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Bridging Global Change, Inuit Health and the Transforming Arctic Ocean

ANNUAL PROGRESS REPORT 2017-2018

Nunavimmiut consume marine foods, which are linked to small algae through the food web



Schematic representation of marine food webs in Nunavik

Nunavimmiut choose local marine foods according to their preferences but also the accessibility, abundance, appearance and quality of these foods. These four characteristics are strongly tied to the sun light environment that is important for algae production. These small algae are a key source of energy for sea bottom animals, seabirds, fish and marine mammals. The algae also produce healthy components (good fats like omega 3, vitamins) and integrate some contaminants that accumulate in country foods. Thus a change in climate, light in the Ocean and algae production can impact country food quality and eventually food security and health of Nunavummiut.

RESEARCH QUESTIONS

How much nutrients are there in marine foods?

Francis Dufour is a master student that evaluated the content in selenium and selenoneine (nutrients) of various country foods. These components are naturally found in plants and animals and are beneficial for the health of Nunavimmiut as they possibly reduce toxicity of mercury (contaminant). Kasey Cameron-Bergeron, Catherine Van-Doorn, Sara Bolduc and Guillaume Cing-Mars are other students currently working to evaluate the content of healthy nutrients (omega 3, vitamins, selenoneine) in marine plants and animals. Species studied include small algae, sea bottom animals, Arctic char, beluga whale, ringed seal and walrus. Nutrient content of sea water is also evaluated to understand what is available to the bottom of the food web.



Xavier Dallaire works differences on genetic among Arctic char populations of Nunavik. These differences inform us on the presence of different which help improve management. stocks. The genetic tools developed can also help hatcheries to select the best source population (broodstock), to monitor hatchery fish health (avoid inbreeding) and to know which rivers are used by released fish.



Kuujjuag fish hatchery



How do marine foods impact Inuit health?

Part of S. Bolduc's research will also document what characteristics of the Arctic char (color, fat, etc.) are preferred by Nunavimmiut. Once all these data from student projects is available, we aim to study how climate change impacts stocks, access and quality of key marine species, and subsequently impacts to diet, nutrition, food security and health in Nunavik.



HOW MUCH NUTRIENTS ARE THERE IN MARINE FOODS?

Sampling marine life with the help of Nunavimmiut

In 2017 and 2018, the BriGHT team had the opportunity to meet and collaborate with members of several Nunavik communities to plan and carry out fieldwork activities. Marine life sampling included summer 2017 and 2018 missions on board of the Amundsen ship, where water, small plants and animal species (algae, scallops, urchins) were collected along the coasts of Nunavik.





Locations sampled in 2017-2018

Our team visited communities of Salluit and Kuujjuarapik-Whapmagoostui in spring 2018 to collect ice algae. During summer 2018, we visited the communities of Akulivik, Ivujivik and Quaqtaq to sample Arctic char and sea bottom animals. Being guided on the land by experienced hunters was a key to the success of fieldwork and for learning more about these species.







Where are the Selenium and Selenoneine?

F. Dufour studied the content in selenium and selenoneine of various marine country foods. Nunavimmiut have more in their blood than elsewhere in Québec: where does it come from?

Dufour's research combined with another project by Mélanie Lemire and Pierre Ayotte has shown that the content in selenium and selenoneine was highest in beluga mattaq, and primarily in the skin. A smaller amount of selenoneine was also found in walrus.



Food web studied by F. Dufour



Content in selenium and selenoneine of marine country foods *For walrus skin, only one sample was analyzed

M. Lemire, Matthew Little and P. Ayotte also found higher levels of selenoneine in Inuit women's blood. A small study is on-going in Quaqtaq to try understand why. More results to come next year!

The conditions of marine environment vary across Nunavik

In 2017, 9 stations were sampled for water and phytoplankton (small algae), and were distributed in three main region of Nunavik: Hudson Bay, Hudson Strait and Ungava Bay. Thanks to the sun light, the algae produce a pigment called chlorophyll a. We test this pigment to detect its presence in marine environments. The Hudson Bay subsurface water (SCM) contained more chlorophyll a than other regions, which means that more food is available in the ecosystem of this region for larger marine animals.



Concentration of chlorophyll a at stations sampled in 2017

Analysis of marine animals are underway

Our team has collected samples from different levels of the food chain, from small shrimp-like animals to large marine mammals like beluga whale and walrus. Students are currently analyzing healthy nutrient content to determine what is available to humans when they eat local marine foods.



HOW DIFFERENT ARE ARCTIC CHAR POPULATIONS?

Sampling for Arctic char DNA is completed

The marine environment in Nunavik varies a lot, but are Arctic char from different regions genetically similar? From 2016 to 2018, a total of 823 samples of Arctic char DNA were collected in Nunavik. DNA was sampled in the adipose fin of Arctic chars. The map below shows the



location of Nunavik Arctic char DNA samples collected with project BriGHT as well as the other samples collected outside of Nunavik region as a comparison (441 samples collected since 2004, 208 analyzed).

This coming year, X. Dallaire will analyze those DNA samples to identify different Arctic char stocks from different rivers across Nunavik.



ACKNOWLEDGEMENTS

All the members of BriGHT would like to acknowledge the important contribution of Inuit collaborators to this project. We warmly thank members of the RNUK, local Hunter Support coordinators and municipal offices for their input in the planning of the project. They also provided crucial help in organizing fieldwork activities. All their questions and comments were useful to guide us on and to do a research that will be relevant to Nunavimmiut. The Makivik Corporation and the Nunavik Marine Region Wildlife Board also provided logistic support to this project. Finally, we acknowledge the special contribution of local guides who shared their knowledge of the land and led to the success of sampling activities. Thanks to all!

Students and project coordinator will visit communities in person in 2019 to present global results of project BriGHT. They will be present at the RNUK meeting and will then visit several communities.





DO YOU HAVE QUESTIONS OR COMMENTS? CALL ME OR EMAIL ME: GABRIELLE FORTIN gabrielle.fortin@sn.ulaval.ca / 1 418 656-2131 #4344



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