Amazing Muskoxen: Who They Are, Decline and Recovery, Personalities, and What We're Learning

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2 – Postdoctoral Researcher, Laurier University

Photo K. Olesen

Amazing Muskoxen: Presentation Outline

Photo K. Olesen

1. Kugluktuk Muskoxen (5 minute video)
2. Jan Adamczewski History
3. Muskoxen: Who They Are
4. Decline & Recovery of Muskoxen in Canada
5. Tame Muskox Research in Saskatoon (5 minute video)
6. Nick Luymes History
7. Muskoxen in the Trees: What We're Learning

Jan Adamczewski Career Highlights

Photo K. Olesen

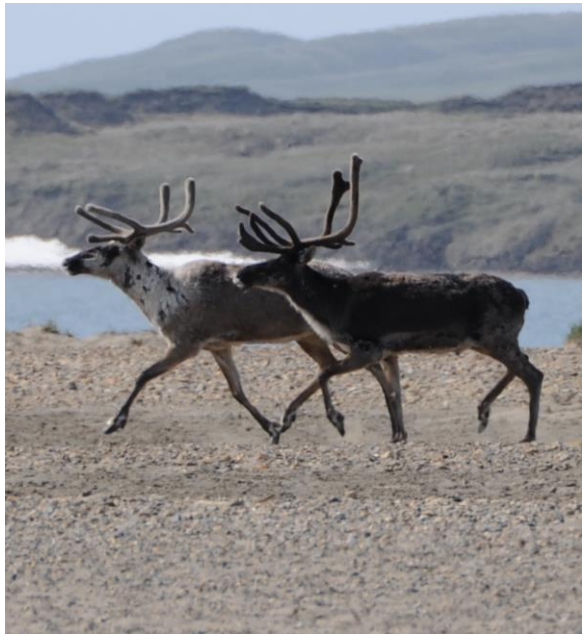


Photo J. Adamczewski

1. 1980: BSc Wildlife Biology, U Guelph
2. 1987: MSc Wildlife Productivity, U Alberta (thesis on caribou)
3. 1995: PhD Biology, U Saskatchewan (thesis on muskoxen)
4. 1995-1997 Biologist, Gov Newfoundland, St. John's (various)
5. 1997-1998 Biologist, Sahtú Ren. Res. Board (various)
6. 1998-2007 Biologist, Yukon Gov, Watson Lake (various)
7. 2007-2025 Biologist, Gov NWT, Yellowknife (mostly caribou)

Muskoxen: Who Are They?

Photo K. Olesen

1. Inuktitut Name: Umingmak (The Bearded One)

2. Scientific Name Ovibos moschatus

   Ovis (sheep); Bos (cattle); Ovibos

3. Nearest Relatives: Takin (Budorcas taxicolor) – Asian Himalayas

   Goral (Naemorhedus); 4 species (Asian mountains)

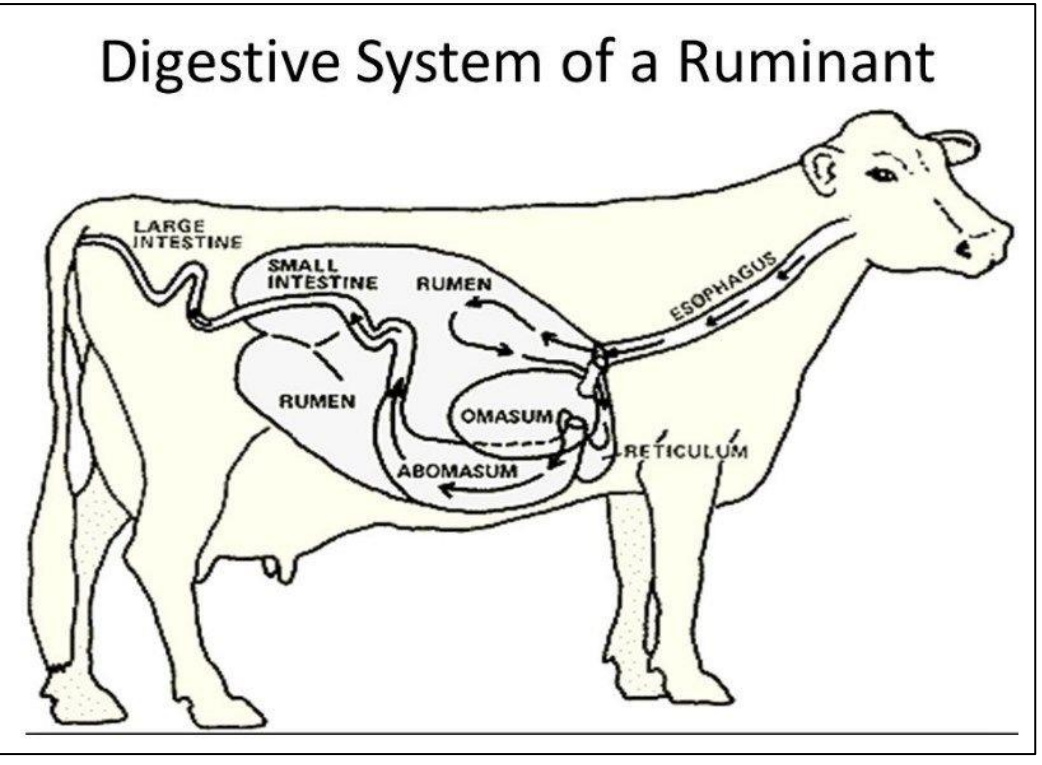
Takin 

 Goral

Internet Photos

4. Muskoxen: Big Goats with Long Hair

Muskoxen: Digestive System and Diets



Internet Image

1. Muskoxen: Herbivores & Ruminants
2. Rumen is Large Fermentation Chamber
3. System Similar to Bovids like Bison, Cattle
4. Rumen Very Large for Body Size
5. Digestive Passage Exceptionally Slow
6. Allows Muskoxen to Extract Maximum Nutrients
7. Diets: Grasses, Sedges, Shrubs
8. Eat Little Relative to Body Size

Muskox Challenges: Main Predators Grizzly Bears & Wolves

Internet Photos

Photo K. Olesen

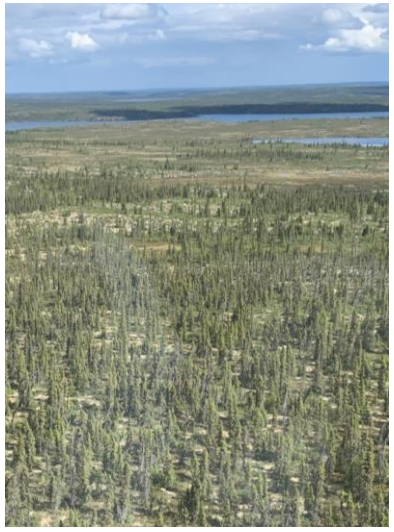
Muskoxen Challenges (Maybe): Caribou Competitors?

Photos K. Olesen

Scientific Knowledge:

1. Caribou & Muskoxen Have Co-existed 1000s of years, Multiple Ice Ages
2. Limited Overlap in Diets & Habitat Use
3. Population Trends Can Be Similar or Opposite

Photo T. Davison



Community/Indigenous Knowledge:

1. Some Communities Say They Co-exist, Don't Compete;
2. Some Say Muskoxen Drive Caribou Away, Bad for Caribou

Muskox Challenges: Very Low Genetic Variability

Photo K. Olesen

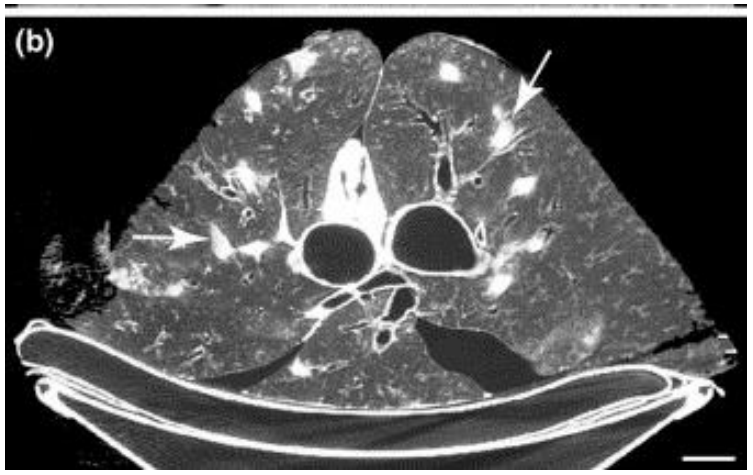
1. All Studies to Date Show Very Low Genetic Variation
2. Possible Bottleneck(s) in the Past

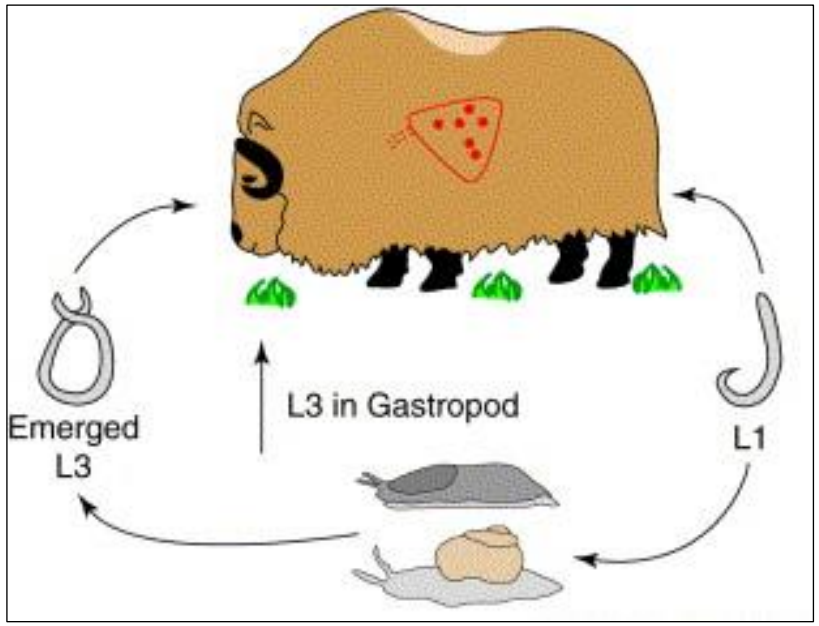
   (Bottleneck = Extremely Low Numbers)
3. Adaptation to Climate and Vegetation Change?
4. Parasites, Pathogens, Other Species Moving North
5. Contrast with Caribou – High Genetic Variability

Photos J. Adamczewski

Muskox Challenges: Lungworm

Umingmakstrongylus pallikuukensis





Images S. Kutz, U Calgary

1. Lungworm First Found near Kugluktuk
2. Unique to Muskoxen
3. Adult Worms (Large) in Lungs; Extensive Damage
4. Life Cycle Includes Slugs
5. Warming Climate: Life Cycle Completed Faster
6. Range Increasing; Now on Arctic Islands (Not Previously)

Muskox Challenges: Bacterial Pathogens & Die-Offs

Figure 2. Dead muskox found on Victoria Island in August 2011.

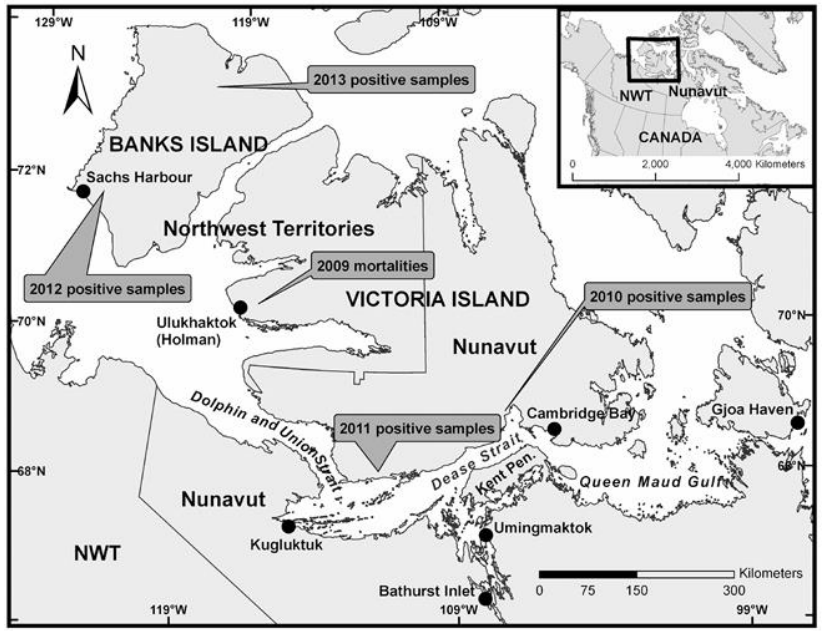


Figure 1. Map demonstrating the general locations and years of the observed die-offs.

1. Yersinia pseudotuberculosis &

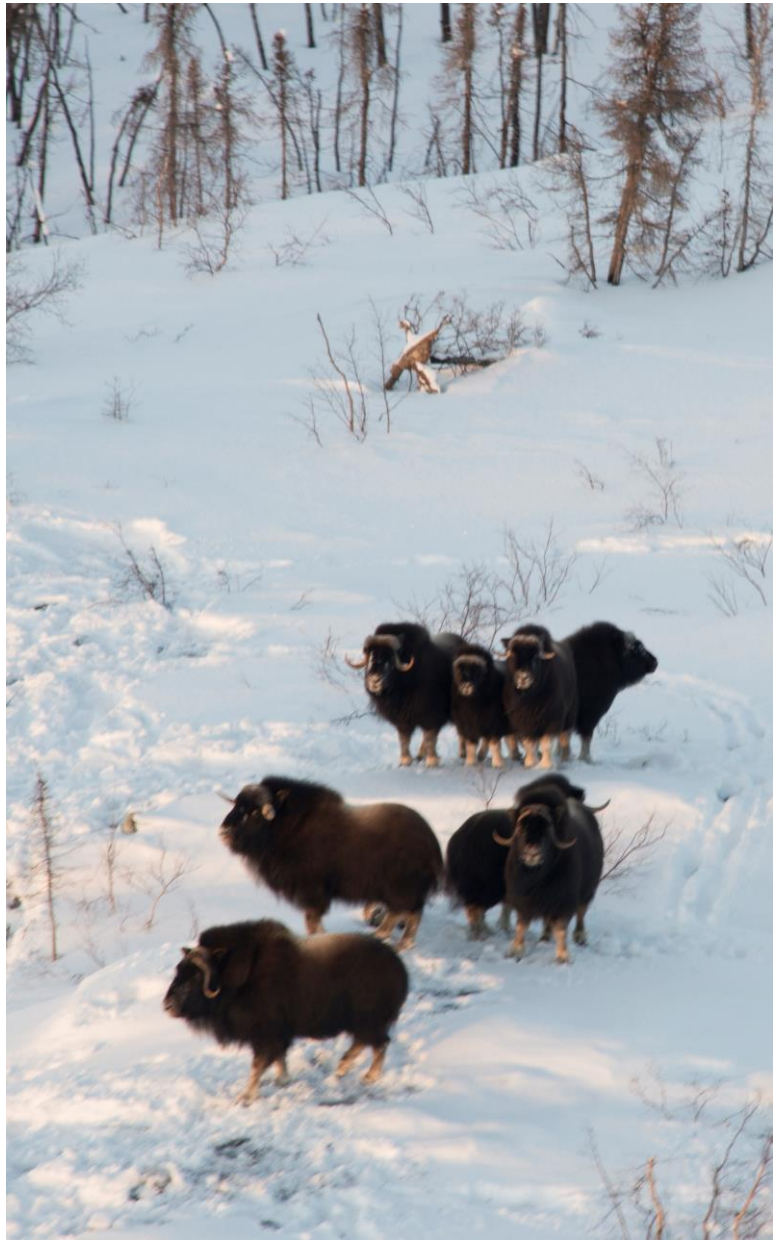
   Erysipelothrix rhusiopathiae – bacterial diseases
2. Known to Cause Die-Offs
3. Recent Die-Offs on Multiple Islands:

   Banks, Victoria & Ellesmere (Erysipelothrix)
4. Sometimes Acute Mortalities in Summer
5. Environmental Conditions Important:

   Climate Change?

Images S. Kutz, U Calgary

Muskox Challenges: Trace Minerals



1. Trace Minerals: Needed for Healthy Physiology (All Mammals)
2. Copper & Selenium Among Key Minerals for Muskoxen
3. Deficiencies Affect Growth, Health, Reproduction
4. Deficiencies May Lead to Cracked Teeth

Photos K. Olesen

Muskox Challenges: Hunters With Rifles

1. Hunters & Muskoxen Have Co-existed 1000s of Years
2. Muskox Defensive Front/Circle Can Be Effective Against Wolves & Bears
3. Not Effective Against Hunters with Rifles
4. Historically Hunter Harvest Has Sometimes Been Heavy

Photo J. Adamczewski

Photo K. Olesen

Decline and Recovery of Muskoxen in Northern Canada

Photo J. Adamczewski

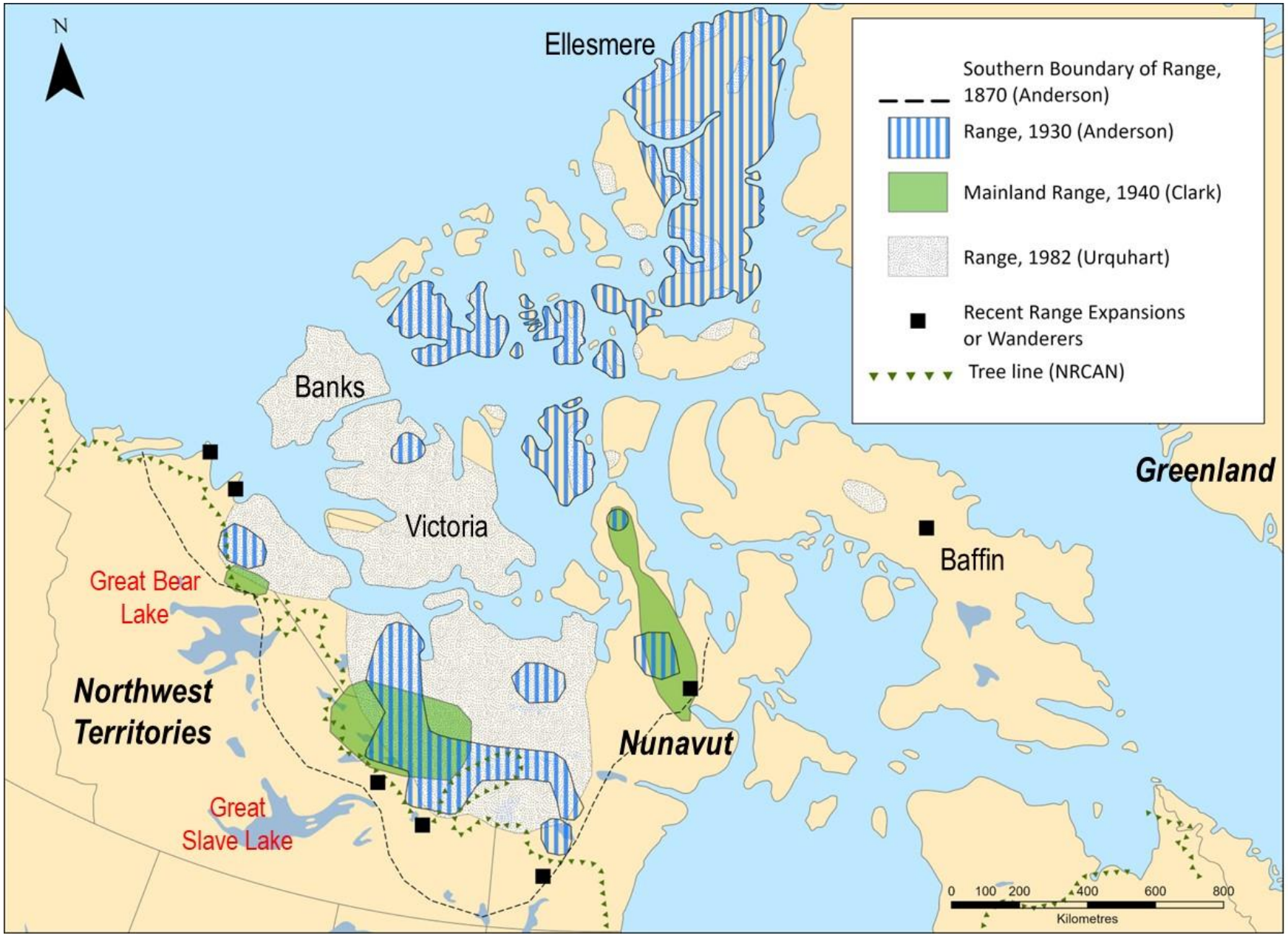
Muskox History Mainland Canada 1860-2020*

Photo K. Olesen

1. Plains Bison Depleted 1800s
2. Demand for Muskox Hides
3. 1860-1916: 22,000+ Muskox Hides Traded
4. Hunters Traveled Ever-Farther to Find Muskoxen
5. 1917: Estimated 400-500 Muskoxen Left On Mainland
6. 1917-1924: Legislated Protection & Thelon Sanctuary
7. 1920s-2020s: 100-Year Muskox Re-Establishment

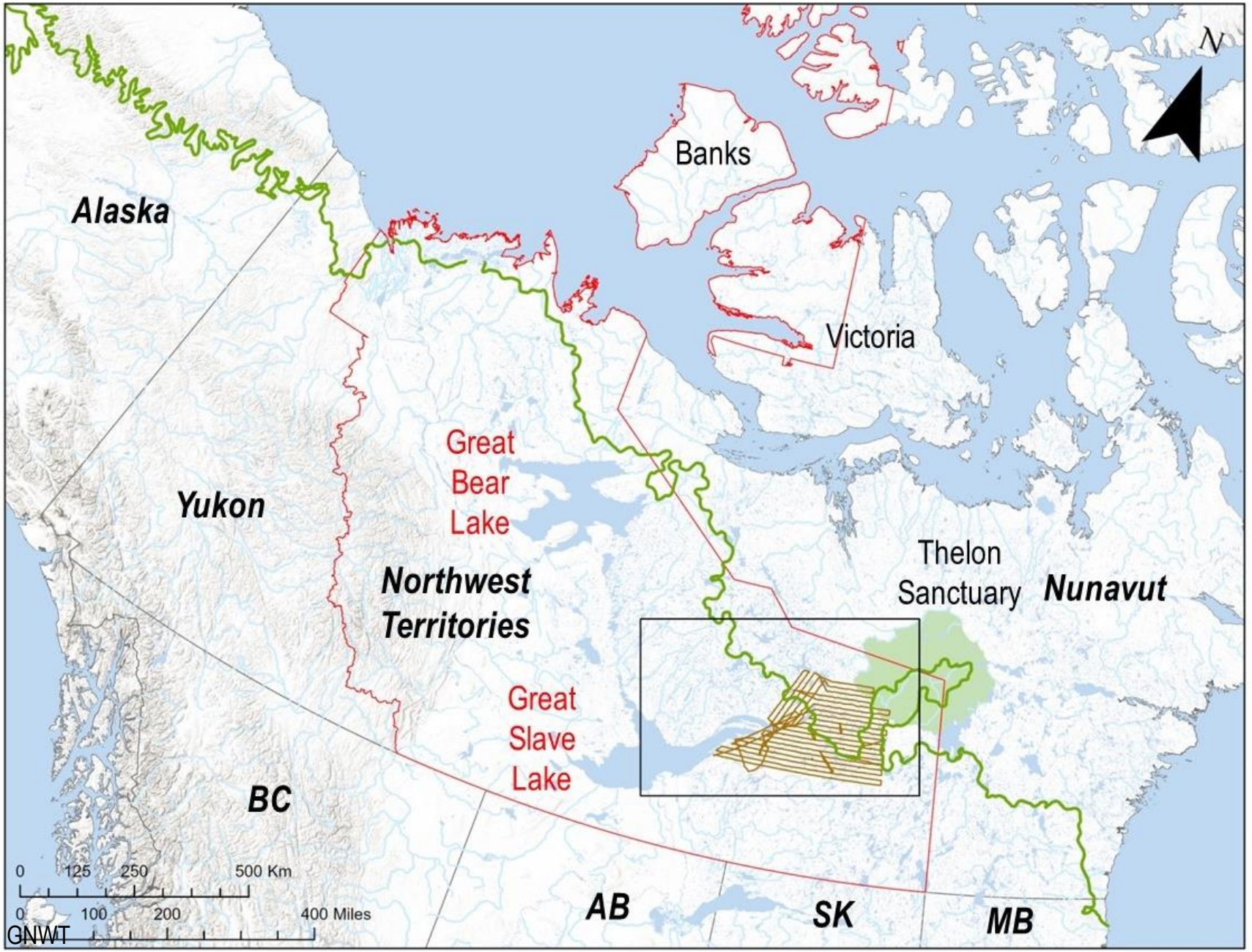
Adapted from: Barr, W. 1991. Back from the Brink: The Road to Muskox Conservation in the Northwest Territories. Komatik Series, No. 3. The Arctic Institute of North America, University of Calgary; and
Lent, P.C. 1999. Muskoxen and Their Hunters: A History. Norman: University of Oklahoma Press.

Muskox Range in Northern Canada 1870-1982 (Barr 1991)*



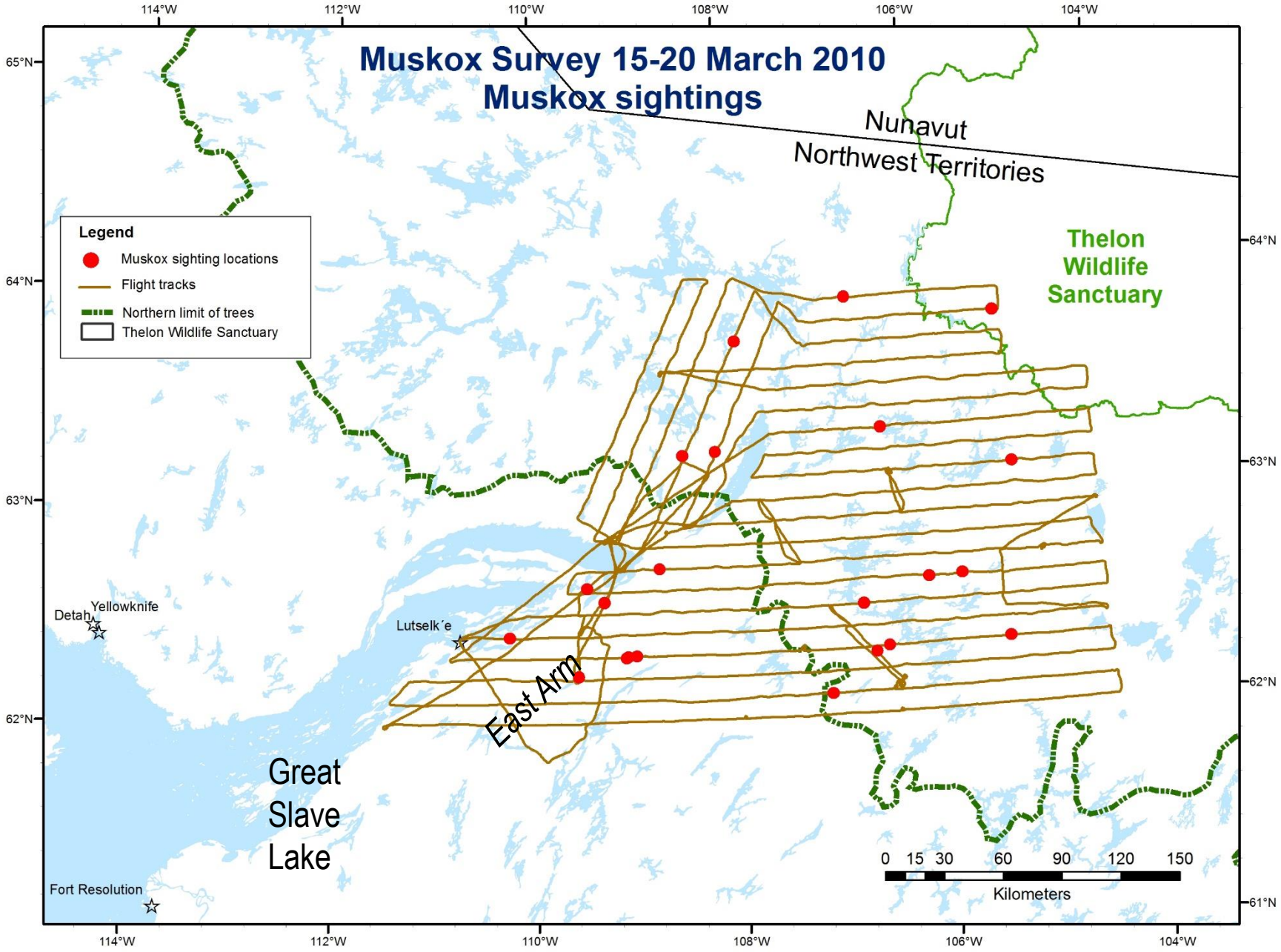
*Adapted from: Barr, W. 1991. Back from the Brink: The Road to Muskox Conservation in the Northwest Territories. Arctic Institute of North America. Map R. Abernethy, GNWT

East Arm Region of Great Slave Lake: Muskox Survey 2010



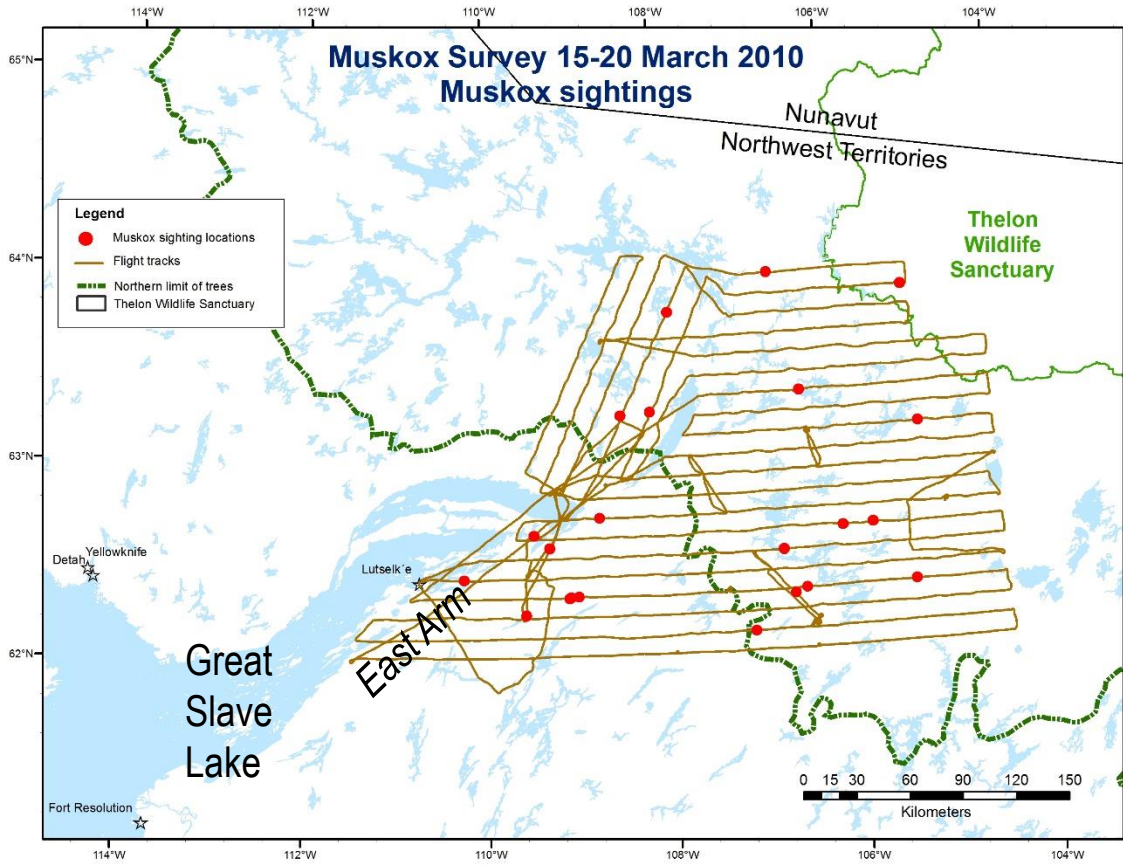
Map N. Wilson, GNWT

Cluff et al: Muskox Survey East Arm Region of Great Slave Lake 2010

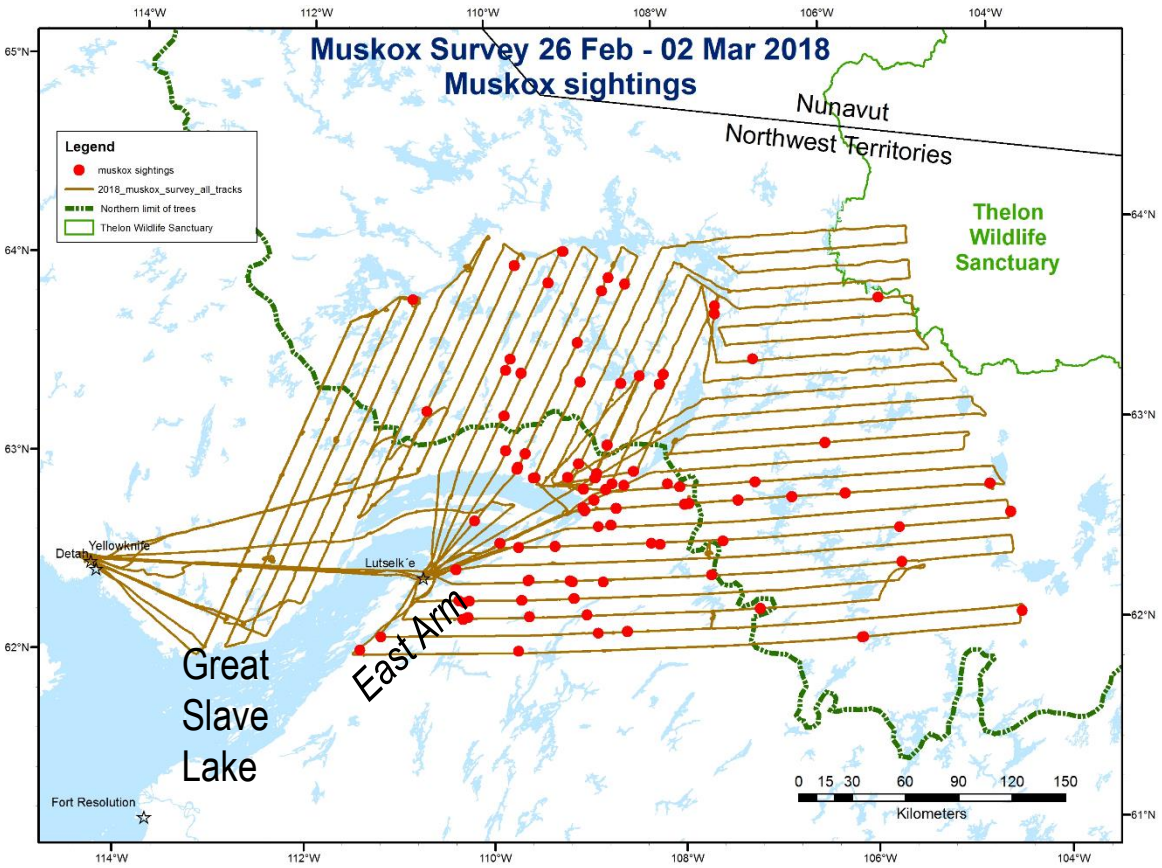


Dean Cluff et al: Surveys East Arm Region, Great Slave Lake

2010



2018



2010 to 2018: 6-Fold Increase in 8 Years

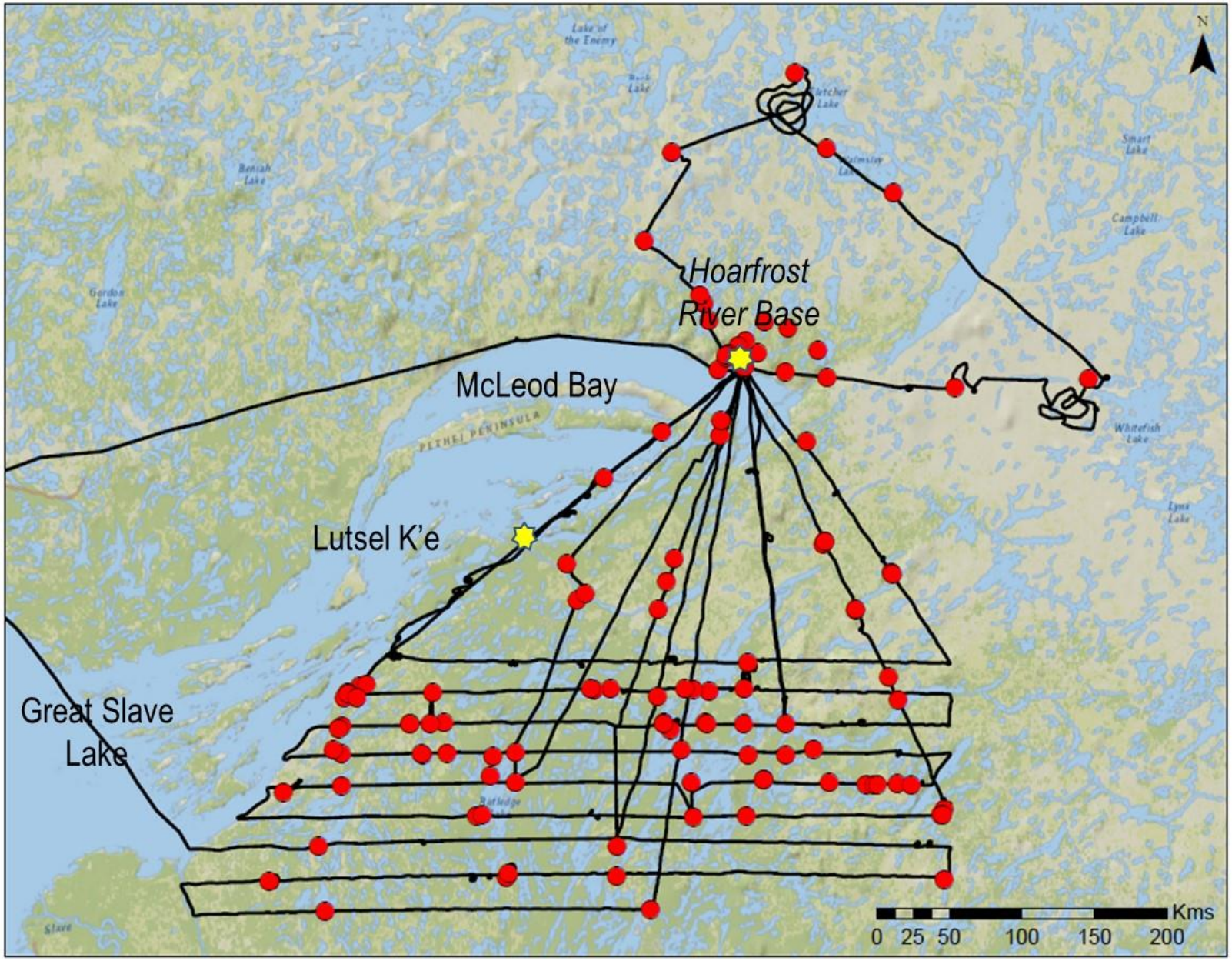
Annual Growth Rate λ about 1.30

Hoarfrost River Base, Great Slave Lake

Dave & Kristen Olesen & Husky

Photo S. Goodman

First Hoarfrost River Muskox Photo Survey, March/April 2018



East Arm Survey March 2018, Photo 1

East Arm Survey March 2018: Photo 2

Photo K. Olesen

Forested Areas: Difficult to Photograph/Classify

Photo K. Olesen

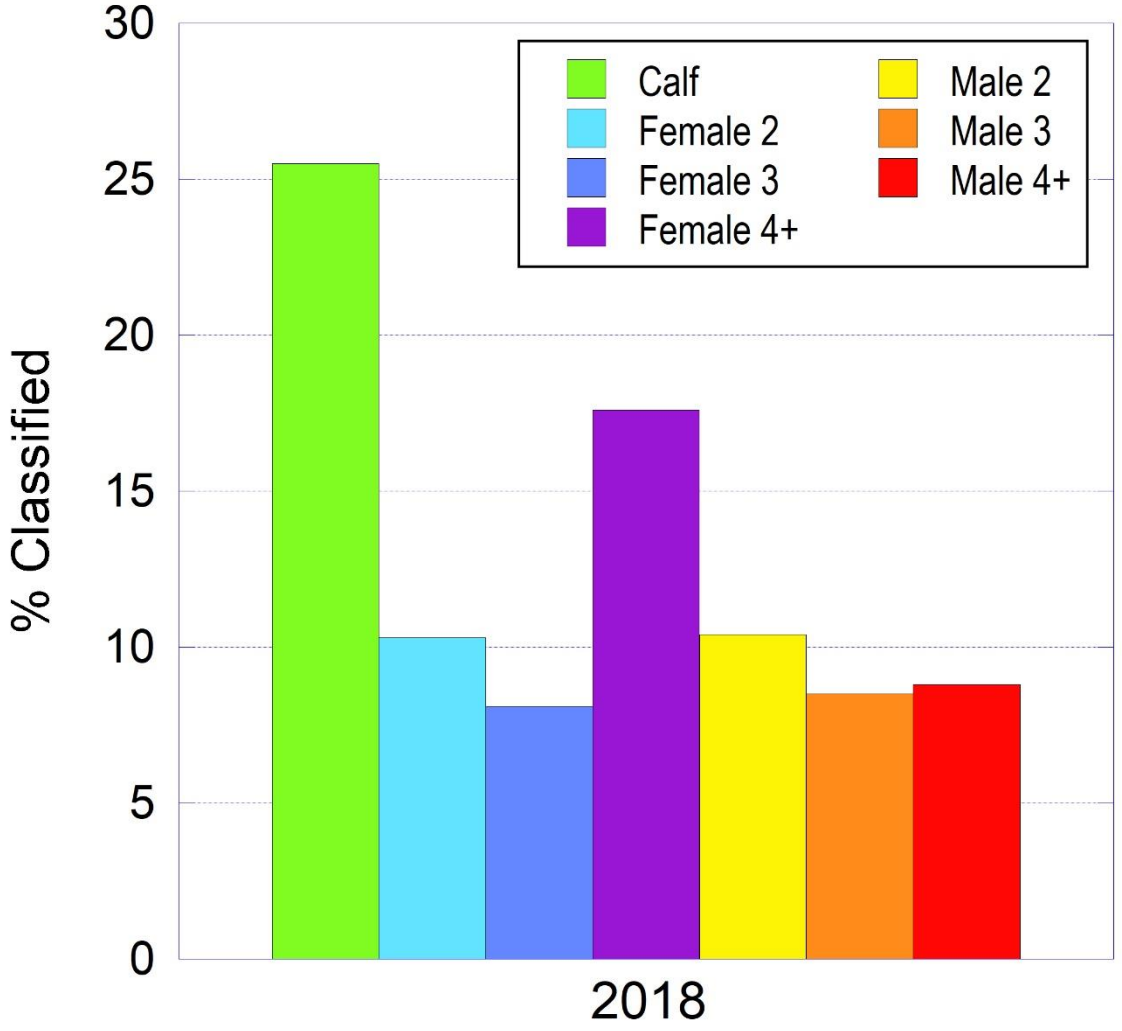
March 2018 East Arm Muskox Photo Survey

- 75 Muskox Groups Photographed
- 17 Bull-Only Groups (All Classified)
- 58 Mixed Groups (39 Classified; 67%)
- Minimum 80% Classified in Any Group
- 891 Muskoxen Classified; 6.5% Unknown

Photos K. Olesen

March 2018 East Arm Muskox Photo Survey
Classification of Mixed Groups

Photo K. Olesen

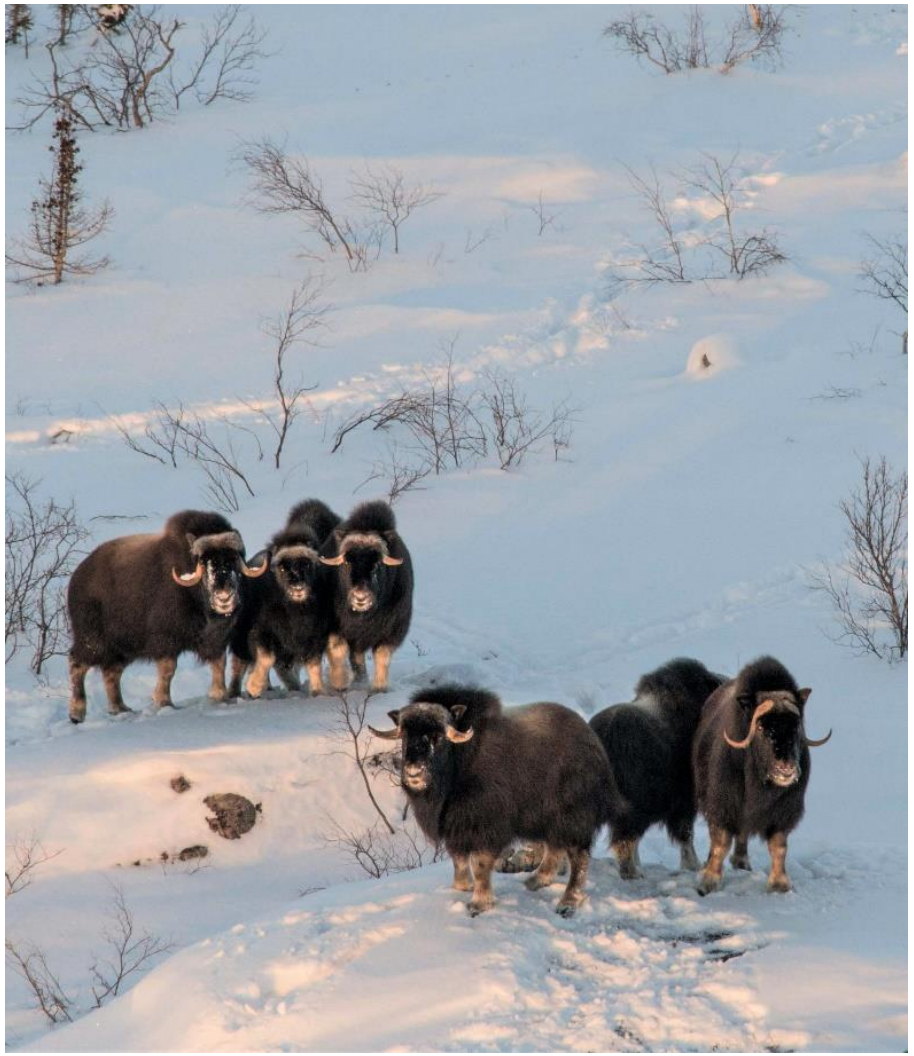


Bull-Only Groups:

17 Groups, 48 Males 4+

Photo K. Olesen

East Arm Muskox Photo Surveys 2018 and 2020: Trends



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1. Population Still Growing
2. Highest Muskox Density in Canada
3. Many Young Animals
4. High Pregnancy Rate
5. High Calf & Adult Survival
6. Predation?
7. Limited Harvest
8. Continuing Shift To More Mature Animals

Tame Research Muskoxen at U Saskatchewan (video)

Drawing J. Adamczewski

Comparison of Cattle & Muskoxen on Low Quality Diet

1. Diet: Grass Hay Similar to Wild Muskox Late Winter Diets (6% Protein)
2. Food Available Free Choice
3. Measured How Much They Ate, How Well Digested, and Body Weight
4. 5 Muskoxen, 3 Hereford Cows

A. Cattle & Muskoxen Both Maintained Body Weight
B. Digestibility Higher in Muskoxen (48%) Than Cattle (40%)
C. Adjusted for Body Weight, Cattle Ate 3 Times as Much as Muskoxen

Internet Photo

Photo K. Olesen

Muskoxen In the Trees: What We're Learning (Nick)