



29 December 2017

FISHERIES ACT AUTHORIZATION 14-HCAA-00525

2017 Milne Ore Dock Fish Offset Monitoring Report

Submitted to:

Fisheries and Oceans Canada
Fisheries Protection Program
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REPORT



Report Number: 1663724-040-R-Rev0

Distribution:

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Fisheries Act Authorization



1.0 INTRODUCTION

Baffinland Iron Mines Corporation (Baffinland) 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. A Project Certificate No. 005, amended by the Nunavut Impact Review Board (NIRB) on 28 May 2014 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 18 Mtpa of ore by rail to Steensby Port for year-round shipping through the Southern Shipping Route (via Foxe Basin and Hudson Strait), and 4.2 Mtpa of ore by truck to Milne Port for open water shipping through the Northern Shipping Route during the open water season (July – October) using chartered ore carrier vessels.

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 m² of marine fish habitat, or 6,003 Habitat Equivalent Units. It was subsequently determined by 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 to offset the serious harm to fish.

Baffinland submitted to DFO an application for an authorization under Section 35(2)b of the *Fisheries Act* for installation of the ore dock. The application included a Fish Offset Plan, which proposed the addition of coarse rock material around the perimeter of the ore dock to increase habitat complexity in Milne Port and serve as functional habitat for marine benthic invertebrate and fish species. DFO approved the Fish Offset Plan and issued a *Fisheries Act* Authorization (FAA) (#14-HCAA-00525) for the ore dock on June 30, 2014 (Appendix A). The FAA also 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 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).
 - 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 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.



Monitoring the effectiveness of the offsetting habitat began in 2015. 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 of offset monitoring. This report presents the results of Year 3 of habitat offset monitoring undertaken in Milne Port during the open-water season of 2017. A more extensive overview of the regulatory context for the FAA is provided in SEM's 2016 habitat offset monitoring report (SEM 2017a).

2.0 OBJECTIVES

The objective of the 2017 offset monitoring program was to complete Year 3 monitoring and reporting on the structural stability and the overall effectiveness (biological utilization) of the offset habitat installed around the perimeter of the Milne ore dock. Year 3 monitoring activities included the following:

- 1) Underwater video surveys (drop camera) of the offset habitat to determine the integrity of the coarse rock material and identify any slumping or deterioration of the materials.
- 2) Retrieval of artificial and natural substrate settlement baskets in the vicinity of the ore dock to evaluate colonization of benthic invertebrates (encrusting epifauna) and larval fish.
- 3) Underwater video surveys to demonstrate the association of fish with the rock substrate.

3.0 METHODS

Monitoring was conducted from 1 to 14 September 2017. The monitoring team consisted of two Golder biologists and a local boat operator and field technician from Pond Inlet. Field sampling was conducted from a 28-foot aluminum vessel based out of the Milne Port facility. The following scientific data collection permits were obtained from the Nunavut and federal government prior to the start of the monitoring program:

- DFO Licence to Fish for Scientific Purposes Permit #: S-17/18-1036-NU
- DFO Animal Use Protocol Permit # FWI-ACC-2017-044
- Nunavut Research Institute (NRI) Scientific Research Licence #02 039 17R-M

3.1 Underwater Video Collection

Underwater video was used to assess the structural integrity of the offsetting habitat and identify any slumping or deterioration of the materials. For consistency, sampling methods used during the 2015 and 2016 video surveys were replicated to the extent possible.

On 4 September 2017, towed video surveys were conducted along two ~470-m transects on the east side of the ore dock and two 170-m transects on the west side of the ore dock (Figure 1). Underwater video was also collected at 12 drop camera sampling stations along the north face of the dock where ship loading activities prevented access for towed video surveys (Figure 1). The underwater video system consisted of a Deep Blue Pro high resolution underwater video camera with integrated 300 lumen LED light pods and Global Positioning System



(GPS) video overlay. The video camera was connected to a video monitor set-up on the deck of the vessel via an umbilical with integrated hoisting cable and winch system. Video data was recorded on an external hard drive with GPS overlay.

For towed video surveys, the video system was towed behind the field boat using an onboard winch system and video monitor for monitoring camera depth. For the drop camera surveys, the video system was lowered over the side of the ore dock until reaching the rock armour substrate, and video was collected for five to ten minutes at each of the twelve sampling stations (Figure 1).

Video data was post-processed by Golder personnel to confirm the structural integrity of the armour stone and to identify marine biota occupying the offset habitat. Evidence of displaced rocks and the general amount of biological growth and sedimentation on the armour stone was documented. Results of the video survey were interpreted to provide a general comparison of the armour stone to previous years and an overall assessment of the structural integrity of the armour stone. Fish observed in the video were identified to the lowest practical taxonomic level. Results of the video survey were interpreted by an experienced Golder fisheries biologist to provide a general overview of fish utilization of the offset habitat.

Table 1: Drop Camera Video Locations

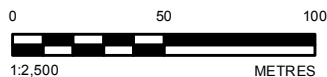
Station Name	Location	
	Easting	Northing
A1	503338	7976681
A2	503330	7976675
A3	503318	7976665
A4	503327	7976672
A5	503315	7976671
A6	503308	7976661
A7	503223	7976610
A8	503226	7976623
A9	503229	7976637
A10	503234	7976642
A11	503235	7976638
A12	503237	7976640

Notes: Coordinates in UTM NAD 83, Zone 17



LEGEND

- DROP CAMERA VIDEO LOCATION
- TOWED VIDEO PATH



REFERENCE(S)

SATELLITE IMAGERY BY DIGITALGLOBE (AUGUST, 2016), RETRIEVED FROM KNIGHT PIESOLD LTD. FULCRUM DATA MANAGEMENT SITE, MAY 2017. HYDROGRAPHY, POPULATED PLACE, AND PROVINCIAL BOUNDARY DATA OBTAINED FROM GEOGRATIS. © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. PROJECTION: UTM ZONE 17 DATUM: NAD 83

CLIENT

BAFFINLAND IRON MINES CORPORATION

PROJECT

MARY RIVER PROJECT – HABITAT OFFSET MONITORING PROGRAM

TITLE

UNDERWATER VIDEO LOCATIONS FOR FISH HABITAT OFFSET MONITORING, MILNE ORE DOCK, 2017

CONSULTANT



YYYY-MM-DD 2017-12-19

DESIGNED DV

PREPARED LMS

REVIEWED PR

APPROVED PR

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3.2 Settlement Baskets

During the 2017 field season, Golder recovered three settlement baskets deployed in 2016 by SEM from the southwest corner of the ore dock near the caisson to allow for colonization by encrusting epifauna (SEM 2017b). The baskets were placed by SEM along the rock armouring at the base of the ore dock for a continuous 12-month period, tethered to the dock to allow for future retrieval and to limit displacement of the baskets from ice movement during the shoulder seasons. Each basket measured 16.5 cm in diameter and 28 cm in length, and was filled with cobble ranging from 8 to 12 cm in diameter.

Upon recovery of the baskets in 2017, it was determined that the amount of colonization on the settlement baskets was insufficient for analysis, so no processing of the samples occurred. The settlement baskets were cleaned and re-deployed in the same location on the southwest corner of the existing ore dock. In addition to the settlement baskets, a string of five plastic pail lids were tied to the rope just above the baskets (Figure 2). The plastic lids served as additional platforms for encrusting epifauna to colonize. The plastic material was deemed to be a better surface than cobble to effectively remove colonized organisms without damaging them to allow for better taxonomic identification. The field crew also installed additional settlement baskets on the northwest side of the ore dock. Baskets were identical to the previous sampling baskets and deployed in a similar manner including co-deployment of the string of five plastic pail lids.

Following future retrieval of the settlement baskets (planned for August of 2018), processing of the samples will involve the following steps. Encrusted epifaunal organisms will be photographed in place on the settlement substrate. Organisms will then be manually detached from the settlement substrate and preserved in 95% ethanol for taxonomic analysis. Fixed samples will be submitted to Biologica Environmental Services Inc., an accredited marine taxonomist laboratory based in Victoria, BC. Species will be enumerated and identified to the lowest practical taxonomic level. A validated reference collection will be maintained by the laboratory.

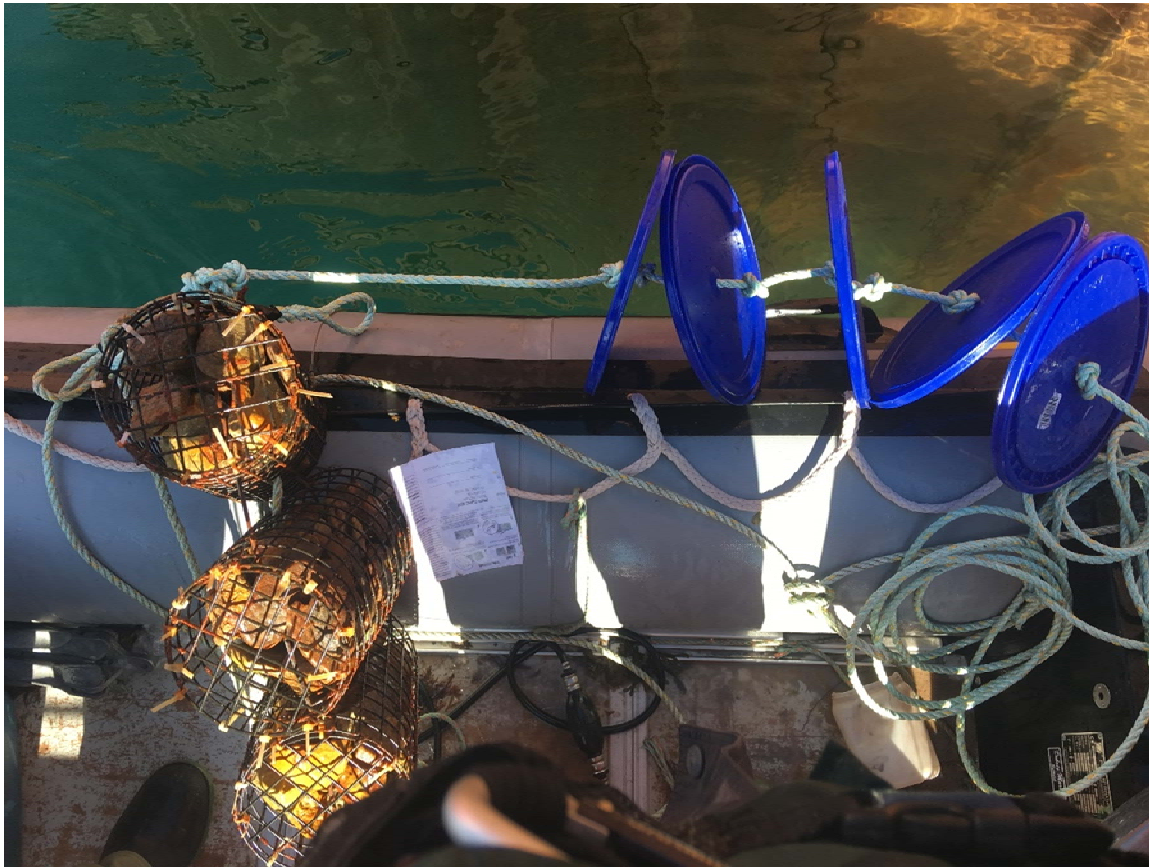


Figure 2: Settlement Rock Basket Set-up and Addition of New Settlement Methods.

4.0 RESULTS

4.1 Structural Integrity of Offset Habitat

Underwater video collected along transects on the east and west sides of the ore dock, as well as at the 12 drop camera sampling stations, was analyzed to identify changes in the structural integrity of the armour stone placed during construction of the ore dock. Methods used during the 2015 and 2016 video surveys were replicated; however, some areas near the caisson that were previously surveyed in 2016 could not be accessed due to the presence of berthed carriers and ore loading operations. Habitat offset areas that could not be accessed in 2017 will be prioritized for surveying as part of the 2018 monitoring efforts.

No evidence of movement or slumping of the armour stone was observed in the video surveys conducted in 2017. The placement of the armour stone was unaltered and functioning as constructed. Transects surveyed along the seafloor adjacent to the ore dock showed no evidence of loose or stray rocks in the sediment. There was a large amount of algal growth on the majority of the rocks along the east and west sides of the ore dock (Figure 3). Less prominent algal growth was observed on rocks directly adjacent to the caisson on both sides of the ore dock; however, a large number of sessile invertebrates (e.g., barnacles, hydroids, sponge) were observed on rocks near the caisson. Sediment deposition was generally minor with greater amounts of fine particulates observed along



the southern portion of the east side of the ore dock in an area that is more protected from wave and propeller scouring. Previous surveys (SEM 2017b) noted similar levels of algal growth and sediment deposition on the armour stone in 2016, and a low rate of biological colonization in the Project area as determined by monitoring of settlement baskets deployed in 2015. In general, patterns of biological growth and sediment deposition on the armour stone in 2017 suggest the rocks have been in a relatively stable position since their initial placement.



Figure 3: Armour stone around ore dock – still images from underwater video collected in 2017.

4.2 Benthic Invertebrates and Fish Larvae

Settlement baskets deployed in 2016 by SEM were retrieved by Golder in September 2017 and examined for signs of colonization by encrusting epifauna. The cobble substrate in the settlement baskets exhibited limited evidence of colonization. No organisms were available for processing or taxonomic analysis. Although the majority of the rocks were bare, several rocks showed limited colonization by a white encrusting epifauna which could not be taxonomically identified (Figure 4). Previous surveys conducted by SEM indicated that the process of biological colonization was expected to be slow (occurring over several years) (SEM 2017a). As such, the baskets were redeployed for recovery in 2018. Similar observations were reported by SEM in 2015 for settlement baskets deployed in 2014, in which inadequate epifaunal growth was available on the settlement substrate to allow for taxonomic analysis. The baskets were retrieved again in 2016 at which point colonization was sufficient for sample collection.

Settlement baskets retrieved by Golder in 2017 were redeployed and an additional string of settlement baskets was deployed on the east side of the ore dock. A set of plastic plates was attached to each string of baskets to provide more surface area for biological colonization, as well as a means of quantifying abundance on a known surface area. Settlement baskets deployed in 2017 will be re-assessed in 2018 when colonization is expected to be sufficient for sampling purposes.



Figure 4: Settlement basket retrieved from west side of ore dock in 2017.

A large number of euphasid shrimp were observed during video transects around the ore dock in 2017 (Figure 5). A variety of other invertebrates including urchins, barnacles, krill, brittle stars, shrimp, and calcareous tube worms were also observed on the armour stone during the video surveys (Figure 6). The presence and general abundance of invertebrates on the armour stone suggests the offset habitat provides more suitable habitat for benthic invertebrates than the settlement baskets.



Figure 5: Euphasid shrimp observed during video surveys around ore dock in 2017.



Figure 6: Barnacles and urchins observed on armour stone along east side of ore dock in 2017.



Fish larvae were not found in the settlement baskets retrieved in 2017. Fish larvae were also not observed in the drop camera or towed video transects around the ore dock; however, fish larvae were recorded during plankton sampling conducted as part of the Aquatic Invasive Species (AIS) monitoring program (Figure 7).



Figure 7: Fish larvae (yellow arrow) collected in plankton sample in Milne Inlet in 2017.

4.3 Association of Fish with Offset Habitat

Underwater video collected along transects on the east and west sides of the ore dock, as well as at the 12 drop camera sampling stations, was analyzed to document the association of fish with the armour stone substrate. The video resulted in a total of three adult cod observed swimming above or hiding within the rock substrate (Figure 8). The cod appear to be using the rock armouring habitat for both cover and foraging. One cod, which was observed at station A5 off the eastern side of the ore dock, was identified as an adult Greenland cod (*Gadus ogac*) (Figure 9). The other two cod were observed off the western side of the ore dock and could not be identified to species level.

Three unidentified adult sculpins were also observed occupying the armour stone substrate (Figure 10 and Figure 11). Two of the sculpins were observed along the west side of the ore dock and one was observed along the east side. No other fish were observed during the drop camera surveys. The sculpin were noted to be using the rock materials to provide shelter and cover.



Figure 8: Adult cod swimming above Milne Inlet, 2017.



Figure 9: Adult Greenland cod using armour stone for cover Milne Inlet, 2017.



Figure 10: Sculpin (yellow arrow) in armour stone during drop camera survey, Milne Inlet, 2017.



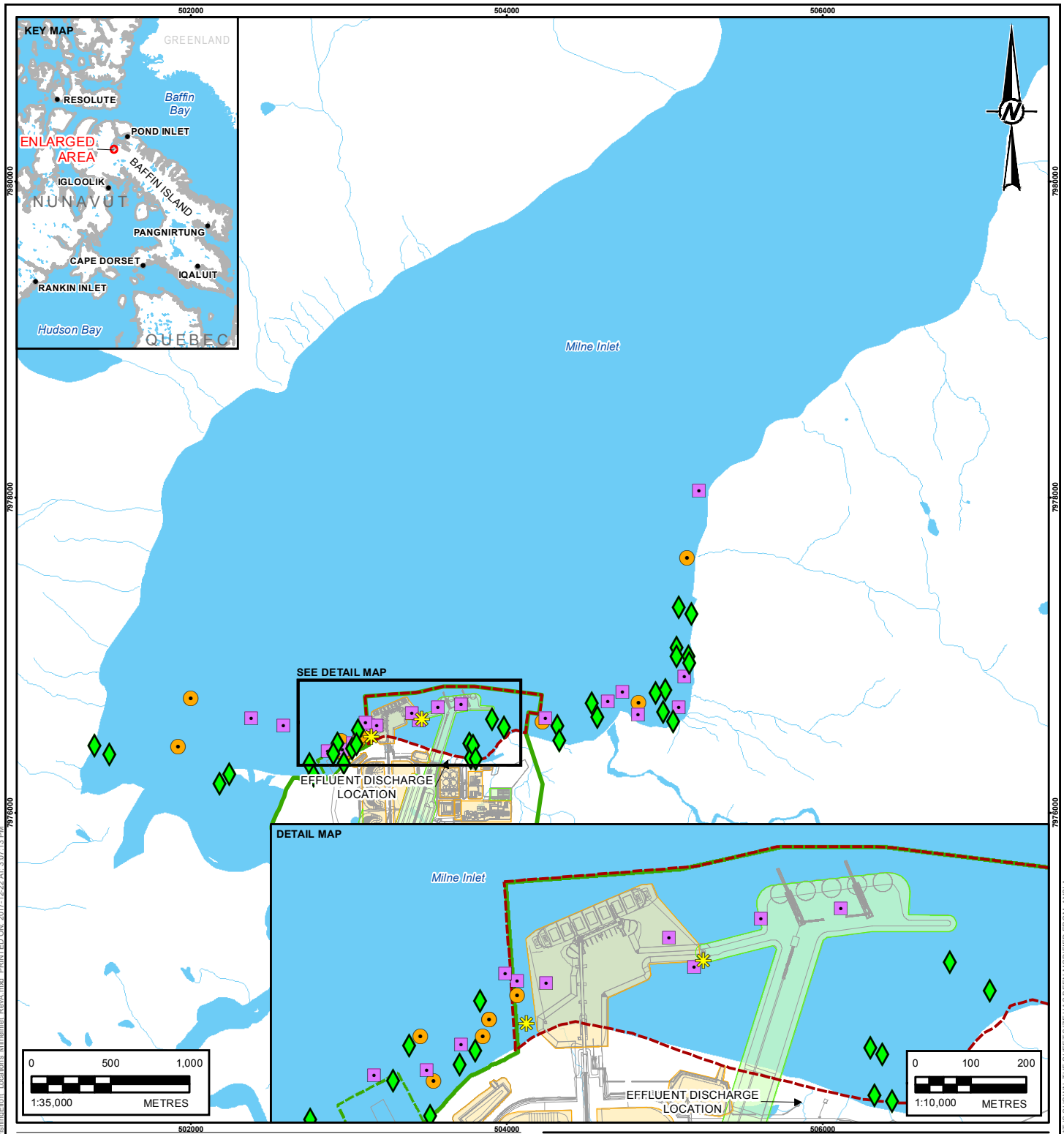
Figure 11: Sculpin (yellow arrow) on armour stone during drop camera survey, Milne Inlet, 2017.

As part of the 2017 Marine Ecological Effects Monitoring Program (MEEMP) a variety of fish sampling methods were used to document fish presence in and around the port facility (Figure 12). Fish sampling methods included angling, gill netting, and deployment of Fukui traps and minnow traps. Arctic Char (*Salvelinus alpinus*), Arctic sculpin (*Myoxocephalus scorpioides*), fourhorn sculpin (*Myoxocephalus quadricornis*), and shorthorn sculpin (*Myoxocephalus scorpius*) were all captured in Milne Inlet in the vicinity of the ore dock and all have the potential to interact with and utilize the ore dock offset. During biophysical surveys conducted as part of the



MEEMP, sculpin (multiple species) were recorded near the base of the ore dock. Northern sand lance (*Ammodytes dubius*) were also caught in a Fukui trap deployed during the MEEMP program on the east of the ore dock (Figure 13). The large number of sessile invertebrates (e.g., barnacles, hydroids, sponge) observed on the rock armour substrate is thought to serve as a food source for fish (e.g., cod and sculpin) observed in the habitat offset area.

Continuous video monitoring of the rock substrate was not undertaken in 2016 or 2017. Baffinland is currently involved in a feasibility study to evaluate the potential for continuous video surveillance of the coarse rock substrate to assess habitat utilization by the local fish community.



LEGEND

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| PDA / QIA COMMERCIAL LEASE | 2017 FISHING EFFORTS |
| REVISED PDA FOR PHASE 2 PROPOSAL | ANGLING |
| WATERCOURSE | FUKUI TRAP |
| INAC FORESHORE LEASE | GILL NET |
| EXISTING INFRASTRUCTURE | MINNOW TRAP |
| ADDITIONAL PHASE 2 INFRASTRUCTURE | |
| WATERBODY | |

REFERENCE(S)

HYDROGRAPHY DATA BY EAGLE MAPPING (2005), RETRIEVED FROM KNIGHT PIESOLD LTD. FULCRUM DATA MANAGEMENT SITE, MAY 2017. MILNE PORT INFRASTRUCTURE DATA BY HATCH, JANUARY 25, 2017, RETRIEVED FROM KNIGHT PIESOLD LTD. FULCRUM DATA MANAGEMENT SITE MAY 19, 2017. HYDROGRAPHY, POPULATED PLACE, AND PROVINCIAL BOUNDARY DATA OBTAINED FROM GEOGRATIS, © DEPARTMENT OF NATURAL RESOURCES CANADA. ALL RIGHTS RESERVED. PROJECTION: UTM ZONE 17 DATUM: NAD 83

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
MARY RIVER PROJECT – HABITAT OFFSET MONITORING PROGRAM

TITLE
MEEMP FISHING EFFORT LOCATIONS, MILNE INLET, 2017

CONSULTANT
YYYY-MM-DD 2017-12-22



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PREPARED	LMS
REVIEWED	PR
APPROVED	PR

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Figure 13: Northern sand lance caught in Fukui traps east of the ore dock in 2017

5.0 SUMMARY

The 2017 monitoring surveys were designed to fulfil the Year 3 effectiveness monitoring of the offset habitat for FAA# 14-HCAA-00525, including evaluation of the structural integrity of the armour stone, the association of fish with the rock substrate, and the biological productivity of encrusting epifauna in the offset habitat.

Video surveys confirmed that the structural integrity of the rock armouring is in place and does not currently require any upgrades, repairs, or enhancement. The video surveys did not show any evidence of movement or slumping of the rock armouring. Sediment deposition was generally minor with greater amounts of fine particulates observed along the southern portion of the east side of the ore dock in an area that is more protected from wave and propeller scouring. These conditions are similar to those observed during SEM's 2016 survey. The coarse rock substrate placed around the perimeter of the ore dock in Milne Inlet is functioning in accordance to the conditions set out in the FAA and as designed in the Offsetting plan.

Biological productivity was monitored through the use of settlement baskets and general observations were recorded from the video surveys. Settlement baskets demonstrated minor signs of colonization following one year of growth. This was similar to observations made after one year of basket deployment as part of previous survey efforts (SEM 2017a; 2017b). Video surveys, however, demonstrated that colonization is occurring at a faster rate on the armour rock substrate in several areas around the ore dock. It is expected that adequate colonization will occur by 2018 to allow for enumeration (i.e., percent cover) and taxonomic sampling.



Based on monitoring results collected to date, rock armouring installed around the perimeter of the Milne ore dock is serving as functional habitat for benthic invertebrates and fish species in Milne Inlet, and colonization of the rock substrate by algae and aquatic vegetation is occurring and providing a food source for benthic invertebrates and fish. As such, the results of monitoring indicate that the offsetting habitat to date has been successful and contingency measures are not required at this time.

6.0 CLOSURE

We trust that this report meets your current requirements. If you have any further questions, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

John Sherrin, BSc, MSc
Marine Biologist

Evan Jones, MSc, PEng, EP(CEA)
Associate, Project Director

JS/EJ/klj

7.0 REFERENCES

- SEM (Sikumiut Environmental Management Ltd.). 2014. Request for Review under the Fisheries Protection Provisions of the Fisheries Act, Milne Port, Mary River Project. Supplementary Information. Prepared by SEM Ltd., St. John's NL for Baffinland Iron Mines Corporation, Oakville, ON. ii + 20 pp, + 4 appendices.
- SEM. 2015. Mary River Project 2015 Monitoring of the Milne Ore Dock Fish Offset. Fisheries Act Authorization 14-HCAA-00525. Prepared for Baffinland Iron Mines Corporation. December 22, 2015.
- SEM. 2017a. 2016 Milne Ore Dock Fish Offset Monitoring. Prepared for Baffinland Iron Mines Corporation. January 12, 2017.
- SEM. 2017b. Draft Report - 2016 Marine Environmental Effects Monitoring Program (MEEMP) and Aquatic Invasive Species Monitoring, Milne Inlet Marine Ecosystem. Prepared for Baffinland Iron Mines Corporation. March 22, 2017.

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APPENDIX A

Fisheries Act Authorization



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 m² (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.

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

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