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Polar Bears
Salient points

• 20 – 25000
• Up from 10-12000 in the 1970’s
• 19 Management Units / Populations
• 13 in Canada
Canadian Polar bear Conservation & Management
Canadian Polar bear Conservation & Management

- TAH 475-525 bears per year (2006/2007 = 511)
- ~ 85-90% is actually harvested
- Prior to the listing in the USA ~ 80-90 sporthunts a year with ~ 85-90+% success rate
- Now reduced sporthunts but TAH constant
Canadian Polar bear Conservation & Management

- *A few general issues.*
- Census every 12-15 years in the MU’s
- Three year projects – expensive by bio standards
- Invasive & not liked by Inuit
- Dynamic not known in most populations most of the time
- Incapable of monitoring of polar bears in this time of expected rapid change
Immediate Problem:

- M’ Clintock Channel (MC) and Gulf of Boothia (GB) populations
- MC severely depleted – moratorium based on 1997-2000 CMR survey
- 3 bears per year shared with Cambridge Bay and Gjoa Haven
- Local stakeholders wanted a contemporary estimate of polar bear numbers
Polar bear studies at Queen’s and Gjoa Haven HTO –

*M’Clintock Channel and Gulf of Boothia Populations*

MC = M’Clintock Channel
GB = Gulf of Boothia
Polar bear studies at Queen’s and Gjoa Haven HTO

New Non-invasive and Inuit Inclusive Ways to Monitor Polar Bears

HST
Polar bear studies at Queen’s and Gjoa Haven HTO Hairs
Polar bear studies at Queen’s and Gjoa Haven HTO S---
Polar bear studies at Queen’s and Gjoa Haven HTO Tracks

- Reliability and accuracy of Inuit of track diagnoses of sex, age and size of tracks
- Tracks as fingerprints
Polar bear studies at Queen’s & Gjoa HTO

Value added backbone -- Genetics

10 individuals from 18 hair snags – no contamination
Location of noninvasive sampling station across all 4 years of sampling. Stations were also placed at higher density in activity areas as identified by Gjoa Haven hunters, while outside of these activity areas, they were placed in a transect every ~15km.
The location of sampled bears over the years of the study showing an increasing number of bears being contacted by our sampling stations from 2006-2009 – Hairs only

- 2009, N = 54
Polar bear studies at Queen’s & Gjoa HTO

Genetics – Health from Poop, San Diego Zoo

<table>
<thead>
<tr>
<th>Etiologic agents</th>
<th>Tested for by PCR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacteria</strong></td>
<td>Positive/Animals Tested</td>
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<tr>
<td>Campylobacter spp.</td>
<td>0/29</td>
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<tr>
<td>Helicobacter spp.</td>
<td>19/29</td>
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<tr>
<td>Mycoplasma spp.</td>
<td>0/29</td>
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<tr>
<td>Pathogenic E. coli</td>
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<tr>
<td>Plesiomonas shigelloides</td>
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<tr>
<td>Salmonella spp.</td>
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<td>Shigella spp.</td>
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<tr>
<td>Yersinia spp.</td>
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<tr>
<td><strong>Viruses</strong></td>
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<tr>
<td>Adenovirus</td>
<td>0/29</td>
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<tr>
<td>Astrovirus</td>
<td>0/29</td>
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<tr>
<td>Calicivirus</td>
<td>0/29</td>
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<tr>
<td>Coronavirus</td>
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<tr>
<td>Herpesvirus</td>
<td>0/29</td>
</tr>
<tr>
<td>Influenza viruses</td>
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<tr>
<td>Morbillivirus</td>
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<tr>
<td>Parvovirus</td>
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<tr>
<td><strong>Protozoa</strong></td>
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<tr>
<td>Cryptosporidia spp.</td>
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<tr>
<td>Entamoeba spp.</td>
<td>0/29</td>
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<tr>
<td>Giardia spp.</td>
<td>0/29</td>
</tr>
<tr>
<td>All Protozoa</td>
<td>0/29</td>
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</table>

*Fecal Flotation for parasites 0/29*
Polar bear studies at Queen’s & Gjoa HTO

Genetics -- ID (census) and diet (health) from poop, Cornell

Getting 16S rRNA gene sequences from faecal sample

DNA → 16S rDNA

PCR

454 pyrosequencing

Sequence

GCTCTAGAGACAA

qIME

Quantitative Insights Into Microbial Ecology
• Sequences across samples.

• Rarefaction to 1200 sequences per sample.
• Unscaled, Unweighted, PCoA of 1200 sequences per sample
• Blue = Zoo Bears (incl. Nanook); Red = Churchill Bears
• Unscaled, Unweighted, PCoA of 1200 sequences per sample
• Blue = Zoo Bears (incl Nanook); Red = Churchill Bears, Green = wild bears
• Know red dots different bears, and which of Blue dots different bears, green dots = ? unique bears -- microsatellite genotyping
How does the fauna change with different diet?
Orange = Char, Green = seal, Light Green = herring and lettuce (zoo diet)
### Cortisol Titres from Hairs -- estimators of health

21 MC 2009 hairs -- as efficient as CMR samples

**Table:**

<table>
<thead>
<tr>
<th>ID (AS SENT)</th>
<th>Hair Type</th>
<th>Sample Quantity (mg)</th>
<th>Final HCC (pg/mg)</th>
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<td></td>
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<td>PBH 168B</td>
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<tr>
<td>PBH 169B</td>
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<td>80</td>
<td>25.89</td>
</tr>
</tbody>
</table>

*Not much different from Western Hudson Bay animals*
Still only a small scale study – scale up with the military`s help

- Set up traps –
- Choppers. Rapid sampling and re-baiting,
- Dismantling and biopsy darting
ARIF and Stimulus

• As part of Canada’s recent stimulus package received funding from the Arctic Research Infrastructure Fund (ARIF)
• A whopping 610K
• Small but lots of value
Old Cabin at Cape Sydney 16 x 16ft
Boothia Peninsula
Finish them …
Interacting with the Military
(esp. Canadian Rangers)

Awareness of their exercises:

For less frequent activities
• Annual Training exercise – limited research opportunity, close to town
• Directed Patrolling exercise – 1 patrol on an objective 8 rangers x 8 days. Can be as many as 12 per year around all three territories
• Mass Exercise – a joint patrol in 3-5 communities, 8-20 people per community, 3-5 per year, 8 days can be extended.
• Provision of Service (Yukon Quest Support) CPRG supports up to 25 K
• Support of other government departments wg DF0, RCMP
• Support of Major CF operations eg. Nanook, Nunalivut.

For recurring activities:
• MOU (a whole other Ball game)
Cautions.

• Environmental realities - 12 barrels or less before semi-permanent structure required
• Caching – only store fuel for 1 calendar year
• Fly in Fly out makes sense – one flight.
• 3 month lead on caching at least
How to interact (with Rangers)

• Formal request to JTFN Commander.
• Commander *point of contact* operations cell J3
• Commander has 25K discretionary funds for provision of service to non-governmental agencies
• In our case -no cost-- as the support was provided as part of training exercise
• Looking for an opportunity to include useful ventures in training.
• Different interfaces with Can Rangers and other CF elements eg. Arctic Operations Advisor Course.
Why these relationships may become more common

• C-HARS

• Ongoing support - not possible for ANY GOVERNMENT

• Upscale polar bear research from Minimum Number Alive to Census estimate – major significance for tracking polar bears response to climate change