Harvest Assessment for the Baffin Bay and Kane Basin Polar Bear Subpopulations: Summary of Findings

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The Baffin Bay (BB) and Kane Basin (KB) polar bear subpopulations are jointly managed by Canada (Nunavut) and Greenland. The *Canada-Greenland Joint Commission on Polar Bear* (JC) facilitates coordination between the two jurisdictions. The JC is advised by a *Scientific Working Group* (SWG) consisting of members from both countries. From 2011-2014, the SWG performed new scientific studies of the BB and KB subpopulations. The purpose of the studies was to understand the effects of changing sea-ice conditions and to determine Total Allowable Harvest (TAH; the total number of bears that can be removed by humans each year in a sustainable manner). The new studies were needed because information from scientific studies in the 1990s was outdated. Complete results from the 2011-2014 scientific studies are presented in a separate report.

The JC asked the SWG to use information from the 2011-2014 studies to provide advice on harvest management. Specifically, the JC wanted to know the levels of TAH that would meet three management goals: (1) maintain a stable subpopulation size; (2) maintain a subpopulation size that is in balance with the number of bears the environment can support; and for BB only, (3) reduce subpopulation size by approximately 30% in 10-15 years. The JC recognized that, because scientific studies include uncertainty, it would not be possible for the SWG to provide exact answers. Therefore, the JC requested that, for each subpopulation, the SWG calculate the level of TAH that has a high (90%) chance of meeting each management goal (which means a low chance of over-harvesting the subpopulation), as well as the level of TAH that has a medium (70%) chance of meeting each management goals (which means a medium chance of over-harvesting the subpopulation).

The SWG addressed these questions using information from the 2011-2014 scientific studies in conjunction with a population model for polar bears. The population model included the effects

of sea-ice loss on polar bear numbers. In their analysis, the SWG considered many factors that affect TAH, including the sex and age of harvested bears, and the future schedule of scientific and Traditional Ecological Knowledge (TEK) studies. The future schedule of studies is important because, if new studies are performed frequently, there is a lower chance that a subpopulation will be over-harvested because the studies will provide new information that managers can use to adjust TAH.

Baffin Bay

The 2011-2013 scientific study estimated that there are about 2800 bears (95% CI = 2,059–3,593) in the BB subpopulation. The sea ice in Baffin Bay has decreased over the past several decades. This has reduced the area that the BB subpopulation uses, and may be starting to cause bears to be thinner and have fewer cubs. The environment in Baffin Bay will likely support fewer bears in the future as sea-ice loss continues. Therefore, sea-ice loss was included as a negative effect on polar bear numbers in the population model.

The SWG concluded that it is not possible to meet goal (1) of maintaining a stable size for the BB subpopulation in the future, because sea-ice loss will likely reduce the number of bears regardless of harvest and simulations suggested that meeting goal (3) of a 30% reduction is not likely feasible at the stated level of risk tolerance. The SWG concluded that there is a high chance of meeting goal (2) with a present-day TAH of up to 120 bears per year (a harvest rate of 4.3% of the population), and a medium chance of meeting goal (2) with a present-day TAH of up to 160 bears per year (a harvest rate of 5.7% of the population). These results depend on several conditions. First, it was assumed that the sex of harvested bears will remain similar to what it has been in recent decades. When the Nunavut and Greenland harvests are combined, the average harvest between 1998 and 2013 has been 1.25 males for every 1 female. If the sex of harvested bears changes, then TAH may change. Second, these results require that new scientific and TEK studies will be performed frequently in the future, so that new information is available to recalculate TAH every 15 years. If new scientific information is not available to recalculate TAH in 15 years, then the levels of TAH presented above would not meet the management goals stated by the JC and could have a higher chance of causing serious over-harvest over the next several decades. Third, these results assume that the low estimates of survival for the period 2011-2013 were a false result. In reality, these low estimates could be partially true due to the negative effects of sea-ice loss on BB polar bears.

The SWG identified several concerns for the BB subpopulation. First, there are currently fewer males than females in the subpopulation, and male survival is lower than female survival. If males continue to decline it could lead to fewer cubs being born, and a decline in the subpopulation size. Understanding what is happening to males is an important question for future studies. Second, managers should expect that TAH for the BB subpopulation will decline over the next several decades, because sea-ice loss will likely reduce the number of bears that the Baffin Bay environment can support. Third, it is possible that the population model used by the SWG under-estimated the negative effects of sea-ice loss on BB polar bears. If this is the case, then the TAH levels presented above might lead to over-harvest. Although sea-ice loss will be harmful for most polar bears in the long term, different subpopulations are currently responding to sea-ice loss in different ways, and it is difficult to accurately predict the future effects of sea-ice loss. Because of these concerns, the SWG recommended that a precautionary approach to harvest management will help reduce the chances of over-harvest for the BB subpopulation.

Kane Basin

The 2012-2014 scientific study estimated that there are about 360 bears (95% CI = 221–493) in the KB subpopulation. Although the sea ice in Kane Basin has decreased over the past several decades, this does not appear to have had negative effects on KB polar bears. Indeed, lighter sea-ice conditions may be making Kane Basin more suitable for polar bears. Therefore, sea-ice loss was not included as a negative effect in the population model.

The SWG concluded that it is not possible to identify levels of TAH that have a high chance of meeting goals (1) and (2). This is not because the KB subpopulation is doing poorly. Rather, it is because there was a lot of uncertainty in the information from scientific studies, due to the fact that the KB subpopulation is small and difficult to study. The SWG concluded that there is a medium chance of meeting goal (1) with a present-day TAH of up to 10 bears per year (a harvest rates of 2.8%). This conclusion was based both on the population model for KB polar bears, and on TEK suggesting that the KB subpopulation likely has increased since the last population assessment in the 1990s. Similar to the analysis for the BB subpopulation, these results depend on several conditions. First, it was assumed that the sex of harvested bears will remain similar to what it has been in recent decades. When the Nunavut and Greenland harvests are combined, the average harvest has been 0.94 males for every 1 female. Second,

these results require that new scientific and TEK studies will be performed frequently in the future, so that new information is available to recalculate TAH every 15 years. If new scientific information is not available to recalculate TAH in 15 years, then the levels of TAH presented above could have a higher chance of causing serious over-harvest over the next several decades.

In the near term, the SWG identified fewer concerns for the KB subpopulation than for the BB subpopulation. Nonetheless there are several important considerations. Similar to the BB subpopulation, there are currently fewer males than females in the KB subpopulation, and male survival is lower than female survival. Second, although sea-ice loss may have had positive effects on KB polar bears in recent decades, these effects are expected to become negative in the long term as sea-ice loss continues. Third, the KB subpopulation will continue to be difficult to study because it is small and remote of logistic platforms. The SWG recommended that the JC consider an alternative, more frequent monitoring plan for the KB subpopulation, such as regular aerial surveys combined with TEK, which could help managers detect potential over-harvest and other problems before they cause serious harm to the subpopulation.