



# Non-invasive Genetic Sampling of Polar Bears (*Ursus maritimus*)

Jason Herreman<sup>1</sup> and Elizabeth Peacock<sup>2</sup>



1. North Slope Borough Department of Wildlife Management, PO Box 1269 Barrow, AK 99723, USA, jason.herreman@north-slope.org
2. United States Geological Survey Alaska Science Center, 4210 University Drive Anchorage, AK 99508, USA, lpeacock@usgs.gov

## Abstract

There is a need to develop less-invasive methods to collect information for the management of polar bears, as local communities across the circumpolar Arctic often do not support their physical capture. Further, non-invasive collection of genetic material can increase precision and decrease bias of population estimates, where physical capture is unsafe (high topography or small off-shore islands). Non-invasive sampling can also be conducted by local residents, who are often more knowledgeable regarding sea-ice travel; fostering collaborative conservation among scientists, government managers, and local communities. We erected a single-strand barb wire fence around carcasses to collect hair samples for microsatellite genetic analysis. The snare was checked at intervals set by observed patterns of bear use. Hair was considered to be a new sample if no other hair was collected within 6 barbs (approximate width of a polar bear). All uncollected hair was removed after each sampling period. Since November 2010 we have collected more than 650 hair samples from our site (photographic and visual observations suggest from at least 50 bears).



## Introduction

Polar bears are an important subsistence species to arctic communities. In addition, since their listing under the Endangered Species Act in 2008, they have become the iconic image for climate change world wide. Because of the historical and cultural importance of polar bears to arctic peoples, the overlap in use areas, as well as the new emphasis on climate change, communities such as the Inupiat of the North Slope are key conservation partners for polar bear management. These communities often do not support the physical capture of polar bears for research and management. As such, there is a need to develop less-invasive methods to collect information for the management of polar bears. This project is an effort to identify and apply a new sampling technique for polar bear management that is less invasive and stressful to the animals and can easily involve local community members.

## Point Barrow bone pile and hair snare



## Objectives

Hair Samples will be used to:

1. Document annual and seasonal use cycles of bowhead carcasses by bears.
2. Determine relatedness of individuals that use carcasses.
3. Determine if visitation rates are high enough to make population estimates using mark recapture feasible.
4. Compare use of bone piles to beach cast whales by polar bears.
5. Include all samples in USGS genetics database for future genetic mark recapture studies

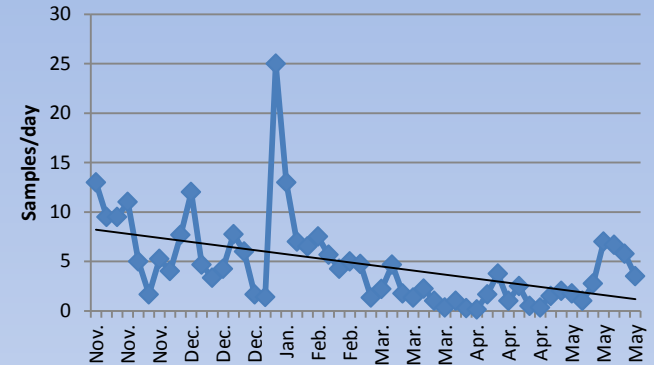


Fence Repairs and Adjustments

## Methods

- Single strand of 4 point 12 gauge barbed wire erected around carcasses Nov. 2010
- Fence posts spaced ~10 meters apart
- Wire was attached on alternating sides of fence posts
- Fence height initial: 0.5 meters Adjusted: 0.65 meters
- Spacing between samplings ~0.75 meters or 6 barbs
- Fence checked every day for the first 4 days of operation, switched to every other day, later adjusted as needed by bear presence
- Hair was not collected if a barb had large quantities of hair that looked like it could be from more than one animal.
- Still cameras setup to help monitor fence
- All unsampled hairs cleaned from fence at each visit (propane torch used when temperatures allowed)
- Fence repairs were done using bailing wire and by twisting the wire to tighten it
- Additional fence post were added and the snare raised and lowered to deal with drift and melt

## Bone Pile use by Polar Bears



## Preliminary Results

- 649 samples collected as of May 27, 2011
- No evidence for injury to bears despite the occurrence of scuffles, starting events, and numerous bears using the pile at one time (up to 20 bears)
- The 200 samples from the first 3 months of collection were sent in for analysis in February (currently the highest period of harvest in Barrow)
- 97 individuals have been ID'd (35% recapture rate)
- 75 (77%) were bears not currently identified in the USGS genetics database
- 17% failure rate of hair (most under fur)
- Time of day bears present : Fall/Winter: Bears appear to use bone pile at all hours as long as humans are not present. Likely due to limited light. Spring: majority of bears use bone pile during early morning or late evening (exception seems to be large adult males)

## Conclusions

Barbed wire hair snare enclosures around marine mammal bone piles are an effective way to collect hair samples from polar bears for genetic and other analyses.

- Fence height for polar bears should be ~0.65 meters
- Fence should be checked a minimum of once every week at the lowest usage rate and a minimum of every other day at the highest
- During high use periods, after storms/drift events, and during spring melt the fence requires maintenance and adjustment
- A propane torch works very well for cleaning when temp. is above ~-10°C
- Use Highest strength barb wire available
- Twisting the wire is the most effective method of tightening
- Alternating wire placement on posts proved highly beneficial
- A continuous piece of wire should be attached to multiple (4) poles
- Local technicians can easily be trained to collect samples

## Future Work

- Expand sampling to 2 additional sites
  1. Cooper Island: guillemot colony
  2. Kaktovik bone pile

Permit #MA134907-1

## Entrance techniques

