

Development of Alternative Methods to Monitor Polar Bear Populations

- Large investment to increase monitoring frequency and decrease invasiveness
- Multiple partners & contributors
- Population-wide applications
 - Aerial surveys
 - Genetic mark-recapture
- Research & development
 - Aerial surveys over sea-ice
 - Satellite imagery
 - Photo surveys
 - Drones (UAV's)



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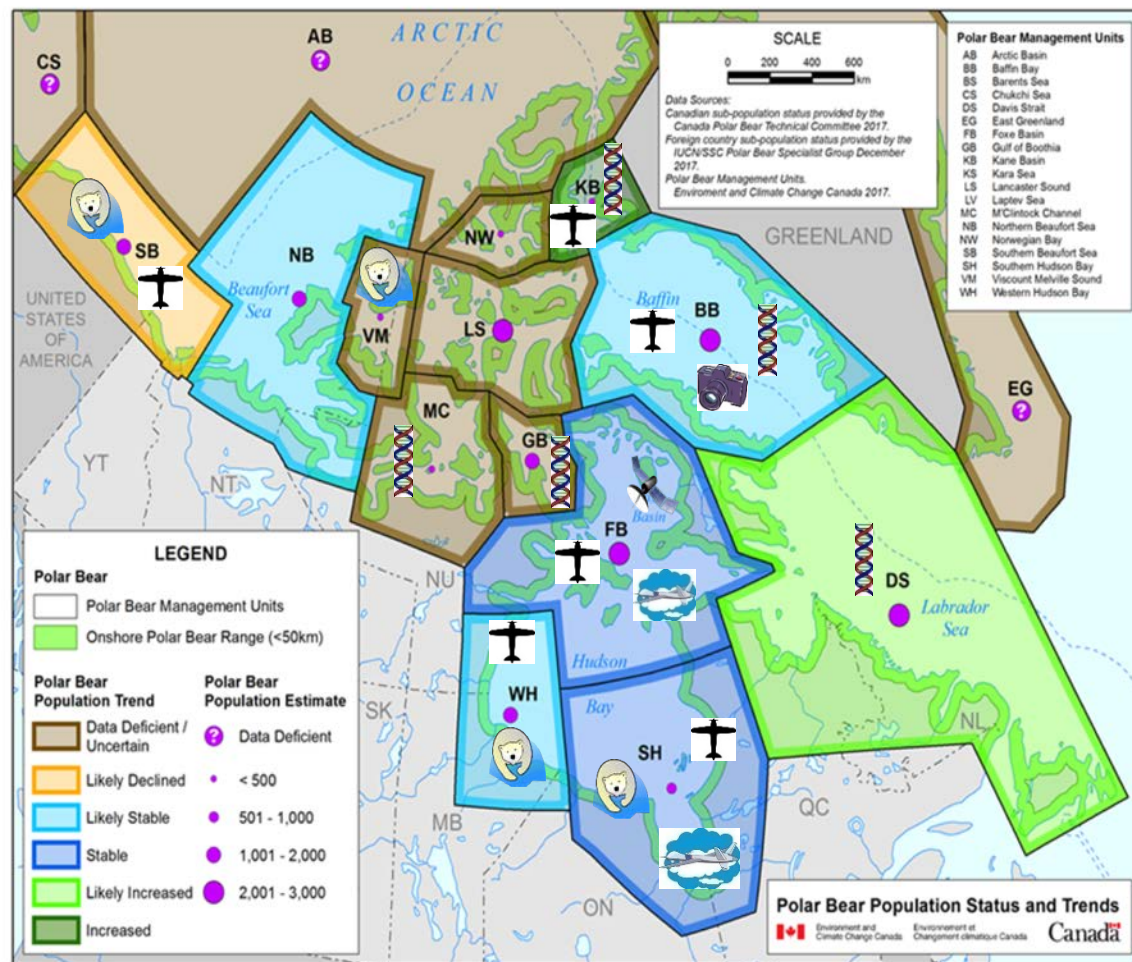
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Monitoring techniques across Canada



Monitoring methods used or in progress (2010-17):

Physical MR



Genetic MR



Aerial Survey



Satellite



Photo Survey



Drone



Other population assessment work

- M'Clintock Channel – 3 year genetic mark-recapture program (2014-2016)
- Gulf of Boothia - 3 year genetic mark recapture program (2015-2017)
- WH aerial survey 2016: 842 (95% CI: 562-121)*
- SH aerial survey 2016: 780 (95% CI: 590–1029)*
- SB aerial survey spring 2017 (results pending)
- Baffin Bay and Kane Basin cooperative scientific working group.
- Davis Strait – 2 year genetic mark-recapture program started in 2017.



Canada's Current Polar Bear Research



- Four research priorities:

1. Habitat and climate change: understanding links among changes in climate, sea ice habitat, polar bear activities, body condition and population status

2. Population assessment: application of less intrusive and more cost-effective monitoring techniques to assess population demography

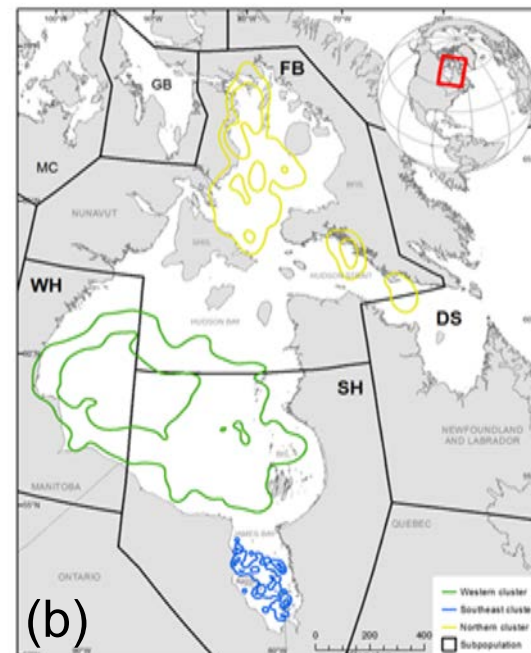
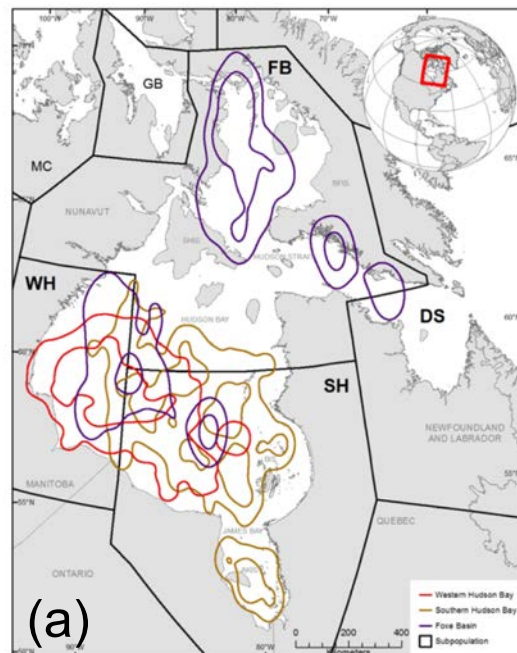
3. Genetics and health: research into population genetics and polar bear health

4. Foraging ecology and ecosystem dynamics: polar bear foraging ecology in relation to prey dynamics in marine and terrestrial environments



Population Genetics: individual movements help maintain structure

- Population structure is maintained by movements of females in the breeding season. Utilization distribution based on (a) subpopulation and (b) genetic relatedness



(Environment and Climate Change Canada / University of Alberta)

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Polar Bear Health Research



- Use of hair as a matrix to assess polar bear health (e.g. cortisol stress, mercury levels, stable isotopes and dietary shifts)
- Development of filter paper sampling technique for contaminant analysis
- Contaminants monitoring (development of new novel techniques for detecting legacy contaminants in serum)
- Temporal study of disease prevalence in the Western Hudson Bay polar bear population
- Assessing body condition using multiple metrics (BIA, mass, lipid content etc.)

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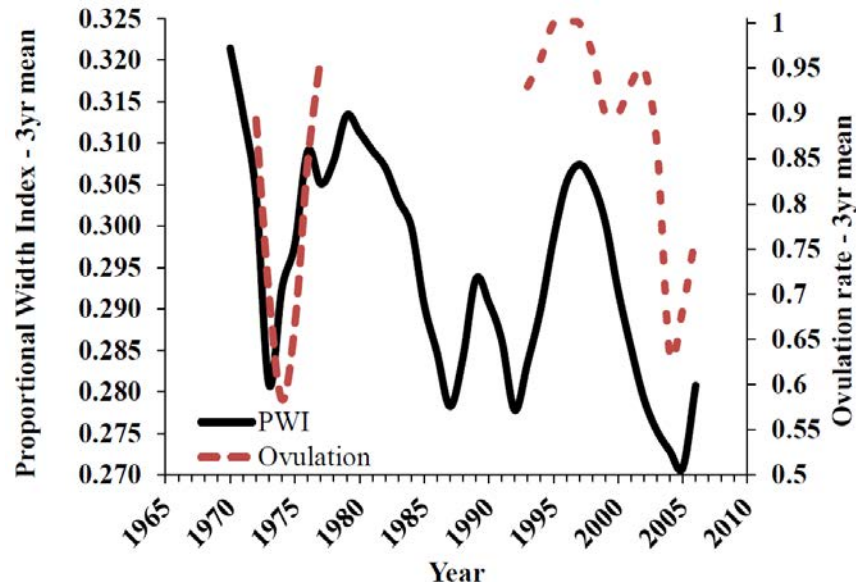


More time on land: foraging ecology in terrestrial habitats

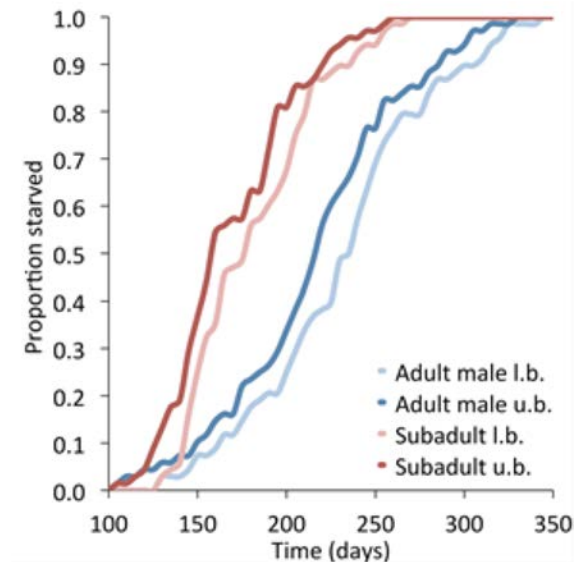
- Using drone technology to remotely observe trophic interactions between polar bears, eiders and gulls.



Understanding prey dynamics, ecosystem function and energetics



- Cycling and productivity in ringed seal populations and its importance for polar bear health and demography (Nguyen et al. 2017)



- Mass loss rates and estimated time to starvation in captive polar bears (Pilfold et al. 2016)



Ongoing Research.....



- **Population genetics:** University of Alberta, Nunavut, Northwest Territories, Ontario, Newfoundland and Labrador, Manitoba, ECCC
- **Diet & body condition:** York University, University of Alberta, Nunavut, Northwest Territories, Ontario, ECCC
- **Climate & sea ice:** University of Alberta, York University, Carleton University, ECCC
- **Polar bear health:** University of Saskatchewan, University of Alberta, Ontario, University of Western Australia, Northwest Territories, Nunavut, ECCC
- **Population demography & assessment:** University of Alberta, Northwest Territories, Nunavut, Yukon, USGS, ECCC
- **Movement & habitat use:** University of Alberta, Northwest Territories, Nunavut, Ontario, ECCC
- **Ringed seal ecology:** Department of Fisheries and Oceans, University of Alberta, York University, ECCC

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Summary



- Effective conservation and management of polar bears requires collaborative research and integration of all available knowledge
- Canada has long history of conducting applied polar bear research (1961- present)
 - focused on understanding population ecology, health and genetics in key subpopulations
 - conducted and supported by governments, universities and aboriginal organisations
- Canadian polar bear research is closely linked to management needs
 - population modelling, population monitoring, harvest management decisions and assessing emerging threats



Questions?



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