

08 January 2019

Proj. No.: 307071-01148

Nunavut Research Institute
Box 1720, Building 959
Iqaluit, NU
X0A 0H0

Attention: Mosha Cote, Manager, Research Liaison

Dear Mr. Cote:

**Re: Permit Summary – Iqaluit Marine Infrastructure Project
(Government of Nunavut) Permit Number #01 034 16N-M**

1. Introduction and Project Location

In the open water season of 2018, construction began on three facilities in Koojesse Inlet (Qikiqtaaluk Region). The Deep Sea Port Project (DSP Project) is a new construction, and the Small Craft Harbour Project (SCH Project) involved improvements to the municipal breakwater and the existing causeway in Iqaluit (Figure 1-1). In October 2017, the Nunavut Impact and Review Board (NIRB) issued a screening report which determined that the DSP and SCH Projects do not require further review.

Fisheries and Oceans Canada-Fisheries Protection Program (DFO-FPP) determined serious harm would result from the construction of both projects, and thus *Fisheries Act Authorization* (FAA) applications were submitted. The DSP and SCH Projects were reviewed under one application by DFO-FPP and will hereafter be referred to as the Iqaluit Project.

A component of the FAA was to design an Offset Plan to compensate for serious harm. It should be noted that consultation specific to the requirements for the FAA were held in Iqaluit in September 2017 with the Amaruq Hunters and Trappers Association (HTA). The HTA do not feel that Arctic char will be affected by the construction of the facilities but are interested in participating in the Iqaluit Offset Plan that is required as a component of the FAA. The FAAs have been issued (DFO-FPP, File #s: 17-HCAA-00961, 17-HCAA-00964) and the pre-construction field survey was conducted from between mid August and the first week of September 2018.

This letter provides a summary of the 2018 field activities that were conducted as part of a multi-year program. The work was conducted with a Nunavut Research Institute (NRI) permit renewal from field work conducted for the baseline assessments (Permit #01-034-16N-M). Project construction monitoring (which includes the FAA) is included in NPC File # 148431 (DSP) And 148429 (SCH).

The information presented in this report is preliminary and has not been analyzed in its entirety. Further details will be provided to the NRI as they become available through reports generated for DFO-FPP through the offset monitoring period. All data collected as a part of the Offset Program can be shared with interested parties, and NRI will be notified if any content from the Offset Program is published.

Construction of these facilities is ongoing and will continue in 2019.



2. Research Team

The research team that was affiliated with the Iqaluit Offset Plan is as detailed in Table 2-1. Any questions associated with this Project can be directed to Victoria Burdett-Coutts (email: victoria.coutts@advisian.com; Phone: 778-945-5501) on behalf of the Government of Nunavut (contact Channing McRae, email: McRae, CMcRae@gov.nu.ca).

Table 2-1 Iqaluit Offset Plan Research Team

Name	Title
Victoria Burdett-Coutts	Lead Biologist
Diane Pinto	Community Engagement and Indigenous Knowledge Lead
Cameron Knight	Field Technician

3. Project Scope

The Iqaluit Offset Plan consists of two components, the Monitoring Program and the Research Program. The goal of the Monitoring Program is to assess the habitat characteristics within the footprint of proposed projects. In future years, after construction of the facilities, this will be compared to the habitat provided by the boulders/rocks that are a component of project design for shoreline protection. Rocks provide multi-dimensional habitat where marine organisms can find refuge in the spaces between them. The goal of the Research Program is to investigate the primary prey species of Arctic char in Koojesse Inlet in the waters surrounding the proposed facilities.

4. Methodology

The field work components of these two programs, a summary of methodology and the dates that they occurred are provided in Table 4-1.

Intertidal surveys were conducted on the western (DSP, causeway) and eastern (municipal breakwater, Northmart breakwater, intertidal access) intertidal seabed of Koojesse Inlet. These areas are subsequently referred to as Koojesse West and Koojesse East (see Figure 4-1 and Figure 4-2). Subtidal surveys were conducted fronting the DSP in Koojesse West. The habitat map that was generated from the Project Baseline Program (Advisian 2017) was georeferenced and used in the field on an iPad using the AvenzaPDF program.

Table 4-1 Field Components for the Iqaluit Offset Plan

Component	Activity	Methodology	Survey Date 2018
Monitoring Program	Intertidal surveys conducted at low tide in the footprint of each of the three facilities and at a nearby reference site.	<p>Intertidal surveys were conducted at low tide, with a Transect Survey and a Quadrat Survey.</p> <p>Transect Survey: Five transects were conducted at the Koojesse East</p> <p>Eight and six transects were conducted on Koojesse West and East sides respectively.</p> <p>Field personnel documented habitat characteristics (substrate, organisms) and took GPS positions for future reference.</p>	August 14 – 18, 31 September 1
	Subtidal surveys will be conducted at the proposed DSP and at a nearby reference site.	A local boat operator was subcontracted. The field team operated a remote operated vehicle (ROV) to provide video documentation of the habitat characteristics.	August 15
Research Program	The intention had been to purchase 15 Arctic char from local harvesters fishing near the existing causeway. 15 fish could not be obtained as local harvesters were no longer fishing around the existing causeway. Advisian biologists were in Iqaluit in mid August which was when the fish had already returned to the river. Nine of the 15 fish were purchased.	<p>There is no field work associated with this component, as fish were purchased from local harvesters.</p> <p>In the laboratory technicians will collected biological data from each fish (length, weight, sex, maturity status) and collect biological materials (otoliths, section of white muscle, stomach). The biological material was be preserved in an appropriate manner for the analysis required and shipped to Vancouver, British Columbia (BC) for processing.</p>	August 16
	An IQ workshop was conducted to integrate the extensive first-hand knowledge of local fishers—who have observed the environment and Arctic char on a continuing basis over decades—with scientific research. The goal of the IQ workshop was to determine habitat types (intertidal/subtidal) preferentially used by Arctic char in the marine environment.	<p>The workshop included the participation of six currently active fishers (including two women and four elders) selected by the HTA for being especially knowledgeable about arctic char and their environments.</p> <p>With the support of a local interpreter, large scale maps, photos, and a questionnaire were used to guide discussions. The workshop was not bound to any strict process and information was shared in the manner most comfortable for each participant.</p>	August 31



Legend

- ▲ ROV Survey
- Causeway Transect Survey
- Deep Sea Port Transect Survey
- Quadrat
- Facility Layout



Note:
Coordinate System: NAD 1983 UTM Zone 19N

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IQALUIT MARINE INFRASTRUCTURE

KOOJESSE WEST INTERTIDAL AND
SUBTIDAL TRANSECT SURVEYS



Legend

- Intertidal Transect Survey
- Facility Layout



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IQALUIT MARINE INFRASTRUCTURE
KOOJESSE EAST INTERTIDAL TRANSECT SURVEYS



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5. Results and Summary

5.1 Monitoring Program

Habitat characteristics within the footprint of facilities in Iqaluit were confirmed in the intertidal and subtidal areas of Koojesse Inlet, using the habitat map from the Project. Transect locations are provided in Figure 4-1 and Figure 4-2.

5.1.1 Intertidal Surveys

Koojesse West (Deep Sea Port and Causeway)

Habitat characteristics surrounding the proposed DSP and Causeway footprint were confirmed to be similar to those presented in the Baseline Report. On the southern shore of Koojesse Inlet, surrounding the proposed DSP footprint, rockweed was present in variable densities, and was typically associated with higher densities of benthic invertebrates (amphipods, snails, etc.). The habitat characteristics surrounding the causeway were less diverse, with primarily soft substrates observed. Habitat diversity was lower on the north side of the causeway as opposed to the south side. Photographs to demonstrate habitat characteristics are provided in Photo 5-1 and Photo 5-2 for the DSP and Causeway respectively.

Small Craft Harbour

Habitat characteristics surrounding the proposed SCH footprint were confirmed to be similar to those presented in the Baseline Report. The intertidal area on the east shore of Koojesse Inlet is extensive, and entirely soft substrate. Boulder density is variable, with more boulders being present in the seaward direction. Amphipods were observed and associated with higher densities either when structural substrate was present (boulders) or when depressions in the sand allowed for increased inundation relative to the surrounding areas that were 'out of water' at low tide. Photographs to demonstrate habitat characteristics are provided in Photo 5-3.

5.1.2 Subtidal Surveys

Deep Sea Port

Subtidal habitat characteristics surrounding the proposed were confirmed to be similar to those presented in the Baseline Report. Substrate observed was primarily sand with boulder densities occurring in moderate (30% to 50% coverage) densities. Seaweed observed were primarily kelp species including sugar wrack kelp, sieve kelp, ribbon kelp. Arctic char, sculpin, and isopods were also observed. Photographs to demonstrate habitat characteristics are provided in Photo 5-4.

5.2 Research Program

5.2.1 Fish

Nine of 15 fish samples were obtained, as it was determined the season for harvesting Arctic char had terminated earlier than when the field biologists had mobilized to Iqaluit. Fish samples will be obtained from



local harvesters in the 2019 open water season, with late July being targeted as opposed to mid August. Five of the fish were males and four were females. Fish length and weight ranged from 42 cm to 68 cm and from 1.4 lbs to 4.1 lbs respectively.

The samples (stomachs, white muscle tissue) are being maintained in a minus 80 freezer and have not been processed at this time.

5.2.2 IQ

The following is a summary of the information obtained about Arctic char:

- Local fish caught in the area (other than Arctic Char) include arctic cod, sculpin, capelin, and occasionally halibut. Also shrimp in the inlet at times (after southerly swells).
- Arctic Char prefer areas around rocks and away from vegetation. When the Char are first out of the river, they are hungry and go deep to feed. By July and early August they come closer to shore and prefer to stay along the shoreline. They feed at night and on calm days the ripples they make in shallow areas are visible. Big Char are usually found on the bottom.
- Participants stated that they had not observed any changes to Char diet over the years. However, one participant stated that Char caught in the inlet in 2016 were very white and less tasty than usual and wondered whether this was caused by a change in their diet that year. The eldest participant stated that according to IQ, Arctic Char don't always run. Some individuals during certain years will stay in lakes and rivers instead of heading to the ocean. During their first run back to the ocean, these Char will have very white meat, but after a month in the ocean they turn red and colourful. This is not dependent on age. All participants agreed that all Char (regardless of age) will run.

"We don't believe that young Char stay in rivers until they are old enough to run. We think they run no matter what age. Young Char stay along the shallow areas in the rivers. Once in the ocean they hang out in large schools and stay shallow"

- Arctic Char diet consists primarily of small white krill, capelin, and baby char. None of the participants had ever seen Char eating cod or found evidence of cod in Char stomachs.

"Sometimes they jump out and eat flies, but most of the time they are eating amphipods everywhere, all along the water column. They feed anywhere and everywhere".

- You can tell where fish are from by their taste (depending on what they're eating from the different lakes and river). Sea run Char eat a lot of krill and eat mostly in the ocean. They don't eat as much in the lake.
- The best tasting Char are from the Armstrong river. They also have a nice orange colour. The difference is that the Armstrong river is semi rocky, with lots of pebbles and little vegetation, *"there's much less seaweed and plants in the water there"*.
- Participants weren't certain of whether Arctic Char diet changes depending on size of individual, but all believed that larger individuals tended to eat more fish compared to smaller individuals. All participants had observed *"pretty big fish"* in the stomach contents of medium to large sized Char.



Panel 1



Panel 2



Panel 3



Habitat Type: Boulder,
trace rockweed

Quadrant No.: 9

Panel 4



Habitat Type: Boulder,
infrequent rockweed

Quadrant No.: 18

Photo 5-1

Demonstrative Photos of Intertidal Habitat around Koojesse West (DSP)



Panel 1



Panel 2



Panel 3



Transect: 1

Quadrant No.: 5

Panel 4



Transect: 2

Quadrant No.:9

Photo 5-2 Demonstrative Photos of Intertidal Habitat around Koojesse West (Causeway)



Panel 1



Panel 2



Panel 3



Transect: 1

Quadrant No.: 8

Panel 4



Transect: 2

Quadrant No.:17

Photo 5-3

Demonstrative Photos of Intertidal Habitat for Koojesse East (SCH)



Panel 1



Panel 2



Panel 3



Transect: 1

Quadrant No.: 8

Panel 4



Transect: 2

Quadrant No.:17

Photo 5-4

Demonstrative Photos of Subtidal Habitat for Koojesse West (DSP)



6. References

Advisian. 2017. Iqaluit Marine Infrastructure Project. Marine Baseline Report. Prepared for Government of Nunavut. May 2017. (Document No. 307071-01148-02-EN-REP-0003, Rev. 1).

7. Closing

We trust that this correspondence provides the necessary details required for our annual summary. To reiterate, any data collected over the course of this program will be available for interested parties. Publications on the subject, as they become available will be provided to the NRI.

If you require any further information, please do not hesitate to contact the undersigned.

Sincerely,

Victoria Burdett-Coutts, M.Sc, R.P.Bio
Marine Scientist, Environmental Consultant

**Environment & Society - Canada
Advisian, Americas**

cc: Harald Kullmann, Advisian
Diane Pinto, Advisian
Paul Mulak, Government of Nunavut

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