Executive Summary
53rd Meeting of the Polar Bear Technical Committee
25-28 January 2022
Virtual Meeting

The 53rd meeting of the Polar Bear Technical Committee (PBTC) was held 25-28 January 2022 in a virtual format due to ongoing travel and health restrictions associated with the COVID-19 pandemic. The meeting used an online conferencing platform and a modified agenda that considered both reasonable lengths of time for participants to attend virtually and the time zones over which the participants were spread (5½ hours). The meeting was attended by all 19 members, 4 permanent participants, 11 Invited Specialists, 9 alternates and/or support staff, and 2 Secretariat staff.

Both 'open' and 'closed' sessions comprised the formal meeting of the PBTC. The 'open' sessions (24th and 25th January) provided a forum for members, permanent participants, invited specialists, observers, and support staff to participate and exchange information, whereas the 'closed' sessions (26th and 27th January) allowed the members to address specific Committee business.

Days One & Two – Open Session

Following approval of the meeting agenda, the Co-Chairs provided a summary of discussions/activities within the PBAC that are of direct relevance to the PBTC. The 2021 status table of the PBTC was adopted as presented and is available on the PBAC website. The 2020 status table has not yet been adopted. The PBAC is still working on management objectives for each subpopulation that the PBTC would then incorporate into the status table. The PBAC is still working on issues related to membership on the PBTC.

The PBTC approved final minutes from both the February 2021 virtual meeting and the November 2021 teleconference. Most of the previous action items have been completed; those still outstanding will be discussed in the 'closed' business session.

The membership reviewed the three internal, 'living' datasets (harvest, human/bear conflict, research) maintained by the PBTC. Québec noted that harvest reporting rates appear to be linked to fur prices – higher reporting when prices are high and hunters want to sell hides. Decreasing harvest trend in Northern Beaufort Sea related to both sea-ice conditions and less hunter interest due to low hide prices. There was a brief discussion on the research dataset, which summarized the types and intensity of research on polar bears undertaken in the previous year. In 2021, there were multiple research efforts (aerial surveys, physical capture, genetic biopsy) in both Southern and Western Hudson Bay. The number of bears reported for each type of research activity in the research dataset likely includes an unknown number of individuals that were observed and/or handled on multiple occasions.

Similar to the 2021 virtual meeting, the PBTC streamlined the meeting to allow for shorter days. To accommodate shorter days, many of the typical presentations from each jurisdiction were eliminated, and the reports were posted on a SharePoint site in advance. Thus, presentations were limited to the most time-efficient or time-sensitive ones with an open period to ask questions either on the presentations or the written reports.

Government of Nunavut provided a summary of its recently released final report on the assessment of the Davis Strait subpopulation. Fieldwork was undertaken in 2017 and 2018 using genetic mark-recapture (1139 biopsies collected). Analysis used these data, as well as data from previous research and from harvest recoveries. The analysis estimated population size for both 2005-2007 (the last estimate of Davis Strait by Peacock et al.) and 2017-2018. The estimate of abundance for 2005-2007 was 2,250,

which is comparable and not statistically different to the 2,158 determined by Peacock et al. The estimate for 2017-2018 was 2,015. Survival rates were < 0.9 for bears of all age and sex classes. Mean population growth was 0.989. The probability that the 2017-2018 estimate was smaller than the 2005-2007 estimate was 0.896, although neither population stability or increase could be ruled out. It was noted that vital rates can be highly influenced by duration of data collection and that analytical models have a hard time estimating interannual rates with gaps between years of study. The results suggest that there was limited movement in and out of Davis Strait (immigration/emigration) during the period of study, but it was not possible to estimate. In future, movement data (e.g., collars) would be important to have.

Government of the NWT provided an overview of population demographic work done in Viscount Melville Sound in 2012-2014. Fieldwork used physical mark-recapture and the deployment of satellite collars (25 in Viscount Melville Sound and 15 in neighbouring Northern Beaufort Sea). The area has experienced a significant change in sea-ice conditions, with spring thaw occurring 3.1 days/decade earlier and fall freeze-up occurring 6.2 days/decade later. There were low numbers of captures and an even lower number of recaptures during the study. Using a Cormack-Jolly-Seber model, abundance was similar to that obtained by Taylor in the 1990s. The analysis resulted in large confidence intervals, unrealistically low survival rates, and no evidence of population growth. Given the low captures and recapture rates, an additional year of fieldwork would not have improved the results. Although telemetry data was not used in the analysis, it showed that some bears were outside of the study area when the work was undertaken and thus not available for recapture. Eric Regehr (University of Washington) was enlisted to use these additional data to improve the abundance estimate.

Eric Regehr noted that there was almost certainly negative bias in the abundance estimate because polar bear subpopulations cannot survive with survival rates of 60-70%. He cautioned that a big problem in spring studies to estimate abundance is that bears are moving around on sea ice, especially in and out of study area. Issues of temporary immigration/emigration can introduce negative bias in both abundance (-20%) and survival (-5%), and that movement data are needed to solve/inform analysis. He used multi-state capture-recapture analysis that allowed the inclusion of additional data available from telemetry movement and harvest. Mean abundance in 2012-2014 = 252 (95% CRI 156-590) for bears within Viscount Melville Sound boundary but 351 (95% CRI 221-859) for the superpopulation (i.e., bears that use Viscount Melville Sound in spring but are not necessarily residents). He noted that reproduction in 2012-2014 appeared sufficient to support a stable subpopulation and that it was only possible to improve the analysis because of the inclusion of telemetry and harvest data.

Governments of Ontario, Québec and Nunavut provided very brief updates on aerial surveys flown August/September 2021 in Southern Hudson Bay and Western Hudson Bay, respectively. Analysis is underway for both. Results are expected later in 2022 and hopefully, reports will be available for review and discussion at the 2023 meeting of PBTC.

Steve Braund (Stephen R. Braund and Associates, Anchorage) provided an overview of work he is doing with respect to incorporating Indigenous Knowledge into integrated population models that could be applicable/relevant to the Southern and Northern Beaufort Sea subpopulations. He stressed that his work is in developing the methods and that he is not generating an estimate. The strength of integrated population models is that they can estimate abundance by incorporating many different types of information, including Indigenous Knowledge and, thus, knowledge that is unavailable through western science. He stressed that his framework uses Indigenous Knowledge for a narrow and focused purpose and that it is not trying to capture the entire breadth of that knowledge. The success of incorporating Indigenous Knowledge into integrated population models does require meaningful collaboration among

scientists, anthropologists, resources users, and Indigenous Knowledge holders because it is specific to each situation and not a cookie-cutter, one-size-fits-all approach.

Government of the NWT provided a preliminary summary of ongoing genetic mark-recapture work in the Southern and Northern Beaufort Seas. Originally planned for three years of fieldwork (2019-2021), it was necessary to add a fourth year (2022) because of COVID restrictions. Full coverage of the study area occurred in 2019 and 2021, but very limited coverage in 2020 (US in field for two weeks before shutdown, no fieldwork in Canada). In 2021, over 26,000 km were flown in Canada, resulting in 199 observations of bears and the collection of 149 biopsies. US researchers flew over 6,000 km, observed 93 bears, and collected 68 biopsies. There have been some delays with sample analysis due to issues with CITES permits.

Government of Nunavut reported that the population inventory work in Lancaster Sound was cancelled following the fatality in Spring 2021 and that no work has yet been planned for Norwegian Bay. Discussions are ongoing with respect to what the next steps are and how the Government of Nunavut will proceed.

The IK Working Group provided an update on activities over the past year. The Group was less active due to capacity issues. The white paper "*Indigenous Knowledge at the Polar Bear Technical Committee: Background Paper*" has been finalized after incorporating comments from the PBTC membership. The PBTC supported the sharing of the white paper with the PBAC. There was discussion about how to improve inclusion of IK in the status table, and it was agreed that it would be very useful for some members of the IK Working Group to be part of the Status Table Working Group, the latter of which noted that it had not attempted to address IK because it did not have the expertise.

Stephen Lougheed (Queen's University) provided an update on the BearWatch initiative. BearWatch began five years ago and with funding from Genome Canada. The broad objectives were to establish baseline population genetic data, develop monitoring tools, and contribute to community-based monitoring programs. From over 6,600 tissue and scat samples from 13 of 19 subpopulations, they have mapped and created a database of polar bear genetic diversity. Similar to other research, they identified four distinct genetic groupings: Polar Basin, Arctic Archipelago, Hudson Complex, and M'Clintock Channel. MSc student working on landscape genomics to predict past, present, and future genetic patterns of bears. A PhD student is working on immunogenetics by surveying 6 'immune' genes. The group has been involved in pathogen surveys (found seven positives for *Toxoplasma gondii* and two positives for *Trichinella* spp.). They are developing toolkits for real-time biomonitoring. Using genotyping-in-thousands sequencing (GTSeq), they have been able to distinguish individuals, assess relatedness, and determine sex from scat. GTSeq can be done on a massive scale and is cost-effective. GTSeq may be effective in extraction of DNA from polar bear tracks in snow, which are much more common than polar bear scats. This would enable greater participation by community members and engagement of youth. BearWatch has also been involved in using genetics to look at diet, contaminants, and microplastics.

PBTC had a short discussion on human-polar bear co-existence, noting that several people are working on human/polar bear conflicts but that there is no real standardization. Significant increases in conflict are occurring. It was noted that the Range States has had a Conflict Working Group for a few years and has been coordinating what is done in various places. The objective is to be a repository of information to advise those who ask.

Government of Nunavut provided background and history on its harvest management system. The first MOUs were signed in 1996, implemented a 2:1 male-biased harvest, no carryover of unused tags, and instituted a credit system where credits were able to accumulate but only used to cover overharvest in

order to minimize penalties (quota reductions the next year). The MOUs were revamped in 2004 but generally followed the 1996 ones, with the exception that credits were now allowed to be used to increase harvest. As a consequence of communities wanting a simpler system, less restrictions, less penalties and more opportunity to accumulate credits, the Government of Nunavut proposed a new management system in 2019 that allowed for the harvest to be any ratio so long as no more than 50% of the harvest was female (i.e., up to 1:1 harvest system). Female tags can be used on male bears so that, in theory, 100% of harvest could be males. The annual recommended quota = base allocation – overharvest penalties + credits turned into tags. The credit system was maintained but 1 bear = 1 credit. Credits are zeroed upon a new TAH decision and not when a new abundance estimate is determined. This new management system was implemented in 2019 on an interim basis and is currently under review by the NWMB. Although in the 2019/2020 harvest season the harvest sex ratio remained near 2:1, the 2020/21 harvest season shows first evidence of the up to 1:1 system affecting the sex ratio of the harvest through the increased harvest of females.

A quick update was given on initiatives undertaken by the Range States relative to the Circumpolar Action Plan.