F.R.V *Nuliajuk* Science Cruise Report: Chesterfield Inlet and Wager Bay (Ukkusiksalik National Park) Marine Baseline Study

28-July to 31-August 2016

Photo Credit: B. Misiuk

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Nuliajuk Ship Crew

Cecil Bannister	Captain	Newfoundland and Labrador
Joachim Fagan	First Mate	Newfoundland and Labrador
Bob Bennet	First Mate	Newfoundland and Labrador
Neil Osmond	Deckhand/Mechanic	Newfoundland and Labrador
Jeff Cheater	Deckhand/Cook	Newfoundland and Labrador
Alf Burton	Deckhand/Cook	Newfoundland and Labrador
Gloria Kaludjak	Deckhand/Cook	Rankin Inlet, Nunavut

1. Introduction

1.1 Background and Program Objectives

The marine baseline study project in Chesterfield Inlet and Wager Bay in Ukkusiksalik National Park (UNP) was a one year, multi-disciplinary research project designed as a first assessment of important aspects of the marine environment. This project, initiated and funded by Parks Canada Agency and Government of Nunavut's Department of Environment Fisheries and Sealing Division, was a collaboration between government and the Universities of Manitoba, Québec à Rimouski, and Memorial University of Newfoundland. The project provided a unique opportunity to investigate two acutely understudied coastal sub-arctic inlets, each currently experiencing very different levels of human and industrial activity. Simultaneously, the Hudson Bay region is facing environmental changes from ongoing climate change (Dery, 2005; Ferguson *et al.,* 2005; Gagnon and Gough, 2005)

In Chesterfield Inlet, shipping has increased in recent years due to mining activities inland. The community of Chesterfield have voiced their concerns about impacts of ship traffic on the marine environment near the community. This project attempted to address some of these concerns by increasing knowledge of the benthic community and supporting habitats, including the overlying water column and seafloor, against which future assessment of biodiversity and potential stressors, such as ship traffic and climate change can be evaluated. The study also aimed to investigate, using the recent sedimentary record (~last 100 years), the concentration of contaminants including hydrocarbons, metals, and total mercury as a first step towards establishing a baseline against which future changes could be assessed.

In contrast, shipping and human activity has been relatively non-existent in Wager Bay (UNP). However, there are concerns of possible future increases in tourism and mining operations based outside of the park that could increase ship traffic through the Bay. In addition to these concerns, Wager Bay is an extremely understudied, large, complex, and uncharted Bay, which in itself warrants scientific investigation. This study aimed to collect the first ever baseline marine data of Wager Bay (UNP) including tidal, bathymetry, biological, and sedimentological/ geochemical data.

1.2 Regional Setting

Chesterfield Inlet and Wager Bay are located in northwestern Hudson Bay, in the Kivalliq Region of Nunavut (63°20'N and 90°40'W and 65°30'N and 88°58'W , respectively)(Figure 1). The regional climate is characterized by short summers and long winters, with freeze up taking place in late November and ice break up occurring in late June. Chesterfield Inlet is a long (220 km) narrow inlet that connects Baker Lake to Hudson Bay. The Inlet is relatively shallow (mean depth ~50m) with strong tidal currents (2-5 knots). The Inlet receives freshwater from a number of larger rivers, draining an area of about 290,000 km^2 with mostly continuous permafrost. Overall, the shoreline of the Inlet is made of granitic gneisses with high cliffs in the western portion of the Inlet and rounded boulders in the middle and near the mouth (Budgell, 1976). The bottom of the inlet is mostly rocky throughout with shell hash, and silt and clay deposits near the mouth and community of Chesterfield Inlet (Budgell, 1976).

Located ~ 250 km north of Chesterfield Inlet and ~200 km south of the Arctic Circle, Wager Bay is a 150 km long and 36 km wide Inlet that is a part of Ukkusikslaik National Park (UNP), a newer National Park established in 2003. Canadian Parks Service (1977) suggested that the Bay could be a submerged rift valley. This theory may be supported by the multi-beam survey in August 2016 (reported herein) that recorded depths greater than 300 m along the southern shoreline. Unlike Chesterfield Inlet, Wager Bay receives freshwater from smaller rivers that drain an area of only about ~28,551 km^2. The Bay is connected to Roes Welcome Sound and Hudson Bay through a long narrow and shallow (minimum depth 30 m) passageway. The Narrows restricts the exchange of water between Hudson Bay and Wager Bay, creating complex currents and whirlpools that can be difficult to navigate and need to be studied more extensively. Satellite images show the Narrows remain ice free throughout the winter, reflecting the strong currents in this region (see NASA worldview January- March images URL: https://worldview.earthdata.nasa.gov).

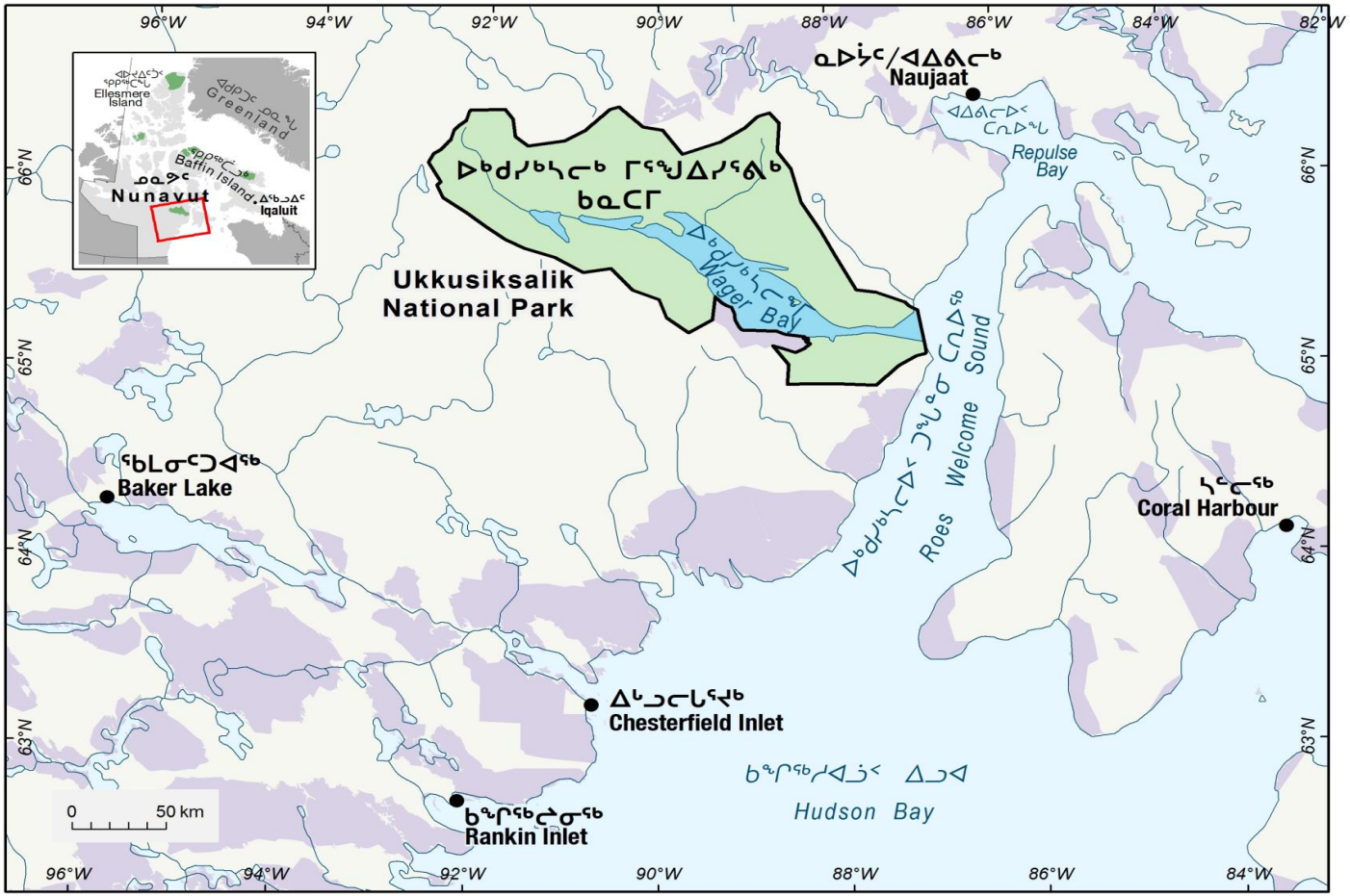


Figure 1 Map of the Kivalliq Region of Nunavut showing Chesterfield Inlet and Wager Bay (UNP) (map produced by Parks Canada Agency).

2 Mapping Survey

In Chesterfield Inlet, the goal of the multi-beam survey was to map near the harbour and between Fairway Island and Promise Island, where scallop beds were presumed to be located (Figure 2A). The area was also identified as an area adjacent to a planned multi-beam survey by the Canadian Hydrographic Service (CHS) later in September 2016. To reduce replication of multi-beam survey efforts, the *Nuliajuk* survey focused on the area south west of the survey planned by CHS (Figure 2B).

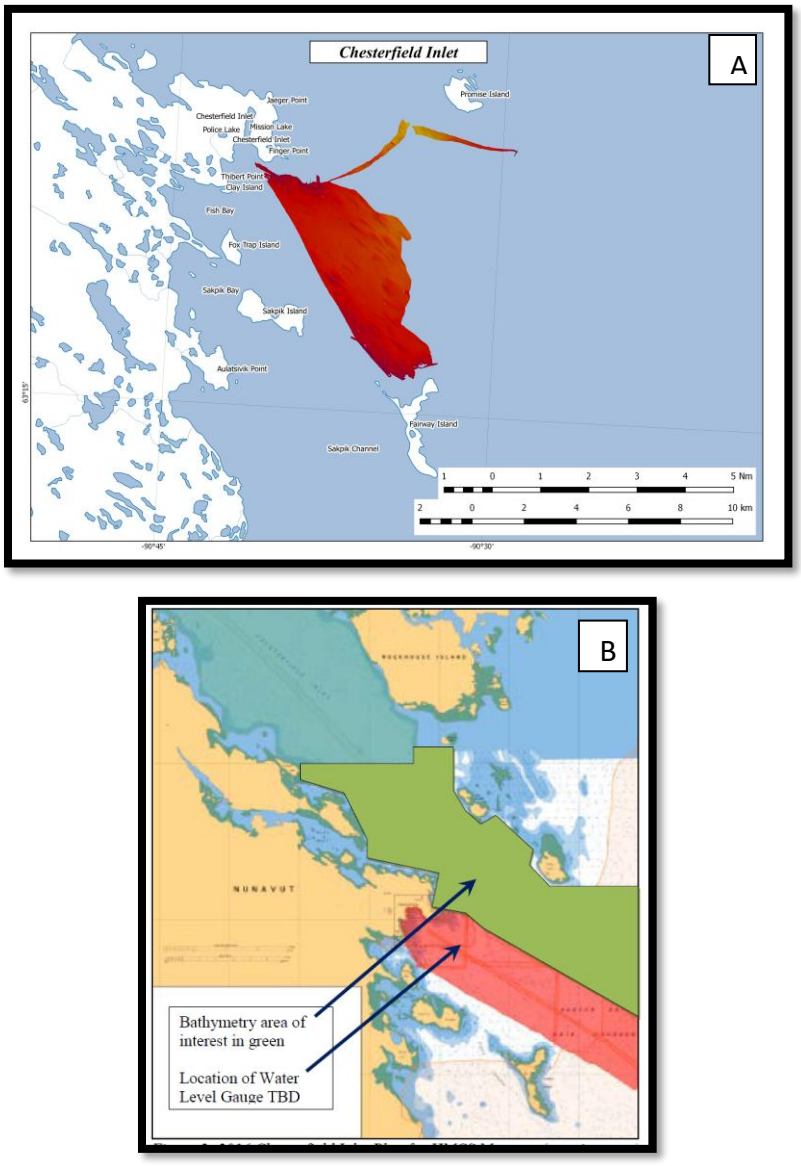


Figure 2 The area surveyed by multi-beam in Chesterfield Inlet from FRV Nuliajuk (A) and the adjacent expected survey area (green) by CHS and HMS Moncton in September 2016 (B) (image proved by Andrew Leyzack on 17-May-2016).

In Wager Bay (UNP), the mapping survey took place from both the Parks Boat (single beam sonar) and FRV *Nuliajuk* (multi-beam sonar). The primary objectives of the multi-beam mapping survey from FRV *Nuliajuk* was to (1) map the Narrows connecting Wager Bay to Roes Welcome sound at 100% overlap (CHS Standards) to ensure safe navigation through these Narrows in the future; (2) map predetermined areas of interest that included around Paliak Islands, near Sila Lodge, and along the shoreline adjacent to Douglas Harbour for benthic invertebrate habitat study; and 3) conduct a reconnaissance multi-beam survey lengthwise and across Wager Bay to gain a more inclusive understanding of how the bathymetry might look as a whole (Figure 3).

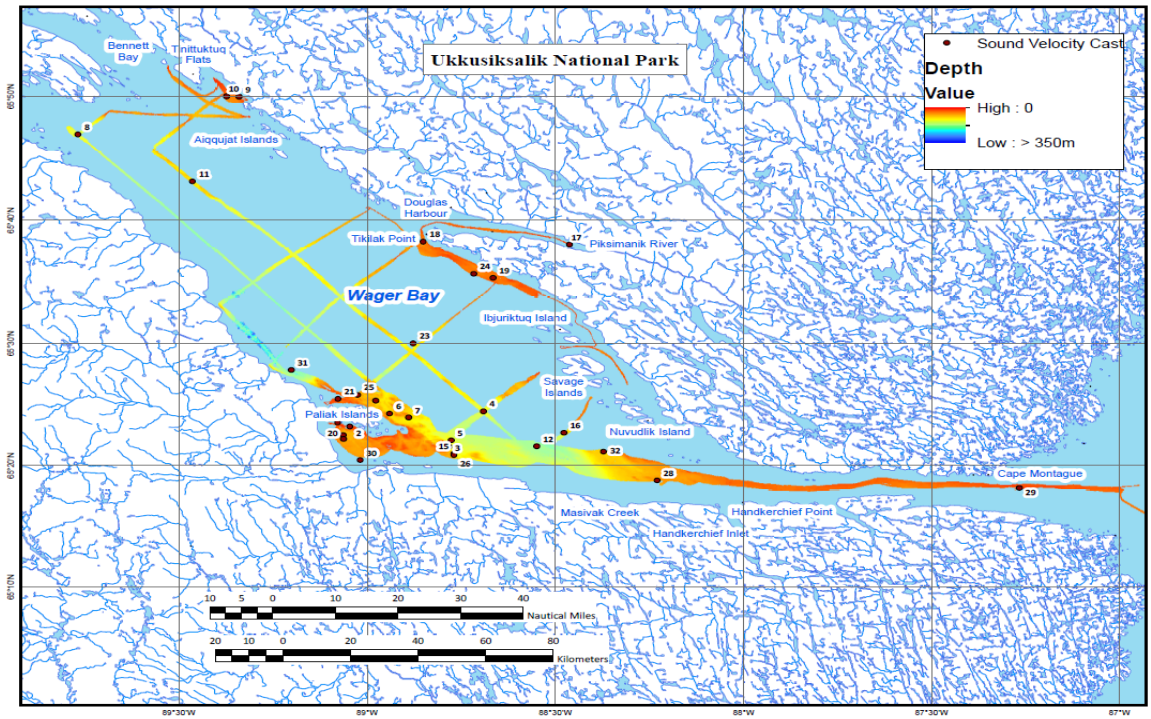


Figure 3 The multi-beam survey of Wager Bay (UNP) conducted from FRV Nuliajuk 2-9 August 2016

Methods

Hydrographic data was collected using a Kongsberg EM2040C multi-beam sonar. This sonar covers a 130° swath using 400 soundings at widths up to 2.5x the bottom depth that is mounted to the haul of the *Nuliajuk*. The *Nuliajuk* navigated adjacent lines with minimal overlap to obtain complete bottom coverage over the area being surveyed. A sound velocity probe (Minos-X) was deployed and retrieved multiple times each day to measure the change in speed of sound throughout the water column and increase the precision of the sonar (see table 2 in appendix 1 for location of sound velocity data collection).

3 Tide Gauge Deployment

Two tide gauges were moored at either end of Wager Bay in Ukkusiksalik National Park. The sites were selected based because of the locations relatively flat seabed and protection from ice and storms. One tide gauge was deployed near Paliak Islands and the other at the entrance to Bennett Bay (Figure 4). These two tide gauges will remain in place for approximately one year. GPS ellipsoidal elevations were sampled over a 24hr period. This GPS data will be used in conjunction with the tide data to calculate a separation value between ellipsoidal elevations and chart datum.

The tide gauges were deployed from the starboard side of the back (stern) deck of FRV *Nuliajuk*. The tide gauges were lowered into the water using a rope and pulley system. Simultaneously the weight and drag line were lowered from the *Nuliajuk*'s zodiac (Figure 5). The Parks Canada boat was used to travel to locations for water level observations, calibrations, CTD casts and GPS observations.

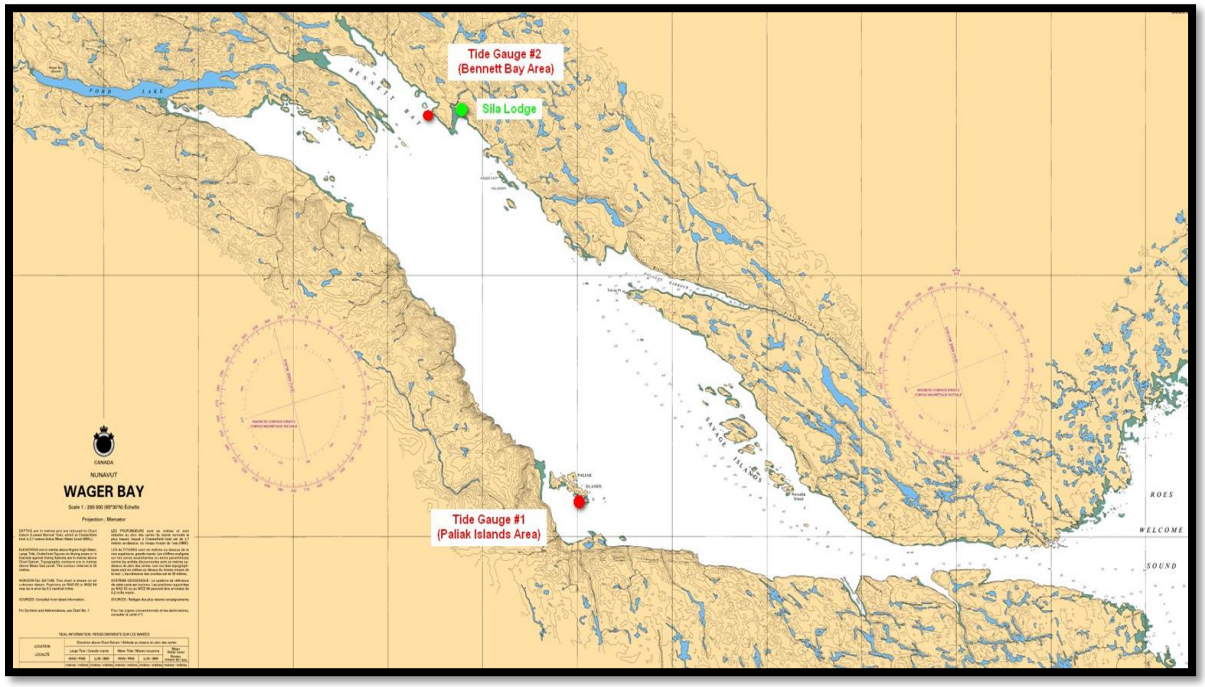


Figure 4 Locations of tide gauges.

Figure 5 John Mercuri (CHS) deploys a tide gauge from FRV Nuliajuk (a) while, at the same time, Glenn Toldi (CHS) works from the zodiac to deploy a weight and drag line (b). The drag line connects the two pieces of the mooring and can be used to retrieve both tide gauge and weight in the following year. (Photo Credit: Captain Cecil Bannister)

4 Water Sampling

4.1 Environmental DNA Collection in Chesterfield Inlet

The objection of the environmental DNA (eDNA) collection was to characterize benthic communities with eDNA techniques in Chesterfield Inlet.

Methods:

Water samples from nearshore and deep water locations within the Chesterfield Inlet survey area were collected from the *Nuliajuk* zodiac (see Figure 6 for locations). Samples were returned to the vessel for filtering, where DNA was extracted from the water and stored in Longmire's solution. In shallow water locations, habitat information was collected using drop video. In deep water areas, the samples were co-located with habitat mapping ground trothing points (in collaboration with Dr. Edinger). Samples will be sent to the lab and the results will be compared with the parallel characterizations conducted by the benthic habitat survey.

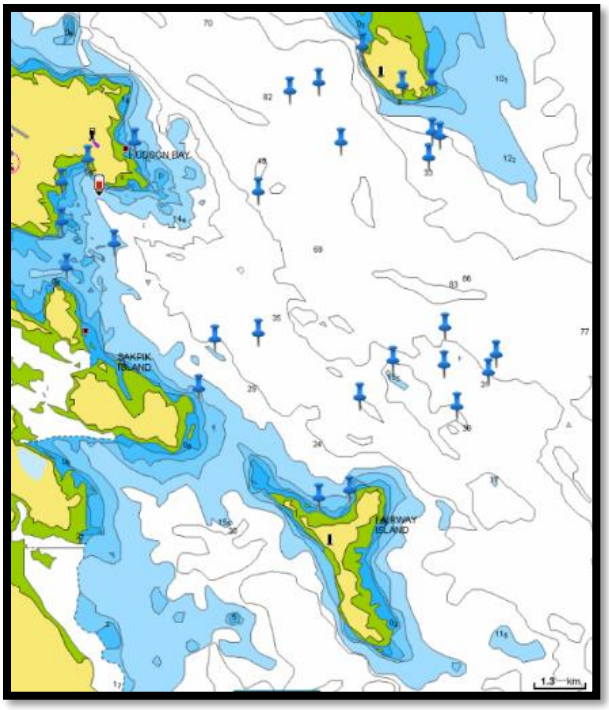


Figure 6 Location of eDNA samples collected in Chesterfield Inlet in July 2016.

4.2 Water Chemistry

The objective of the water sampling was to collect baseline data on the chemical and oceanographic properties of Wager Bay (UNP) and Chesterfield Inlet. One transect of water samples were collected in Roes Welcome Sound, outside of Wager Bay, to investigate the water mass leaving the Bay and mixing with the southward flowing water in Roes Welcome from Foxe Basin.

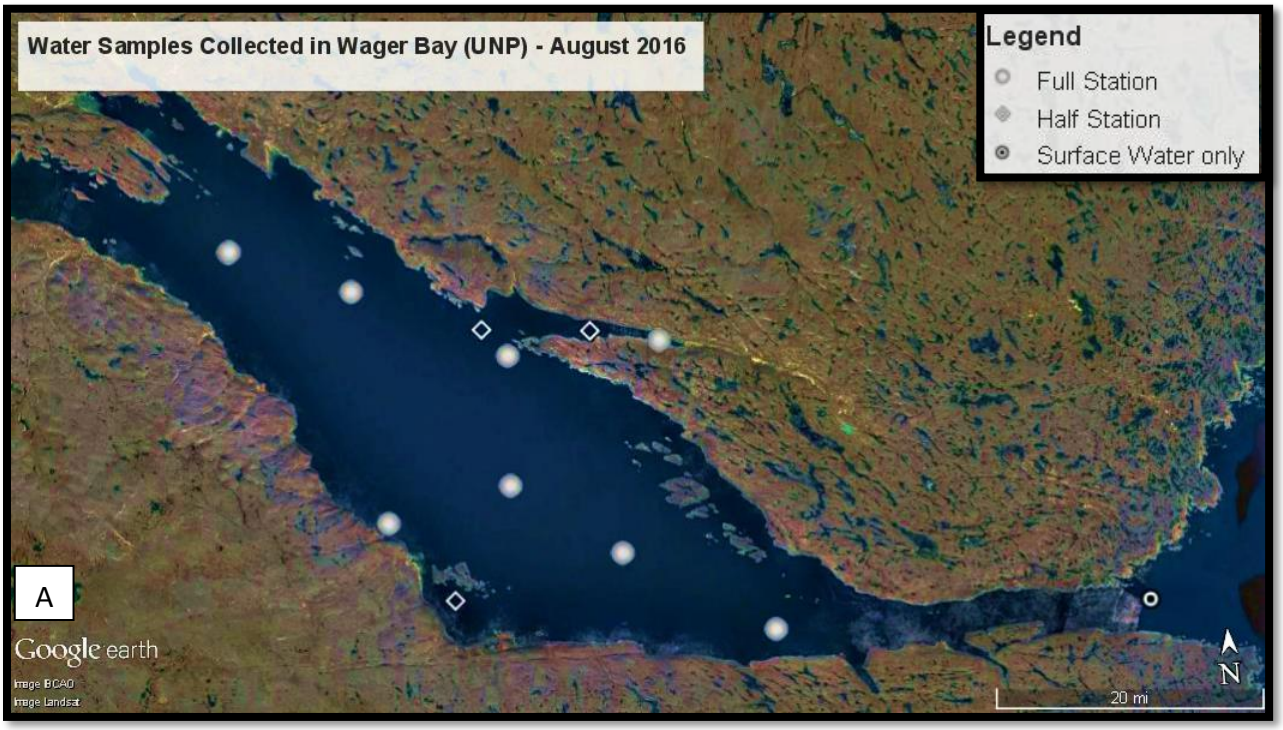
Methods:

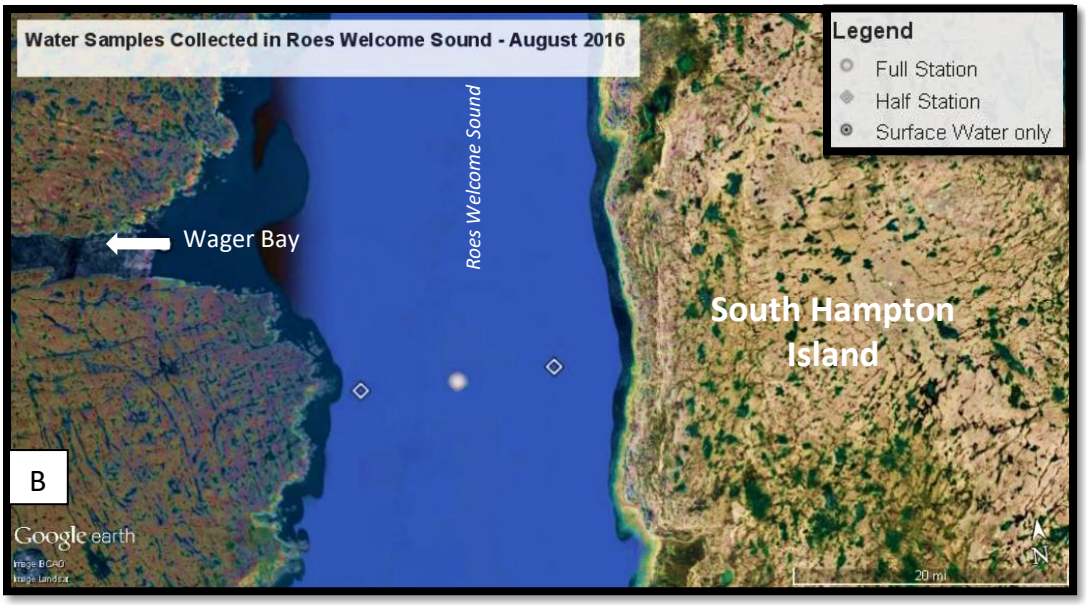
At each station, conductivity, temperature and depth profiles were first collected using either the Minos-X CTD/sound velocity probe or an Idronaut CTD probe with a turbidity sensor. Water samples were collected using two 5L niskin bottles that were lowered to the desired depth using the scientific winch off the starboard side or marked sideline using the capstan off the port side of the vessel. Water samples were collected at 3-5 depths, usually at surface, above halocline, halocline, below halocline, and 1-5m above seafloor. At each depth, water was transferred from the niskin sampling bottle to 10L pre-acid cleaned polyethylene bottle (rinsed 3x with sample water). From this bottle, water was sub-sampled, in the order listed, for the following parameters.

1. Nutrients (Nitrate-nitrite, phosphate, silicic acid)
2. Coloured dissolved organic matter (CDOM) and Strontium
3. Salinity
4. Oxygen-18 isotope ratios ($\delta^{18}O$)

5. chlorophyll *a* (chl *a.*)
6. Particulate organic carbon and nitrogen (POC/PON)

Nutrient samples were filtered through pre burned 0.7 µm GF/F filters into pre-acid washed 15mL vials and frozen immediately. CDOM samples were filtered simultaneously with nutrients by incorporating 0.2 µm filter to the sweenex containing the GF/F filter and filtering into 40 mL pre acid washed and burned amber vials. Salinity and $\delta^{18}O$ samples were drawn directly into 250 mL and 40 mL and sealed with parafilm to prevent evaporation. At a subset of stations (Full Stations), Chlorophyll *a,* POC, and PON was collected by filtering large volumes of water (1-3 L) through pre-burned 0.7 µm GF/F filters. Filters were carefully wrapping in pre-burned tinfoil and immediately placed in the freezer.





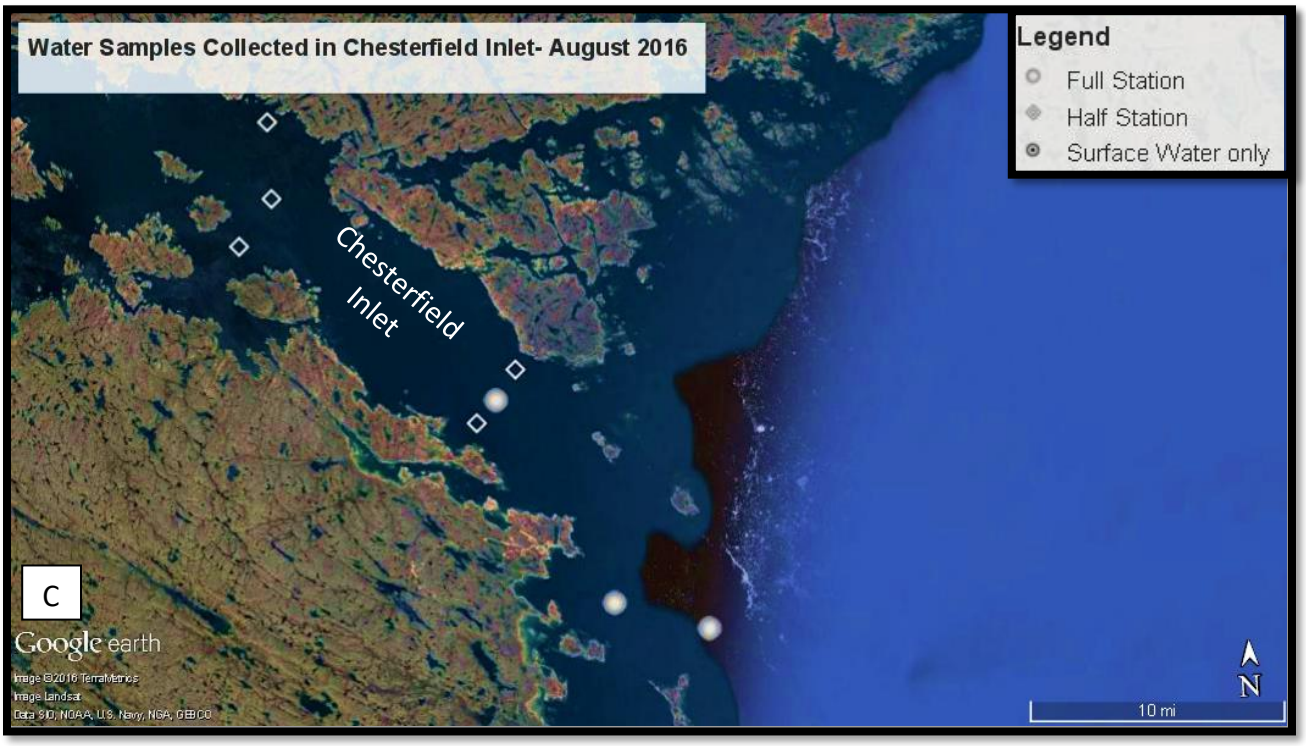


Figure 7 Locations of water samples collected in Wager Bay (UNP) (A), Roes Welcome Sound (B), and Chesterfield Inlet (C)

5 Plankton Sampling

The objective of the plankton sampling program was to collect samples of dinoflagellates/phytoplankton and zooplankton for identification and inventory of plankton community composition by Dr. Kim Howland's group at Department of Fisheries and Oceans Canada.

Methods

Phytoplankton and dinoflagellates were collected at three different depths (surface=1m below surface, mid-depth=secchi depth and maximal depth=2x secchi depth) using a Niskin Bottle. The three depths were pooled into one plastic container (20 L), rinsed 3x with water from the site and a sub-sample (250 ml) was collected into an amber glass bottle, preserved with 1 mL of Lugol's solution, and stored at room temperature, away from light exposure.

Zooplankton was collected using 80 µm and 250 µm net. The 80 µm net was towed vertically by lowering the net to approximately 1-2 m from the bottom using the scientific winch on both the *Nuliajuk* and Park Boat. The nets were brought to the surface at a steady pace of approximately 1-2 m sec^{-1}. The 250 µm net was lowered to ~1-2 m above the bottom and towed on an oblique angle slowly so that the net gradually moved up through the water column. On the *Nuliajuk*, both nets were taken out of the water using the crane and brought around to the starboard side of the back deck of the vessel, where the net was rinsed off using a salt water hose (rinsing outside of net only) and using a manual sprayer with filtered sea water (rinsing inside of net and cod end). Samples collected from the Park Boat used a manual sprayer with filtered sea water only. For each the 80 µm and 250 µm net collection, the zooplankton was stored in 250 ml jar and preserved in 95% ethanol.

Figure 8 A zooplankton net was lowered from the starboard side of the Nuliajuk using the scientific winch.

6 Benthic Invertebrate Collection and Habitat Mapping

The objective of the benthic invertebrate collection and seabed habitat mapping portion of the Wager Bay (UNP) and Chesterfield Inlet Marine Baseline projects was to inventory benthic invertebrates and collect information on bottom types (organic carbon content, grain size, slope) and communities that characterize the benthic habitats.

Methods

Underwater video was collected using a Deep Blue Underwater Video Camera (Figure 9) outfitted with an additional GoPro Hero4 Black camera for high resolution video recording, lights for bottom illumination, and 5 cm-spaced lasers for scale. Video transects consisted of a four-minute drift beginning at a pre-defined sample location. Beginnings and endings of transects were recorded by hand, and on-screen GPS overlay recorded real-time locational information. The camera was set at a near-vertical tilt in relation to the seabed to facilitate the estimation of bottom area imagery. The camera was maintained at approximately 0.5 m above the seabed.

Figure 9 Roxanne Van Velzen (MUN) holds up the underwater video camera before deploying it on the starboard side of FRV Nuliajuk in Wager Bay (UNP).

If the underwater video revealed penetrable substrate, sediment and faunal samples were collected using either a 24 L Van Veen grab, 2.4 L WILDCO Petit Ponar, or the box corer. From the Park boat and in Chesterfield Inlet, the Van Veen grab was lowered by hand and used as default, yet most often failed to capture sediment in rocky or gravelly areas. For this reason, the Petit Ponar was used in rocky and gravelly areas, with a much greater rate of success. The loss

of sample volume consistency was deemed acceptable in order to obtain more successful sediment samples. All grab and box core samples were sub-sampled for sediments (~100 mL or 1 tbsp.) and frozen at -20^{o}C for organic carbon content and grain size analyzes at Memorial University of Newfoundland. The grab and box core samples were then sieved through 0.5 mm mesh sieve and infauna identified, counted, and fixed in 4% formalin.

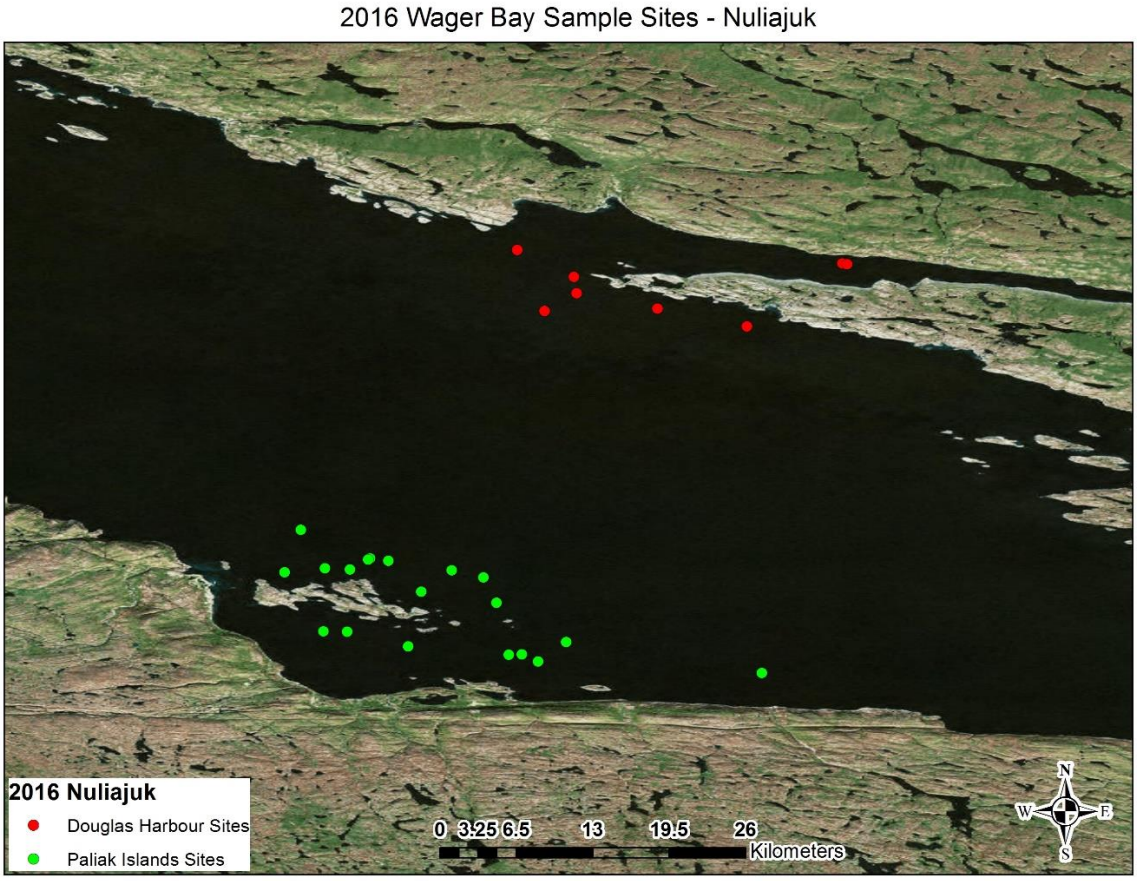


Figure 10 Underwater video and triplicate grab sample locations collected from the FRV Nuliajuk around Paliak Islands (Green) and Douglas Harbour (Red) in Wager Bay (UNP).

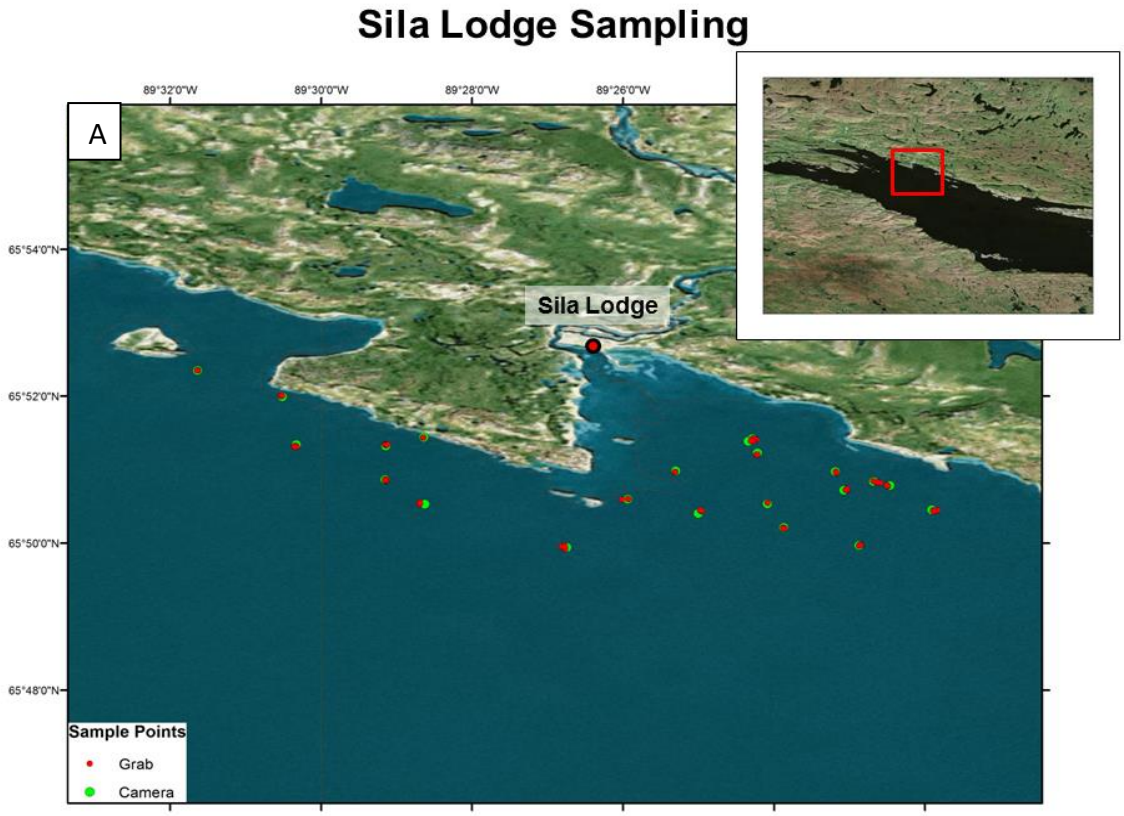


Figure 11 Underwater video and grab samples collected near Sila Lodge in Wager Bay (UNP) (A) using the Parks Canada boat (B).

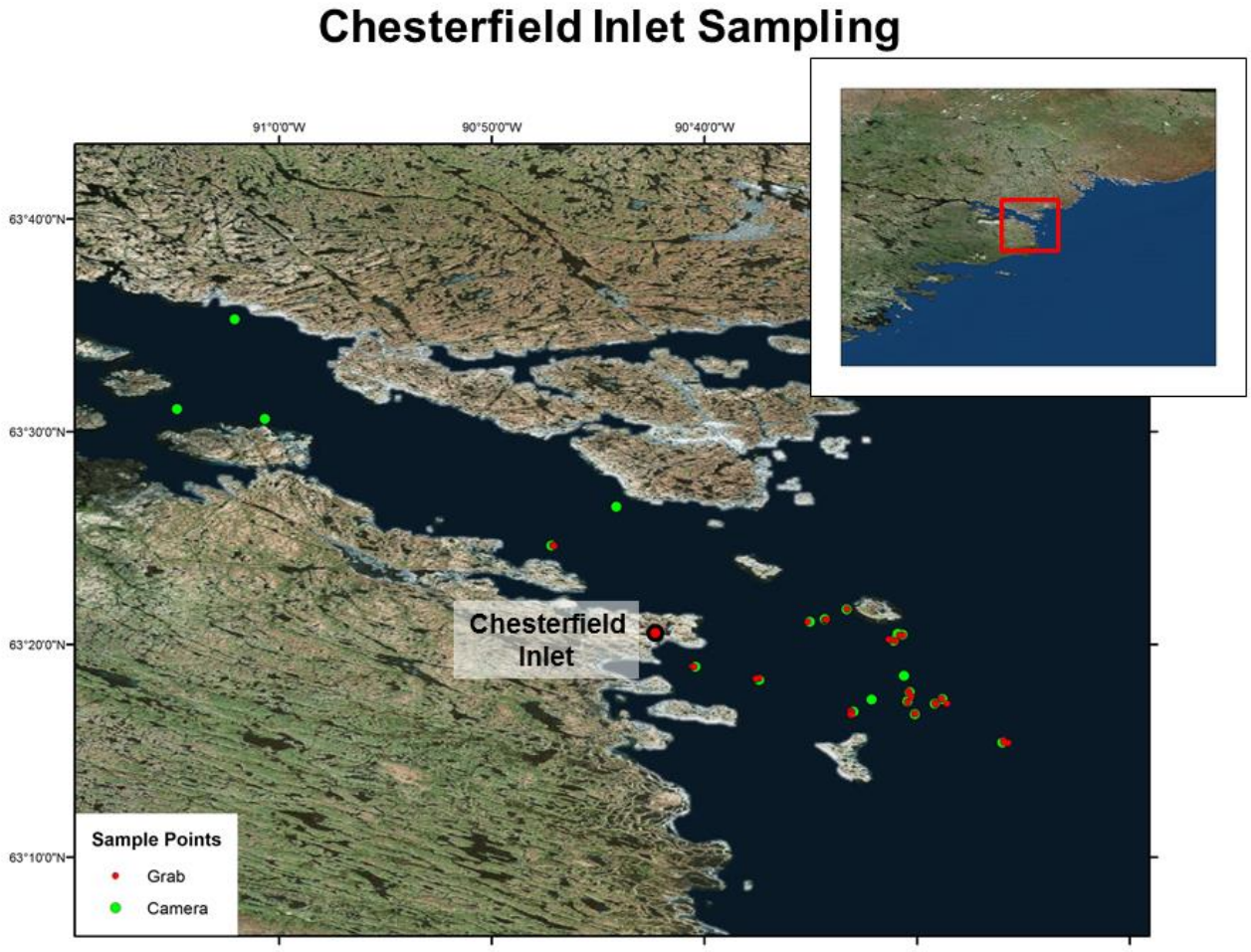


Figure 12 Underwater video and grab sample locations near Chesterfield Inlet, NU (A).

An Agassiz trawl (AGT), provided by Université du Québec à Rimouski, was deployed from the stern of the *Nuliajuk* using the starboard side bottom trawl winch and dragged along the seafloor at ~1.5 knots to collect epibenthic invertebrates (Figure 13). The AGT consisted of a simple metal sled like frame (1 m wide) and net (mesh size 1 mm). Due to the rocky substrate of Wager Bay (UNP), the AGT was deployed successfully only once. Samples collected from the AGT were sieved through a 1 mm mesh, sorted and identified if possible, and fixed in 4% formaldehyde. A small subset of samples was frozen for contaminant analyses by Dr. Gary Stern and Dr. Zou Zou Kuzyk's lab. Unfortunately, the AGT was lost on the east side of Paliak Island during the second deployment due to a weak link in the chain that attached the AGT to the winch cable.

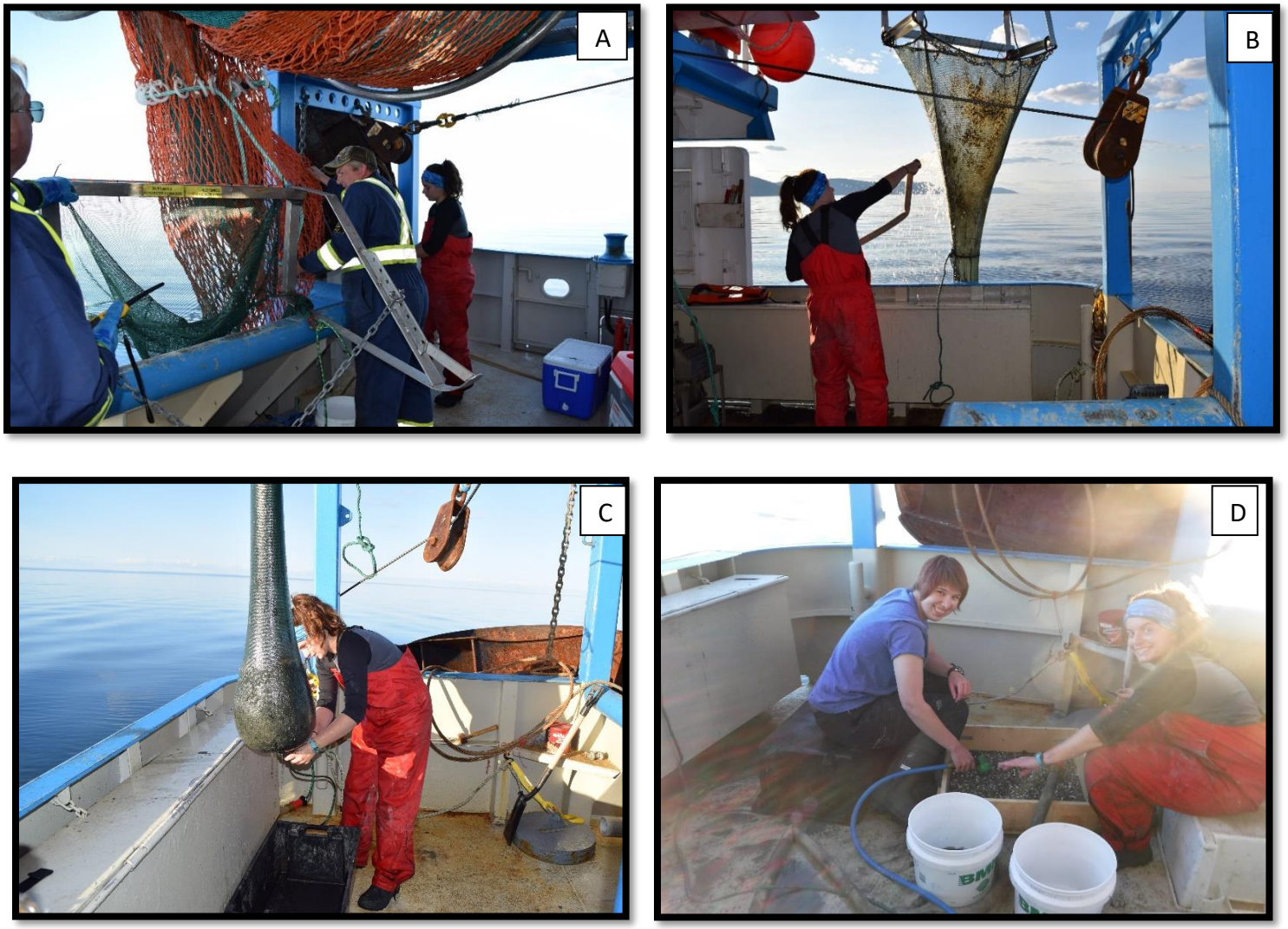


Figure 13 After the Agassiz Trawl was deployed off the stern of the Nuliajuk (A),the crane was used to bring the net to the starboard side of the vessel where sediment was rinsed off the net (B), invertebrate collected in a fish pan (C), rinsed, sorted and identified (D)

7 Sediment Core Collection

The objective of the box coring portion was to collect 5 sediment cores from Wager Bay and a minimum of 2 sediment cores from Chesterfield Inlet for investigate the chronology of contaminants (Hg, PAH's, metals) over the past ~100 years and to use the sediment cores to provide insight into the systems themselves (e.g., deposition, resuspension) (see core collection locations in Figure 14).

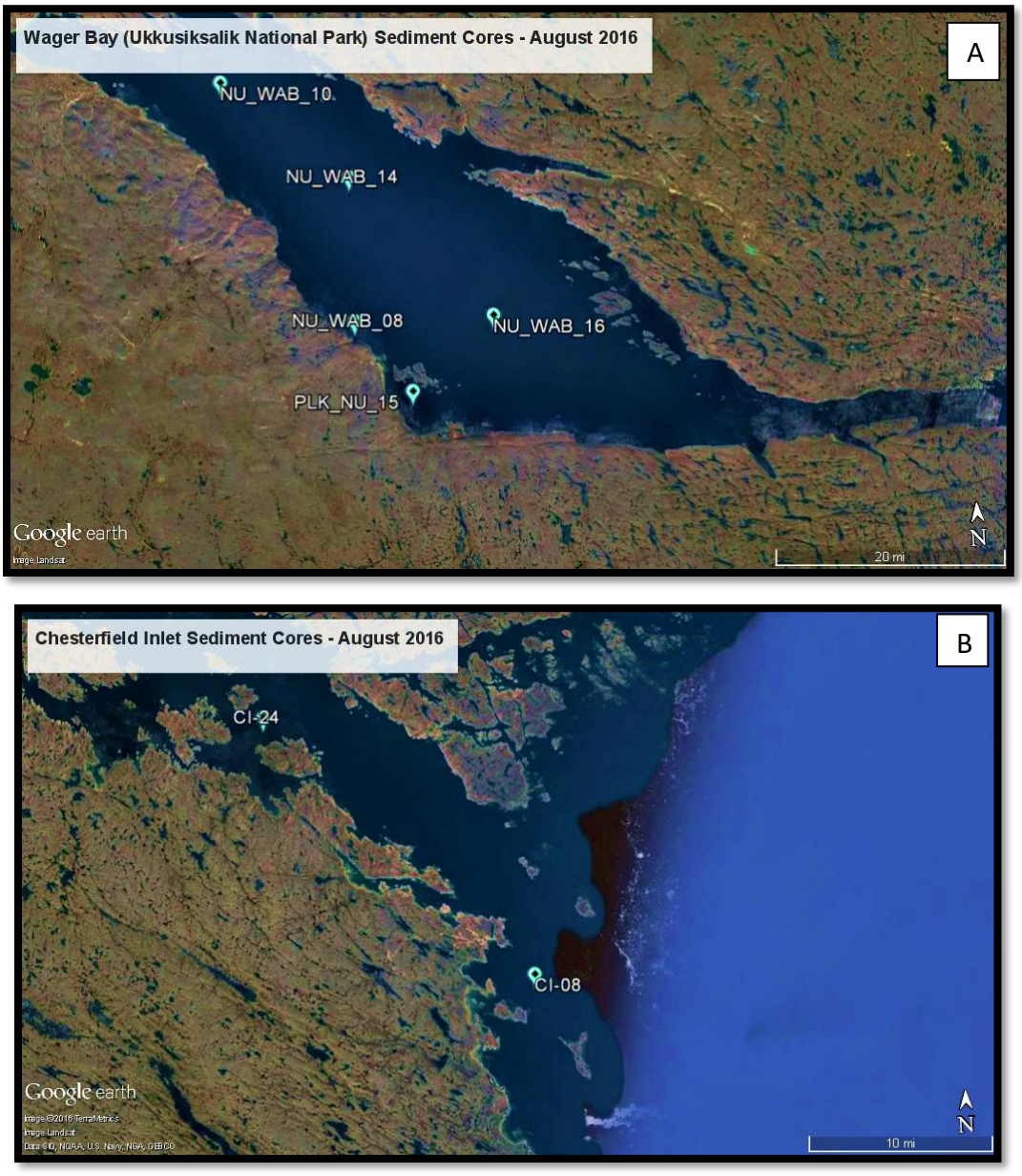


Figure 14 Locations of sediment cores collected in Wager Bay (UNP) (A) and Chesterfield Inlet (B) in August 2016

Method

A Gomex box corer, provided by the University of Manitoba, was used to collect sediment cores based on observed seafloor substrate recorded by the drop camera. The box corer was tied and shackled to floating rope and deployed using the crab pot hauler on the starboard side of the *Nuliajuk* (Figure 15A). The box corer was deployed at ~1 m sec^{-1} until it hit the seafloor. Once at the bottom, extra rope was let out to ensure enough slack in the rope would allow the corer to trigger closed. The box corer was then brought to the surface using the crab pot hauler and, using the crane, was brought around to the starboard side of the stern and lowered onto the box corer frame.

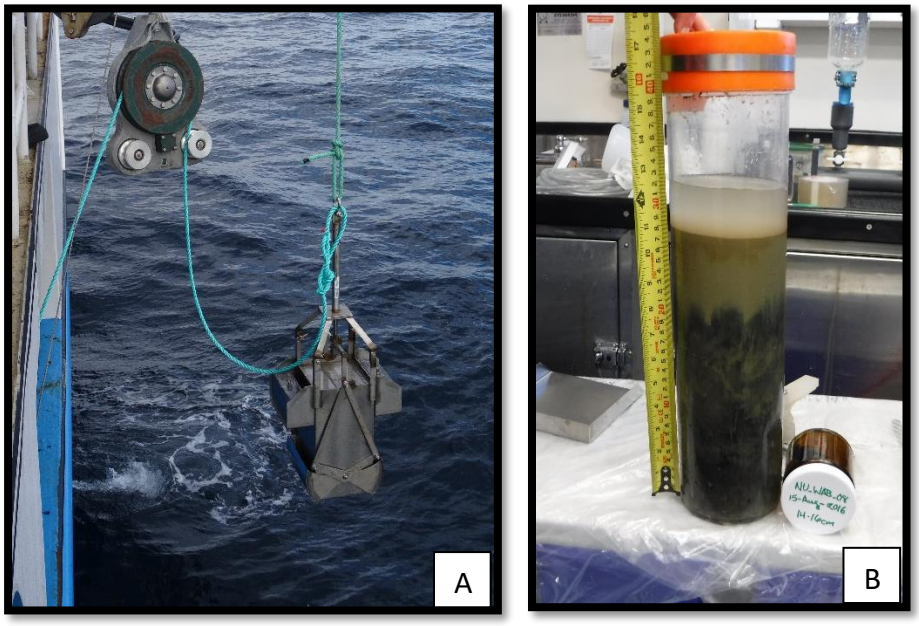


Figure 15 The box corer was moved from the stern to the starboard side of the vessel using the crane and hooked up to the crab pot hauler, which was used for deployment and retrieval (A). A sediment core collected in Wager Bay is measured before sectioning in the lab of the Nuliajuk (B).

If the box corer was sealed water tight and/or the sediment inside was not slumped, a core tube was pressed slowly into the sediment and a grab sample of the surface material was taken. The core was then plugged, capped and carefully removed from the box core (Figure 15B). The sediment core was then measured, photographed, and sectioned into trace metal clean jars every 1 cm until 10 cm, 2 cm until 20 cm and 5 cm after 20 cm. The sediment sections were frozen and sent to the University of Manitoba for radioisotope and contaminants analyses.

8 Scientific Recommendations

Continued work in Chesterfield is required to provide better confidence to any estimates of the scallop grounds. It would be important that more data be gathered on the scallop distribution within that area. This would consist of more underwater video or photographs where scallop numbers could be quantified and georeferenced. We have some of this information from the 2016 season, but more would provide better confidence in any results produced from this study.

In Wager Bay (UNP), the goal of this study was to collect baseline data for the whole Bay. However, we currently have two separate study sites near Sila Lodge and the Paliak Islands, which was required due to limited time and funds. Future studies should focus on multi-beam collection across the entire Bay. This year's multi-beam survey collected the first every data of the seafloor across Wager Bay, revealing a multifaceted deep basin with many shallow shoals. In addition to sea bed mapping, a better understanding of the oceanography of the Bay is required. If future work were to take place in Wager Bay (UNP), it is recommended that collection be focused on sea floor mapping and gaining a better understanding of the Bay's fundamental processes like currents, water mass distribution, and exchange between Hudson Bay and Wager Bay. This would allow future scientists who are interested in working in the Park the data they need to set more defined scientific objectives.

9 Acknowledgements

The success of this project would not have been possible without the advice, support, and knowledge shared by the generous people from the communities of Chesterfield Inlet and Naujaat. The invaluable advice given by experienced fisherman and hunters from the region ensured the safe passage of the *Nuliajuk* into the uncharted and potentially dangerous waters of Wager Bay. Special thanks to Captain Cecil Bannister and the crew of FRV *Nuliajuk*, who worked tirelessly to bring the *Nuliajuk* to the Kivalliq region for the first time and went above and beyond to ensure the success of this program. Funding was provided by Parks Canada Agency and Government of Nunavut Department of Environment.

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List of Abbreviations

General:

UNP – Ukkusiksalik National Park

Equipment:

CTD: CTD Cast
BOT: Niskin (bottle) cast for water samples
BPP: Niskin (bottle) for phytoplankton collection
VPT: Vertical phytoplankton tow
VZT: Vertical zooplankton tow
OZT: Oblique zooplankton tow
BOX: Box Corer
VAV: Van Veen Grab (24 L capacity)
BAT: Benthic Agassiz Trawl

Sample Notation and Identification:

PLK - Paliak Islands
SIL - Sila Lodge
DGH - Douglas Harbor
WAB - Wager Bay
CI – Chesterfield Inlet
PB - Park boat
NU - *Nuliajuk*

NOTE: To reduce duplication of sample notation and confusion because of the two sampling teams in Wager Bay, physical samples collected in UNP were given notations that included **Boat sampled from (e.g., PB or NU), region (e.g., PLK, SIL, DGH), and sample number.** Sample numbers were given in sequence as they were collected. If the sample was collected in Wager Bay but not near PLK, SIL, or DGH (excluding water samples collected during multi-beam survey), the sample was given a notation of WAB for Wager Bay.

Appendix 1: Samples and Data Collected

Table 1 Mooring deployment and retrieval

Date	Time (UTC)	Event	Latitude	Longitude	Bottom Depth (m)
1-Aug-16	01:05	Acoustic Mooring Deployed	63 20.9517	90 34.3520	99
2-Aug-16	13:30	Tide Gauge Deployment	65 23.2027	89 02.7372	19
3-Aug-16	12:53	Tide Gauge Deployment	65 52.506	89 31.695	23
24-Aug-16	N/A	Acoustic Mooring Retrieved	63 20.9517	90 34.3520	99

Table 2 Minos-X CTD (Marine Institute)

Cast #	Latitude	Longitude	Bottom Depth (m)
1	65.2222	-86.7715	54.7
2	65.3867	-89.0456	18.75
3	65.3592	-88.7833	126.5
4	65.4074	-88.6912	197
5	65.3676	-88.7763	204.4
6	65.404	-88.94	161.7
7	65.3988	-88.8892	123
8	65.78218	-89.76801	226
9	65.8327	-89.3405	17
10	65.8331	-89.3737	80
11	65.7188	-89.4636	149
12	65.3596	-88.549	294
13	65.39176	-89.07811	31
14	65.3748	-89.0637	116
15	65.34984	-88.76831	194
16	65.37803	-88.47663	125
17	65.63374	-88.46135	22.9
18	65.6376	-88.8503	72.5
19	65.5886	-88.6654	68
20	65.3696	-89.062	109
21	65.42417	-89.0769	61.6
22	65.42212	-88.97652	130
23	65.5	-88.8767	187
24	65.594	-88.7168	81
25	65.4296	-89.0252	118.7
26	65.34786	-88.769	156.6
27	65.32	-88.1982	104.97
28	65.3127	-88.229	103.33
29	65.3026	-87.2666	58.23
30	65.3406	-89.0181	106.3
31	65.4634	-89.2015	318
32	65.352035	-88.371	125

Table 3 Idronaut CTD with turbidity probe (U of Manitoba).

Date (dd/mm/yy)	Station ID	Latitude	Longitude
18/08/16	PLK_NU_12	65.4051	-88.9754
18/08/16	PLK_NU_15	65.3733	-89.0465
20/08/16	DGH_NU_07	65.6312	-88.8557
20/08/16	DGH_NU_08	65.6646	-88.8985
20/08/16	DGH_NU_09	65.6558	-88.6594
23/08/16	RWS_01	65.1232	-86.8170
23/08/16	RWS_02	65.1233	-86.5740
23/08/16	RWS_03	65.1240	-86.31674
25/08/16	CI_21	63.4103	-90.7865
25/08/16	CI_22	63.4236	-90.7599
25/08/16	CI_23	63.4417	-90.7348
26/08/16	CI_04	63.3157	-90.6738
26/08/16	CI_05	63.2952	-90.6026
26/08/16	CI_08	63.3058	-90.6241
26/08/16	CI_20	63.3276	-90.6017
27/08/16	CI_01	63.2807	-90.5533
27/08/16	CI_06	63.2963	-90.5060
27/08/16	CI_07	63.2867	-90.4843
27/08/16	CI_10	63.2902	-90.5335
27/08/16	CI_12	63.2574	-90.4305
27/08/16	CI_16	63.2895	-90.4787
27/08/16	CI_17	63.2791	-90.4991
27/08/16	CI_19	63.2878	-90.5072
28/08/16	CI_03	63.3509	-90.5860
28/08/16	CI_13	63.3092	-90.5104
28/08/16	CI_14	63.3408	-90.5110
28/08/16	CI_15	63.3418	-90.5161
28/08/16	CI_18	63.3363	-90.5192
28/08/16	CI_24	63.5176	-91.0799
28/08/16	CI_26	63.5878	-91.0361
28/08/16	P3	63.3607	-90.55485
29/08/16	CI_25	63.5401	-91.0276
29/08/16	CI_28	63.3335	-90.6913

Table 4 Environmental DNA collection in Chesterfield Inlet

Date (dd/mm/yy)	Station Name	Latitude (N)	Longitude (W)	Bottom Depth (m)
29/07/16	Marker 1	63.3532	-90.5143	4
29/07/16	Marker 2	63.3524	-90.5290	3
30/07/16	Site 1	63.2808	-90.5494	32
30/07/16	Site 10	63.2891	-90.5349	18
30/07/16	Site 17	63.2796	-90.5030	30
30/07/16	Site 5	63.2958	-90.6002	40
30/07/16	Little Italy	63.2944	-90.6248	15
30/07/16	Polar Bear Nose	63.2830	-90.6328	3
30/07/16	Site 19	63.2882	-90.5082	37
30/07/16	Site 7	63.2874	-90.4857	35
30/07/16	Site 16	63.2914	-90.4809	51
30/07/16	Site 6	63.2969	-90.5063	49
30/07/16	Tern	63.2586	-90.5560	1.5
30/07/16	Fucus	63.2580	-90.5698	2
30/07/16	Site 18	63.3361	-90.5149	36
30/07/16	Site 14	63.3410	-90.5107	35
30/07/16	Site 15	63.3419	-90.5139	37
30/07/16	Promise 3	63.3617	-90.5494	5
30/07/16	Site 20	63.3282	-90.5353	53
31/07/16	Site 3	63.3522	-90.5859	88
31/07/16	Site 2	63.3536	-90.5715	82
31/07/16	Site 9	63.3404	-90.5593	91
31/07/16	Marker 3 (Net Point)	63.3356	-90.6892	6
31/07/16	Eider Cove	63.3392	-90.6660	2.4
31/07/16	School Point	63.3304	-90.7024	2
31/07/16	Marker 4 (Cabin Point)	63.3213	-90.7027	5
31/07/16	Site 4	63.3167	-90.6750	20
31/07/16	Marker 5 (Fox Trap Point)	63.3108	-90.7001	4

Table 5 Water samples collected in Wager Bay (UNP), Roes Welcome Sound, and Chesterfield Inlet.

Date	Time (UTC)	Station	Latitude (N)	Longitude (W)	Bottom Depth (m)	Sample Depth (m)	Parameters[1]
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	10	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	10 dup	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	30	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	100	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
4-Aug-16	16:00	NU_WAB_01	65.7663	-89.5632	221	220	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	7:00	NU_WAB_02	65.6340	-88.4607	25	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	7:00	NU_WAB_02	65.6340	-88.4607	25	1 DUP	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	7:00	NU_WAB_02	65.6340	-88.4607	25	10	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	7:00	NU_WAB_02	65.6340	-88.4607	25	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	10:45	NU_WAB_03	65.6317	-88.8533	85	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	10:45	NU_WAB_03	65.6317	-88.8533	85	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	10:45	NU_WAB_03	65.6317	-88.8533	85	20 dup	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	10:45	NU_WAB_03	65.6317	-88.8533	85	40	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
6-Aug-16	10:45	NU_WAB_03	65.6317	-88.8533	85	75	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	9:30	NU_WAB_04	65.4104	-88.6052	168	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	9:30	NU_WAB_04	65.4104	-88.6052	168	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	9:30	NU_WAB_04	65.4104	-88.6052	168	60	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	9:30	NU_WAB_04	65.4104	-88.6052	168	110	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	14:30	NU_WAB_05	65.4927	-88.8787	185	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	14:30	NU_WAB_05	65.4927	-88.8787	185	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	14:30	NU_WAB_05	65.4927	-88.8787	185	50	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
7-Aug-16	14:30	NU_WAB_05	65.4927	-88.8787	185	170	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
8-Aug-16	13:45	NU_WAB_06	65.3135	-88.2297	104	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
8-Aug-16	13:45	NU_WAB_06	65.3135	-88.2297	104	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
8-Aug-16	13:45	NU_WAB_06	65.3135	-88.2297	104	60	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
8-Aug-16	13:45	NU_WAB_06	65.3135	-88.2297	104	60DUP	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*

8-Aug-16	13:45	NU_WAB_06	65.3135	-88.2297	104	100	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
8-Aug-16	16:00	NU_WAB_07	65.3035	-87.2596	40	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	40	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	60	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	100	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	200	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
9-Aug-16	9:45	NU_WAB_08	65.4632	-89.2012	324	300	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
13-Aug-16	6:00	NU_WAB_09	65.7141	-89.2496	61	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
13-Aug-16	6:00	NU_WAB_09	65.7141	-89.2496	61	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
13-Aug-16	6:00	NU_WAB_09	65.7141	-89.2496	61	60	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
14-Aug-16	11:00	NU_WAB_10	65.7711	-89.5565	216	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
14-Aug-16	11:00	NU_WAB_10	65.7711	-89.5565	216	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
14-Aug-16	11:00	NU_WAB_10	65.7711	-89.5565	216	20 dup	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
14-Aug-16	11:00	NU_WAB_10	65.7711	-89.5565	216	80	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
14-Aug-16	11:00	NU_WAB_10	65.7711	-89.5565	216	200	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	15:24	DGH_NU_09	65.6553	-88.6499	75	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	15:31	DGH_NU_09	65.6553	-88.6499	77	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	15:35	DGH_NU_09	65.6553	-88.6499	75	70	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	15:40	DGH_NU_09	65.6553	-88.6499	75	70 DUP	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	18:00	DGH_NU_08	65.6637	-88.8980	75	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	18:06	DGH_NU_08	65.6637	-88.8980	75	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
20-Aug-16	18:10	DGH_NU_08	65.6637	-88.8980	75	80	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
21-Aug-16	17:00	NU_WAB_15	65.6662	-89.5202	305	1	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
21-Aug-16	17:00	NU_WAB_15	65.6662	-89.5202	305	20	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
21-Aug-16	17:00	NU_WAB_15	65.6662	-89.5202	305	60	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
21-Aug-16	17:00	NU_WAB_15	65.6662	-89.5202	305	150	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
21-Aug-16	17:00	NU_WAB_15	65.6662	-89.5202	305	300	Nut, CDOM, Sal., δ^{18}O,POC,PON,Chl *a.*
23-Aug-16	15:45	RWS_01	65.1169	-86.8169	24	1	Nut, CDOM, Sal., δ^{18}O
23-Aug-16	15:45	RWS_01	65.1169	-86.8169	24	10	Nut, CDOM, Sal., δ^{18}O
23-Aug-16	15:45	RWS_01	65.1169	-86.8169	24	20	Nut, CDOM, Sal., δ^{18}O

23-Aug-16	22:42	RWS_02	65.1238	-86.5742	80	1	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
23-Aug-16	22:47	RWS_02	65.1238	-86.5742	80	10	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
23-Aug-16	22:51	RWS_02	65.1238	-86.5742	80	20	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
23-Aug-16	22:55	RWS_02	65.1238	-86.5742	80	20 DUP	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
23-Aug-16	22:57	RWS_02	65.1238	-86.5742	80	70	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
23-Aug-16	19:45	RWS_03	65.1241	-86.3166	55	1	Nut, CDOM, Sal., $\delta^{18}O$
23-Aug-16	19:45	RWS_03	65.1241	-86.3166	55	20	Nut, CDOM, Sal., $\delta^{18}O$
23-Aug-16	19:45	RWS_03	65.1241	-86.3166	55	50	Nut, CDOM, Sal., $\delta^{18}O$
25-Aug-16	13:36	CI_21	63.4118	-90.7871	43.8	1	Nut, CDOM, Sal., $\delta^{18}O$
25-Aug-16	13:36	CI_21	63.4118	-90.7871	43.8	10	Nut, CDOM, Sal., $\delta^{18}O$
25-Aug-16	13:36	CI_21	63.4118	-90.7871	43.8	30	Nut, CDOM, Sal., $\delta^{18}O$
25-Aug-16	16:19	CI_22	63.4244	-90.7609	104	1	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
25-Aug-16	16:19	CI_22	63.4244	-90.7609	104	1 dup	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
25-Aug-16	16:19	CI_22	63.4244	-90.7609	104	10	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
25-Aug-16	16:19	CI_22	63.4244	-90.7609	104	20	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
25-Aug-16	16:19	CI_22	63.4244	-90.7609	104	100	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
25-Aug-16	17:35	CI23	63.4409	-90.7345	70	1	Nut, CDOM, $\delta^{18}O$
25-Aug-16	17:40	CI23	63.4409	-90.7345	84	20	Nut, CDOM, $\delta^{18}O$.
25-Aug-16	17:52	CI23	63.4409	-90.7345	72	60	Nut, CDOM, $\delta^{18}O$
27-Aug-16	12:02	CI_08	63.3063	-90.6255	41	1	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
27-Aug-16	12:05	CI_08	63.3063	-90.6255	41	10	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
27-Aug-16	12:07	CI_08	63.3063	-90.6255	41	10 DUP	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
27-Aug-16	12:09	CI_08	63.3063	-90.6255	41.6	30	Nut, CDOM, Sal., $\delta^{18}O$,POC,PON,Chl *a.*
27-Aug-16	15:05	CI_019	63.2874	-90.5070	39.4	1	Nut, CDOM, $\delta^{18}O$
27-Aug-16	15:05	CI_019	63.2874	-90.5070	39.4	20	Nut, CDOM, $\delta^{18}O$.
27-Aug-16	15:05	CI_019	63.2874	-90.5070	39.4	35	Nut, CDOM, $\delta^{18}O$
28-Aug-16	12:00	CI_24	63.5184	-91.0820	34.7	1	Nut, CDOM, $\delta^{18}O$.
28-Aug-16	12:00	CI_24	63.5184	-91.0820	34.7	20	Nut, CDOM, $\delta^{18}O$
28-Aug-16	12:00	CI_24	63.5184	-91.0820	34.7	20dup	Nut, CDOM, $\delta^{18}O$.
28-Aug-16	12:00	CI_24	63.5184	-91.0820	34.7	35	Nut, CDOM, $\delta^{18}O$
29-Aug-16	N/A	CI26	63.5884	-91.0332	34.4	1	Nut, CDOM, $\delta^{18}O$
29-Aug-16	N/A	CI26	63.5884	-91.0332	34.4	15	Nut, CDOM, $\delta^{18}O$.

29-Aug-16	N/A	CI26	63.5884	-91.0332	34.4	30	Nut, CDOM, $\delta^{18}O$.
29-Aug-16	N/A	CI25	63.5439	-91.0312	82.9	1	Nut, CDOM, $\delta^{18}O$
29-Aug-16	N/A	CI25	63.5439	-91.0312	82.9	20	Nut, CDOM, $\delta^{18}O$
29-Aug-16	N/A	CI25	63.5439	-91.0312	87	80	Nut, CDOM, $\delta^{18}O$.

[1]Parameters sampled for include Nut=nutrients (Nitrate-Nitrite, Phosphate, Silicic Acid), CDOM (Coloured Dissolved Organic Matter and strontium), Sal = salinity, $\delta^{18}O$ = oxygen 18 isotope ratio, POC=Particulate organic carbon, PON = Particulate organic nitrogen, Chl *a* = chlorophyll

Table 6 Plankton samples collected in Wager Bay (UNP) and Chesterfield Inlet snowshoeing

Date	Station	Latitude (N)	Longitude (W)	Dinoflagellates/ Phytoplankton (Niskin Bottle)	Zooplankton (80 µm net)	Zooplankton (250 µm net)
15/08/2016	4/SIL-PB-4-15082016	65.8514	-89.3883		X	X
15/08/2016	PLK_NU_03	65.4210	-89.0735	X	X	X
16/08/2016	NU_WAB_11	65.3336	-88.5470	X	X	X
17/08/2016	NU_WAB_12	65.4652	-88.9412	X	X	X
18/08/2016	PLK_NU_15	65.3742	-89.0462	X	X	X
25/08/2016	CI-21	63.4110	-90.7866	X	X	
25/08/2016	CI-22	63.4243	-90.7607	X		
25/08/2016	CI-23	63.4416	-90.7358	X		

Table 7 Underwater video collected in Wager Bay (UNP) from the Parks Canada boat.

Date (dd/mm/yy)	Station Name	Latitude (N)	Longitude (W)	Bottom Depth (m)
14/08/16	SIL_PB_5	65.8570	-89.4048	20
14/08/16	SIL_PB_7	65.8565	-89.4107	25
14/08/16	SIL_PB_4	65.8538	-89.4037	25
15/08/16	SIL_PB_N4	65.8497	-89.3865	40
16/08/16	SIL_PB_N2	65.8453	-89.3845	45
16/08/16	SIL_PB_N7	65.8473	-89.3830	45
16/08/16	SIL_PB_N8	65.8465	-89.3745	40
16/08/16	SIL_PB_N0	65.8408	-89.3652	65
16/08/16	SIL_PB_MB7	65.8368	-89.3978	50
17/08/16	SIL_PB_N9	65.8422	-89.4015	50
17/08/16	SIL_PB_N1	65.8433	-89.4323	15
17/08/16	SIL_PB_P2	65.8497	-89.4217	15
17/08/16	SIL_PB_P1	65.8725	-89.5273	35
17/08/16	SIL_PB_P3	65.8665	-89.5085	20
17/08/16	SIL_PB_MB17	65.8557	-89.5055	100
18/08/16	SIL_PB_P6	65.8553	-89.4857	45
18/08/16	SIL_PB_MB3	65.8478	-89.4858	70
18/08/16	SIL_PB_P0	65.8573	-89.4773	10
18/08/16	SIL_PB_MB21	65.8422	-89.4770	110
20/08/16	SIL_PB_MB12	65.8323	-89.4458	110
20/08/16	SIL_PB_MB14	65.8328	-89.3813	80
20/08/16	SIL_PB_P10	65.8400	-89.4167	45

Table 8 Underwater video collected in Wager Bay (UNP) from FRV Nuliajuk.

Date (dd/mm/yy)	Station Name	Latitude (N)	Longitude (W)	Bottom Depth (m)
15/08/2016	PLK_NU_01	65.4214	-89.0296	57
15/08/2016	PLK_NU_02	65.4225	-89.0473	67
15/08/2016	PLK_NU_03	65.4195	-89.0780	76
16/08/2016	PLK_NU_23	65.3426	-88.7142	168
16/08/2016	PLK_NU_22	65.3511	-88.8848	101
16/08/2016	PLK_NU_21	65.3567	-88.8970	53
17/08/2016	PLK_NU_05	65.4519	-89.0657	63
17/08/2016	PLK_NU_06	65.4291	-89.0142	109
17/08/2016	PLK_NU_07	65.4280	-88.9984	133
17/08/2016	PLK_NU_08	65.4216	-88.9501	183
17/08/2016	PLK_NU_09	65.4090	-88.9257	131
17/08/2016	PLK_NU_18	65.3664	-88.8641	103
18/08/2016	PLK_NU_15	65.3748	-89.0484	133
18/08/2016	PLK_NU_16	65.3745	-89.0308	109
18/08/2016	PLK_NU_17	65.3631	-88.9831	94
18/08/2016	PLK_NU_13	65.3957	-88.9179	170
18/08/2016	PLK_NU_12	65.4042	-88.9776	55
19/08/2016	DGH_NU_09	65.6552	-88.6524	74.2
20/08/2016	DGH_NU_09	65.6552	-88.6482	75.3
20/08/2016	DGH_NU_08	65.6661	-88.9005	62
20/08/2016	DGH_NU_07	65.6447	-88.8571	58.9
20/08/2016	DGH_NU_06	65.6183	-88.8793	100
20/08/2016	DGH_NU_05	65.6209	-88.7934	58
20/08/2016	DGH_NU_04	65.6065	-88.7256	76
21/08/2016	NU_WAB_14	65.5706	-88.5801	58

Table 9 Underwater video collected in Chesterfield Inlet from FRV Nuliajuk.

Date (dd/mm/yy)	Station Name	Latitude (N)	Longitude (W)	Bottom Depth (m)
24/08/16	CI_NU_02	63.3528	-90.5723	90
25/08/16	CI_NU_21	63.4105	-90.7867	40
25/08/16	CI_NU_23	63.4412	-90.7358	75
26/08/16	CI_NU_04	63.3157	-90.6737	20
26/08/16	CI_NU_08	63.3055	-90.6240	40
27/08/16	CI_NU_01	63.2805	-90.5498	40
27/08/16	CI_NU_10	63.2900	-90.5357	20
27/08/16	CI_NU_17	63.2785	-90.5018	35
27/08/16	CI_NU_19	63.2885	-90.5078	40
27/08/16	CI_NU_07	63.2867	-90.4862	40
27/08/16	CI_NU_12	63.2563	-90.4332	55
27/08/16	CI_NU_16	63.2903	-90.4803	55
27/08/16	CI_NU_06	63.2960	-90.5060	50
28/08/16	CI_NU_24	63.5175	-91.0802	35
28/08/16	CI_NU_18	63.3362	-90.5183	35
28/08/16	CI_NU_14	63.3408	-90.5117	35
28/08/16	CI_NU_15	63.3417	-90.5155	40
28/08/16	CI_NU_13	63.3085	-90.5105	105
28/08/16	CI_NU_03	63.3508	-90.5842	95
28/08/16	CI_NU_P3	63.3607	-90.5553	55
28/08/16	CI_NU_26	63.5878	-91.0350	40
29/08/16	CI_NU_27	63.5100	-91.0113	35

Table 10 Benthic invertebrate collection in Wager Bay (UNP) from the Parks Canada Boat.

Date (dd/mm/yy)	Station Name	Equipment Type	Latitude (N)	Longitude (W)	Bottom Depth (m)	Comments
14/08/16	SIL_PB_5	Grab	65.8568	-89.4038	20	
14/08/16	SIL_PB_5	Grab	65.8570	-89.4043	20	
14/08/16	SIL_PB_5	Grab	65.8572	-89.4045	20	Sand, rocks, shrimp, clams/shells
14/08/16	SIL_PB_5	Grab	65.8570	-89.4045	20	Little sand + pebbles
14/08/16	SIL_PB_5	Grab	65.8570	-89.4048	20	
14/08/16	SIL_PB_7	Grab	65.8565	-89.4048	20	
14/08/16	SIL_PB_7	Grab	65.8565	-89.4048	20	Sand, rocks, shrimp
14/08/16	SIL_PB_7	Grab	65.8565	-89.4052	20	Rock, sand
14/08/16	SIL_PB_4	Grab	65.8533	-89.4038	25	Rocks, sand
14/08/16	SIL_PB_4	Grab	65.8533	-89.4035	25	Sand, kelp, urchins
14/08/16	SIL_PB_4	Grab	65.8533	-89.4037	25	Rocks, some sand
15/08/16	SIL_PB_N4	Grab	65.8492	-89.3862	45	
15/08/16	SIL_PB_N4	Grab	65.8495	-89.3863	45	
15/08/16	SIL_PB_N4	Grab	65.8493	-89.3863	45	
16/08/16	SIL_PB_N2	Grab	65.8455	-89.3842	45	
16/08/16	SIL_PB_N2	Grab	65.8453	-89.3838	45	Pebbles, rock, some sand
16/08/16	SIL_PB_N2	Grab	65.8455	-89.3838	45	
16/08/16	SIL_PB_N2	Grab	65.8457	-89.3838	45	Sand
16/08/16	SIL_PB_N2	Grab	65.8453	-89.3840	45	
16/08/16	SIL_PB_N7	Grab	65.8470	-89.3765	40	Sand
16/08/16	SIL_PB_N7	Grab	65.8472	-89.3775	40	
16/08/16	SIL_PB_N7	Grab	65.8475	-89.3780	40	Sand, some rock
16/08/16	SIL_PB_N7	Grab	65.8472	-89.3772	40	
16/08/16	SIL_PB_N8	Grab	65.8465	-89.3752	45	Sand, some rock
16/08/16	SIL_PB_N8	Grab	65.8462	-89.3748	45	
16/08/16	SIL_PB_N8	Grab	65.8463	-89.3750	45	Sand, some rock
16/08/16	SIL_PB_N8	Grab	65.8463	-89.3750	45	
16/08/16	SIL_PB_N8	Grab	65.8463	-89.3752	45	Little sand
16/08/16	SIL_PB_N0	Grab	65.8407	-89.3648	65	Sand/mud
16/08/16	SIL_PB_N0	Grab	65.8408	-89.3648	65	Little sand/mud
16/08/16	SIL_PB_N0	Grab	65.8407	-89.3643	65	
16/08/16	SIL_PB_N0	Grab	65.8408	-89.3640	65	

16/08/16	SIL_PB_N0	Grab	65.8405	-89.3648	65	Very little sand/mud
16/08/16	SIL_PB_MB7	Grab	65.8368	-89.3980	55	
16/08/16	SIL_PB_MB7	Grab	65.8367	-89.3977	55	Sed mud/sand, large worm
16/08/16	SIL_PB_MB7	Grab	65.8368	-89.3978	55	
16/08/16	SIL_PB_MB7	Grab	65.8367	-89.3978	55	
16/08/16	SIL_PB_MB7	Grab	65.8367	-89.3980	55	
17/08/16	SIL_PB_N9	Grab	65.8425	-89.4013	50	
17/08/16	SIL_PB_N9	Grab	65.8425	-89.4013	50	
17/08/16	SIL_PB_N9	Grab	65.8425	-89.4015	50	
17/08/16	SIL_PB_N1	Grab	65.8433	-89.4337	15	
17/08/16	SIL_PB_N1	Grab	65.8433	-89.4320	15	Sand, some organics
17/08/16	SIL_PB_N1	Grab	65.8433	-89.4323	15	
17/08/16	SIL_PB_N1	Grab	65.8433	-89.4323	15	
17/08/16	SIL_PB_N1	Grab	65.8433	-89.4323	15	Some sand, kelp
17/08/16	SIL_PB_P2	Grab	65.8495	-89.4218	10	
17/08/16	SIL_PB_P2	Grab	65.8495	-89.4218	10	
17/08/16	SIL_PB_P2	Grab	65.8495	-89.4218	10	
17/08/16	SIL_PB_P1	Grab	65.8725	-89.5272	35	Sand/mud
17/08/16	SIL_PB_P1	Grab	65.8727	-89.5273	35	Sand/mud
17/08/16	SIL_PB_P1	Grab	65.8725	-89.5273	35	
17/08/16	SIL_PB_P1	Grab	65.8725	-89.5273	35	
17/08/16	SIL_PB_P1	Grab	65.8725	-89.5273	35	
17/08/16	SIL_PB_P3	Grab	65.8667	-89.5090	20	
17/08/16	SIL_PB_P3	Grab	65.8667	-89.5087	20	Sand, mud, bio: large anthropod
17/08/16	SIL_PB_P3	Grab	65.8668	-89.5085	20	Sand/mud
17/08/16	SIL_PB_P3	Grab	65.8667	-89.5085	20	
17/08/16	SIL_PB_MB17	Grab	65.8552	-89.5058	105	
17/08/16	SIL_PB_MB17	Grab	65.8553	-89.5060	105	Mud
17/08/16	SIL_PB_MB17	Grab	65.8555	-89.5057	105	
17/08/16	SIL_PB_MB17	Grab	65.8555	-89.5057	105	
17/08/16	SIL_PB_MB17	Grab	65.8552	-89.5053	105	Mud, crushed clam
17/08/16	SIL_PB_MB17	Grab	65.8552	-89.5058	105	Mud
18/08/16	SIL_PB_P6	Grab	65.8555	-89.4857	40	Mud/sand, smallish grab
18/08/16	SIL_PB_P6	Grab	65.8557	-89.4860	40	Mud/sand
18/08/16	SIL_PB_P6	Grab	65.8557	-89.4858	40	
18/08/16	SIL_PB_P6	Grab	65.8557	-89.4855	40	
18/08/16	SIL_PB_P6	Grab	65.8557	-89.4853	40	
18/08/16	SIL_PB_MB3	Grab	65.8477	-89.4855	65	

18/08/16	SIL_PB_MB3	Grab	65.8478	-89.4858	65	Small amt. of sand, some pebble
18/08/16	SIL_PB_MB3	Grab	65.8475	-89.4857	65	
18/08/16	SIL_PB_MB3	Grab	65.8475	-89.4858	65	
18/08/16	SIL_PB_MB3	Grab	65.8477	-89.4858	65	
18/08/16	SIL_PB_P0	Grab	65.8573	-89.4775	15	
18/08/16	SIL_PB_P0	Grab	65.8573	-89.4775	15	
18/08/16	SIL_PB_P0	Grab	65.8573	-89.4775	15	
18/08/16	SIL_PB_P0	Grab	65.8573	-89.4775	15	
18/08/16	SIL_PB_MB21	Grab	65.8425	-89.4783	115	Mud
18/08/16	SIL_PB_MB21	Grab	65.8422	-89.4782	115	Mud
18/08/16	SIL_PB_MB21	Grab	65.8423	-89.4783	115	
18/08/16	SIL_PB_MB21	Grab	65.8422	-89.4782	115	
18/08/16	SIL_PB_MB21	Grab	65.8425	-89.4782	115	Mud
20/08/16	SIL_PB_MB12	Grab	65.8322	-89.4462	110	
20/08/16	SIL_PB_MB12	Grab	65.8320	-89.4462	110	
20/08/16	SIL_PB_MB12	Grab	65.8328	-89.4463	110	
20/08/16	SIL_PB_MB12	Grab	65.8325	-89.4468	110	
20/08/16	SIL_PB_MB12	Grab	65.8325	-89.4462	110	
20/08/16	SIL_PB_MB14	Grab	65.8330	-89.3808	80	
20/08/16	SIL_PB_MB14	Grab	65.8330	-89.3810	80	Little sand, bio
20/08/16	SIL_PB_MB14	Grab	65.8327	-89.3813	80	
20/08/16	SIL_PB_MB14	Grab	65.8328	-89.3808	80	
20/08/16	SIL_PB_MB14	Grab	65.8328	-89.3810	80	
20/08/16	SIL_PB_P10	Grab	65.8407	-89.4163	40	
20/08/16	SIL_PB_P10	Grab	65.8405	-89.4160	40	Sand, bio
20/08/16	SIL_PB_P10	Grab	65.8407	-89.4160	40	Sand, bio
20/08/16	SIL_PB_P10	Grab	65.8408	-89.4163	40	Sand, bio - large worm

Table 11 Benthic invertebrate, grain size, and organic carbon collection in Wager Bay (UNP) from FRV Nuliajuk.

Date	Type of sampling	Latitude (N)	Longitude (W)	Depth (m)	Diversity	Area	Grain size	Organic content	Comments
Date	Type of sampling	Latitude	Longitude	Depth (m)	Diversity	Area	Grain size	Organic content	Comments
15/08/2016	BOX	65.4215	-89.0301	58	NA	NA	1	NA	Not enough mud for the other samples
15/08/2016	BOX	65.4213	-89.0298	56	NA	NA	1	NA	Not enough mud for the other samples
15/08/2016	BOX	65.4214	-89.0303	59	NA	NA	1	NA	Not enough mud for the other samples
15/08/2016	BOX	65.4569	-89.2045	327	1	25*25*28	2	1	
15/08/2016	BOX	65.4580	-89.2049	332	1	25*25*28	2	1	
15/08/2016	BOX	65.4655	-89.2018	332	1	25*25*29	2	1	
16/08/2016	BOX	65.3413	-88.7182	184	NA	NA	1	NA	Not enough mud for the other samples
16/08/2016	BOX	65.3413	-88.7318	184	NA	NA	1	NA	Not enough mud for the other samples
16/08/2016	BOX	65.3410	-88.7126	186	NA	NA	1	NA	Not enough mud for the other samples
16/08/2016	BOX	65.3360	-88.5655	256	1	25*25*10	2	1	Lot of littles rocks
16/08/2016	BOX	65.3356	-88.5653	256	1	25*25*10	2	1	Lot of littles rocks
16/08/2016	BOX	65.3357	-88.5808	256	1	25*25*11	2	1	
16/08/2016	BOX	65.3582	-88.8912	103	NA	NA	1	NA	Not enough mud for the other samples
17/08/2016	BOX	65.4292	-89.0122	127	1	25*25*15	2	1	Some rocks
17/08/2016	BOX	65.4303	-89.0108	138	1	25*25*10	2	1	One big rock and littles rocks
17/08/2016	BOX	65.4295	-89.0128	118	1	25*25*15	2	1	Some rocks
17/08/2016	BOX	65.3953	-88.8929	187	NA	NA	1	NA	Not enough mud for the other samples
17/08/2016	BOX	65.3957	-88.8923	187	NA	NA	1	NA	Not enough mud for the other samples
18/08/2016	BOX	65.3740	-89.0468	132	1	25*25*18	2	1	One little rock
18/08/2016	BOX	65.3732	-89.0481	131	1	25*25*23	2	1	One little rock
18/08/2016	BOX	65.3733	-89.0471	130	1	25*25*21	2	1	Somes littles rocks
18/08/2016	BOX	65.3733	-89.0287	105	1	25*25*16	2	1	Somes littles rocks
18/08/2016	BOX	65.3708	-89.0231	120	1	25*25*14	2	1	Somes littles rocks
18/08/2016	BOX	65.3697	-89.0205	124	1	25*25*11	2	1	One big rock and littles rocks
20/08/2016	BOX	65.6538	-88.6501	74	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.6547	-88.6503	74	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.6554	-88.6519	72	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.6213	-88.8789	107	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.6202	-88.8801	108	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.6189	-88.8700	97	NA	NA	1	NA	Not enough mud for the other samples
20/08/2016	BOX	65.5304	-88.9182	208	1	25*25*20	2	1	One little rock
20/08/2016	BOX	65.5300	-88.9186	211	1	25*25*16	2	1	Some little rocks

20/08/2016	BOX	65.5305	-88.9181	211	1	25*25*15	2	1	Some little rocks
21/08/2016	BOX	65.6446	-89.1974	209	1	25*25*22	2	1	One rock and littles rocks
21/08/2016	BOX	65.6440	-89.1990	204	1	25*25*18	2	1	Some little rocks
21/08/2016	BOX	65.6421	-89.2024	203	1	25*25*16	2	1	Some little rocks
22/08/2016	BOX	65.4636	-88.7859	201	1	25*25*15	2	1	
22/08/2016	BOX	65.4621	-88.7866	201	1	25*25*13	2	1	

Table 12 Benthic invertebrate, grain size, and organic carbon collection in Chesterfield Inlet from FRV Nuliajuk.

Date	Type of sampling	Latitude	Longitude	Depth (m)	Diversity	Area	Grain size	Organic content	Comments
24-08-2016	Grab	63.3540	-90.5725	89.4	1	1/3	2	1	
24-08-2016	Grab	63.3532	-90.5708	84	1	1/3	2	1	
26/08/2016	Grab	63.3070	-90.6238	41	1	1/2	2	1	Mud
26/08/2016	Grab	63.3067	-90.6263	41	1	1/2	2	1	Mud
26/08/2016	Box core	63.3078	-90.6244	42	1	25*25*20	1	1	The other grab didn't work, so I take a sample in the box core to get 3 replicates
27/08/2016	Grab	63.2962	-90.6028	44	1	1/2	2	1	
27/08/2016	Grab	63.2952	-90.6012	44	1	1/2	2	1	
27/08/2016	Grab	63.2961	-90.6025	45	1	1/2	2	1	
27/08/2016	Petit Grab	63.2797	-90.5509	41.6	1	1/3	2	1	Too many rocks to try the big grab, little mud with some rocks
27/08/2016	Petit Grab	63.2789	-90.5015	35.1	1	1/3	2	1	
27/08/2016	Petit Grab	63.2873	-90.4861	37.1	1	1/3	1	NA	Too many rocks to try the big grab, just enough mud for Ben
27/08/2016	Petit Grab	63.2862	-90.4852	44.8	1	1/3	1	NA	Too many rocks to try the big grab, just enough mud for Ben
27/08/2016	Petit Grab	63.2869	-90.4769	49.8	1	1/3	1	NA	Too many rocks to try the big grab, just enough mud for Ben
27/08/2016	Petit Grab	63.2903	-90.4813	53.9	1	1/3	1	NA	Too many rocks to try the big grab, just enough mud for Ben. 2 SCALLOPS, IN THE FREEZER
27/08/2016	Petit Grab	63.2906	-90.4806	53.2	1	1/3	2	1	
27/08/2016	Box core	63.2892	-90.4797	53	2	25*25*18	2	1	
27/08/2016	Box core	63.2891	-90.4812	50	1	25*25*10	2	1	
28/08/2016	Box core	63.5177	-91.0766	40	1	25*25*18	1	1	Mud and little rocks
28/08/2016	Box core	63.5177	-91.0803	36	1	25*25*15	1	1	Mud and little rocks, one big rock
28/08/2016	Box core	63.5183	-91.0824	34	1	25*25*25	1	1	Mud and little rocks
28/08/2016	BOX	65.3733	-89.0471	130	1	25*25*21	2	1	Some little rocks

Table 13 Sediment cores collected in Wager Bay (UNP) and Chesterfield Inlet.

Date	Station	Latitude (N)	Longitude (W)	Bottom Depth (m)	Core Length (cm)
14/08/2016	NU_WAB_10	65.7720	-89.5580	221	13
15/08/2016	NU_WAB_08	65.4655	-89.2070	332	27
18/08/2016	PLK_NU_15	65.3735	-89.0484	131	18
21/08/2016	NU_WAB_14	65.6457	-89.1922	197	13
22/08/2016	NU_WAB_16	65.4604	-88.7889	202	6
26/08/2016	CI-08	63.3069	-90.6254	42	21.5
28/08/2016	CI-24	63.5175	-91.0794	41	11.5

Appendix 2: Narrative/Daily Log

28-July-2016:

- Michelle Kamula and Kirk Regular arrive in Chesterfield Inlet.
- Meet with Hamlet SAO and make arrangements for transportation
- Pick up coolers and other equipment including pump for *Nuliajuk* engine from HTO
- Kirk and Michelle stayed the night at local school teachers house as there were no rooms available at the Inn.

29-July-2016

- *Nuliajuk* Arrives in Chesterfield harbour. Anchors at 6:30 CST
- Michelle and Kirk meet Jeff in zodiac at Chesterfield dock.
- Kirk and Jeff bring coolers and luggage to *Nuliajuk*
- Kirk works all morning to prepare surveying equipment
- Michelle meets Dave Cote and Alex Eaves at airport (12;10 pm CST)
- Jeff Cheater arrives with zodiac at beach behind Northern Store to pick up Dave, Alex, and Michelle
- Dave and Alex begin collecting eDNA via the zodiac (14:45 CST). Lucien Taleritok accompanies them as bear guard (Figure 16).
- Anchor is pulled (14:50 CST) and multi-beam sonar survey begins.
- Sub-bottom profiler not working properly and Kirk tries to trouble shoot
- Zodiac returns before dinner and Alex and Dave filter water at night
- Anchored at 22:30 CST

Figure 16 Dave Cote, Alex Eaves, and Lucian Taleritok (Bear Guard, Chesterfield Inlet) pose for a picture on the bow of the Nuliajuk after a day of collecting water samples for eDNA.

30-July-2016

- Zodiac was put in the water and Alex and Dave headed out to collect water samples (6:30 CST)
- Anchor pulled up at 6:32 and multi-beam survey continued
- Zodiac returns for lunch and filtration of water
- Dave, Alex and Neil leave in zodiac (12:30 CST) to collect water samples (see polar bear swimming) and multi-beam survey continues until midafternoon when zodiac returns for supper and water filtration.
- Dave, Alex and Neil leave in zodiac (18:30 CST) for eDNA sample collection around promise Isl.
- Anchored at in front of Community

31-July-2016

- Michelle and Alex slept in galley – awoke at 2:00 CST to sample water at slack tide
- Multi-beam survey commences (6:30 CST)
- Zodiac is deployed and Dave, Alex, Neal, and Lucien collect water for eDNA (8:10 CST)
- Anchored at 13:18 when zodiac returned
- Dave Cote and Alex Eaves disembark and John Mercuri and Glenn Toldi embark and we begin steaming (15:30 CST)
- Continue multi-beam survey towards main channel
- Acoustic recorder (Figure 17) mooring deployed at mouth of Chesterfield Inlet (20:05 CST).
- Began steaming to Wager Bay (UNP)

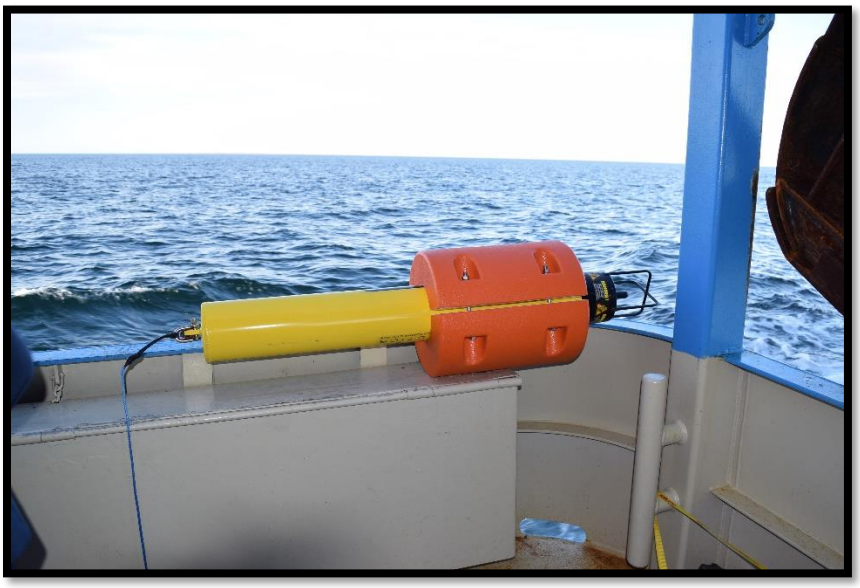

Figure 17 Underwater acoustic recorder moored near the mouth of Chesterfield Inlet. Equipment supplied by Marianne Macoux and Steve Ferguson (DFO). Data collected from the recorder will be studied by a student under the supervision of Marianne.

1-August-2016:

- Transiting through Roes Welcome Sound towards Wager Bay (UNP)

2-August-2016

- Anchored on SE side of Paliak Islands in Wager Bay (UNP) (5:00 CST)
- Park Boat leaves Sila Lodge to meet *Nuliajuk* and accompany John and Glenn on land (7:45 CST)
- Kirk (Minos X) and John (Cast Away) do a CTD casts
- Tide gauge are deployed at 8:30 CST (Figure 5)
- Continued surveying towards entrance while waiting for Park Boat to arrive
- ~13:00 CST John and Glenn go to land to install markers with Parks bear guard and Jeff Cheater (zodiac operator)
- *Nuliajuk* surveys one swath across Bay while waiting
- Science winch counter begins to malfunction
- Returned to Paliak Islands to meet zodiac (18:30 CST)
- Foggy and rainy all day
- Continued multi-beam survey of Narrows all night. *Nuliajuk* reached 16 knots.

3-August-2016

- Anchored at Paliak Isl. at 6:00 CST
- Continued mapping around Paliak Isl. while John and Glenn returned to markers to pick up GPS. Joe Fagon accompanied as bear guard and Gloria Kaludjak operated zodiac (13:00 to 16:30 CST).
- Began transiting toward Sila Lodge, surveying as we travelled.
- Possibly saw 2 Narwhale in the evening.
- Anchored east of Sila Lodge late at night.

4-August-2016

- Pulled anchor at 6:00 CST.
- Deployed second tide gauge at 7:53 CST
- John and Glenn disembarked the *Nuliajuk* with tide gauge boxes and other equipment to be left at Sila lodge and used for retrieval of tide gauges.
- Roxanne Van Velzeen embarked the *Nuliajuk*.
- Continued multi-beam survey while Michelle cleaned the lab and prepared for water sampling.
- Arrived at first water sampling station (), NU_WAB_01 (16:00 CST).
- Continued multi-beam survey throughout the night across the Bay and Narrows.

5-August-2016

- Windy (40 Knots), anchored at Paliak Isl. at 7:30 CST
- Pulled anchor and continued multi-beam survey at 15:00 CST
- Anchored in Douglas Harbour at 1:00 CST due to high winds.

6-August-2016

- Anchored in Douglas Harbour most of the morning due to 30 knot winds
- Collected water samples while anchored (7:00 CST)
- Conducted multi-beam survey in Douglas Harbour (7:30 CST)
- Wind calmed down later in the morning
- Collected water samples outside of Douglas Harbour and continued surveying
- Anchored overnight behind Paliak Isl.

7- August-2016

- Pulled anchor at 6:00 CST
- Weather was foggy but seas were calm
- Surveyed all day collecting water column samples at stations
- Anchored behind Paliak Isl.

8-August-2016

- Pulled anchor at 4:30 CST so that we could survey the Narrows with the ebb and flood tides.
- Was too early arriving at the Narrows (still flood tide) so surveyed along the wider (outside) area of the Narrows.
- Sampled 2 water stations
- Anchored behind Paliak Isl. after a long night of surveying

9-August-2016

- Pulled anchor at 7:00 (CST)
- Continued multi-beam surveying
- Collected water at 2 stations
- Began transiting in the afternoon to Naujaat to fuel
- Began encountering first year ice moving southwards through Roes Welcome Sound by the evening (Figure 18).

Figure 18 Particulate laden first year ice encountered in Roes Welcome Sound 09-August-2016

10-August-2016

- 1:00 CST ran into a lot of multi-year ice in Roes Welcome Sound
- Turned around and began heading south towards Chesterfield
- Sunny and calm day

11-August-2016

- Anchored in Chesterfield by 5:00 CST
- Fueling started at 9:30 CST (Figure 19)
- Neil, Joe, and Kirk disembarked
- Bob and Alf embarked
- groceries and supplies were picked up
- Fueling ended at 17:30 CST
- Pulled anchor at 18:45 and continued multi-beam survey in Chesterfield Inlet with Roxanne (~5 swaths)
- Began transiting north to Wager Bay.

Figure 19 Fueling the vessel in Chesterfield Inlet.

12-August-2016

- Transited north through Roes Welcome Sound to Wager Bay (UNP)
- Arrived at the mouth of the Narrows at 21:30 CST
- Collected multi-beam data as we transited

13-August-2016

- Surveyed through the night while transiting to Sila Lodge
- Water sampling station (6:00 CST)
- Arrived at Sila Lodge (8:00 CST)
- Continued multi-beam survey around Sila Lodge while waiting for high tide
- Science Crew embark (Noemie Friscourt and Sam Huyghe)
- PCA Staff (Maryse Mahy, Colleen Murchison) and Ben Misiuk and Manasee Kendral come aboard for science meeting (15:00 CST). Disembarked at 17:30 CST.
- Continued multi-beam survey after dinner.
- Anchored at 22:50 CST

14-August-2016

- Passed data off to Sila Lodge (8:00 CST)
- Collected CTD, Water, and a sediment core from NU_WAB_10 (basically same locations as NU_WAB_01)
- Steamed to Paliak Isl. recording multi-beam data as we transit.

15-August-2016

- 20-30 knot winds in the morning
- Completed 3 stations that included one very successful sediment core and Agassiz benthic trawl
- Anchored near Paliak Isl.

16-August-2016

- Pulled anchor at 8:00 (CST)
- Completed 4 stations around Paliak Isl.
- most stations showed very rocky substrate
- Anchored at 19:00 (CST)

17-August-2016

- Pulled anchor at 7:00 (CST)
- Completed 8 stations
- most stations showed very rocky substrate
- Attempted to collect a sediment core without success
- Anchored near a waterfall along the south shoreline, east of Paliak Isl.

17-August-2016

- Pulled anchor at 8:00 (CST)
- Drop camera reveal silty clay substrate at PLK_NU_15
- Collected successful box cores for a core and benthos
- Attempted deployment of Agassiz Trawl
- Lost the trawl; unsuccessful in attempts to retrieve it
- Anchored east of Paliak Isl. over night

19-August-2016

- Pulled anchor at 7:00 (CST)
- Very windy morning
- Attempted to transit north of Paliak Isl. but had to turn around and seek shelter
- Remained anchored until 15:00 (CST)
- Steamed across to Douglas Harbour leaving two sites left to do at Paliak Isl.
- Too windy for any successful deployment
- Anchored in Douglas Harbour overnight

20-August-2016

- Pulled anchor at 6:00 (CST)
- Wind up to 40 knots
- Anchored at 7:00 (CST) in Douglas Harbour

21-August-2016

- Pulled Anchor in the morning and began steaming towards Sila Lodge to meet the Park boat
- Foggy day
- Sampled a station while waiting for the Park boat and found
- Found soft substrated and collected the 4th sediment core
- Roxanne disembarked and Ben embarked the *Nuliajuk*
- Spent most of the day with Parks staff aboard

22-August-2016

- Pulled anchor at 8:00 (CST)
- Steamed to last 2 sites near Paliak Isl. and collected 5th sediment core
- Continued multi-beam survey until 18:00 (CST)
- Anchored near Paliak Isl.

23-August-2016

- Reports suggested winds in Roes Welcome Sound were calm
- Pulled anchor at 9:00 (CST) and began leaving the Park
- Steamed through Roes Welcome Sound conducting one water sampling transect

24-August-2016

- Steamed through Roes Welcome Sound to Chesterfield Inlet throughout the night
- Noticeably faster traveling south than north through Roes Welcome Sound due to the counter clock wise circulation in Hudson Bay

25-August-2016

- Pulled anchor at 7:00 (CST)
- Sampled 3 water stations
- Collected multi-beam between stations

26-August-2016

- Very windy morning
- Pulled anchor at 15:00(CST)
- Sampled 3 stations near the community
- Collected multi-beam between stations

27-August-2016

- Pulled anchor at 6:30(CST)
- Sampled 8 stations
- Collected multi-beam between stations
- Anchored near community

28-August-2016

- Anchor up at 6:25 (CST)
- Sampled 7 stations
- Rainy, cool day
- Anchored up the Inlet

29-August-2016

- Anchor up at 7:15 (CST)
- Sampled multiple stations
- Anchored near community

30-August-2016

- Anchor up at 7:30 (CST)
- Attempted to get to a site near the mouth but the swells were too big
- Anchored near the community for the day and began packing up
- Community members were out hanging Beluga whale
- Attempted box coring again in the evening after hunting had stopped, no success

31-August-2016

- Michelle, Sam, and Noemie disembarked *Nuliajuk*
- Crew Change
- *Nuliajuk* began steaming to Coral Harbour (~13:00 CST)