Application: Kivalliq wolf monitoring using satellite telemetry and hunter harvest

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Nunavut Wildlife Research Trust (2024-2025)

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2024-0000000011_ Final report

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Project Report

1. **NWRT Project Number**: **2024-0000000011**

2. **Project title**: **Kivalliq wolf monitoring using satellite telemetry and hunter harvest**

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Note: This draft project report provides a brief preliminary summary of the 2024 results. This is an ongoing project. Results from wolf harvest and telemetry analysis will be presented in the final project report which is anticipated to be available in spring 2027.

4. Summary:

Most herds of migratory tundra caribou (*Rangifer tarandus groenlandicus*) in Nunavut and adjacent Northwest Territories (NWT) are either in decline or at historically low population levels. Enhanced wolf (*Canis lupus*) management actions are often employed to support recovery of declining caribou herds. To support recovery of the caribou herds, the Government of Nunavut (GN) Department of Environment (ENV) offered compensation through the Support for Active Harvesters program to local hunters for ground based wolf hunting in the Kitikmeot Region since the 2018–2019 season and expanded this program across Nunavut since the 2019–2020 season.

Although most migratory caribou herds have shown steep rates of decline and low abundance, for example the Bathurst (BA) and Bluenose-East (BNE), the Qamanirjuaq (QM) herd in the Kivalliq Region of Nunavut has instead demonstrated a moderate rate of decline of 2% based on the 2017 calving ground survey. Of key interest is whether relative stability of the QM herd can be correlated to the more intensive wolf harvest measures undertaken on this herds' range and whether these removal measures will have a biologically positive or negative effect on the long term health, productivity and abundance of the QM herd.

During 2023-24, 443 wolves were recorded harvested across Kivalliq, with 78% of the harvest from Arviat and Baker Lake hunters. We obtained the skull and a small piece of skin with fur from hunters with the assistance of Hunters and Trappers Organizations (HTOs) and Conservation Officers (CO). A $500 subsidy was provided to hunters. We sent the first premolar to Matson's Laboratory LLC (Milltown, MT, USA) for age estimation using cementum analysis. While caribou herd monitoring procedures are in place, there is no similar one for wolves, especially to investigate how effective the enhanced wolf harvest program is for barren-ground caribou recovery. Age and sex structure of the wolf harvest will document temporal trends, including examination of spatial and temporal clustering of kill sites. Shifts in age structure of wolves harvested will be used as an index of the effectiveness of the ground-based wolf removal efforts. However, collared wolves are needed to monitor individual packs and document what happens when pack mates, especially among the breeding pair, are killed.

Wolves collared near their den in June offers an opportunity to target the breeding pair of wolves and follow their movements to explore whether a wolf pack tends to be associated with a given caribou herd where wolves den or rather be part of a panmictic population, regardless of den site location. Tracking mortality within wolf packs will allow a better understanding of their kill site clusters and the potential impact of kill rates of wolves on barren-ground caribou. Given the high harvest rate of wolves in the area by local hunters, especially in March/April, collaring wolves in June offers the advantage that collared wolves will likely survive more than a few months. In June 2024, we deployed GPS collars on 20 wolves, 8 were females and 12 were males within both the QM and the tundra-dwelling Northeast Mainland (NEM) caribou annual ranges.

Of the 20 wolves captured and collared in June 2024, eight were harvested, one collar dropped (cotton insert was broken), one wolf died, one collar dropped or wolf died. Preliminary analyses of wolf collar location data shows North-South and East-West movement pattern.

To estimate wolf predation, from the collar GPS locations, we identified 98 cluster locations (potential kill sites) for the month of September 2024. We investigated 98 clusters from Oct 06 -16, 2024, searched for prey remains and described as kill site (predation) or non-kill site (scavenging or rest/rendezvous site). Of these 98 sites, 86 (88%) were kill sites, most were caribou.

In coordination with an active caribou telemetry program within these caribou herds, we will be able to examine wolf movement, predatory behavior on the distribution and abundance of ungulates and characterize wolf demography, specifically survival and recruitment, in response to enhanced wolf harvest.

Background:

Most herds of migratory tundra caribou (*R. t. groenlandicus*) in Nunavut and adjacent Northwest Territories (NWT) are either in decline or at historically low population levels (COSEWIC 2016). Evidence from traditional and scientific sources indicates that caribou herds periodically increase and decrease at some interval (COSEWIC 2016, Bongelli et al. 2020). Although not fully understood, cyclical changes are likely largely due to trends in range quality, habitat disturbance, climate, predation, disease and anthropogenic influences (COSEWIC 2016). Wolf (*Canis lupus*) predation is often singled out as a significant contributing factor (Hayes and Russell 2000, Russell 2010). Wolves are known to predate both adults and calves (Bergerud et al. 2008), and managing the wolf populations to reduce wolf predation on caribou is one of the few management levers available (Awan et al. 2023).

Targeted wolf management to support recovery of declining migratory caribou herds has been conducted across Canada and Alaska, USA. Management actions have included harvest incentives, aerial shooting, and poisoning, among others (e.g., Farnell 2009, Russell 2010, Hayes 2013, Boertje et al. 2017). To support recovery of the Bathurst (BA) and Bluenose-East (BNE) caribou herds, the Government of Nunavut (GN) Department of Environment (ENV) implemented an incentive program for Inuit harvesters to support ground based wolf hunting in the Kitikmeot Region since the 2018–2019 season and expanded this program across Nunavut since the 2019–2020 season (Awan et al. 2023). The Government of the Northwest Territories (GNWT) Department of Environment and Climate Change (ECC) during the 2019-2020 harvest season implemented a wolf control program, augmented by aerial removals in the first year of the program, within the winter range of the BA and BNE caribou herds (Wilson et al. 2022).

From the wolf harvest data, we are documenting temporally the age and sex structure of the wolf harvest, including examination of spatial and temporal clustering of the harvest and estimating shifts in age structure of wolves harvested as an index of the effectiveness of the ground-based wolf removal efforts. However, quantifying harvest incentive program efficacy requires credible evidence not only on the demographic recovery of respective caribou herds, but similar evidence of the effects of expanded harvest on wolf populations. Further, documenting population growth of these caribou herds during enhanced wolf harvest programs cannot be attributed to wolf harvests unless we demonstrate the relationship to wolves through monitoring of their populations and predator-prey relationships.

Although most migratory caribou herds within mainland NWT and Nunavut have shown steep rates of decline and low abundance, for example the BA and BNE (Adamczewski et al. 2022, Boulanger et al. 2022), the Qamanirjuaq (QM) herd in the Kivalliq Region of Nunavut has instead demonstrated a moderate rate of decline of 2% based on the 2017 calving ground survey (Boulanger et al. 2018). Of key interest is whether relative stability of the QM herd can be correlated to the more intensive wolf harvest measures undertaken on this herds' range and whether these removal measures will have a biologically positive or negative effect on the long term health, productivity and abundance of the QM herd.

5. Project Objectives:

Our goal is to improve our understanding of wolf movements within and between caribou herds, and examine the spatial and temporal dynamics of predator prey (wolves, muskox, and caribou) within the QM and Northeast Mainland (NEM) caribou herds range in the Kivalliq region of Nunavut. Our objectives are to:

- Collect wolf data on seasonal and annual patterns of wolf movement on the tundra
- Quantify wolf predation rates of caribou, identify prey species at kill sites to investigate selective predation
- Characterize wolf demography, specifically survival and recruitment, in response to enhanced harvest within the annual range of QM and NEM caribou herds
- Estimate changes in age structure of harvested wolves within and across years to index efficacy of the ground-based wolf removal program

6. Material and Methods:

The study area incorporates caribou range across the Kivalliq mainland. We deployed collars in early June 2024 on the QM and tundra-dwelling NEM caribou ranges (Figures 1 & 2).

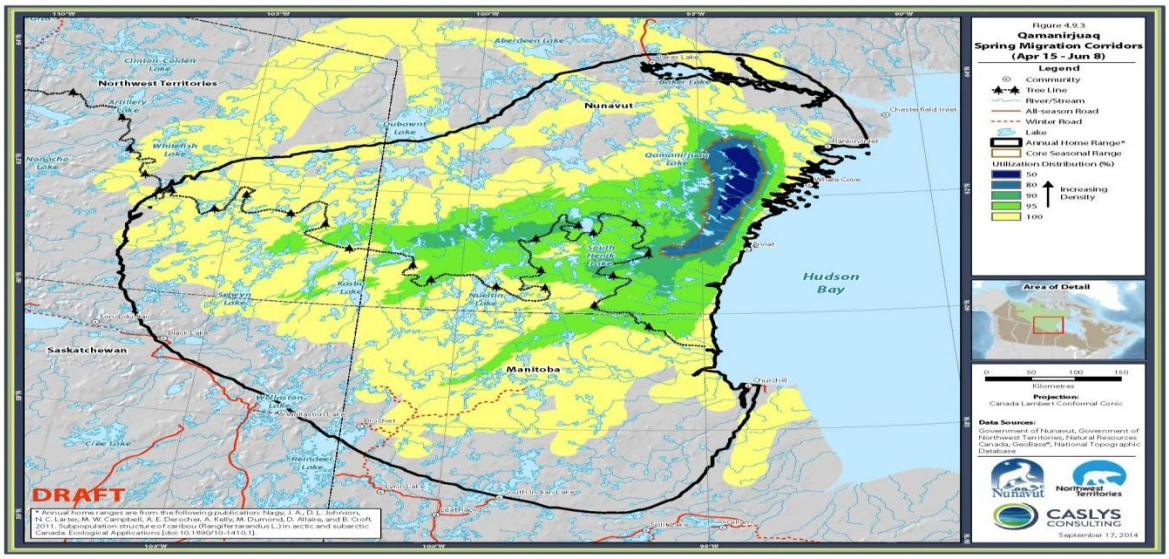

Figure 1. The Qamanirjuaq Herd spring migratory seasonal range and general study area.

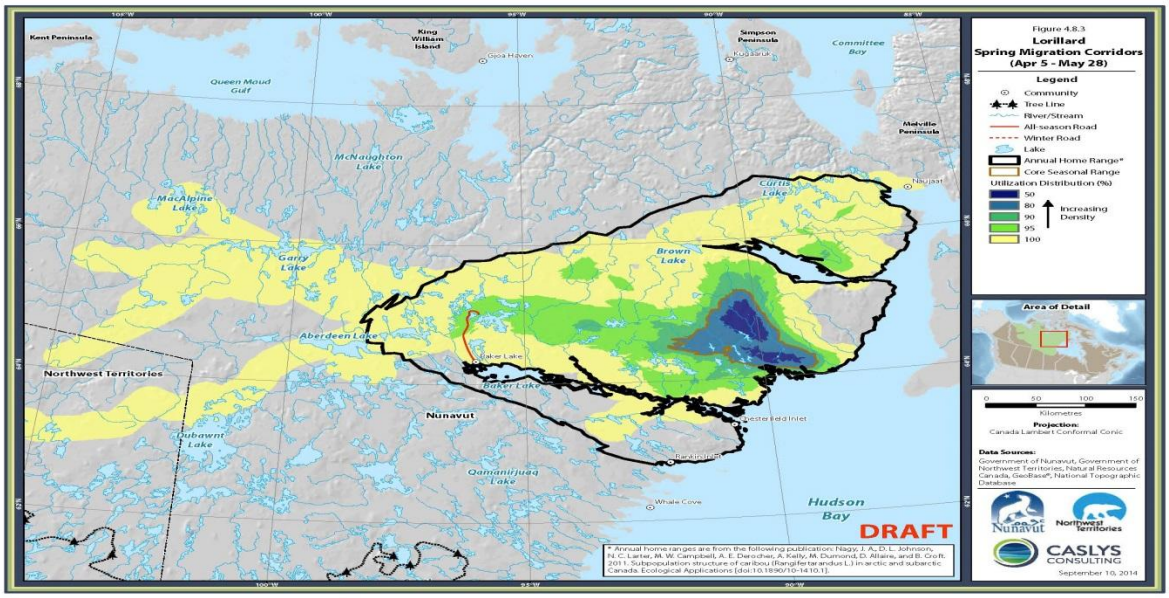

Figure 2. The Lorillard Herd spring migratory seasonal range and general study area.

Wolf harvest data:

We obtained the skull and a small piece of skin (~2.5 x 2.5 cm) with fur from hunters with the assistance of HTOs and Conservation Officers (CO). A $500 subsidy was provided to hunters for each skull brought back to their wildlife office to encourage the reporting and return of samples. For each wolf sample collected, COs filled out sample collection forms with information from hunters about their name, home community, the harvest date, location, wolf sex, and method of harvest, and their opinion about the current abundance trend of the local wolf population: “Do you think the wolf population is decreasing, stable or increasing”. The skinned skulls were stored frozen, and were

thawed at room temperature for examination in early May and a first upper premolar extracted for age estimation (Matson 1981). We sent the first premolar to Matson's Laboratory LLC (Milltown, MT, USA) for age estimation using cementum analysis. This technique is based on the cyclic nature of cementum growth in teeth forming annular patterns of different darkness depending on the season (Matson 1981). Following Mech (1970) and Gese and Mech (1991), individuals were then grouped into three age classes: juvenile (0-year-old), yearling (1-year-old) and adult (≥2 years). Note that the harvest year is assigned as the year at the end of the regulations' harvesting season, for example, 1 July 2023–30 June 2024 = 2024 harvest year.

Wolf Capture and collaring:

We hired a professional crew and followed methods and protocols established by the GNWT (GNWT WCC SOP) to capture the wolves. In June 2024, we captured the wolves from a helicopter using net guns to entangle/trap wolves with the net. We collared the wolves without the use of immobilization drugs. Each wolf was ear tagged and fitted with a GPS collar (Telonics model TGW-4577-5, programmed to obtain relocation every 4 hours or less for up to 3 years) equipped with an automatic drop-off and cotton breakaway.

Wolf potential kill sites:

We used only September 2024 locations to identify potential kill sites. The parameters used to identify clusters were the search radius (SR), the number of "window" days (W-D), and the minimum number of locations for a cluster (CML). For identifying potential kill sites among clusters, we chose an initial SR of 300m, 2 W-D, and 5 GPS locations for the CML.

Results Summary

7. Project Schedule:

Kivalliq wolf monitoring using satellite telemetry and hunter harvest.			
Output or Step	Start Date	End Date	Person days
Community consultations, Wildlife Research Permit Applications	Dec 2023	Feb 2024	15
Jet fuel purchase and caching	Jan 2024	April 2024	-
Collar purchase	Jan 2024	April 2024	-
Collection of samples from harvested wolves			On Going
Wolf collar deployment	June 2024	June 2024	15

Wolf den/kill site visits	Oct 2024	Oct 2026	15
Collar locations and preliminary analysis of the data	June 2025	Sep 2026	20
Data analysis, reports, communication to co-management partners	Nov 2025	Mar 2027	100

8. Preliminary results/discussion:

A total of 443 wolves were harvested by 103 hunters in the Kivalliq region during the 2023-24 season and male wolves comprised 55% of the harvest (Table 1).

Table 1. Number and sex of recorded wolf harvests by community, Kivalliq region, 2023-24.

Region	Community	Female	Male	Unknown	Total
Kivalliq					
	Arviat	113	142		255
	Baker Lake	41	48		89
	Chesterfield Inlet	11	11		22
	Naujaat	19	28	1	48
	Rankin Inlet	12	16		28
	Whale Cove	1			1
	Total	**197**	**245**	**1**	**443**

We extracted first upper premolar and submitted to Matson's Laboratory LLC (Milltown, MT, USA) for age estimation. We will use wolf age information to estimate changes in age structure of harvested wolves within and across years to index efficacy of wolf harvest.

In June 2024, we deployed GPS collars on 20 wolves, 8 were females and 12 were males (Table 2) within both the QM and the tundra-dwelling NEM caribou annual ranges.

Of the 20 wolves captured and collared in June 2024, eight were harvested (Table 2), one collar dropped (cotton insert was broken), one wolf died, one collar dropped or wolf died. Three collars begin malfunction after about one year of deployment (Table 2). Preliminary analyses of wolf collar location data shows North-South and East-West movement pattern.

Table 2. Kivalliq wolf collar deployments in June 2024.

Date	Wolf ID	Sex	Age class	Fate (Sep 29, 2025)
13-Jun-24	HWF 01	M	Adult	Harvested in NT (24 Jan 2025)
13-Jun-24	HWF 02	F	Young	Collar drop (21 Aug 2025)
13-Jun-24	HWF 03	F	Young	Active
14-Jun-24	HWF 04	F	Adult	Harvested (14 Apr 2025)
14-Jun-24	HWF 05	F	Adult	Harvested (14 Apr 2025)
15-Jun-24	HWF 06	M	Adult	Collar drop or died (18 Aug 2024)
15-Jun-24	HWF 07	M	Adult	Harvested (9 Mar 2025)
16-Jun-24	LWF 08	M	Young	Active
16-Jun-24	LWF 09	M	Adult	Active
16-Jun-24	LWF 10	M	Young	Malfunctioning as of 26 Aug 2025
16-Jun-24	LWF 11	M	Adult	Active
18-Jun-24	HWF 12	F	Adult	Harvested (18 Apr 2025)
18-Jun-20	HWF 13	M	Young	Harvested in NT (25 Jan 2025)
19-Jun-24	HWF 14	M	Adult	Harvested (8 Sep 2024)
20-Jun-24	LWF 15	F	Adult	Harvested (20 Apr 2025)
20-Jun-24	LWF 16	M	Adult	Malfunctioning as of 26 Jul 2025
20-Jun-24	LWF 17	F	Adult	Active
20-Jun-24	LWF 18	M	Adult	Malfunctioning as of 28 Jun 2025
21-Jun-24	LWF 19	F	Adult	Died (25 May 2025)
21-Jun-24	LWF 20	M	Adult	Active

In coordination with an active caribou telemetry program within these caribou herds, we will examine wolf movement, predatory behavior on the distribution and abundance of ungulates and characterize wolf demography, specifically survival and recruitment, in response to enhanced wolf harvest.

To estimate wolf predation, from the collar GPS locations, we identified 98 cluster locations (potential kill sites) for the month of September 2024. We investigated 98 clusters from Oct 06 -16, 2024, searched for prey remains and described as kill site (predation) or non-kill site (scavenging or rest/rendezvous site). Of these 98 sites, 86

(88%) were kill sites, most were caribou. Preliminary monitoring of collard wolves has shown that collared wolves spending time within and between different caribou herds. Analyses of movement and cluster site investigations to estimate the kill rate are in progress.

9. **Reporting to communities/resources users**:

Preliminary study results were presented to Arviat, Naujaat, Rankin Inlet and Whale Cove HTOs. In fall 2025, update will be provided to the other Kivalliq HTOs and to the Kivalliq Wildlife Board (KWB).

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