



Fisheries and Oceans Pêches et Océans
Canada Canada

Institute of Ocean Sciences

Institut des Sciences de la Mer

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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 **#04 004 20R-M 2020** Annual Report and 2021 plans.

Dear NRI, NIRB and interested parties,

Please accept this letter as our report submission for our 2020 oceanographic sampling and research in the Kitikmeot Sea, under the multiyear NRI licence number: **04 004 20R-M**. This letter further describes our plans for the 2021 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.

2020 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 in 2020. However we have been working with community partners in Cambridge Bay and Kugluktuk to carry out sampling activities in local rivers and estuaries. Springtime sampling was completed in the Burnside River and estuary in May 2020 with partners from Cambridge Bay and a year-round sampling program will begin in the Coppermine River and estuary in December. This sampling program on the Coppermine River is expected to continue throughout 2021 and into 2022.

2021 Plans:

If travel to Nunavut is permitted in the summer of 2021, we aim to focus our sampling aboard the *R/V Martin Bergmann* 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. While conducting oceanographic work in these regions, we also plan to sample the Tree River, Hood River, Burnside River, and Western River using the small aluminum support boat on the *R/V Martin Bergmann* to sample from the river mouth and into the tidal estuary. The Coppermine River and estuary will also be sampled with the support of local platforms in Kugluktuk. We plan to conduct focused studies of tidal straits in Icebreaker Channel, around the Finlayson Islands, and within Bathurst Inlet. Our focus for 2021 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 work aboard the *R/V Martin Bergmann* will take place between 1 August 2021 and 30 September 2021, with the participants are listed in Table 2 below. Our proposed observational activities for 2021 include:

- a) recovery and re-deployment of long-term moorings;
- b) measurement of physical and geochemical properties of seawater via electronic instruments deployed from the ship and via water sample collection;
- c) collection of sediment samples to measure the abundance and diversity of seafloor life;
- d) use of small nets to collect zooplankton samples;
- e) sampling of river water from river mouths, and in transects from the river into the estuary using small boats to study land-to-ocean connections;
- f) deployment of surface drifters to measure surface currents and demonstrate connectivity between different parts of the ocean;
- g) deployment of small short duration moorings (recovered during the expedition) to measure local tidal flows and associated mixing.

We also have plans for limited wintertime river-ocean transect sampling for 2021-2022. As in 2020, wintertime river-ocean sampling in 2021 will include a spring expedition to the Burnside River 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. These observations will be carried out in collaboration with local guides from the community of Cambridge Bay. A similar exercise will be carried out at the Coppermine River, with year-round observations of river to ocean gradients in physical and geochemical parameters recorded at 5 – 6 intervals throughout the year. Wintertime transects will be conducted by snow machine and summertime transects will be conducted by small boat. These observations will be carried out in collaboration with the Kugluktuk Hunters and Trappers Organization and the Canadian Rangers Ocean Watch program.

Summary:

Our research uses a suite of oceanographic tools and year-round moorings, deployed from the *R/V Martin Bergmann*, 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 2021.

Sincerely,



Dr. Bill Williams - Research Scientist

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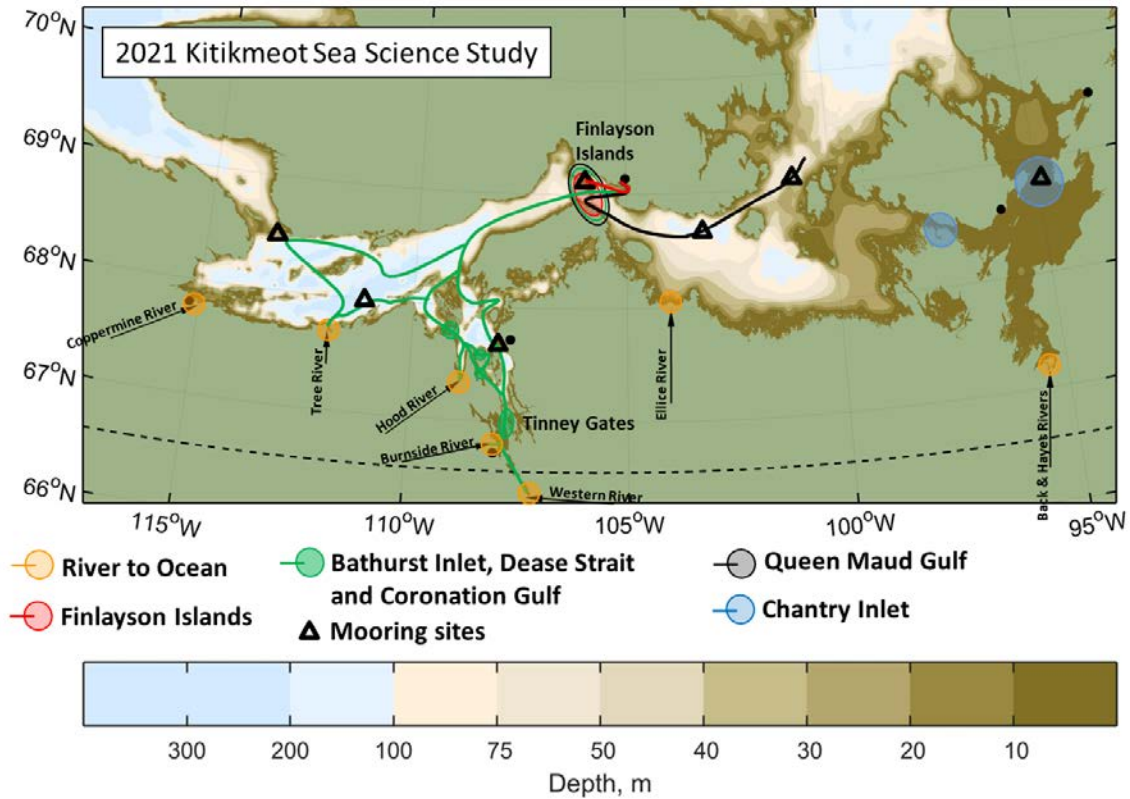
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Figures and tables:

1. Map showing the 2021 proposed route and areas of interest for oceanographic sampling from the *R/V Martin Bergmann* from approximately 1 August 2021 to 30 September 2021.



2. Expected participants for 2021 *RV Martin Bergmann* expedition.

01 August 2021 – 30 September 2021 (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
Peter van Buren	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