Collecting non-invasive polar bear genetic ID samples along the Chukchi Sea coast: Working with Alaska Natives

Andrew Von Duyke^{1*}, Lori Quakenbush^{2*}, Kim Titus³, Kelly Nesvacil³

Background

- . Polar bears are harvested annually by Alaska Natives under allowances of the Marine Mammal Protection Act and the Endangered Species Act.
- 2. Estimating polar bear abundance in the Chukchi Sea is vital for setting an annual sustainable harvest quota as required by the US-Russia Bilateral Polar Bear Agreement.
- 3. Remote and challenging conditions make data collection difficult and there is ongoing concern over invasive study methods among stakeholders (Alaska Natives), researchers, and agencies.
- 4. Polar bear conservation will benefit from non-invasive approaches that are less controversial, less expensive, and can be implemented locally by experienced Native hunters.
- 5. We adapted methods used in the past to sample DNA from the hair of bears and other carnivores.

Key Issues

- Controversy over setting annual harvest limits as required by the Bilateral Agreement with Russia
- Controversy about the boundary for establishing the quota – Point Barrow (Bilateral Agreement) vs. Icy Cape (PGSG)
- Quota is based on qualitative abundance estimate of 2,000
- Quota has still not been put into regulation
- Now lower cost method exists for estimating abundance
- Desire active participation by native hunters and residents

Objectives

- 1. Develop local support for field logistics.
- 2. Determine the feasibility of estimating polar bear numbers moving by coastal communities.
- 3. Augment larger datasets used for spatial mark-recapture abundance estimates.



Hair sampling stations were deployed in Utqiagvik and Pt Lay in 2016. All villages shown were sampled in 2017. Stations were maintained by locally hired Native hunters.



Funding

- State of Alaska Coastal Impact Assistance Program
- North Slope Borough Department of Wildlife Management -
- Collaborative Alaskan Arctic Studies Program
- ✤ State of Alaska State Wildlife Grant
- ✤ World Wildlife Fund

Methods

- Discuss project with hunters, community leaders, Alaska Eskimo Whaling Commission, Barrow Whaling Captains' Association, Alaska Native Co-Management Partners, U.S. Fish and Wildlife Service, and the Scientific Working Group of the US-Russia Polar Bear Commission.
- 2. Construct portable hair sampling stations that can be easily shipped, assembled, and deployed via snow machine.
- 3. Deploy hair sampling stations near Utqiagvik & Pt. Lay (2016) and across NW Alaska (2017).
- 4. Two types of hair sampling stations deployed: barbed-wire and wire-brush.
- 5. Check sampling stations and collect hair as weather permits; preferably 2-3 times per week.

Two types of hair sampling station were evaluated

BARB-WIRE

A wooden frame was strung with 25' of barb-wire. A scented attractant was placed at the peak and inside the strand of wire. Bear snags fur in barbs when reaching for attractant.

WIRE BRUSH

Box is open at one end and contains scented attractants. Bear reaches inside box and snags fur on the stiff wire brushes. Entire brush is removed and replaced with a clean brush when resetting the station.





Poster background: Two Native hunters from Wales, AK deploy a hair collection station on the sea ice near their village. The cooperation and expertise of Native hunters was vital to the success of this investigation. (Photo: Elisabeth Kruger, WWF)

Cooperators

- ✤ U.S. Fish and Wildlife Service E. Regehr Polar Bear Program
- ✤ S. Talbot USGS
- ✤ Native villages across NW Alaska
- Barrow Whaling Captains' Association
- Alaska Eskimo Whaling Commission
- Many Alaska Native Co-Management Partners & Stakeholders

Results

- samples

Genetics 2016

- Barb-wire:
- the loci Wire-brush:

Conclusions

- for genetic ID.

- Barbed wire

- Poor public perception
- Wire brushes





Field work 2016

Local cooperation was obtained in support of the project Utqiaġvik (Barrow) (11 stations)

 340 Trap nights (11 March – 15 May); 22 capture events; 45 total samples Point Lay (10 stations)

127 trap nights (14 April – 5 May); No polar bear samples, but 6 brown bear

Field work 2017

Total of 9 villages sampled

3 stations per village

Hired local Native hunters as technicians

Currently waiting for samples to be shipped.

In 28 of 46 samples (60%), >75% of 13 loci were amplified

Snagged both guard hairs and under-fur

• 22 of 26 (84%) guard hair samples with visible follicles amplified at >75% of

 Snagged mostly under-fur 2 of 2 (100%) guard hair samples amplified at >75% of the loci

21 invividual polar bears at Utqiagvik and repeated sampling of

a single brown bear (Ursus arctos) at the Point Lay

Overall, results seem promising for subsequent work

 Cooperative effort with Native subsistence hunters was productive Approach holds significant promise to remotely sample polar bears

Approach lends itself to be "exported" to remote Russian polar bear habitat in Chukotka

Fewer hairs/sample but more guard hairs

Difficult to collect samples in wind/cold

 Bears appeared to learn to avoid barbs, got bait but left little/no hair Heavy and difficult to work with

 More hairs/sample, but also more underfur than guard hairs Brushes easily replaces with no DNA cross-contamination May be more difficult for bears to take bait without leaving hair sample Light weight, easy to deploy Better public perception

Contact information

✤ Andrew Von Duyke* Lori Quakenbush* Kim Titus (retired) Kelly Nesvacil

andrew.vonduyke@north-slope.org lori.quakenbush@Alaska.gov ktitus54@gmail.com kelly.nesvacil@Alaska.gov

¹North Slope Borough Dept. Wildlife Management, Utqiaġvik, AK ²ADF&G, Arctic Marine Mammals Program, Fairbanks, AK ³ADF&G, Division of Wildlife Conservation, Juneau, AK

Next steps...

1. Project is ongoing – funding in place 2. Expand sampling into more communities 3. Explore possibility of deployment in Russia 4. Continue to evaluate sampling efficiency, build sample library, resample?

5. Work with captive bears to refine sampling methods

