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.

Days Three & Four – Closed Session

The closed session began with a short discussion of voting for the next Co-Chairs. Four members had been nominated, three government and one non-government – Mark Basterfield (non-government, current Co-Chair who agreed to stay on), and Guillaume Szor (Québec), Joe Northrup (Ontario), and Jodie Pongracz (Yukon). Guillaume declined the nomination. The members agreed to vote via email.

The members discussed Nunavut's new harvest system with respect to both the up to 1:1 harvest and the use of credits. Following the previous day's background presentation, a number of questions related to clarification/explanation were asked. Concerns expressed that the Total Allowable Harvests were not reduced when moving to the up to 1:1 harvest and thus female harvest was effectively increased from 1.5% to 2.25% of total population size and that no modelling was done to assess the impacts. While PBTC members were told that the harvest ratio remained similar to 2:1 during the first year of the interim system, in 2020/2021 there was evidence that the sex ratio of the harvest was being affected with a greater proportion of females being harvested.

While the original intention and implementation of the credit system were understood, it was noted that in some cases there has been a long time between population inventories and in others no formal evaluation of a TAH despite new abundance estimates. Thus, credits can accumulate for many years, which raises other issues, in particular that it should not be assumed that large numbers of credits can be used without causing a risk to sustainable harvest. Southern Hudson Bay was discussed because there has been no formal change to Total Allowable Harvest following the 2011/12 and 2016 aerial surveys and the completion of a harvest risk assessment that were based in part on these new estimates. Thus, credits that accumulated before the aerial surveys were conducted are still available, some of which were used to increase Nunavut's harvest in SH in 2020/21. It was noted that the issue of credit accumulation was not specific to Southern Hudson Bay and that large numbers of credits exist and are available in other subpopulations. The PBTC agreed that this was a serious concern that needs to be brought to the attention of the PBAC. A subcommittee was formed to draft a letter, raising the PBTC's concerns to the PBAC.

The Status Table Working Group presented its suggestions for improvements to the status table, based on discussions at the 2021 virtual meeting of the PBTC. The status table is the primary means by which the PBTC provides a technical assessment to the PBAC on the status of polar bears in Canada. Although

much of a restructured status table would remain unchanged from previous years, some notable changes were proposed for consideration:

> Population Estimate – For those subpopulations where the population estimate was more than 20 years old, replace the estimate with "Unknown" to reflect that estimates become dated and we are less confident in continuing to use that number. The Working Group proposed inclusion of an additional column "Estimate Used for Management" (or equivalent) to be able to provide transparency on what number a subpopulation is being managed. Viscount Melville Sound is an example where the population estimate is 30 years old and both the Northern Beaufort Sea and Southern Hudson Bay are being managed on different estimates than the population estimate in the status table.
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> Improving How Indigenous Knowledge is Included – The Working Group did not directly address this because the Group's members did not have the necessary expertise. During the earlier update by the IK Working Group, there was agreement that some members of the IK Working Group should work with or become Status Table Working Group members to begin to address this.
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> Management Objectives – The Working Group included this as a new column in the table and noted that this information would be provided to the PBTC by the PBAC. Thus, it was not the PBTC's function to determine what the management objectives for each subpopulation were.
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> Harvest Levels and Nunavut Credits – The Working Group noted that the potential removals columns in the status table should reflect the number of bears that could be harvested and not just base allocations. Thus, the Working Group advised that any credits that are turned into tags in Nunavut should be added to the Nunavut totals.
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> Description of Harvest Management Systems – Following on from discussions at last year's meeting, the Working Group supported the suggestion that a description of each of the various harvest systems in use should be placed in a harvest system section within the narrative. Thus, a detailed description could be provided rather than a few words included as a footnote.

As was the case last year, there was a diversity of opinions on the proposed changes and a good discussion of the pros and cons of adopting such changes. There was agreement that all members would review the Status Table Working Group's document outlining proposed changes and provide feedback to the Working Group. Some members of the IK Working Group to work with the Status Table Working Group on how to improve inclusion of IK in the status table.

Prior to discussing the completion of the 2022 Status Table, the PBTC reviewed whether there were any new subpopulation estimates or new information to include and whether such information would alter the current determinations. There was discussion with respect to the Davis Strait report. Some members were of the opinion that we should include the new estimate in this year's table. However, a concern was raised that the members had only just received the report on Friday (4 days before the meeting) and that subsequent email suggested there might be some changes. It was noted that the Committee's Terms of Reference state that material requiring review and a decision need to be circulated to the members 30 days prior to the meeting. Some members indicated that they had not had sufficient time to review the report and thought we should not be including the new Davis Strait estimate in the status table. It was noted that the report is publically available and that we should include it. The members agreed to not include in discussions at this meeting but that the report authors would circulate the final report by 21 March and that the PBTC would hold a meeting on 21 April to discuss, thus, members

would have 30 days in which to review. The status table would then be finalized prior to the meeting of the PBAC in May.

Members agreed to review and update the subpopulation narratives that are specific to them.

The Committee's Terms of Reference were reviewed and discussed, with particular attention to the election of Co-Chairs. There was consensus that the current model of having two Co-Chairs, with one representing provincial/territorial/federal governments and the other representing management boards/council/organizations, was working well, and members wanted to continue with the model. It was agreed that Co-Chairs should serve two-year terms and that the government and non-government Co-Chairs should be elected in alternate years to ensure continuity and avoid having two new Co-Chairs assuming these duties at the same time.

The election results were announced, and the Co-Chairs are Mark Basterfield (continuing) and Jodie Pongracz (new).

There was a discussion on the location of the next two meetings, with there being a desire to know and be able to plan a few years out. Prior to the pandemic, the face-to-face meetings in 2021 and 2022 were to be in Québec and Nunavut, respectively. Québec is happy to host the meeting in 2023 and Nunavut in 2024. It was recognized that these plans might change in the event we are unable to meet in person in 2023.