

The KUTZ RESEARCH GROUP and CANADA NORTH OUTFITTING

INVESTIGATING MUSKOX AND CARIBOU POPULATION DECLINES IN A
RAPIDLY CHANGING ARCTIC



UNIVERSITY OF CALGARY
FACULTY OF VETERINARY MEDICINE



Partnered with



RESEARCH UPDATE prepared by the KUTZ RESEARCH GROUP





MUSKOX AND CARIBOU POPULATION DECLINES

Muskoxen and caribou are keystone species in the Arctic threatened by emerging infectious diseases.

Climate change is chipping away many past “norms” of arctic habitat and conditions placing all life forms under new stresses. As the Arctic heats up, insects and parasites are able to shift northward, and seasonal cycles of forage plants shift, too. These are just some of the subtle yet impactful changes that can affect the health and reproduction of animals.

Dolphin and Union caribou are distinct from other caribou in the Arctic and are found on Victoria Island and the neighbouring mainland. Scientific surveys and Traditional Knowledge indicate that the population is around 4,000 animals today, which is a decline from an estimated 35,000 animals in the late 1990’s (decline of roughly 89%). Other herds of caribou have seen similar declines over the past two decades.



Prior to 2010, the **muskoxen on Banks Island and Victoria Island** in the western Canadian Arctic archipelago were the two largest populations in the world. Both have suffered devastating **mortalities from emerging diseases and severe icing events**. While their combined numbers topped 110,000 in the early 2000s, recent scientific surveys and Traditional Knowledge indicate that this total has plummeted to fewer than 30,000 animals (declines exceeding 75%).

These declines are concerning for arctic residents, northern outfitter operations, and the conservation world at large. Northern communities rely on muskoxen and caribou for subsistence, and these animals are central to the culture of these communities. Guided hunting in the Arctic depends on healthy wildlife, and these expeditions also support the economic wellbeing of northern communities.



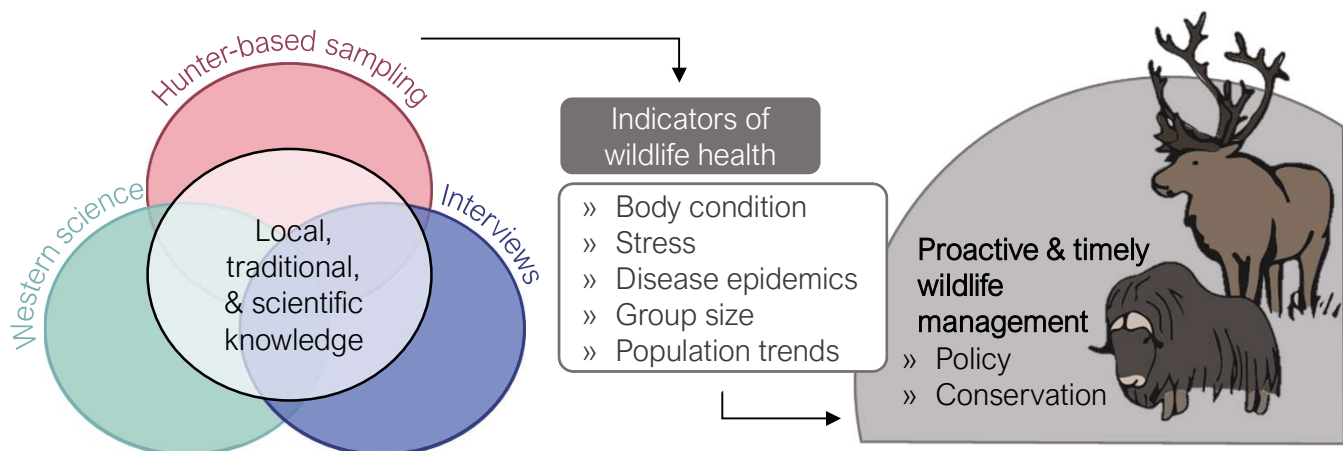
COMMUNITY-BASED WILDLIFE HEALTH MONITORING PROGRAM

Since 2010, **Dr Susan Kutz**, Canada Research Chair in Arctic One Health at the University of Calgary, and her team have partnered with private industry, **Shane Black** from Canada North Outfitting, community hunters and trappers organizations (HTOs), and territorial governments to monitor wildlife health in the Arctic.



Our goal is to bring **Indigenous Knowledge**, **Local Knowledge**, and **western Scientific Knowledge** together to better understand how climate change, and other anthropogenic disturbances, affect wildlife health, wildlife conservation, and food security in the Arctic.

We have worked intensively with three communities – Kugluktuk, Ekaluktutiak (Cambridge Bay) and Ulukhaktok – to develop and implement a **community-based wildlife health surveillance program**. Our work involves documenting Indigenous Knowledge through individual and group interviews, supporting a harvester-based sampling program, and bringing the research that we are doing into classrooms.





TAKING ACTION AS ARCTIC UNGULATES FACE A NEW WORLD

Hunter-based sampling program

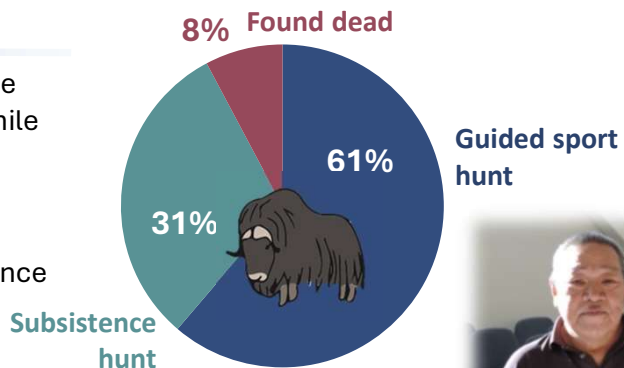
Hunters and guides collect samples and data from animals they are harvesting for food or as a guided hunt. Participants receive an honorarium for returning a completed sample kit. Since the program began in 2009, harvesters have submitted samples from more than 350 caribou and 1,400 muskoxen. We use these samples to **monitor key health indicators**.



Where do our samples come from?

For **muskoxen in Cambridge Bay**, over half of the samples have come from guided sport hunts, while a third have come from subsistence hunts in the community. The remaining samples have come from animals that were found dead.

Caribou samples have also come from subsistence and sport hunts, as well as animals captured for government monitoring.



Through this program we have been able to:

- » Track the population trends of muskoxen and caribou.
- » Identify new diseases and threats to these populations and to human health.
- » Guide wildlife stewardship actions and policies.



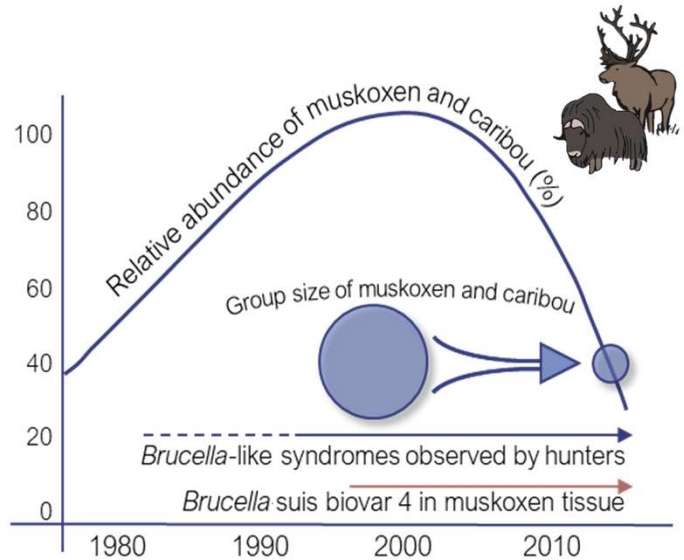


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Key results of the program

Group size and population trends

- » Indigenous knowledge interviews were conducted with harvesters to understand health indicators and population abundance, long-term trends in population abundance, group size and *Brucella* symptoms (blue in figure). Hunter-based sampling was used to detect *Brucella* (red in figure).
- » By combining harvester-based sampling and Indigenous knowledge, we can understand the association between individual

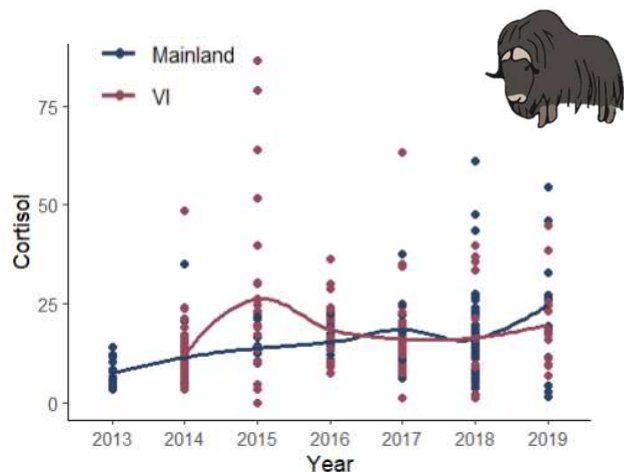


Disease outbreaks

- » Harvesters from Cambridge Bay identified a period (2010 to 2014) of unusually high muskox mortality from unknown causes.
- » Carcasses tested positive for the bacterium *Erysipelothrix rhusiopathiae*
- » Without the harvester observations the cause of the subsequent population decline would have remained unknown.

Muskox stress levels

- » These are measured from hunter-based sampling.
- » Stress in muskoxen has gradually increased over time on the mainland, whereas it peaked in 2015 on Victoria Island (VI) and may again be increasing.
- » Harvesters have outlined the complex physical, human, and biological factors influencing muskox stress.





MUSKOXEN IN THE CANADIAN ARCTIC: EMERGING INFECTIOUS DISEASES

Ellesmere Island: Urgent Investigation of Muskox Mortalities

On August 3, 2021, a film crew documenting Arctic wolves came across the disturbing scene of a mother muskox standing over her dead calf. As the next week passed, they proceeded to discover more fresh carcasses of varying age, some in clusters, and with no evidence of predation.

The crew made an urgent distress call to the South. In talking with Dr. Kutz, they described observations of multiple recent or sudden muskox deaths. In collaboration with the Government of Nunavut, an investigation was launched to examine the muskox carcasses and determine the cause of the mortalities.

A bacterium called *Erysipelothrix rhusiopathiae* was present in all carcasses. *Erysipelothrix* is found globally in a variety of species. The strain of *Erysipelothrix* that we are finding is unique to the Arctic and has caused unusually high mortality in muskoxen.

Mortalities occurred again in 2022 and 2023, and investigations by the Government of Nunavut, Dr. Kutz and her team are continuing to understand this emerging infectious disease.



These large-scale mortality events over the last decade have been linked to the population declines on Victoria and Banks Islands. Caribou, which are also susceptible to *Erysipelothrix*, have suffered enigmatic and dramatic declines over this same period.

The population declines have negative impacts on Inuit food security and on northern economies through loss of guided hunting opportunities and other ecotourism activities.



WHAT IT ALL MEANS: THE BIG PICTURE FOR CARIBOU AND MUSKOXEN

Increasing and emerging diseases add urgency to the need for more information on emerging infectious diseases, and the general health of muskox and caribou populations.

Our collaborative research program, which establishes current status of caribou and muskox health and detects health concerns, is continuing to:

1. **Engages with knowledge holders** on the ground to mobilise indigenous knowledge with western science.
2. Provides **mechanisms for early detection** of changes in populations by establishing the current status of wildlife populations and identifying threats to wildlife health.
3. Enables **rapid response to wildlife population health concerns** and contributes to the co-management of healthy wildlife.
4. Providing key public messages to **safeguard country foods** for Inuit communities, and help protect the **future** of Inuit youth.

Results guide effective and pro-active wildlife management to preserve wildlife for generations to come. This is essential for ensuring the livelihoods and culture of Indigenous people.





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