

Physiological response of soft-shell clam (*Mya truncata*) to spring microalgal blooms (PRECAB)

Leads: Lisa Matthes (DFO) and Michelle Kamula (DFO)

Dates: May 1, 2025-March 31, 2026

Funding: DFO-Coastal Environmental Baseline Program

Project Overview:

The truncate soft-shell clam *Mya truncata* is an important subsistence food for Inuit communities across Nunavut. Additionally, the filter feeding clam is an important food source for bearded seals and walrus, providing a significant linkage for energy and nutrient to transfer between primary producers and the higher trophic species. Despite their ecological importance in the Arctic marine food web, their life history and reproductive cycle in relation to the timing of primary production, like sea ice algae and open water phytoplankton, is not well known. This lack of understanding impedes any predictions of the impact of climate and/or anthropogenic related changes on the reproductive potential and ultimately clam biomass available for harvest in the future.

The objective of this project is to investigate how the soft-shell clam population of *Mya truncata*, found in the coastal marine waters near the community of Qikiqtarjuaq, physiologically respond to different microalgal blooms of sea ice algae in spring and phytoplankton in summer. To investigate the clams physiological response to different food sources, we plan to collect sea ice and water samples to investigate microalgal biomass, diversity and fatty acid composition; soft-shell clams will be collected by SCUBA diving to examine food web signatures and gonadal development stages. This investigation will provide more information on which role the different microalgal communities play in the spawning cycle of *M. truncata*.

Where, when, and how long the field research will be:

To capture seasonal changes in the gonadal development stages of the soft-shell clams in response to the different microalgal blooms, we plan to sample clams during the ice-covered season 20 May to 6 June, 2025 and over a two week period in July 2025 . Samples will be collected at 3 – 4 coastal stations near the community of Qikiqtarjuaq (see Figure 1).



Figure 1: Map showing proposed sampling locations for soft-shell clams, sea ice, and water samples.

Methods used to conduct the research:

In May/June 2025, clams will be collected by a local SUBA diver. In July 2025, clams will be collected by SCUBA diving from a small local boat or by collection at low tide. Up to 25 clams will be collected at each station during each sampling period for a maximum total of 200 clams. After sampling, clams will be measured, photographed and either frozen or preserved in 10% formaldehyde. The frozen clams will be brought back to DFO Winnipeg in coolers. In the DFO laboratory or on site at the new research centre, tissue samples will be collected for fatty acid analysis to examine food web structure. The remaining tissue will be dissected to determine the gonadal development stage during a microscopic analysis.

At the same locations where clams are collected, sea ice, water and sediment samples will be collected to investigate microalgal biomass, diversity and fatty acid content. Sea ice cores will be sampled using a Kovacs Ice Corer. The bottom 3 cm of the ice will be melted and filtered for analyses of ice algae taxonomy, chlorophyll a, particulate organic carbon/nitrogen, and fatty acids. Additionally, one ice core will be sampled to assess physical ice conditions including temperature and conductivity down the full length of the ice. Water profiles of conductivity, temperature, depth, and light will be measured at each station using a Maestro CTD sense to characterize physical water column properties. Water samples at the surface, middle and near bottom will be collected using a pump (surface only) and niskin bottles. Water will be processed for nutrients, salinity, phytoplankton taxonomy, chlorophyll a, particulate organic carbon/nitrogen, fatty acids and highly branched isoprenoids (HBI's). Surface sediment samples may be collected by the diver or by using a shovel at low tide at each location. Surface sediments will be analyzed for particulate organic carbon/nitrogen, fatty acids and

How, when, and with whom research results will be shared.

Following data collection, we plan to provide an update to the Nattivak HTA on the sampling activities in person and by written communication. We will also continue to contribute to the DFO led Coastal Environmental Baseline Program yearly newsletters. Once analyses is completed, we will provide a written summary of findings to the Nattivak HTA and will work closely with the Coastal Environmental Baseline Program on a coordinated effort to ensure the data is publicly available.