Developing local research capacity for the monitoring of marine resources near Pond Inlet, Nunavut

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INTRODUCTION

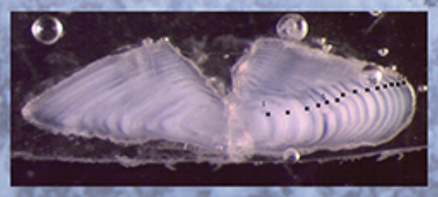
As a resident of Mittimatalik (Pond Inlet) all my life, I have been noticing changes in weather, sea ice, marine mammals, land wildlife, and fish. My experience at Nunavut Arctic College's Environmental Technology Program (2012) made me question what I see out there (my observations) and it made me realize that there is some changes that we cannot tell just by our "naked" eye and that we, as Inuit, need to seek more to find out the unnoticeable things impacting our environment. As Inuit, country food is our main resource all year round and we especially need to know if the animals that we hunt or fish are being affected. There is a need for more inuit to do the testing of our food in the North, the scientific way, in order to find out.

I wanted to start my own research project on **arctic char and seals,** to find out if they are being affected not only by "climate change" but also by human activities. There is especially more and more ships passing through in front of our community and going to the iron ore mine port in Milne Inlet which, on its own, is likely already affecting marine mammals and arctic char. Through the oceans, the Arctic is also connected to all other regions of the world and can carry and bank contaminants that can be absorbed by wildlife and Inuit.

METHODS

Back in 2015/2016, I started, with the help of ARCTIConnexion and other partners for mentorship, a project on arctic char looking at body condition and mercury levels during winter when we do a lot of fishing in lakes. In 2016, me and my team went fishing to two different lakes, one of them, Qurluqtu, is close to the Milne Inlet port where they load ships of raw iron ore. The other lake is called Tugaat and is also not far from the port. I also bought chars from local fishermen from two other lakes, Kangilluarjjuk and Inalugaarjjuk, which are far from the port. I compared mercury concentration in fish meat among these four lakes.The samples that I collected were sent down to University of Waterloo to measure mercury levels in fish and for aging them with based on otolith's ring count.

Linear regressions were performed on the fish data to test the effect of age, gender, and harvest locations on mercury concentrations.



In the spring of 2016, and in spring and fall of 2017, I started a similar project on ringed seals looking at mercury concentration and trace metals in meat and liver, Persistent Organic Pollutants in blubber, body condition, and infectious disease with the help of a veterinarian from University of Prince Edward Island. Lab analysis is ongoing and so I only present highlights of my sampling.

RESULTS

We harvested 93 char in total: 32 from Tugaat, 21 from Qurluqtu, 20 from Inalugaarjjuk and 20 from Kangilluarjjuk. We harvested 30 seals in total: 15 in the spring and 15 in the fall.

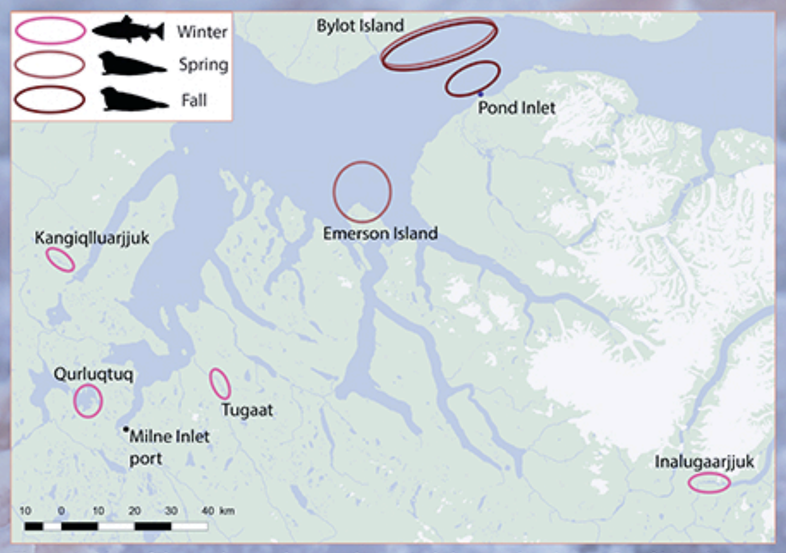


Figure 1- Map of the study are where we harvested chars and seals near Pond Inlet, Nunavut.

The char from Qurluqtu had the highest mercury concentration and the oldest fish were found there. Kangilluarjjuk had the lowest concentration of mercury level and the youngest fish. Although Inalugaarjjuk was the furthest from the mine port it had the second highest concentration of mercury.

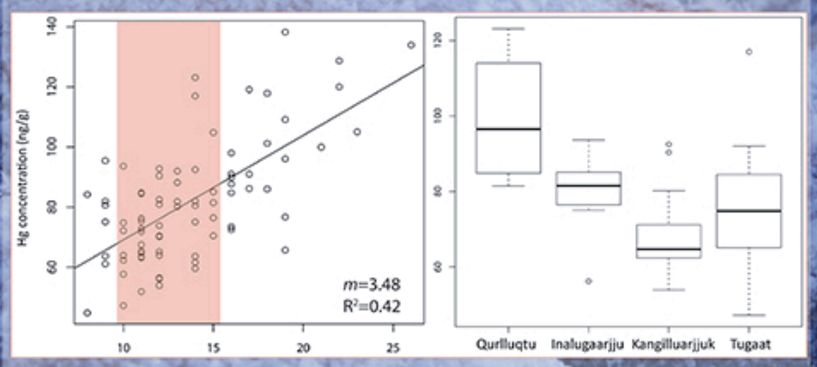


Figure 2- Mercury (Hg) concentration as function of age (left panel) and harvest location (right panel). In the left panel, the line illustrates the average obtained in linear regression. The orange rectangle delineate a subdataset that correspond to char of in between 10 and 15 years old that were selected for the among-location comparison (right panel). This is because harvest locations were unequal in age composition (only Qurluqtu and Inalugaarju had char >15). The 10-15 age class maximized the sample size for each location. In the right panel, box plots provide the average (dark line), the 50% Confidence Interval , and the 95% Confidence Interval.

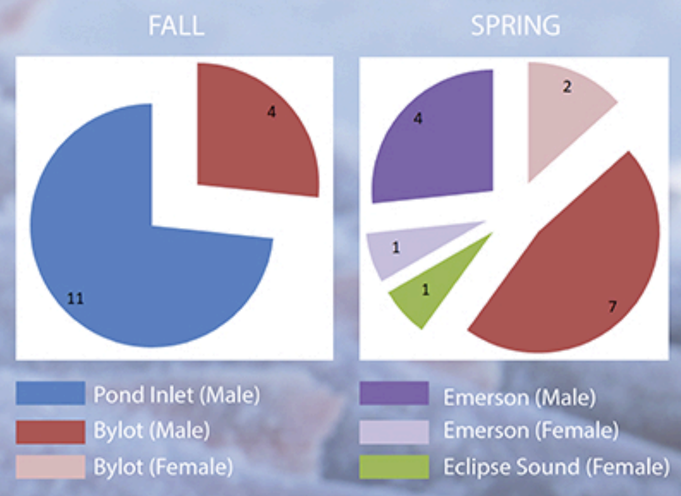


Figure 3- These indicate when and where we harvest the seals and indicate the gender.

DISCUSSION

Accorging to us inuit, the fish that we get from different lakes around Pond Inlet are safe to eat. Our results allowed us to confirm that the mercury concentrations in fish are about three times lower than the Health Canada Guidelines (0.5 ug/g).

Nevertheless, according to our research, Qurluqtu is still a concern for us because it had the highest concentration of mercury. Because of its proximity to the port, it raises additional questions about the potential effects of dust and fossil fuels release to the environment and water from industrial activities including terrestrial and marine ore transport. In addition, the fish harvested in Qurluqtu were older than the fish harvested in any other lake, despite that we used the same mesh size for nets. Should we assumed that the young fish can`t handle the contaminants level in this lake? Or is Qurluqtu simply a better habitat for fish and can sustain older ones? In any case, there is a need for more research in this lake, among seasons and including the ore shipping season (in summer,) and at different sampling sites.

As for the seals, our lab analyses will soon reveal the mercury and other traces metals level which can be elevated in meat and liver as reported in other regions of the Arctic.

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