

Graduate student opportunities in the Arctic Marine Invertebrate Research Group

The Arctic marine invertebrate research group led by Dr. David Deslauriers is looking to fill two graduate student positions to begin in January of 2019. Based in Winnipeg, Manitoba, the students will be affiliated with the Arctic Aquatic Research Division of Fisheries and Oceans Canada (DFO) as well as with the Department of Biological Sciences at the University of Manitoba.

Development of a biophysical-population dynamics-bioenergetics model for Northern Shrimp in the Arctic (1 PhD Position; Co-advisor: Dr. Dirk Weihrauch)

Climate change (CC) will lead to more variable oceanographic conditions, that in some cases may enhance and in others compromise, the productivity of commercial fisheries. The main expected outcomes of CC include a decrease in pH and dissolved oxygen and an increase in water temperature. Salinity is also expected to decrease at both poles. One such fishery in Canada that is expected to be affected by climate change is the Northern Shrimp (*Pandalus borealis*) fishery. Northern Shrimp are harvested in the Arctic, Newfoundland, Gulf, and Quebec regions and support a \$400 million industry annually. Here, we propose to couple bioenergetics modelling with a population dynamics and biophysical model that will allow us to predict spatially-explicit physiological and biological responses of this species under different climate change and exploitation scenarios.

Challenges:

- Develop a modeling approach that will integrate data from multiple sources and that will couple bioenergetics modelling with population and spatial dynamics.
- Design and conduct sampling protocols for shrimp throughout their range.
- Transport and care for live shrimp to be brought back at the Freshwater Institute and University of Manitoba for temperature, acidification, and low dissolved oxygen exposure experiments.
- Design and conduct laboratory exposure experiments on live shrimp.
- Interact with community members in Nunavut by answering questions, addressing concerns, and presenting results on an annual basis.
- Present main study results on an annual basis at National and International conferences.
- Collaborate and interact with DFO researchers from the Quebec and Newfoundland regions.
- Analyse and interpret data, and publish results in government reports and peer-reviewed journals.

Arctic Clam Population Physiology (1 MSc Position; Co-advisor: Dr. Ken Jeffries)

In this project, the focus will be on clams, which are important organisms harvested by communities in Nunavut, and serve as vital links for the food web structure in Frobisher Bay, Nunavut. Clams can also serve as indicators for environmental changes that are predicted to occur in the proximate future. In particular, we will be focusing our work on understanding the impacts ocean warming and acidification can have on the growth and development of clams and how these effects interact with biotoxin accumulation as a result of wastewater effluent inputs to the system. We are proposing to test for these impacts at the genomic, phenotypic, and population levels to provide a mechanistic representation of the processes at play. Field collection of empirical data combined with laboratory experiments will be used to address the study objectives.

Challenges:

- Design and conduct a sampling protocol for clams in Frobisher Bay.
- Transport and care for live clams to be brought back at the Freshwater Institute for temperature and acidification exposure experiments.
- Design and conduct laboratory exposure experiments on live organisms.
- Interact with community members in Iqaluit by answering questions, addressing concerns, and presenting results on an annual basis.
- Present main study results at the end of the two-year period at one International conference.
- Collaborate and interact with other researchers from the Coastal Environmental Baseline Monitoring Program in Frobisher Bay.
- Analyse and interpret data, and publish results in government reports and peer-reviewed journals.

If interested, please contact David Deslauriers (David.Deslauriers@dfo-mpo.gc.ca or 204-983-8120) for more details about the positions.