



Institute of Ocean Sciences Institut des Sciences de la Mer

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12 January 2022

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Research liaison
Nunavummi Qaujisaqtulirijikkut/Nunavut Research Institute (NRI)
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Chairperson
Nunavut Impact Review Board (NIRB)
P.O Box 1360
Cambridge Bay, NU
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RE: Scientific Research License #04 013 21R-M 2021 Annual Report and 2022 plans.

Dear NRI, NIRB and interested parties,

Please accept this letter as our report submission for our 2021 oceanographic sampling and research in the Kitikmeot Sea, under the multiyear NRI licence number: **04 013 21R-M**. This letter further describes our plans for the 2022 field season, to be conducted under the same license.

Building on our previous years of work in this region, our research seeks to understand the general oceanography of the Kitikmeot Sea and study the effects on the marine ecosystem of both river inflow and tidally-driven mixing in narrow and shallow straits. Our observations include oceanographic measurements to establish a baseline of physical, biological, and geochemical information across the region and includes focussed sampling in straits and near river mouths where we anticipate enhanced biological production.

2021 Annual Summary:

Unfortunately, travel restrictions due to covid-19 made it impossible to carry out our ship-based research activities aboard the RV Martin Bergmann again in 2021. However we were able to successfully recover two long-term moorings in Dease Strait that had been in the water since 2019. These were recovered by the CCGS Sir Wilfrid Laurier during their work in the area on August 10th, 2021. All the instruments were intact and will be refurbished over the winter for redeployment in 2022. We have also been working with community partners in Cambridge Bay and Kugluktuk to carry out sampling activities in local rivers and estuaries. Unfortunately planned sampling activities were thwarted by weather or Covid-19 related

restrictions on several occasions. A member of our science team was able to visit Kugluktuk in September 2021 to work with representatives from the Hunters and Trappers Organization to plan for a community based sampling program in the Coppermine River and Coronation Gulf proposed to begin this winter (details below).

2022 Plans:

Ship-based Oceanographic Sampling: If travel to Nunavut is permitted in the summer of 2022, we aim to focus our mooring deployment and water sampling activities aboard either the *CCGS Sir Wilfrid Laurier* or the *R/V Martin Bergmann*. These activities will take place in the Finlayson Islands, Coronation Gulf, Bathurst Inlet, Queen Maud Gulf, and Icebreaker Channel, and if time allows, travelling into Chantry Inlet (St. Roch and Rasmussen Basins), as shown in Figure 1. Our focus for 2022 will be the continuation of work carried out from 2017-2019, and as such, our planned sampling, instruments, and techniques are the same as in our original permit.

Our ship-based oceanographic program will take place between 1 August 2022 and 30 September 2022, with the participants listed in Table 2 below. Our proposed observational activities for 2022 include: a) recovery and re-deployment of long-term moorings; and, b) measurement of physical and geochemical properties of seawater via electronic instruments deployed from the ship and via water sample collection. As described in our original permit, mooring instrumentation will be mounted on recoverable sub-surface moorings that reach from the bottom to within 15m of the surface. Pairs of moorings include sensors for measuring currents and ice thickness and sensors measuring temperature and salinity and optically observed biological parameters (fluorescence, light intensity, turbidity, etc).

Community-Based Oceanographic Sampling: We also have plans to work with community partners in Kugluktuk, Bathurst Inlet, and Cambridge Bay to conduct local sampling activities in 2022-2023. As in 2021/2022, we will continue to work with the Kugluktuk Hunters and Trappers Organization and the Canadian Rangers Ocean Watch program to collect year-round observations of river to ocean gradients from the Coppermine River into Coronation Gulf. This sampling will include collecting observations of physical and geochemical parameters using local platforms in Kugluktuk and will take place from early spring (February 2022) into the following winter (March 2023). There will be approximately 5 – 6 sampling events throughout the year, depending on weather conditions and safe travel considerations. Wintertime transects will be conducted by snow machine and summertime transects will be conducted by small boat.

We also plan to work with the Bathurst Inlet Hunters and Trappers Organization to carry out a springtime river-ocean sampling campaign in the Burnside River and Burnside Bay. The goal of this program will be to record observations of the transition in physical (temperature and salinity, with depth) and geochemical (nutrients, alkalinity, organic carbon, dissolved oxygen) properties along a transect from the river mouth into the estuary before sea ice break-up.

Wintertime observations of oceanographic conditions within Dease Strait will also be conducted by community partners in Cambridge Bay, once safe-travel on sea ice is possible. This will include conducting a transect across Dease Strait from Cape Colborne to the Kent Peninsula and another through the Finlayson Islands. These transects will collect physical observations of the entire ocean water column through the sea ice to observe wintertime conditions of the water temperature, salinity, and dissolved oxygen concentrations.

As our program covers the entire year, we request that our research license allow sample collection activities in the above-mentioned regions from January 2022 to December 2022.

Summary:

Our research uses a suite of oceanographic tools and year-round moorings to investigate the oceanography of the Kitikmeot Sea, including the flow of river water to the sea, and the tidally influenced narrow straits. We have an overall goal of understanding the structure and function of the region's ecosystem, which would provide NRI and the Canadian High Arctic Research Station a scientific basis for long-term ecological ocean monitoring and research.

We greatly appreciate your support of these investigations and we welcome any comments, suggestions, and ideas you may have related to this research. We would be happy to answer any questions you may have, so please contact us at your convenience. We look forward to working with you in 2022.

Sincerely,



Dr. Bill Williams - Research Scientist

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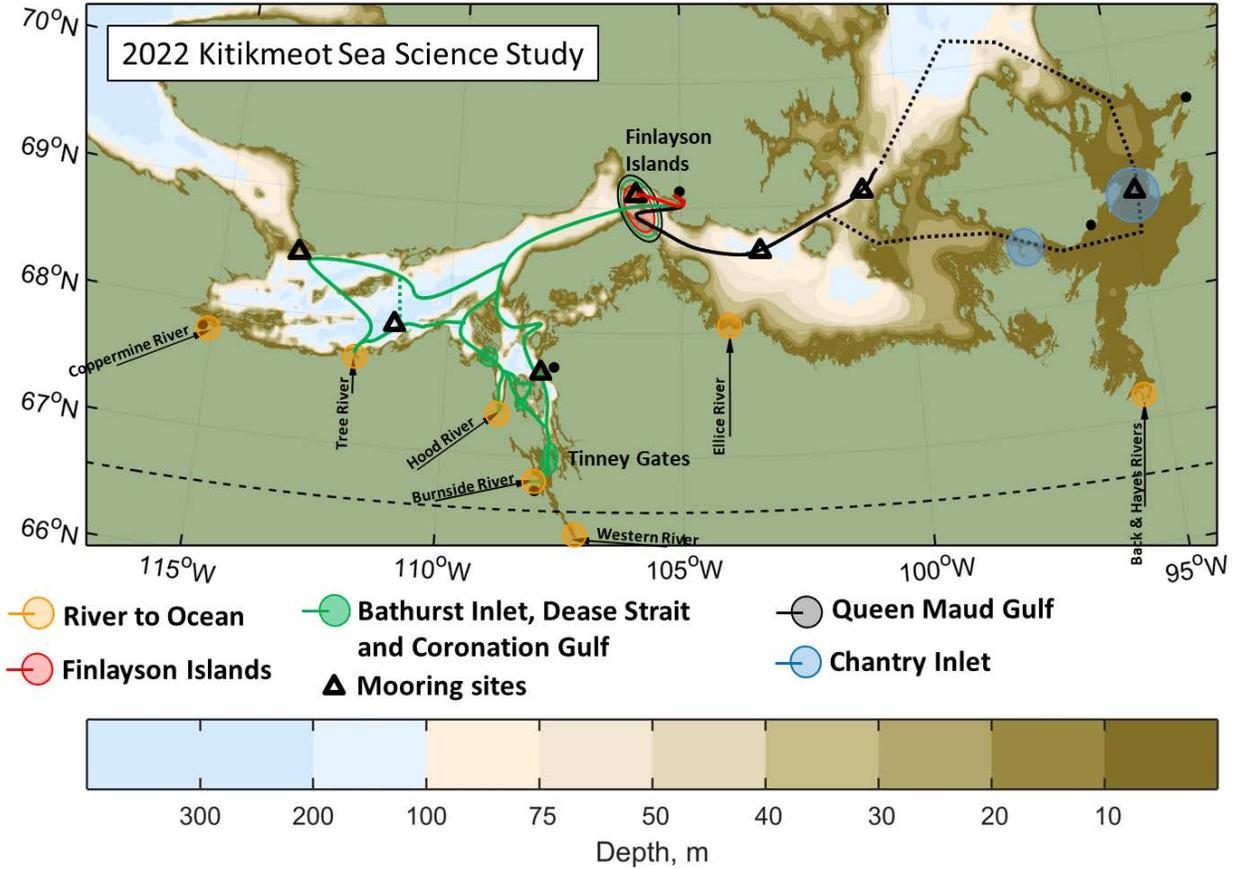
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Figures and tables:

1. Map showing the 2022 proposed route and areas of interest for ship-based oceanographic sampling from approximately 1 August 2022 to 30 September 2022.



2. Expected participants for 2022 ship-based oceanographic sampling

01 August 2022 – 30 September 2022 (dates to be confirmed)			
Participant	Role	Institution	Research Focus
Bill Williams	Co-PI	DFO	Physical Oceanography
Seth Danielson	Co-PI	U. of Alaska Fairbanks	Physical Oceanography
Eddy Carmack	Co-PI	DFO	Ocean Ecosystem Concepts
Bodil Bluhm	Co-PI	U. of Tromso, Norway	Benthic Ecology
Kristina Brown	Co-PI	DFO	River and Ocean Geochemistry
John Nelson	Co-PI	DFO	Zooplankton
Brent Else	Co-PI	U. of Calgary	Carbon Dioxide Chemistry
Mike Dempsey	Technician	DFO	Mooring recovery/deployment
Chis Clarke	Technician	DFO	Mooring recovery/deployment
Shawn Marriott	Technician	U. of Calgary	Water sampling
Richard Sims	Postdoc	U. of Calgary	Carbon Dioxide Chemistry
Hank Statscewich	Student	U. of Alaska Fairbanks	Physical Oceanography