunal organisms may still be present in the adjacent soft substrate.

The most abundant taxon observed were opossum shrimp (Mysida), which were observed in largest numbers on Transect T1 along the deeper section of the west side of the Ore Dock (Appendix C, Photo 15). Small pelagic shrimp were also dominant in 2018; however, they were not enumerated in 2018 surveys, so it is not possible to comment on whether or how abundance has varied between years. Ctenophores (Ctenophora indet.) were the next most abundant taxa observed and most common on the west side of the Ore Dock; several species of ctenophores were documented, the most common of which was the Arctic comb jelly (*Mertensia ovum*; Appendix C, Photos 16 – 17). It is possible that the unidentified jellyfish in 2018 surveys were comb jellies as well, given similarities in abundance and distribution based on qualitative observation (enumeration of jellyfish in 2018 was not conducted due to the high density of organisms).

Other pelagic invertebrates recorded in low numbers on the west side of the Ore Dock on Transect T1 include: hydromedusas (Hydromedusae indet.), arrow worms (Chaetognatha indet., Appendix C, Photo 18), tachymedusas (*Ptychogastria polaris,* Appendix C, Photo 19), sea angels (*Clione limacina*), sea butterflies (*Limacina helicina*), copepods (Copepoda indet.), and seed shrimp (Ostracoda indet). Sea butterflies were observed previously during the 2018 surveys in higher numbers on both sides of the Ore Dock than in the 2020 surveys (Table 8). Small planktonic crustaceans, including mysid shrimp and calanoids (including copepods) are noted among the dominant identifiable tissues found in fish stomachs from Milne Port (Golder 2020) indicating the coarse rock habitat is supporting recruitment of important food species to fish in Milne Port.

Other species recorded on the video transects include: the wrinkled rock-borer (*Hiatella arctica,* Appendix C, Photo 20), Iceland scallops (*Chlayms islandica*), unnamed small scallops (*Similipecten greenlandicus*), brittle stars (Ophiuridae indet.), green sea urchins (*Strongylocentrotus droebachiensis,* Appendix C, Photo 21), two unidentified species of tunicates (*Polycarpa* spp*.,* Appendix C, Photos 21 – 22), and tube worms (Polychaeta indet.). Unknown bivalves (Bivalvia indet.) and barnacles (Balanomorpha indet.) were also observed on Transects T1, T2, and T5. On the west side of the Ore Dock, comparable numbers of *H. arctica* were recorded between 2018 and 2020, but a similar trend was not noted for the east side, where only one *H. arctica* was observed in 2020 compared to seven in 2018. Brittle stars, sea urchins, tunicates, and tube worms were all observed in higher numbers in 2020 than in 2018 on the west side of the Ore Dock (Table 8). None of the

formerly mentioned species were observed on the east side of the Ore Dock in 2020, a difference from 2018 where they were recorded in small numbers.

Further, changes in habitat colonization of tube worms was noted between 2018 to 2020 where, in 2018, tube worms were predominantly observed attached to the surface of coarse rock while in 2020, they were observed burrowed in the soft sediment. These differences may be related to changes in macroalgal compositions and percent cover, or reflective of natural succession patterns within the environment. Barnacle densities were lower in 2020 than in 2018 on both sides of the Ore Dock (up to <10% on both sides in 2020 and up to >25-50% on the west side in 2018 and up to >10-25% on the east side in 2018), but still associated with macroalgae and kelp on the transects of the Ore Dock.

Several taxa observed in the 2020 video transects were new observations in the offset habitat monitoring program. Rough-mantled doris (*Onchidoris bilamellata,* Appendix C, Photo 23) and an unknown sponge (Heteroscleromorpha indet., Appendix C, Photo 15), suspected to be a species of demosponge, were the most commonly observed new taxa. The rough-mantled doris are a major predator of barnacles, indicating that their presence on the coarse rock habitat may be related to the reduced barnacle densities observed in 2020 compared to previous years (Ellison and Hardy 2017). Nudibranchs were only observed on the west side of the Ore Dock; however, nudibranch eggs were observed on both sides of the Ore Dock. Bivalve siphons were only observed in low percent cover on Transect T1 and appear to consist largely of blunt gapers (*Mya truncata*), which were also observed on Transect T2 and in larger numbers on T5. An ice cream cone worm (*Cistenides granulata*), an unknown gastropod (Gastropoda indet.), and a sea spider (*Nymphon* sp*.,* Appendix C, Photo 24) were recorded with one specimen each on Transect T1. Several fiber-tube worms (Terebellida indet.) and feather worms (Sabellidae indet.) were also recorded on Transect T1 and unknown ribbon worms (Nemertea indet.) were observed on T1 and T6.

Table 9: Incidental Observations of Benthic Invertebrates Recorded on ROV Video Transect Surveys of Milne Ore Dock Offset Habitat

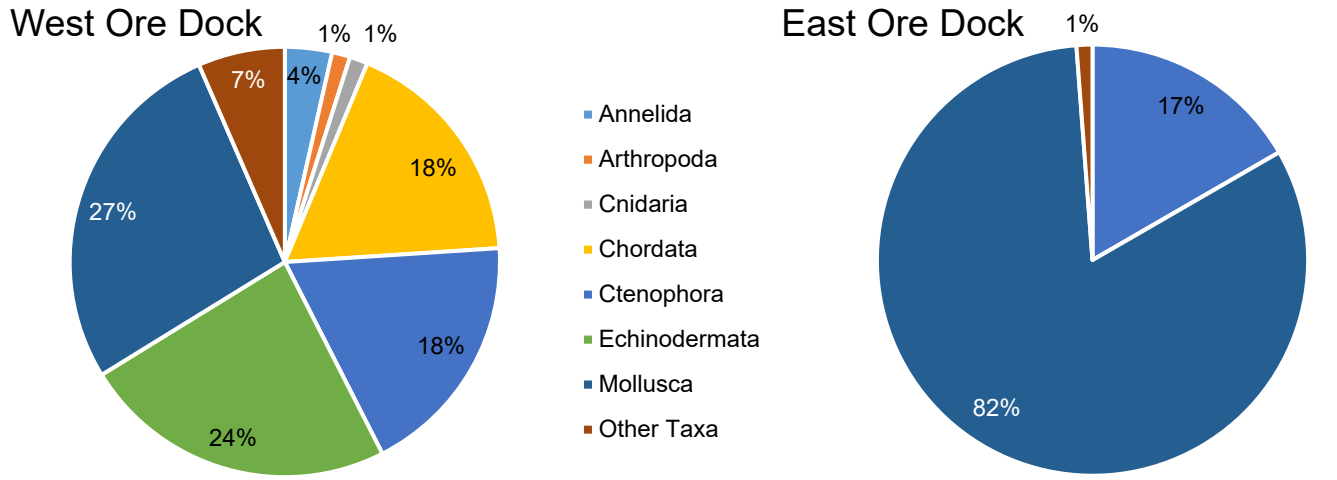
Taxa	Common Name	Abundance (# of individuals) / Percent Cover (%)†						Abundance Compared to 2018 Observations
		West Ore Dock		East Ore Dock			Total	
		T1	T2	T5	T6	T7		
Annelida								
Polychaeta								
Polychaeta indet.	Tube worms	<10%	-	-	-	-	**-**	Increased abundance – 33 observed in 2018
Sabellida								
Sabellidae indet.	**Feather worm**	6	-	-	-	-	**6**	-
Terebellida								
Cistenides granulata	**Ice cream cone worm**	3	-	-	-	-	**3**	-
Terebellida indet.	**Fiber tube worm**	4	-	-	-	-	**4**	-
Arthropoda								
Crustacea								
Balanomorpha indet.	Barnacle	<10%	<10%	<10%	-	<10%	**-**	Equally abundant – densities too high to accurately enumerate
Copepoda indet.	**Copepod**	2	-	-	-	-	**2**	-
Mysida indet. *††	Opossum shrimp	>5000	1000-2500	>1000-2500	<1000	1000-2500	**>10000**	Likely equally abundant – densities too high to accurately enumerate
Ostracoda indet.	**Ostracod**	2	-	-	-	-	**2**	-
Chelicerata								
Nymphon sp.	**Sea spider**	1	-	-	-	-	**1**	-
Cnidaria - Hydrozoa								
Hydromedusae indet.	**Hydromedusa**	**1**	**-**	**-**	**-**	**-**	**1**	-
Ptychogastria polaris	**Tachymedusa**	4	-	-	-	-	**4**	-

Taxa	Common Name	Abundance (# of individuals) / Percent Cover (%)†						Abundance Compared to 2018 Observations
		West Ore Dock		East Ore Dock			Total	
		T1	T2	T5	T6	T7		
Chordata								
Polycarpa spp.*	Tunicate	65	-	-	-	-	**65**	Increased abundance – 7 observed in 2018
Ctenophora								
Mertensia ovum*	**Arctic comb jelly**	33	-	7	-	-	**40**	Likely equally abundant – densities too high to accurately enumerate
Ctenophora indet. *	Ctenophore	35	-	5	-	2	**42**	
Echinodermata								
Ophiuroidea								
Ophiuridae indet.	Brittle star	62	1	-	-	-	**63**	Increased abundance – only 2 observed in 2018
Echinoidea								
Strongylocentrotus droebachiensis	Green sea urchin	24	-	-	-	-	**24**	Increased abundance – 8 observed in 2018
Mollusca								
Bivalvia - Heterodonta								
Hiatella arctica	Wrinkled rock-borer	8	-	1	-	-	**9**	Reduced abundance – 15 observed in 2018
Mya truncata*	**Blunt gaper**	-	5	21	-	-	**26**	-
Bivalvia indet. *	Unknown bivalves	1	6	46	-	-	**53**	Increased abundance – 11 observed in 2018
	Unknown bivalve siphons	<10%	-	-	-	-	**-**	
Bivalvia - Pectinida								
Chlamys islandica	Iceland scallop	1	-	-	-	-	**1**	-
Similipecten greenlandicus	**Unnamed scallop**	28	-	-	-	-	**28**	-

Taxa	Common Name	Abundance (# of individuals) / Percent Cover (%)†						Abundance Compared to 2018 Observations
		West Ore Dock		East Ore Dock			Total	
		T1	T2	T5	T6	T7		
Gastropoda								
Clione limacina	Sea angel	1	-	-	-	-	**1**	-
Limacina helicina	Sea butterfly	1	-	-	-	-	**1**	Reduced abundance – 24 observed in 2018
Onchidoris bilamellata	**Rough-mantled Doris**	26	-	-	-	-	**26**	-
	Egg cases	9	11	1	-	-	**21**	-
Gastropoda indet.	Gastropod	1	-	-	-	-	**1**	-
Porifera								
Heteroscleromorpha indet.	**Demosponge**	<10%	<10%	<10%	-	-	**-**	-
Other Taxa								
Chaetognatha indet.	**Chaetognath**	20	-	-	-	-	**20**	-
Nemertea indet.	**Ribbon worm**	4	-	-	1	-	**5**	-
Total**		**342**	**23**	**81**	**1**	**2**	**449**	**-**

*Species counts are not exact due to several visual impairments to the ROV (e.g. sediment in the water column, freshwater input, angle of the camera). Count likely represents an underestimation of abundance.
**Total counts for abundance per transect are excluding Mysida indet. estimated counts.
†Percent cover was categorized as: <10%, >10 to 25%, >25 to 50%, >50 to 75% and >75%.
††Mysida indet. observations are recorded under the following categories: <1000, >1000-2500, >2500-5000, >5000.
Note: Newly observed taxa are bolded. Comparison not available for some previously noted taxa due to lack of quantification in 2019 surveys.

Taxa information sources: ArcOD 2020, WoRMS 2020, Dinn and Leys 2018, Golder 2018, Tompkins et al. 2017, Majaneva 2014, Siferd and Conover 1992



Note: Percent cover-quantified invertebrates and Mysida were not included. Percentages are rounded to the nearest whole number.

Figure 9: Benthic and pelagic invertebrate abundance distributions by major taxa grouping across the West (N = 365) and East (N = 84) sides of the Ore Dock

4.3 Settlement Baskets and Plates

The settlement basket and settlement plates on the west side of the Ore Dock were not redeployed in 2019 for recovery in 2020; therefore, no results on recruitment are available for 2020. In 2019, total encrusting organisms and total unique taxa counts on the settlement baskets were higher relative to 2018, while epifauna counts in 2019 represented a 34% increase in total organisms and a 125% increase in unique taxa relative to 2018.

5.0 SUMMARY

The 2020 habitat offset monitoring program was designed to fulfill the final year of monitoring requirements under Sections 7.1 and 7.2 of FAA# 14-HCAA-00525, including documenting types and percent cover of vegetation and invertebrates associated with the coarse rock substrate, evaluating the production of encrusting epifauna in the offset habitat, and documenting the types and numbers of fish observed in the vicinity of the Ore Dock offset habitat, including association of fish with the coarse rock substrate. A summary of monitoring requirements under FAA# 14-HCAA-00525 in relation to offset habitat monitoring completed to date is provided in Table 10.

In accordance with Condition 7.1.2, the coarse rock substrate was surveyed using ROV to document the types and percent coverage of aquatic vegetation colonizing the substrate. Percent cover of aquatic vegetation was relatively high throughout the offset habitat and was comparable to, or greater than, the percent cover reported from previous monitoring years. Kelp was observed on the coarse substrate in more locations than in 2018, but in relatively lower densities than previously observed in 2018. The difference in observed kelp densities could be the result of a number of factors, including different ROV footage reviewers, variations in the position of the ROV along the transects, seasonal ice scour, colonization of other vegetation or grazing by invertebrates. Alternatively, spatial and temporal variation in kelp distribution at the Ore Dock may simply be reflective of natural variability in recruitment patterns driven by environmental parameters (e.g. light, temperature, salinity), by species-specific dispersal and colonization patterns, or reflective of natural successional patterns (Orberg *et al*. 2018; Beuchel and Gulliksen 2008). These observations, and the continued presence of kelp and other perennial algae on the coarse rock substrate suggests the coarse rock is stable enough to provide sufficient habitat for the colonization and growth of large perennial and canopy forming aquatic vegetation species which, in turn, provide greater cover and habitat complexity for fish and invertebrates utilizing the habitat. Invertebrate association and fish foraging behaviour indicates the coarse rock habitat is recruiting macroalgae, which provides a direct and indirect food source for benthic invertebrates and fish in accordance with Condition 6.2.2.

Video surveys of the coarse rock habitat were also used to identify and quantify invertebrates associated with the habitat in accordance with Condition 7.1.2. An increase in the number of species associated with the coarse rock habitat was observed in comparison to 2018 surveys. Abundances of most species were comparable or greater than 2018. These observations indicate the habitat is supporting invertebrate recruitment and is stable in accordance with Condition 6.2.1.

In accordance with Condition 7.1.4, fish association with the coarse rock habitat was monitored using ROV and supplemented by active fishing efforts. Collectively, results suggest that the coarse rock offset is productive and functional, as evidenced by increases in number and diversity of associated fish, including observations of fish using the coarse rock as habitat in accordance with Condition 6.2.1.

In the sixth and final year of monitoring for the Ore Dock offset habitat, macroalgal cover, invertebrate abundances and fish usage of the habitat were all determined to meet the permitted requirements. The offsetting measures are complete and functioning according to the prescribed criteria. Overall, the coarse rock offset is considered stable, high quality fish habitat that is functioning in accordance to conditions set out in FAA #14-HCAA-00525 and as designed in the Fish Offset Plan, such that contingency measures or modifications are not required.

Table 10: Monitoring Requirements under FAA# 14-HCAA-00525 Relative to Monitoring Completed to Date

FAA Requirement	Year 1 (2015)	Year 2 (2016)	Year 3 (2017)	Year 4 (2018)	Year 5 (2019)	Year 6 (2020)	Monitoring Requirement Met (Y/N)	Overall Outcome for Demonstrating Functional Fish Habitat
7.1.1 - During Year 1, 3 and 5 the integrity of the coarse rock substrate will be monitored using video surveys.	√	N/A	√	N/A	√	N/A	Y – Year 1, Year 3 and Year 5 monitoring completed.	Coarse rock habitat is stable. No repairs or reinforcement required.
7.1.2 - During Year 2, 4 and 6, video surveys of the coarse rock substrate will be used to document the types and percent coverage of aquatic vegetation colonizing the substrate. Benthic invertebrates and fish will be identified and quantified.	N/A	√	N/A	√	N/A	√	Y – Year 2 and Year 4 and Year 6 monitoring completed.	Coarse rock habitat is functional. Colonization by macroalgae and sessile invertebrates. Habitat use by motile invertebrates and fish
7.1.3 - The production of benthic invertebrates and the occurrence of fish larva will be monitored by setting artificial and natural substrate collection baskets in the vicinity of the coarse substrate.	x	x	x	√	√	x	N – Year 4 and Year 5 monitoring completed†	Colonization observed of benthic invertebrates. Juvenile and larval fish observed associated with the habitat.
7.1.4 - Continuous video monitoring of the rock substrate shall be undertaken to demonstrate the association of fish with the rock substrate.	√	√	√	√	√	√	Y – Monitoring completed in all years††	Fish are associated with the coarse rock habitat with increasing observations with each survey year.

Notes: √=completed; x=not completed; N/A=condition not required during monitoring year. †Settlement basket monitoring was not completed in Years 1, 2 or 3 due to insufficient colonization and loss of settlement baskets deployed in Year 1 (SEM 2016). Settlement baskets were not redeployed in 2019; therefore, results were not available for 2020. †† Continuous video monitoring was completed via stationary and transect video recordings at multiple locations around the Ore Dock following the methods initially developed by SE

6.0 CLOSURE

We trust this information is sufficient for your needs at this time. Should you have any questions or concerns, please do not hesitate to contact the undersigned at 250-881-7372.

Golder Associates Ltd.

Christine Bylenga, PhD
Marine Scientist

Niallan O'Brien, BSc
Marine Ecologist

Reviewed by:

Marina Winterbottom, BSc, MMM, RPBio
Senior Marine Biologist

Shawn Redden, RPBio
Senior Fisheries Biologist

CB/NOB/MW/DK/lih

https://golderassociates.sharepoint.com/sites/11206g/deliverables (do not use)/issued to client_for wp/1663724-250-r-rev1-34000/1663724-250-r-rev1-34000 2020 milne ore dock habitat offset rpt-22dec_20.docx

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APPENDIX A

Fisheries Act Authorization

Fisheries and Oceans Canada | Pêches et Océans Canada

DFO File No.: 14-HCAA-00525
Authorization No.:1

FISHERIES ACT 35 (2)(b)AUTHORIZATION

Authorization issued to:

Baffinland Iron Mines Corporation (hereafter referred to as the "Proponent")
Attention: Oliver Curran
2275 Upper Middle Road East Suite 300
Oakville, ON
L6H 0C3

Location of Proposed Project

Nearest community : Pond Inlet
Territory: Nunavut
Name of waterbody: Milne Inlet
UTM Coordinates: NAD 83 UTM 17 503250E 7976508N

Description of Proposed Project

The proposed project of which the work, undertaking or activity authorized is a part involves:

The Early Revenue Phase of the Mary River Project will involve the mining and shipment of up to 4.2 million tonnes per annum of iron ore via the Tote Road to the port at Milne Inlet, for shipment to European markets during the open water season.

Description of Authorized work(s), undertaking(s) or activity(ies) likely to result in serious harm to Fish

The works, undertakings, or activities associated with the proposed project described above, that are likely to result in serious harm to fish, are:

The infilling of fish habitat in Milne Inlet resulting from the construction of the ore dock and mooring structures.

The serious harm to fish likely to result from the proposed work, undertaking, or activity, and covered by this authorization includes:

Permanent destruction of 24, 847 m^2 (6015 Habitat Equivalent Units) of fish habitat.

Conditions of Authorization

The above described work, undertaking or activity that is likely to result in serious harm to fish must be carried on in accordance with the following conditions.

1. **Conditions that relate to the period during which the work, undertaking or activity that will result in serious harm to fish can be carried on:**

The work, undertaking or activity that results in serious harm to fish is authorized to be carried on during the following period:

From	To
Date of Issuance	December 31, 2020

If the Proponent cannot complete the work, undertaking or activity during this period, Fisheries and Oceans Canada (DFO) must be notified. DFO may, where it considers appropriate, provide in writing notice that the period to carry on the work, undertaking or activity has been extended.

The period during which other conditions of this authorization must be complied with are provided in their respective sections below.

2. **Conditions that relate to measures and standards to avoid and mitigate serious harm to fish resulting from the ore dock construction:**

2.1 Sediment and erosion control measures must be in place and shall be upgraded and maintained, such that release of sediment is avoided at the location of the authorized work, undertaking, or activity.

2.2 Measures and standards to avoid and mitigate serious harm to fish resulting from the construction of the ore dock shall be implemented prior to the commencement of in-water works.

2.3 While conducting vibratory pile driving, dredging and infilling a marine mammal exclusion zone of 200m radius will be established. Field measurements will be undertaken to verify that underwater noise levels are below the 100db threshold.

2.4 The marine mammal exclusion zone will be monitored for marine mammal presence starting 30 minutes prior to the commencement of vibratory pile driving, dredging or infilling activities. All activities shall cease if marine mammals are observed within or approaching the exclusion zone and only recommence when the marine mammals have left the area.

2.5 If measured underwater noise levels exceed the 100db threshold the following contingency measures shall be considered for implementation: expansion of the marine mammal exclusion zone and the installation of bubble curtains.

2.6 Turbidity levels shall be monitored in waters adjacent to the work zone during vibratory pile driving, infilling and dredging activities. If turbidity levels exceed Canadian Council of Ministers of the Environment (CCME) guidelines the following contingency measures shall be considered for implementation: installation of additional turbidity curtains, changes in grain size gradation of infill material, altered methods of infilling and the suspension of in-water works until turbidity levels are within the CCME guidelines.

3. Conditions that relate to measures and standards to avoid and mitigate serious harm to fish resulting from project related shipping activity (Terms and Conditions (T&C) adapted from Nunavut Impact Review Board's Project Certificate No 5 May 28, 2014):

3.1 The Proponent shall develop and implement a monitoring program to evaluate changes to marine fish, fish habitat and aquatic organisms as well as to monitor for non-native species introductions resulting from ballast water discharges. Baseline data collection shall commence prior to any ballast water discharge into Milne Inlet and monitoring shall continue for the life of the project. (NIRB T&C 87).

3.2 The Proponent shall develop and implement a monitoring program to confirm the predictions made in the Final Environmental Impact Statement – Addendum, with respect to disturbance impacts of shipping noise on the distribution of marine mammals. The survey shall be designed to monitor effects during the shipping season and include locations in Milne Inlet, Eclipse Sound and Pond Inlet. The survey shall continue over a sufficiently lengthy period of time to determine the extent to which habituation occurs for Narwhal and Bowhead whales. (NIRB T&C 109)

3.3 The Proponent shall develop and implement a monitoring protocol that includes but is not limited to acoustic monitoring, to assess the potential short term, long term and cumulative effects of vessel noise on marine mammals and marine mammal populations.(NIRB T&C 110)

3.4 The Proponent shall provide sufficient marine mammal observer coverage on project vessels to monitor marine mammal interactions with project vessels and report any accidental contact of marine mammals. (NIRB T&C 121)

3.5 The Proponent shall identify and implement measures to reduce the potential for interactions with marine mammals throughout the life of the project. These measures may include; a) changes in frequency and timing (including periodic shipping suspensions) when the likelihood of negative interactions with marine mammals are greatest or during sensitive life stages b) reduced shipping speeds where ship-marine mammal interactions are most likely to occur. (NIRB T&C 105)

4. Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish from the ore dock construction:

4.1 The Proponent shall undertake monitoring and report to DFO annually by December 31st whether measures and standards to avoid and mitigate serious harm to fish were conducted according to the conditions of this Authorization, by:

4.1.1 Providing dated photographs and inspection reports to demonstrate effective

implementation and functioning of mitigation measures and standards described above to limit the serious harm to what is covered by this authorization.

4.1.2 Providing details of any contingency measures that were followed, to prevent impacts greater than those covered by this authorization in the event that mitigation measures did not function as described.

5. Conditions that relate to monitoring and reporting of measures and standards to avoid and mitigate serious harm to fish from project related shipping:

5.1 The Proponent shall undertake monitoring and report to DFO annually. The submission of monitoring reports shall coincide with the Proponent's submission of their Annual Monitoring Report to the Nunavut Impact Review Board.

6. Conditions that relate to the offsetting for the serious harm to fish likely to result from the authorized work, undertaking or activity:

6.1 Course rock substrate will be placed around the perimeter of the ore dock and moorings at Milne Inlet to provide 6003 HEU of fish habitat.

6.2 All fish habitat offsetting measures shall be completed and functioning according to the criteria below by December 31, 2020.

6.2.1 Coarse rock substrate will provide additional habitat for benthic invertebrates and fish species in Milne Inlet.

6.2.2 Colonization of the rock substrate by algae and aquatic vegetation to provide a food source for benthic invertebrates and fish.

6.3 If the results of monitoring as required in condition 7 indicate that the offsetting measures are not completed by the date specified in condition 6.2, the Proponent shall give written notice to DFO and put in place contingency measures specified in condition 6.5 and associated monitoring measures, as contained within their approved offsetting plan, to ensure the offsetting is completed and functioning as required by this authorization.

6.4 If monitoring identifies deterioration in the structure, plans will be developed to repair and reinforce these areas. Annual monitoring (drop camera) will be adjusted to include repaired locations and will continue for a period of three years following any repairs.

6.5 If no quantifiable increase in use of the rock substrate by fish, benthic invertebrates or aquatic vegetation is detected by year 6 the following contingency measures will be undertaken.

6.5.1 The Proponent will create an additional 6005 HEU of artificial reefs outside the zone of influence of the ore dock within Milne Inlet.

6.6 To ensure that the above offsetting contingency measures are functioning as intended the monitoring program described in Condition 7 shall be carried out.

6.7 Offsetting measures shall be left undisturbed, and the Proponent shall not carry on any work, undertaking or activity that will adversely disturb or impact the offsetting measures.

6.8 DFO may draw upon funds set aside by the Proponent through the letter of credit provided as

part of the application for this authorization, in order to ensure conditions of this authorization related to offsetting measures, including monitoring and reporting, are met.

7. **Conditions that relate to monitoring and reporting of offsetting measures (described above in section 6:**

7.1 The Proponent shall conduct monitoring of the offsetting measures according to the approved schedule and criteria below:

7.1.1 During Year 1, 3 and 5 the integrity of the coarse rock substrate will be monitored using video surveys (drop camera). All information will be geo-referenced and any slumping or other deterioration will be documented and repaired as necessary.

7.1.2 During Year 2, 4 and 6 video surveys (drop camera) of the coarse rock substrate will be used to document the types and percent coverage of the aquatic vegetation colonizing the substrate. Benthic invertebrates and fish recoded in the video will be identified and quantified.

7.1.3 The production of benthic invertebrates and the occurrence of fish larva will be monitored by setting artificial and natural substrate collection baskets in the vicinity of the coarse substrate.

7.1.4 Continuous video monitoring of the rock substrate shall be undertaken to demonstrate the association of fish with the rock substrate.

7.2 The Proponent shall report to DFO that the offsetting works were conducted according to the conditions of this Authorization by providing the following:

7.2.1 Monitoring report shall be submitted to the DFO-Yellowknife Office by December 31 of each year monitoring is carried out.

DFO File No. : 14-HCAA-00525
Authorization No. :1

Authorization Limitations and Application Conditions

The Proponent is solely responsible for plans and specifications relating to this Authorization and for all design, safety and workmanship aspects of all the works associated with this Authorization.

The holder of this authorization is hereby authorized under the authority of paragraph 35(2)(b) of the Fisheries Act. R.S.C., 1985, c.F. 14 to carry on the works, undertakings and/or activities that are likely to result in serious harm to fish as described herein. This authorization does not purport to release the applicant from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies.

This Authorization does ***not*** permit the deposit of a deleterious substance in water frequented by fish. Subsection 36(3) of the *Fisheries Act* prohibits the deposit of any deleterious substances into waters frequented by fish unless authorized by regulations made by Governor in Council.

At the date of issuance of this Authorization, no individuals of aquatic species listed under the *Species at Risk Act* (SARA) were identified in the vicinity of the authorized works, undertakings or activities. In the event that any such individuals are identified in this area, or in the event that an aquatic species found in this same area is listed under the SARA after this Authorization is issued, this Authorization does not permit the killing, harming, capture or taking of individuals of any such species (section 32 of the SARA), or the damage or destruction of residence of individuals of such species (s. 33 of the SARA) or the destruction of the critical habitat of any such species (s. 58 of the SARA).]

The failure to comply with any condition of this authorization constitutes an offence under paragraph 40(3)(a) of the *Fisheries Act* and may result in charges being laid under the *Fisheries Act*.

This authorization must be held on site and work crews must be made familiar with the conditions attached.

This authorization cannot be transferred or assigned to another party. If the work(s), undertaking(s) or activity(ies) authorized to be conducted pursuant to this authorization are expected to be sold or transferred, or other circumstances arise that are expected to result in a new Proponent taking over the work(s), undertaking(s) or activity(ies), the Proponent named in this authorization shall advise DFO in advance.

Date of Issuance: JUN 3 0 2014

Approved by:

Dave Burden
Regional Director General
Central and Arctic Region
Fisheries and Oceans Canada

APPENDIX B

Permits

Canada

Date: October 23rd 2020

To: Phil Rouget, Senior Marine Biologist, Golder Associates Ltd.

Subject: Animal Use Protocol - Letter of Approval

Dear Phil,

Your 2020 Animal Use Protocol (AUP), number FWI-ACC-2020-41, entitled "Baffinland 2020 Marine Ecological Effects Monitoring Program and Marine Habitat Offset Monitoring Program" has been reviewed and approved by the Freshwater Institute Animal Care Committee.

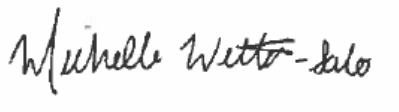
Keep this signed letter of approval as well as the signed AUP application form for your records. Please be advised that should there be a need to revise the protocol you are requested to contact the Freshwater Institute Animal Care Committee and obtain approval prior to proceeding.

The Canadian Council on Animal Care requires post approval monitoring of Animal Use Protocols (AUP). The Freshwater Institute Animal Care Committee will be randomly choosing AUPs and asking for photographs or video that shows the handling or interaction of animals for these projects.

In addition, you are required to submit a brief report within 30 days of completion of the project outlining the unexpected changes to the protocol, the number of animals used and any unanticipated results. If injuries or mortalities occur, an incident report must be provided. A blank copy of these forms will be sent out with your final approval.

Feel free to contact me if you have any questions or concerns.

Sincerely,



Michelle Wetton-Salo

Chair Person of FWI-ACC

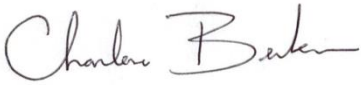
Freshwater Institute Animal Care Committee
Arctic & Aquatic Research
Ontario and Prairie Region / région de l'Ontario et des Prairies
Fisheries and Oceans Canada / Pêches et Océans Canada
501 University Crescent
Winnipeg, Manitoba R3T 2N6
Phone:204-983-5238
xca-fwisl-acc@dfo-mpo.gc.ca

APPROVAL BY ANIMAL CARE COMMITTEE MEMBERS

Signatures of ACC Members

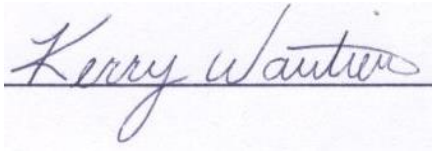
Andrew Chapelsky

Marc Brandson

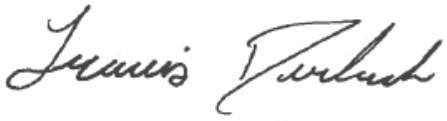


Dr. Charlene Berkvens D.V.M., D.V.Sc.

Chantelle Sawatzky



Kerry Wautier



Travis Durhack

Brent Young

Interim Approval ☐ **Final Approval** ☒

APPROVAL BY THE FWI ANIMAL CARE COMMITTEE IS FOR THE PERIOD STATED ON YOUR ANIMAL USE PROTOCOL.

Licence #: S-20/21-1006-NU

Philippe Rouget
3795 Carey Road 2nd floor
Victoria, BC, CA V8Z 6T8

Dear Philippe Rouget,

Enclosed is your Licence to Fish for Scientific Purposes issued pursuant to Section 52 of the Fishery (General) Regulations.

Failure to comply with any of the conditions specified on the attached licence may result in a contravention of the Fishery (General) Regulations.

Please be advised that this licence only permits those activities stated on your licence. Any other activity may require approval under the Fisheries Act or other legislation. It is the Project Authority's responsibility to obtain any other approvals.

Please ensure that you include the licence number and project title in any future correspondence and that you complete the Summary Harvest Report upon completion of activities under this licence.

Yours truly,

Jenna Kayakjuak
License Delivery Officer
Northern Operations
Central and Arctic Region
Fisheries and Oceans Canada

Date

Enclosure

LICENCE TO FISH FOR SCIENTIFIC PURPOSES

S-20/21-1006-NU

Pursuant to Section 52 of the Fishery (General) Regulations, the Minister of Fisheries and Oceans hereby authorizes the individual(s) listed below to fish for scientific purposes, subject to the conditions specified.

Project Authority: Philippe Rouget — Golder Associates Ltd.
3795 Carey Road 2nd floor
Victoria, BC, CA V8Z 6T8

Other Personnel:
Christine Bylenga (Lead)
Daniel Vicente (Lead)
Patricia Tomliens
Niallan O'Brian
Benjamin Widdowson
Robert Hollingshead (Boat Operator)
Erika Grebeldinger
Kristin Westman
Bradley Cox
Therese Chicote
Corby Shurgot
Jeff Reynolds

Objectives: Baffinland Iron Mines Corp. - Mary River Project - 2020 Marine Environmental Effects Monitoring Program (MEEMP) and Marine Habitat Offset Monitoring Program at Milne Port, Nunavut

The Project objectives are to conduct sampling to adhere to the terms and conditions of Baffinland to operate the Mary River Mine and Port Facility in Milne Inlet including:
1. To assess the effectiveness of fish offsetting measures in relation to the construction of the Milne ore dock.
2. To collect marine data for the Marine Ecological Effects Monitoring Program and Marine Habitat Offset Monitoring Program regulatory requirements.

CONDITIONS

Specified Conditions:

GEAR TYPES:
Fukui traps, Fyke nets and minnow traps are a live trap technique. Beach seines are a live capture technique and not anticipated to result in mortality. Gill net sets will be short in duration to limit mortality (2 hour soak time then checked). Angling (jigging and/or trolling) and trawls (beam and/or otter) are not anticipated to result in mortality. Species listed here are based on potential to occur, as well as species observed or captured in previous programs in Milne Inlet. The total number of live samples are estimated, based on species potential in the area. The purpose is to gather information about distribution, relative abundance, size distribution, and other biological characteristics. Biologica Laboratory and BV Labs will be used for aging, body burden analysis and stomach content analysis. Sacrificial dead samples (approximately 50 individuals each of Fourhorn Sculpin and Hiatella arctica) in addition to all incidental mortalities will be submitted to Biologica for sample processing and analysis.

Waters:

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Sculpin, Fourhorn — Gear: 10 MM Mesh Gillnets and Larger

Species:

Gear: Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Sculpin, Arctic

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Sculpin, Shorthorn

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Sculpins Spp.

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Sculpin, Ribbed

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Sculpin, Arctic Staghorn

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Spiny Lumpsucker

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Lumpfish

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Sand Lance

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Fish Doctor

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Cod, Greenland

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine

Species: Gear: Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Cod, Arctic

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Arctic Char (Searun)

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: Milne Inlet
Point A: 72° 20' N, 80° 30' W

Species: Stickleback, Ninespine

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Fourline Snakeblenny

Gear: 10 MM Mesh Gillnets and Larger
Angling
Fish Trap
Fyke Nets
Minnow Trap
Otter Trawl
Seine
Trawl

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			500	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Gastropods/Shellfish

Gear: Ponar dredge
Van Veen Grab

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
			200	100				

Water Body: **Milne Inlet**
Point A: 72° 20' N, 80° 30' W

Species: Benthos

Gear: Ponar dredge
Van Veen Grab

Total Weight	Weight Live	Weight Dead	Number Alive	Number Dead	Number Tows	Number Sets	Hours	Minutes
300.00								

Fishing Period: July 21, 2020 to September 30, 2020

A copy of this licence must be available at the study site and produced at the request of a fishery officer.

Live fish may not be retained unless specified in the conditions of this licence.

The licence holder shall immediately cease fishing when the total fish killed or live sampled reaches any of the maximums set for any of the species listed.

Transportation:

Other approvals/permits may be necessary to collect or transport certain species, such as Marine Mammal Transportation Permits. For marine mammal parts, products and derivatives a Marine Mammal Transportation Licence is required for domestic transport and, for international transport a Canadian CITES Export Permit is also required.

Report on Activities:

The Project Authority will submit to the License Delivery Officer, Department of Fisheries and Oceans, within one month of the expiry date, a report stating:

i) whether or not the field work was conducted; and if conducted

ii) waterbody location, fishing coordinates, gear types used at each coordinate, numbers or amount of fish (by species) collected and/or marked and the date or period of collection.

A Summary Harvest Report template is provided by the License Delivery Officer at time of issuance of this licence .

The Project Authority also will provide a copy of any published or public access documents which result from the project . Information supplied will be used for population management purposes by the Department of Fisheries and Oceans and becomes part of the public record.

All documents should be sent to:

Fisheries and Oceans Canada
Northern Operations
Central and Arctic Region
P.O. Box 358
Iqaluit, NU X0A 0H0

Attention: Licence Delivery Officer

Telephone: (867) 979-8005
Fax: (867) 979-8039
E-mail: XCNA-NT-NUpermit@dfo-mpo.gc.ca

Kevin Bill
A/Regional Director, Arctic Operations
Arctic Region
Fisheries and Oceans Canada

Date

For the Minister of Fisheries and Oceans.

Pursuant to Section 52 of the Fishery (General) Regulations.

Nunavummi Qaujisaqtulirijikkut / Nunavut Research Institute
Box 1720, Iqaluit, NU X0A 0H0 phone:(867) 979-7279 fax: (867) 979-7109 e-mail:
mosha.cote@arcticcollege.ca

SCIENTIFIC RESEARCH LICENSE

LICENSE # 02 065 20R-M

ISSUED TO: Megan-Lorde Hoyle
Baffinland Iron Mines Corporation
2275 Upper Middle Road East, Suite 300
Oakville, Ontario
L6H 0C3 Canada

TEAM MEMBERS: Please see attached

AFFILIATION: Baffinland Iron Mines Corporation

TITLE: Mary River Project

OBJECTIVES OF RESEARCH:
Data collection and analysis for environmental monitoring and management of the Mary River project to assess Project impacts in relation to the approved environmental impact assessment;Compliance to NIRB Certificate No. 005, Amended Type "A" Water License 2AM-MRY1325 and further baseline and operating conditions analysis for future permitting.

TERMS & CONDITIONS:
The holder of the licence will be bound by the terms and conditions of the Nunavut Impact Review Board Screening Decision Report and the Department of Culture & Heritage archaeological sites terms and conditions. The license holder will abide by all special public health protection measures imposed by Nunavut's Chief Medical Officer of Health in response to the Covid-19 Pandemic, including restrictions on non-essential travel to Nunavut. These terms and conditions will form part of this licence.

DATA COLLECTION IN NU:
DATES: January 01, 2020-December 31, 2020
LOCATION: Steensby Port,Mary River,Milne Port/Road

Scientific Research License 02 065 20R-M expires on December 31, 2020
Issued at Iqaluit, NU on July 29, 2020

Mary Ellen Thomas
Science Advisor

APPENDIX C

Photos

Photo 1: Remotely operated vehicle (ROV) Unit in the water during survey of offset habitat.

Photo 2: ROV operator reviewing the live feed from the ROV during surveys.

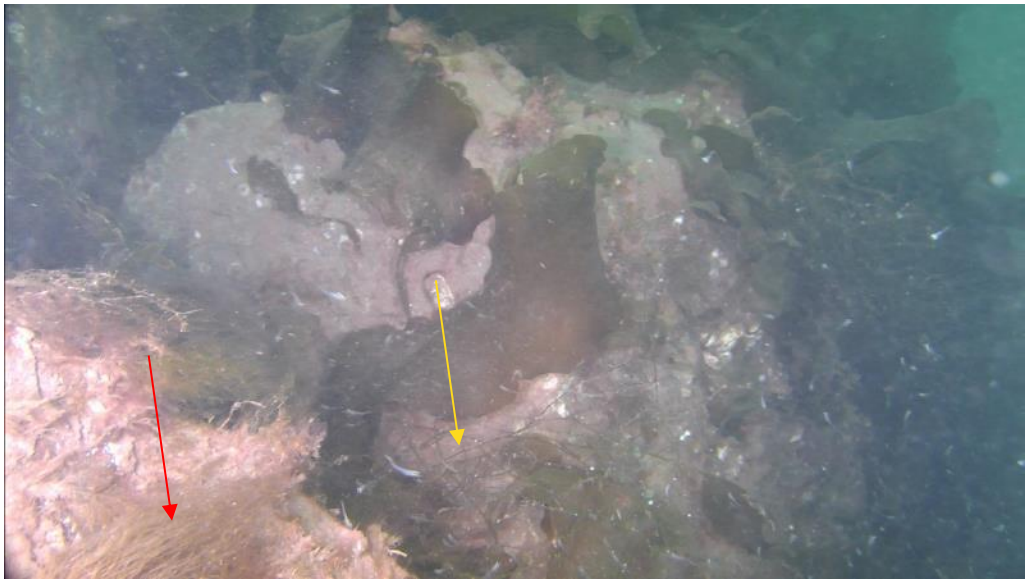


Photo 3: Sugar kelp (*Saccharina latissima*), *Battersia sp.* (red arrow) and *Gracilaria sp.* (yellow arrow) on the west side of the ore dock on Transect T1. Also note large aggregations of opossum shrimp in the surrounding water column (30 July 2020)

Photo 4: Green filamentous algae (Chlorophyta indet.) and brown filamentous algae on the west side of the ore dock on Transect T2 (31 July 2020)

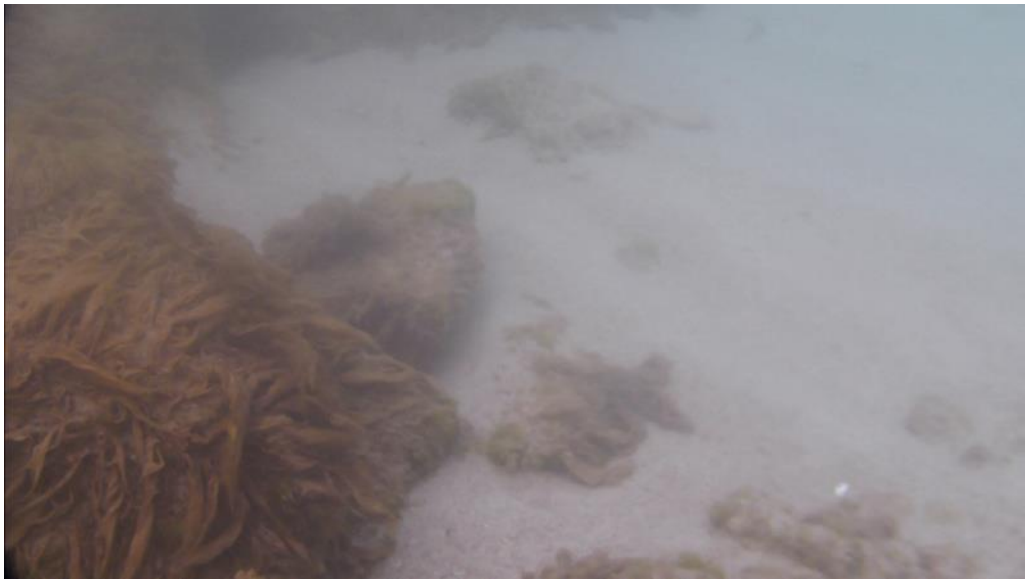


Photo 5: Brown filamentous algae (Phaeophycaea indet., >25-50% cover) on the east side of the ore dock on Transect T6 (2 August 2020)

Photo 6: Rockweed (*Fucus evanescens*) and epiphytic filamentous algae (*Pylaiella sp.*) on the east side of the ore dock on Transect T7 (2 August July 2020)

Photo 7: Fourhorn sculpin (*Myoxocephalus quadricornis*) hiding under macroalgae on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 8: Arctic sculpin (*Myoxocephalus scorpioides*) hiding under habitat on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 9: Shorthorn sculpin (*Myoxocephalus scorpius*) on the west side of the ore dock on Transect T2 (31 July 2020)

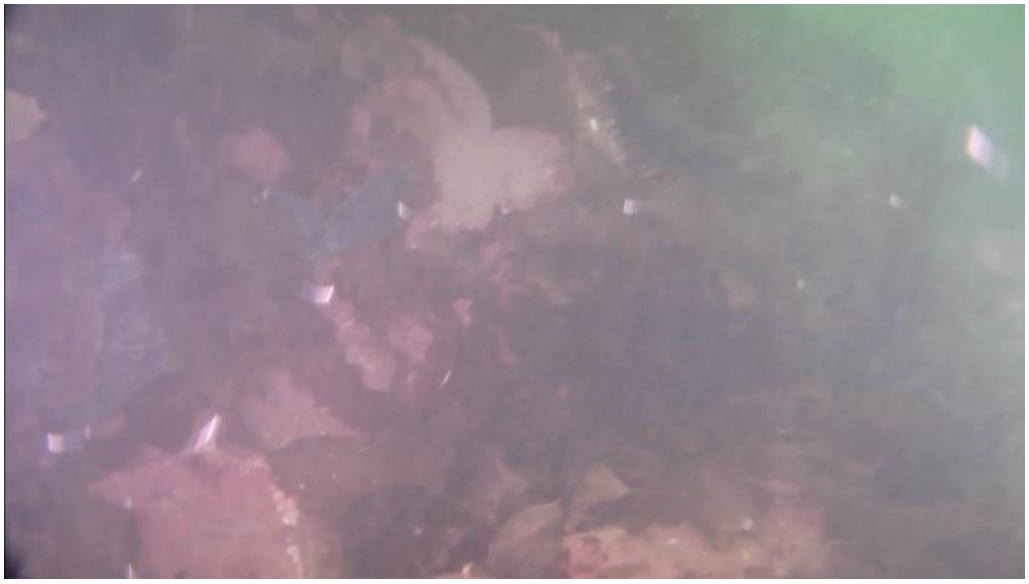


Photo 10: Greenland cod (*Gadus ogac*) hiding under sugar kelp on the west side of the ore dock on Transect T2 (31 July 2020)

Photo 11: Unknown sculpin (Cottidae indet., red arrow) on the east side of the ore dock on Transect T6 (2 August 2020)

Photo 12: Unknown cod (Gadidae indet., red arrow) hiding between boulders on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 13: Sandlance (*Ammodytes sp.*, red arrow) emerging from soft sediment on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 14: Unknown prickleback (Stichaeidae indet., red arrow) behind cobble on the east side of the ore dock on Transect T6 (2 August 2020)

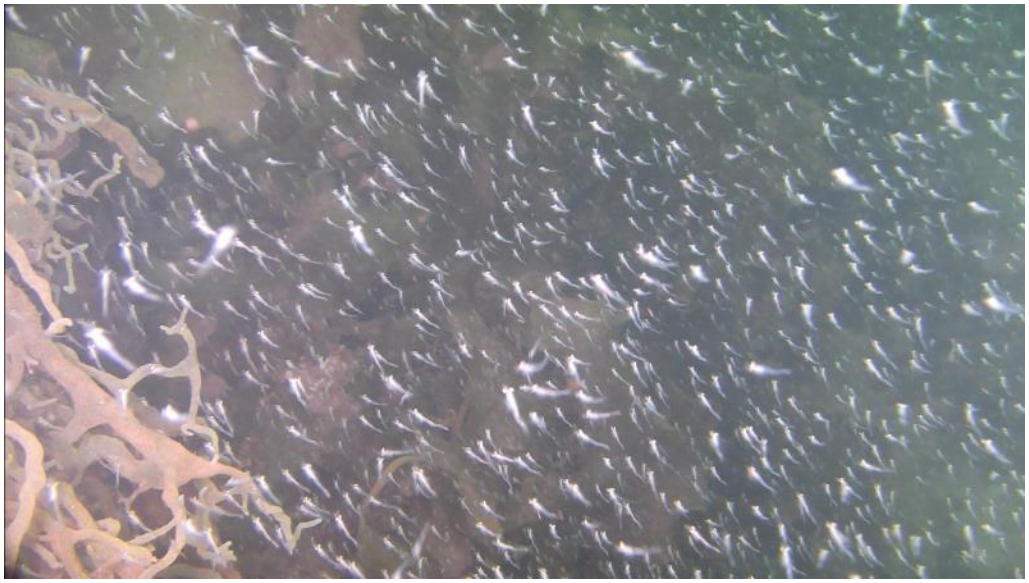


Photo 15: Opossum shrimp (Mysida indet.) and unknown sponge (Heteroscleromorpha indet.) west side of the ore dock on Transect T2 (31 July 2020)

Photo 16: Four ctenophore species (Ctenophora indet.; red, yellow, green, and blue arrows) in the water column on the west side of the ore dock on Transect T1 (30 July 2020)

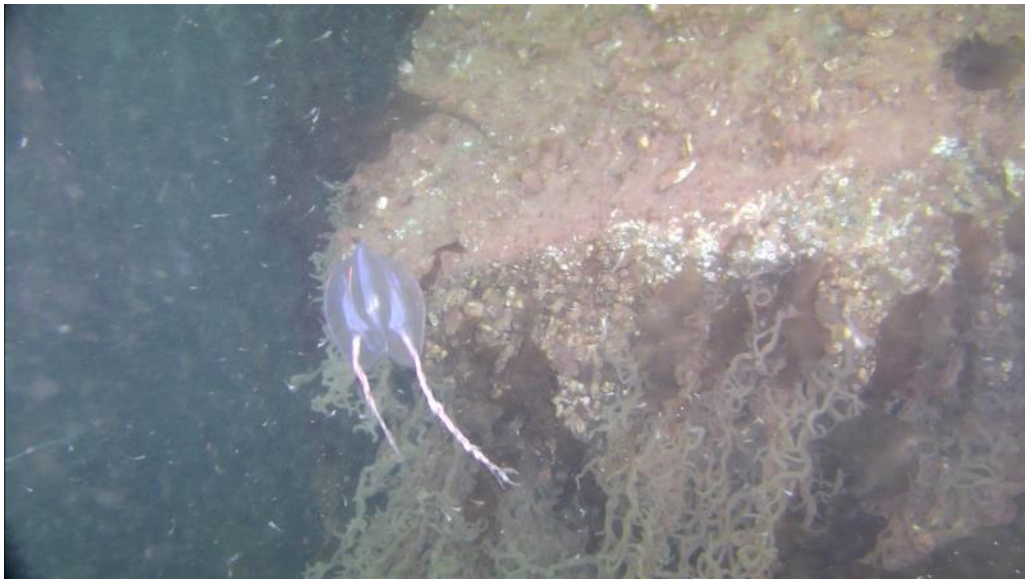


Photo 17: Arctic comb jelly (*Mertensia ovum*) in the water column on the west side of the ore dock on Transect T1 (30 July 2020)

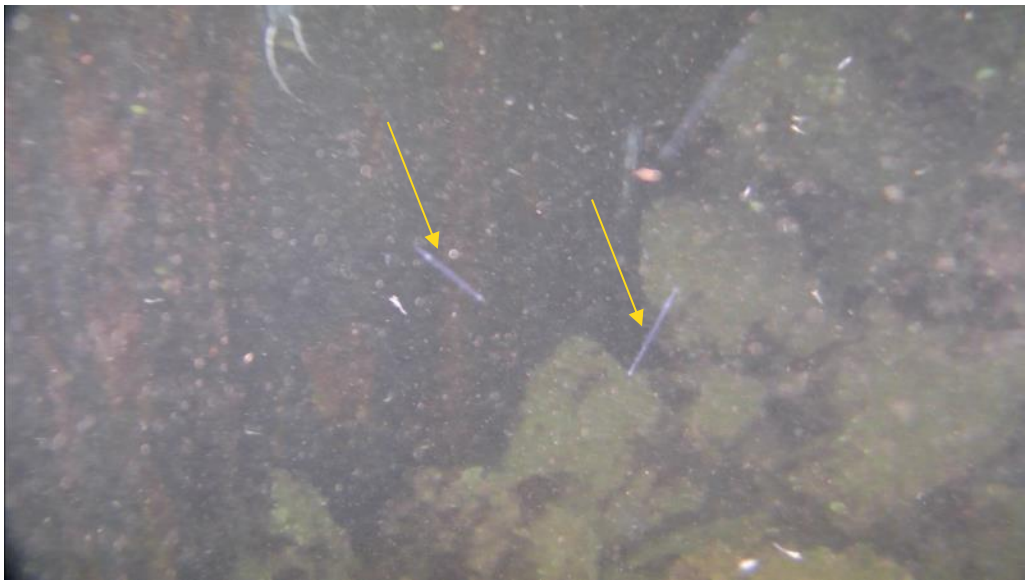


Photo 18: Arrow worms (Chaetognatha indet.; yellow arrows) in the water column on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 19: Tachymedusa (*Ptychogastria polaris*, red arrows) on the west side of the ore dock on Transect T1 (30 July 2020)

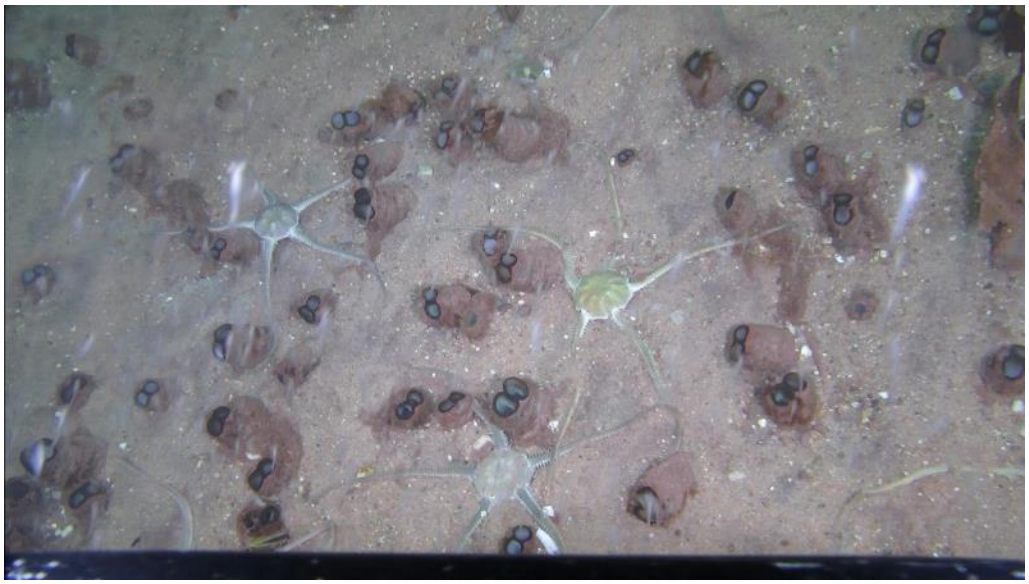


Photo 20: Brittle stars (Ophiuridae indet.) and blunt gaper siphons (*Mya truncata*) on the west side of the ore dock on Transect T1 (30 July 2020)

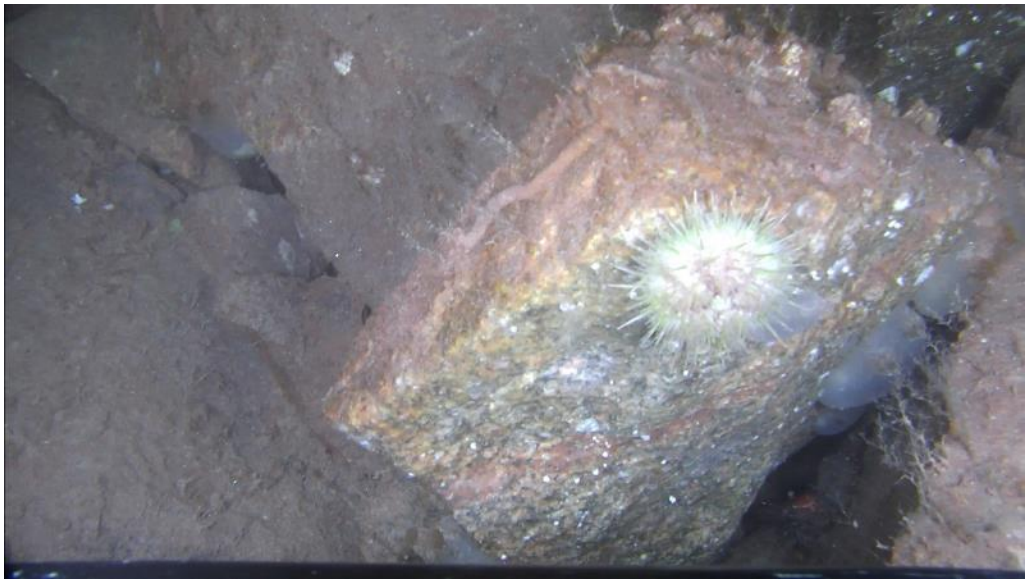


Photo 21: Green sea urchin (*Strongylocentrotus droebachiensis*) and tunicates (*Polycarpa sp.*) on the west side of the ore dock on Transect T1 (30 July 2020)

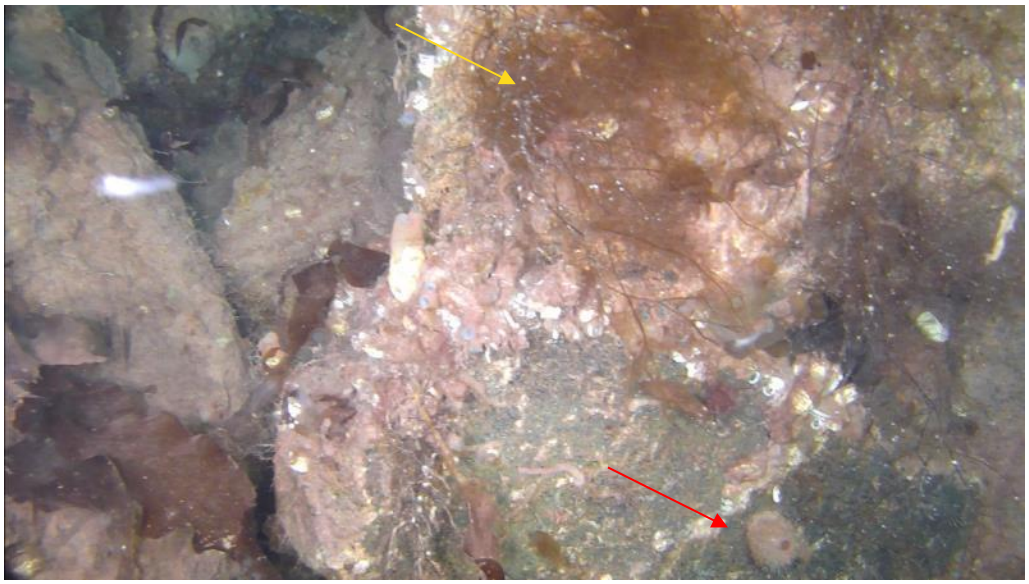


Photo 22: Tunicate (red arrow) and *Desmarestia sp*. (yellow arrow) on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 23: Rough-mantled dorids (*Onchidoris bilamellata*) and their eggs and unknown barnacles (Balanomorpha indet.) on the west side of the ore dock on Transect T1 (30 July 2020)

Photo 24: Sea spider (*Nymphon sp.*) on the west side of the ore dock on Transect T1 (30 July 2020)

golder.com