

# Bioaccumulation in the Marine Food Web of Hudson Bay, Canada

## Why study metals in animals from Hudson Bay and James Bay?

Metals released from human activities can affect the health of animals and humans. By measuring the levels of metals in animals, information is obtained on their exposure to contaminants and possible sources in the environment. Metal levels in animals can also be monitored for changes over time. Because of local concerns about potential impacts of contaminants from distant or regional human activities, a community-driven study was done on marine animals of east Hudson Bay and James Bay.



## What was done?

Over 3 years from 2015 to 2017, more than 25 local participants from Sanikiluaq, Inukjuak, Umiujaq, Kuujuaaraapik, and Chisasibi collected marine animals near their communities. Blue mussel, sea urchin, Arctic cod, sculpin, common eider, and ringed seal were captured, frozen, and shipped to a Government of Canada laboratory in Ottawa, Ontario, where tissues were analyzed for their levels of metals.



## How do metals accumulate in animals?

Animals take up metals mainly through their food. If an animal cannot quickly rid the metal from its body, it builds up over time. Older animals tend to have more metals in their body. Metals accumulate mainly in organs, such as the liver and kidney, and mercury also accumulates in muscle.

## Where do metals in Hudson Bay and James Bay come from?

Metals such as cadmium, lead, and mercury occur naturally at low levels in the environment. Human activities, both locally and far away, are also sources of these elements, which are then dispersed through the air and by rivers and ocean currents.

## What were the main study results?

The levels of cadmium, lead, and mercury varied widely among species of marine animals. The differences were related to the animal's diet and their position in the food chain. For example, mercury increases as it is transferred up the food chain (called biomagnification), and higher levels were found in ringed seal, as we would expect. Blue mussels are sedentary and can be used as an indicator of metal bioaccumulation near the base of the food chain. Cadmium and mercury levels of blue mussels varied among locations, indicating some geographic differences in sources of metals to coastal areas.



## How do mercury levels in the study area compare to other Arctic regions?

Ringed seals collected at Kuujuaaraapik and Sanikiluaq had lower levels of mercury in their muscle compared to seals from most other areas of the Canadian Arctic. These geographic differences in mercury bioaccumulation relate to the diet of the seals, length of the food chain, and sources of the metals.



## What are the next steps?

As standard procedure, the metal concentrations of marine animals have been submitted for review by health authorities. As part of on-going study, SIKU, a social media mapping platform and mobile app (<https://siku.org/>), is being used by local residents to collect near real-time observations for community-driven environmental research in east Hudson Bay and James Bay. Their observations will contribute to long-term monitoring of contaminants in wildlife and provide important information on effects of climate change in the region.

## Who do I contact for more information?

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