

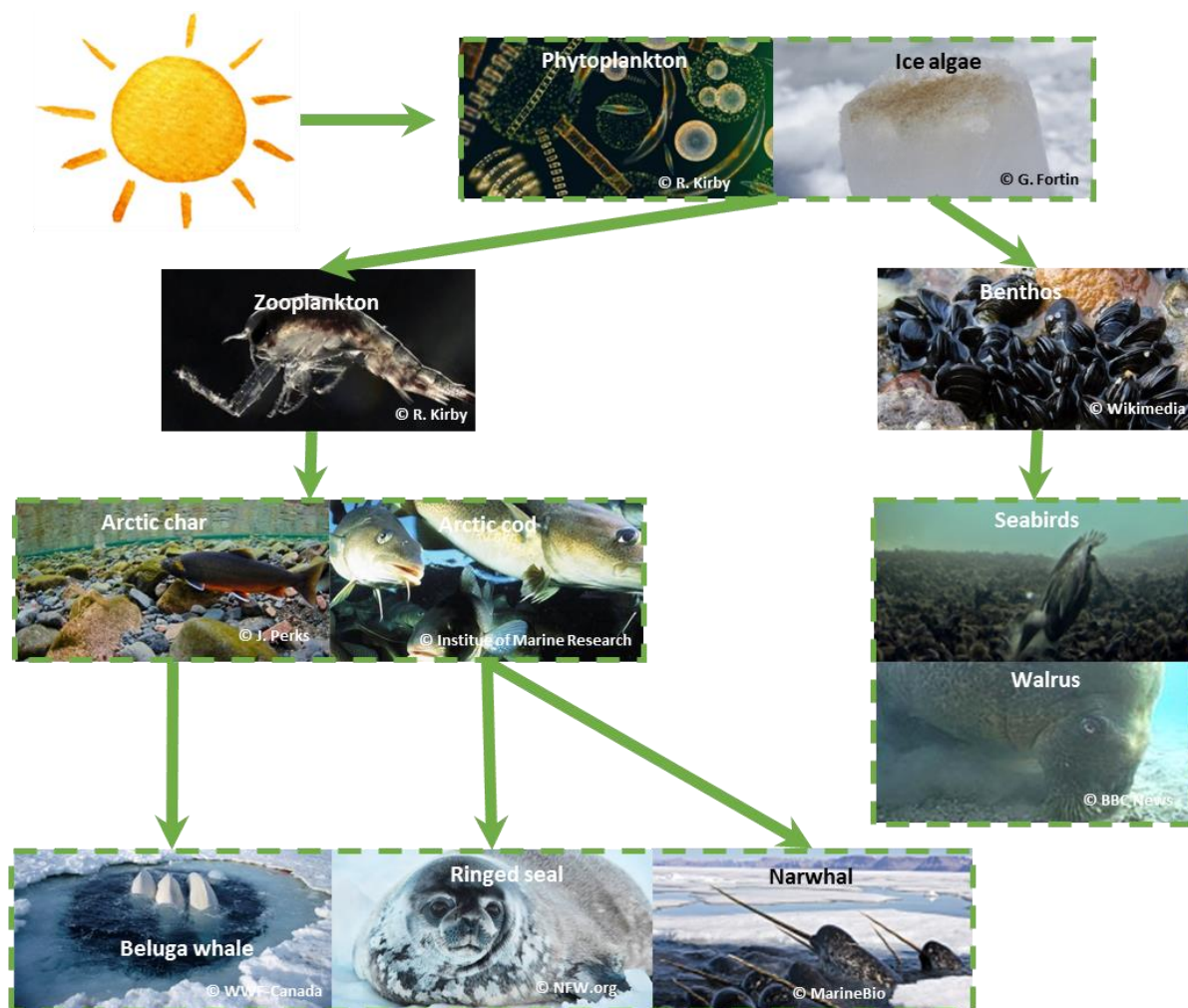
Λε/Δ^c▷^cb BriGHT / Project BriGHT

Bridging Global Change, Inuit Health and the Transforming Arctic Ocean

ANNUAL PROGRESS REPORT 2017-2018

CONTEXT OF THE STUDY

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 their accessibility, abundance, appearance and quality. These four characteristics are influenced by the availability of sunlight and nutrients required for algal production (ice algae, phytoplankton). These small algae are a key source of energy for benthic (seabed) species, seabirds, fish and marine mammals. Algae produce healthy components (good fats like omega-3, vitamins), but also absorb contaminants that bioaccumulate in country foods. Changes in climate, sea ice, light in the ocean and thus, algal production can affect the marine food web, food security and health.

RESEARCH QUESTIONS

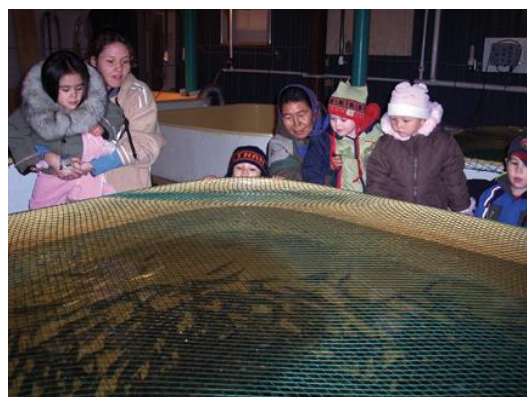
How nutritious are marine foods?

Francis Dufour is a Master's student who analyzed the selenium and selenoneine (nutrients) contents 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 the toxicity of mercury (contaminant). Kasey Cameron-Bergeron, Catherine van Doorn, Sara Bolduc and Guillaume Cinq-Mars are other Master's students currently trying to determine which healthy nutrients (fatty acids, vitamins, selenoneine) can be found in marine plants and animals. Species studied include small algae, benthic species, Arctic char, beluga, ringed seal and walrus. Sea water is also being analyzed to understand which nutrients are available at the bottom of the food web.



How genetically different are Arctic char populations?

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



Kuujuaq fish hatchery



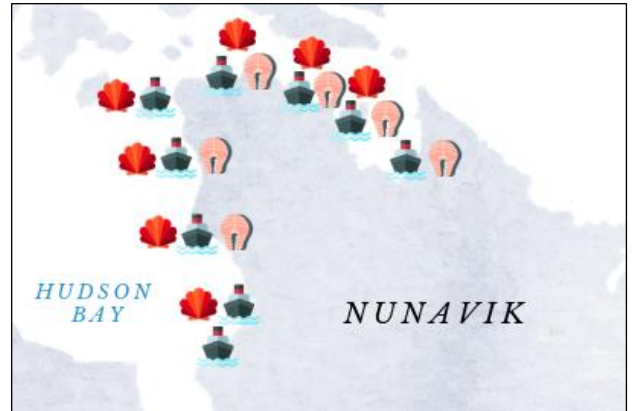
How do marine foods impact Inuit health?

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

HOW NUTRITIOUS ARE MARINE FOODS?

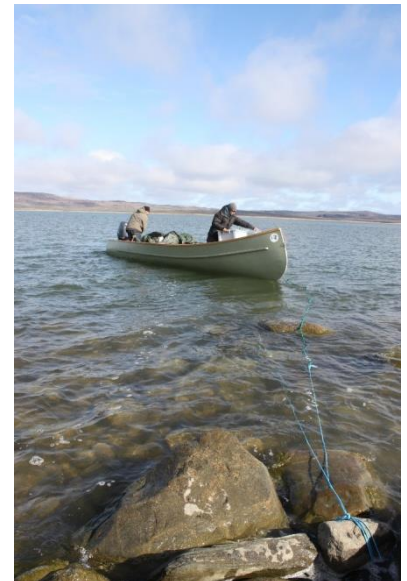
Sampling marine life with the help of Nunavimmiut

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



Locations sampled in 2017-2018

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

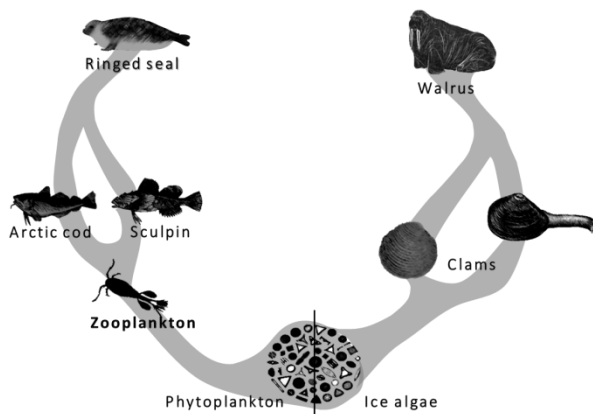


HOW NUTRITIOUS ARE MARINE FOODS? (CONTINUED)

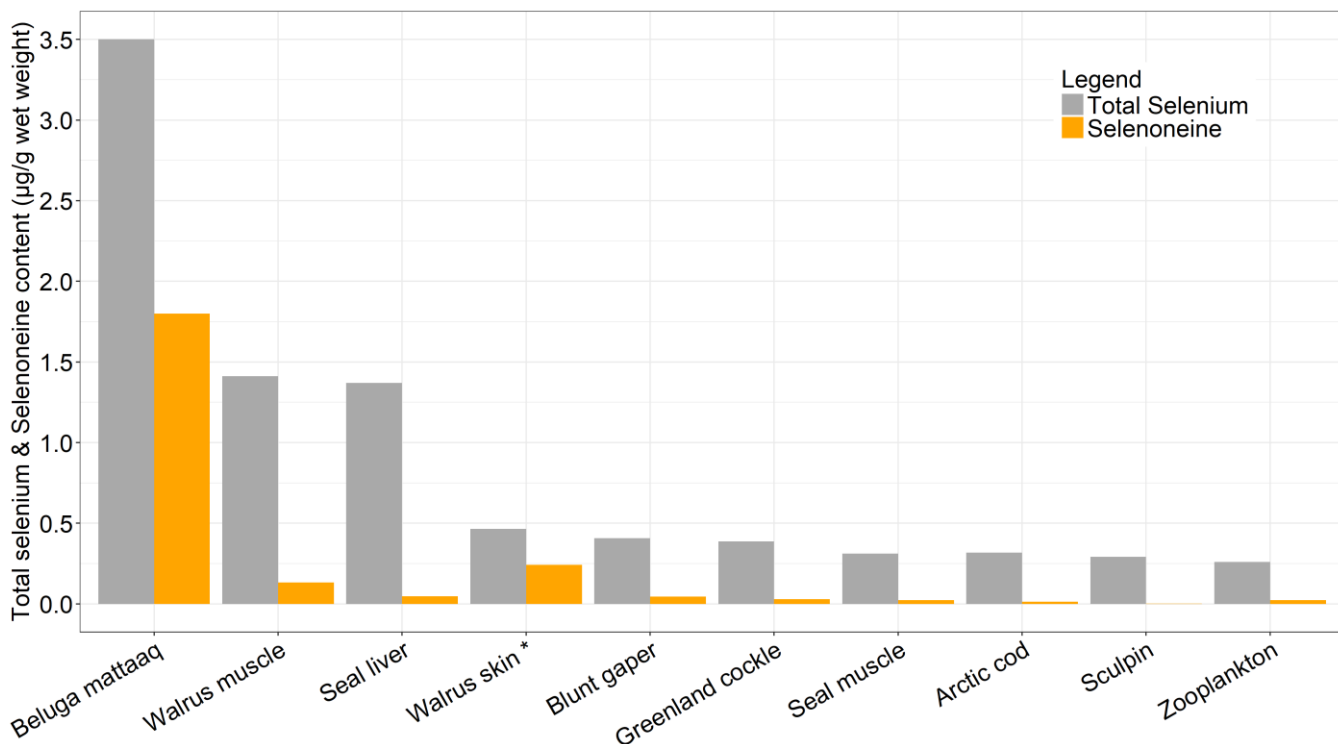
How about selenium and selenoneine?

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

Dufour's research combined with another project by Mélanie Lemire and Pierre Ayotte has shown that the selenium and selenoneine contents were 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



Selenium and selenoneine contents of marine country foods

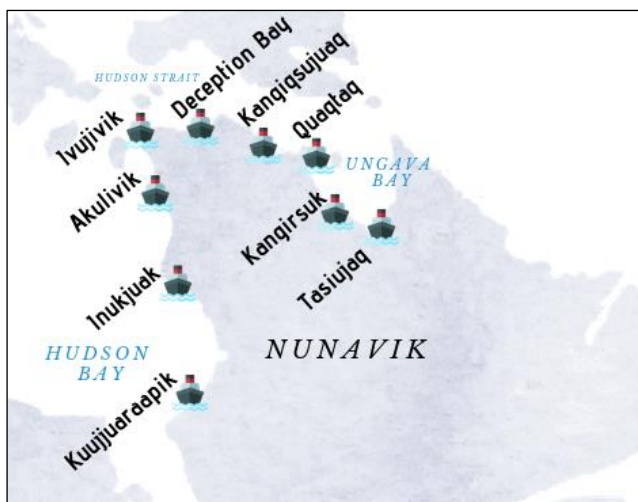
*For walrus skin, only one sample was analyzed

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

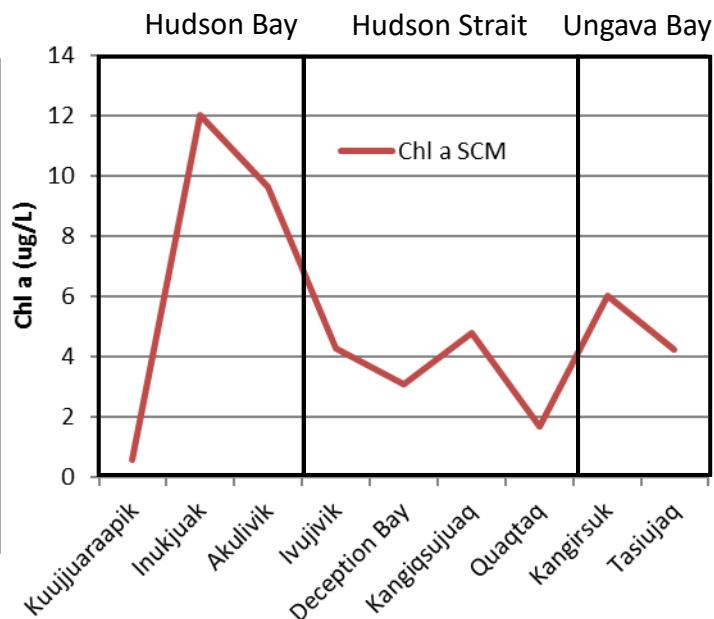
HOW NUTRITIOUS ARE MARINE FOODS? (CONTINUED)

Varying conditions of the marine environment across Nunavik

In 2017, 9 stations were sampled for water and phytoplankton (small algae) in the three main regions of Nunavik: Hudson Bay, Hudson Strait and Ungava Bay. Thanks to the sunlight, 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.



Locations sampled by the Amundsen in 2017



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 them for healthy nutrients to determine what is available to humans when they eat local marine foods.



HOW GENETICALLY DIFFERENT ARE ARCTIC CHAR POPULATIONS?

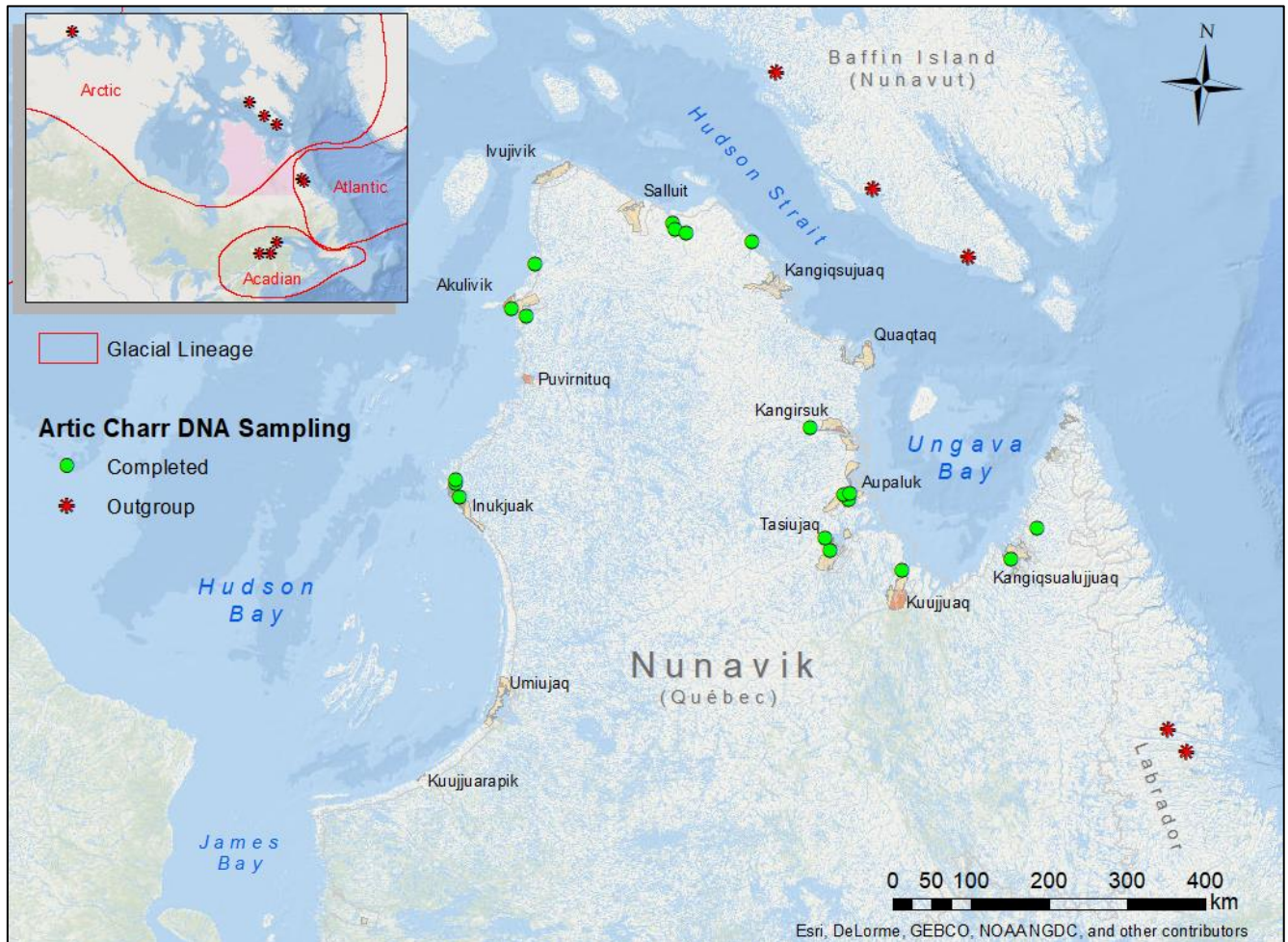
Sampling for Arctic char DNA is completed

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. The map below shows the location of



DNA samples collected for the BrIGHT project as well as other samples collected outside of Nunavik 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 BriGHT team members 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 to do 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!

The students and project coordinator will visit communities in person in 2019 to present global results. They will be present at the RNUK meeting and 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 #404344

