NPC 151178: Ecology and demography of killer whales in the eastern Canadian Arctic

Close

Proposal Status: Conformity Determination Issued

Overview Documents

Project Overview

Type of application: New

Proponent name:

Cory Matthews

Proponent company:

Fisheries and Oceans Canada

Project Description:

There is growing concern among Inuit communities that increasing killer whale presence in the Arctic with declining sea ice may have adverse impacts on their marine mammal prey. As a result, several Inuit communities have asked for population assessments to determine whether killer whale populations can be sustainably harvested or culled, and whether killer whales can be safely eaten by people. Our research aims to address these concerns and questions by determining killer whale diet, interactions with prey species, population size and trends, shifts in distribution, and contaminant levels. In summers 2026-29, we will continue with core research methods including satellite telemetry, tissue biopsy, and photo-identification. We have recently compiled results of this work conducted over previous years to better understand how killer whales and prey interact (satellite telemetry), to estimate killer whale population size and trend (mark-recapture analysis of photo-identified whales) and population structure (genetics analysis of biopsies), and to characterize diet (stable isotopes analysis) and potential prey consumption (bioenergetics modeling). Expanded project goals over recent years include recording killer whale calls using hydrophones and recording behavior using drones. This work will allow us to study interactions between Arctic killer whales and their prey with greater detail than we have previously, particularly where some have questioned whether killer whale presence has impacted narwhal numbers or distribution. Ultimately, characterization of killer whale calls and behavior (e.g., hunting) will provide benchmark information with which to develop acoustic monitoring of killer whale behavior and impacts on prey populations throughout the Arctic. We will also do more in-depth analyses of genetics data and photographs to assess individual condition and population growth (demographics), which will provide an

updated population estimate. Our objective is to study Arctic killer whale distribution and range expansions, population structure and trends, and foraging ecology to determine how to incorporate killer whale predator-prey interactions into marine mammal stock assessments. We propose a multidisciplinary study based at Admiralty Inlet, Nunavut, to assess killer whale: 1. distribution and spatiotemporal range expansions using sightings reports, photographic identification, passive acoustic monitoring, state-space modelling of satellite telemetry data, and biochemical analysis of tissues; 2. population abundance, historic and current demographic trends, and genetic structure using capture-mark-recapture analysis of photographically identified individuals, whole-genome sequencing of biopsies, and drone footage to assess reproductive state; 3. genetic variation across environmental gradients as evidence of local adaptation to Arctic conditions (via whole-genome analysis); 4. diet, including existence of ecotypes, using a) biochemical dietary proxies (stable isotope, fatty acid, and contaminant analyses of biopsies), b) whole-genome sequencing, c) morphological differences assessed using photo-ID and drone footage, and d) observations of predatory interactions (bioacoustics, drone and boat-based focal follows, satellite telemetry); 5. consumptive and non-consumptive (e.g., displacement) impacts on prey by incorporating abundance, spatiotemporal distribution, and diet into bioenergetics models of prey consumption, as well as distribution and behavior shifts of prey species in the presence of killer whales.

Project Schedule

Start Date:

2026-07-15

End Date:

2029-10-31

Project Map

List of project geometries:

Id

Geometry

Location Name

21583

polygon

polygon encloses area of boat-based field work

21584

point

location of field camp (at or near Kakiak)

NPC Planning regions:

North Baffin

Project Land Use and Authorizations

Project Land Use:

Scientific Research

Marine-Based Activities

Scientific Research

Temporary Structures

Licensing Agencies:

Government of Canada - Fisheries and Oceans Canada

Material Use

Equipment:

Type

Quantity

Type

Use

longhouse canvas tent

2

10x12

camp kitchen/meeting place and equipment storage

personal camping tents

5

6x6

each person sleeps in their own personal tent/space

generator

1

honda 2000

run electronics in camp (eg laptops, battery charging)

boat

2

TBD

Two boats will be required for access to killer whales and deployment of tags, biopsies, and hydrophones. Boats are either contracted through the local Hunters and Trappers Organizations or Inuit owned outfitters (if available).

crossbow

2

35.5 inches

Two crossbows used for deploying satellite tags and biopsy darts.

Drone

2

12x9.5x3.3 inches

Drones will be used to assess killer whale hunting behavior, numbers, group composition, and individual body condition.

Hydrophone

2-4

530mm x 60 mm

Hydrophones will be deployed to collect and record underwater noise, shipping, and vocalizations from marine mammals, with primary goals to assess killer whale vocal behavior while hunting, as well prey response.

Fuel Use:

Type

Container

Capacity

Use

Gasoline

4

206

boat fuel, generator fuel

Propane

5

20

primarily to run cooking stoves

Other

12

4

naphta to run stoves

Hazardous Material and Chemical Use:

Type

Container

Capacity

Use

No data found

Water Consumption:

Daily Amount (m^2)

Retrieval Method

Retrieval Location

0

Freshwater will be collected and stored in camp for daily drinking and cooking needs; possible melting sea ice

Stream or river close to camp, possibly sea ice

Waste and Impacts

Environmental Impacts:

No adverse effects are expected based on this project. Fuel spills will be prevented and minimized by storing all liquid fuels in a temporary berm located at least 30m above the high-water mark. All liquid fuel transfer will be done within this berm using appropriate nozzles/funnels; and a spill kit will be readily available. Unused fuel and empty containers to be removed from site at the end of the program. Short term environmental impacts of the camp will be minimal and long-term impacts are expected to be nil. We will use the most durable surfaces when travelling, resting or re-filling water containers to avoid soil compaction/vegetation trampling. Biodegradable soap will be used (only when necessary) for dishwashing and bathing. The use of the generator will be kept to a minimum to minimize noise and air pollution. (I cannot get the 'Project Activity' drop-down menu to work. Here are the waste management components: Greywater0.1 m3/dailyGreywater will be disposed in a sump hole at least 30 m away from the high-water mark and sleeping areas. Non-Combustible wastes1 m3/dailyAll garbage will be packed out and properly disposed of in Arctic Bay Sewage (human waste)0.05 m3/dailySewage will be buried in a sump hole at least 30 m away from the high-water mark and sleeping areas.)

Waste Management:

Waste Type

Quantity Generated

Treatement Method

Disposal Method

No data found