

NIRB Project Application File No: 19YN020
University of Alberta
Impacts of Melting Tidewater Glaciers on Marine Biogeochemical Cycles

Summary of current and future consultation plans:

We will be applying for an NRI license for our 2019 field season. A copy of our application for this license is included in this NIRB application – copies in both English and Inuktitut are provided. We will also be submitting an application to the Nunavut Water Board for use of waters without a license. This will be to use waters from the ice cap for drinking water purposes. This project will also be carried out in consultation with the Hamlet of Grise Fiord. A local member of the Grise Fiord Ranger Patrol (Jimmy Qaapik) will serve as our liaison with the Hamlet. We plan to hold an open meeting with the Hamlet of Grise Fiord each summer allowing us to inform the community about our annual project plans, our overall findings to date, and most importantly, to garner feedback from the Hamlet regarding the project.

Flight plans (including any planned aerial surveys): We will access the field sites on Devon Island Ice Cap and Jones Sound via twin plane provided by the Polar Continental Shelf Project (PCSP). We also plan to annually use a helicopter to access our on-ice field sites on Devon and Ellesmere islands in the summer. Part of this work will include aerial surveys of Devon Ice Cap.

Research methodologies to be employed:

The following research methodologies will be used:

- (i) ***Time-lapse cameras:*** Each time-lapse unit will consist of a tripod bolted into bedrock, a Nikon DSLR camera, a battery and solar panel. These systems operate year-round collecting images every hour until light becomes insufficient. We will service them and download data each spring and summer of the project.
- (ii) ***Ice sampling:*** Small ice samples (~1 kg each) will be collected using a chisel and hammer.
- (iii) ***Marine measurements:*** Measurements of ocean conductivity, temperature, pressure will be undertaken using an RBR multi-channel logger which will be profiled from the surface to ~500 m.
- (iv) ***Glacial meltwater and marine sampling:*** Meltwater and ocean samples will be collected in bottles and filtered on-site aboard small boats, with only the filter paper or small liquid volumes (<500 mL) sent back to the laboratory for analysis.

Mitigation plans that include identification of potential impacts and proposed mitigation measures:

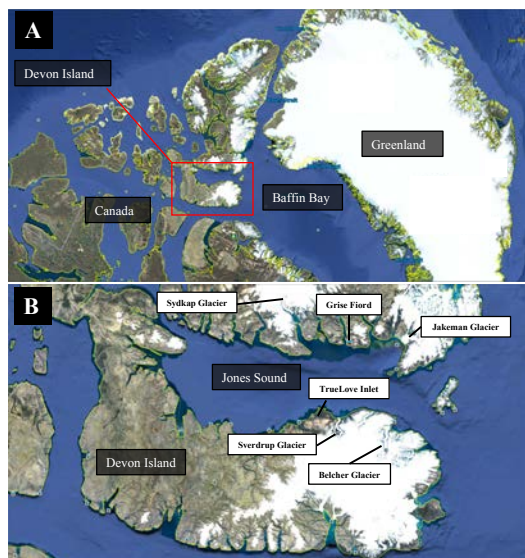
This project consists of a small scientific study requiring at maximum 6 people or less to spend approximately 1 month on-site in the field. The predicted environmental impacts will be minimal as all camps will be temporary, and all equipment, waste, and fuel drums will be back-hauled to Resolute Bay via twin otter support from the Polar Continental Shelf Project (PCSP). As such, additional mitigation measures are not anticipated to be necessary.

Waste management and spill contingency plans:

All waste (except greywater), equipment, fuel drums will be back-hauled to Resolute Bay via twin otter support from the Polar Continental Shelf Project (PCSP). Fuel drums will be handled

and managed by twin plane/helicopter pilots only and PCSP staff. All hazardous chemicals are in a minimum quantity, and used solely to preserve water samples. These will be stored in a double container vessel, thus negating the possibility of any spill. For our marine-based scientific work, greywater will be disposed of at sea, offshore, via international norms. A disposal at sea permit is not required for this disposal, as disposal of sewerage in Arctic Waters is currently allowed under the Arctic Shipping Pollution Prevention Regulations. There will be no disposal of any wastes except grey water, and the grey water will not contain any oily substances. There will be no discharge of bilge water.

Images of project location (if available):



Location	Latitude	Longitude	Use
TrueLove Inlet	75°37'24.35"N	84°26'19.10"W	Temporary camp location and fuel cache location
Sverdrup Glacier	75°38'15.41"N	83° 8'3.40"W	Temporary camp location; research site location
Belcher Glacier	75°31'38.47"N	81°28'2.02"W	Temporary camp location; research site location
Sydkap Glacier	76°40'57.29"N	85°20'25.61"W	Research site location
Jakeman Glacier	76°28'8.63"N	80°48'47.32"W	Research site location
Grise Fiord	76°25'6.54"N	82°54'11.81"W	Mobilization point