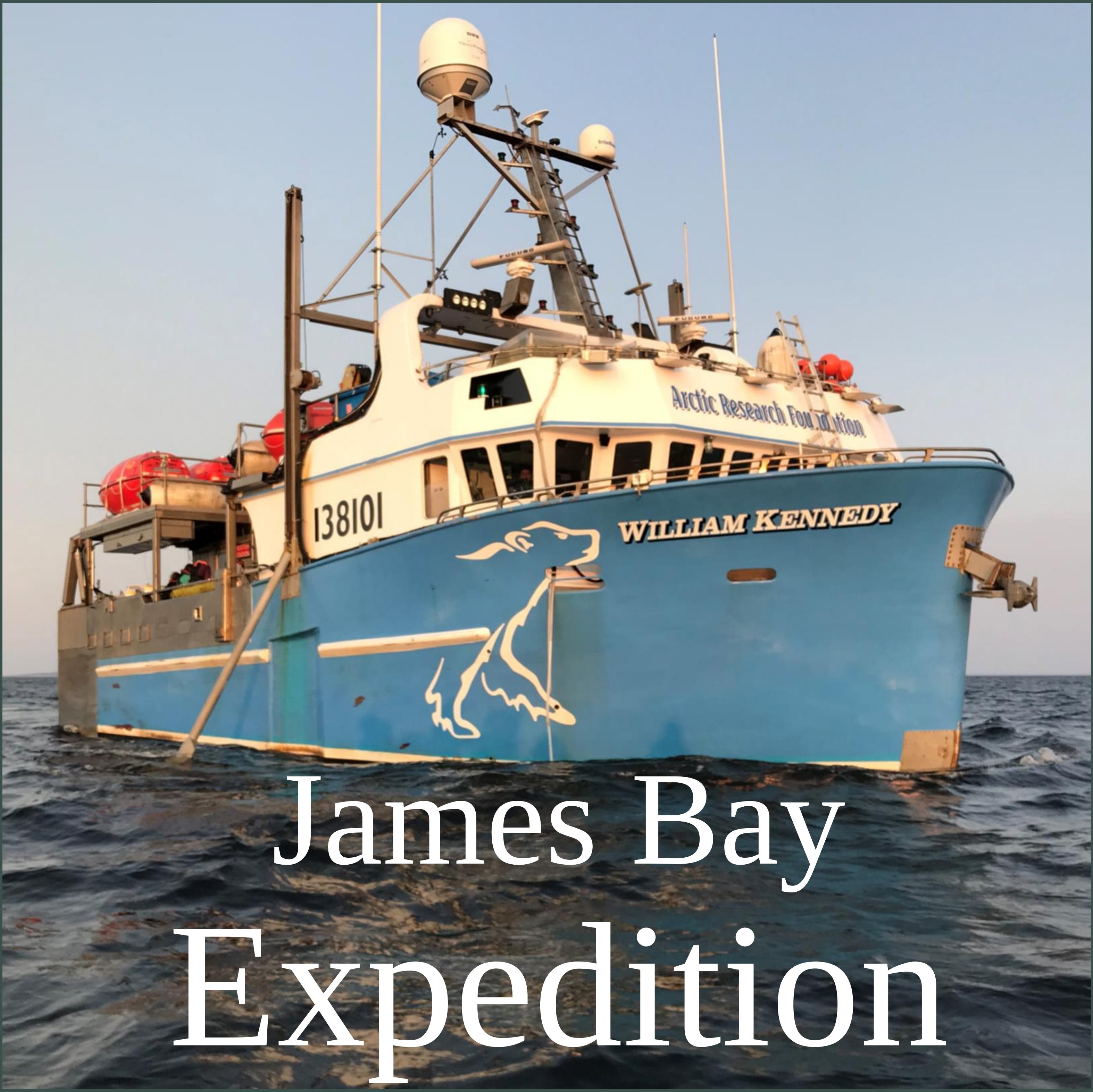

James Bay Expedition

Cruise Report

July 20 – August 24, 2022

Executive Summary

This document should be cited as: Ausen, E.L., Fedirchuk, G., Mundy, C.J., Ehn, J., Kuzyk, Z.A. (Eds.) (2023). *James Bay Expedition 2022- Cruise Report July 20–August 24, 2022*. Centre for Earth Observation Science (CEOS), University of Manitoba, Winnipeg, Manitoba. 73 pp. and Appendices A–G.

Abstract:
With funding support from NSERC, Oceans North NGO, and Parks Canada, a research consortium led by researchers at the Centre for Earth Observation Science (CEOS), University of Manitoba (UM), carried out an oceanographic research expedition to James Bay and nearby waters during July 20–August 26, 2022. This James Bay Expedition (JBE) 2022 was the second of two oceanographic research cruises to James Bay aboard the RV William Kennedy intended to update our understanding of the oceanography of this system. The first phase of the JBE took place in summer 2021 and accomplished oceanographic sampling throughout James Bay as well as deployment of five oceanographic moorings intended to monitor subsurface conditions for year-long periods. During summer 2022, the moorings were recovered, and sampling was repeated at a number of stations throughout James Bay. The summer 2022 program also expanded oceanographic data coverage to include the waters surrounding the Belcher Islands in southeastern Hudson Bay, which receives outflow from James Bay.

In addition to the University of Manitoba, scientists from the Freshwater Institute, Fisheries and Oceans Canada (DFO), University of Sherbrooke (QC), L'Université du Québec à Rimouski (UQAR), and Université Laval participated in the research program. The Cree Marine Research Needs Working Group chaired by Oceans North provided regional support and advice, and consultations with Chiefs and Councils of coastal communities helped plan the cruise. Several community visits and outreach projects were conducted during the 2022 expedition, including visits to the communities of Sanikiluaq, the Cree Nation of Wemindji, as well as a Moose Cree First Nation youth visit while the ship was anchored near Moose Factory/Moosonee.

The research program was multidisciplinary and included sampling in support of physical oceanography, chemical oceanography, biogeochemistry (both organic and inorganic), biological oceanography (primary production), invertebrates and fish, environmental DNA (eDNA), and sediment geochemistry (box coring). Accomplishments include deployment of five new oceanographic moorings that are to remain for one full year and retrieval of five oceanographic moorings originally deployed in James Bay during the 2021 JBE. All moorings carry sensors for temperature, salinity, and current profiles, and selected moorings carry instruments for measuring ecologically significant properties (light, fluorescence of dissolved organic matter and Chlorophyll, pH) and collecting settling particulate matter (i.e., sediment traps). To improve understanding of the bay's physical oceanography, hydrographic sections were completed that included more than 260 conductivity-temperature-depth (CTD) casts to profile the water column. Near-continuous measurements of salinity and temperature were obtained from a flow-through system connected to the ship's thermosalinograph (TSG). The ship's zodiacs were used to extend sampling sections towards the coast and various river mouths.

In the lab aboard the RV William Kennedy, a benchtop Algae Online Analyser implemented on the flow-through system provided estimates of phytoplankton community abundance. Additionally, more than 120 water samples were obtained from various depths and locations and processed by filtration and other means to allow subsequent analyses of various chemical and biological parameters. Nets were deployed to obtain samples that will be used to characterize the biodiversity and distribution of zooplankton and fish communities in James Bay and assess taxon-specific fatty acids and stable isotope signatures of key forage species and benthic invertebrates. Ten sediment cores were sectioned for dating and geochemical analysis and additional surface sediment samples were obtained where the seabed was not amenable to subsurface core collection.

Overall, the research cruise represents a significant step towards obtaining new data that will update the understanding of the oceanography of the James Bay marine system. The semi-synoptic measurements of water properties across James Bay obtained within a approximate three-week time frame will allow preparation of maps and sectional plots showing the spatial distribution of important surface and subsurface ocean properties. These properties include salinity, temperature, water clarity, pH, and concentrations of coloured dissolved organic matter, dissolved organic carbon, nutrients, chlorophyll *a*, and suspended particulate matter.

During the coming months, the new observations will be used to improve our understanding of the oceanography of James Bay. The data will allow assessment of the contributions of freshwater sources in James Bay and investigate the influence of freshwater on nutrient distributions. The data will be used to describe the distribution and magnitude of phytoplankton production and characterize the vulnerability to ocean acidification. The continuous observations of properties obtained from the moored instruments will provide insight into the seasonal cycle in salinity, water temperature, and several biological and chemical parameters. Samples of pelagic and benthic organisms will allow detailed descriptions of fish and invertebrate community characteristics. Sediment cores will be analyzed and dated where possible with the goal of estimating sediment and carbon accumulation rates and seeking evidence of environmental change. The new knowledge will be shared through workshops, presentations, and distribution of community outreach materials as advised by the Cree Marine Research Needs Working Group and prepared for scientific presentations and publications.

Acknowledgments

We wish to thank the following people and organizations: Captain David McIsaac and the entire crew of RV William Kennedy for their hard work and long hours to support the research efforts of this cruise, while also ensuring researchers on board were safe, comfortable, and well fed; the Arctic Research Foundation for their support of the Kennedy's activities; Chris Debicki and Oceans North for financial support and general collaboration in support of James Bay marine science; Dr. Jennie Knopp and all members of the *Cree Marine Research Needs Working Group* for their dedication and guidance concerning the James Bay Expedition; Maude Durand of Oceans North for leading video preparation and media relations; Annie Eastwood of Oceans North for communications support in Winnipeg; Stephanie Varty and Angela Coxon of the Eeyou Marine Region Wildlife Board and Natasha Loutitt of the Cree Trappers Association for coordination of community consultations; Anna Baggio and Megan Chen of Wildlands League for coordination of community consultations and assistance with poster preparation; Alan Penn of the Cree Nation Government for helping prepare plain language background material; Vern Cheechoo and Lawrence Martin of Mushkegowuk Council for motivating the project and helping guide the research and outreach efforts for this cruise; Drs. Karen Richardson and Marlow Pellatt from the Office of the Chief Ecosystem Scientists, Parks Canada Agency, for input and coordination related to carbon cycling and biodiversity science in the region; The Arctic Eider Society and Joel Heath for support of vessel operations around the Belcher Islands.

Executive director Lauren Candlish, Scientific Director Dr. Tim Papakyriakou, and many members of CEOS were instrumental in making the cruise possible. Special thanks to Heather Stark for managing equipment, shipping, and assisting with logistics; Dr. Sergei Kirillov for overseeing mooring preparation; Stephen Ciastek for preparing other equipment and instruments; Alessia Guzzi for sampling protocol development and student training; Elizabeth Kitching, Janine Hunt, and Devin Hammett for other logistical support. Students Yekaterina Yezhova and Jillian Reimer were also instrumental in preparing and packing for the cruise.

Financial support for the expedition (ship time) and operations onboard was provided by Oceans North, NSERC, Parks Canada Agency, and the CFI-funded University of Manitoba's Churchill Marine Observatory (CMO). Additional support was provided by ArcticNet NCE, Niskamoon Corporation, University of Manitoba GETS program, Canadian Foundation for Innovation (CFI), and NSERC Discovery Grants and Research Tools and Instruments programs. Preparation of this report was led by Emma Ausen. G Fedirchuk, CJ Mundy, Z Kuzyk, and J Ehn completed reviews.

Project Team

University of Manitoba Expedition Participants

Dr. CJ Mundy, Co-lead and Chief Scientist on board Aug. 1–14, 2022
Dr. Zou Zou Kuzyk, Co-lead, not on board
Dr. Jens Ehn, Chief Scientist on board Aug. 15–26, 2022
Dr. Tim Papakyriakou, not on board
Dr. Eric Collins, not on board
Dr. Sergei Kirillov, not on board
Kate Yezhova, Oceanographic Technician
Daniel Gedig, Technician
Devin Hammett, Technician
Madelyn Stocking, Student
Grace Fedirchuk, Student
Patricia Montalvo-Rodriguez, Student
Nicholas Decker, Student (and University of Waterloo)
Braydon Acheson, Student
Kallie Strong, Student
Lauri Corlett, Student
Kari Green, Student
Shaylyn Pelikys, Student

Université de Sherbrooke

Dr. Céline Guéguen
Claudie Meilleur, Student

Fisheries and Oceans Canada – Freshwater Institute

Dr. Kimberly Howland
Dr. David Capelle
Dr. Andrea Niemi
Elizabeth Kitching, Technician (and University of Manitoba)
Cole Wolbaum, Technician
Delphine Cottier, Student

Oceans North

Dr. Brynn Devine
Maude Durand, not on board
Jennie Knopp, not on board

Cree Marine Research Needs Working Group Members

Dr. Jennie Knopp, Oceans North, Chair
Vern Cheechoo and Lawrence Martin, Mushkegowuk Council Lands and Resources
Angela Coxon and Stephanie Varty, Eeyou Marine Region Wildlife Board
Melvin Wesley, Eeyou Marine Region Planning Commission
Chantal Otter Tétreault, James Bobbish, and Alan Penn, Cree Nation Government
Chantal Ouimet, Parks Canada

William Kennedy Crew
David McIsaac, Captain
Yves Bernard, Chief Mate
Matthew Rose, Bridge Watch
Karson Myers, Bridge Watch
Cheri Herbert, Small Vessel Operator
Billy Gaudet, Cook

Other collaborators, not on board
Dr. Michel Gosselin, Université du Québec à Rimouski
Dr. Philippe Archambault, Université Laval
Natasha Louttit, Cree Trappers Association
Claire Farrell, Wildlife Conservation Society Canada
Jennifer Simard, Moose Cree First Nation
Wildlands League Inc.
Drs. Karen Richardson and Marlow Pellatt from the Office of the Chief Ecosystem Scientists, Parks Canada Agency

Arctic Research Foundation
Adrian Shimnowski
Christine Cox
Tom Henheffer
Thomas Surian

Community members and other visitors to the ship
Stella and David Kostyshyn, Mushkegowuk Council and Moose Cree First Nation, on board between Churchill and Moose Factory
Moose Cree First Nation youth and families, day trip and overnight visit to ship
Reggie Scipio and Mimie Neacappo, Cree Nation of Chisasibi, day trip to ship
Henry Steward, Cree Nation of Wemindji, day trip to ship
Lindsay Carlson, University of Saskatchewan Ph.D. student, day trip to ship
Lucassie Arragutainaq and Johnny Kudlorak as well as community members from Sanikiluaq, Nunavut, day trips to ship

Participants during Leg 2 of the James Bay Expedition 2022 aboard the Research Vessel William Kennedy. (Photo credit: Devin Hammett, CEOS)

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1. ***Introduction***

James Bay (Figure 1) remains one of the least studied water bodies in Canada despite its vast size (~68,000 km^2), resident beluga whale population, and rich coastal habitats that seasonally host hundreds of thousands of migratory birds (Steward & Lockhart, 2005). It is home to a large Cree First Nation population in nine coastal communities (Figure 1). The Belcher Islands are an Arctic archipelago located 120 km north of James Bay (Figure 1). The Inuit community of Sanikiluaq is located on the northern side of the islands, and the lands are part of Inuit Nunangat, or the homeland of the Inuit.

Situated at the southern margin of the Arctic, adjacent to Hudson Bay and with a vast watershed that includes the peatlands of the James Bay Lowlands, James Bay is uniquely positioned to respond to climate change. It is also a locus of freshwater river runoff, receiving more than 200 km^3/yr, which influences virtually all its properties. Because of its large freshwater inputs, James Bay exerts a strong influence on properties around the Belcher Islands within southeast Hudson Bay (Eastwood et al., 2020) and contributes to modifying Arctic Ocean outflow as it gets transported to the North Atlantic Ocean, ultimately influencing ocean properties and productivity in downstream areas as far away as the Labrador Sea.

The James Bay watershed hosts large industrial (hydroelectric) developments that have altered the timing and volume of river inflow to the bay. Throughout most of James Bay, our knowledge of basic ocean properties such as the saltiness (salinity) of the waters and the circulation patterns date back to the early 1970s. Based on observations (El-Sabhl & Koutitonsky, 1977; Peck, 1978; Prinsenberg, 1982) and recent modelling (Eastwood et al., 2020; Ridenour et al., 2019), James Bay may be considered a large estuary, connected to but oceanographically distinct from its neighbour, Hudson Bay. The early 1970s was the last time an offshore research vessel carried out a dedicated scientific mission in James Bay. Since then, we know James Bay has changed substantially, with Cree community members observing first-hand changes in river mouth morphology and in the plants and animals that comprise coastal ecosystems. Although a comprehensive coastal habitat research program got underway in Eeyou Istchee (east James Bay) in 2017 to study eelgrass habitat and its use by geese, the offshore areas of James Bay remained unstudied.

The Belcher Islands are of interest because the generally cyclonic (counterclockwise) surface circulation in Hudson Bay results in a strong influence of James Bay outflow around the southern part of the islands during winter (Eastwood et al., 2020) and possibly other times of the year (Macdonald & Kuzyk, 2011). In the summer, the surface waters surrounding the Belcher Islands show the lowest temperature relative to the surrounding Hudson Bay system, which may indicate water mixing and high productivity in the area (Department of Fisheries and Oceans, 2011; Galbraith & Larouche, 2011). Tidally generated internal waves (Petrusevich et al., 2018) and elevated surface Chlorophyll *a* concentrations (Anderson and Roff, 1980) also are documented in the Belcher Islands area. Indigenous-driven marine protection initiatives are being explored for both the Belcher Islands archipelago and James Bay.

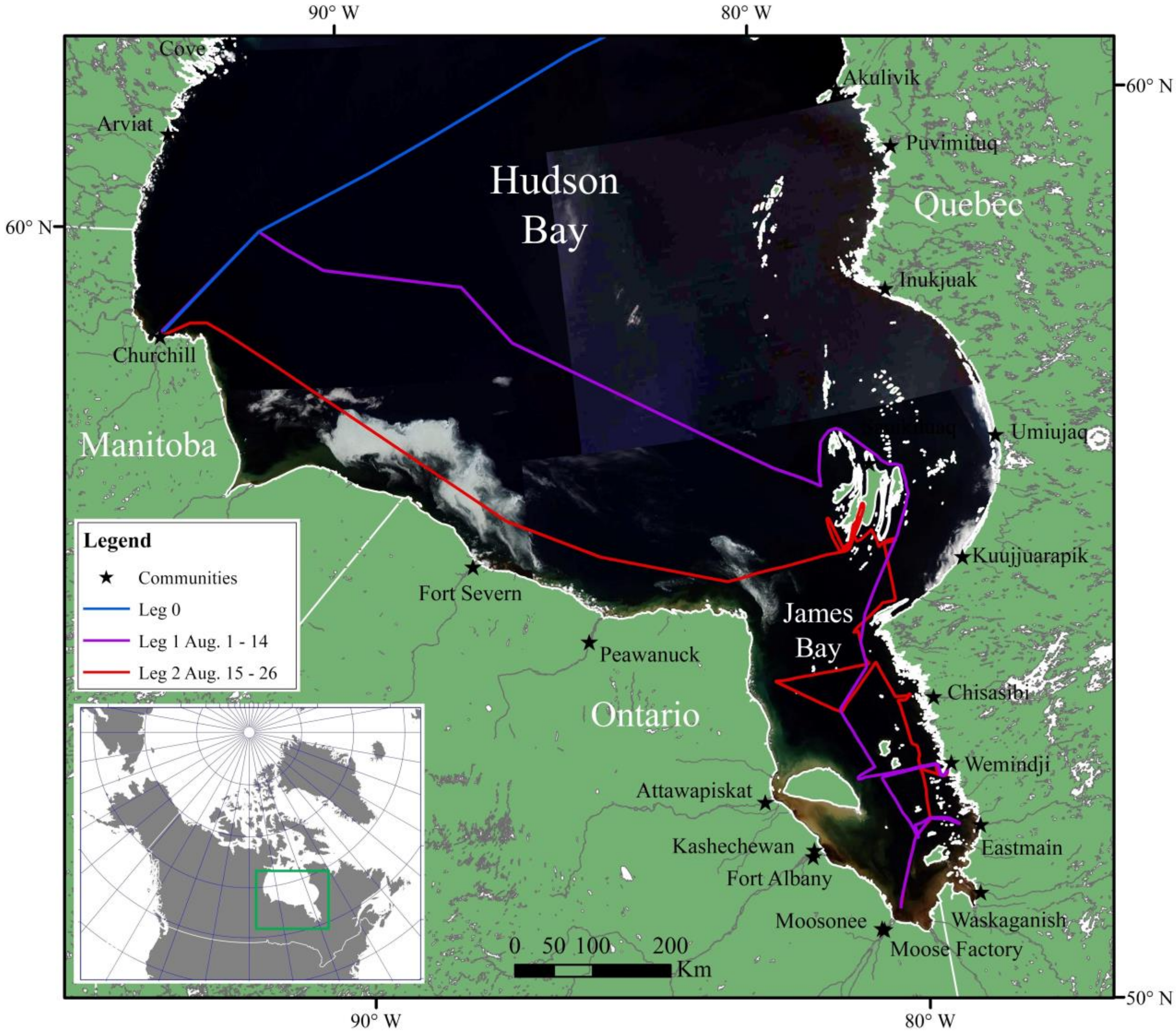

Figure 1. Cruise tracks for the James Bay Expedition (2022).

The James Bay Expedition that took place in August 2021 and August 2022 aimed to collect oceanographic data from southern Hudson Bay, the area surrounding the Belcher Islands, and the waters of James Bay to better understand these systems and the exchanges among the various subregions. The objective of the cruise in August 2022 (JBE 2022) was to build on baseline oceanographic data collected in James Bay during August 2021, including observations of physical, chemical, and biological features (e.g., salinity, temperature, currents, phytoplankton, zooplankton), with emphasis on offshore waters. The 2022 cruise also expanded its track beyond James Bay to sample and collect baseline data in the waters surrounding the Belcher Islands.

The JBE 2022 was conducted over 25 days and two legs (leg 1 and leg 2; Figure 1), after a ‘leg 0’ transit that brought the ship into Hudson Bay to dock at the Port of Churchill. Leg 1 (purple line in Figure 1) originated in Churchill, MB, on August 1, 2022. After leaving Churchill, the ship transited through offshore waters to the area north of the Belcher Islands avoiding potentially hazardous pack ice along the northern Ontario-Manitoba coasts (visible in MODIS satellite imagery in Figure 1). The ship then passed east of the Belcher Islands before entering James Bay. Leg 1 was completed at Moose Factory with a community visit (Moose Cree First Nation youth and family members) and partial crew change.

Leg 2 (red line in Figure 1) began at Moose Factory on August 15, 2022. The ship retraced part of the cruise track towards Eastmain, sampled near Wemindji and Chisasibi, and then completed a triangular section near the entrance to James Bay (Figure 1). Finally, some sampling and mooring installation was completed south of the Belcher Islands and the ship returned to Churchill on August 26, 2022. On this return trip from the Belcher Islands to Churchill, the ship was able to pass closer to the southwest coast of Hudson Bay and the communities of Peawanuck and Fort Severn because the coastal waters were ice-free.

In each leg of the cruise, moorings installed during the 2021 cruise were retrieved, and new oceanographic moorings were deployed. Within the James Bay-southern Hudson Bay study area, a full suite of water, sediment, and biota sampling was completed at 18 full stations, five near the Belcher Islands and the remainder in James Bay. The zodiac was deployed to sample near the shore at a number of these stations. Additionally, surface water properties were monitored all along the ship's track using the ship's underway 'flow-through' system. Appendices A, B, C, D, E, and F provide logs of ship operations, zodiac operations, moored sensor details, primary production sampling, eDNA sampling, and RNA sampling respectively.

A goal of the study is to provide new knowledge to help address the marine research needs of the coastal Cree communities and regional organizations, including Mushkegowuk Council, Cree Nation Government, Eeyou Marine Region (EMR) Wildlife Board, and EMR Planning Commission. The Cree Marine Research Needs Working Group was instrumental in the success of the project and advised on communication and outreach. Conservation organizations provided support with preparation of posters and other communication materials. Presentations were given to Chiefs and Council and regional organizations to discuss the plans and gain community input. Appendix G gives an example of communications materials.

The James Bay Expeditions (2021, 2022) were made possible by funding from NSERC ($168,000), Oceans North ($126,000), and by the CMO-IOF operating fund dedicated to mooring operations ($120,000). Parks Canada Agency contributed $150,000 towards the coastal and oceanic carbon cycling component of the research. The project also benefitted from funds from MEOPAR NCE, NSERC, ArcticNet NCE, CMO-IOF, and DFO (grants to individual principal investigators Mundy, Kuzyk, Ehn, Papakyriakou, Gueguen, Gosselin, Marcoux, Loseto, Howland, Niemi, Capelle). EMR, Mushkegowuk Council, and Wildlands League staff all contributed their time to communication and outreach. The 2022 scientific cruise was supported by a multiyear Nunavut Research Institute (NRI) Licence (# 03 007 22R-M) and a DFO Licence to Fish for Scientific Purposes Licence (# S-21/22-1027-NU). The intention is that the collected data will be completely accessible to all research partners. Data are first subjected to quality assurance/quality control screening and then curated onto the CEOS-based Canadian Watershed Information Network (CanWIN) (http://lwbi.cc.umanitoba.ca/). UM also will enter into a Data Sharing Agreement with Mushkegowuk Council.

2. Physical Oceanography and Mooring Operations

Cruise Participants: Jens Ehn, Kate Yezhova, Devin Hammett, C.J. Mundy (CEOS), Dave Capelle, and Andrea Niemi (DFO)
Principal Investigators: Jens Ehn, Sergei Kirillov, Zou Zou Kuzyk, C.J. Mundy (CEOS), Dave Capelle, and Andrea Niemi (DFO)

Introduction:

While the east coast of James Bay (Quebec) has been studied in relation to hydroelectric development and more recently eelgrass habitat (Ingram and Prinsenberg, 1987; Messier et al., 1989; Leblanc et al., 2022; Peck et al., 2022), the offshore and west coast (Ontario) has received little attention. Previous systematic hydrographic observations occurred in the 1970s and early 1980s (El-Sabh and Koutitonsky, 1977). Since the 1970s, James Bay has undergone significant change both in terms of the persistence of sea ice and sea surface temperatures (SST) (Kirillov et al., 2020). Prior to the James Bay 2021 research cruise, virtually no information has been available for assessment of changes to subsurface hydrographic baseline conditions or surface conditions (e.g., salinity) that are not accurately assessed from space (i.e., satellite data). The 2022 James Bay Expedition built on oceanographic data collected during 2021 through the retrieval of moorings that continuously collected data from August 2021 to August 2022, as well as deployed a new mooring in southern James Bay.

The 2022 expedition also extended data collection into southern Hudson Bay, sampling oceanographic conditions surrounding the Belcher Islands and deploying two moorings in the waters south of the islands. The Belcher Islands lie downstream of James Bay outflow meaning that surface waters south of the islands are more strongly influenced by freshwater than expected from the amount of local river discharge (Eastwood et al., 2020; Meilleur et al., 2023). This is particularly noticeable during winter when James Bay outflow contains large amounts of river discharge due, in part, to high discharge from the regulated La Grande River system (Peck et al., 2022; de Melo et al., 2022). South of the Belcher Islands, the water column remains shallowly stratified during winter (~20 m), in contrast to the winter mixed layers >40–60 m deep that develop in areas outside the influence of winter river discharge (Prinsenberg, 1987; Granskog et al., 2011; Eastwood et al., 2022). Subsurface waters surrounding the Belcher Islands also have an increased risk of ocean acidification possibly due to the degradation of organic matter exported from James Bay (Azetsu-Scott et al., 2014). Oceanographic data collected in 2022, including more than 269 CTD casts and surface water properties from continuous flow-through sampling using the ship's thermosalinograph, will contribute to a better understanding of the oceanography of the James Bay and southeastern Hudson Bay marine systems.

Data Collection:

Hydrographic Profiles:
Hydrographic profiles were collected using conductivity, temperature, and depth (CTD) sondes. Two identical, pump-type Seabird 19plus V2 CTDs with Biospherical scalar photosynthetically active radiation (PAR), Seabird SBE-43 dissolved oxygen sensors and Seabird/WetLabs ECO fluorometer sensors for CDOM and Chl *a*, were used; one instrument in a standalone style with

its own stainless-steel cage (Figure 2a) and the other mounted horizontally on the ship's rosette (Figure 2b). The standalone CTD also included a Seabird/WetLabs C-Star transmissometer, while the ship's rosette had an independently logging Seabird/Satlantic SUNA nitrate sensor. The recording rate for both CTDs and all sensors was every 0.25 seconds.

Locations for Seabird CTD profiles included transects at different latitudes in James Bay and southern Hudson Bay (approximately 53ºN, 54.3ºN, and 55.5ºN; Figure 3). Profiles were also obtained around the circumference of the Belcher Islands and across the length of James Bay both east and west of the mid-bay islands. In addition to the Seabird CTD units, a Castaway CTD and/or an RBR Concerto CTD was deployed on a weighted line to sample from the ship's zodiacs when they visited near-shore and river sample sites. This occurred near the communities of Wemindji, Eastmain, Moose Factory, and Sanikiluaq. A total of 220 Seabird CTD profiles and 49 RBR and/or Castaway CTD profiles were completed in James Bay and the Belcher Islands (Figure 3), which nicely complement the 173 CTD profiles taken in 2021, to give extensive oceanographic observation coverage for southern Hudson Bay and James Bay. Logs of casts conducted from the ship and the zodiac can be found in Appendices A and B.

Preliminary temperature, salinity, Chl *a*, and CDOM surface concentrations from the CTDs are shown using colour-coded circles in Figure 4. In general, surface salinity in James Bay was lower in the southern and northern areas, with the lowest values near the Moose River. Waters surrounding the Belcher Islands had higher salinity than James Bay (Figure 4). Surface waters were colder in the northern half of James Bay except for the area around Long Island, and especially colder in the area surrounding the Belcher Islands (<7.5ºC). High Chl *a* and CDOM concentrations were observed in the estuaries of Moose River, Eastmain River, and the coastline near Wemindji. High concentrations of Chl *a* were also found in patches near the northeastern extent of James Bay and southwest of the Belcher Islands. Several sections of these transects were first visited during the 2021 James Bay Expedition (Figure 4).

Preliminary water column profiles of temperature, salinity, and Chl *a* collected via the rosette and caged Seabird CTD are shown in figures from west to east transects across north (54.3ºN) and central (53ºN) James Bay (Figures 5 and 6). The northern transect revealed higher temperatures, lower salinity, and higher values of Chl *a* when compared to the southern central transect. In the north transect, from west to east, salinity and temperature were fairly consistent across the surface and subsurface waters (Figure 5). Surface Chl *a* was highest on the eastern side of James Bay through the top 10 m, with a high subsurface (10–20 m) patch of Chl *a* between 25 and 50 km from the west end of the transect (Figure 5). In the central transect, from west to east, James Bay's highest surface temperatures were recorded close to Akimiski Island and the east coast (9–12ºC), with lower temperatures in the center of the bay (5–7ºC) (Figure 6). Salinity generally decreased from west to east, dropping to 18 near the coast. Chl *a* concentrations were elevated in the top 5 m near the eastern end of the transect. Bottle samples collected with the rosette and analyzed in the laboratory at UM will be used to calibrate salinities and Chl *a* recorded by the CTD casts.

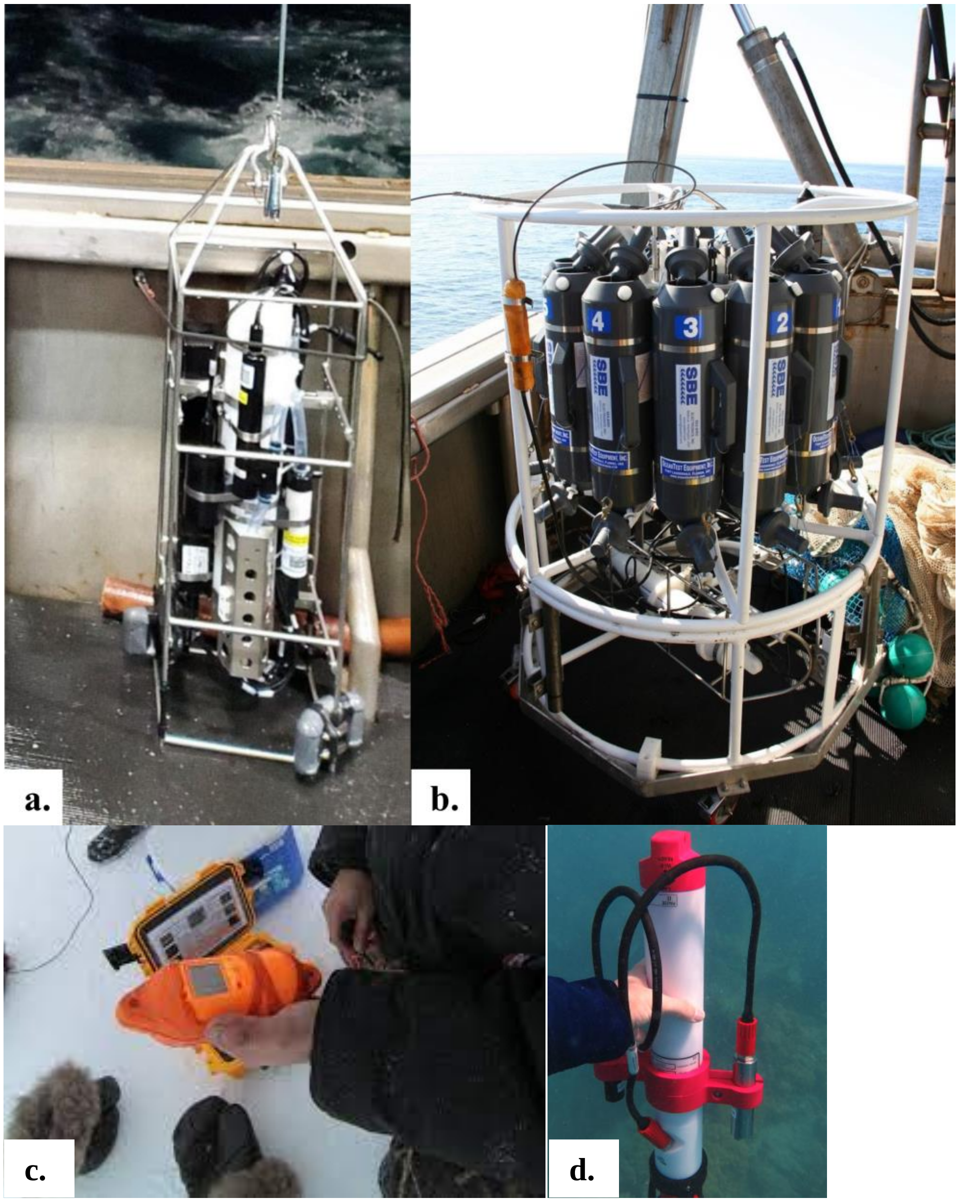

Figure 2. Pictures of the standalone Seabird CTD (a), rosette-mounted Seabird CTD (b, mounted horizontally below rosette), Castaway CTD (c), and RBR CTD (d).

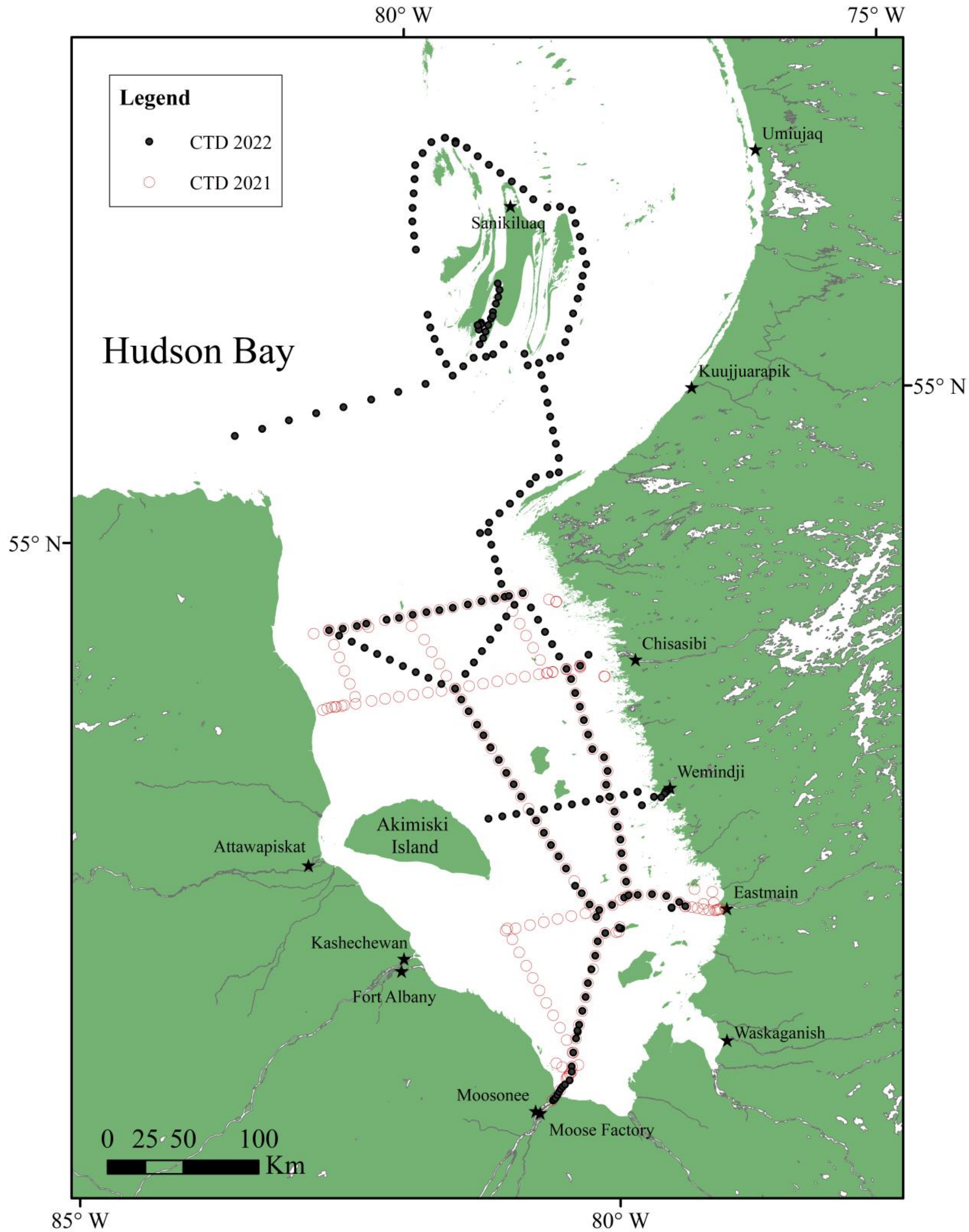

Figure 3. Locations of CTD casts taken during the JBE 2022 (black dot, total 269) in relation to the CTD casts taken in JBE 2021 (red circle, total 174).

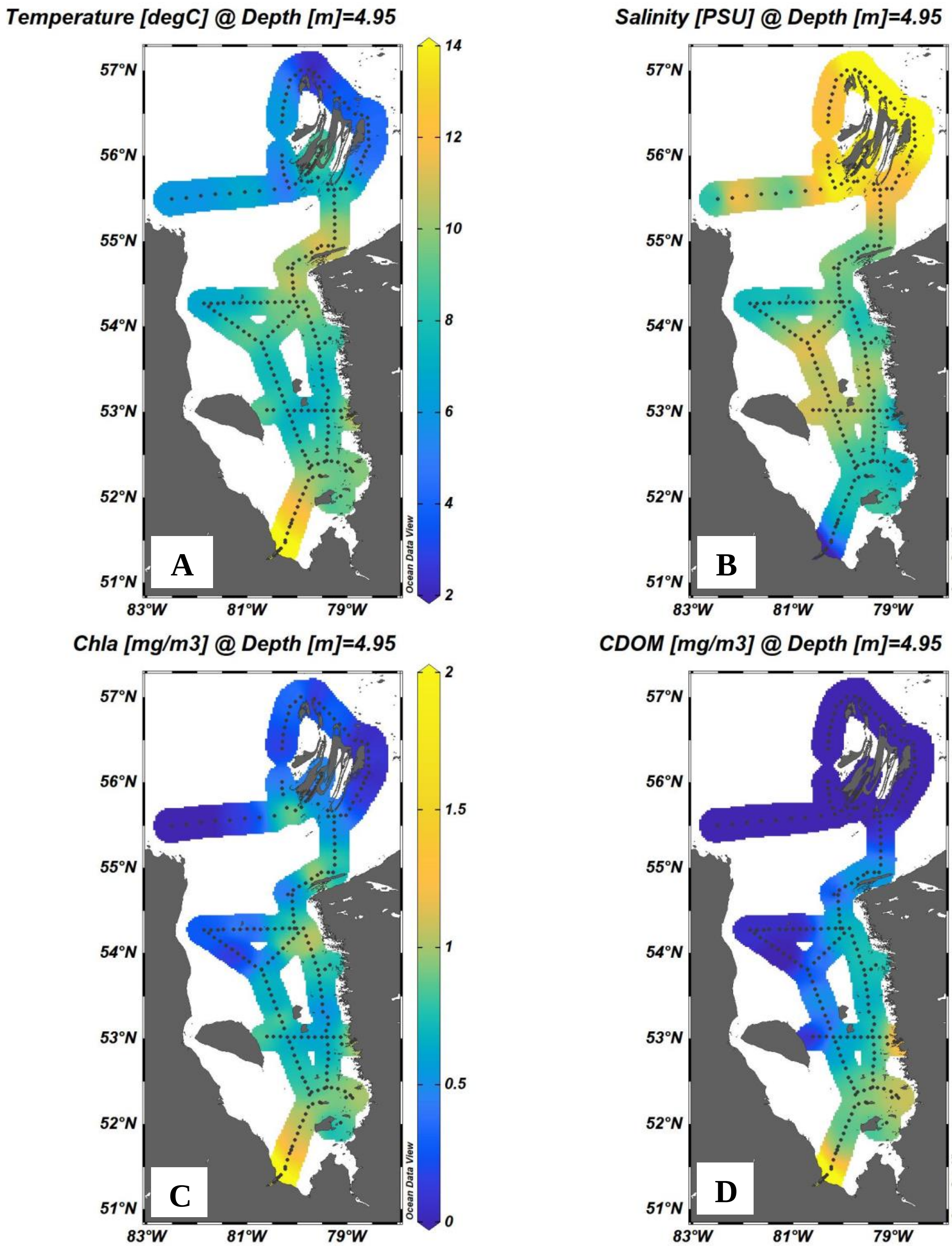

Figure 4. Black dots show CTD deployment locations and colours show surface-most temperature (A), salinity (B), Chl a (C), and CDOM (D) obtained from 220 Seabird CTD deployments. Note that data is corrected to remove top 1.5 meters of data.

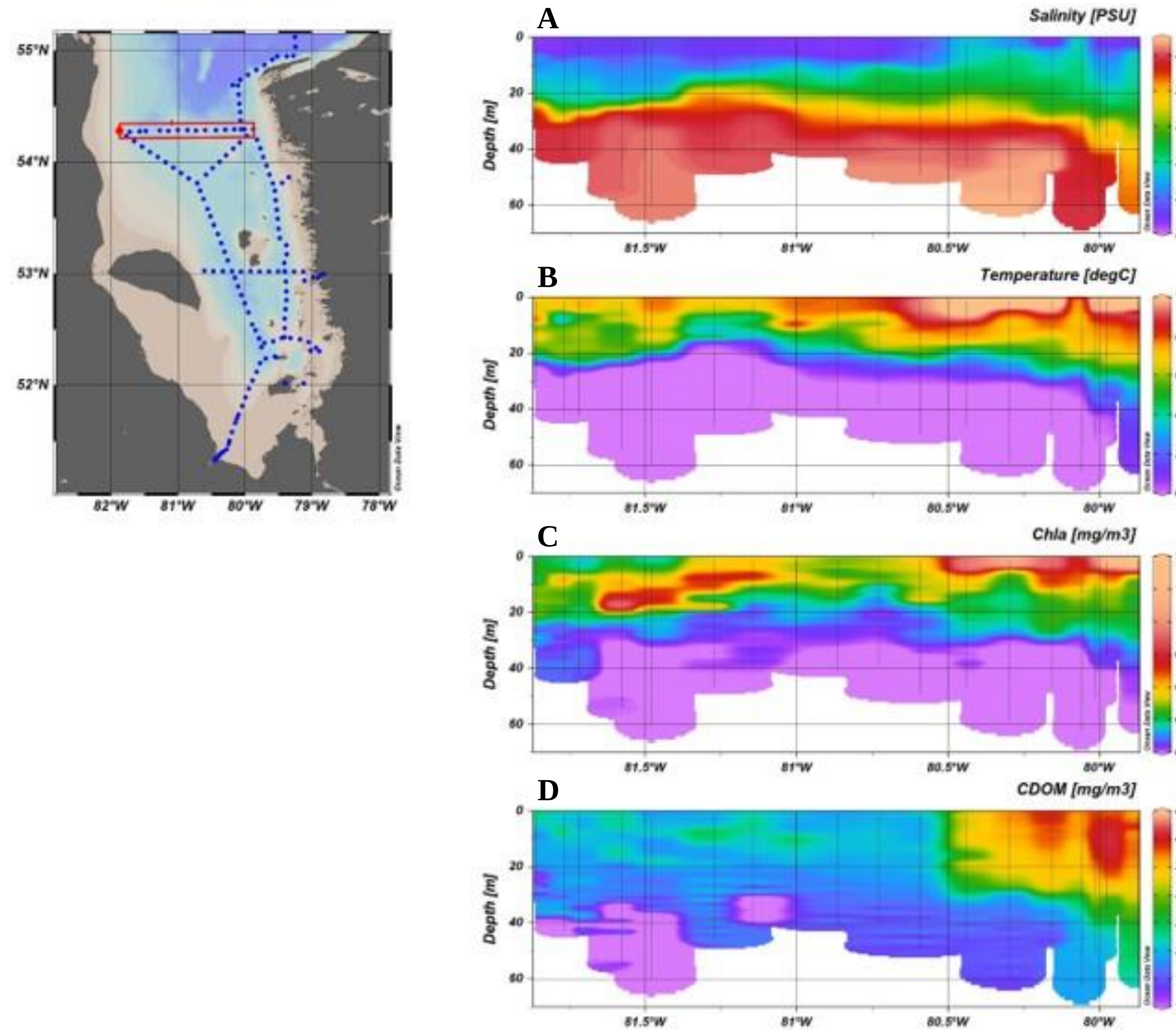

Figure 5. Vertical (depth) profiles of salinity (A), temperature (B), Chl a (C), and CDOM (D) collected from the Seabird CTD are shown from the cross section along a W-E transect at 54.3°N in northern James Bay.

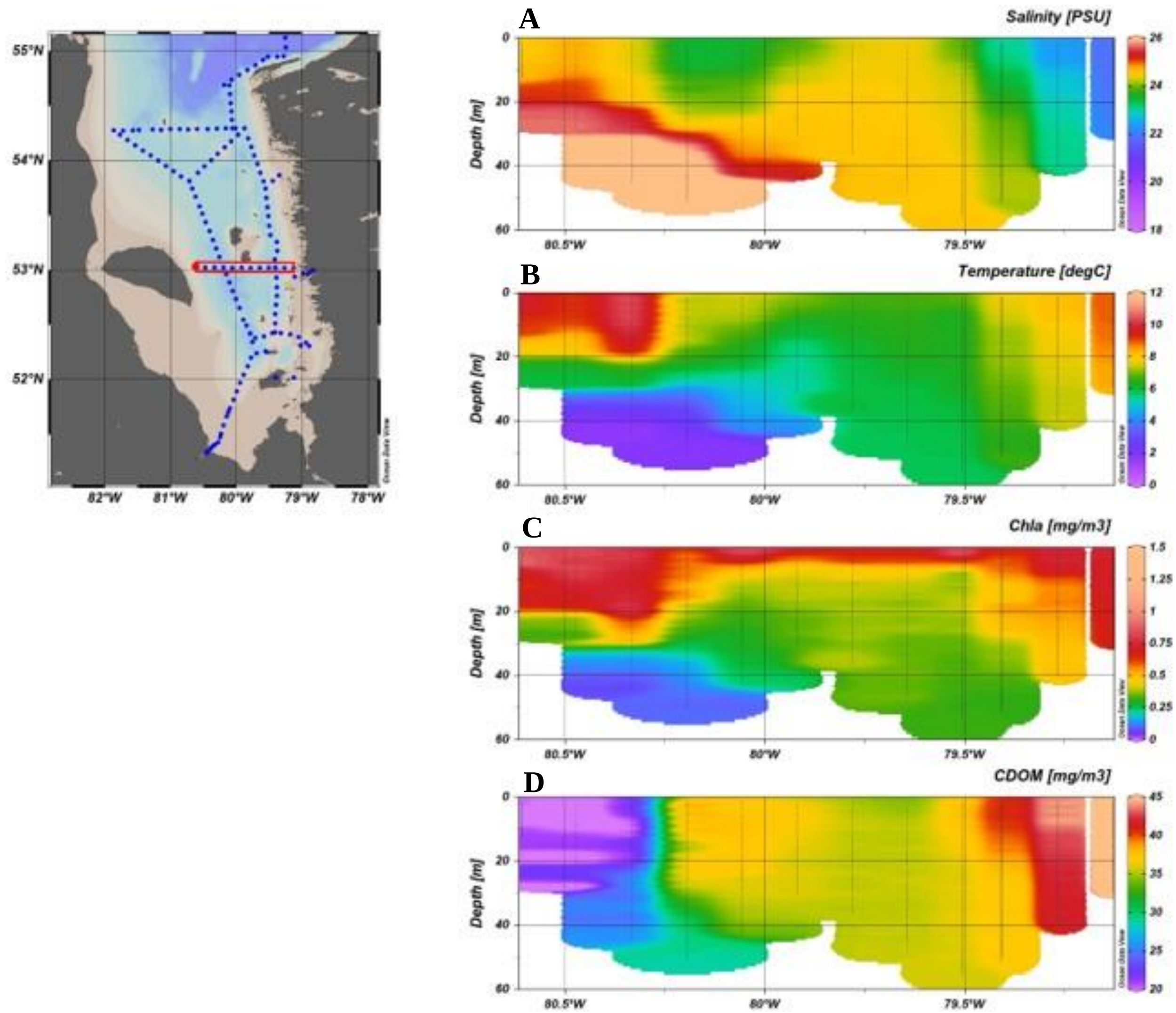

Figure 6. Vertical (depth) profiles of salinity (A), temperature (B), Chl a (C), and CDOM (D) collected from the Seabird CTD are shown from the cross section along a W-E transect at 53°N in northern James Bay.

Mooring Recovery and Deployment:
The 2022 James Bay Expedition continued oceanographic monitoring through the deployment and retrieval of oceanographic moorings. Of the seven moorings deployed during the 2021 JBE, five were recovered (Figure 7; Table 1). The recovery included four out of five moorings deployed in James Bay and one out of two moorings deployed in Hudson Bay. Mooring CMO-B deployed south of Coats Island in northern Hudson Bay and mooring JB-M4 deployed in north-central James Bay were unable to be recovered. Additionally, the recovered CMO mooring (CMO-A) sustained damage to sensors and the mooring line, resulting in the loss of several instruments (see Appendix C for details).

Efforts to recover mooring CMO-B from northern Hudson Bay included a search within a 6 nautical mile radius of the deployed location using the ship's sounder. The original log book was checked to confirm the location and the cruise track from 2021 was checked to ensure the ship was passing over the correct location. All original documents detailing the release/transponder configuration were checked to verify if there were any errors in the 2021 mooring schematic and all deck unit release codes stored in the CMO inventory were tested. Finally, two different deck boxes and transducers were used in case of malfunction.

JB-M4 was originally deployed in north-central James Bay, northeast of Akimski Island 53.57417 N, 80.61833 W, water depth 50 m). It had a top float located at 13 m depth—the shallowest of any deployed moorings—and a possible reason for the loss is snagging of the float by thick ice floes followed by relocation (dragging) of the mooring out of location. An area was surveyed using the ship's sounder but no evidence of the mooring was found in the vicinity of deployment site. However, time constraints prevented extensive search efforts. It is hoped that additional search efforts can be made during a future cruise.

Preliminary Nortek ADCP 5th beam data from recovered moorings M1 (northwest James Bay) and M5 (southern James Bay) are shown in Figures 8 and 9, respectively. In Figure 8, the decrease in median sea level height (white circles) starting in early December indicates the onset of ice cover at the mooring site, i.e., the sensor started to pick up the bottom surface of the ice. The sea level height values decreased steadily during January and February as the ice thickness increased. The ice appears to have reached a thickness of about 1 m in early March. At the M5B site, The blue line in the figures indicates the sea ice concentration in the vicinity of the mooring derived from satellite data (AMSR2). Those data independently confirm that the mooring sites were covered by ice from about mid-December until mid-June.

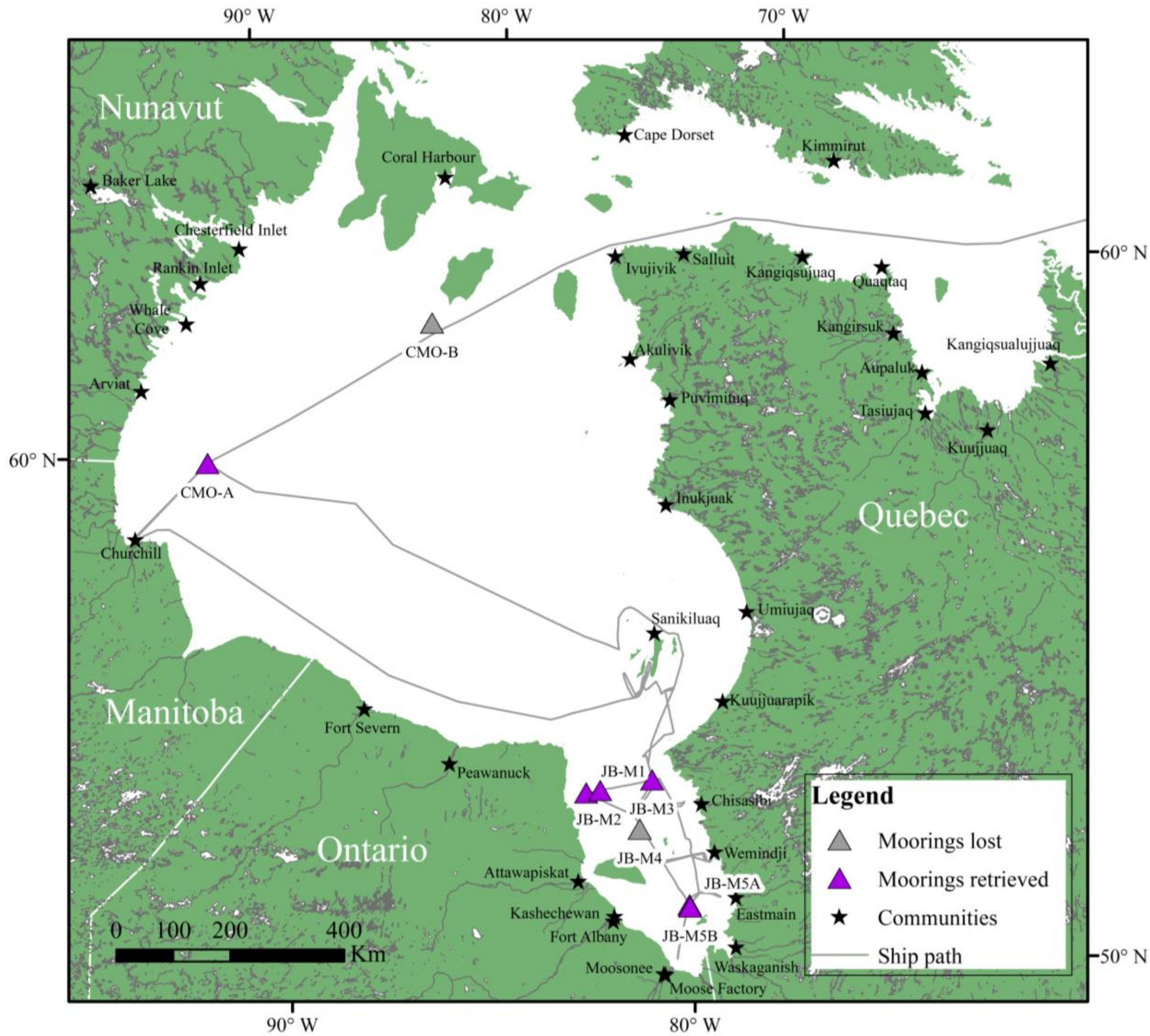

Figure 7. The 2022 cruise track with moorings retrieved (purple) and missed (grey) that were deployed during the 2021 James Bay Expedition.

Table 1. Moorings retrieved in the 2022 James Bay Expedition.

Site	Bottom depth (m)	Lat (N)	Long (W)	Date of retrieval	Depth of top float (m)	Sediment trap serial number (if present)
CMO-A	105	59.9777	91.9392	2022-07-27	16	No. 718631
JB-M3	68	54.2977	80.0584	2022-08-09	19	No. 718643
JB-M5A	63	52.2707	79.7018	2022-08-12	16	No. 718633
JB-M5B	62	52.2378	79.6940	2022-08-12	20	None
JB-M1	33	54.2743	81.8601	2022-08-19	27	None
JB-M2	62	54.2772	81.4789	2022-08-19	18	No. 718635

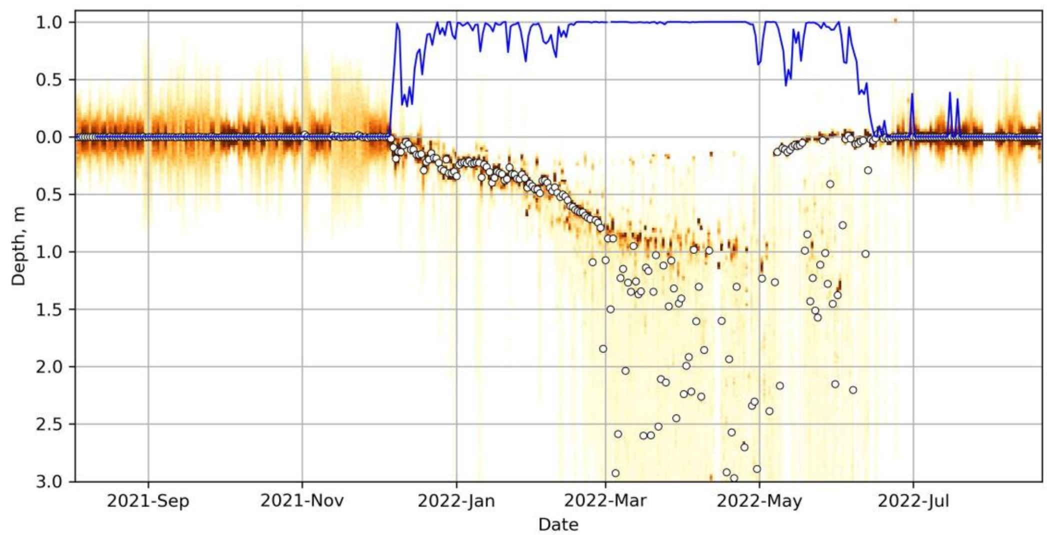

Figure 8. Preliminary data from mooring M1 deployed in northern James Bay between August 2021 and August 2022. The daily PDF of sea level heights and/or lower ice surface depths from Nortek Signature500. White circles show the position of corresponding medians. Blue line indicates the sea ice concentration in the vicinity of the mooring derived from satellite data (AMSR2).

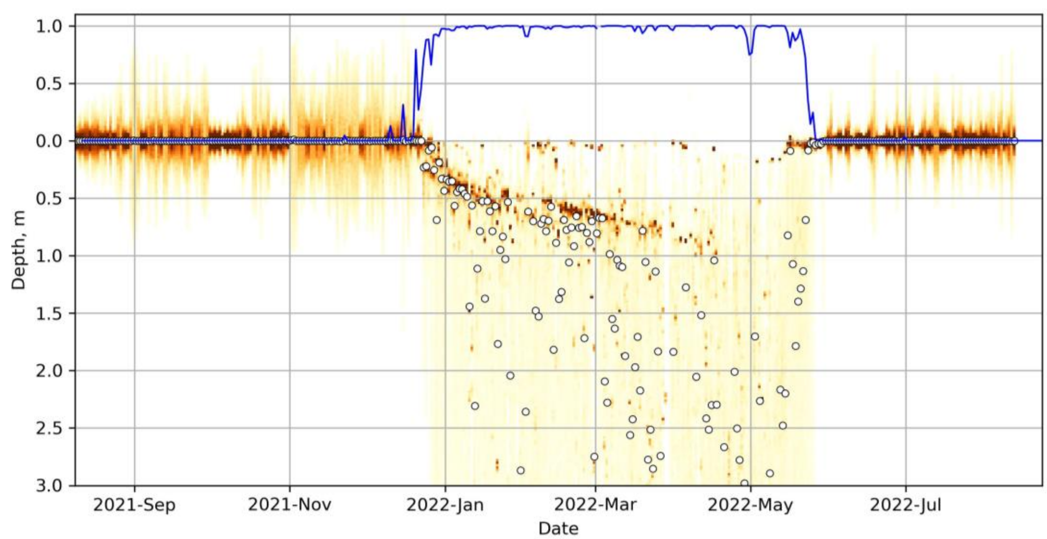

Figure 9. Preliminary data from mooring M5B deployed in southern James Bay between August 2021 and August 2022. The daily PDF of sea level heights and/or lower ice surface depths from Nortek Signature500. White circles show the position of corresponding medians. Blue line indicates the sea ice concentration in the vicinity of the mooring derived from satellite data (AMSR2).

New mooring deployments:

A total of five moorings were deployed in Hudson Bay, James Bay, and in the area surrounding the Belcher Islands (Figure 10; Table 2). Two of these moorings were deployed along the shipping lane in Hudson Bay (CMO-A and CMO-B) and will contribute to the Churchill Marine Observatory (CMO) project. One mooring was deployed in the south of James Bay, and two moorings were deployed south of the Belcher Islands.

Figures 11–15 present schematics of the instrument arrays on the five oceanographic moorings deployed during the cruise. The five moorings deployed within James Bay contained a combination of equipment supplied by CMO and individual researchers within DFO and CEOS. The schematics include instrument type, serial numbers, approximate depths, and acoustic release codes. Each mooring was programmed to accommodate >12 months of deployment, with recovery planned for August 2023. Moorings CMO-B, CMO-A, BI-M1, and BI-M2 were equipped with sequential sediment traps (Baker-style, ten vials per trap, manufactured by Gurney Instruments; Figure 16) which were programmed to rotate vial positions in approximately 35-day intervals.

Successful deployment of each sensor's bottom position and vertical orientation in the water column was verified shortly after deployment by passing across the mooring location while scanning with the WASSP multibeam sonar system (Figure 17). Moorings were generally assembled on the stern deck. They were deployed anchor last from the *RV William Kennedy* via the A-frame and crane (Figure 18).

DFO colleagues provided a number of additional sensors for the moorings, as follows:

Two moorings were deployed to measure dissolved CO_2 (ProOceanus CO_2-proV), as well as temperature, salinity (RBR XR-420 CTTu), and depth (Nortek Signature 500). These instruments give the ability to measure dissolved CO_2 near the surface (~19 m) throughout the year. The initial and final CO_2 concentrations will be calibrated against discrete water samples (Sal, DIC, TA) collected from the rosette prior to and after deployment/recovery.

Mooring BI-M1: water depth 92.8 m; latitude: 55.6202 N; longitude: 79.0273 W; date deployed: Aug 21, 2022 11:03 UTC; ProOceanus CO_2-proV SN: 41-961-75; sensor depth 17 m; Tandem CART releases (SN 31913 and 31387).

Mooring BI-M2: water depth 100 m; latitude: 56.0083 N; longitude: 80.3026 W; date deployed: Aug 22, 2022 00:35 UTC ProOceanus CO_2-proV SN: 40-713-75; sensor depth 19 m; Tandem CART Releases (SN 31386 and 31388).

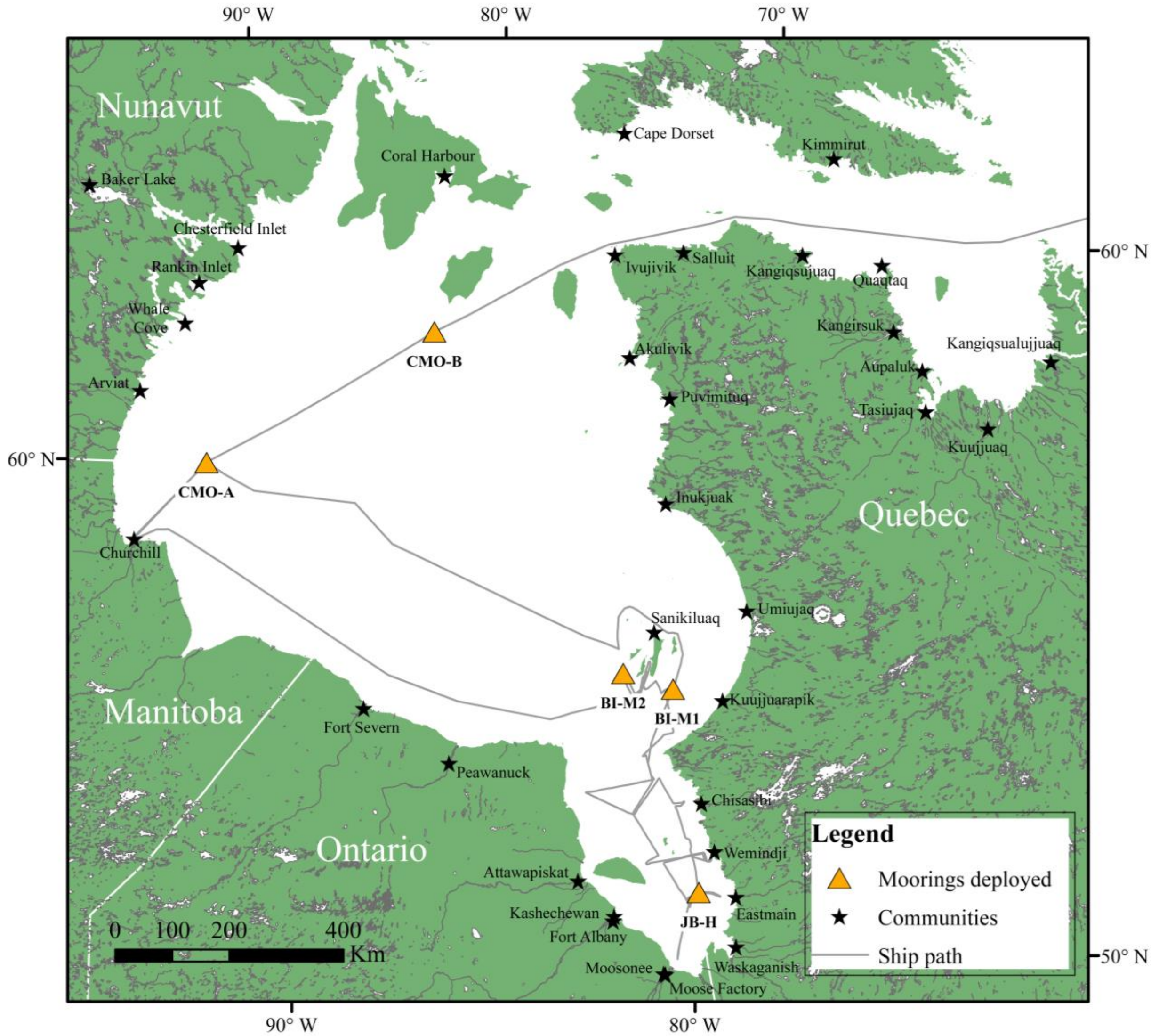

Figure 10. Cruise track with moorings deployed in Hudson Bay and James Bay during the 2022 James Bay Expedition.

Table 2. Moorings deployed during the 2022 James Bay Expedition.

Site	Bottom depth (m)	Lat (N)	Long (W)	Date of Deployment	Depth of top float (m)	Sediment trap serial number (if present)
CMO-B	181	61.760	84.301	2022-07-25	22	718642
CMO-A	103	59.978	91.941	2022-07-27	15	718641
JB-H	78.1	52.432	79.409	2022-08-16	44	NA
BI-M1	92.8	55.620	79.027	2022-08-21	16.4	718634
BI-M2	110	56.008	80.303	2022-08-22	18.6	718632

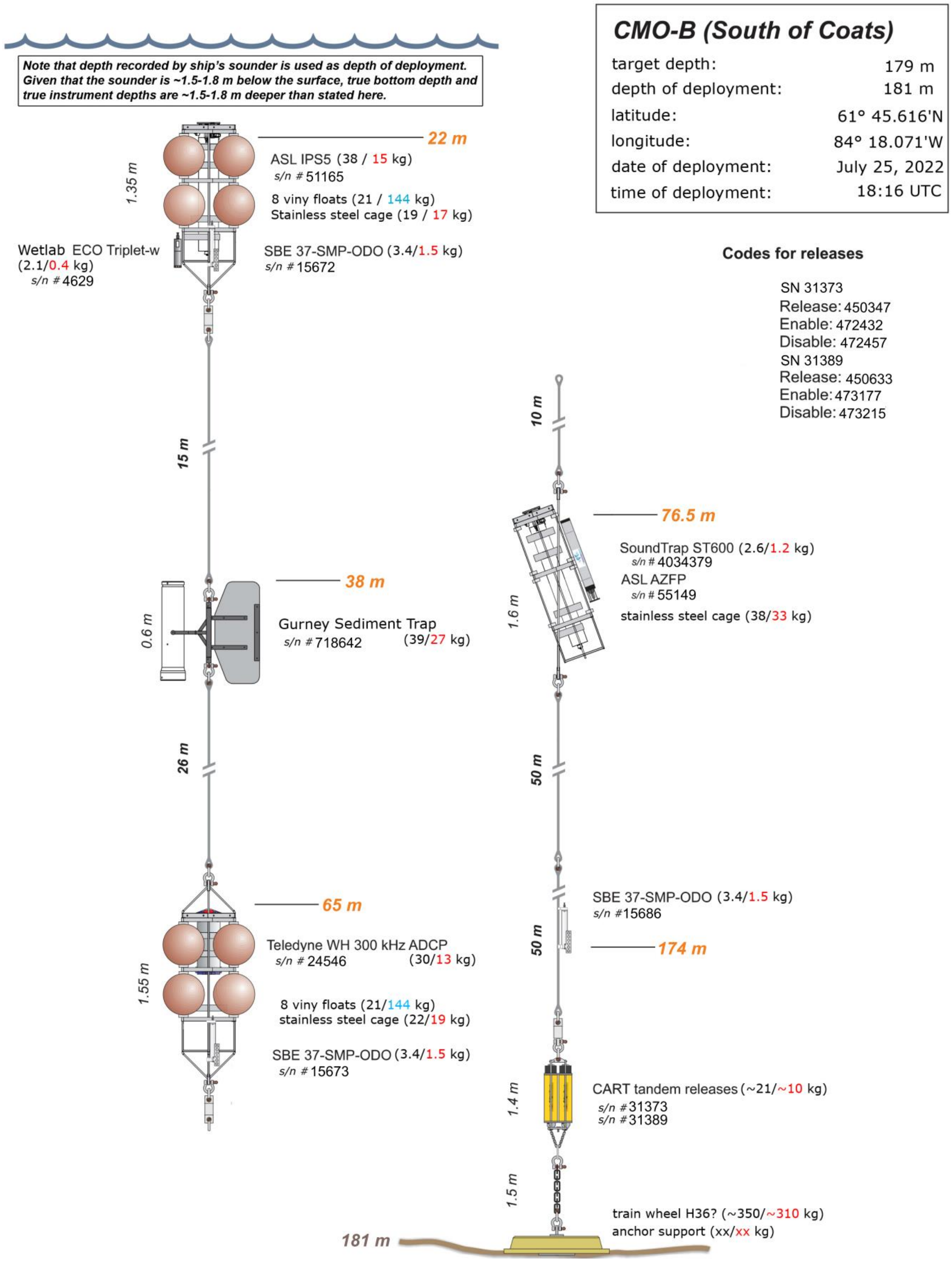

Figure 11. Configuration and instrument serial numbers for mooring CMO-B.

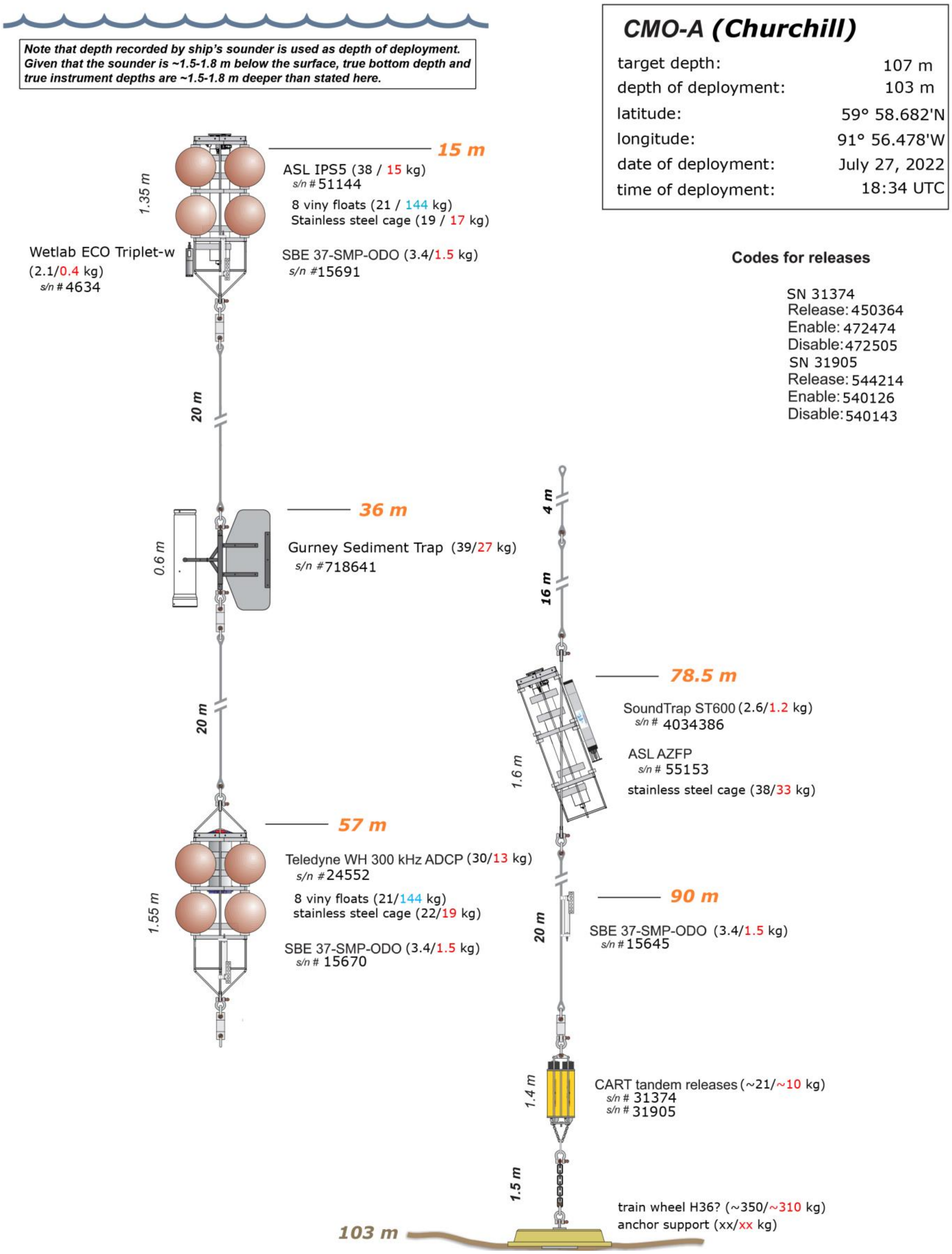

Figure 12. Configuration and instrument serial numbers for mooring CMO-A.

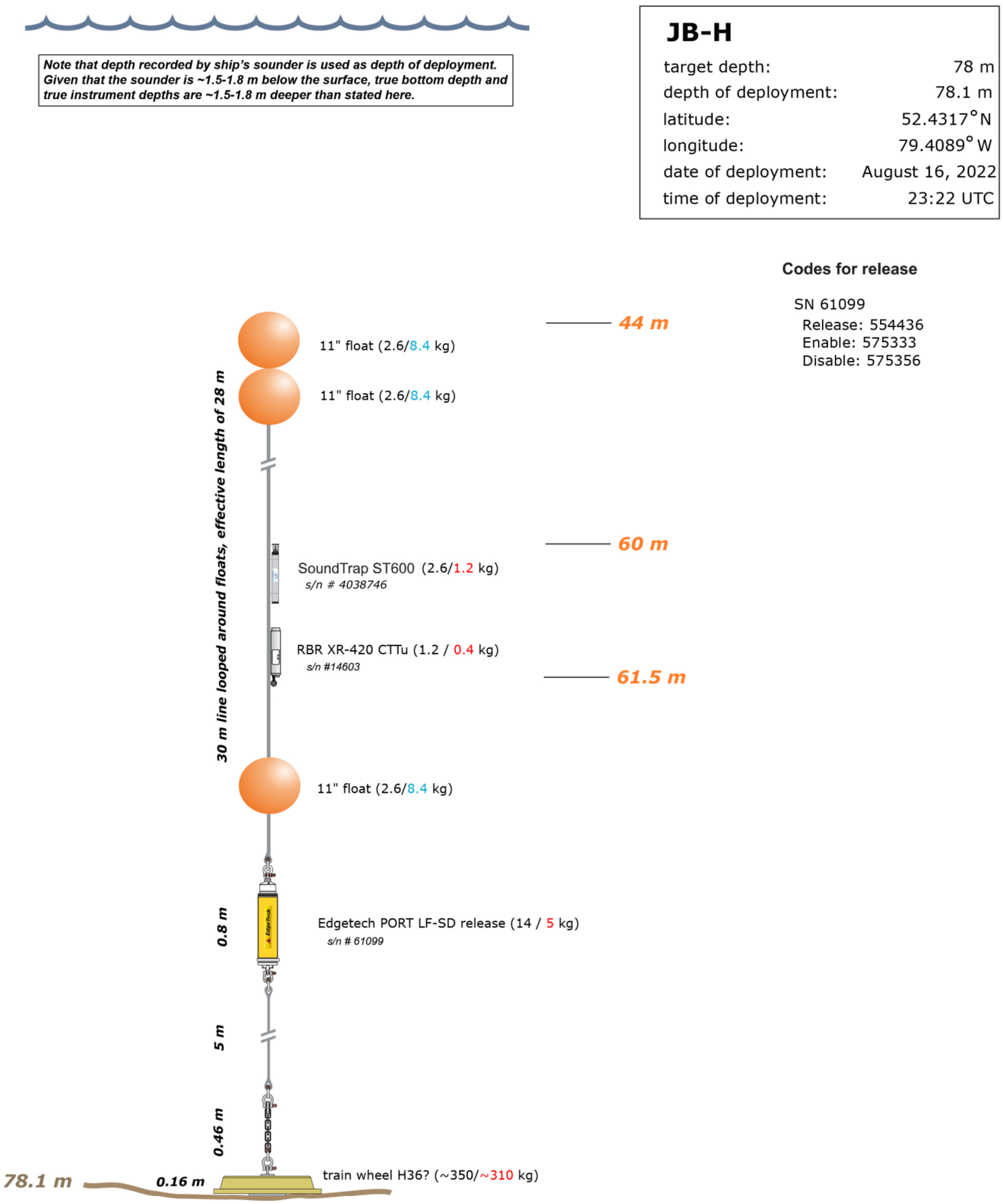

Figure 13. Configuration and instrument serial numbers for mooring JB-H.

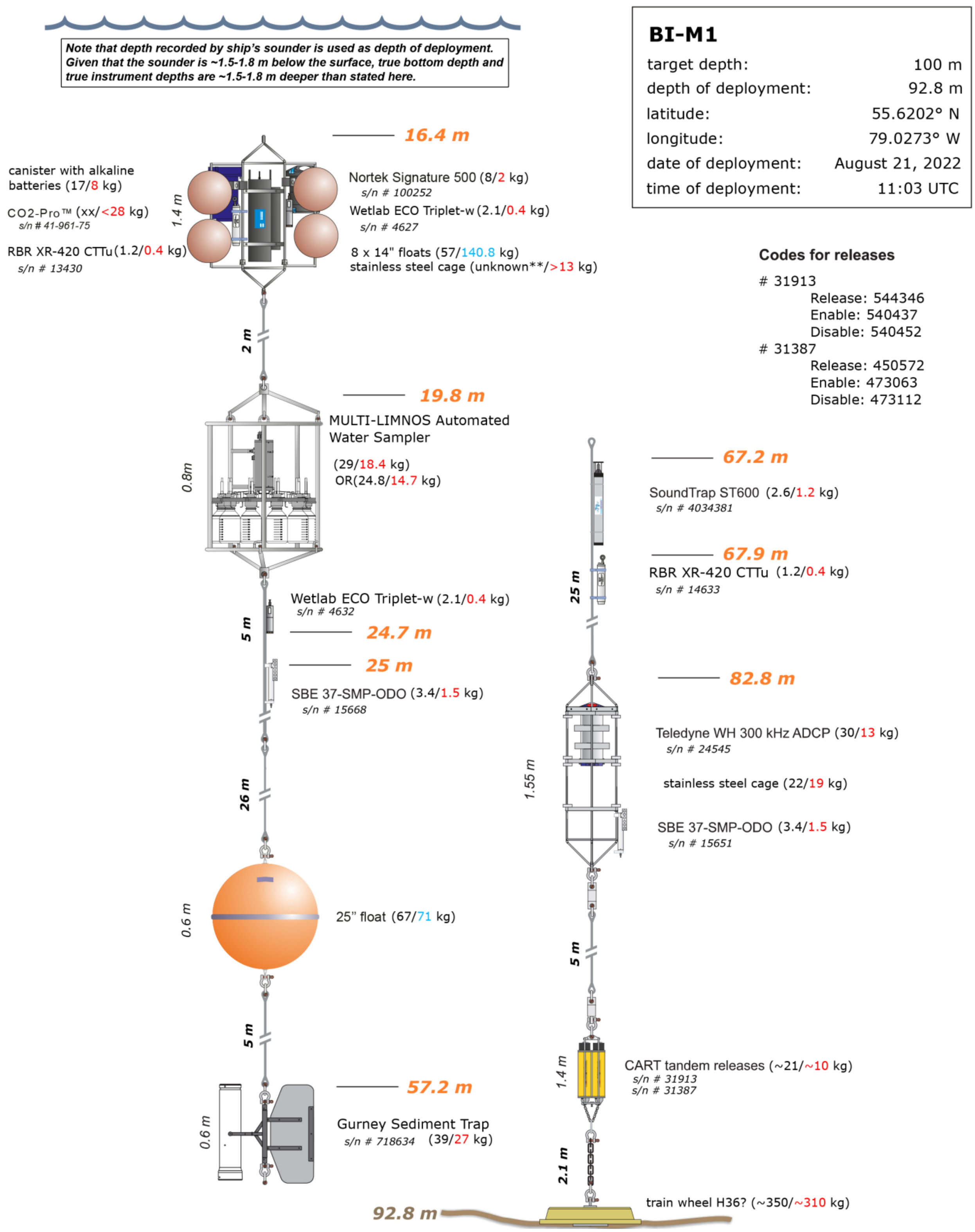

Figure 14. Configuration and instrument serial numbers for mooring BI-M1.

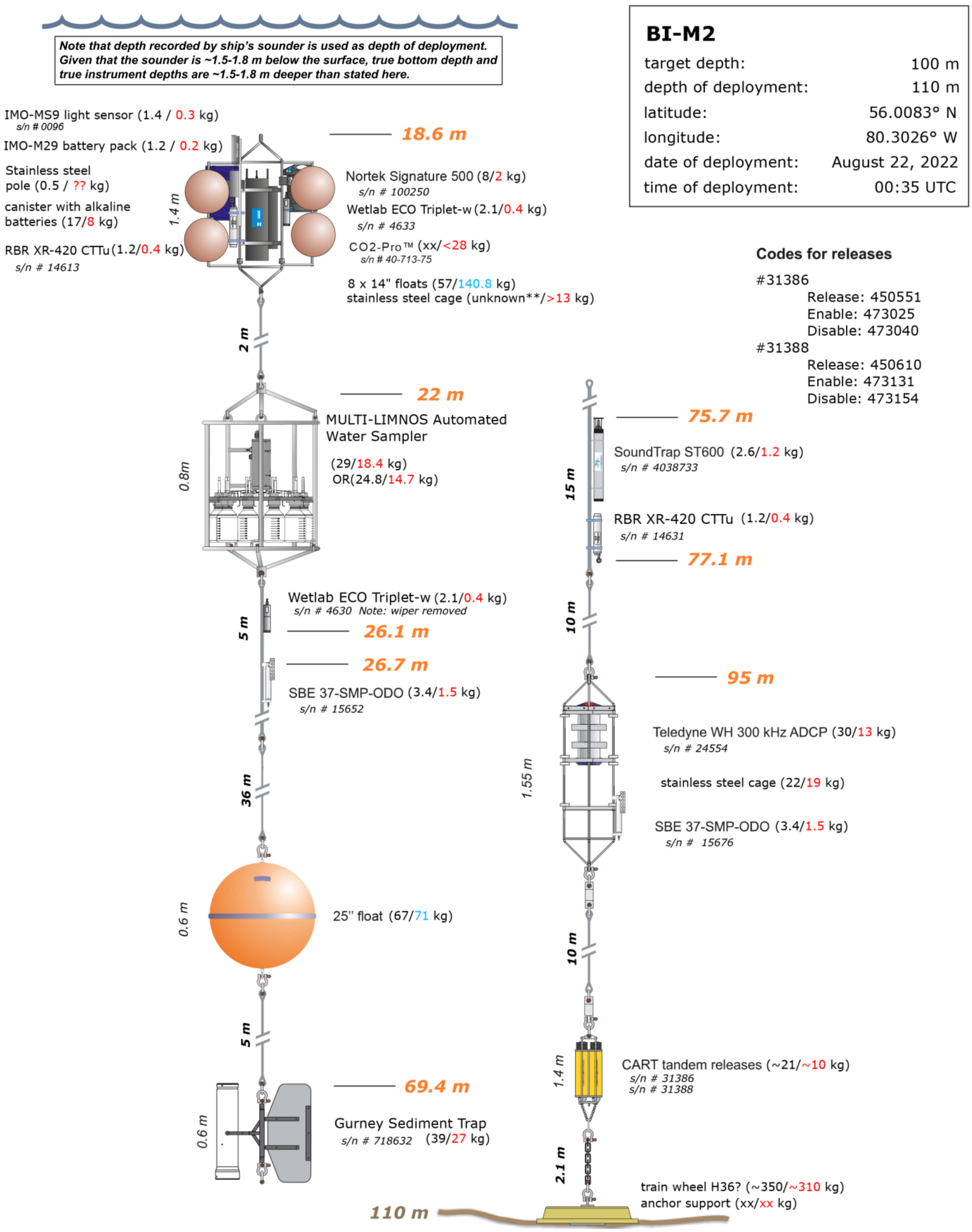

Figure 15. Configuration and instrument serial numbers for mooring BI-M2.

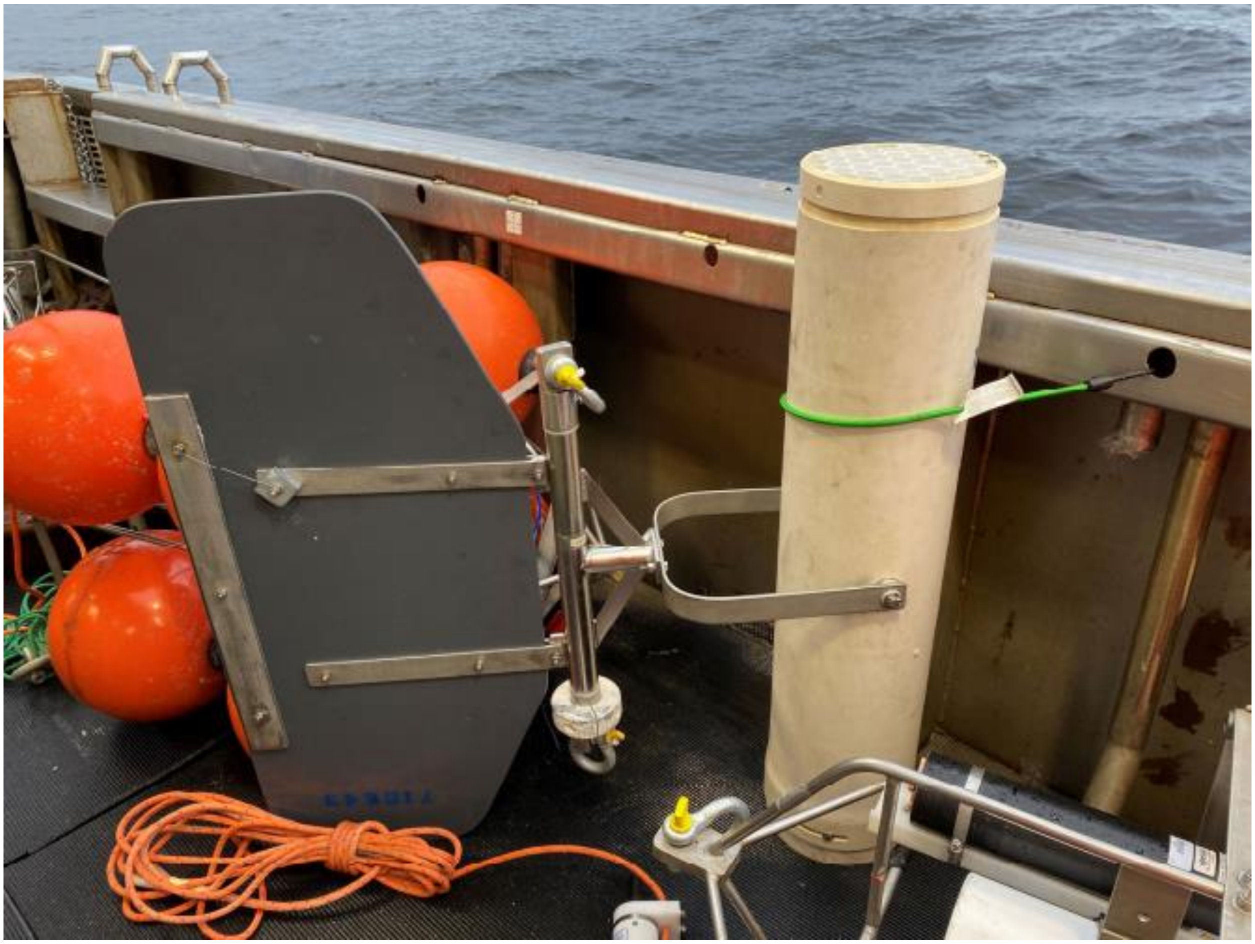

Figure 16. Baker-style sediment trap by Gurney Instruments, assembled on stern deck prior to deployment.

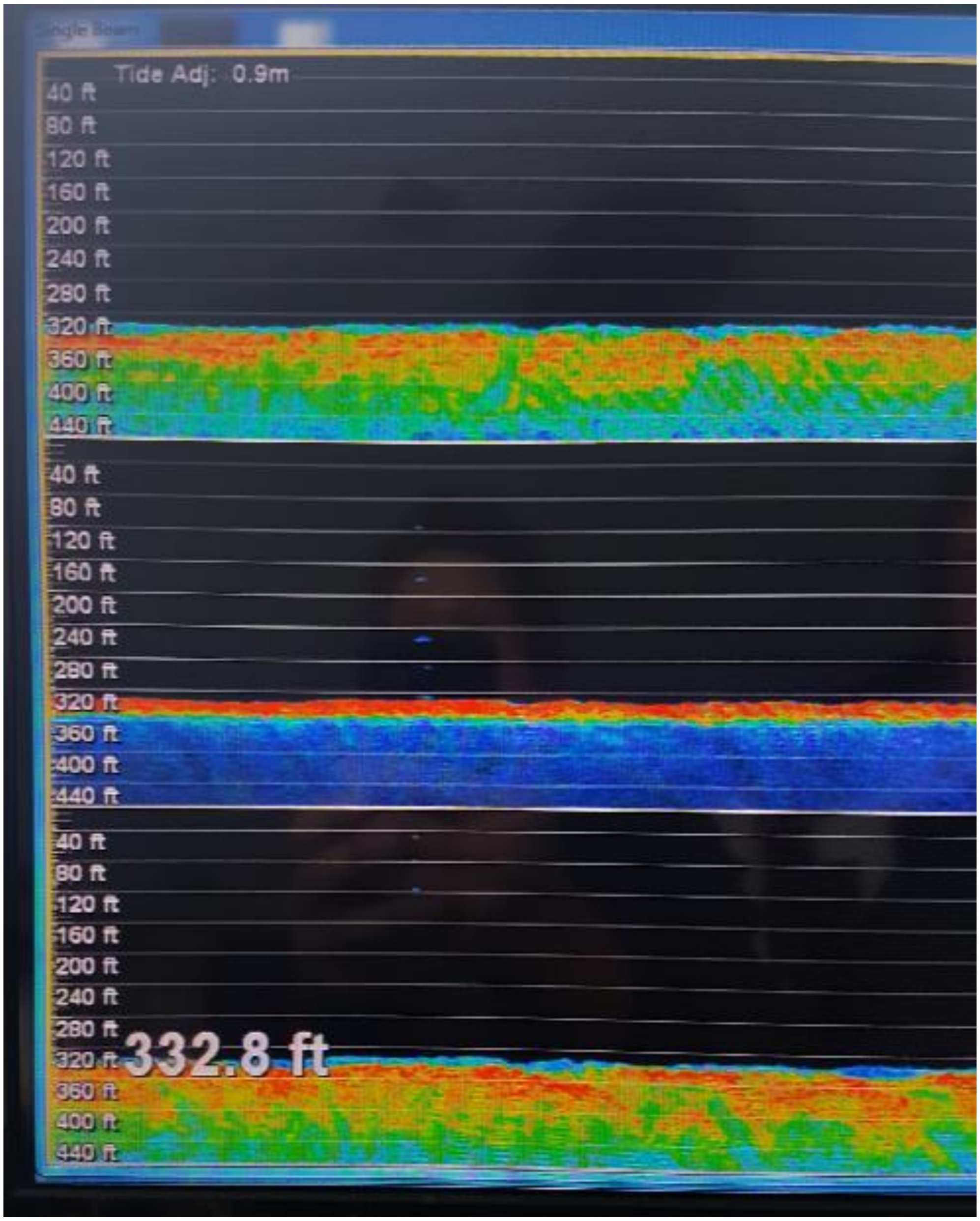

Figure 17. Photo of multibeam screen passing over mooring shortly after deployment. Middle panel shows acoustic backscattering signal that reveals depth of mooring components.

Figure 18. Mooring deployment from the stern of the William Kennedy using the A-frame.

3. Sample Collection

Offshore and coastal samples were collected throughout James Bay and southwestern Hudson Bay from RV William Kennedy and the vessel's two large zodiacs. Sample collection included water, phytoplankton, zooplankton, benthic invertebrates, benthic fish, and sediment. The sample collection and subsequent on board processing are described in detail in the following sections.

From the RV William Kennedy, full data collection stations were conducted at 17 offshore sites throughout James Bay and southeastern Hudson Bay (Figure 19; Table 3). Full data collection stations included the collection of a CTD profile and water samples from throughout the water column using the twelve 5 L Niskin bottles on the Seabird Rosette sampler (see sections 3a–d and 3f). The rosette was typically deployed twice to obtain sufficient water for all the samples (Table 3). Following the rosette, a series of nets were deployed (see section 3f). After the nets came back on board, the final activity at each station was the collection of a sediment grab sample followed by a box core, provided the substrate was suitable (see section 3g). Water samples brought on board were filtered or otherwise processed in the lab for later analysis in southern labs (section 3a–c) and used for incubation experiments (section 3d). Invertebrates and fish caught in the nets were rinsed out into fish totes and sorted by hand and using sieves. Sediment grab samples similarly were sieved and sorted. Sediment cores were sectioned (section 3g).

Water samples were also collected from 56 locations through the shipping route using the ship's flow-through underway system. The flow-through system continually measured temperature, salinity, and dissolved CO_2 in the water as the ship moved. Of these samples 22 were collected on Leg 0 across Hudson Bay (Figure 20) during transit from Québec City to Churchill, 34 were collected from Churchill to southeastern Hudson Bay, then throughout James Bay on Legs 1 and 2. Samples collected between Québec City and Churchill were for RNA (see section 3i). An in-line algal analyzer and an automated incubator were installed on the flow-through system in the lab area to estimate NPP, GPP, and GR along the cruise track (see section 3d). Additionally, surface water from the flow-through system was collected throughout Hudson Bay and James Bay to examine suspended sediment (see section 3f) and marine microbiology (see section 3h).

Using the vessel's two zodiacs, near-shore and river samples were collected in six coastal areas around James Bay (Figure 21). The coastal areas included: A) three sites surrounding the Belcher Islands, B) within the Moose River and Moose River Estuary, C) offshore coastal areas from islands near Eastmain River, and D) coastal sites near the community of Wemindji (Figure 21). Coastal sampling conducted from the zodiacs included CTD profiles using a Castaway and/or an RBR Concerto CTD, collection of water using a single Niskin bottle deployed on a weighted line, and collection of surface sediment samples and benthic invertebrate samples using a Ponar grab. The list of coastal stations accessed by zodiac is provided in Table 4.

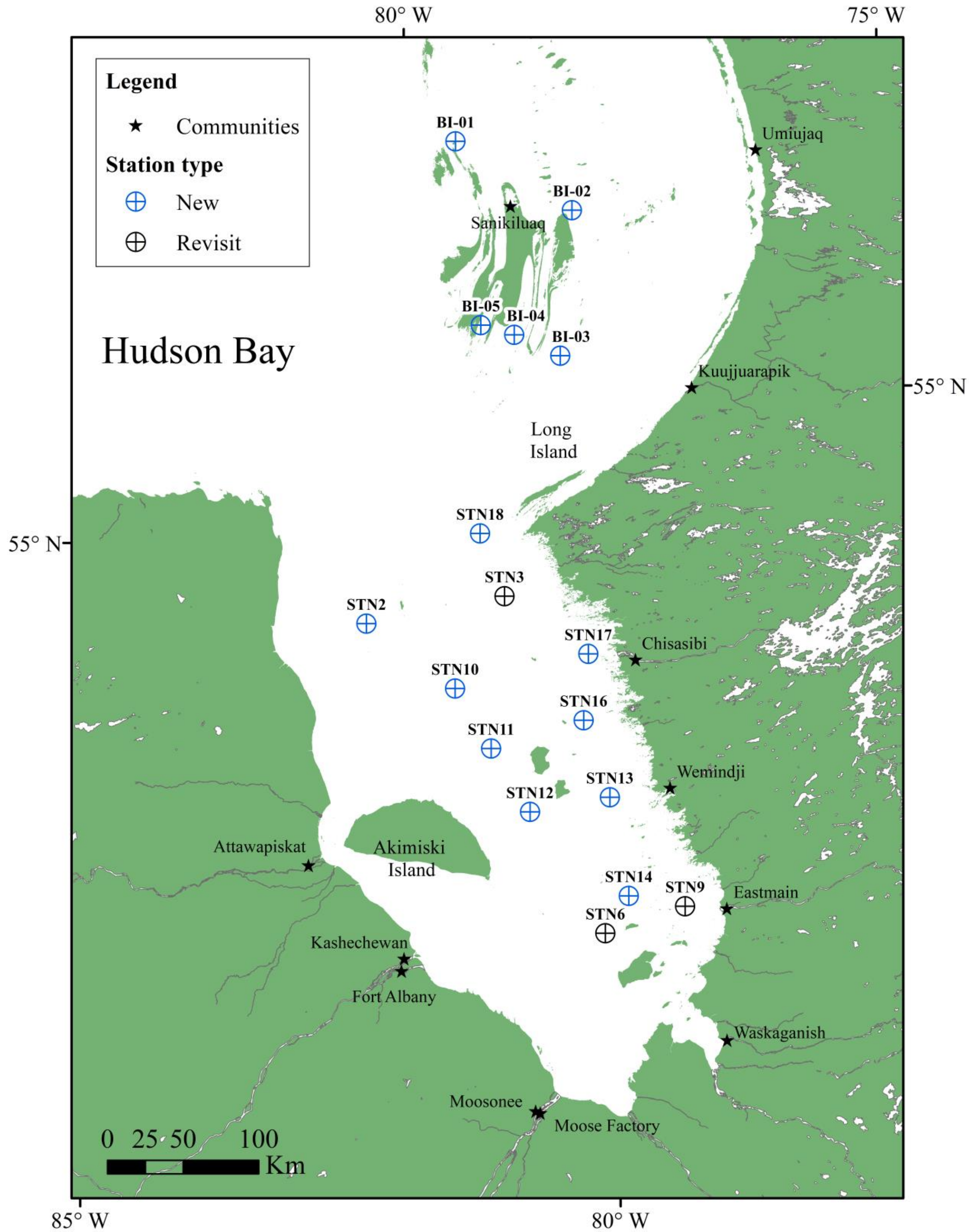

Figure 19. Location and station names for full data collection stations (i.e. "full stations") surrounding the Belcher Islands and James Bay. Stations in blue are new stations visited for the first time in 2022, stations in black were stations established in 2021 and revisited in 2022.

Table 3. List of full stations.

Station	Date	Status	Bottom depth (m)	Lat. (N)	Long. (W)	No. rosettes
BI-01	2022-08-05	New	40.8	56.981	79.665	3
BI-02	2022-08-06	New	46.5	56.446	78.592	2
STN3	2022-08-09	Re-visit from 2021	65.2	54.297	80.058	1
STN11	2022-08-09	New	48.7	53.429	80.463	1
STN12	2022-08-10	New	53.5	53.021	80.196	2
SNT13	2022-08-10	New	58.9	53.019	79.404	2
STN6	2022-08-12	Re-visit from 2021	62.3	52.238	79.693	2
STN9	2022-08-13	Re-visit from 2021	38	52.305	78.893	2
STN14	2022-08-13	New	75.1	52.428	79.405	1
STN13*	2022-08-17	Re-visit from 2022-08-10	58.9	53.019	79.404	2
STN16	2022-08-18	New	61.6	53.493	79.513	0
STN17	2022-08-18	New	34.2	53.871	79.343	1
STN10	2022-08-19	New	21	53.814	80.711	1
STN2	2022-08-19	Re-visit from 2021	62.1	54.279	81.478	2
STN18	2022-08-20	New	100	54.686	80.186	2
BI-03	2022-08-21	New	99	55.623	79.026	2
BI-04	2022-08-21	New	34.6	55.797	79.454	1
BI-05	2022-08-22	New	73.7	55.891	79.778	2

*STN13 was sampled twice on 2022-08-10 and 2022-08-17.

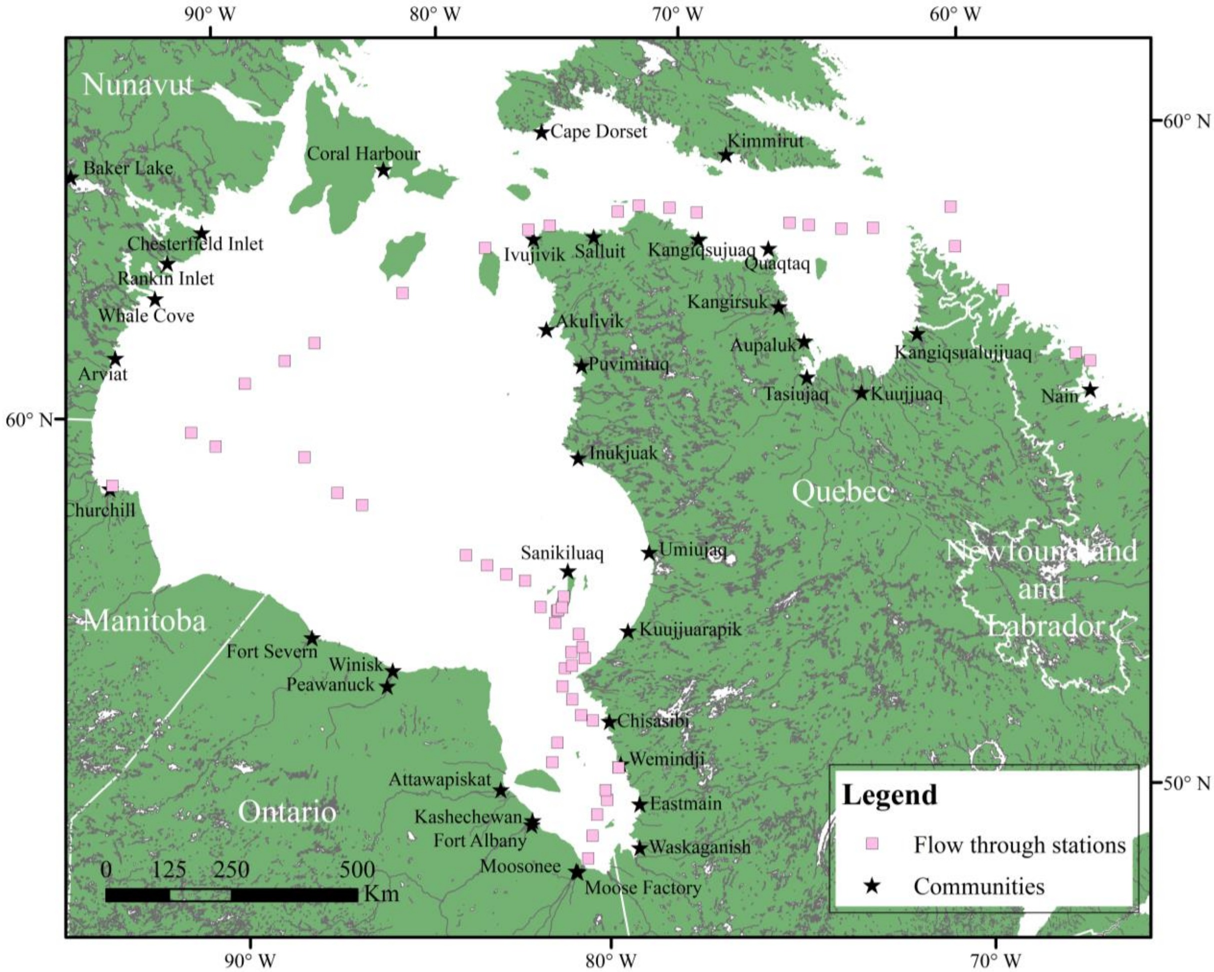

Figure 20. Map showing flow-through sample sites.

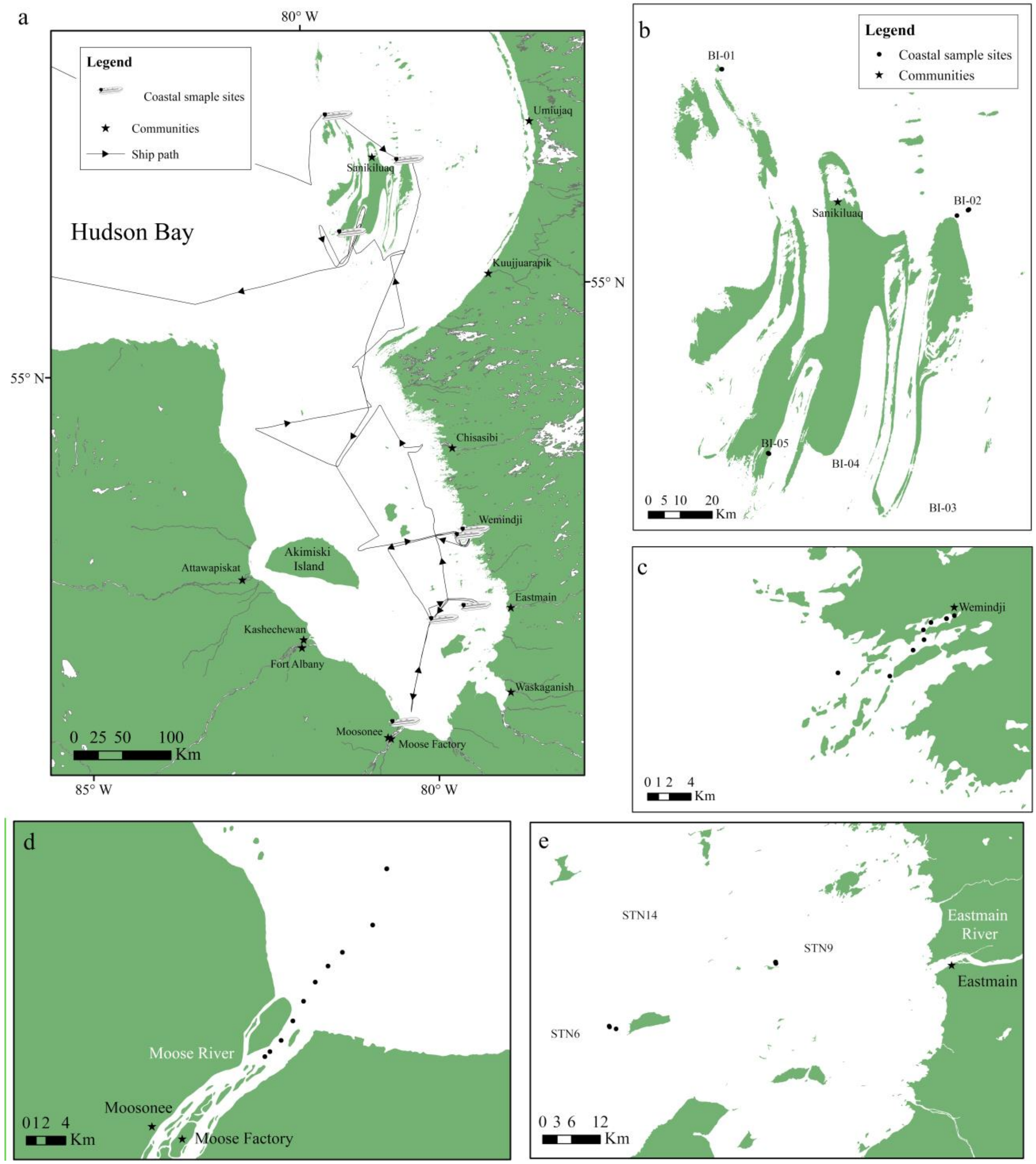

Figure 21. Map showing coastal sample sites (a) surrounding the Belcher Islands (b), near Wemindji (c), in the Moose River and Moose River Estuary (d), and near islands close to the Eastmain River (e).

Table 4. List of coastal sampling sites accessed by zodiac.

Station	Bottom depth (m)	Date and time (UTC)	Lat (N)	Long (W)
CTD-Z1	5.1	2022-08-05 19:10	56.970	79.669
CTD-Z2	13–14	2022-08-05 19:30	56.970	79.669
CTD-Z3	25	2022-08-05 20:36	56.970	79.668
BI-02	41.2	2022-08-06 21:59	56.446	78.590
BI-02	46.6	2022-08-06 22:15	56.448	78.585
BI-02-NS	26	2022-08-06 23:00	56.438	78.651
STN-13-Z1	1.19	2022-08-11 21:21	52.997	78.811
STN-13-Z2 (A)	7.38	2022-08-11 22:04	52.996	78.823
STN-13-Z2 (A)	7.38	2022-08-11 22:04	52.996	78.823
STN-13-Z3 (B)	9.83504	2022-08-11 23:01	---	---
STN-13-Z4 (C)	17.6784	2022-08-11 23:22	---	---
STN-6-ZA	9.2	2022-08-12 20:20	52.248	79.534
STN-6-ZB	16.82	2022-08-12 21:36	52.253	79.553
STN-6-ZC	23.56	2022-08-12 22:26	52.255	79.553
STN-9-ZA	7.3	2022-08-13 11:20	52.310	79.023
STN-9-ZB	17.1	2022-08-13 12:32	52.313	79.024
STN-9-ZC	30	2022-08-13 13:16	52.313	79.023
CTD-80	5.3	2022-08-15 16:08	51.472	80.243
CTD-81	7.4	2022-08-15 19:06	51.472	80.243
CTD-82	---	2022-08-15 22:18	51.324	80.463
CTD-83	---	2022-08-15 22:52	51.327	80.455
CTD-84	---	2022-08-15 23:09	51.336	80.436
CTD-85	---	2022-08-15 23:24	51.351	80.415
CTD-86	---	2022-08-15 23:36	51.367	80.395
CTD-87	6.1	2022-08-15 23:50	51.382	80.373
CTD-88	4.8	2022-08-16 0:01	51.394	80.351
CTD-89	6	2022-08-16 0:16	51.404	80.327
CTD-90	3.6	2022-08-16 0:40	51.424	80.278
CTD-104	>1	2022-08-17 18:50	---	---
CTD-105	7.11	2022-08-17 19:06	52.996	78.822
CTD-106	28.1	2022-08-17 20:31	52.996	78.844
CTD-107	9.1	2022-08-17 21:06	52.991	78.856
CTD-108	7.23	2022-08-17 22:39	52.983	78.858
CTD-109	8.14	2022-08-17 22:57	---	---
CTD-110	17.38	2022-08-17 23:09	---	---
CTD-111	6.91	2022-08-17 23:20	---	---
BI-05-ZA	6.5	2022-08-22 13:00	55.894	79.812
BI-05-ZA	6.5	2022-08-22 13:20	55.894	79.812
BI-05-ZA	7.3	2022-08-22 13:37	55.894	79.812
BI-05-ZB	13	2022-08-22 14:15	55.892	79.808
BI-05-ZB	13	2022-08-22 14:20	55.892	79.808
BI-05-ZB	13	2022-08-22 14:40	55.892	79.808
BI-05-ZA	6.5	2022-08-22 NA	55.894	79.812

3a. Chemical Oceanography

Cruise Participants: Lauri Corlett and Elizabeth Kitching (CEOS and DFO)
Principal Investigators: Jens Ehn, C.J. Mundy, Zou Zou Kuzyk (CEOS), Michel Gosselin (UQAR), Christine Michel (DFO)

Objectives:

Dissolved water properties (geochemical tracers) and particulate properties measured on bottle samples provide complementary information to physical in situ measurements for improving understanding of the oceanography of James Bay including circulation, water mass distributions, mixing of freshwater from river inflow and sea ice melt, and surface water properties that affect light penetration. Not since the 1970s have these characteristics been assessed in James Bay (Prinsenberg, 1982; Peck, 1978; El-Sabh and Koutitonsky, 1977), and it is thought that Hudson Bay surface waters have generally warmed and freshened during the 1980s and '90s (Brand et al., 2014).

Water samples were collected throughout the 2022 James Bay Expedition to be analyzed for water mass tracers (salinity, oxygen isotope ratio of seawater ($\delta^{18}O$), dissolved nutrients, and dissolved organic carbon (DOC)). Water also was filtered on board the vessel to collect filters to be analyzed for suspended particulate matter (SPM) (also called total suspended solids (TSS)) and properties of suspended particulate matter (organic carbon content (POC), organic nitrogen content (PON), stable isotopes of C and N, and particulate absorption (a_p)). Refer to Appendices A and B; Figures 19, 20, 21; and Tables 3 and 4 for sampling locations. Large bulk samples of seston or SPM were collected by filtration of the ship's flow-through system water so as to obtain sufficient sample mass for detailed biomarker characterization.

The objectives of this water sampling program were to:

1. Provide an in situ dataset of water properties including salinity and water stable isotope ratios that may be applied to quantify the contribution of different freshwater sources (river water, sea ice melt). These data provide new baseline information for the James Bay region.
2. Determine how nutrients, DOC, and suspended particle properties vary both spatially and temporally, and in relation to changing light and sea ice conditions. The suspended particle dataset will be cross-referenced with current satellite imagery to gauge whether or not current remote sensing algorithms are suitable for high-latitude waters. The data provide insight into areas of high biological productivity/phytoplankton biomass.
3. Develop a better understanding of how these variables are influenced by freshwater sources, including variations in salinity, temperature, and freshwater source.

These data will be used in conjunction with data collected from the 2021 James Bay Expedition to provide a robust baseline dataset spanning both the inshore and offshore waters of James Bay.

Methods and Data Collection:

Sample collection occurred from August 2 to 24 on board the RV William Kennedy, as well as at remote zodiac stations. A Seabird Rosette consisting of twelve 5 L Niskin bottles was used to collect seawater at various depths at 18 full stations, five near the Belcher Islands and the remainder in James Bay. Four stations within James Bay were revisits of stations sampled in 2021 and one station (STN13) was sampled twice during the expedition on August 10 and 17, 2022. An individual Niskin bottle was used to collect water at the zodiac stations. Stations were completed from the zodiacs in four areas (Belcher Islands, Wemindji, Moose River/Estuary, and Eastmain River/Estuary).

Samples were collected at the surface and bottom for all rosette stations, as well as throughout the water column at pre-determined depths. Sampling depths varied between locations based on bathymetry and can be found in Appendices A and B. Rosette samples for POC/PON, TSS, and a_p were collected in bulk polyethylene containers ranging from 9 L to 20 L in volume. The containers were rinsed three times with sample water prior to collection and the water was dispensed using acid-washed Tygon tubes.

Salinity, δ^{18}O, and Other Dissolved Tracers:
For salinity, δ^{18}O, and other dissolved tracers, samples were collected into an acid-washed 500-mL brown Nalgene bottle. The Nalgene bottle was rinsed three times with sample water before collecting the sample water. The same sample collection method was used at the zodiac stations. While in transit, water samples were collected directly from the vessel's underway flow-through system into glass jars. Flow-through samples were collected at various times, often on a three-hour rotating schedule or in conjunction with a CTD cast. Additional details pertaining to rosette, zodiac, and flow-through samples can be found in Appendices A and B.

Water for salinity and δ^{18}O was collected into 250 mL glass bottles and 20 mL glass scintillation vials, respectively. Bottles and scintillation vials were cleaned three times with sample water before filling. The lids were tightly closed and sealed with paraffin wax and then the samples were placed in the dark (salinity) or in the fridge (δ^{18}O). Salinity samples will be analyzed at the Centre for Earth Observation Science (CEOS) at the University of Manitoba. δ^{18}O samples will be analyzed at CEOS and the University of Ottawa.

DOC and nutrient samples were filtered through a 25-mm GF/F filter using an acid-washed syringe and Sweenex filter holder. The GF/F filter was previously baked at 500°C. For DOC, a 0.2-µm filter was attached to the end of the Sweenex, downstream of the GF/F filter, and the sample water was passed through both sets of filters and collected in amber glass vials. Nutrient samples were collected into acid-washed 15-mL falcon tubes after rinsing three times with filtered sample water. They were stored in the -20°C freezer. Each DOC vial was rinsed three times with filtered sample water and then filled to the top with the filtered water. DOC samples were placed in the fridge at 4°C until analyzing.

TSS Sample Collection:
47 mm Whatman ProWeigh® filters were used for TSS analysis on board the William Kennedy. Filters were pre-purchased to minimize preparation time and mitigate human error. ProWeigh® filters were rinsed three times with deionized water and dried at 105°C prior to distribution. The filters were weighed to approximately 0.1 g and the final weight is recorded (in grams) on the side of the respective aluminum filter container, as well as a unique code identifier. Containers

were stored in the laboratory until filtrations were completed in the field to ensure that the filters were kept cool and dry. 25-mm Whatman GF/F filters were used for a_p analysis. Filters for a_p analysis were not burned or rinsed with deionized water prior to use.

Water samples collected for TSS and a_p analysis were transferred from the bulk sampling container to a graduated cylinder for filtration (Figure 22a). Each bulk container was equipped with a spigot for ease of transfer. The prepared 47 mm Whatman ProWeigh® filters and 25 mm Whatman GF/F filters were placed on the filtration system for TSS and a_p analysis, respectively. The filtration system consisted of three 250-mL funnels for TSS filtrations and three 250 mL funnels for a_p. A GAST vacuum pump was incorporated into the filtration system to expedite the filtration process. The volumes of water filtered varied from 500–6820 mL for total suspended solids and 55–1035 mL for particulate absorption. Lower volumes were required in areas influenced by riverine runoff, which commonly had higher quantities of coloured dissolved organic matter (CDOM) and suspended solids. Samples were filtered until there was visible colour on the filters, at which point the filtration valves would be closed and the pump would be turned off to avoid the collection of any airborne particles. For each sampling location, the volume of water filtered was recorded in millilitres, also recorded was the filter weight (in grams) and code identifier for TSS.

Following filtration, the 47 mm Whatman ProWeigh® filter for TSS analysis would be removed from the filtration stand with a pair of tweezers and placed in its respective labelled aluminum container. These containers were stacked and immediately stored in the -20°C freezer until analysis down south. The 25 mm Whatman GF/F filters for a_p analysis were also removed from the filtration rack using tweezers and stored in their respective labelled container. Unlike TSS, the a_p containers were labelled on board the ship with the applicable sampling location ID and depth (in metres). The containers were plastic polyethylene capsules that were manufactured to size. The capsules were wrapped in regular, unbaked aluminum foil and stored in a Ziploc bag. The samples were immediately placed in the -80°C freezer until analysis down south.

Flow-through Seston (SPM) Collection:
Throughout the 2022 cruise, bulk samples of seston or SPM were collected by capturing the residue from filtration of surface water. We used a custom-built filtering device (Figure 22b–d). Particles ranging in size from 63–500 µm were collected from constant surface flow via a two-filter system (500-µm mesh size followed by 63-µm mesh size). The residue was rinsed off the 63-µm filter at regular intervals and was stored at 4°C. One composite sample was collected for all of James Bay separate from that of Hudson Bay.

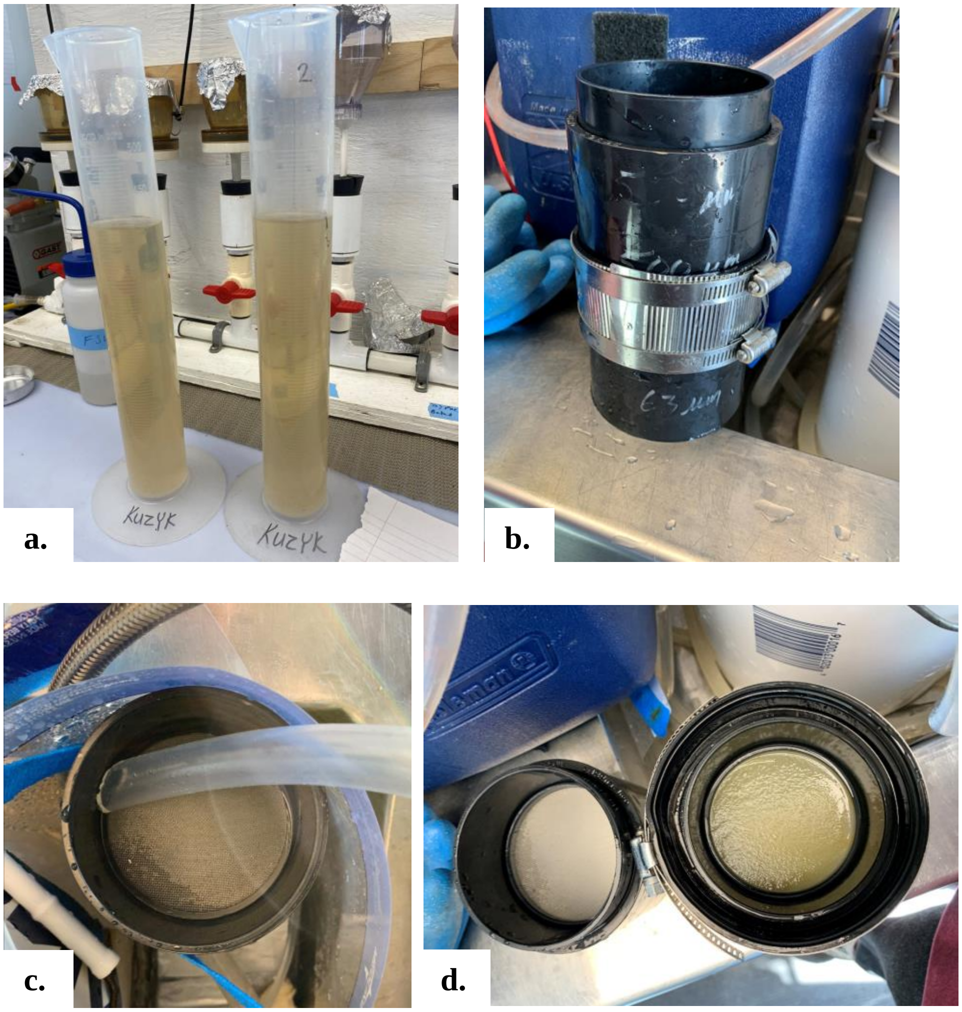

Figure 22. Photos of apparatus used for particle collection: a) water measured out into graduated cylinders before filtration to assess concentrations of TSS. Vacuum filtration rack is in the background; b) flow-through filter system showing the 500 µm filter device locked on top of the 63 µm filter; c) top view of the assembled flow-through filter showing the water supply tube discharging onto the 500 µm filter; d) filters disassembled, showing greenish filtrate on the 63 µm filter.

Table 5. TSS sample list

Date	Time (UTC)	Station	Depth (m)	Vol. filtered (L)
2022-08-02	17:00	FT01	2.0	5.478
2022-08-02	21:00	FT02	2.0	2.749
2022-08-03	13:00	FT03	2.0	3.749
2022-08-03	17:00	FT04	2.0	5.480
2022-08-03	21:00	FT05	2.0	5.498
2022-08-04	13:00	FT06	2.0	5.480
2022-08-04	16:00	FT07	2.0	3.740
2022-08-04	19:00	FT08	2.0	5.478
2022-08-04	22:00	FT09	2.0	5.489
2022-08-05	12:52	BI-01	1.0	5.464
2022-08-05	14:07	BI-01	10.0	2.729
2022-08-05	16:52	BI-01	20.0	2.729
2022-08-05	14:03	BI-01	30.0	2.749
2022-08-05	14:01	BI-01	40.0	2.790
2022-08-06	18:20	BI-02	1.0	5.498
2022-08-06	20:05	BI-02	10.0	2.740
2022-08-06	20:02	BI-02	20.0	3.249
2022-08-06	20:00	BI-02	32.0	2.731
2022-08-06	23:10	BI-02-NS	1.0	2.749
2022-08-06	23:07	BI-02-NS	24.0	2.740
2022-08-08	13:00	FT10	2.0	3.749
2022-08-08	16:00	FT11	2.0	2.733
2022-08-08	19:00	FT12	2.0	2.731
2022-08-08	22:00	FT13	2.0	2.733
2022-08-09	01:44	STN03	56.0	2.231
2022-08-09	01:46	STN03	40.0	2.729
2022-08-09	01:50	STN03	20.0	2.229
2022-08-09	01:52	STN03	10.0	2.231
2022-08-09	01:54	STN03	1.0	2.729
2022-08-09	19:05	FT15	2.0	2.749
2022-08-10	9:28	STN12	40.0	2.731
2022-08-10	9:30	STN12	30.0	2.729
2022-08-10	9:32	STN12	20.0	2.749
2022-08-10	9:34	STN12	10.0	2.740
2022-08-10	9:37	STN12	1.0	2.722
2022-08-10	20:48	STN13	50.0	2.733
2022-08-10	22:22	STN13	30.0	1.100
2022-08-10	22:25	STN13	10.0	2.740
2022-08-10	21:00	STN13	1.0	2.731
2022-08-11	19:09	FT16	2.0	2.749

Date	Time (UTC)	Station	Depth (m)	Vol. filtered (L)
2022-08-11	21:21	STN13-Z1	1.0	0.650
2022-08-11	22:11	STN13-Z2	1.0	0.400
2022-08-12	20:46	STN06	50.0	2.731
2022-08-12	20:48	STN06	40.0	2.749
2022-08-12	20:50	STN06	30.0	2.731
2022-08-12	20:52	STN06	20.0	2.733
2022-08-12	20:54	STN06	10.0	2.749
2022-08-12	19:13	STN06	1.0	2.733
2022-08-12	20:45	STN06-ZA	1.0	1.500
2022-08-12	21:52	STN06-ZB	1.0	1.500
2022-08-12	22:40	STN06-ZC	1.0	1.500
2022-08-13	13:12	STN09	25.0	2.749
2022-08-13	13:14	STN09	20.0	2.733
2022-08-13	13:17	STN09	10.0	2.749
2022-08-13	11:34	STN09	1.0	2.749
2022-08-13	11:40	STN09-ZA	1.0	1.500
2022-08-13	12:40	STN09-ZB	1.0	1.500
2022-08-13	13:30	STN09-ZC	1.0	1.500
2022-08-16	22:02	FT-20	1.0	2.730
2022-08-17	13:22	FT-22	1.0	2.730
2022-08-18	0:24	STN-13-ZB	1.0	0.960
2022-08-18	1:14	STN-13-ZB	1	0.900
2022-08-18	1:55	STN-13-ZC	8	0.900
2022-08-18	2:25	STN-13-ZA	1.0	0.500
2022-08-18	3:00	STN-13-ZC	1.0	0.500
2022-08-18	3:22	STN-13-ZA	2	0.900
2022-08-18	15:26	STN-17	1.0	2.740
2022-08-18	16:52	STN-17	10	1.130
2022-08-18	19:12	FT-24	1.0	2.749
2022-08-18	22:08	FT-25	1.0	2.730
2022-08-19	9:25	STN-10	10	2.730
2022-08-19	9:43	STN-10	1.0	2.730
2022-08-19	19:40	STN-2	54	2.730
2022-08-19	20:47	STN-2	21	2.730
2022-08-19	21:11	STN-2	1.0	2.740
2022-08-20	12:36	STN-18	100	2.740
2022-08-20	15:01	STN-18	13	2.040
2022-08-20	16:33	STN-18	1.0	2.749
2022-08-21	12:35	BI-03	99	2.740
2022-08-21	14:28	BI-03	1.0	2.749
2022-08-21	23:15	BI-04	1.0	2.749
2022-08-22	00:21	BI-04	17	2.750

Date	Time (UTC)	Station	Depth (m)	Vol. filtered (L)
2022-08-22	01:09	BI-04	36	2.750
2022-08-22	13:05	BI-05	58	5.460
2022-08-22	15:00	BI-05	1.0	5.470
2022-08-22	19:30	FT-30	1.0	2.740
2022-08-23	00:13	FT-31	1.0	2.740
2022-08-23	16:45	FT-32	1.0	2.730
2022-08-24	01:02	FT-33	1.0	2.730

3b. Biogeochemistry

Cruise Participant: Céline Guéguen / Claudie Meilleur
Principal Investigators: Céline Guéguen

Objectives:

Coloured dissolved organic matter (CDOM) and fluorescent dissolved organic matter (FDOM) can be used as tracers of river discharge in the estuaries and coastal waters of Hudson Bay (Granskog et al., 2007; Guéguen et al., 2011, 2016). As data regarding the influence of James Bay in Hudson Bay is scarce, the objective of this study is to contribute to the understanding of carbon fluxes in Hudson Bay and the influence of James Bay in its FDOM composition and concentration of Hudson Bay. Lignin-phenols and barium, and other tracers of oceanic circulation, will also be collected and subsequently analyzed.

Methods and Data Collection:

CDOM samples were collected using the underway system, rosette, and zodiac, totalling 140 samples. Depth profiles were obtained for 17 sites using Rosette casts (CMO-B, CMO-A, BI-01, BI-02, STN3, STN11, STN12, STN13, STN6, STN9, STN14, STN17, STN2, STN18, BI-03, BI-04, and BI-05). Samples were also obtained from zodiac transects at stations 13, 6, 9, and BI-05 (Figure 21). Underway samples were collected on 4 times a day schedule whenever possible, totalling 32 samples. Lignin-phenols samples were collected at surface depth for each station in James Bay as well as river endmembers during zodiac outings.

CDOM/FDOM/Barium:

CDOM samples were filtered through a 25 mm GF/F filter which has been previously baked at 500°C, and a 0.2 µm PES filter attached to the end of the Sweenex. Each CDOM vial was rinsed three times with filtered sample water, then filled to the top. Samples were then put in the fridge at 4°C until analyzing.

Dissolved Lignin Phenols:

Dissolved lignin phenol samples were collected at 7 sites using the underway system. At each site 2 L of water were collected and filtered on a 47 mm GF/F filter, using a peristaltic pump. The 2-L bottles were rinsed three times with filtered sample water. Filtered water samples were acidified using 2.6 mL of concentrated HCl. Solid-phase extraction cartridges were conditioned using 6 mL of MeOH. The samples were passed through the cartridge at a rate of about 1 L/hr. After 2 L of the sample was passed through, the cartridge was frozen at -20°C until further processing. Washing and elution of the cartridge, as well as analysis will be performed at Université de Sherbrooke. Protocol was adapted depending on the salinity of each sample to ensure the cartridge did not saturate. For salinity samples under 20, 1.5 L were collected and acidified with 1.3 mL of concentrated HCl. For salinity less than 5, 0.5 L acidified with 0.54 mL of HCl was used. All glassware was rinsed three times with seawater.

Table 6. List of biogeochemical samples.

Date	Station	Lat (N)	Long (W)	Depth (m)	FDOM	Lignin Phenols	Salinity
2022-08-02	FT01	59.772	90.333	2	1		
2022-08-02	FT02	59.514	90.486	2	1		
2022-08-03	FT03	58.736	87.242	2	1		29.16
2022-08-03	FT04	58.536	86.383	2	1		27.72
2022-08-03	FT05	58.276	85.598	2	1		28.52
2022-08-04	FT06	57.144	82.384	2	1		27.57
2022-08-04	FT07	56.907	81.755	2	1		27.16
2022-08-04	FT08	56.691	81.190	2	1		26.6
2022-08-04	FT09	56.521	80.636	2	1		25.49
2022-08-08	FT10a	55.518	79.155	2	1		26.64
2022-08-08	FT10	55.408	79.286	2	1		24.91
2022-08-08	FT11	55.125	79.623	2	1		26.04
2022-08-08	FT12	54.864	79.902	2	1		22.1
2022-08-08	FT13	54.555	80.089	2	1		23.96
2022-08-09	FT14	53.585	80.542	2	1		24.04
2022-08-11	FT16	52.951	78.901	2	1		18.93
2022-08-11	FT16a	52.951	78.902	2	1	1	19.2
2022-08-12	STN13-Z2	52.996	78.823	2	1	1	0
2022-08-12	STN06-ZA	52.448	79.534	2	1		20.54
2022-08-12	STN06-ZB	52.253	79.593	2	1		20.42
2022-08-13	STN06-ZC	52.255	79.553	2	1		20.9
2022-08-13	STN09-ZA	52.310	79.023	2	1		20.92
2022-08-13	STN09-ZB	52.313	79.024	2	1		21.15
2022-08-15	STN09-ZC	52.313	79.023	2	1		20.6
2022-07-25	CMO-B	61.767	84.270	169	1		
2022-07-25	CMO-B	61.767	84.270	98	1		
2022-07-25	CMO-B	61.767	84.270	60	1		
2022-07-25	CMO-B	61.767	84.270	52	1		
2022-07-25	CMO-B	61.767	84.270	40	1		
2022-07-25	CMO-B	61.767	84.270	29	1		
2022-07-25	CMO-B	61.767	84.270	23	1		
2022-07-25	CMO-B	61.767	84.270	10	1		
2022-07-25	CMO-B	61.767	84.270	2	1		
2022-07-27	CMO-A	59.983	91.941	89	1		
2022-07-27	CMO-A	59.983	91.941	60	1		
2022-07-27	CMO-A	59.983	91.941	40	1		

Date	Station	Lat (N)	Long (W)	Depth (m)	FDOM	Lignin Phenols	Salinity
2022-07-27	CMO-A	59.983	91.941	27	1		
2022-07-27	CMO-A	59.983	91.941	20	1		
2022-07-27	CMO-A	59.983	91.941	16	1		
2022-07-27	CMO-A	59.983	91.941	10	1		
2022-07-27	CMO-A	59.983	91.941	2	1		
2022-08-05	BI-01	56.981	79.665	2	1		
2022-08-05	BI-01	56.981	79.665	10	1		
2022-08-05	BI-01	56.981	79.665	20	1		
2022-08-05	BI-01	56.981	79.665	30	1		
2022-08-05	BI-01	56.981	79.665	40	1		
2022-08-06	BI-02	56.446	78.585	2	1		
2022-08-06	BI-02	56.446	78.585	10	1		
2022-08-06	BI-02	56.446	78.585	20	1		
2022-08-06	BI-02	56.446	78.585	32	1		
2022-08-09	STN3	54.293	80.059	2	1	1	
2022-08-09	STN3	54.293	80.059	10	1		
2022-08-09	STN3	54.293	80.059	20	1		
2022-08-09	STN3	54.293	80.059	30	1		
2022-08-09	STN3	54.293	80.059	40	1		
2022-08-09	STN3	54.293	80.059	56	1		
2022-08-09	STN11	53.429	80.463	2	1		
2022-08-09	STN11	53.429	80.463	40	1		
2022-08-10	STN12	53.022	80.194	2	1	1	
2022-08-10	STN12	53.022	80.194	10	1		
2022-08-10	STN12	53.022	80.194	20	1		
2022-08-10	STN12	53.022	80.194	30	1		
2022-08-10	STN12	53.022	80.194	40	1		
2022-08-10	STN13	53.020	79.405	2	1	1	
2022-08-10	STN13	53.020	79.405	50	1		
2022-08-10	STN13	53.088	79.403	2	1		
2022-08-10	STN13	53.088	79.403	10	1		
2022-08-10	STN13	53.088	79.403	20	1		
2022-08-10	STN13	53.088	79.403	30	1		
2022-08-10	STN13	53.088	79.403	40	1		
2022-08-12	STN06	52.239	79.693	2	1	1	
2022-08-12	STN06	52.239	79.693	50	1		
2022-08-12	STN06	52.239	79.644	10	1		
2022-08-12	STN06	52.239	79.644	20	1		

Date	Station	Lat (N)	Long (W)	Depth (m)	FDOM	Lignin Phenols	Salinity
2022-08-12	STN06	52.239	79.644	30	1		
2022-08-12	STN06	52.239	79.644	40	1		
2022-08-13	STN09	52.311	78.896	2	1	1	
2022-08-13	STN09	52.311	78.896	30	1		
2022-08-13	STN09	52.295	78.891	2	1		
2022-08-13	STN09	52.295	78.891	10	1		
2022-08-13	STN09	52.295	78.891	20	1		
2022-08-13	STN09	52.295	78.891	25	1		
2022-08-13	STN14	52.428	79.405	2	1	1	
2022-08-13	STN14	52.428	79.405	10	1		
2022-08-13	STN14	52.428	79.405	20	1		
2022-08-13	STN14	52.428	79.405	30	1		
2022-08-13	STN14	52.428	79.405	40	1		
2022-08-13	STN14	52.428	79.405	50	1		
2022-08-13	STN14	52.428	79.405	60	1		
2022-08-13	STN14	52.428	79.405	70	1		
2022-08-15	FT17	51.472	80.243	2	1		14.32
2022-08-16	FT18	51.566	80.007	2	1		18.028
2022-08-16	FT19	52.214	79.770	2	1		21.275
2022-08-16	FT20	52.432	79.406	2	1		20.413
2022-08-16	FT21	52.620	79.402	2	1		21.734
2022-08-17	STN13ZA	52.996	78.822	2	1	1	0.13
2022-08-17	STN13ZD	52.983	78.888	2	1	1	7.27
2022-08-18	FT24	54.034	79.720	2	1		17.636
2022-08-18	FT25	54.267	79.922	2	1		20.31
2022-08-20	FT26	54.882	79.681	2	1		22.393
2022-08-0	FT27	54.970	79.251	2	1		23.01
2022-08-22	BI-05ZA	55.894	79.812	BOTTOM	1		
2022-08-22	BI-05ZA	55.894	79.812	2	1		
2022-08-23	FT31	56.009	80.306	2	1		
2022-08-23	FT32	56.111	79.518	2	1		27.376
2022-08-23	FT32 DUP	56.111	79.518	2	1		27.376
2022-08-24	FT33	55.929	79.637	2	1		25.655
2022-08-24	FT33 DUP	55.929	79.637	2	1		25.655
2022-08-18	STN17	53.878	79.340	2	1	1	16.9
2022-08-18	STN17	53.878	79.340	10	1		
2022-08-18	STN17	53.878	79.340	20	1		
2022-08-18	STN17	53.878	79.340	30	1		

Date	**Station**	**Lat (N)**	**Long (W)**	**Depth (m)**	**FDOM**	**Lignin Phenols**	**Salinity**
2022-08-19	STN10	53.815	80.710	2	1	1	
2022-08-19	STN10	53.815	80.710	10	1		
2022-08-19	STN2	54.274	81.476	2	1	1	21.7
2022-08-19	STN2	54.274	81.476	10	1		
2022-08-19	STN2	54.274	81.476	15	1		
2022-08-19	STN2	54.274	81.476	24	1		
2022-08-19	STN2	54.274	81.476	40	1		
2022-08-19	STN2	54.274	81.476	50	1		
2022-08-20	STN18	54.686	80.186	2	1	1	24
2022-08-20	STN18	54.686	80.186	12	1		
2022-08-20	STN18	54.686	80.186	20	1		
2022-08-20	STN18	54.686	80.186	30	1		
2022-08-20	STN18	54.686	80.186	40	1		
2022-08-20	STN18	54.686	80.186	50	1		
2022-08-21	BI-03	55.623	79.026	2	1		
2022-08-21	BI-03	55.623	79.026	10	1		
2022-08-21	BI-03	55.623	79.026	20	1		
2022-08-21	BI-03	55.623	79.026	30	1		
2022-08-21	BI-03	55.623	79.026	40	1		
2022-08-21	BI-03	55.623	79.026	BOTTOM	1		
2022-08-21	BI-04	55.791	79.455	2	1		27.3
2022-08-21	BI-04	55.791	79.455	16	1		
2022-08-21	BI-04	55.791	79.455	25	1		
2022-08-22	BI-05	55.891	79.778	2	1		27.6
2022-08-22	BI-05	55.891	79.778	40	1		
2022-08-22	BI-05	55.891	79.778	BOTTOM	1		

3c. Inorganic Carbon

Cruise Participant: Nicholas Decker (CEOS), Daniel Gedig (CEOS)
Principal Investigator: Tim Papakyriakou (CEOS)

Objectives:

Insights from BaySys (study in HB) indicate that the waters at the confluence between James Bay and Hudson Bay are low in aragonite saturation and pH that we attributed to the compounding effects of sea ice melt and river water on the region's carbon system. The circulation of the bay causes an accumulation of both freshwater sources in the southern portion of Hudson Bay. While the organic load of river water can increase the partial pressure of CO_2 (pCO_2) through microbial and photochemical processes, the low alkalinity and dissolved inorganic carbon of river water can cause a drop in pCO_2. pCO_2 is the main driver of air-sea CO_2 exchange and determines the regions' CO_2 source/sink status. The 2022 cruise of the RV William Kennedy is among the first opportunities to measure attributes of the carbon system in James Bay. The objectives of the cruise are to:

- Survey the concentrations of inorganic and organic carbon across James Bay in conjunction with measurements of freshwater tracers and the region's physical and biological system;
- Sample the concentration of these carbon species in major rivers and estuaries of James Bay;
- Sample the concentration of dissolved greenhouse gases (GHG).

The inorganic carbon system includes: dissolved inorganic carbon (DIC), total alkalinity (TA), pH, the saturation state for calcium carbonate minerals aragonite and calcite, pCO_2, particulate inorganic carbon, and through collaboration, dissolved and particulate organic carbon. In addition to CO_2, the potent GHG methane (CH_4) will be measured. Collectively, the observations will allow us to assess the CO_2 source/sink status, broader GHG footprint through consideration of CO_2 and CH_4, current state and susceptibility of the region to ocean acidification, and to identify the main moderating factors to the above. We expect the carbon system (specifically pH and pCO_2) and GHG footprint of the marine system to be strongly modified by river inflow to an extent dictated by the water properties of the rivers. We expect sea ice melt to also impact the region's carbon system, however, the relative role of the freshwater sources (river and sea ice melt), temperature, and biology remain uncertain. The cruise will allow us to establish a baseline understanding of the bay's carbon system, its role relative to other Arctic and subarctic seas as a net GHG source or sink, and better prepare us to project future states of the carbon system, including the GHG source/sink and state of ocean acidification.

Methods and Data Collection:

Discrete Water Samples:
Sample collection took place from August 2–24, 2021, from the RV William Kennedy. Water samples were collected using a Seabird rosette equipped with twelve 5 L Niskin bottles and a

Seabird 19+ V2 CTD. At each selected depth, at least one Niskin bottle was “fired” and closed to ensure there was enough sample water for all requirements. Additionally, water samples were collected from the seawater sampling line connected to the ship’s water intake system that continuously sampled water from ~2 m depth. Lastly, water samples were also taken using a 5 L Niskin bottle from small boats deployed from the RV William Kennedy to sample near coastal and river areas.

Water samples were sampled in the following order: CH_4, 13C-DIC, pH, DIC/TA. First, a sampling tubing was connected to the Niskin spigot or the seawater sampling line in the ship’s laboratory and water was allowed to run through to clean and remove any air bubbles from the tubing. For CH_4 and 13C-DIC samples, the vials were filled smoothly from the bottom, with tubing touching the bottom of the vial, and were overflowed three times their volume. For pH, the bottle was rinsed three times with ~100 mL of sample water and then filled slowly from the bottom with the tubing touching the bottom of the vial. For DIC, the bottle was rinsed twice with ~100 mL of sample water, then filled smoothly from the bottom, with tubing touching the bottom of the vial, and overflowed by a full volume. The glass stopper was inserted to prevent contamination. After all sampling was completed (5–15 minutes), 5 mL of the stoppered DIC sample was removed to prevent the bottles from breaking in case of freezing temperatures. The gas samples were then spiked with saturated mercuric Chloride solution ($HgCl_2$), with volumes of $HgCl_2$ used outlined in Table 7. Once the samples were spiked, the DIC stopper was greased and the sample was securely closed with electrical tape around the bottle and stopper, CH_4 samples were crimped, and CH_4 and 13C-DIC samples were wrapped with Parafilm. Information for rosette, small boat, and water intake line samples is given in Tables 8, 9, and 10, respectively. The DIC/TA samples will be analyzed at BIO DFO, and the CH_4 and 13C-DIC samples will be analyzed at UM.

Table 7. Volumes of saturated mercuric Chloride solution used to spike gas samples.

Variable	Vial type	Volume of $HgCl_2$ used (µL)
DIC/TA	500 mL borosilicate glass bottle with glass stopper	100
CH_4	60 mL clear glass vial with rubber stopper and aluminum crimp seal	20
13C-DIC	30 mL amber vial	20
pH	250 mL borosilicate glass bottle	0

Table 8. Samples collected from the rosette. At each sampling depth, 1 CH_4 vial, 1 13C-DIC vial, 1 pH bottle, and 1 DIC/TA bottle were collected, unless noted otherwise. Dates and times are in UTC.

Date	Time	Stn	Lat (N)	Long (W)	Stn depth (m)	Sample depth (m)
2022-08-05	12:52	BI-01	56.981	79.665	40.8	0, 10, 20, 30, 40
2022-08-06	18:10	BI-02	56.446	78.590	43	0, 10, 20, 32
2022-08-06	23:07	BI-02-NS	56.438	78.651	26	0, 25
2022-08-21	11:54	BI-03	55.623	79.026	99	0, 10, 20, 30, 40, 90

Date	Time	Stn	Lat (N)	Long (W)	Stn depth (m)	Sample depth (m)
2022-08-21	22:47	BI-04	55.791	79.455	34.6	0, 16, 25
2022-08-22	13:10	BI-05[b]	55.894	79.778	73.7	40, 57
2022-08-19	18:22	Stn-2	54.274	81.476	62.1	0, 10, 20, 30, 40, 50
2022-08-09	1:44	Stn-3	54.296	80.058	66.8	0, 10, 20, 30, 40, 56
2022-08-12	19:01	Stn-6	52.239	79.694	62.3	0, 10, 20, 30, 40, 50
2022-08-13	11:22	Stn-9	52.311	78.896	38	0, 10, 20, 30
2022-08-19	4:45	Stn-10	53.814	80.711	21	0, 10
2022-08-09	15:34	Stn-11	53.429	80.463	48.7	0, 39
2022-08-10	9:28	Stn-12	53.022	80.194	53.6	0, 10, 20, 30, 40
2022-08-10	20:48	Stn-13	53.020	79.405	63.3	0, 10, 20, 30, 40, 50
2022-08-13	18:55	Stn-14	52.428	79.405	75.1	0, 69
2022-08-18	14:05	Stn-17[b]	53.871	79.343	34.2	10, 20[a], 30
2022-08-20	11:57	Stn-18	54.686	80.186	100	0, 12, 20, 30[a], 40, 90

[a] No CH_4/N_2O sample
[b] Surface sample taken via water intake line

Table 9. Samples collected from small boat operations. At each sampling depth, 1 CH_4 vial, 1 13C-DIC vial, 1 pH bottle, and 1 DIC/TA bottle were collected, unless noted otherwise. Dates and times are in UTC.

Date	Time	Stn	Lat (N)	Long (W)	Stn depth (m)	Sample depth (m)
2022-08-05	19:19	BI-01-ZA	49.870	97.257	5.1	0, 5.1
2022-08-05	19:30	BI-01-ZB	57.025	79.706	13	0, 13
2022-08-05	20:36	BI-01-ZC	56.970	79.668	25	0, 25
2022-08-11	22:04	Stn-13-ZB (2)	52.996	78.823	10	0
2022-08-12	20:20	Stn-6-ZA	52.248	79.534	8.9	0, 8.9
2022-08-12	21:30	Stn-6-ZB	52.253	79.593	16.8	0, 16.8
2022-08-12	22:24	Stn-6-ZC	52.255	79.553	23.6	0, 23.6
2022-08-13	11:27	Stn-9-ZA	52.316	79.023	7.3	0, 7.3
2022-08-13	12:25	Stn-9-ZB	52.313	79.024	17.1	0, 17.1
2022-08-13	13:16	Stn-9-ZC	52.313	79.023	30	0, 30
2022-08-15	22:21	MR-1	51.324	80.463	5.7	0
2022-08-16	0:16	MR-2	51.404	80.327	6	0
2022-08-22	13:00	BI-05-ZA	55.894	79.812	6.5	0, 5.5[a]

[a] No CH_4/N_2O sample

Table 10. Samples for DIC collected from the ship's water intake line.

Date	Time	Associated stn	Lat (N)	Long (W)	Station depth (m)
2022-08-02	17:00	FT-01	59.859	91.333	140
2022-08-02	21:10	FT-02	59.732	90.529	138
2022-08-03	13:12	FT-03	58.736	87.242	184
2022-08-03	17:10	FT-04	58.573	86.630	173
2022-08-03	21:00	FT-05	58.406	85.819	61.5
2022-08-04	13:00	FT-06	57.144	82.384	109
2022-08-04	16:00	FT-07	56.907	81.755	134
2022-08-04	19:00	FT-08	56.691	81.190	154
2022-08-04	22:00	FT-09	56.521	80.636	123
2022-08-08	13:00	FT-10	55.408	79.286	136
2022-08-08	16:00	FT-11	55.125	79.623	94
2022-08-08	19:00	FT-12	54.864	79.902	121
2022-08-08	22:00	FT-13	54.555	80.089	72
2022-08-09	13:13	FT-14	53.585	80.542	36.3
2022-08-09	19:05	FT-15			18.6
2022-08-11	19:09	FT-16	52.951	78.901	18
2022-08-15	17:00	FT-17	51.472	80.244	Not recorded
2022-08-16	16:03	FT-18	51.853	80.019	25
2022-08-16	19:02	FT-19	52.208	79.773	49.5
2022-08-16	22:05	FT-20	52.452	79.406	80.7
2022-08-17	1:05	FT-21	52.605	79.400	39.5
2022-08-18	14:31	Stn-17	53.871	79.343	34.2
2022-08-18	19:09	FT-24	53.994	79.696	45.8
2022-08-18	22:09	FT-25	54.295	79.873	59.3
2022-08-22	14:57	BI-05	55.894	79.778	73.7
2022-08-23	0:01	FT-31	55.894	80.305	112
2022-08-23	16:39	FT-32	55.894	79.518	21.8
2022-08-24	0:55	FT-33	55.894	79.637	26.1

Note: At each sampling depth, 1 CH_4 vial, 1 13C-DIC vial, 1 pH bottle, and 1 DIC/TA bottle were collected, unless noted otherwise. Dates and times are in UTC.

3d. Primary Production

Cruise Participants:, CJ Mundy, Braydon Acheson, Shaylyn Pelikys, Madelyn Stocking, Lauri Corlett, Jens Ehn (CEOS), Elizabeth Kitching, David Capelle (DFO)
Principal Investigators: CJ Mundy, Zou Zou Kuzyk, Andrea Niemi, Jens Ehn (CEOS), Michel Gosselin (UQAR), Christine Michel (DFO)

Objectives:

The objectives of the primary production group were to:
1. Characterize the phytoplankton community and estimate rates of net ecosystem production (NEP), gross primary production (GPP), and gross respiration (GR).
2. Quantify new versus regenerated primary production rates across James Bay.
3. Examine spatial differences and establish baseline estimates in phytoplankton production, phytoplankton taxonomic composition, and photosynthetic pigment concentrations.
4. Investigate how primary production and other variables related to primary production are influenced by freshwater sources, including variations in water salinity and temperature.
5. Examine the presence/absence of kelp and/or benthic algae.

Methods and Data Collection:

Water Sampling:
Water samples, kelp samples, and conductivity, temperature, and depth (CTD) profiles were collected using a Seabird rosette with twelve 5-L Niskin bottles, a singular 5-L Niskin bottle (for work aboard small research vessels), water underway flow-through system, DTG3 Remote Operated Vehicle (ROV), conical phytoplankton net, and CTD. Depths for rosette stations were chosen prior to the cruise for the majority of the water sampling variables, with the number of depths being determined upon arrival at each station. The depths were surface water, 10 m, 20 m, 30 m, 40 m, and bottom depth. If present and not captured within a listed depth, a Chlorophyll a (Chl *a*) maximum depth (SCM) was determined via the downcast data of the rosette's CTD. The exception to the set depths was the primary production depths, which were chosen based on the photosynthetically active radiation (PAR) profiles for set light depths of 100, 55, 28, 17, 8, and 2% PAR. The Secchi disk depth, i.e., the depth at which a weighted, black-and-white disk, 30 cm in diameter, disappeared from view, which corresponds to the depth at which approximately 10% of the surface light remains, was assessed from the bow at each station (Table 11).

Table 11. Secchi disk depth at each sampling station, recorded to the nearest half-meter from the bow of the ship.

Station ID	Secchi disk depth (m)
BI-01	6.5
BI-02	7
STN 3	ND
STN 11	4
STN 12	3
STN 13	5

Station ID	Secchi disk depth (m)
STN 13 Z	0.5
STN 6	3
STN 9	2
STN 14	ND
MR	0.5
STN 17	2
STN 10	ND
STN 2	4
STN 18	7.5
BI-03	5.5
BI-04	ND
BI-05	10

Water was collected at a 2-m depth from the flow-through underway system in the engine room of the ship, which was continuously pumped up to the lab workspace and fed into an incubation system used for NEP, GPP, and GR estimations. These samples were collected 3 hours on days without rosette sampling stations. Several stations were sampled from small research vessels, with water being collected from the surface, estimated to be 0.5 m in depth. Appendix D provides a list of samples collected.

Bulk water was collected at rosette stations and small research vessel stations using acid-washed Tygon tubing and polyethylene bulk water containers (9 L and 20 L) that were first rinsed in sample water three times before being filled with the sample. Collected water samples were then transferred to the lab for filtration and taxonomy. Water needed for primary production was subsampled from the bulk water containers and then moved to a dark area of the lab. The bulk water was then subsampled for specific analyses in the following order: nutrient concentration, nitrate isotope concentration, flow cytometry, Lugol taxonomy (only Chl *a* maximum), Chl *a* concentration, particulate absorption (ap), particulate organic carbon and nitrogen (POC/N), and high-performance liquid chromatography (HPLC) (only at Chl *a* maximum) (see Appendix D).

Four nutrient samples were collected at each sampling depth. Water samples were drawn through an acid washed 60-mL syringe and then a Swinnex filter with a 25-mm combusted GF/F was attached. The syringe, filter, and acid-washed 15-mL falcon tube were rinsed three times with filtered sample before the falcon tube was filled with 12 mL and stored in the -20°C freezer.

One nitrate isotope sample was collected at each depth following the same procedure as used for nutrient collection, with the exception that the vials were 50 mL.

Seven flow cytometry samples (FC) were collected at each sampling depth using the same 60-mL syringe used for nutrient sample collection without a Swinnex filter. A subsample of 4 mL was added to a pre-spiked cryovial containing 20 µL or 100 µL of glutaraldehyde (6 contained 20 µL and 1 contained 100 µL, the larger volume designated for virus preservation). They were gently inverted several times before being placed in the dark for 15 minutes and then finally stored in the -80°C freezer.

Lugol taxonomy samples were collected at the SCM depth. A subsample of 200 mL was collected at each depth and placed in amber bottles. Following this, 0.8 mL of Lugol was added, and the bottle was gently inverted five times. Each bottle was then sealed with Parafilm and stored in the fridge (4°C).

Two Chl *a* samples were filtered for each sampling depth onto a 25-mm GF/F filter. The amount of water filtered varied between 100 and 700 mL depending on colouration of the filter. The filters were then placed into tinfoil sleeves and stored in the -80°C freezer.

One high-performance liquid chromatography (HPLC) sample for measurement of algal pigment composition was filtered from the Chl *a* maximum depth. The amount filtered at each station ranged between 910 and 2000 mL depending on colouration of the filter. The samples were filtered on a 47-mm pre-combusted GF/F and then placed in 2-mL cryovials. The cryovials were then stored in the -80°C freezer.

POC/N, TSS and ap filter collections were described earlier in the report and are briefly mentioned here as they will contribute to the primary production work as well.

Nets:
A vertical 20 µm mesh conical net (30 cm diameter, length of 1 m) with a removable cod end jar was used to collect a sample over 100 m or the depth of the water column (if shallower than 100 m). The net was lowered and raised at 1 m/s until 1–2 m of the bottom of the water column. The net was then rinsed to move the sample to the jar and concentrated the sample in the cup with filtered seawater so it can be poured into 250 mL glass amber bottles. An addition of 30 mL of 37% formaldehyde (final concentration = 5% w/v) was added to the contents of the bottle using a designated 60 mL syringe. Additional filtered seawater was added to fill the bottle, and then the bottle was gently mixed and sealed using Parafilm and stored in the fridge.

Incubations:
For primary production (PP) incubations for the estimation of new and regenerated primary production, 2000 mL of bulk water was sampled into four 500-mL clear Nalgene polycarbonate bottles. Each subsample was spiked with 500 µL of carbon-13 (^{13}C) in the form of $NaH_{13}CO_3$. Then two bottles were spiked with 500 µL of NH_4 in the form of $(^{15}NH_4)2SO_4$ and the other two with 500 µL of NO_3 in the form of $K^{15}NO_3$. This was done for each of the light depths (100, 55, 28, 17, 8, and 2% PAR), and then the 24 bottles were turned upside down three times gently before being placed into the incubator for 4 hours. The incubators were placed on the top deck of the ship and surface water was circulated through (Figure 23).

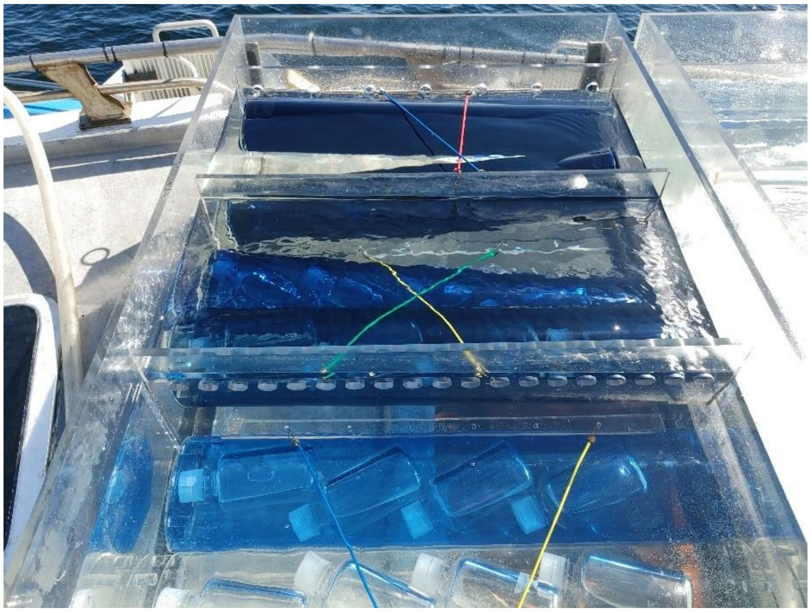

Figure 23. Incubation chambers for primary production estimates. (Photo credit: E. Kitching)

Each set of bottles was placed in clear plastic tubes covered with a film that replicates the light received at each of the light depths. Two 500-mL T_0 bottles were taken at the surface depth (for underway flow-through sampling stations) or the 2% light depth (for rosette sampling stations). The water was immediately filtered, and when there was approximately 20 mL remaining, 500 µL of carbon-13 (^{13}C) in the form of $NaH_{13}CO_3$ was added to each tulip, and one filtration tulip was also then spiked with 500 µL of NH_4 and the other with 500 µL of NO_3. After the four-hour incubation, water from the light incubations was filtered onto pre-combusted (450℃ for 5 hours) 21 mm glass fibre filters (GF/F). Filters were placed into pre-combusted (450℃ for 5 hours) aluminum foil sleeves and stored in the -80°C freezer.

Phytoplankton community abundance was estimated using an Algae Online Analyser (bbe Moldaenke) (Figure 24). The instrument uses fluorescence at four wavelengths to estimate the abundance of Chlorophyll concentration among four different algal groups (greens, blue-greens, diatoms, and Chlorophytes). It also estimates the concentration of fluorescent yellow substance, essentially a measure of coloured dissolved organic matter (CDOM), as well as turbidity. Water samples were pumped from the ship's seawater intake line to the Algal Online Analyser and measured every 10 minutes over the duration of the cruise.

Figure 24. Algal Online Analyser and automatic incubator set up on the flow-through system where it discharges in the lab. (Photo credit: David Capelle)

In addition to the algal analyzer, an automated incubator was installed to estimate NPP, GPP, and GR along the cruise track. The incubator consists of two spherical chambers which are filled with seawater from the ship's water intake line once every hour. Once filled, a stirring pump mixes the water inside the chamber while an oxygen probe measures dissolved oxygen and temperature. The oxygen and temperature probes are calibrated before the cruise and can be cross-referenced against the ship's underway thermosalinograph and periodic CTD casts, which include O_2 concentrations. The chambers are cleaned daily by adding 10 mL of household bleach to each chamber during filling. The subsequent three incubations are discarded. The incubators are housed inside coolers to control light levels and minimize water temperature changes during the course of the incubation. One chamber is illuminated by an LED light, the other cooler is kept dark. The change in oxygen concentration over the course of the incubation is a function of primary production and respiration in the light chamber, while the change in oxygen in the dark chamber is a function of respiration only. Together, these can be used to estimate the rates of primary production and respiration in the near-surface (~2 m) water column along the cruise track at hourly intervals (Yezhova et al., 2021).

Finally, a CO_2 sensor (Licor LI-820) was used to measure dissolved CO_2 in surface water continuously (~1/second) along the cruise track. Water was pumped from the same reservoir used by the Algal Analyser and incubator system via a ¼" OD nylon tube with a peristaltic pump, through a semi-permeable membrane (3M LiquiCell Mini-Module Membrane Contractor), the dissolved CO_2 passes through the membrane into a flow of air from the exterior (stern, aft side, ~4 m above the water surface) and into the CO_2 detector. At hourly intervals, the water pump is reversed, drawing air into the membrane contractor instead of water, allowing the detector to measure the atmospheric CO_2 concentration. A Garmin GPS antenna was connected to this system, to record the position with each measurement. The CO_2 sensor was zeroed and spanned every 1–3 days by first connecting a CO_2 scrubber to the air inlet line (zero), followed by a gas-tight bag containing a certified reference CO_2 gas mixture (~400 ppm CO_2 in nitrogen, Praxair). Each standard was passed through the system for 2–5 minutes, until the reading stabilized. Post-processing is required to adjust the CO_2 measurements based on the calibrations and to remove any air samples that were collected while the air intake was downwind of the ship's exhaust (which would contaminate the air sample with CO_2 from the diesel fumes).

A DTG3 Remote Operated Vehicle (ROV) equipped with a 270º range view camera was deployed from the stern deck of the ship and from the zodiac (Appendix D). Perpendicular coastline transects were recorded of the ocean floor to explore for the presence of kelp (*Saccharina latissima),* commonly known as sugar kelp, around nearshore environments (within approximately 20 km from shore). Various bottom depths were recorded. In total, 6 Zodiac stations with 6 ROV bottom depth recordings and 2 additional deployments from the RV William Kennedy were completed. One video during Leg 2 revealed the presence of kelp, however, no collections were made. None of the 8 recordings revealed the presence of sugar kelp. However, the benthic footage may be useful for identifying benthic species (see section 3f Invertebrates and Fish).

3e. eDNA

Cruise Participants: Kallie Strong (CEOS), Alia Sanger (McGill), Kimberly Howland (DFO), and Delphine Cottier (DFO)
Principal Investigators: Eric Collins (CEOS), Kimberly Howland (DFO)

Objectives:

Biodiversity and the presence of invasive species in James Bay emerged as research priorities among discussions of the members of the Cree Marine Research Needs Working Group. Parks Canada and Eeyou Marine Region representatives both mentioned that community members have reported seeing unfamiliar species and are generally very curious about what species are present in James Bay. The objectives of this sampling program were:

1) To characterize patterns of biodiversity and distributions of key fish and invertebrate species along the Hudson Bay-James Bay coast based on eDNA metabarcoding.
2) Evaluate the level of correspondence between eDNA and specimen-based measures of biodiversity and community structure.
3) Evaluate relationships between environmental variables and eDNA-based species composition.
4) Screening for potential invasive/non-indigenous species of concern in Hudson Bay-James Bay.

Methods and Data Collection:

Water Sample Collection:
Water samples were collected in sterile stand-up Whirl-Pak bags directly from the ship's underway system (at approximately 2 m depth) from the continually flowing source in the lab (for sampling protocol details, see JBE 2021 cruise report). For each sample, environmental data for temperature and salinity was collected from the ship's engine room. Samples were collected while the ship was in transit off the coast of Newfoundland and Labrador, Quebec, and one when pulling into Churchill. Collection took place 3 times per day, with 2 replicates collected per location. A total of 31 samples were collected from the flow-through system. Due to station distance from the shore, no samples were collected during the rosette casts at stations CMO-A or CMO-B. See Appendix E for a complete list of samples collected.

eDNA Collection:
eDNA was collected following the James Bay Flow Through System eDNA Sampling & Syringe Filtration Protocol from Howland, K. et al. (for details see the James Bay Expedition Cruise Report 1–17 August 2021). Water samples were filtered immediately after collection by hand using a syringe (BD 60 mL, Kranklin Lakes, NJ, USA), and a total of 1 L of sample water was filtered through a filter holder (MilliporeSigma Swinnex) containing a 0.7 µm glass microfiber filter (Whatman GF/F, 25 mm). After filtration, filters were transferred, using sterile tweezers, and preserved in 2 mL cryovials containing 700 µL of Longmire's buffer. The samples were then preserved at room temperature until they could be stored at -80°C. Blanks were taken, using the same method, from the ship's RO/distilled water system after every 10th sample.

3f. Invertebrates and Fish

Cruise Participants: Kallie Strong (CEOS), David Capelle, Andrea Niemi, and Kimberly Howland (DFO)
Principal Investigators: David Capelle, Andrea Niemi, and Kimberly Howland (DFO)

Objectives:
To characterize the biodiversity and distribution of zooplankton, ichthyoplankton, and benthic fish communities, and assess taxon-specific fatty acids and stable isotope signatures of key forage species.

Methods and Data Collection:

A Hydrobios WP2 conical net (0.57 m diameter) was deployed from the back of the RV William Kennedy (Figure 25) to collect integrated samples for taxonomic analyses of zooplankton and ichthyoplankton (150 µm mesh). An attached General Oceanics flow meter was used to determine filtration volume, and an attached RBR solo was used to verify the maximum depth of deployment. The net was lowered at 1 m/s to within 10 m or in some cases within 2 m from the bottom, depending on station depth and sea state. Given that the net is not meant to contact the bottom, the zooplankton samples collected do not well represent benthos-associated zooplankton species. The net was recovered at 0.5 m/s. Once at the surface, the outside of the net was rinsed with a saltwater hose prior to bringing the net on board. Ichthyoplankton was removed and frozen, and the remainder of the sample was preserved (10% (v/v) buffered formaldehyde in filtered sea water) and stored at room temperature. At most stations, a second tow was conducted and preserved in 90% ethanol for DNA-associated work.

Oblique Tows:
A bongo net (2 nets, 0.5 m diameter, 500 µm mesh) deployed from the back of the RV William Kennedy was towed obliquely for a total of 15 minutes. A General Oceanics flow meter was attached to each net to determine filtration volume, and an attached RBR solo was used to measure depth throughout the tow. The bongo net is used primarily to collect high biomass samples for food web analyses and the study of larger zooplankton and fish larvae. The bongo net was deployed at approximately 2 knots speed-over-ground with a vertical line out of 2 m/s to within 10 m of the bottom. Line out was estimated using physical markings on the line. Once near the bottom, the net was retrieved at a winch speed of 0.5 m/s. The procedure was repeated until the net had been towed for 15 minutes. Prior to bringing on board, the outsides of the nets were rinsed with a gentle saltwater spray. Flow meter numbers were recorded for both nets. Samples were sorted by hand into target groups of ichthyoplankton and zooplankton and frozen at -80°C for later food web analysis. Given the low number of target species both nets were used to collect samples for food web analyses.

Epifauna/Benthic Invertebrates and Fish

Benthic Beam Trawl:
Benthic fishes were collected from benthic beam trawl (Figure 26) and benthic sled deployments. The beam trawl was lowered to the bottom and towed at ~2 knots for 15 minutes when sea state

and bottom morphology allowed. The beam trawl was not deployed at stations near the Belcher Islands when large rocks and boulders were on the bottom.

Fish collected from the benthic sled and benthic trawl (cf., Figure 27) were grouped by family and weighed, then the length and weight of each individual fish was recorded before freezing at -80°C. At DFO Winnipeg, the taxonomy of frozen fish samples will be verified to the lowest taxonomic level possible, and tissues will be sub-sampled for stable isotopes, fatty acids, and highly branched isoprenoid analyses.

Invertebrate samples were collected from benthic sled and benthic trawl catches and sieved or hand-picked from the Van Veen (ship-based) and Petite Ponar grab (zodiac) sediment samples and box core deployments (Figure 30). Collected invertebrates were sorted into groups by sieving and by hand (Figures 28, 29) and processed according to the epifauna methods described in the JBE 2021 report. A list of ethanol-preserved benthic invertebrate samples is given in Table 12.

Figure 25. Readying the net for a zooplankton tow. (Photo credit: Dr. Andrea Niemi, DFO)


Figure 26. Benthic beam trawl being prepared for a night deployment. (Photo credit: Dr. Brynn Devine, Oceans North)

Figure 27. Arctic cod collected at station 18. (Photo credit: Dr. Andrea Niemi, DFO)

Figure 28. Assortment of collected invertebrates before sorting. (Photo credit: Patricia Rodriguez, University of Manitoba)

Figure 29. Assortment of invertebrates being sorted after a trawl. (Photo credit: Stella Koostachin, Mushkegowuk Council)

Figure 30. Box core deployment.

Table 12. Ethanol-preserved benthic invertebrate samples (see Appendices A and B for station details).

Station	Petite Ponar (zodiac)	Van Veen (ship)	Beam Trawl** (ship)	Benthic Sled** (ship)
BI-01	-	1*	1	1
BI-02	1	1*	1	1
BI-03	-	1*	1	1
BI-04	-	1*	1	1
BI-05	1	1*	1	1
STN2	-	1*	1	1
STN3	-	1*	1	1
STN6	1	1*	1	1
STN9	3	1*	1	1
STN10	-	1*	-	1
STN11	-	-	-	-
STN12	-	1*	1	2
STN13	2	-	1	1
STN17	-	1*	-	-
STN18	-	1*	-	1

*2nd replicate froze for diet analyses
**selected hard-bodied organisms and representative specimens photographed, counted, and frozen for diet analyses

3g. Sediments

Cruise Participants: Grace Fedirchuk, Devin Hammett, Maddy Stocking (CEOS)
Principal Investigators: Zou Zou Kuzyk (CEOS)

Objectives:

There are few previous data concerning bottom sediments in James Bay. Studies were conducted in the Eastmain Estuary prior to river diversion (d'Anglejan, 1982). Sediment cores were collected and analyzed in Hudson Bay including just outside the entrance to Hudson Bay (Kuzyk et al., 2008). These first surface sediment samples and cores from James Bay will provide much-needed data on sediment properties such as particle size distribution and organic carbon content. Profiles of radioisotopes will be assessed for the possibility of using them to constrain sedimentation rates. First surveys for possible proxies also will be conducted.

1. Characterize surface sediment properties across James Bay including particle size distribution, organic matter content, and composition.
2. Determine profiles of radioisotopes (^{210}Pb, ^{137}Cs) in sediment cores and where possible estimate modern sedimentation rates and burial rates of organic carbon.
3. Qualitatively look at the James Bay and Hudson Bay suspended sediment in the surface water.
4. Quantify dinoflagellate cysts in relation to environmental properties to develop a basis for applying these as paleo proxies in James Bay (via collaborator Audrey Limoges).

Methods:

Box Cores:
A Gomex box corer was deployed if weather conditions were stable and Van Veen Ponar grabs brought up sediment that did not contain large amounts of rocks. When there was a good recovery of sediment in the box corer, excess water was siphoned off as much as possible without disturbing the sediment (Figure 31). A push coring tube was inserted slowly, away from the edges of the box, and pushed down until refusal. Prior to tube capping, a spoon was used to scoop surface samples from the sediment around the coring tube for geochemical and dinoflagellate analyses. An exception was at station BI-01 geochemical and dinoflagellate samples were taken from the Ponar grab, as the substrate contained too many shells and gravel to deploy a box core. The box was then opened to allow a researcher to insert a plug into the bottom of the tube by reaching into the bottom of the box. Once plugged, the tube was carefully removed from the box, lifting it slowly and smoothly out of the top of the box. The top of the core was capped and held securely in an upright position until ready to process the sediment core. At that time, the core tube was placed on the extruder (stand; Figure 32). The cap was removed from the top and the overlying water was siphoned off the surface of the mud into a Whirl-Pak bag labelled "surface". The core was extruded and sectioned at 1 cm intervals for the first 10 cm and 2 cm intervals for the remainder (Figure 33). Sections were placed in Whirl-Pak bags and frozen at -20°C. During Leg 2 of the 2022 cruise, we were able to section a total of 10 cores and recovered 15 surface samples for geochemical and dinoflagellate analyses (Table 13).


Figure 31. Box core recovered sediment.

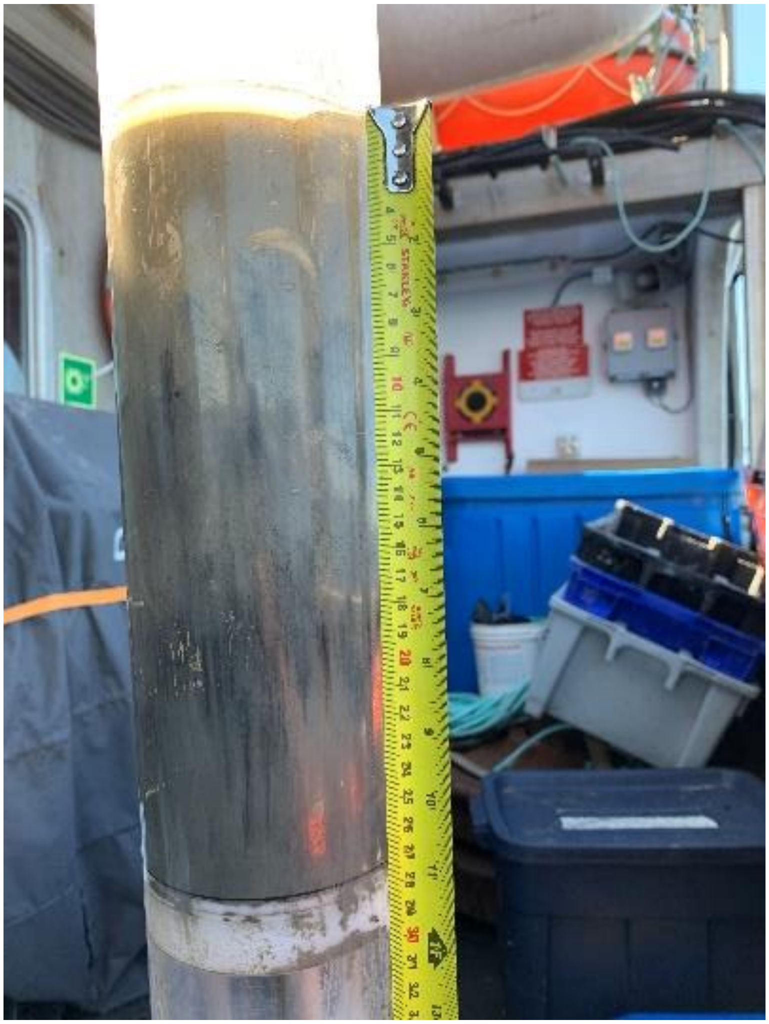

Figure 32. Core on the extruder, showing the undisturbed surface water above the sediment.

Figure 33. Core being extruded, after surface water had been removed.

Table 13. List of box core sampling activity and collection.

Station	ID	Date (UTC)	Lat (N)	Long (W)	Bottom depth (m)	Description	Sample type	Core length (cm)
BI-01	PON	2022-08-05	56.982	79.668	37.4	shelly	dino, geochem	
BI-02	BOX1	2022-08-06	56.449	78.588	45.3	no recovery	no	
BI-02	BOX2	2022-08-06	56.449	78.587	50.3	slumped	dino, geochem	
STN-3	BOX1	2022-08-09	54.298	80.057	64.7	no recovery	no	
STN-3	BOX3	2022-08-09	54.295	80.058	66.3	no recovery	no	
STN-3	BOX5	2022-08-09	54.309	80.054	35.6	no recovery	no	
STN-3	BOX2	2022-08-09	54.299	80.057	57.5	slumped	dino, geochem	
STN-3	BOX4	2022-08-09	54.297	80.058	66.5	slumped	no	
STN-12	BOX1	2022-08-10	53.014	80.185	54.1	no recovery	no	
STN-12	BOX3	2022-08-10	53.013	80.185	53.6	no recovery	no	
STN-13-1	BOX1	2022-08-10	53.017	79.388	61.8	no recovery	no	
STN-13-1	BOX2	2022-08-10	53.019	79.384	59.6	no recovery	no	
STN-13-1	BOX3	2022-08-10	53.021	79.387	58.1	no recovery	no	
STN-12	BOX4	2022-08-10	53.013	80.194	53.2	slumped	no	
STN-12	BOX2	2022-08-10	53.013	80.186	52.1	slumped		
STN-13-1	BOX4	2022-08-11	53.019	79.403	57.8	core retrieved	dino, geochem, core	18
STN-13-Z3	BOX1	2022-08-11	52.951	78.902	18.3	core retrieved	dino, geochem, core	24
STN-6	BOX4	2022-08-12	52.240	79.695	62	core retrieved	dino, geochem, core	16
STN-6	BOX1	2022-08-12	52.245	79.693	62.6	no recovery	no	
STN-6	BOX2	2022-08-12	52.487	79.692	63	no recovery	no	
STN-6	BOX3	2022-08-12	52.236	79.694		no recovery	no	

Station	ID	Date (UTC)	Lat (N)	Long (W)	Bottom depth (m)	Description	Sample type	Core length (cm)
STN-14	BOX4	2022-08-13	52.432	79.407	79.6	core retrieved	core	18
STN-9	BOX4	2022-08-13	52.307	78.888	40.9	core retrieved	dino, geochem, core	18
STN-9	BOX1	2022-08-13	52.306	78.889	41.1	no recovery	no	
STN-9	BOX2	2022-08-13	52.306	78.886	41.7	no recovery	no	
STN-9	BOX3	2022-08-13	52.306	78.888	41.5	no recovery	no	
STN-14	BOX1	2022-08-13	52.431	79.407	81.5	no recovery	no	
STN-14	BOX2	2022-08-13	52.430	79.407	79.6	no recovery	no	
STN-14	BOX3	2022-08-13	52.430	79.406	78.9	possibly slumped	dino, geochem, core	16
STN-13	BOX1	2022-08-17	52.951	78.901	16.2	core retrieved	dino, geochem, core	25
STN-17	BOX1	2022-08-18	53.866	79.343	36.8	core retrieved	dino, geochem, core	18.5
STN-16	BOX1	2022-08-18	53.492	79.513	61.6	core retrieved	dino, geochem, core	23.5
STN-2	BOX3	2022-08-19	54.276	81.475	60.1	no recovery	no	
STN-2	BOX4	2022-08-19	54.276	81.474	59.8	no recovery	no	
STN-2	BOX5	2022-08-19	54.276	81.473	59.4	no recovery	no	
STN-2	BOX1	2022-08-19	54.277	81.477	60.8	slumped	dino, geochem	
STN-2	BOX2	2022-08-19	54.276	81.475	60.5	slumped	dino, geochem	
STN-2	BOX6	2022-08-19	54.275	81.470	58.3	slumped	dino, geochem	
STN-18	BOX1	2022-08-20	54.683	80.184	95.9	core retrieved	dino, geochem, core	14
BI-03	BOX1	2022-08-21	55.634	79.013	114	slumped	no	
BI-03	BOX2	2022-08-21	55.635	79.010	103	slumped	no	

3h. Marine Microbiology

Cruise Participants: Patricia Montalvo-Rodriguez; Kari Green; Kallie Strong (CEOS)
Principal Investigator: Eric Collins (CEOS)

Objectives:

Microbial communities in highly transited areas like Hudson Bay can tell the story of water mass history, riverine input, and biogeochemical processes. Understanding microbial communities in the water column is essential for understanding ecosystem processes and the future of ecosystem services.

1) To characterize patterns of biodiversity, distribution, and composition of microbial species along the Hudson-James Bay coast based on metagenomic analysis.
2) To evaluate the relationships between environmental variables and microbial composition.
3) To determine co-occurrence and possible interactions among phytoplankton and bacteria in the presence of phytoplankton blooms.

Methods and Data Collection:

Water Sample Collection:
Water samples for metagenomic analysis were collected between August 3–23, 2022 using two different water collection methods:

1) Directly from the ship's flow-through underway system which collected water at a 2 m depth and pumped it into the lab space on a continuous basis.
2) Bulk samples from rosettes deployed off the ship offshore at each of the full sampling stations.

In most cases, metagenomic samples were taken concurrently with primary productivity and biogeochemistry sampling/measures to allow for later exploration of relationships between metagenomic-based biodiversity and environmental conditions in different areas along the Hudson-James Bay Coastline.

Flow-through samples were collected an average of four times a day during transit for a total of 25 flow-through station samples collected. For each of the full stations in James Bay, a surface (usually flow-through), a bottom (bulk rosette), and if present, a Chl *a* maxima (bulk rosette) were collected. Chl *a* Max samples were only collected at STN-2 (STN-2-10; STN-2-20), BI-03 (BI-03-11), and BI-04 (BI-04-17). The only exceptions were metagenomic samples collected from a box core (STN-18-BOX) and a benthic sled (STN-2-BBT).

In total, 63 samples were collected, of which 25 were from the bulk rosette and 37 were from the flow-through.

All water samples for metagenomic analysis were collected in darkened 4-gallon jugs that were rinsed three times with sample water before collection. Sterile nitryl gloves were worn during the duration of the sampling process. Whenever possible, samples were filtered shortly after collection. If this was not possible, water samples were stored temporarily in the refrigerator (on the ship) until they could be filtered.

***Filtration*:**
Sterile nitryl gloves were worn during the entirety of the filtration process. The majority of samples were filtered using a peristaltic pump. The exceptions being STN-18-BOX and STN-2-BBT which were filtered using a 50 mL syringe. The tubing was rinsed with approximately 500 mL of sample water before attaching 0.22 µm Sterivex filters. Water was filtered until the filter became clogged, approximately 1–2 L for most samples. Water was expelled from the filters using an air-filled syringe and immediately preserved at -80^{o}C.

Samples (Table 14) were shipped back to Winnipeg in coolers containing ice packs for later lab analysis. Further analysis will include DNA extractions and Nanopore metagenomic sequencing.

Table 14. Microbial filter samples collected during the Hudson Bay and James Bay cruise.

Date (UTC)	Station	Lat (N)	Long (W)	Time (UTC)	Depth (m)	Code	Filter Size (µm)	Sample
2022-08-03	FT-03	59.226	87.404	13:47	2	FT	0.22	FT-03-2
2022-08-03	FT-04	58.536	86.382	16:57	2	FT	0.22	FT-04-2
2022-08-03	FT-05	58.276	85.597	22:37	2	FT	0.22	FT-05-2
2022-08-04	FT-06	57.104	82.272	13:32	2	FT	0.22	FT-06-2
2022-08-04	FT-07	56.907	81.755	16:00	2	FT	0.22	FT-07-2
2022-08-04	FT-08	56.691	81.190	19:00	2	FT	0.22	FT-08-2
2022-08-04	FT-09	56.521	80.636	22:00	2	FT	0.22	FT-08-2
2022-08-08	FT-10	55.408	79.286	13:00	2	FT	0.22	FT-10-2
2022-08-08	FT-11	55.125	79.623	16:00	2	FT	0.22	FT-11-2
2022-08-08	FT-12	54.864	79.902	19:00	2	FT	0.22	FT-12-2
2022-08-08	FT-13	54.555	80.089	22:00	2	FT	0.22	FT-13-2
2022-08-11	FT-16	52.951	78.901	19:09	2	FT	0.22	FT-16-2
2022-08-05	BI-01	56.981	79.665	12:40	2	FT	0.22	BI-01-2
2022-08-05	BI-01	56.981	79.665	13:58	SFC	ROS	0.22	BI-01-SFC
2022-08-05	BI-01	56.982	79.664	16:43	38	ROS	0.22	BI-01-38
2022-08-06	BI-02	56.446	78.590	18:06	2	FT	0.22	BI-02-2
2022-08-06	BI-02	56.447	78.592	19:57	SFC	ROS	0.22	BI-02-SFC
2022-08-06	BI-02	56.438	78.651	23:04	32	ROS	0.22	BI-02-32
2022-08-06	BI-02	56.438	78.651	23:04	24	ROS	0.22	BI-02-24
2022-08-08	STN-3	54.266	80.057	1:40	2	FT	0.22	STN-03-2
2022-08-08	STN-3	54.266	80.057	1:40	57	ROS	0.22	STN-03-57
2022-08-10	STN-12	53.022	80.194	9:24	2	FT	0.22	STN-12-2
2022-08-10	STN-12	53.022	80.194	9:24	40	ROS	0.22	STN-12-40
2022-08-10	STN-13	53.020	79.405	20:40	2	FT	0.22	STN-13-2
2022-08-10	STN-13	53.019	79.405	20:40	50	ROS	0.22	STN-13-50
2022-08-12	STN-06	52.239	79.694	18:53	2	FT	0.22	STN-06-2
2022-08-12	STN-06	52.239	79.694	18:53	50	ROS	0.22	STN-06-50

Date (UTC)	Station	Lat (N)	Long (W)	Time (UTC)	Depth (m)	Code	Filter Size (µm)	Sample
2022-08-13	STN-09	52.311	78.896	11:10	2	FT	0.22	STN-09-2
2022-08-13	STN-09	52.311	78.896	11:10	30	ROS	0.22	STN-09-30
2022-08-13	STN-14	52.428	79.405	18:38	SFC	ROS	0.22	STN-14-SFC
2022-08-13	STN-14	52.428	79.405	18:38	70	ROS	0.22	STN-14-70
2022-08-16	FT-18	51.833	80.019	16:36	2	FT	0.22	FT-18-2
2022-08-16	FT-19	52.208	79.773	19:25	2	FT	0.22	FT-19-2
2022-08-16	FT-20	52.452	79.406	22:29	2	FT	0.22	FT-20-2
2022-08-17	FT-21	52.605	79.400	0:19	2	FT	0.22	FT-21-2
2022-08-17	FT-22	52.951	78.901	13:38	2	FT	0.22	FT-22-2
2022-08-18	STN-17	53.871	79.343	13:56	2	FT	0.22	STN-17-2
2022-08-18	FT-23	53.858	79.374	16:01	2	FT	0.22	FT-23-2
2022-08-18	FT-24	53.994	79.696	16:56	2	FT	0.22	FT-24-2
2022-08-18	FT-25	54.295	79.873	22:01	2	FT	0.22	FT-25-2
2022-08-19	STN-10	53.814	80.711	4:38	2	FT	0.22	STN-10-2
2022-08-19	STN-10	53.814	80.711	4:38	10	ROS	0.22	STN-10-10
2022-08-19	STN-2	54.274	81.476	18:08	2	FT	0.22	STN-2-2
2022-08-19	STN-2	54.274	81.476	18:08	55	ROS	0.22	STN-2-55
2022-08-19	STN-2	54.276	81.479	19:53	10	ROS	0.22	STN-2-10
2022-08-19	STN-2	54.276	81.479	19:53	20	ROS	0.22	STN-2-20
2022-08-19	STN-2	54.277	81.473	22:23	N/A	BBT	0.22	STN-2-BBT
2022-08-20	STN-18	54.686	80.186	11:47	2	FT	0.22	STN-18-2
2022-08-20	STN-18	54.683	80.185	14:27	N/A	ROS	0.22	STN-18-BOX
2022-08-20	STN-18	54.686	80.186	11:47	91	ROS	0.22	STN-18-91
2022-08-20	FT-26	54.882	79.681	19:14	2	FT	0.22	FT-26-2
2022-08-20	FT-27	54.970	79.251	22:23	2	FT	0.22	FT-27-2
2022-08-21	BI-03	55.623	79.026	11:42	2	FT	0.22	BI-03-2
2022-08-21	BI-03	55.628	79.027	13:23	11	ROS	0.22	BI-03-11
2022-08-21	BI-03	55.623	79.026	11:42	91	ROS	0.22	BI-03-91
2022-08-21	BI-04	55.796	79.454	22:40	SFC	ROS	0.22	BI-04-SFC
2022-08-21	BI-04	55.796	79.454	22:40	17	ROS	0.22	BI-04-17
2022-08-21	BI-04	55.796	79.454	22:40	26	ROS	0.22	BI-04-26
2022-08-22	BI-05	55.895	79.779	13:05	41	ROS	0.22	BI-05-41
2022-08-22	BI-05	55.895	79.779	13:05	58	ROS	0.22	BI-05-58
2022-08-22	FT-30	55.684	79.946	19:21	2	FT	0.22	FT-30-2
2022-08-22	FT-31	56.012	80.305	0:01	2	FT	0.22	FT-31-2
2022-08-23	FT-32	56.111	79.518	16:39	2	FT	0.22	FT-32-2

3i. RNA

Cruise Participant: Alia Sanger (McGill), Kallie Strong (CEOS)

Principal Investigators: Nagissa Mahmoudi (McGill)

Objectives:

Viruses in the oceans lyse up to 20% of the microbial biomass, altering the community composition and recycling a huge amount of carbon in a process known as the viral shunt. Viruses are host-specific, and understanding which bacterial populations are being impacted the most in seawater has ramifications on carbon and nutrient biogeochemical cycling.

When viruses lyse bacteria, they cause them to release the contents of their cell into seawater, including ribosomal RNA (rRNA), which is stable in seawater for at least 21 days. By quantifying the relative abundance of extracellular ribosomal RNA (0.22 µm filtrate) and comparing it to the amount of cellular ribosomal RNA (retained on the filter), we can calculate taxon-specific rates of viral lysis.

Methods and Data Collection:

Sampling Underway (Flow-through System):
Method adapted from Zhong et al. (2021). The RNA sample log can be found in Appendix F.

For filtering 100 mL of seawater for RNA samples, 12 steps were followed:

1. Turn on seawater tap and let flow for 5 min
2. After 2 min, record salinity/temperature/latitude/longitude/bottom depth
3. Assemble a BD 50 mL Luer-Lok syringe, a 0.22 µm Millipore Sterivex filter, a 5.0 mL screw cap microtube (Five-0), three 2 mL cryovials and caps, a stand-up Whirl-Pak bag, and a smaller Whirl-Pak bag at your station
4. Label the cryovials, caps, small Whirl-Pak, and Sterivex filters
5. At 5-minute mark open Whirl-Pak bags and fill with at least 200 mL of seawater
    a. If the syringe is being re-used then run under the tap, then rinse three times by drawing 20 mL of seawater into the syringe, swirling around, and plunging out
6. Use a BD 50 mL Luer-Lok syringe to draw 50 mL of water from the Whirl-Pak bags
7. Attach a pre-labelled 0.22 µm Millipore Sterivex filter unit to the syringe
8. Press gently to filter seawater over sink
9. Rinse the 5.0 mL screw cap microtube with filtrate 2x before filling with filtrate
10. Fill the syringe with 50 additional mL of seawater from the Whirl-Pak bags and filter into the sink
11. Remove filter and draw air into the syringe, reattach filter and press to remove any water remaining in the filter
12. Use a 1.0 mL pipette to transfer filtrate into 3 x 2mL cryovials

Future Extraction in the Lab:

Subsequent sample processing involves three steps:

1. Cellular DNA obtained from the 0.22 µm pore-size filter to estimate the number of 16S rRNA genes (rDNAcell).

2. cDNA of cellular RNA to estimate the concentration of cellular 16S rRNA (rRNAcell) using cDNA from the 0.22 µm pore-size filter.

3. Extracellular RNA to estimate the concentration of extracellular 16S rRNA (rRNAext) using cDNA from the <0.22 µm filtrate.

4. Community Engagement

To increase understanding and share in discoveries, the 2022 James Bay Expedition included several community engagement and outreach events. This included visits to communities during the expedition, a youth visit to the vessel, and information-sharing projects and presentations both before and after the James Bay Expedition. Additionally, two community representatives participated on board during the first half of the cruise.

Community Visits:

The ship made brief stops near Sanikiluaq, the Cree Nation of Wemindji, and in the Moose River Estuary, nearby the communities of Moose Factory, and Moosonee. Community members who were curious about the ship were invited on board to learn what research was being done and take a look at the equipment that was used.

Moose Cree Youth Visit:

A youth visit was organized by Moose Cree First Nation and Wildlife Conservation Society (WCS) Canada. Youth and their parents were invited on board to learn about the research happening on the ship and try their hand at using some of the equipment. While the ship was anchored near Moose Factory/Moosonee, youth were welcomed to tour the ship with their parents, and three youth participants stayed on board overnight, with a chaperone.

Community Representatives on Board:

Stella Koostachin, an Elder and Indigenous educator, and her son David Koostachin were aboard the William Kennedy from the time they departed in Churchill until they arrived in their home, Moosonee. They had the opportunity to learn about and participate in all the research that was being done during the first leg of the expedition. Stella has shared some of her experience in the quotation below.

"What defines me? I can now proudly say my homeland defines me and my people. Why do I say this? I have travelled in a ship across and around Hudson Bay and James Bay, something I will never do again. I felt reconnected to everything and to our people as well our language and culture. I feel re-born and renewed from that experience."
Stella Koostachin (Moosonee, ON)

Communication Materials:

In 2022, the Cree Marine Research Needs Working Group continued to bring together regional Cree representatives, Eeyou Marine Region Wildlife Board staff, Parks Canada staff, and researchers biweekly to monthly to exchange updates and discuss future plans. Numerous meetings were held before the cruise. The Working Group also provided a platform for exchanging information about the National Geographic 'Pristine Seas' voyage, which came into northern James Bay in summer 2022.

Similar to 2021, a poster was prepared to present the proposed 2022 field campaign and distributed via the communication network of members of the Cree Marine Research Needs Working Group. The poster was prepared by UM research leads with support from Wildlands League. An image of the poster may be found in Appendix G.

In December 2022, we launched the James Bay Expedition 2022 StoryMap (see Appendix G). This is an ArcGIS Online StoryMap that was created by the UM team to communicate a more visual, interactive, and accessible activity report of the 2022 James Bay Expedition aboard the R/V William Kennedy. This initiative was led by Alessia Guzzi who gathered photos and information of activities on board from many participants and from multiple partners (U of M, DFO Canada, Oceans North, Stella Koostachin). Included photos are credited within the StoryMap.

The StoryMap describes all the major equipment that was used during the expedition to conduct scientific work and details each participating team and what scientific work they conducted on the ship. A summary of the work done, and main goals were provided by most participating teams to understand better the different aspects of research. Community engagement during the expedition is also detailed in the StoryMap, including details and insights shared by Stella Koostachin, an Elder from Moosonee, ON who was aboard the ship. The Map Tour section also details all activities done at major stations with photos while scrolling through station locations on a map, which gives the user the experience of following along on the expedition. An interactive map is also included of all stations with pop-ups of simple metadata information.

This tool was designed to share details and photos of the expedition with community partners, funders, and anyone who is interested in the work done during the 2022 expedition. It can be shared by email and social media using a link (https://arcg.is/1TG9OS2) and can be viewed with internet access on a computer, tablet, or phone. The distribution of this tool is underway and may continue for some time. After the draft version was reviewed by the Cree Marine Research Needs Working Group and revisions made, the “finalized” story map was displayed and shared at the 2022 Hudson Bay Summit in Montreal, QC. It is intended to be shared with all communities involved and associated organizations and it is also intended to be editable to allow additional information and perspectives to be included. We would like to use this as a platform for future engagement with the youth participants, for example.

https://storymaps.arcgis.com/stories/d5e9f3e44de94324addda45bf899986a
https://arcg.is/1TG9OS2 (shortened link)

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Appendix A: Ship Log

Station	Code	No	Date	Time (UTC)			Location in		Location out		Bot Depth	Notes
				Surf	Bottom	Out	Lat (N)	Long (W)	Lat (N)	Long (W)	(m)	
CMO-B	ROS	1	2022-07-25	15:11	15:23	15:38	61.767167	84.269917	61.764067	84.28746667	179	
CMO-B	ROS	2	2022-07-25	16:40	16:52	17:04	61.760717	84.301267	61.759117	84.31033333	180	
CMO-B	MOOR		2022-07-25	18:11	18:16	---	61.760267	84.301183	---	---	181	New CMO-B mooring deployed
CMO-A	ROS	3	2022-07-27	12:03	12:10	12:23	59.983333	91.941067	59.980433	91.94471667	100	
CMO-A	ROS	4	2022-07-27	13:17	13:25	13:31	59.9756	91.9442	59.9737	91.94563333	105	
CMO-A	MOOR		2022-07-27	14:55	---	15:35	59.977733	91.939183	---	---	104	2021 CMO-A moor. retrieved
CMO-A	MOOR		2022-07-27	18:27	18:34	---	59.978033	91.9413	---	---	103	New CMO-A mooring deployed
	---		2022-08-02	13:36	---	---	---	---	---	---	---	Temperature stabilizes - CJ (13:36 (8:36 WPG)) 08-02
	CTD	1	2022-08-04	23:54	23:59	0:00	56.3984	80.3015	56.3979	80.2965	45.7	
	CTD	2	2022-08-05	0:49	0:56	0:58	56.4815	80.2931	56.4805	80.286	62	
	CTD	3	2022-08-05	1:49	1:54	1:55	56.5654	80.2837	56.5644	80.2804	38	
	CTD	4	2022-08-05	2:45	2:50	2:51	56.6444	80.2538	56.6431	80.2498	33.2	
	CTD	5	2022-08-05	3:42	3:49	3:51	56.7267	80.2143	56.7249	80.2085	55.1	
	CTD	6	2022-08-05	4:43	4:48	4:50	56.8081	80.1751	56.805	80.17	24.5	
	CTD	7	2022-08-05	5:47	5:51	5:53	56.8886	80.1415	56.8869	80.1374	31.4	
	CTD	8	2022-08-05	6:42	---	6:52	56.95	80.0381	56.9471	80.0327	57	
	CTD	9	2022-08-05	7:42	---	7:50	57.0033	79.9221	57.0027	79.9202	32.5	
	CTD	NA	2022-08-05	8:38	---	---	57.0133	79.7715	---	---	94	2 downcasts in a row on same cast - use second downcast
	CTD	10	2022-08-05	8:47	8:54	---	57.013	79.7672	57.0126	79.7636	92	2 downcasts in a row on same cast - use second downcast
	CTD	11	2022-08-05	9:33	9:40	---	56.9811	79.6657	56.9803	79.6627	41	

BI-01	ROS	5	2022-08-05	12:36	12:42	12:53	56.9808	79.6651	56.9778	79.657	40.8	Cast #5, light cast
BI-01	CTD	1001	2022-08-05	13:02	13:07	13:09	56.9795	79.6619	56.9777	79.6584	51.1	no CTD cast number ---- giving it Cast# 1001
BI-01	WP2		2022-08-05	13:18	13:21	13:22	56.9808	79.6653	56.9797	79.6633	41.1	
BI-01	WP2		2022-08-05	13:30	13:32	13:33	56.9811	79.6664	56.9808	79.665	39	
BI-01	DINO		2022-08-05	13:43	13:45	13:45	56.984	79.6704	56.9832	79.669	40	
BI-01	ROS	6	2022-08-05	13:54	14:00	14:08	56.9808	79.6643	56.9775	79.6576	45	cast #6
BI-01	BON		2022-08-05	14:19	---	---	56.9779	79.6582	---	---	---	Cancelled, need to change line to a marked one
BI-01	BON		2022-08-05	14:24	14:29	14:43	56.9795	79.6601	56.9878	79.673	61	going 2kn SOG, 180m of warp
BI-01	BON		2022-08-05	14:56	---	15:17	56.9844	79.6688	56.9748	79.6562	48.4	220m warp
BI-01	BON		2022-08-05	15:53	---	16:15	56.9825	79.6674	56.9728	79.6523	46	120m warp
BI-01	ROS	7	2022-08-05	16:39	16:46	16:55	56.9829	79.6681	56.9824	79.6686	43.6	cast #7
BI-01	BS		2022-08-05	18:22	18:31	18:38	56.9847	79.6675	56.9781	79.6599	56	didn't touch bottom
BI-01	BS		2022-08-05	18:49	---	18:52	56.9797	79.6586	---	---	70	cancelled
BI-01	BS		2022-08-05	18:59	19:10	19:17	56.9795	79.6577	56.9721	79.6527	77	issues with sled being upside down in the beginning
BI-01	BS		2022-08-05	19:29	19:37	19:44	56.9731	79.6512	56.9814	79.6581	73.9	
BI-01	BBT		2022-08-05	20:09	20:14	20:27	56.9808	79.6643	56.9743	79.655	46	unsuccessful, missing chains
BI-01	BBT		2022-08-05	20:34	20:39	20:54	56.9757	79.6565	56.986	79.6697	70	
BI-01	PON		2022-08-05	21:35	---	---	56.9816	79.6662	---	---	42.2	Jaws didn't close
BI-01	PON		2022-08-05	21:37	21:38	21:39	56.9817	79.6665	56.9818	79.6666	41.4	
BI-01	PON		2022-08-05	21:48	21:48	21:49	56.9821	79.6678	56.9821	79.6681	37.4	half-open, Maddy took surf samples
BI-01	PON		2022-08-05	22:04	22:06	22:07	56.9815	79.668	----	---	34.2	didn't trigger
BI-01	PON		2022-08-05	22:07	22:08	22:09	56.9816	79.6683	56.9816	79.6686	32.2	
	CTD	12	2022-08-05	23:47	23:55	23:57	56.9305	79.5589	56.9316	79.5585	80	
	CTD	13	2022-08-06	0:39	0:45	0:47	56.8687	79.4614	56.8692	79.462	72.3	
	CTD	14	2022-08-06	1:28	1:33	1:34	56.8064	79.3614	56.8058	79.362	66.4	

	CTD	15	2022-08-06	2:13	2:18	2:20	56.7455	79.2594	56.7449	79.2586	76.6	
	CTD	16	2022-08-06	3:06	3:10	3:12	56.6829	79.1574	56.6814	79.1556	57.1	
	CTD	17	2022-08-06	3:51	3:56	3:57	56.6242	79.053	56.6221	79.0544	49.8	
	CTD	18	2022-08-06	4:39	4:44	4:46	56.5545	78.972	56.5545	78.973	49.7	
BI-02	CTD	2001	2022-08-06	17:46	17:50	17:51	56.4461	78.5917	56.4455	78.5896	46.5	no CTD cast number ---- giving it Cast# 2001
BI-02	ROS	8	2022-08-06	18:03	18:08	18:21	56.4462	78.59	56.4459	78.5853	43	Cast #8, light cast
BI-02	WP2		2022-08-06	18:27	18:29	18:31	56.4457	78.5916	56.4454	78.5912	43	
BI-02	DINO		2022-08-06	18:35	18:38	18:40	56.4463	78.5912	56.4466	78.5899	43	
BI-02	BON		2022-08-06	18:52	18:58	19:00	56.4454	78.5888	56.4445	78.5787	58	Lost weight, end 60m bot depth
B	BON		2022-08-06	19:23	19:32	19:41	56.4431	78.5632	56.4443	78.5846	56.3	
BI-02	ROS	9	2022-08-06	19:53	19:59	20:06	56.4465	78.5922	56.4475	78.5916	45.4	Cast #9
BI-02	BS		2022-08-06	20:16	20:26	20:33	56.4471	78.5915	56.4467	78.5849	43	End bot depth 44.8
BI-02	BBT		2022-08-06	20:55	21:01	21:15	56.4458	78.5922	56.4383	78.5914	44	
BI-02	PON		2022-08-06	21:30	21:30	21:31	56.4472	78.5905	56.4473	78.5903	42.5	
BI-02	PON		2022-08-06	21:35	21:36	21:36	56.4478	78.5895	56.448	78.5893	44.4	
BI-02	BOX		2022-08-06	21:43	21:43	21:44	56.4489	78.5882	56.4491	78.5879	45.3	Jaws didn't close
BI-02	BOX		2022-08-06	21:47	21:47	21:48	56.4493	78.5872	56.4494	78.5867	50.3	
BI-02	ROV		2022-08-06	21:59	---	22:06	56.4463	78.5903	56.4466	78.5884	41.2	
BI-02	ROV		2022-08-06	22:15	22:19	22:22	56.4477	78.5848	56.4485	78.5827	46.6	
BI-02-NS	ROV		2022-08-06	23:00	23:06	23:11	56.4379	78.6505	56.4408	78.6464	26	Looking for kelp, no kelp
BI-02-NS	ROV		2022-08-06	---	---	---	---	---	---	---	---	CJ: tried to go down couldn’t make it to the bottom- 'thrown out'
BI-02-NS	ROV		2022-08-06	---	---	---	---	---	---	---	---	CJ: tried to go down couldn’t make it to the bottom- 'thrown out'
BI-02	BON		2022-08-06	not recorded	19:07	19:11	56.4437	78.5715	56.4433	78.5685	66	
	CTD	19	2022-08-08	1:10	1:15	1:16	56.4913	78.842	56.4913	78.8415	41.5	

	CTD	20	2022-08-08	1:52	1:57	1:58	56.48	78.7086	56.48	78.7087	45.4	
	CTD	21	2022-08-08	2:31	2:36	2:37	56.446	78.5908	56.4448	78.5873	45.7	
	CTD	22	2022-08-08	3:12	3:15	3:16	56.3653	78.5837	56.3641	78.5832	36.4	
	CTD	23	2022-08-08	3:52	3:55	3:56	56.2827	78.5689	56.2807	78.5678	30.2	
	CTD	24	2022-08-08	4:33	4:36	4:37	56.1971	78.5727	56.1956	78.5722	29.1	
	CTD	25	2022-08-08	5:13	5:16	5:18	56.1173	78.5648	56.1163	78.5641	40.5	
	CTD	26	2022-08-08	5:53	5:56	5:58	56.0551	78.6261	56.055	78.6262	44.6	
	CTD	27	2022-08-08	6:32	---	6:41	55.9933	78.6669	55.9928	78.6664	69	
	CTD	28	2022-08-08	7:17	---	7:25	55.9294	78.7272	55.9291	78.7282	73	
	CTD	29	2022-08-08	8:09	---	8:17	55.8494	78.8055	55.8498	78.806	70	
	CTD	30	2022-08-08	9:04	---	9:13	55.7672	78.8833	55.768	78.8838	81.4	
	CTD	31	2022-08-08	9:55	---	10:04	55.694	78.9465	55.6956	78.9478	82	100m hole right beside station
STN3	MOOR		2022-08-09	---	---	0:37	---	---	54.2977	80.0584	63	JB-M3 mooring out
STN3	CTD		2022-08-09	---	---	---	---	---	---	---	---	Cast cancelled
STN3	CTD	3001	2022-08-09	1:23	1:29	1:30	54.2927	80.0591	54.295	80.059	65.2	no CTD cast number ---- giving it Cast# 3001
STN3	ROS	11	2022-08-09	1:38	1:43	1:54	54.2963	80.0576	54.3014	80.0567	66.8	Cast #11, some collected surf from UND
STN3	WP2		2022-08-09	2:03	2:05	2:09	54.2937	80.0592	54.296	80.0593	66.1	69m of line out
STN3	WP2		2022-08-09	2:12	2:14	2:15	54.2974	80.0593	54.2987	80.0591	59	59m of line out
STN3	BON		2022-08-09	2:26	2:30	2:39	54.2948	80.0589	54.2886	80.0561	66.4	170m warp (both times), 64.7m bot depth, bot 2 02:37 65.7m
STN3	BS		2022-08-09	2:50	2:54	3:08	54.29	80.0573	54.2994	80.0568	63	180m warp, 10 min trawl
STN3	BBT		2022-08-09	3:20	3:23	3:45	54.2983	80.0581	54.288	80.0633	65	180m warp, 15 min trawl
STN3	PON		2022-08-09	3:57	3:58	3:59	54.2926	80.0596	54.2935	80.0591	65.1	
STN3	PON		2022-08-09	4:03	4:04	4:05	54.2951	80.0584	54.2957	80.0581	66.3	
STN3	BOX		2022-08-09	4:09	4:10	4:11	54.2975	80.0573	54.2983	80.0571	64.7	didn't close
STN3	BOX		2022-08-09	4:12	4:13	4:13	54.2987	80.0569	54.2994	80.0566	57.5	
STN3	BOX		2022-08-09	4:29	4:29	4:30	54.2953	80.058	54.296	80.0581	66.3	didn't close

STN3	BOX		2022-08-09	4:33	4:33	4:34	54.2968	80.0577	54.2974	80.0573	66.5	
STN3	ROV		2022-08-09	4:40	---	---	54.2997	80.056	---	---	56.2	
STN3	BOX		2022-08-09	4:55	---	4:57	54.3058	80.0538	54.3064	80.0534	35.6	rocks
	CTD	32	2022-08-09	10:38	---	10:43	53.8101	80.7101	53.8096	80.708	21.1	
	CTD	33	2022-08-09	11:16	---	11:21	53.7427	80.6688	53.7428	80.6659	21.1	
	CTD	34	2022-08-09	11:58	---	12:01	53.6672	80.618	53.6674	80.617	25.6	
	CTD	35	2022-08-09	12:44	---	12:48	53.581	80.5585	53.5816	80.5555	36	
	CTD	36	2022-08-09	13:49	13:53	13:53	53.5126	80.5152	53.5134	80.5136	36.6	
STN11	ROS	12	2022-08-09	15:28	15:33	15:46	53.429	80.4628	53.4336	80.4662	48.7	Cast #12, light and phys. casts combined
STN11	CTD	1101	2022-08-09	15:49	15:54	15:55	53.4344	80.4665	53.436	80.4669	46.3	no CTD cast number ---- giving it Cast# 1101
	CTD	37	2022-08-09	16:53	16:56	16:58	53.3539	80.4077	53.3562	80.4077	45.2	
	CTD	38	2022-08-10	2:30	2:34	2:35	53.2715	80.3584	53.271	80.3577	40	
	CTD	39	2022-08-10	3:13	3:18	3:20	53.1972	80.3074	53.1969	80.3065	48.5	
	CTD	40	2022-08-10	4:01	---	4:09	53.1187	80.2564	53.1179	80.256	43.5	
	CTD	41	2022-08-10	6:01	---	6:06	53.0236	80.6084	53.0247	80.6078	12.5	
	CTD	42	2022-08-10	6:50	---	6:55	53.023	80.4716	53.0237	80.4705	28.1	
	CTD	43	2022-08-10	7:44	---	7:50	53.0225	80.3321	53.0258	80.3309	48.9	
STN12	CTD	1201	2022-08-10	9:01	9:06	9:08	53.0208	80.1955	53.0231	80.195	53.5	no CTD cast number ---- giving it Cast# 1201
STN12	ROS	13	2022-08-10	9:20	9:26	9:37	53.0219	80.1937	53.025	80.1911	53.6	Cast #13, some people took surf from UND
STN12	WP2		2022-08-10	9:47	9:50	9:52	53.0202	80.1943	53.0208	80.1937	53.8	60m warp, RBR shows it got to 41m depth
STN12	WP2		2022-08-10	9:57	10:02	10:04	53.0198	80.1966	53.0209	80.195	53.6	95m warp
STN12	BON		2022-08-10	10:15	10:17	10:25	53.0221	80.1945	53.0163	80.1957	54.4	Bot. 1, 80m warp: surf 2: bot. 2, 70m warp: 10:17, 54.3m: 10:18, 54.2m bot depth
STN12	BON		2022-08-10	10:33	10:35	10:49	53.0167	80.1956	53.0244	80.1917	55.5	Formerly labelled BON-B
STN12	ROS	14	2022-08-10	12:12	12:18	12:30	53.0212	80.1941	53.0172	80.1866	55.3	Cast #14, light cast

STN12	DINO		2022-08-10	12:34	12:36	12:38	53.0157	80.1843	53.0143	80.1821	55.1	54.4m, depth at 12:36, 60m warp
STN12	BS		2022-08-10	12:47	12:52	13:06	53.0137	80.1828	53.0185	80.1915	55	
STN12	BBT		2022-08-10	13:19	13:27	13:40	53.0225	80.198	53.0243	80.1981	53.2	200m warp
STN12	PON		2022-08-10	13:50	13:51	13:52	53.0207	80.1928	53.0197	80.1917	55.3	
STN12	PON		2022-08-10	13:56	13:56	13:58	53.0181	80.1898	53.017	80.1887	54.7	
STN12	BOX		2022-08-10	14:04	14:05	14:06	53.0144	80.1854	53.0134	80.1844	54.1	
STN12	BOX		2022-08-10	14:17	14:18	14:19	53.0126	80.1861	53.0121	80.1852	52.1	
STN12	BOX		2022-08-10	14:25	14:26	14:27	53.0132	80.1852	53.0128	80.1842	53.6	Didn't trigger
STN12	BOX		2022-08-10	14:27	14:28	14:29	53.0125	80.1839	53.0118	80.183	53.2	
STN12	BS		2022-08-10	14:42	14:44	14:59	53.0142	80.1864	53.0166	80.1891	54.4	14:46 started 10min timer
STN12	BBT		2022-08-10	15:11	15:16	15:40	53.0206	80.1915	53.0109	80.1663	54.3	15min trawl
	CTD	44	2022-08-10	16:15	16:18	16:19	53.0194	80.0578	53.0186	80.0562	44.3	
	CTD	45	2022-08-10	17:02	17:06	17:07	53.0205	79.9197	53.0221	79.9198	30	
	CTD	46	2022-08-10	17:54	17:58	17:59	53.0192	79.7813	53.0189	79.7811	36.3	
	CTD	47	2022-08-10	18:43	18:48	18:49	53.0191	79.644	53.0202	79.6418	48.6	
	CTD	48	2022-08-10	19:34	19:38	19:39	53.0187	79.5059	53.0205	79.5066	58.7	
STN13	CTD	1301	2022-08-10	20:18	20:23	20:24	53.0193	79.404	53.0225	79.4028	58.9	no CTD cast number ---- giving it Cast# 1301
STN13	ROS	15	2022-08-10	20:40	20:47	21:00	53.0196	79.4052	53.0281	79.4019	63.3	Cast #15, light cast; some people got surf from UND
STN13	WP2		2022-08-10	21:12	21:15	21:17	53.0169	79.4068	53.0194	79.4055	65.4	87m warp
STN13	DINO		2022-08-10	21:22	21:23	21:25	53.02	79.4053	53.0213	79.4047	60	
STN13	BON		2022-08-10	21:32	21:34	22:00	53.0223	79.4034	53.0058	79.4056	57.2	150m warp; 21:41 surf 2; bot 2 21:50 150m warp, surf 3 21:53, bot 3 21:56
STN13	ROS	16	2022-08-10	22:13	22:19	22:26	53.0084	79.4031	53.012	79.4002	49.1	Cast #16
STN13	BS		2022-08-10	22:35	22:41	22:53	53.0147	79.4	53.0105	79.4037	66	
STN13	BOX		2022-08-10	23:30	23:31	23:32	53.0171	79.3878	53.0177	79.3869	61.8	didn't close
STN13	BOX		2022-08-10	23:37	23:38	23:39	53.019	79.3842	53.0194	79.3833	59.6	didn't close
STN13	BOX		2022-08-10	23:44	23:44	23:46	53.0206	79.3866	53.0209	79.3858	58.1	didn't close

STN-13-Z3	BOX		2022-08-11	23:25	---	---	52.9509	78.9016	---	---	18.3	Taken from the ship near Wemindji
	CTD	49	2022-08-12	3:15	---	3:20	53.0179	79.1293	53.0159	79.1299	29.5	
	CTD	50	2022-08-12	4:01	---	4:10	53.0167	79.2665	53.0136	79.2675	41.4	
STN13	BBT		2022-08-12	4:57	5:01	5:22	53.0191	79.3935	53.0181	79.4156	56.2	
STN13	BOX		2022-08-12	5:40	5:41	5:42	53.019	79.4038	53.019	79.4038	58.3	didn't close
STN13	BOX		2022-08-12	5:42	5:43	5:44	53.0188	79.4034	53.0187	79.4032	57.8	
	CTD	51	2022-08-12	9:53	---	10:00	52.9642	80.1532	52.9676	80.1542	58	
	CTD	52	2022-08-12	10:59	---	11:07	52.8843	80.1016	52.8871	80.1035	60.6	
	CTD	53	2022-08-12	11:56	12:01	12:02	52.8056	80.0545	52.8065	80.0539	65.4	
	CTD	54	2022-08-12	12:46	12:51	12:52	52.7323	80.0017	52.7329	79.9995	61.9	
	CTD	55	2022-08-12	13:38	13:42	13:44	52.6538	79.9518	52.654	79.948	58.5	
	CTD	56	2022-08-12	14:31	14:36	14:37	52.5442	79.896	52.5735	79.894	59.2	
	CTD	57	2022-08-12	15:15	15:20	15:21	52.4945	79.8462	52.4935	79.8456	62.6	
	CTD	58	2022-08-12	15:57	16:01	16:03	52.4211	79.7918	52.4206	79.7909	61.6	
	CTD	59	2022-08-12	16:39	16:44	16:45	52.3425	79.7497	52.341	79.7479	63.9	
STN6	CTD	6001	2022-08-12	18:39	18:42	18:43	52.2385	79.6936	52.2385	79.6933	62.3	no CTD cast number ---- giving it Cast# 6001
STN6	ROS	17	2022-08-12	18:53	19:00	19:13	52.2386	79.6936	52.2392	79.6925	62.3	Cast #17, light cast
STN6	DINO		2022-08-12	19:42	19:45	19:47	52.2386	79.6939	52.2387	79.6934	62.4	
STN6	WP2		2022-08-12	19:51	19:53	19:54	52.2389	79.6938	52.239	79.694	62.2	
STN6	BON		2022-08-12	20:05	20:08	20:23	52.2389	79.6922	52.2464	79.6766	62.3	
STN6	ROS	18	2022-08-12	20:38	20:45	20:57	52.239	79.6936	52.2414	79.6916	61.9	Cast #18
STN6	BS		2022-08-12	21:03	21:10	21:23	52.2385	79.6999	52.2439	79.7087	61.9	Cancelled, forgot RBR
STN6	BS		2022-08-12	21:29	21:34	21:50	52.2433	79.7032	52.2402	79.6885	61.9	180m warp, 10 min trawl
STN6	BBT		2022-08-12	22:04	22:09	22:29	52.2289	79.7024	52.2302	79.7024	61.9	240m warp, 15 min trawl
STN6	PON		2022-08-12	22:43	22:44	22:45	52.2397	79.6934	52.2407	79.6932	61.6	
STN6	PON		2022-08-12	22:49	22:50	22:51	52.2422	79.6929	52.243	79.6928	62.3	
STN6	BOX		2022-08-12	22:55	22:55	22:56	52.2448	79.6925	52.2456	79.6924	62.6	didn't close

STN6	BOX		2022-08-12	23:00	23:00	23:02	52.2471	79.6921	52.2479	79.6919	63	fell over
STN6	BOX		2022-08-12	23:16	23:17	23:18	52.2361	79.6944	52.24	79.695	--	Depth not recorded
STN6	BOX		2022-08-12	23:19	23:19	23:20	52.2402	79.6951	52.2408	79.6954	62	a core!! :):)
JB-M5A	MOOR		2022-08-12	---	---	17:27	---	---	52.2707	79.7018	64.2	Retrieved mooring 5A (JB-M5A)
JB-M5B	MOOR		2022-08-12	---	---	18:12	---	---	52.2378	79.694	62.3	Retrieved mooring 5B (JB-M5B)
STN6	BBT		2022-08-13	0:12	0:19	0:39	52.2505	79.6957	52.2666	79.6929	62.9	
	CTD	60	2022-08-13	1:30	1:34	1:35	52.3784	79.7104	52.38	79.7106	49.8	
	CTD	61	2022-08-13	2:34	2:39	2:40	52.394	79.5797	52.3944	79.5808	69.6	
	CTD	62	2022-08-13	3:21	3:27	3:29	52.4232	79.4517	52.4246	79.4491	78.2	
	CTD	63	2022-08-13	3:41	3:47	3:48	52.4301	79.4092	52.4313	79.4071	79.6	
	CTD	64	2022-08-13	4:15	4:20	4:22	52.4238	79.319	52.4249	79.3187	77.6	
	CTD	65	2022-08-13	5:05	---	5:11	52.4113	79.1823	52.4113	79.1802	56.1	
	CTD	66	2022-08-13	5:55	---	6:00	52.3854	79.0502	52.386	79.0489	48.4	
	CTD	67	2022-08-13	6:41	6:45	6:47	52.3354	78.9411	52.3362	78.9407	55.2	
	CTD	68	2022-08-13	7:13	---	---	52.304	78.8903	---	---	38.8	
STN9	ROS	19	2022-08-13	11:10	11:20	11:34	52.3112	78.8957	52.317	78.8973	38	Cast #19, light cast. There was an issue, see rosette log
STN9	WP2		2022-08-13	11:50	11:52	11:54	52.3075	78.8927	52.3099	78.8928	38.8	50m warp
STN9	DINO		2022-08-13	12:03	---	12:05	52.307	78.8925	52.308	78.8926	38.1	
STN9	BON		2022-08-13	12:17	---	12:21	52.3013	78.8915	52.2991	78.8915	41.7	TEST - Cancelled
STN9	BON		2022-08-13	12:28	---	12:44	52.2959	78.8906	52.2882	78.8903	29.1	
STN9	ROS	20	2022-08-13	13:01	13:10	13:19	52.2951	78.8912	52.302	78.8902	31.8	Cast #20
STN9	BS		2022-08-13	13:30	13:34	13:46	52.3056	78.8892	52.3012	78.8888	39.8	
STN9	BBT		2022-08-13	14:03	14:06	14:20	52.304	78.8905	52.2949	78.8901	38.8	10min trawl
STN9	PON		2022-08-13	14:48	14:49	14:50	52.3045	78.8912	52.3048	78.8907	39.5	
STN9	PON		2022-08-13	14:54	14:55	14:56	52.3052	78.8899	52.3053	78.8897	39.8	
STN9	BOX		2022-08-13	15:00	15:01	15:02	52.3058	78.8891	52.3059	78.889	41.1	didn't close, fell over

STN9	BOX		2022-08-13	15:05	15:05	15:06	52.3063	78.8884	52.3063	78.8883	41.7	didn’t close
STN9	BOX		2022-08-13	15:07	15:07	15:08	52.3063	78.8882	52.3065	78.8882	41.5	didn't close, fell over
STN9	BOX		2022-08-13	15:11	15:11	15:12	52.3069	78.8878	52.307	78.8878	40.9	worked
STN14	ROS	21	2022-08-13	18:38	18:54	19:13	52.4282	79.4052	52.4251	79.404	75.1	Cast #21, issues equilibrating
STN14	BOX		2022-08-13	19:24	19:25	19:26	52.4308	79.4068	52.4305	79.4067	81.5	didn't close
STN14	BOX		2022-08-13	19:30	19:31	19:32	52.43	79.4065	52.4298	79.4064	79.6	didn't trigger
STN14	BOX		2022-08-13	19:32	19:33	19:34	52.4297	79.4063	52.4296	79.4062	78.9	It worked!!!
STN14	BOX		2022-08-13	20:01	20:01	20:02	52.4317	79.4067	52.4318	79.4066	79.6	
STN14	CTD	1401	2022-08-13	20:21	20:26	20:28	52.4318	79.4075	52.4319	79.4078	78.6	no CTD cast number ---- giving it Cast# 1401
JB-H	MOOR		2022-08-13	20:48	---	---	52.4317	79.4092	---	---	78.1	Mooring deployed
	CTD	69	2022-08-14	0:28	0:33	0:34	52.1989	79.7793	52.2	79.7787	46.4	
	CTD	70	2022-08-14	1:23	1:27	1:27	52.1188	79.8276	52.1191	79.828	32.6	
	CTD	71	2022-08-14	2:25	2:28	2:29	52.0436	79.8874	52.0437	79.8869	19.7	
	CTD	72	2022-08-14	3:10	3:13	3:14	51.9676	79.9435	51.9672	79.9437	19.9	
	CTD	73	2022-08-14	3:54	3:57	3:58	51.8901	79.9895	51.889	79.9906	24	
	CTD	74	2022-08-14	4:38	4:41	4:42	51.8129	80.0435	51.8114	80.0428	27.4	
	CTD	75	2022-08-14	5:25	---	5:31	51.7361	80.096	51.7339	80.0957	13	
	CTD	76	2022-08-14	6:04	---	---	51.6599	80.1484	---	---	14.1	
	CTD	77	2022-08-14	6:45	---	6:50	51.5812	80.1973	51.5794	80.1961	13.5	
	CTD	78	2022-08-14	7:25	---	7:31	51.5022	80.2343	51.5007	80.2339	10	
	1 BAD CAST		2022-08-14	7:45	---	---	---	---	---	---	---	Bad cast, had to reposition ship
	CTD	79	2022-08-14	7:47		7:52	51.4717	80.2436	51.4712	80.244	7.9	Moose River Anchor
MRE	BOX		2022-08-15	20:08	20:08	20:09	51.4716	80.2434	51.4715	80.2434	8.1	Time approximate, taken for practice by Grace
	CTD	91	2022-08-16	14:36	14:43	14:43	51.6969	80.1202	51.6974	80.1202	13	1st cast after CTD rescue
	CTD	92	2022-08-16	14:48	14:52	14:52	51.7038	80.1219	51.704	80.122	12.8	
	CTD	93	2022-08-16	22:00	22:08	22:10	52.4323	79.4056	52.4318	79.4067	80.7	

JB-H	MOOR		2022-08-16	23:22	---	---	52.4317	79.4089	---	---	78.1	Redeployed mooring JB-H
JB-H	MOOR		2022-08-16	---	---	22:14	---	---	52.4317	79.4085	77.6	Retrieved mooring JB-H
	CTD	94	2022-08-17	0:06	0:10	0:11	52.5131	79.4047	52.5152	79.4042	57.5	
	CTD	95	2022-08-17	0:45	0:49	0:59	52.5972	79.4065	52.604	79.4009	55.4	CTD caught on ship, but rescued!
	CTD	96	2022-08-17	1:33	1:37	1:39	52.6815	79.3969	52.6821	79.3966	59.7	
	CTD	97	2022-08-17	2:15	2:19	2:21	52.7622	79.3816	52.7653	79.3827	58.1	
	CTD	98	2022-08-17	2:50	2:55	2:57	52.8392	79.3839	52.8431	79.3844	76.5	
	CTD	99	2022-08-17	3:33	3:38	3:39	52.9305	79.3871	52.9327	79.3875	65.1	
	CTD	100	2022-08-17	4:18	4:22	4:24	53.0191	79.4041	53.0204	79.4036	58.8	
	CTD	101	2022-08-17	5:04	5:07	5:08	53.0167	79.2665	53.016	79.2668	41.4	
	CTD	102	2022-08-17	5:48	5:51	5:52	53.0184	79.1283	53.0179	79.1272	28.8	
	CTD	103	2022-08-17	6:32	6:36	6:37	52.9357	79.1137	52.9351	79.1132	39.2	
STN13	BOX		2022-08-17	13:30	13:30	13:31	52.9513	78.9007	52.9513	78.9007	16.2	
	CTD	112	2022-08-18	3:56	4:02	4:03	53.0219	79.408	53.024	79.4089	58.8	
	CTD	113	2022-08-18	4:35	4:40	4:41	53.0944	79.4171	53.0967	79.4159	44.9	
	CTD	114	2022-08-18	5:18	5:19	5:21	53.1722	79.3774	53.1744	79.3765	40.2	
	CTD	115	2022-08-18	6:03	6:07	6:09	53.2551	79.3856	53.2534	79.3865	38.1	
	CTD	116	2022-08-18	6:55	6:59	7:01	53.3155	79.484	53.3131	79.4869	36.8	
	CTD	117	2022-08-18	7:54	7:58	8:00	53.4041	79.498	53.4042	79.4971	43.3	
	CTD	118	2022-08-18	8:50	8:54	---	53.4927	79.5126	---	---	58.4	
STN16	BOX		2022-08-18	9:00	9:01	9:01	53.4927	79.5126	53.492	79.5134	61.6	Same as CTD-118
	CTD	119	2022-08-18	10:07	10:12	10:13	53.5744	79.5254	53.5752	79.5269	42.5	
	CTD	120	2022-08-18	10:53	---	10:59	53.6587	79.5458	---	---	50.8	
	CTD	121	2022-08-18	11:42	11:44	11:45	53.7443	79.5585	---	---	38.8	Dark calib on transm.
	CTD	122	2022-08-18	12:14	12:19	---	53.8077	79.5856	---	---	42.5	
	CTD	123	2022-08-18	13:03	13:08	13:08	53.8108	79.4445	53.8115	79.444	29	
STN17	CTD	124	2022-08-18	13:45	13:49	13:49	53.8648	79.3437	53.8669	79.3437	36.6	STN-17
STN17	ROS	22	2022-08-18	13:56	14:03	14:19	53.8708	79.3425	53.8781	79.3396	34.2	

STN17	WP2		2022-08-18	14:33	14:35	14:36	53.8656	79.3434	53.8667	79.3436	36.6	40m warp
STN17	WP2		2022-08-18	14:43	14:44	14:46	53.866	79.3421	53.8667	79.3424	36.4	38m warp
STN17	BOX		2022-08-18	14:52	14:52	14:53	53.8655	79.3426	53.8656	79.3429	36.8	
STN17	PON		2022-08-18	15:00	15:01	15:01	53.8677	79.3432	53.8684	79.3431	35.2	
STN17	PON		2022-08-18	15:05	15:06	15:06	53.8699	79.3429	53.8702	79.3428	35	
STN17	BON		2022-08-18	15:21	15:22	15:33	53.8703	79.3415	53.8643	79.3418	35	50m warp (1st and 2nd), 1.7 kn SOG, 40 degree angle, @3rd, 4th and 5th 45m warp
	CTD	125	2022-08-18	17:35	17:41	17:42	53.8872	79.6336	53.8878	79.6318	43.9	
	CTD	126	2022-08-18	18:26	18:31	---	53.9666	79.6789	---	---	53.9	
	CTD	127	2022-08-18	19:22	19:27	19:28	54.0453	79.7262	54.0453	79.7262	41.1	
	CTD	128	2022-08-18	20:13	20:18	20:19	54.1236	79.7724	54.1242	79.7727	43.5	
	CTD	129	2022-08-18	21:00	21:05	21:06	54.2021	79.819	54.2022	79.8199	50.1	
	CTD	130	2022-08-18	21:53	21:59	22:00	54.2939	79.8727	54.2951	79.8732	54.2	
	CTD	131	2022-08-18	22:45	22:51	22:51	54.2353	79.977	54.2369	79.9805	56.2	
	CTD	132	2022-08-18	23:35	23:40	23:42	54.1765	80.0784	54.1784	80.0811	47	
	CTD	133	2022-08-19	0:24	0:29	0:30	54.1202	80.1783	54.121	80.1819	56.8	
	CTD	134	2022-08-19	1:11	1:16	1:18	54.0599	80.2793	54.0594	80.2811	51.8	
	CTD	135	2022-08-19	1:58	2:03	2:05	54.0021	80.3819	54.0025	80.3844	52	
	CTD	136	2022-08-19	2:46	2:51	2:51	53.9445	80.4816	53.9446	80.4831	29.2	
	CTD	137	2022-08-19	3:31	3:34	3:35	53.8874	80.5846	53.8876	80.5861	21.5	
STN10	CTD	138	2022-08-19	4:26	4:30	4:30	53.8135	80.7118	53.8139	80.7124	21	STN-10
STN10	ROS	23	2022-08-19	4:38	4:44	4:48	53.8139	80.7107	53.815	80.71	21	CTD pump issues, see rosette log
STN10	WP2		2022-08-19	4:55	4:56	4:57	53.8129	80.712	53.8129	80.712	21.5	19m warp
STN10	PON		2022-08-19	5:03	5:03	5:04	53.8132	80.7115	53.8133	80.7114	21.3	rocks
STN10	PON		2022-08-19	5:07	5:07	5:08	53.8135	80.7117	53.8136	80.7116	21.9	
STN10	BS		2022-08-19	5:17	5:22	5:34	53.8135	80.7116	53.8176	80.7052	21.7	10min trawl, 63m warp
STN10	BON		2022-08-19	5:53	---	6:05	53.8158	80.7098	53.8221	80.7016	20	

	CTD	139	2022-08-19	6:58	7:02	---	53.8538	80.8386	---	---	28.4	
	CTD	140	2022-08-19	7:49	7:55	---	53.9021	80.9553	---	---	39.4	
	CTD	141	2022-08-19	8:42	---	---	53.9481	81.0709	---	---	37.5	
	CTD	142	2022-08-19	9:32	9:36	---	53.9959	81.187	53.9949	81.189	30	
	CTD	143	2022-08-19	10:18	10:22	---	54.0449	81.3061	---	---	37.1	
	CTD	144	2022-08-19	10:59	11:05	---	54.0914	81.4213	---	---	46	
	CTD	145	2022-08-19	11:42	11:47	---	54.1395	81.5366	54.1393	81.5399	52.1	
	CTD	146	2022-08-19	12:25	12:31	---	54.1871	81.6536	---	---	55	
	CTD	147	2022-08-19	13:09	13:14	13:15	54.2339	81.7688	54.2348	81.7702	43.4	
	CTD	148	2022-08-19	13:46	13:51	13:51	54.2747	81.8622	54.276	81.8633	32.4	Mooring location M1
JB-M1	MOOR		2022-08-19	13:59	---	14:03	54.2743	81.8601	54.2745	81.8602	33	M1 retrieval
	CTD	149	2022-08-19	14:43	14:49	14:50	54.2716	81.7219	54.2712	81.7193	44.8	
	CTD	150	2022-08-19	15:29	15:35	15:37	54.2733	81.5773	54.272	81.5746	56.2	
	CTD	151	2022-08-19	16:09	16:15	16:16	54.2785	81.4791	54.2762	81.4779	62.1	
JB-M2	MOOR		2022-08-19	16:34	---	16:48	54.2772	81.4789	54.2722	81.4763	62.2	M2 retrieval
STN2	ROS	24	2022-08-19	18:08	18:21	18:41	54.2744	81.4761	54.2657	81.4678	62.1	
STN2	WP2		2022-08-19	18:53	18:55	18:58	54.2777	81.4792	54.2771	81.4784	62.2	
STN2	WP2		2022-08-19	19:04	19:06	19:08	54.2769	81.4784	54.2763	81.4772	62.2	
STN2	DINO		2022-08-19	19:13	19:15	19:17	54.2774	81.4802	54.2767	81.479	62.1	
STN2	BON		2022-08-19	19:25	19:29	19:40	54.2773	81.4793	54.2705	81.4693	61	
STN2	ROS	25	2022-08-19	19:53	20:05	20:19	54.276	81.4759	54.274	81.4699	61.7	
STN2	BS		2022-08-19	20:26	20:36	20:52	54.2762	81.4757	54.2811	81.4797	61.7	10min trawl, 180m warp
STN2	PON		2022-08-19	21:24	21:25	21:26	54.2777	81.4775	54.2775	81.477	61.1	
STN2	PON		2022-08-19	21:30	21:31	21:32	54.2771	81.4774	54.277	81.4776	61	
STN2	BOX		2022-08-19	21:37	21:37	21:38	54.2767	81.477	54.2766	81.4766	60.8	
STN2	BOX		2022-08-19	21:44	21:45	21:45	54.2762	81.4751	54.2761	81.4747	60.5	didn't close
STN2	BOX		2022-08-19	21:46	21:46	21:47	54.276	81.4746	54.276	81.4744	60.1	
STN2	BOX		2022-08-19	21:49	21:49	21:50	54.2758	81.4738	54.2756	81.4733	59.8	didn't close

STN2	BOX		2022-08-19	21:53	21:53	21:54	54.2755	81.4728	54.2754	81.4722	59.4	
STN2	BOX		2022-08-19	22:01	22:01	22:02	54.2749	81.4701	---	---	58.3	
STN2	BBT		2022-08-19	22:23	22:29	22:50	54.2773	81.4729	54.2779	81.449	56.7	57.24 average depth
	CTD	152	2022-08-19	23:40	23:45	23:46	54.281	81.2717	54.2813	81.2683	49.4	
	CTD	153	2022-08-20	0:20	0:25	---	54.2796	81.1454	---	---	42.8	
	CTD	154	2022-08-20	1:06	1:09	1:10	54.2841	81.0027	54.2844	81.0015	25.5	
	CTD	155	2022-08-20	1:50	1:54	1:56	54.2855	80.8626	54.2841	80.8616	44.4	
	CTD	156	2022-08-20	2:34	2:38	2:39	54.2835	80.73	54.282	80.7291	40	
	CTD	157	2022-08-20	3:20	3:25	3:26	54.2843	80.5927	54.2835	80.5917	50.1	
	CTD	158	2022-08-20	4:12	4:16	4:19	54.2872	80.4384	54.2869	80.4361	47.2	
	CTD	159	2022-08-20	4:59	5:04	5:06	54.2913	80.2964	54.2897	80.2953	60.9	
	CTD	160	2022-08-20	5:46	5:50	5:53	54.2931	80.1576	54.2927	80.158	48	
	CTD	161	2022-08-20	6:37	6:42	6:44	54.2925	80.0143	54.2904	80.0155	56.3	
	CTD	162	2022-08-20	7:34	7:38	7:40	54.3709	80.0688	54.3891	80.0696	46.7	
	CTD	163	2022-08-20	8:32	8:38	---	54.4479	80.0735	---	---	64.5	
	CTD	164	2022-08-20	9:19	9:24	---	54.5215	80.086	---	---	69.5	
	CTD	165	2022-08-20	10:07	10:13	---	54.6084	80.0954	---	---	101	
	CTD	166	2022-08-20	10:51	10:56	10:58	54.6852	80.1017	54.6864	80.1036	58	
	CTD	167	2022-08-20	11:22	11:29	11:31	54.6881	80.1858	54.6879	80.188	101	BaysSys 2016 mooring location
STN18	ROS	26	2022-08-20	11:47	11:56	12:12	54.6864	80.1864	54.6862	80.1894	100	Cast #26, light cast
STN18	WP2		2022-08-20	12:23	12:25	12:30	54.6863	80.1912	54.6865	80.1922	104	
STN18	WP2		2022-08-20	12:36	12:39	12:42	54.6851	80.185	54.6854	80.1856	96.9	94m warp
STN18	DINO		2022-08-20	12:52	12:54	12:58	54.6856	80.1872	54.686	80.1878	100	91m warp
STN18	ROS	27	2022-08-20	13:05	13:13	13:25	54.6867	80.1886	54.6876	80.1885	102	Cast #27
STN18	BON		2022-08-20	13:33	13:38	13:42	54.6871	80.1878	54.6835	80.1866	103	1 cycle, 180m warp
STN18	PON		2022-08-20	13:57	13:59	14:00	54.6828	80.186	54.6828	80.1858	96.8	
STN18	PON		2022-08-20	14:01	14:02	14:04	54.6828	80.1857	54.6828	80.1853	96.9	
STN18	PON		2022-08-20	14:07	14:08	14:10	54.6828	80.1849	54.6828	80.1845	96.8	

STN18	BOX		2022-08-20	14:16	14:18	14:20	54.6827	80.1837	54.6827	80.1836	95.9	
STN18	BS		2022-08-20	14:27	14:33	14:46	54.6826	80.1845	54.6783	80.1832	95.5	10min trawl, 200m warp
STN18	BBT		2022-08-20	15:09	15:17	15:39	54.6807	80.183	54.6919	80.1901	95.9	15min trawl, 370m warp
	CTD	168	2022-08-20	16:25	16:31	16:37	54.7382	80.0749	---	---	110	
	CTD	169	2022-08-20	17:15	17:21	17:24	54.7816	79.9541	54.7811	79.9517	102	
	CTD	170	2022-08-20	18:03	18:09	18:12	54.8254	79.8318	54.8241	79.8305	113	
	CTD	171	2022-08-20	18:54	19:00	19:03	54.8711	79.7114	54.8704	79.7099	114	
	CTD	172	2022-08-20	19:43	19:50	19:53	54.917	79.5917	54.9164	79.5901	105	
	CTD	173	2022-08-20	20:19	20:25	20:28	54.9491	79.521	54.9487	79.5208	103	
	CTD	174	2022-08-20	21:09	21:15	21:17	54.9493	79.3748	54.9482	79.3717	97.6	
	CTD	175	2022-08-20	21:51	21:58	---	54.9509	79.2802	---	---	108	
	CTD	176	2022-08-20	23:25	23:33	23:36	55.0336	79.2511	55.0322	79.2499	118	
	CTD	177	2022-08-21	0:22	0:30	0:33	55.1196	79.2517	55.1181	79.2498	133	
	CTD	178	2022-08-21	1:15	1:23	1:25	55.1994	79.2545	55.2004	79.2563	98.3	
	CTD	179	2022-08-21	2:05	2:15	2:19	55.2826	79.2541	55.2848	79.2573	185	
	CTD	180	2022-08-21	2:58	3:10	3:14	55.3657	79.2539	55.3673	79.2555	192	
	CTD	181	2022-08-21	3:55	4:03	4:06	55.449	79.2556	55.448	79.2536	142	
	CTD	182	2022-08-21	5:07	5:13	---	55.5323	79.2571	---	---	94.9	
	CTD	183	2022-08-21	5:53	5:59	6:01	55.6058	79.2576	55.6045	79.2528	92.8	
	CTD	184	2022-08-21	6:37	6:42	---	55.6192	79.135	---	---	60.8	
BI-M1	MOOR		2022-08-21	11:03	---	---	55.6202	79.0273	---	---	92.8	BI-M1 deployment
	CTD	185	2022-08-21	11:19	11:24	11:27	55.6192	79.029	55.6201	79.0283	92.1	Near BI-M1
BI-03	ROS	28	2022-08-21	11:42	11:53	12:08	55.6226	79.0263	55.6246	79.0234	99	
BI-03	WP2		2022-08-21	12:14	12:17	12:21	55.6252	79.0222	55.6258	79.0207	105	Cast #28
BI-03	WP2		2022-08-21	12:27	12:30	12:34	55.6265	79.0191	55.6272	79.0176	111	
BI-03	DINO		2022-08-21	12:41	12:44	12:49	55.6279	79.0158	55.6289	79.0132	110	
BI-03	BON		2022-08-21	12:57	13:01	13:05	55.6297	79.0142	55.6286	79.0207	108	
BI-03	ROS	29	2022-08-21	13:23	13:31	13:44	55.628	79.027	55.6305	79.021	114	Cast #29

BI-03	PON		2022-08-21	13:48	13:50	13:51	55.6313	79.0192	55.6318	79.0183	126	
BI-03	PON		2022-08-21	13:55	13:56	13:58	55.6324	79.0169	55.6327	79.0161	124	
BI-03	BOX		2022-08-21	not recorde d	14:05	14:07	55.6337	79.0134	55.6341	79.0128	114	In coords recorded at bottom, no core recovered
BI-03	BOX		2022-08-21	not recorde d	14:14	14:16	55.6351	79.0099	55.6354	79.0093	103	No core recovered, only geochem sample
BI-03	BS		2022-08-21	14:32	14:35	14:38	55.6376	79.0048	55.6356	79.0095	103	200m warp, tow time 3mins, rep 1 of 2
BI-03	BS		2022-08-21	14:49	14:55	14:58	55.6319	79.0169	55.629	79.0224	125	250m warp, tow time 3mins, rep 2 of 2
BI-03	BBT		2022-08-21	15:10	15:21	15:36	55.6253	79.0295	55.6186	79.0427	117	450m warp, tow time 15mins
	CTD	186	2022-08-21	19:14	19:20	19:24	55.6039	79.3784	55.6059	79.3756	133	
	CTD	187	2022-08-21	20:01	20:08	20:10	55.6748	79.3872	55.6762	79.3846	107	
BI-04	ROS	30	2022-08-21	22:40	22:46	22:53	55.7906	79.4547	55.7934	79.4542	34.6	
BI-04	WP2		2022-08-21	23:02	---	23:06	55.796	79.4537	55.7973	79.4535	---	
BI-04	PON		2022-08-21	23:16	23:17	23:17	55.8003	79.4529	55.8008	79.4527	48.2	
BI-04	PON		2022-08-21	23:20	23:20	23:21	55.8015	79.4527	55.802	79.4527	49.4	
BI-04	BS		2022-08-21	23:34	23:28	23:43	55.8016	79.4555	55.7981	79.4552	48.7	Trawl 3mins
BI-04	BBT		2022-08-21	23:57	0:00	0:09	55.7959	79.4543	55.8023	79.4526	61.2	Trawl 5mins
	CTD	188	2022-08-22	1:23	1:29	1:30	55.7521	79.581	55.7541	79.5781	45.9	
	CTD	189	2022-08-22	2:17	2:25	2:27	55.7074	79.7098	55.7068	79.7088	101	
	CTD	190	2022-08-22	2:51	3:01	3:05	55.7012	79.7875	55.7023	79.7846	174	
	CTD	191	2022-08-22	3:55	4:00	4:01	55.7795	79.8267	55.7794	79.8249	52.3	
	CTD	192	2022-08-22	4:40	4:44	4:47	55.8117	79.7807	55.8117	79.7786	37.7	
	CTD	193	2022-08-22	5:17	5:21	5:22	55.8468	79.7416	55.8462	79.7404	47.9	
	CTD	194	2022-08-22	5:50	5:55	5:56	55.8815	79.7011	55.8803	79.7	51.2	
	CTD	195	2022-08-22	6:19	6:24	6:25	55.9164	79.6606	55.9153	79.6596	51.5	
	CTD	196	2022-08-22	6:48	6:51	6:53	55.9526	79.6267	55.9519	79.6254	37.3	
	CTD	197	2022-08-22	8:08	8:13	8:15	55.8657	79.8072	55.8638	79.8065	78.6	

	CTD	198	2022-08-22	11:07	11:13	11:15	55.9035	79.77	55.9019	79.7703	75.4	
	CTD	199	2022-08-22	12:40	12:46	12:48	55.8934	79.7764	55.8921	79.7772	68.9	
BI-05	ROS	31	2022-08-22	13:05	13:08	13:25	55.8907	79.7781	55.8858	79.7774	73.7	
BI-05	WP2		2022-08-22	13:35	13:37	13:40	55.8968	79.7795	55.8961	79.7792	80.4	
BI-05	WP2		2022-08-22	13:46	13:48	13:51	55.8947	79.779	55.8937	79.7788	72.9	
BI-05	DINO		2022-08-22	13:56	13:59	14:01	55.8925	79.7787	55.8915	79.7786	70.6	
BI-05	BON		2022-08-22	14:12	14:15	14:26	55.8948	79.7763	55.901	79.7766	69.6	
BI-05	ROS		2022-08-22	14:42	---	---	55.898	79.7763	---	---	64	Cast cancelled, cable frayed
BI-05	PON		2022-08-22	14:57	14:58	14:59	55.8954	79.7741	55.895	79.7737	64	Rocky
BI-05	PON		2022-08-22	15:03	15:04	15:05	55.8944	79.7749	55.894	79.7752	66.5	
BI-05	BS		2022-08-22	15:40	15:46	15:49	55.8897	79.7902	55.8928	79.7838	86	Warp is 250m time is 3mins
BI-05	BBT		2022-08-22	16:07	16:07	16:25	55.8952	79.7778	55.8888	79.7838	72.7	
BI-M2	MOOR		2022-08-23	0:35	---	---	56.0083	80.3026	---	---	110	BI-M2 deployment
	CTD	200	2022-08-23	0:52	0:59	1:02	56.0088	80.3059	56.0087	80.3067	118	By BI-M2
	CTD	201	2022-08-23	1:44	1:51	1:54	55.9313	80.3028	55.9313	80.3048	100	
	CTD	202	2022-08-23	2:32	2:35	2:37	55.8615	80.2801	55.8613	80.2794	38.2	
	CTD	203	2022-08-23	3:23	3:28	3:30	55.7819	80.2549	55.7829	80.2533	44.4	
	CTD	204	2022-08-23	4:13	4:17	4:19	55.7037	80.2102	55.7034	80.2075	41.8	
	CTD	205	2022-08-23	5:01	5:06	5:08	55.629	80.1661	55.6295	80.1633	97.9	
	CTD	206	2022-08-23	5:51	5:54	5:55	55.6711	80.0387	55.6707	80.0379	30.8	
	CTD	207	2022-08-23	6:38	6:42	6:43	55.7088	79.9158	55.71	79.9155	56.4	
	CTD	208	2022-08-23	16:33	16:33	16:34	56.1109	79.5175	56.111	79.5176	21.8	Anchored
	CTD	209	2022-08-23	22:53	22:56	22:58	56.0724	79.5126	56.0723	79.5111	77.5	
	CTD	210	2022-08-23	23:22	23:26	23:28	56.0329	79.5418	56.0326	79.5405	43.8	
	CTD	211	2022-08-23	23:56	0:01	---	55.9969	79.578	---	---	55	
	CTD	212	2022-08-24	0:51	0:55	0:55	55.9296	79.6376	55.9289	79.637	30.5	
	CTD	213	2022-08-24	7:32	7:37	7:39	55.6104	80.4589	55.6084	80.4549	73.8	

	CTD	214	2022-08-24	9:08	9:19	---	55.5931	80.754	---	---	99.7	
	CTD	215	2022-08-24	10:52	10:59	---	55.576	81.0451	---	---	99.9	
	CTD	216	2022-08-24	12:32	12:38	12:40	55.5599	81.3435	55.5579	81.3423	92.5	
	CTD	217	2022-08-24	14:00	14:07	14:08	55.5509	81.6343	---	---	82.5	
	CTD	218	2022-08-24	15:29	15:34	15:36	55.5356	81.9262	55.535	81.9269	69.9	
	CTD	219	2022-08-24	17:08	17:13	17:14	55.5105	82.2148	55.5093	82.2124	49.7	
	CTD	220	2022-08-24	19:00	19:04	19:05	55.4943	82.5084	55.4922	82.5022	21.4	

NOTES:

Station: Indicates the station number or the mooring identifier. BI refers to stations and mooring locations around the Belcher Islands. JB refers to moorings deployed in James Bay. Stations beginning with STN are in James Bay. CMO refers to moorings associated with the Churchill Marine Observatory. The following are mooring identifiers: BI-M1, BI-Me, CMO-A, CMO-B, JB-H, JB-M1, JB-M2, JB-M5A, JB-M5B. STN-13-Z3 is given a zodiac identifier but occurred on the ship located near Wemindji.

Code: Indicates the equipment or sample taken. BBT = bottom benthic trawl, BON = bongo nets, BOX = box corer, BS = bottom sled trawl, CTD= conductivity temperature and depth sonde, DINO = dinoflagellate nets, MOOR = mooring, PON = ponar grab, ROS = rosette, ROV = remotely operated vehicle, WP2 = vertical zooplankton net.

No: Number for rosette cast (ROS) or conductivity temperature and depth sonde (CTD) cast.

Appendix B: Zodiac Log

				Time (UTC)			Location in		Location out			
Station	Code	No	Date	Surf	Bottom	Out	Lat (N)	Long (W)	Lat (N)	Long (W)	Bottom depth (m)	Notes
CTD-Z1	CTD	1002	2022-08-05	19:10	---	---	56.97015	79.66902	---	---	5.1	~25m off from Z2, location used from CTD-Z2 ---- Cast# 1002
CTD-Z2	CTD	1003	2022-08-05	19:30	---	---	56.97015	79.66902	---	---	13-14m	2 downcast (use last one) ---- Cast# 1003
CTD-Z3	CTD	1004	2022-08-05	20:36	---	---	56.969932	79.667573	---	---	25	no CTD cast number ---- Cast# 1004
BI-02	ROV		2022-08-06	21:59	---	22:06	56.4463	78.5903	56.4466	78.5884	41.2	
BI-02	ROV		2022-08-06	22:15	22:19	22:22	56.4477	78.5848	56.4485	78.5827	46.6	
BI-02-NS	ROV		2022-08-06	---	---	---	---	---	---	---	---	CJ: tried to go down couldn’t make it to the bottom- 'thrown out'
BI-02-NS	ROV		2022-08-06	23:00	23:06	23:11	56.4379	78.6505	56.4408	78.6464	26	Looking for kelp, no kelp
BI-02-NS	ROV		2022-08-06	---	---	---	---	---	---	---	---	CJ: tried to go down couldn’t make it to the bottom- 'thrown out'
STN-13-Z1	NISK		2022-08-11	21:21	---	21:21	52.9974	78.8111	52.9974	78.8111	1.19	
STN-13-Z2 (A)	NISK		2022-08-11	22:04	22:04	22:06	52.9963	78.8225	52.9963	78.8225	7.38	
STN-13-Z2 (A)	CTD	1302	2022-08-11	22:04	22:04	22:06	52.9963	78.8225	52.9963	78.8225	7.38	no CTD cast number ---- giving it Cast# 1302, 1303, 1304
STN-13-Z3 (B)	CTD	1303	2022-08-11	23:01	23:01	23:03	---	---	---	---	9.83504	Bottom depth originally recorded as 32.3ft --- no location information
STN-13-Z4 (C)	CTD	1304	2022-08-11	23:22	23:22	23:24	---	---	---	---	17.6784	Bottom depth originally recorded as 58ft
STN-6-ZA	CTD	6002	2022-08-12	20:20	---	---	52.2476	79.5343	---	---	9.2	+Niskin, grab, CTD cast # 6002
STN-6-ZB	CTD	6003	2022-08-12	21:36	---	---	52.2532	79.5525	---	---	16.82	+Niskin, CTD cast # 6003
STN-6-ZC	CTD	6004	2022-08-12	22:26	---	---	52.255	79.5534	---	---	23.56	+Niskin, oblique/vertical nets, CTD cast # 6004

STN-9-ZA	CTD	9001	2022-08-13	11:20	---	---	52.3102	79.0228	---	---	7.3	+Niskin, grabs, CTD cast # 9001
STN-9-ZB	CTD	9002	2022-08-13	12:32	---	---	52.3129	79.0235	---	---	17.1	+Niskin, grabs, CTD cast # 9002
STN-9-ZC	CTD	9003	2022-08-13	13:16	---	---	52.3129	79.0225	---	---	30	+Niskin, grabs, oblique/vertical nets, CTD cast # 9003
CTD-80	CTD	80	2022-08-15	16:08	16:10	16:10	51.4717	80.2432	51.4717	80.2431	5.3	Taken from a Zodiac? In PP log says they were so moving to Zodiac log
CTD-81	CTD	81	2022-08-15	19:06	19:09	19:09	51.4716	80.2434	51.4715	80.2434	7.4	Taken from a Zodiac? In PP log says they were so moving to Zodiac log
CTD-82	CTD	82	2022-08-15	22:18	---	---	51.3237	80.4634	---	---	---	# MR1 water sampling, Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-83	CTD	83	2022-08-15	22:52	---	---	51.3274	80.4549	---	---	---	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-84	CTD	84	2022-08-15	23:09	---	---	51.3356	80.4362	---	---	---	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-85	CTD	85	2022-08-15	23:24	---	---	51.3511	80.4148	---	---	---	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-86	CTD	86	2022-08-15	23:36	---	---	51.3669	80.3947	---	---	---	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-87	CTD	87	2022-08-15	23:50	---	---	51.3821	80.3733	---	---	6.1	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-88	CTD	88	2022-08-16	0:01	---	---	51.3944	80.3512	---	---	4.8	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-89	CTD	89	2022-08-16	0:16	---	---	51.4044	80.3274	---	---	6	MR2 water sampling. Moose R. estuary

												transects casts #82-90. Coupled with castaway profiles
CTD-90	CTD	90	2022-08-16	0:40	---	---	51.4239	80.2775	---	---	3.6	Moose R. estuary transects casts #82-90. Coupled with castaway profiles
CTD-104	CTD	104	2022-08-17	18:50	---	---	---	---	---	---	>1	Cast cancelled due to shallow water
CTD-105	CTD	105	2022-08-17	19:06	19:11	19:11	52.99629	78.822326	52.9963	78.8224	7.11	Wemindji
CTD-106	CTD	106	2022-08-17	20:31	20:33	20:34	52.995697	78.844204	52.9957	78.8442	28.1	Wemindji
CTD-107	CTD	107	2022-08-17	21:06	21:08	21:09	52.991	78.8561	52.991	78.8559	9.1	Wemindji
CTD-108	CTD	108	2022-08-17	22:39	22:41	22:41	52.983	78.858	52.9835	78.858	7.23	Wemindji
CTD-109	CTD	109	2022-08-17	22:57	23:00	23:00	---	---	52.9764	78.8753	8.14	Wemindji
CTD-110	CTD	110	2022-08-17	23:09	23:12	23:13	---	---	52.9702	78.9814	17.38	Wemindji
CTD-111	CTD	111	2022-08-17	23:20	23:23	23:23	---	---	52.9593	78.9133	6.91	Wemindji
BI-05-ZA	NISK		2022-08-22	13:00	---	---	55.893867	79.811567	---	---	6.5	Sample @ 5.5m
BI-05-ZA	NISK		2022-08-22	13:20	---	---	55.893867	79.811567	---	---	6.5	Sample @ 1.0m
BI-05-ZA	CAST		2022-08-22	13:37	---	13:39	55.893867	79.811567	---	---	7.3	Cast depth 7.24m sample #456
BI-05-ZA	PON		2022-08-22	---	---	---	55.893867	79.811567	---	---	6.5	
BI-05-ZB	NISK		2022-08-22	14:15	---	---	55.892183	79.808217	---	---	13	Sample @ 12m
BI-05-ZB	CAST		2022-08-22	14:20	---	14:21	55.892183	79.808217	---	---	13	Cast depth 12.93m sample #457
BI-05-ZB	NISK		2022-08-22	14:40	---	---	55.892183	79.808217	---	---	13	Sample @ 1.0m

Appendix C: Logbook of Sensors Not Recovered From Moorings.

Site	Latitude	Longitude	Sensor name	SN
CMO-A	60.15806	92.045	WET Labs ECO Triplet	unknown
CMO-A	60.15806	92.045	ASL Ice Profiling Sonar 5	51052
CMO-A	60.15806	92.045	SBE 37-SMP-ODO	15669
CMO-A	60.15806	92.045	SBE 37-SMP-ODO	15685
CMO-A	60.15806	92.045	Gurney Sediment Trap	718631
CMO-B	61.92028	84.34778	RBR solo PAR	207183
CMO-B	61.92028	84.34778	WetLabs ECO Triplet-w	4628
CMO-B	61.92028	84.34778	SBE 37-SMP-ODO	15674
CMO-B	61.92028	84.34778	WetLabs Eco Triplet-w	4626
CMO-B	61.92028	84.34778	RBR solo PAR	201187
CMO-B	61.92028	84.34778	SBE 37-SMP-ODO	15684
CMO-B	61.92028	84.34778	RBR XR-420-CT	10021
CMO-B	61.92028	84.34778	Teledyne WH 300 kHz ADCP	24551
CMO-B	61.92028	84.34778	SoundTrap ST600	4038734
CMO-B	61.92028	84.34778	ASL AZFP	55150
CMO-B	61.92028	84.34778	SBE 37-SMP-ODO	15675
CMO-B	61.92028	84.34778	SBE 37-SMP-ODO	15671
CMO-B	61.92028	84.34778	CART tandem releases	30464/65

JB-M4	53.57417	80.61833	RBR solo Pressure	78045
JB-M4	53.57417	80.61833	WetLabs Eco Triplet-w	1669
JB-M4	53.57417	80.61833	RBR XR-420 CT	12961
JB-M4	53.57417	80.61833	RBR XR-420 CT	12958
JB-M4	53.57417	80.61833	RDI 600kHz ADCP	24028
JB-M4	53.57417	80.61833	EdgeTech PORT LF Release	51797
JB-M3	54.46778	80.20083	WetLabs ECO Triplet	4631

Appendix D: Logbook of samples collected for the primary production group.

Station	Type	Date	Time	Lat	Long	Bot Depth	Depths sampled	Cast #	Samples collected								
		(UTC)	(UTC)	(N)	(W)	(m)	(m)		Nut	FC	Chl *a*	POC/N	PP	AP	HPLC	Isotopes	Lugol
CMO-B	ROS	2022-07-25	15:11	61.7672	84.2699	179	0.5, 11.0, 24.0, 30.0, 41.0, 53.0, 61.0, 99.0, 170.0	1	Y	N	Y	Y	N	N	N	N	N
CMO-B	ROS	2022-07-25	16:40	61.7607	84.3013	180	0.5, 11.0, 24.0, 30.0, 41.0, 53.0, 61.0, 99.0, 170.0	2	Y	N	Y	Y	N	N	N	N	N
CMO-A	ROS	2022-07-27	12:03	59.9833	91.9411	100	0.5, 10.0, 16.0, 20.0, 27.0, 40.0, 60.0, 89.0	1	Y	N	Y	Y	N	N	N	N	N
CMO-A	ROS	2022-07-27	13:17	59.9756	91.9442	105	0.5, 10.0, 16.0, 20.0, 27.0, 40.0, 60.0, 89.0	2	Y	N	Y	Y	N	N	N	N	N
FT 1	FT	2022-08-02	17:00	59.7722	91.3333	140	2	N/A	Y	Y	N	N	N	Y	N	N	Y
FT 2	FT	2022-08-02	21:00	59.5139	90.4861	138	2	N/A	Y	Y	Y	Y	N	Y	Y	N	N
FT 3	FT	2022-08-03	13:00	59.2259	87.4039	184	2	N/A	Y	Y	Y	Y	Y	Y	Y	N	N
FT 4	FT	2022-08-03	17:00	58.5357	86.3825	173	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 5	FT	2022-08-03	21:00	58.2764	85.5975	61.5	2	N/A	Y	Y	Y	Y	N	Y	Y	N	N
FT 6	FT	2022-08-04	13:00	57.1444	82.3841	109	2	N/A	Y	Y	Y	Y	Y	Y	N	N	Y
FT 7	FT	2022-08-04	16:00	56.907	81.755	134	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 8	FT	2022-08-04	19:00	56.6911	81.1903	154	2	N/A	Y	Y	Y	Y	Y	Y	Y	N	Y
FT 9	FT	2022-08-04	22:00	56.5211	80.636	123	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
BI-01	ROS	2022-08-05	12:36	56.9808	79.6651	40.8	0.5, 3.7, 7.9, 11.0, 15.7, 24.2	1	Y	Y	Y	Y	Y	Y	Y	Y	Y
BI-01	DINO	2022-08-05	13:43	56.984	79.6704	40	N/A	1	N	N	N	N	N	N	N	N	N
BI-01	ROS	2022-08-05	13:54	56.9808	79.6643	45	10.0, 20.0, 30.0, 40.0	2	Y	Y	Y	Y	N	N	Y	Y	Y
BI-01	ROS	2022-08-05	16:39	56.9829	79.6681	43.6	10.0, 20.0, 30.0, 40.0	3	N	N	N	N	N	Y	N	N	N
BI-02	ROS	2022-08-06	18:03	56.4462	78.59	43	0.5, 3.9, 8.3, 11.6, 16.5, 25.6, 32.0	1	Y	Y	Y	Y	Y	Y	Y	Y	Y
BI-02	DINO	2022-08-06	18:35	56.4463	78.5912	43	N/A	1	N	N	N	N	N	N	N	N	N
BI-02	ROS	2022-08-06	19:53	56.4465	78.5922	45.4	10.0, 20.0, 32.0	2	Y	Y	Y	Y	N	N	Y	Y	Y

BI-02	ROV	2022-08-06	21:59	56.4463	78.5903	41.2	N/A	1	N	N	N	N	N	N	N	N	N
BI-02	ROV	2022-08-06	22:15	56.4477	78.5848	46.6	N/A	2	N	N	N	N	N	N	N	N	N
BI-02	ROS	2022-08-06	23:00	56.4379	78.6505	26	0.5, 24.0	3	N	N	N	N	N	Y	N	N	N
STN3	ROS	2022-08-09	1:38	54.2963	80.0576	66.8	0.5, 10.0, 20.0, 30.0, 40.0, 56.0	1	Y	Y	Y	Y	N	Y	Y	N	Y
FT 10	FT	2022-08-08	13:00	55.4082	79.2859	136	2	N/A	Y	Y	Y	Y	Y	Y	Y	N	Y
FT 11	FT	2022-08-08	16:00	55.1248	79.6234	94	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 12	FT	2022-08-08	19:00	54.8642	79.9023	121	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 13	FT	2022-08-08	22:00	54.5552	80.0892	72	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
STN3	ROV	2022-08-09	4:40	54.2997	80.056	56.2	N/A	1	N	N	N	N	N	N	N	N	N
FT 14	FT	2022-08-09	13:00	53.5848	80.5424	36.3	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
STN11	ROS	2022-08-09	15:28	53.429	80.4628	48.7	0.5, 2.6, 5.6, 7.8, 11.1, 17.1, 30.0, 39.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN 12	ROS	2022-08-10	9:20	53.0219	80.1937	53.6	0.5, 10.0, 20.0, 30.0, 40.0	1	Y	Y	Y	Y	N	Y	Y	N	Y
STN 12	ROS	2022-08-10	12:12	53.0212	80.1941	55.3	0.5, 2.1, 4.5, 6.3, 9.0, 13.9	2	Y	Y	Y	Y	Y	N	Y	N	Y
STN 12	DINO	2022-08-10	12:34	53.0157	80.1843	55.1	N/A	1	N	N	N	N	N	N	N	N	N
STN 13	ROS	2022-08-10	20:40	53.0196	79.4052	63.3	0.5, 2.1, 4.5, 6.3, 9.0, 13.9, 50.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN 13	DINO	2022-08-10	21:22	53.02	79.4053	60	N/A	1	N	N	N	N	N	N	N	N	N
STN 13	ROS	2022-08-10	22:13	53.0084	79.4031	49.1	10.0, 20.0, 30.0, 40.0	2	Y	Y	Y	Y	N	Y	Y	N	Y
STN 13 ZC (FT 16)	FT	2022-08-11	19:09	52.9509	78.9014	18	2	N/A	Y	Y	Y	Y	Y	Y	Y	N	N
STN 13 ZA	ZOD	2022-08-11	22:04	52.9974	78.8111	1.2	0.5	1	Y	Y	N	N	N	Y	N	N	N
STN 13 ZB	ZOD	2022-08-11	23:01	52.9963	78.8225	7.4	0.5	1	Y	Y	Y	Y	N	Y	N	N	N
STN 6	ROS	2022-08-12	18:53	52.2386	79.6936	62.3	0.5, 2.1, 4.5, 6.3, 9.0, 13.9, 50.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN 6	DINO	2022-08-12	19:42	52.2386	79.6939	62.4	N/A	1	N	N	N	N	N	N	N	N	N
STN 6	ROS	2022-08-12	20:38	52.239	79.6936	61.9	0.5, 10.0, 20.0, 30.0, 40.0, 50.0	2	Y	Y	Y	Y	N	Y	Y	N	Y
STN 9	ROS	2022-08-13	11:10	52.3112	78.8957	38	0.5, 1.6, 3.4, 4.7, 5.8, 10.4, 30.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN 9	DINO	2022-08-13	12:03	52.307	78.8925	38.1	N/A	1	N	N	N	N	N	N	N	N	N

STN 9	ROS	2022-08-13	13:01	52.2951	78.8912	31.8	0.5, 10.0, 20.0, 25.0	2	Y	Y	Y	Y	N	Y	Y	N	Y
STN 14	ROS	2022-08-13	18:38	52.4282	79.4052	75.1	0.5, 10.0, 20.0, 30.0, 40.0, 50.0, 60.0, 70.0	1	Y	N	N	N	N	Y	N	N	N
MR 1	ZOD	2022-08-15	16:08	51.4717	80.2432	5.3	0.5	1	Y	N	Y	Y	N	N	N	N	N
MR 2	ZOD	2022-08-15	19:09	51.4716	80.2434	7.4	0.5	1	Y	N	Y	Y	N	N	N	N	N
FT 17	FT	2022-08-15	15:00	51.472	80.2432	7.9	2	N/A	Y	Y	Y	N	Y	Y	N	N	N
FT 18	FT	2022-08-16	16:00	51.8525	80.0185	25	2	N/A	Y	Y	Y	Y	Y	Y	Y	N	Y
FT 19	FT	2022-08-16	19:00	52.2082	79.7727	49.5	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 20	FT	2022-08-16	22:00	52.4522	79.4055	80.7	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 21	FT	2022-08-16	1:00	52.6016	79.4003	39.5	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
N/A	ROV	2022-08-17	15:40	52.5706	78.5401	ND	N/A	1	N	N	N	N	N	N	N	N	N
STN17	ROS	2022-08-18	13:56	53.8708	79.3425	34.3	0.5, 1.6, 3.4, 4.7, 6.7, 10.0, 20.0, 30.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
FT 24	FT	2022-08-18	19:00	53.9941	79.6956	45.8	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
STN10	ROS	2022-08-19	4:38	53.8139	80.7107	21	0.5, 10.0	1	Y	Y	Y	Y	N	Y	Y	N	Y
STN2	ROS	2022-08-19	18:08	54.2744	81.4761	62.1	0.5, 2.6, 5.6, 7.8, 11.1, 17.1, 40.0, 55.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN2	DINO	2022-08-19	19:13	54.2774	81.4802	62.1	N/A	1	N	N	N	N	N	N	N	N	N
STN2	ROS	2022-08-19	19:53	54.276	81.4759	61.7	0.5, 10.0, 20.0, 30.0	2	Y	Y	Y	Y	N	Y	Y	N	Y
STN18	ROS	2022-08-20	11:47	54.6864	80.1864	100	0.5, 4.1, 8.8, 12.2, 17.4, 26.9, 40.0, 90.0	1	Y	Y	Y	Y	Y	Y	Y	N	Y
STN18	DINO	2022-08-20	12:52	54.6856	80.1872	100	N/A	1	N	N	N	N	N	N	N	N	N
STN18	ROS	2022-08-20	13:05	54.6867	80.1886	102	0.5, 12.0, 20.0, 30.0	2	Y	Y	Y	Y	N	Y	Y	N	Y
BI-03	ROS	2022-08-21	11:42	55.6226	79.0263	99	0.5, 3.3, 7.0, 9.8, 13.9, 21.5, 40.0, 90.0	1	Y	Y	Y	Y	Y	Y	Y	Y	Y
BI-03	DINO	2022-08-21	12:41	55.6279	79.0158	110	N/A	1	N	N	N	N	N	N	N	N	N
BI-03	ROS	2022-08-21	13:23	55.628	79.027	114	0.5, 10.0, 20.0, 30.0	2	Y	Y	Y	Y	N	Y	Y	Y	Y
BI-04	ROS	2022-08-21	22:40	55.7906	79.4547	34.6	0.5, 16.0, 25.0	1	Y	Y	Y	Y	N	Y	Y	Y	Y
FT 31	FT	2022-08-22	0:00	56.0118	80.3049	112	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
BI-05	ROS	2022-08-22	12:59	55.8907	79.7781	73.7	0.5, 5.1, 10.8, 15.0, 21.4, 33.1, 40.0, 57.0	1	Y	Y	Y	Y	Y	Y	Y	Y	Y

BI-05-ZA	ZOD	2022-08-22	13:30	55.8939	79.8116	ND	N/A	1	N	N	N	N	N	N	N	N	N
BI-05	DINO	2022-08-22	13:56	55.8925	79.7787	70.6	N/A	1	N	N	N	N	N	N	N	N	N
BI-05-ZB	ZOD	2022-08-22	14:30	55.8922	79.8082	ND	N/A	1	N	N	N	N	N	N	N	N	N
FT 32	FT	2022-08-23	16:30	56.1109	79.5175	21.8	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
FT 33	FT	2022-08-23	1:00	55.929	79.637	26.1	2	N/A	Y	Y	Y	Y	N	Y	N	N	N
CTD-201	ROV	2022-08-23	2:00	55.9313	80.3028	ND	N/A	1	N	N	N	N	N	N	N	N	N
CTD-211	ROV	2022-08-24	0:05	55.9969	79.578	ND	N/A	1	N	N	N	N	N	N	N	N	N

NOTES:

Station: Indicates the station number, the mooring identifier, or the station ID for the Flowthrough sample. BI refers to stations and mooring locations around the Belcher Islands. JB refers to moorings deployed in James Bay. Stations beginning with STN are in James Bay. CMO refers to moorings associated with the Churchill Marine Observatory. The following are mooring identifiers: BI-M1, BI-Me, CMO-A, CMO-B, JB-H, JB-M1, JB-M2, JB-M5A, JB-M5B. STN-13-Z3 is given a zodiac identifier but occurred on the ship located near Wemindji.

Type: The type of sample. ROS = rosette, FT = flowthrough, ZOD = samples taken from Zodiac, DINO = dinoflagellate nets.

Sample collected: weather or not a sample was collected as indicated by Y = yes this sample was taken, N= no sample taken. Nut = Nutrients, FC = Flow Cytometry, Chl *a* = Chlorophyll *a* concentration, POC/N = particulate organic carbon and nitrogen, PP = primary production, Ap = particulate absorption, HPCL = high performance liquid chromatography, Lugol = lugol taxonomy,

Appendix E: eDNA Sampling Log

eDNA ID	Station-Rep	Water Column	Sample Method	Cast #	ROS #	Bottom depth (m)	Sample depth (m)	Sample Temp (∘C)	Sample salinity (psu)	Salin-Temp Method	Lat (N)	Long (W)	Collect Date (UTC)	Collect Time (UTC)	Filter Time (UTC)	Notes
1	1	FT	FT	N/A	N/A	not recorded	2	7.83	29.10	TSG	57.218017	61.571817	2022-07-20	23:21	23:26	
2	2	FT	FT	N/A	N/A	not recorded	2	7.83	29.10	TSG	57.218017	61.571817	2022-07-20	23:21	23:38	
3	1	FT	FT	N/A	N/A	not recorded	2	2.82	31.84	TSG	58.743600	62.756917	2022-07-21	13:34	13:40	
4	2	FT	FT	N/A	N/A	not recorded	2	2.82	31.84	TSG	58.743600	62.756917	2022-07-21	13:34	13:55	
5	1	FT	FT	N/A	N/A	95.10	2	3.06	31.80	TSG	59.107783	63.090517	2022-07-21	16:52	16:57	
6	2	FT	FT	N/A	N/A	95.10	2	3.06	31.80	TSG	59.107783	63.090517	2022-07-21	16:52	N/A	Dropped filter and bagged sample water
7	1	FT	FT	N/A	N/A	181.48	2	5.71	31.60	TSG	59.391767	61.192133	2022-07-21	18:48	18:50	
8	2	FT	FT	N/A	N/A	181.48	2	5.71	31.60	TSG	59.391767	61.192133	2022-07-21	18:48	19:09	
9	1	FT	FT	N/A	N/A	127.89	2	3.38	31.82	TSG	59.789083	63.558367	2022-07-21	22:11	22:25	
10	2	FT	FT	N/A	N/A	127.89	2	3.38	31.82	TSG	59.789083	63.558367	2022-07-21	22:11	22:40	
11	B1	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-22	11:13	11:56	Distilled water blank
12	1	FT	FT	N/A	N/A	350.52	2	3.01	32.29	TSG	60.686183	65.886633	2022-07-22	10:11	10:20	
13	2	FT	FT	N/A	N/A	350.52	2	3.01	32.29	TSG	60.686183	65.886633	2022-07-22	10:11	10:36	
14	B2	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-22	11:52	12:05	Distilled water blank
15	1	FT	FT	N/A	N/A	344.45	2	1.96	32.29	TSG	60.892017	66.926867	2022-07-22	14:31	14:36	
16	2	FT	FT	N/A	N/A	344.45	2	1.96	32.29	TSG	60.892017	66.926867	2022-07-22	14:31	14:49	
17	1	FT	FT	N/A	N/A	464.52	2	2.11	32.41	TSG	61.167883	67.957133	2022-07-22	18:50	18:55	
18	2	FT	FT	N/A	N/A	464.52	2	2.11	32.41	TSG	61.167883	67.957133	2022-07-22	18:50	19:10	

19	1	FT	FT	N/A	N/A	393.19	2	6.99	31.39	TSG	61.334533	68.576600	2022-07-22	21:22	21:28	
20	2	FT	FT	N/A	N/A	393.19	2	6.99	31.39	TSG	61.334533	68.576600	2022-07-22	21:22	21:40	
21	1	FT	FT	N/A	N/A	295.05	2	5.55	32.07	TSG	62.071633	71.660883	2022-07-23	10:21	10:26	
22	2	FT	FT	N/A	N/A	295.05	2	5.55	32.07	TSG	62.071633	71.660883	2022-07-23	10:21	10:40	
23	B3	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-23	12:15	12:20	Distilled water blank
24	B4	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-23	12:15	12:26	Distilled water blank
25	1	FT	FT	N/A	N/A	196.90	2	5.28	30.92	TSG	62.302067	72.581500	2022-07-23	14:21	14:23	
26	2	FT	FT	N/A	N/A	196.90	2	5.28	30.92	TSG	62.302067	72.581500	2022-07-23	14:21	14:46	
27	1	FT	FT	N/A	N/A	121.31	2	4.78	29.98	TSG	62.504383	73.660867	2022-07-23	19:25	19:27	
28	2	FT	FT	N/A	N/A	121.31	2	4.78	29.98	TSG	62.504383	73.660867	2022-07-23	19:25	19:43	
29	1	FT	FT	N/A	N/A	120.82	2	8.44	29.44	TSG	62.512167	74.503267	2022-07-23	22:50	22:52	
30	2	FT	FT	N/A	N/A	120.82	2	8.44	29.44	TSG	62.512167	74.503267	2022-07-23	22:50	23:13	
31	1	FT	FT	N/A	N/A	401.42	2	4.11	30.35	TSG	62.589233	77.157483	2022-07-24	11:12	11:15	
32	2	FT	FT	N/A	N/A	401.42	2	4.11	30.35	TSG	62.589233	77.157483	2022-07-24	11:12	11:30	
33	1	FT	FT	N/A	N/A	254.20	2	3.33	30.93	TSG	62.610867	77.993100	2022-07-24	14:00	14:05	
34	2	FT	FT	N/A	N/A	254.20	2	3.33	30.93	TSG	62.610867	77.993100	2022-07-24	14:00	14:23	
35	B5	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-24	17:40	17:42	Distilled water blank
36	B6	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-07-24	17:40	17:50	Distilled water blank
37	1	FT	FT	N/A	N/A	22.40	2	10.98	17.25	TSG	58.832267	94.098333	2022-07-28	13:14	13:20	
38	2	FT	FT	N/A	N/A	22.40	2	10.98	17.25	TSG	58.832267	94.098333	2022-07-28	13:14	13:35	
39	FT03-1	FT	FT	N/A	N/A	184.00	2	Not recorded	Not recorded	TSG	58.735530	87.242310	2022-08-03	13:00	15:10	
40	FT03-2	FT	FT	N/A	N/A	184.00	2	Not recorded	Not recorded	TSG	58.735530	87.242310	2022-08-03	13:00	15:10	
41	FT04-1	FT	FT	N/A	N/A	173.00	2	8.60	29.66	TSG	58.535700	86.382467	2022-08-03	17:20	18:00	

42	FT04-2	FT	FT	N/A	N/A	173.00	2	8.60	29.66	TSG	58.535700	86.382467	2022-08-03	17:20	18:00	
43	FT05-1	FT	FT	N/A	N/A	61.50	2	9.18	28.55	TSG	58.276367	85.597483	2022-08-03	21:15	21:35	
44	FT05-2	FT	FT	N/A	N/A	61.50	2	9.18	28.55	TSG	58.276367	85.597483	2022-08-03	21:20	21:35	
45	FT06-1	FT	FT	N/A	N/A	109.00	2	6.84	24.44	TSG	57.144400	82.384100	2022-08-04	13:20	13:35	
46	FT06-2	FT	FT	N/A	N/A	109.00	2	6.84	24.44	TSG	57.144400	82.384100	2022-08-04	13:20	13:35	
47	FT07-1	FT	FT	N/A	N/A	134.00	2	7.05	26.47	TSG	56.907000	81.755000	2022-08-04	16:25	16:40	
48	FT07-2	FT	FT	N/A	N/A	134.00	2	7.05	26.47	TSG			2022-08-04	16:30	16:40	
49	B7	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-04	16:35	16:40	Distilled water blank
50	FT08-1	FT	FT	N/A	N/A	154.00	2	6.48	26.80	TSG	56.691100	81.190300	2022-08-04	19:20	19:30	
51	FT08-2	FT	FT	N/A	N/A	154.00	2	6.48	26.80	TSG	56.691100	81.190300	2022-08-04	19:22	19:30	
52	FT09-1	FT	FT	N/A	N/A	123.00	2	6.08	25.63	TSG	56.521100	80.636000	2022-08-04	22:30	22:45	
53	FT09-2	FT	FT	N/A	N/A	123.00	2	6.08	25.63	TSG	56.521100	80.636000	2022-08-04	22:35	22:45	
54	BI01-1	FT	FT	N/A	N/A	45.00	2	2.09	28.30	ROS	56.980800	79.664300	2022-08-05	13:01	17:50	
55	BI01-2	FT	FT	N/A	N/A	45.00	2	2.09	28.30	ROS	56.980800	79.664300	2022-08-05	13:02	17:50	
56	BI01-1	bottom	ROS	7	1	43.60	38	0.10	29.50	ROS	56.982900	79.668100	2022-08-05	16:47	17:50	Sample preserved in fridge
57	BI01-2	bottom	ROS	7	1	43.60	38	0.10	29.50	ROS	56.982900	79.668100	2022-08-05	16:47	17:50	Sample preserved in fridge
58	BI01-ZA	surface	SB	N/A	N/A	5.10	1.5	Get from SeaBird	Get from SeaBird	SeaBird	56.970150	79.669020	2022-08-05	18:55	2:00	Samples filtered August 6th at 2am UTC
59	BI01-ZA	bottom	SB	N/A	N/A	5.10	4.1	Get from SeaBird	Get from SeaBird	SeaBird	56.970150	79.669020	2022-08-05	18:25	2:00	Samples filtered August 6th at 2am UTC
60	BI01-ZB	surface	SB	N/A	N/A	15.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	56.970150	79.669020	2022-08-05	19:52	2:00	Samples filtered August 6th at 2am UTC
61	BI01-ZB	bottom	SB	N/A	N/A	15.00	14	Get from SeaBird	Get from SeaBird	SeaBird	56.970150	79.669020	2022-08-05	19:30	2:00	Samples filtered

																August 6th at 2am UTC
62	BI01-ZC	surface	SB	N/A	N/A	27.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	56.969932	79.667573	2022-08-05	20:01	3:15	Samples filtered August 6th at 3:15am UTC
63	BI01-ZC	bottom	SB	N/A	N/A	27.00	26	Get from SeaBird	Get from SeaBird	SeaBird	56.969932	79.667573	2022-08-05	20:49	3:15	Samples filtered August 6th at 3:15am UTC
64	B8	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-05	---	3:15	Samples filtered August 6th at 3:15am UTC
65	BI02-1	surface	FT	N/A	N/A	59.90	2	4.94	28.17	TSG	56.444400	78.577800	2022-08-06	not recorded	16:58	
66	BI02-2	surface	FT	N/A	N/A	59.90	2	4.94	28.17	TSG	56.444400	78.577800	2022-08-06	not recorded	16:58	
67	BI02-1	bottom	ROS	9	1	45.40	32	2.82	28.50	ROS	56.446500	78.592200	2022-08-06	20:00	21:00	Filter dropped in cryovial box
68	BI02-2	bottom	ROS	9	1	45.40	32	2.82	28.50	ROS	56.446500	78.592200	2022-08-06	20:00	21:00	
69	BI02-NS	surface	ROS	10	12	26.00	24	3.72	28.40	ROS	56.440800	78.646400	2022-08-06	23:10	23:50	
70	BI02-NS	surface	ROS	10	12	26.00	24	3.72	28.40	ROS	56.440800	78.646400	2022-08-06	23:10	23:50	
71	BI02-NS	bottom	ROS	10	12	26.00	24	3.55	28.40	ROS	56.440800	78.646400	2022-08-06	23:07	23:50	
72	BI02-NS	bottom	ROS	10	12	26.00	24	3.55	28.40	ROS	56.440800	78.646400	2022-08-06	23:07	23:50	
73	B9	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-07	---	00:35	Big Boat, distilled water blank
74	FT10-01	FT	FT	N/A	N/A	137.00	2	6.76	25.15	TSG	55.403300	79.292500	2022-08-08	13:20	13:25	
75	FT10-02	FT	FT	N/A	N/A	137.00	2	6.76	25.15	TSG	55.403300	79.292500	2022-08-08	13:20	13:25	
76	FT11-01	FT	FT	N/A	N/A	97.00	2	5.70	26.35	TSG	55.118800	79.629300	2022-08-08	16:05	16:10	
77	FT11-02	FT	FT	N/A	N/A	97.00	2	5.70	26.35	TSG	55.118800	79.629300	2022-08-08	16:05	16:10	
78	FT12-01	FT	FT	N/A	N/A	121.00	2	9.12	22.11	TSG	54.864200	79.902300	2022-08-08	19:07	19:10	

79	FT12-02	FT	FT	N/A	N/A	121.00	2	9.12	22.11	TSG	54.864200	79.902300	2022-08-08	19:07	19:10	
80	FT13-01	FT	FT	N/A	N/A	75.00	2	8.01	23.97	TSG	54.555200	80.089200	2022-08-08	22:06	22:25	
81	FT13-02	FT	FT	N/A	N/A	75.00	2	8.01	23.97	TSG	54.555200	80.089200	2022-08-08	22:06	22:36	
82	STN3-01	surface	FT	N/A	N/A	66.80	2	7.18	23.00	ROS	54.301400	80.056700	2022-08-09	1:52	2:14	
83	STN3-02	surface	FT	N/A	N/A	66.80	2	7.18	23.00	ROS	54.301400	80.056700	2022-08-09	1:52	2:14	
84	STN3-01	bottom	ROS	11	2	66.80	56	-0.71	29.80	ROS	54.301400	80.056700	2022-08-09	1:44	2:14	
85	STN3-02	bottom	ROS	11	2	66.80	56	-0.71	29.80	ROS	54.301400	80.056700	2022-08-09	1:44	2:14	
86	B10	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-09	---	16:10	Distilled water blank
87	FT14-01	FT	FT	N/A	N/A	36.30	2	7.86	24.04	TSG	53.584800	80.542400	2022-08-09	13:22	13:26	
88	FT14-02	FT	FT	N/A	N/A	36.30	2	7.86	24.04	TSG	53.584800	80.542400	2022-08-09	13:22	13:38	
89	STN11-01	surface	FT	N/A	N/A	48.70	2	7.80	23.66	ROS	53.433600	80.466200	2022-08-09	15:55	16:10	
90	STN11-02	surface	FT	N/A	N/A	48.70	2	7.80	23.66	ROS	53.433600	80.466200	2022-08-09	15:55	16:10	
91	FT15-01	FT	FT	N/A	N/A	18.60	2	12.70	23.68	TSG	53.261100	80.791000	2022-08-09	19:30	19:40	
92	FT15-02	FT	FT	N/A	N/A	18.60	2	12.70	23.68	TSG	53.261100	80.791000	2022-08-09	19:30	19:40	
93	STN12-01	surface	FT	N/A	N/A	53.60	2	7.20	23.40	ROS	53.021900	80.193700	2022-08-10	9:20	9:54	
94	STN12-02	surface	FT	N/A	N/A	53.60	2	7.20	23.40	ROS	53.021900	80.193700	2022-08-10	9:20	9:54	
95	STN12-01	bottom	ROS	13	4	53.60	40	2.70	26.20	ROS	53.021900	80.193700	2022-08-10	9:28	9:54	
96	STN12-02	bottom	ROS	13	4	53.60	40	2.70	26.20	ROS	53.021900	80.193700	2022-08-10	9:29	9:54	
97	STN13-01	surface	FT	N/A	N/A	63.30	2	7.50	23.10	ROS	53.019600	79.405200	2022-08-10	20:53	22:40	
98	STN13-02	surface	FT	N/A	N/A	63.30	2	7.50	23.10	ROS	53.019600	79.405200	2022-08-10	20:53	22:40	
99	STN13-01	bottom	ROS	15	4	63.30	40	6.10	24.20	ROS	53.008400	79.403100	2022-08-10	22:20	22:40	
100	STN13-02	bottom	ROS	15	4	63.30	40	6.10	24.20	ROS	53.008400	79.403100	2022-08-10	22:20	22:40	
101	B11	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-10	22:42	22:43	Distilled water blank, syringe filtration

102	STN13-ZA	surface	SB	N/A	N/A	7.30	1.5	8.87	12.37	CAST	52.996300	78.822500	2022-08-11	22:31	1:16	2 filters needed
103	STN13-ZA	surface	SB	N/A	N/A	7.30	1.5	8.87	12.37	CAST	52.996300	78.822500	2022-08-11	22:31	1:16	2 filters needed
104	STN13-ZA	bottom	SB	N/A	N/A	7.30	6.3	8.87	12.37	CAST	52.996300	78.822500	2022-08-11	22:33	1:16	
105	STN13-ZB	surface	SB	N/A	N/A	10.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	52.993000	78.844800	2022-08-11	23:04	1:16	2 filters needed
106	STN13-ZB	surface	SB	N/A	N/A	10.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	52.993000	78.844800	2022-08-11	23:04	1:16	2 filters needed
107	STN13-ZB	bottom	SB	N/A	N/A	10.00	9	Get from SeaBird	Get from SeaBird	SeaBird	52.993000	78.844800	2022-08-11	23:07	1:16	
108	STN13-ZC	surface	SB	N/A	N/A	19.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	52.991100	78.856100	2022-08-11	23:22	1:36	2 filters needed
109	STN13-ZC	surface	SB	N/A	N/A	19.00	1.5	Get from SeaBird	Get from SeaBird	SeaBird	52.991100	78.856100	2022-08-11	23:07	1:36	2 filters needed
110	STN13-ZC	bottom	SB	N/A	N/A	19.00	18	Get from SeaBird	Get from SeaBird	SeaBird	52.991100	78.856100	2022-08-11	23:22	1:36	
111	STN06-01	bottom	ROS	17	4	62.30	50	3.10	26.00	Rosette	52.238600	79.693600	2022-08-12	19:01	19:51	
112	STN06-02	bottom	ROS	17	4	62.30	50	3.10	26.00	Rosette	52.238600	79.693600	2022-08-12	19:01	19:51	
113	STN06-01	surface	FT	N/A	N/A	62.30	2	11.40	20.80	Rosette	52.239200	79.692500	2022-08-12	19:42	19:51	
114	STN06-02	surface	FT	N/A	N/A	62.30	2	11.40	20.80	Rosette	52.239200	79.692500	2022-08-12	19:42	19:51	
115	STN06-ZA	bottom	SB	N/A	N/A	8.90	7.9	10.35	21.13	CAST	52.247600	79.534300	2022-08-12	20:20	0:41	Small bag (900mL) (Filtered 08/13 UTC)
116	STN06-ZA	surface	SB	N/A	N/A	8.90	1.5	11.05	20.40	CAST	52.247600	79.534300	2022-08-12	20:45	0:41	(Filtered 08/13 UTC)
117	STN06-ZB	bottom	SB	N/A	N/A	15.50	14.5	10.08	21.09	CAST	52.253200	79.552500	2022-08-12	21:33	0:41	(Filtered 08/13 UTC)
118	STN06-ZB	surface	SB	N/A	N/A	15.50	1.5	11.02	20.42	CAST	52.253200	79.552500	2022-08-12	21:52	0:41	(Filtered 08/13 UTC)
119	STN06-ZC	bottom	SB	N/A	N/A	32.00	30	8.77	21.78	CAST			2022-08-12	22:24	1:03	(Filtered 08/13 UTC)
120	STN06-ZC	surface	SB	N/A	N/A	32.00	1.5	9.70	20.90	CAST			2022-08-12	22:40	1:03	Water partly lost 450mL filtered (Filtered 08/13 UTC)

121	B12	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-12	not recorded	1:03	Zodiac
122	STN09-01	surface	FT	N/A	N/A	28.70	2	12.01	18.31	TSG	52.291400	78.891100	2022-08-13	12:50	13:16	
123	STN09-02	surface	FT	N/A	N/A	28.70	2	12.01	18.31	TSG	52.291400	78.891100	2022-08-13	12:50	13:16	
124	STN09-01	bottom	ROS	20	2	31.80	25	9.50	20.80	ROS	52.295100	78.891200	2022-08-13	13:12	13:16	
125	STN09-02	bottom	ROS	20	2	31.80	25	9.50	20.80	ROS	52.295100	78.891200	2022-08-13	13:12	13:16	
126	STN09-ZA	bottom	SB	N/A	N/A	7.30	6.3	8.44	21.57	CAST	52.320200	79.022800	2022-08-13	11:27	16:11	
127	STN09-ZA	surface	SB	N/A	N/A	7.30	1.5	9.49	20.92	CAST	52.310200	79.022800	2022-08-13	11:43	16:11	
128	STN09-ZB	bottom	SB	N/A	N/A	16.00	15	7.68	22.06	CAST	52.312900	79.023500	2022-08-13	12:25	16:11	
129	STN09-ZB	surface	SB	N/A	N/A	16.00	1.5	9.18	21.15	CAST	52.312900	79.023500	2022-08-13	12:40	16:11	
130	STN09-ZC	bottom	SB	N/A	N/A	30.00	29	7.78	21.98	CAST	52.312900	79.022500	2022-08-13	13:16	17:10	
131	STN09-ZC	surface	SB	N/A	N/A	30.00	1.5	9.85	20.60	CAST	52.312900	79.022500	2022-08-13	13:30	17:10	
132	STN14	surface	ROS	21	11	75.10	2	9.60	21.40	ROS	52.428200	79.405200	2022-08-13	19:10	19:40	
133	STN14	surface	ROS	21	11	75.10	2	9.60	21.40	ROS	52.428200	79.405200	2022-08-13	19:10	19:40	
134	STN14	bottom	ROS	21	3	75.10	70	3.20	25.30	ROS	52.428200	79.405200	2022-08-13	18:56	19:40	
135	STN14	bottom	ROS	21	1	75.10	70	3.20	25.30	ROS	52.428200	79.405200	2022-08-13	18:55	19:40	
136	FT17	FT	FT	N/A	N/A	7.90	2	15.68	14.36	TSG	51.472000	80.243200	2022-08-15	15:45	15:55	
137	FT17	FT	FT	N/A	N/A	7.90	2	15.68	14.36	TSG	51.472000	80.243200	2022-08-15	15:45	15:55	
138	FT17	FT	FT	N/A	N/A	7.90	2	15.68	14.36	TSG	51.472000	80.243200	2022-08-15	15:45	15:55	
139	FT17	FT	FT	N/A	N/A	7.90	2	15.68	14.36	TSG	51.472000	80.243200	2022-08-15	15:45	15:55	
140	B13	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-15	---	15:55	Distilled water blank
141	FT18	FT	FT	N/A	N/A	25.00	2	14.62	17.92	TSG	51.852500	80.018500	2022-08-16	16:05	16:10	Filter dropped on ground, not an ideal sample
142	FT18	FT	FT	N/A	N/A	25.00	2	14.62	17.92	TSG	51.852500	80.018500	2022-08-16	16:05	16:10	

143	FT19	FT	FT	N/A	N/A	49.50	2	12.80	21.21	TSG	52.208200	79.772700	2022-08-16	19:08	19:10	
144	FT19	FT	FT	N/A	N/A	49.50	2	12.80	21.21	TSG	52.208200	79.772700	2022-08-16	19:08	19:10	
145	FT20	FT	FT	N/A	N/A	80.70	2	10.59	20.45	TSG	52.452200	79.405500	2022-08-16	22:14	22:15	
146	FT20	FT	FT	N/A	N/A	80.70	2	10.59	20.45	TSG	52.452200	79.405500	2022-08-16	22:14	22:15	
147	FT21	FT	FT	N/A	N/A	39.50	2	9.58	21.77		52.604600	79.400300	2022-08-17	1:07	1:09	
148	FT21	FT	FT	N/A	N/A	39.50	2	9.58	21.77		52.604600	79.400300	2022-08-17	1:07	1:09	
149	B14	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-17	---	1:09	Distilled water blank
150	FT22	FT	FT	N/A	N/A	35.70	2	9.10	20.18	TSG	53.867100	79.343600	2022-08-18	13:50	16:11	
151	FT22	FT	FT	N/A	N/A	35.70	2	9.10	20.18	TSG	53.867100	79.343600	2022-08-18	13:50	16:11	
152	STN17	FT	FT	N/A	N/A	38.80	2	10.60	18.42	TSG	53.826000	79.411300	2022-08-18	13:20	13:45	
153	STN17	FT	FT	N/A	N/A	38.80	2	10.60	18.42	TSG	53.826000	79.411300	2022-08-18	13:20	13:45	
154	STN17	bottom	ROS	22	2	34.20	30	5.60	24.30	TSG	53.867100	79.343600	2022-08-18	14:05	16:50	Low sample volume, waited to collect, samples taken from carboy
155	STN17	bottom	ROS	22	2	34.20	30	5.60	24.30	TSG	53.867100	79.343600	2022-08-18	14:05	16:50	Low sample volume, waited to collect, samples taken from carboy
156	FT23	FT	FT	N/A	N/A	32.40	2	10.80	21.60	TSG	53.846100	79.422500	2022-08-18	16:09	16:50	
157	FT23	FT	FT	N/A	N/A	32.40	2	10.80	21.60	TSG	53.846100	79.422500	2022-08-18	16:09	16:50	
158	B15	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-18	16:09	16:50	
159	FT24	FT	FT	N/A	N/A	45.80	2	13.40	17.22	TSG	53.994100	79.695600	2022-08-18	19:06	19:10	
160	FT24	FT	FT	N/A	N/A	45.80	2	13.40	17.22	TSG	53.994100	79.695600	2022-08-18	19:06	19:10	
161	FT25-01	FT	FT	N/A	N/A	59.30	2	14.11	20.49	TSG	54.295200	79.873200	2022-08-18	22:01	22:04	

162	FT25-02	FT	FT	N/A	N/A	59.30	2	14.11	20.49	TSG	54.295200	79.873200	2022-08-18	22:01	22:04	
163	STN10-01	FT	FT	N/A	N/A	21.00	2	7.07	24.28	TSG	53.813200	80.710700	2022-08-19	4:33	5:00	
164	STN10-02	FT	FT	N/A	N/A	21.00	2	7.07	24.28	TSG	53.813200	80.710700	2022-08-19	4:33	5:00	
165	STN10-01	bottom	ROS	23	2	21.00	10	7.30	25.40	ROS	53.813900	80.710700	2022-08-19	4:45	6:10	
166	STN10-02	bottom	ROS	23	2	21.00	10	7.30	25.40	ROS	53.813900	80.710700	2022-08-19	4:45	6:10	
167	STN10-01	surface	ROS	23	8	21.00	<1	10.00	24.50	ROS	53.813900	80.710700	2022-08-19	4:48	6:10	
168	STN10-02	surface	ROS	23	8, 9, 10	21.00	<1	10.00	24.50	ROS	53.813900	80.710700	2022-08-19	4:48	6:10	Multiple niskins
169	B16	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-19	---	15:38	Distilled water blank
170	STN02-01	surface	ROS	25	11	61.70	<1	7.10	21.20	ROS	54.276800	81.475900	2022-08-19	20:18	20:57	
171	STN02-02	surface	ROS	25	11	61.70	<1	7.10	21.20	ROS	54.276800	81.475900	2022-08-19	20:18	20:57	
172	STN02-01	bottom	ROS	24	1	62.10	55	-1.40	30.50	ROS	54.274400	81.476100	2022-08-19	18:22	19:00	
173	STN02-02	bottom	ROS	24	1	62.10	55	-1.40	30.50	ROS	54.274400	81.476100	2022-08-19	18:22	19:00	
174	STN18-01	bottom	ROS	26	12	100.00	90	-1.50	31.60	ROS	54.686400	80.186400	2022-08-20	11:57	12:30	
175	STN18-02	bottom	ROS	26	12	100.00	90	-1.50	31.60	ROS	54.686400	80.186400	2022-08-20	11:57	12:30	
176	STN18-01	surface	ROS	27	12	102.00	<1	10.30	23.90	ROS	54.686700	80.188600	2022-08-20	13:25	14:24	
177	STN18-02	surface	ROS	27	12	102.00	<1	10.30	23.90	ROS	54.686700	80.188600	2022-08-20	13:25	14:26	
178	B17	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-21	---	11:45	Distilled water blank, used ship's RO water system
179	BI03-01	surface	ROS	29	12	114.00	<1	11.30	24.30	ROS	55.628000	79.027000	2022-08-21	13:43	14:00	
180	BI03-02	surface	ROS	29	12	114.00	<1	11.30	24.30	ROS	55.628000	79.027000	2022-08-21	13:43	14:00	
181	BI03-01	bottom	ROS	28	4	99.00	90	-1.40	31.10	ROS	55.622600	79.026300	2022-08-21	11:54	12:51	
182	BI03-02	bottom	ROS	28	4	99.00	90	-1.40	31.10	ROS	55.622600	79.026300	2022-08-21	11:54	12:51	
183	BI04-01	surface	ROS	30	12	34.60	<1	7.20	27.30	ROS	55.790600	79.454700	2022-08-21	22:52	23:50	
184	BI04-02	surface	ROS	30	12	34.60	<1	7.20	27.30	ROS	55.790600	79.454700	2022-08-21	22:52	23:50	

185	BI04-01	bottom	ROS	30	4	34.60	25	2.20	28.30	ROS	55.790600	79.454700	2022-08-21	22:47	23:50	
186	BI04-02	bottom	ROS	30	4	34.60	25	2.20	28.30	ROS	55.790600	79.454700	2022-08-21	22:47	23:50	
187	FT29-01	FT	FT	N/A	N/A	19.80	2	4.60	27.79	TSG	55.893500	79.807300	2022-08-22	11:38	18:00	Depth of interest for shallow FT site
188	FT29-02	FT	FT	N/A	N/A	19.80	2	4.60	27.79	TSG	55.893500	79.807300	2022-08-22	11:38	18:00	Depth of interest for shallow FT site
189	B18	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-22	---	18:00	Distilled water blank - RO H2O
190	BI-05-ZA	surface	SB	N/A	N/A	6.50	5.5	5.43	27.76	CAST	55.893867	79.811567	2022-08-22	13:00	18:30	
191	BI-05-ZA	bottom	SB	N/A	N/A	6.50	1	5.26	27.61	CAST	55.893867	79.811567	2022-08-22	13:20	18:30	Synched with Rosette cast #31
192	BI-05-ZB	surface	SB	N/A	N/A	13.00	1	5.92	27.72	CAST	55.892183	79.808217	2022-08-22	14:15	19:20	
193	BI-05-ZB	bottom	SB	N/A	N/A	13.00	12	5.40	27.65	CAST	55.892183	79.808217	2022-08-22	14:40	19:20	
194	BI05-01	FT	FT	N/A	N/A	73.70	2	7.60	27.60	ROS	55.890700	79.778100	2022-08-22	13:25	18:00	Synched with Rosette cast #31
195	BI05-02	FT	FT	N/A	N/A	73.70	2	7.60	27.60	ROS	55.890700	79.778100	2022-08-22	13:25	18:00	Synched with Rosette cast #32
196	BI05-01	bottom	ROS	31	4	73.70	57	0.70	28.70	ROS	55.890700	79.778100	2022-08-22	13:10	18:30	Last rosette cast, cable is frayed
197	BI05-02	bottom	ROS	31	4	73.70	57	0.70	28.70	ROS	55.890700	79.778100	2022-08-22	13:10	18:30	Last rosette cast, cable is frayed
198	FT-32	FT	FT	N/A	N/A	21.90	2	10.04	27.38	TSG	56.110900	79.517500	2022-08-23	16:30	17:00	CTD cast #207, FT @13:00 missed
199	FT-32	FT	FT	N/A	N/A	21.90	2	10.04	27.38	TSG	56.110900	79.517500	2022-08-23	16:30	17:00	CTD cast #207, FT @13:00 missed
200	B19	BLANK	BLANK	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2022-08-23	---	15:40	Distilled water blank - used ship's RO water

NOTES:

eDNA ID: the eDNA tube ID

Station-Rep: Gives the station number and repetition for the sample

Cast no: indicates the Rosette or Niskin cast #

Water column: the water column position of the sample, where FT: the flow through/underway system

Sample method: indicates if the sample was taken using the flowthrough/underway (FT), Rosette (ROS)

Salin-Temp Method: refers to the method that salinity and temperature were obtained. ROS: rosette, CAST: castaway, :Seabird, TSG : thermosalinograph in the engine room which is connected to the ships underway or flowthrough system.

Appendix F: RNA sampling log

No	Station	Label	Date (UTC)	Time (UTC)	Depth (m)	Aliquot (1 ml)	Temp (°C)	Salinity (PSU)	Lat (N)	Long (W)	Bottom depth (m)	Notes
		WK-0/Alia/2022-07-12/12:25/Neg RO	2022-07-12									
		WK-0/Alia/2022-07-12/12:25/Neg RO	2022-07-12									
		WK-0/Alia/2022-07-12/12:25/Neg RO	2022-07-12									
1a	FT	WK-0/2022/07/20/12:46 (1)	2022-07-20	15:26	3.96	1						peristaltic pump
1b	FT	WK-0/2022/07/20/12:46 (2)	2022-07-20	15:26	3.96	2						
1c	FT	WK-0/2022/07/20/12:46 (3)	2022-07-20	15:26	3.96	3						
2a	FT	WK-0/2022/07/20/20:17 (4)	2022-07-20	20:17	3.96	1						peristaltic pump
2b	FT	WK-0/2022/07/20/20:17 (5)	2022-07-20	20:17	3.96	2						
2c	FT	WK-0/2022/07/20/20:17 (6)	2022-07-20	20:17	3.96	3						
3a	FT	WK-0/2022/07/21/13:02 (7)	2022-07-21	13:02	3.96	1	2.82	31.84	58.90444	62.86528		100 ml syringe
3b	FT	WK-0/2022/07/21/13:02 (8)	2022-07-21	13:02	3.96	2						

3c	FT	WK-0/2022/07/21/13:02 (9)	2022-07-21	13:02	3.96	3							
4a	FT	WK-0/2022/07/21/16:23 (10)	2022-07-21	16:23	3.96	1	3.06	31.80	59.22972	63.20306	95.09	100 ml syringe	
4b	FT	WK-0/2022/07/21/16:23 (11)	2022-07-21	16:23	3.96	2							
4c	FT	WK-0/2022/07/21/16:23 (12)	2022-07-21	16:23	3.96	3							
5a	FT	WK-0/2022/07/21/22:11 (13)	2022-07-21	22:11	3.96	1	3.38	31.82	59.87917	63.68944	127.89	100 ml syringe	
5b	FT	WK-0/2022/07/21/22:11 (14)	2022-07-21	22:11	3.96	2							
5c	FT	WK-0/2022/07/21/22:11 (15)	2022-07-21	22:11	3.96	3							
6a	FT	WK-0/2022/07/22/10:22 (16)	2022-07-22	10:22	3.96	1	3.01	32.29	60.73083	65.93833	350.50	100 ml syringe	
6b	FT	WK-0/2022/07/22/10:22 (17)	2022-07-22	10:22	3.96	2							
6c	FT	WK-0/2022/07/22/10:22 (18)	2022-07-22	10:22	3.96	3							
7a	FT	WK-0/2022/07/22/14:27 (19)	2022-07-22	14:27	3.96	1	1.96	32.29	60.89778	67.08667	344.41	100 ml syringe	
7b	FT	WK-0/2022/07/22/14:27 (20)	2022-07-22	14:27	3.96	2							
7c	FT	WK-0/2022/07/22/14:27 (21)	2022-07-22	14:27	3.96	3							

8a	FT	WK-0/2022/07/22/21:22 (22)	2022-07-22	21:22	3.96	1	6.99	31.39	61.35333	68.73222	393.17	100 ml syringe
8b	FT	WK-0/2022/07/22/21:22 (23)	2022-07-22	21:22	3.96	2						
8c	FT	WK-0/2022/07/22/21:22 (24)	2022-07-22	21:22	3.96	3						
9a	FT	WK-0/2022/07/23/10:21 (25)	2022-07-23	10:21	3.96	1	5.55	32.07	62.14944	71.83139	295.03	100 ml syringe
9b	FT	WK-0/2022/07/23/10:21 (26)	2022-07-23	10:21	3.96	2						
9c	FT	WK-0/2022/07/23/10:21 (27)	2022-07-23	10:21	3.96	3						
10a	FT	WK-0/2022/07/23/14:20 (28)	2022-07-23	14:20	3.96	1	5.28	30.92	62.33444	72.81389	196.89	100 ml syringe
10b	FT	WK-0/2022/07/23/14:20 (29)	2022-07-23	14:20	3.96	2			0	0		
10c	FT	WK-0/2022/07/23/14:20 (30)	2022-07-23	14:20	3.96	3			0	0		
11a	FT	WK-0/2022/07/23/19:25 (31)	2022-07-23	19:25	3.96	1	4.78	29.98	62.57306	73.83111	121.30	100 ml syringe
11b	FT	WK-0/2022/07/23/19:25 (32)	2022-07-23	19:25	3.96	2						
11c	FT	WK-0/2022/07/23/19:25 (33)	2022-07-23	19:25	3.96	3						
12a	FT	WK-0/2022/07/23/22:50 (34)	2022-07-23	22:50	3.96	1	8.44	29.44	62.70278	74.55444	120.82	100 ml syringe

12b	FT	WK-0/2022/07/23/22:50 (35)	2022-07-23	22:50	3.96	2						
12c	FT	WK-0/2022/07/23/22:50 (36)	2022-07-23	22:50	3.96	3						
13a	FT	WK-0/2022/07/24/11:10 (37)	2022-07-24	11:10	3.96	1	4.11	30.35	62.67917	77.27472	401.40	100 ml syringe
13b	FT	WK-0/2022/07/24/11:10 (38)	2022-07-24	11:10	3.96	2						
13c	FT	WK-0/2022/07/24/11:10 (39)	2022-07-24	11:10	3.96	3						
14a	FT	WK-0/2022/07/24/14:00 (40)	2022-07-24	14:00	3.96	1	3.33	30.93	62.78111	78.14611	254.19	100 ml syringe
14b	FT	WK-0/2022/07/24/14:00 (41)	2022-07-24	14:00	3.96	2						
14c	FT	WK-0/2022/07/24/14:00 (42)	2022-07-24	14:00	3.96	3						
15a	FT	WK-0/2022/07/24/21:18 (43)	2022-07-24	21:18	3.96	1	5.92	29.06	62.63056	79.95556	140.81	100 ml syringe
15b	FT	WK-0/2022/07/24/21:18 (44)	2022-07-24	21:18	3.96	2						
15c	FT	WK-0/2022/07/24/21:18 (45)	2022-07-24	21:18	3.96	3						
16a	FT	WK-0/2022/07/25/10:44 (46)	2022-07-25	10:44		1	9.69	28.63	61.775	83.32861	117.65	100 ml syringe
16b	FT	WK-0/2022/07/25/10:44 (47)	2022-07-25	10:44		2						

16c	FT	WK-0/2022/07/25/10:44 (48)	2022-07-25	10:44		3							
17a	CMO-B	WK-0/2022/07/25/cmo-b/171m (49)	2022-07-25	15:24		1						178	niskin 1/2 (start: lat= 61.77500, lat= 84.32083)
17b	CMO-B	WK-0/2022/07/25/cmo-b/171m (50)	2022-07-25	15:24		2						178	niskin 1/2
17c	CMO-B	WK-0/2022/07/25/cmo-b/171m (51)	2022-07-25	15:24		3						178	niskin 1/2
18a	CMO-B	WK-0/2022/07/25/cmo-b/98m (52)	2022-07-25	15:28		1						178	niskin 3/4
18b	CMO-B	WK-0/2022/07/25/cmo-b/98m (53)	2022-07-25	15:28		2						178	niskin 3/4
18c	CMO-B	WK-0/2022/07/25/cmo-b/98m (54)	2022-07-25	15:28		3						178	niskin 3/4
19a	CMO-B	WK-0/2022/07/25/cmo-b/60m (55)	2022-07-25	15:31		1						178	niskin 5/6
19b	CMO-B	WK-0/2022/07/25/cmo-b/60m (56)	2022-07-25	15:31		2						178	niskin 5/6
19c	CMO-B	WK-0/2022/07/25/cmo-b/60m (57)	2022-07-25	15:31		3						178	niskin 5/6
20a	CMO-B	WK-0/2022/07/25/cmo-b/chl max (52m) (58)	2022-07-25	15:33		1						178	niskin 7/8
20b	CMO-B	WK-0/2022/07/25/cmo-b/chl max (52m) (59)	2022-07-25	15:33		2						178	niskin 7/8

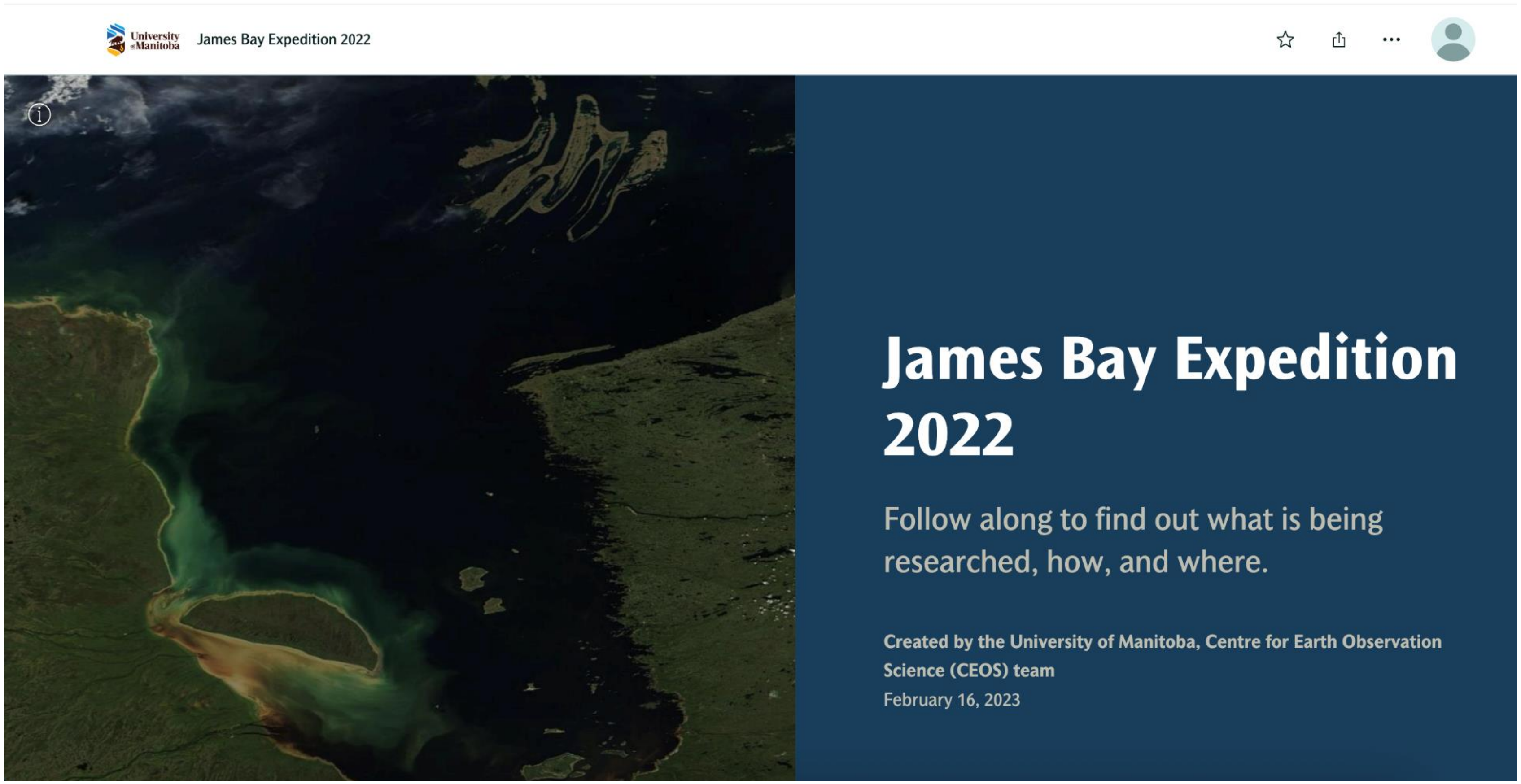
20c	CMO-B	WK-0/2022/07/25/cmo-b/chl max (52m) (60)	2022-07-25	15:33		3					178	niskin 7/8
21a	CMO-B	WK-0/2022/07/25/cmo-b/40m (61)	2022-07-25	15:35		1					178	
21b	CMO-B	WK-0/2022/07/25/cmo-b/40m (62)	2022-07-25	15:35		2					178	
21c	CMO-B	WK-0/2022/07/25/cmo-b/40m (63)	2022-07-25	15:35		3					178	
22a	CMO-B	WK-0/2022/07/25/cmo-b/29m (64)	2022-07-25	15:37		1					178	niskin 11/12
22b	CMO-B	WK-0/2022/07/25/cmo-b/29m (65)	2022-07-25	15:37		2					178	niskin 11/12
22c	CMO-B	WK-0/2022/07/25/cmo-b/29m (66)	2022-07-25	15:37		3					178	niskin 11/12
23a	CMO-B	WK-0/2022/07/25/cmo-b/23m (67)	2022-07-25	17:00		1					178	niskin 1/2
23b	CMO-B	WK-0/2022/07/25/cmo-b/23m (68)	2022-07-25	17:00		2					178	niskin 1/2
23c	CMO-B	WK-0/2022/07/25/cmo-b/23m (69)	2022-07-25	17:00		3					178	niskin 1/2
24a	CMO-B	WK-0/2022/07/25/cmo-b/10m (70)	2022-07-25	17:02		1					178	niskin 3/4
24b	CMO-B	WK-0/2022/07/25/cmo-b/10m (71)	2022-07-25	17:02		2					178	niskin 3/4
24c	CMO-B	WK-0/2022/07/25/cmo-b/10m (72)	2022-07-25	17:02		3					178	niskin 3/4

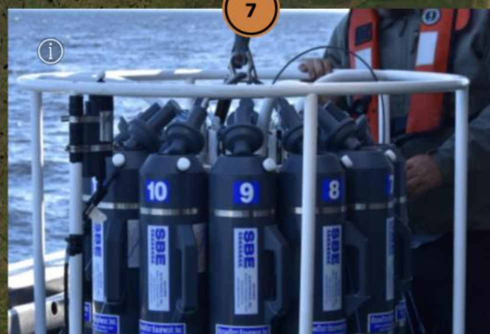
25a	CMO-B	WK-0/2022/07/25/cmo-b/surface (73)	2022-07-25	17:04		1	9.60	29.40				niskin 5/6, end: 84'17.248=long, 61'45.844=lat)
25b	CMO-B	WK-0/2022/07/25/cmo-b/surf (74)	2022-07-25	17:04		2						niskin 5/6
25c	CMO-B	WK-0/2022/07/25/cmo-b/surf (75)	2022-07-25	17:04		3						niskin 5/6
26a	FT	WK-0/2022/07/26/10:42 (76)	2022-07-26	10:42		1	8.55	29.35	61.32417	86.7625	72.84	
26b	FT	WK-0/2022/07/26/10:42 (77)	2022-07-26	10:42		2					0.00	
26c	FT	WK-0/2022/07/26/10:42 (78)	2022-07-26	10:42		3					0.00	
27a	FT	WK-0/2022/07/26/16:04 (79)	2022-07-26	16:04		1	7.87	29.08	61.01944	87.96	59.13	
27b	FT	WK-0/2022/07/26/16:04 (80)	2022-07-26	16:04		2						
27c	FT	WK-0/2022/07/26/16:04 (81)	2022-07-26	16:04		3						
28a	FT	WK-0/2022/07/26/22:42 (82)	2022-07-26			1	7.74	29.37	60.73806	89.44056		
28b	FT	WK-0/2022/07/26/22:42 (83)	2022-07-26			2						
28c	FT	WK-0/2022/07/26/22:42 (84)	2022-07-26			3						
29a	CMO-A	WK-0/2022/07/27/cmo-a/90m (85)	2022-07-27	12:11		1					100	

29b	CMO-A	WK-0/2022/07/27/cmo-a/90m (86)	2022-07-27			2						
29c	CMO-A	WK-0/2022/07/27/cmo-a/90m (87)	2022-07-27			3						
30a	CMO-A	WK-0/2022/07/27/cmo-a/60m (88)	2022-07-27	12:14		1					100	
30b	CMO-A	WK-0/2022/07/27/cmo-a/60m (89)	2022-07-27			2						
30c	CMO-A	WK-0/2022/07/27/cmo-a/60m (90)	2022-07-27			3						
31a	CMO-A	WK-0/2022/07/27/cmo-a/40m (91)	2022-07-27	12:16		1					100	
31b	CMO-A	WK-0/2022/07/27/cmo-a/40m (92)	2022-07-27			2						
31c	CMO-A	WK-0/2022/07/27/cmo-a/40m (93)	2022-07-27			3						
32a	CMO-A	WK-0/2022/07/27/cmo-a/27m (94)	2022-07-27	12:18		1					100	
32b	CMO-A	WK-0/2022/07/27/cmo-a/27m (95)	2022-07-27			2						
32c	CMO-A	WK-0/2022/07/27/cmo-a/27m (96)	2022-07-27			3						
33a	CMO-A	WK-0/2022/07/27/cmo-a/20m (97)	2022-07-27	12:20		1					100	
33b	CMO-A	WK-0/2022/07/27/cmo-a/20m (98)	2022-07-27			2						

33c	CMO-A	WK-0/2022/07/27/cmo-a/20m (99)	2022-07-27			3						
34a	CMO-A	WK-0/2022/07/27/cmo-a/17m (100)	2022-07-27	12:21		1					100	
34b	CMO-A	WK-0/2022/07/27/cmo-a/17m (101)	2022-07-27			2						
34c	CMO-A	WK-0/2022/07/27/cmo-a/17m (102)	2022-07-27			3						
35a	CMO-A	WK-0/2022/07/27/cmo-a/10m (103)	2022-07-27	13:29		1					105	
35b	CMO-A	WK-0/2022/07/27/cmo-a/10m (104)	2022-07-27			2						
35c	CMO-A	WK-0/2022/07/27/cmo-a/10m (105)	2022-07-27			3						
36a	CMO-A	WK-0/2022/07/27/cmo-a/surf (106)	2022-07-27	13:31		1					105	
36b	CMO-A	WK-0/2022/07/27/cmo-a/surf (107)	2022-07-27			2						
36c	CMO-A	WK-0/2022/07/27/cmo-a/surf (108)	2022-07-27			3						
37a	FT	WK-0/2022/07/28/13:14 (109)	2022-07-28	13:14		1	10.98	17.25	59.07667	94.33333	21.91	
37b	FT	WK-0/2022/07/28/13:14 (110)	2022-07-28			2						
37c	FT	WK-0/2022/07/28/13:14 (111)	2022-07-28			3						

Appendix G: Communications Materials



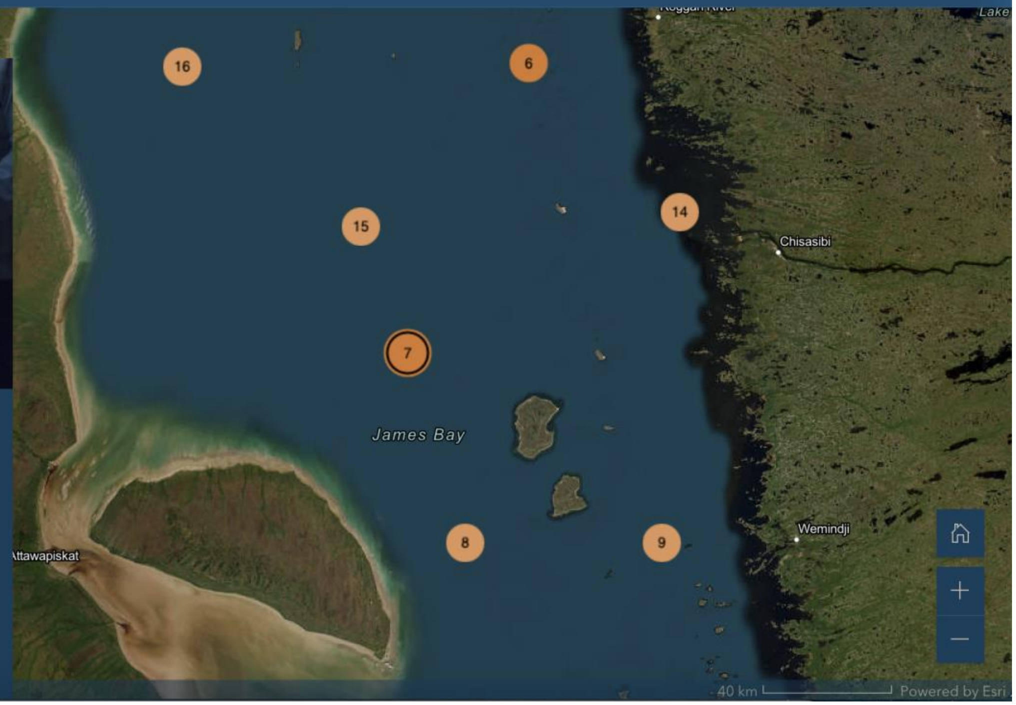


August 9th

Station 11

This was a quick station as only the rosette and CTD sensors were used here. You can see above, a picture of

07 / 21



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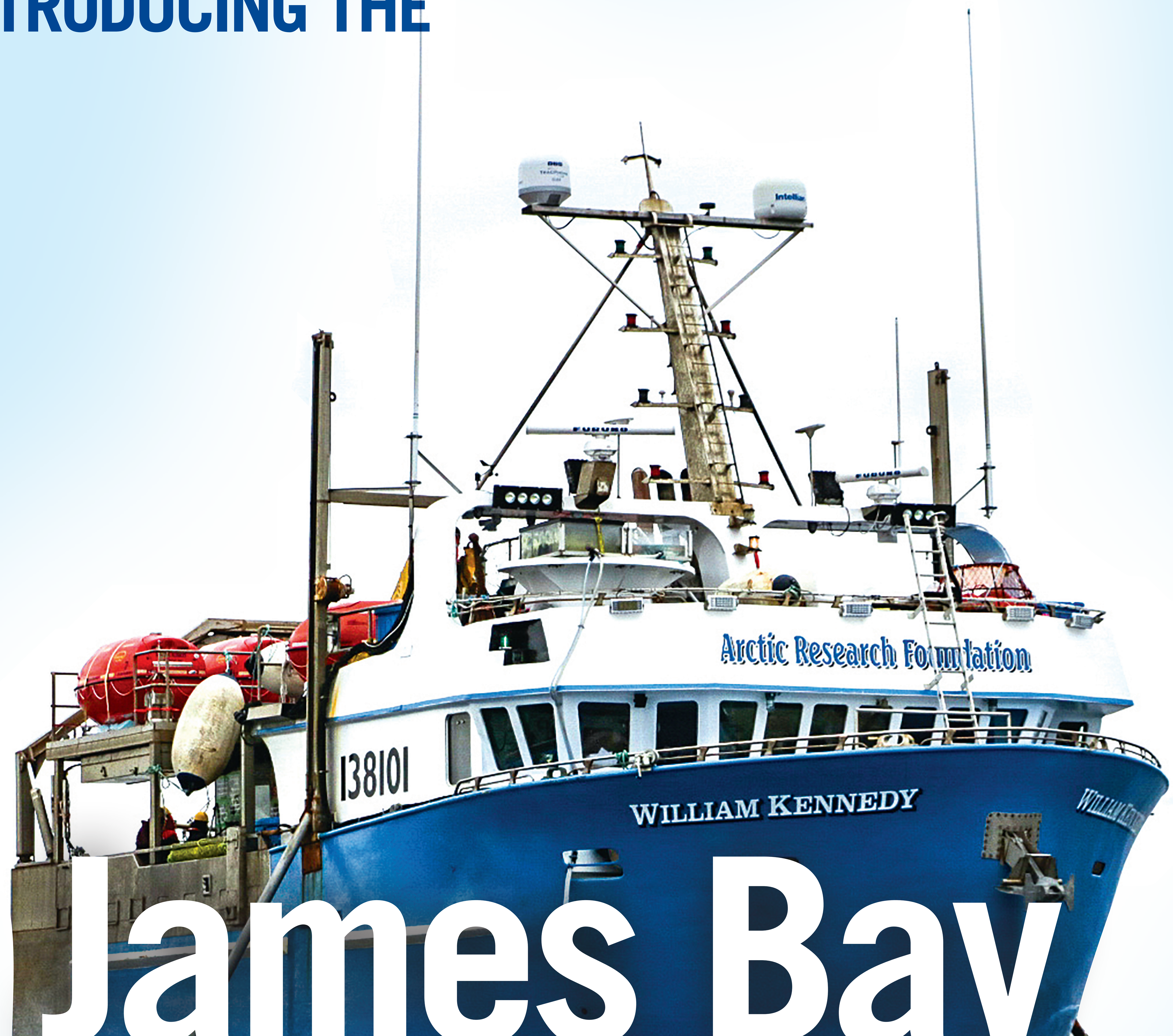

James Bay Expedition

Proposed ship track for August 2022

Cruise Track — Bathymetry section

Mooring — Sampling station

Average speed: **8 knots** (15 km/hr)

65 feet (19.8 m) long

28 feet (8.5 m) wide

Hull is 2 ft (0.6m) thick made from Kevlar

Draft of 13.5 ft (4 m)

The Research Vessel (R/V) William Kennedy is returning to James Bay for phase 2 of an ocean expedition. Last year, many samples and measurements were taken which made a start to better understanding James Bay--one of the least studied water bodies in Canada. This year, community members will join the expedition as more data is collected and engage in the exchanging of cultural and scientific knowledge. The overall goal of this expedition is to explore the marine environment of James Bay and learn how it is interconnected with the nearby river systems. The Bay faces pressures from both hydroelectric development and climate change that will need to be assessed and monitored. Very little is known about the Bay's circulation patterns, underwater habitats, and food webs so there is much to learn. Stay tuned!

The R/V William Kennedy is part of the Churchill Marine Observatory, purchased by the Arctic Research Foundation and retrofitted for research in rough seas by the University of Manitoba. The vessel is named after Captain William Kennedy (1814-1890), an explorer and the first Métis captain to command sea-going vessels in the Arctic. It is equipped with many scientific instruments to capture underwater video, collect samples and measure temperature, depth, pH of water and more. If you see this ship near your community this August, please wave!

Two inflatable boats on the ship can explore shallower waters.

Contact: A Working Group with representatives of Mushkegowuk Council and Cree Nation Government is helping to plan the Expedition.

Co-principal Investigators: Drs. CJ Mundy and Z Kuzyk, Associate Professors, University of Manitoba

University of Manitoba · ASP Arctic Science Partnership · CEOS Centre for Earth Observation Science · Oceans North · Arctic Research Foundation · ArcticNet · Université Laval · UQAR ISMER · Wildlands League