

**Executive Summary**  
**51<sup>st</sup> Meeting of the Polar Bear Technical Committee**  
**3-6 February 2020**  
**Peterborough, Ontario**

The 51<sup>st</sup> meeting of the Polar Bear Technical Committee (PBTC) was hosted by the Government of Ontario, 3-6 February 2020 in Peterborough. The meeting was attended by 16 of 18 Committee Members (Parks Canada Agency and Eeyou Marine Region Wildlife Board were unable to attend) as well as 21 permanent participants, invited specialists, observers, and support staff.

The meeting of the PBTC was preceded by a one day Population and Harvest Modeling Workshop, led by Dr. Eric Regehr, University of Washington. Four themed presentations were given:

- Polar bear management past and present, including challenges and limitations of common scientific methods to estimate abundance
- Overview of population modeling, including new analytical techniques, advantages, challenges, and limitations
- Integrated population modeling, with a focus on recent use in the Chukchi Sea
- Modeling harvest risk assessment

The workshop was designed to be interactive where questions could be asked throughout and within each theme there being a dedicated question/answer/discussion period following each presentation. At the end of the day, there was a general summary discussion on modeling approaches to subpopulation status and harvest risk, with an emphasis on data needs, incorporation of traditional knowledge, and modeling challenges and limitations.

Both an 'open' and 'in-camera' session comprise the formal meeting of the PBTC. The 'open' session occurs first and provides a forum for members, permanent participants, invited specialists, observers, and support staff to participate. During this session, updates were given on research and management initiatives since the last face-to-face meeting, highlights included:

- Completion of reports on abundance estimates for both Gulf of Boothia and M'Clintock Channel anticipated this spring; results will then be presented to affected communities and, after that, released; PBTC would review and consider new information at 2021 meeting
- Following the findings of a recent study in Alaska that documented a considerable amount of macro-plastics in bear stomachs, an initiative is underway to ask harvesters in the Inuvialuit Settlement Region to open the stomach and take pictures to determine how much of an issue this may be in the western Canadian Arctic
- First year of planned three to four year genetic mark-recapture study to estimate abundance of the Northern Beaufort Sea subpopulation and Southern Beaufort Sea subpopulation began in Spring 2019
- Second year completed of three year collaborative project between Government of Ontario, York University, and Environment and Climate Change Canada to collect additional data on movement and denning patterns of bears at the interface of the Southern Hudson and Western Hudson Bay subpopulations to 1) continue to assess movement phenology of bears in Hudson Bay; 2) assess interchange and overlap between the 2 subpopulations; and, 3) quantify denning habitat

- Newfoundland and Labrador, Quebec, and Nunavut, along with the Torngat Secretariat Nunatsiavut Government, and Makivik are partners in the Davis Strait 2017-2018 survey analysis aimed at the production of a standalone abundance estimate for the Davis Strait subpopulation. Additional IPM analyses are also being conducted and lead by NU and University affiliates with input from the partners.
- US Fish and Wildlife Service had been active in the Chukchi Sea since 2008. However, declining or no sea ice has prevented work (2017, shortened field season; 2018 and 2019, no field seasons); discussions with Alaska Native and Russian Federation partners as to how to move forward to best continue monitoring status and trend of CS subpopulation given change in sea ice conditions
- US Geological Survey biopsied bears on Alaskan side of SB as part of joint study; although encounter rate high, sampling was low due to poor ice conditions
- Much of work of North Slope Borough (Alaska) is facilitated by good relations with Native hunters that enables collection of harvest samples and IK shared by the hunters; collaborative study with University of Alaska Fairbanks using stable isotopes in bone collagen of harvested and historical collections to determine where a bear spends “most” of its time, results suggest difference between SB and CS bears and that boundary between subpopulations, based on isotope work, falls around the Icy Cape area and aligns with both research and IK conclusions

Four invited specialists gave presentations on research of interest to the Technical Committee:

- Rute Clemente-Carvalho (BearWatch) – BearWatch Project seeks to partner with northern communities to develop new ways of monitoring polar bears using scat. Three overarching goals of the project – 1) establish baseline genetic population, contaminant and diet data of polar bears, and assess biological responses to climate change and human-caused environmental impacts; 2) develop a new toolkit that will allow ongoing monitoring of polar bear populations including insights on dispersal and movement, population sizes, body burdens of key contaminants like methyl mercury and micro-plastics, and spatial and temporal shifts in diet; and, 3) contribute to existing or new community-based monitoring that could provide ongoing inputs to bear management, and direct economic and social benefits for Inuit communities.

Reference database of genetic structure developed using tissue archives in Nunavut and Northwest Territories from community polar bear harvests from 13 subpopulations, 1998 to 2016. Double-digest Restriction Associated DNA Seq (ddRADSeq) used to map the genetic diversity across Canada. The assignment analysis using 13,488 markers across the polar bear genome showed 3 distinct genetic clusters (Hudson Bay Complex, Arctic Archipelago, Arctic Basin). Since ddRADSeq requires high quality and concentration of DNA, old and degraded tissue samples and scat do not work.

- Eric Regehr (University of Washington) – Provided an overview of a harvest risk assessment for the Southern Hudson Bay subpopulation that was completed by the SH Technical Working Group and for which Eric was an expert consultant. The objective was to develop a demographic model to explore population dynamic outcomes of potential harvest strategies.

From 1980s to 2016 the subpopulation supported a harvest of close to 7%. Based on this, three scenarios of future conditions were modelled (1) Optimistic, where future conditions will be similar to trend since 1985 baseline; (2) Middle, where future conditions will be similar to trend since 2005 baseline; and, (3) Pessimistic, where future conditions will be similar to trend since

2011 baseline (one where decline largely driven by density independent limitations and another where decline largely driven by density dependent limitations).

Assessment also included three management objectives (1) maintain a maximum net productivity level of harvest over time; (2) maintain at current abundance (0.90N); and, (3) maintain above a bottom threshold below which viability would be greatly challenged. Under all three scenarios of future conditions, there was a sustainable harvest at reasonable risk tolerance (80% chance of meeting management objectives) – Optimistic, 21 females per year under MNPL (matches with past which has averaged 19 bears a year); Middle, 10 females per year under MNPL; Pessimistic (density independent), 4 females per year, substantial risk of accelerating population decline; Pessimistic (density dependent), outcomes insensitive to harvest because rapid decline no matter what.

- Greg Thiemann (York University) – Research on polar bear foraging and nutritional ecology using fatty acid signature analysis and other field/laboratory methods to examine the ecological drivers and consequences of prey selection by polar bears. In collaboration with GNWT and IGC, examining long term dietary patterns in NB and SB and trying to characterize polar bear diets in VM. In the Beaufort Sea, there is significant interannual variability in polar bear diets, but little evidence of long-term directional change. Polar bear body condition in the Beaufort Sea appears to be linked to ringed seal availability.

Collaborative research with Government of Nunavut has indicated spatial and temporal variability in polar bear foraging across 10 Nunavut subpopulations. Work with Environment and Climate Change Canada in WH has shown long term trends in diet and declining body condition, based on adipose tissue lipid content. Finally, work in SH, with Government of Ontario is using satellite telemetry to examine terrestrial and sea ice habitat use, denning phenology, diet composition, and foraging behavior.

Adipose tissue samples collected by Indigenous subsistence harvesters have allowed investigation into polar bear diet composition and body condition and provided important insights into the structure and functioning of Arctic marine ecosystems. For instance, polar bears in Foxe Basin seem to be increasingly scavenging on the remains of bowhead whales depredated by killer whales. Samples from harvested bears in Lancaster Sound, GB, and DS indicate that bears reach their lowest body condition in the spring, followed by fat accumulation past sea ice break-up date and subsequent peak body condition in autumn. Fatty acid data derived from harvest-based sampling and remote biopsy darting provide comparable diet estimates.

- Kylee Dunham (University of Alberta/Nunavut Wildlife Cooperative Research Unit and together with DS management authorities) – Research estimating population parameters and total allowable harvest for Davis Strait polar bears using integrated modeling approach. A series of multistate survival models to estimate the probability of survival, recapture, and recovery (from harvest data) have been constructed. Of the models assessed to date, the best fit model includes 2 age classes to describe differences in breeding state probability and accounts for temporal variation in the form of autoregressive random effects for modeling survival, detection, and recovery probabilities. Survival estimates are highly variable and low relative to previous estimates for the Davis Strait subpopulation. Further investigation is required to make biological inference based on these results.

As part of the annual meeting, participants reviewed technical issues related to polar bear research. Two ongoing issues were discussed:

- Use of Collars – Following on from discussions at last year’s meeting, an assessment of the performance of the newer CR-5a release mechanism was undertaken. Of 18 collars with CR-5a mechanisms of known release fate, 100% released as programmed; by comparison, of 24 collars with CR-2a mechanisms of known release fate, only 41.6% (10) released as programmed. While the CR-5a release mechanism looks promising, only 18 so far to derive inference.
- Biopsy Darts – After the last meeting, information exchanged among those using biopsy darts to assess the issue of the cutter head of the dart not resulting in a sample despite the dart striking the bear. Recent field work in SB/NB reinforced this issue. Government of NWT in discussion with the manufacturer (Pneu-Dart), which is doing an analysis. Pneu-Dart suggests that flagging added to dart acts as an impediment to flight performance. However, manufacturer did not address some issues identified with good hits not grabbing a sample (e.g., beveling in machined versus hand sharpened darts). Once discussions with manufacturer complete, biopsy users on PBTC will work together to develop some best practices.

Presentations were given by two Nunavut Regional Wildlife Organizations in attendance – Kivalliq Wildlife Board and Qikiqtaaluk Wildlife Board.

- The KWB feels that the management restrictions put in place have unnecessarily managed the WH population at an unsustainably high level and that the more recent trend of bears coming in to the community are potentially related to this. It is not uncommon for the GN to report 300 bear incidents throughout the fall migration period. This reality combined with the restricted harvest has led to a very strong distrust in the current management system, and the conservation of bears has become essentially a game of trying to maintain numbers without any considerations for what that number should be. This explains why there is an urgency to reduce conflicts and revisit the management objectives of the WH population.
- The QWB noted that in the past, Regional Wildlife Organizations in Nunavut have depended upon NTI for capacity. While some are still building capacity, the QWB feels that it has the capacity to take on a larger role. QWB strongly supports recommendations to involve all stakeholders in study development and risk assessment from the beginning. QWB view is that it should be involved from the start in all such processes. QWB has made formal request to PBAC to join the PBTC and is of the opinion that QWB should be viewed on par with Inuvialuit Game Council, which is a PBTC member.