

# WESTERN HUDSON BAY POLAR BEAR AERIAL SURVEY, 2011



## SUMMARY OF FINDINGS

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## INTRODUCTION

Scientific evidence, based largely on long-term tagging programs, suggests that the abundance of polar bears in the Western Hudson Bay (WH) subpopulation increased during the 1970's, remained stable for a period in the 1980's and subsequently declined. Between 1984 and 2004, the estimated abundance decreased by approximately 22% from 1200 to 935 bears. In association with this decline, reductions in survival, reproductive output and body condition have also been documented. These findings have been attributed to long-term changes climate in Hudson Bay and its effects on sea-ice conditions and seal populations.

There is general agreement between scientific findings and the traditional ecological knowledge (TEK) and local observations of Inuit in the WH region that polar bear abundance has increased since the 1970's. There is also agreement that polar bear distribution has changed, that more bears are being seen around communities, that sea-ice is breaking-up earlier and that climate change is negatively influencing seal populations. However, in contrast to the scientific evidence, Inuit perceptions of the WH sub-population do not support the notion that abundance has declined in recent decades. Reports of increased numbers of bears summering on land in the Kivalliq region and increasing problem bears around camps and communities have been attributed to factors such as increased population abundance, habituation of bears to human activities (e.g. eco-tourism), changes in behavior due to capturing and handling, and increasing use of garbage dumps in communities along the Hudson Bay coastline.

The disparity between science and TEK has generated significant debate over the management and conservation of WH polar bears. Interestingly, although harvesting is not considered the primary threat to the conservation of WH, the controversy has been focussed to a large extent on the management of harvesting. This has also lead to calls for research to be conducted that will support reassessment of the sub-population and resolution of the apparent disparity between scientific findings, TEK and local observations.

Responding to the need for new information on the status of WH, as well as concerns amongst Inuit about the accuracy and invasiveness of tagging studies conducted in Manitoba, an aerial survey of polar bears was undertaken in August 2011. The survey covered the full known range of the sub-population during the ice-free period including Nunavut. In addition to addressing population specific needs, the aerial survey formed part of a broader Government of Nunavut initiative to develop cost effective, less

invasive alternatives to physical capture and tagging as the means of monitoring polar bear populations.

## **OBJECTIVES**

The objectives of the survey were to:

- 1) Reliably estimate the abundance of polar bears in WH via aerial survey
- 2) Compare the precision of an aerial survey-derived abundance estimate with an updated physical mark-recapture-derived abundance estimate.
- 3) Evaluate potential biases in aerial survey and physical mark-recapture results.
- 4) Enhance public participation and provide training in aerial survey methods to support the development of community-based monitoring programs.
- 5) Evaluate the distribution of polar bears in WH during the 2011 ice-free season, particularly with respect to environmental variables.

## **MATERIALS AND METHODS**

The WH aerial survey was conducted in late summer, 2011. At this time, bears were largely confined to land, minimizing the area necessary to survey and therefore permitting a more efficient study. Additionally, the absence of ice and snow during late summer months means that polar bears are readily observable against a dark landscape, ideal conditions for an aerial survey.

To define the study area and in particular to determine how far inland the survey should be extended multiple sources of information were used including:

- Information on the distribution of bears from published papers.
- Data collected by the GN during a 2010 test survey in the Nunavut portion of WH;
- Local knowledge about polar bear distribution provided by Nunavut hunters during a workshop held in Churchill in July, 2010;
- Capture records from Environment polar bear tagging studies (2003-2010);
- Coastal and denning surveys conducted by Manitoba Conservation; and

- Information on the movements of collared polar bears, collected by Environment Canada and University of Alberta.

This information was used to divide the study area into 4 parts which differed in terms of the expected concentration of bears in each (Figure 1). To maximize the number of bears encountered while also ensuring adequate coverage of all regions, flight paths ('transects') were then laid out so that more surveying would occur in areas where the highest concentrations of bears were expected to occur (Figure 1). In addition to these inland transects, the survey included coastal survey flights. Coastal surveys were conducted at or slightly below the high-water line with one side of the aircraft dedicated to monitoring tidal flats and near shore waters (i.e. swimming bears). We surveyed along the coast as close to the time of high tide as possible to minimize tidal flat exposure and reduce the need to double-back to ensure that the coastal zone was comprehensively covered. We additionally sampled as many islands as possible across WH.

The Nunavut and Manitoba portions of the aerial survey were flown using a fixed wing (Turbo Beaver) and helicopter (Bell 206L), respectively. Each survey team consisted of 4 observers, including 6 members of the Arviat and Rankin Inlet Hunters and Trappers Organizations. Transects were flown at an above-ground level altitude of about 400 ft and groundspeed of roughly 150 km / hr. Polar bear sightings were collected using sight-resight distance sampling procedures that have been previously used in studies of polar bears and many other species world-wide. For each bear sighting we recorded location, time, and group size as well as estimated body condition, sex and age category. We also recorded activity when first observed (e.g. lying down, running), weather conditions and habitat characteristics; all factors that may have affected the ability of observers to spot bears. Data were analysed using established distance-sampling and sight-resight methods.

## **RESULTS AND DISCUSSION**

More than 100 combined hours of surveying were carried out from August 13 – 29. This included over 8000 km of flying on inland transects plus survey flights along the coast and offshore islands. In Manitoba, more than 95% of the coastline was covered. Approximately, 85% and 60% of offshore islands were surveyed in Manitoba and Nunavut respectively.

Key results were as follows:

- A total of 701 polar bear sightings were recorded, including 31 and 670 bears in Nunavut and Manitoba, respectively (Figure 2). These were seen in groups ranging from 1 to 21 individuals.
- In Nunavut, the distribution of bears was very similar to that recorded during studies conducted by the GN in 2007 and 2010. The density of bears in Nunavut was relatively low in comparison to other parts of WH. Most bears were concentrated along the coast and islands in particular the area south of Arviat.
- A majority of polar bears seen during the survey were in the Manitoba (and Ontario) part of WH. In this region, bear distribution in 2011 was similar to previous studies. Bears were concentrated along the coast in most places and significant numbers (especially family groups) were also found inland (up to 100 km) in the vicinity of Wapusk National Park. Some of the highest concentrations of bears (especially adult males) were seen along the Southeast coast of WH near the Manitoba-Ontario border.
- The number of bears seen along the coast in Manitoba (295) was very consistent with annual coastal surveys carried out by Manitoba Conservation which indicate that the number of bears seen along the coast of WH (in Manitoba) during the summer has steadily increased over the last 40 years.
- Relatively few cubs of the year (50) and yearlings (22) were observed in WH in comparison to the recent polar bear surveys in Foxe Basin in 2009 and 2010. Additionally, average litter sizes were the lowest recorded in recent years amongst the 3 Hudson Bay sub-populations suggesting that reproductive output in WH was poor in 2011.
- Body condition was variable across WH. Bears in the southeast part of WH appeared to be in the best condition. These bears are thought to come off the sea-ice later than other bears in WH which may account for the difference in condition.
- The aerial survey estimated the abundance of the WH sub-population at 1013 bears in 2011 (with a 95% confidence interval of 717-1430). This aerial survey-based estimate is not significantly different from the 2004 mark-recapture estimate of 934 bears which was based on mark-recapture (i.e. tagging) studies in Manitoba. A new (2011) mark-recapture estimate will be available later in 2012 for comparison with the aerial survey results. In the mean time, however, it should be noted that the 2004 mark-recapture results indicated that the WH sub-population was declining in number. Combining the results of those tagging studies with information on the number of bears harvested in WH from 2004 to 2011, it is predicted that WH should

have declined to approximately 650 bears by 2011. Whether the new mark-recapture estimate will be consistent with this prediction or similar to the aerial survey estimate is unknown. A comparison of aerial survey and mark-recapture results is planned for 2012 once new mark-recaptures are available.

- We examined several hypotheses to explain why abundance estimates derived from aerial survey and mark-recapture studies might differ from one another; if indeed they do.
- We found no evidence to suggest that bears had moved into WH from surrounding sub-populations in unusually high numbers in 2011.
- We found evidence suggestive of a long-term change in the distribution of bears within WH which could potentially affect the accuracy of mark-recapture studies resulting in underestimation of abundance.
- We suggest that aerial survey appears to be a viable alternative for monitoring the size of the WH sub-population.

Figure 1. Strata delineated and transects flown for the Western Hudson Bay polar bear aerial survey, August, 2011.

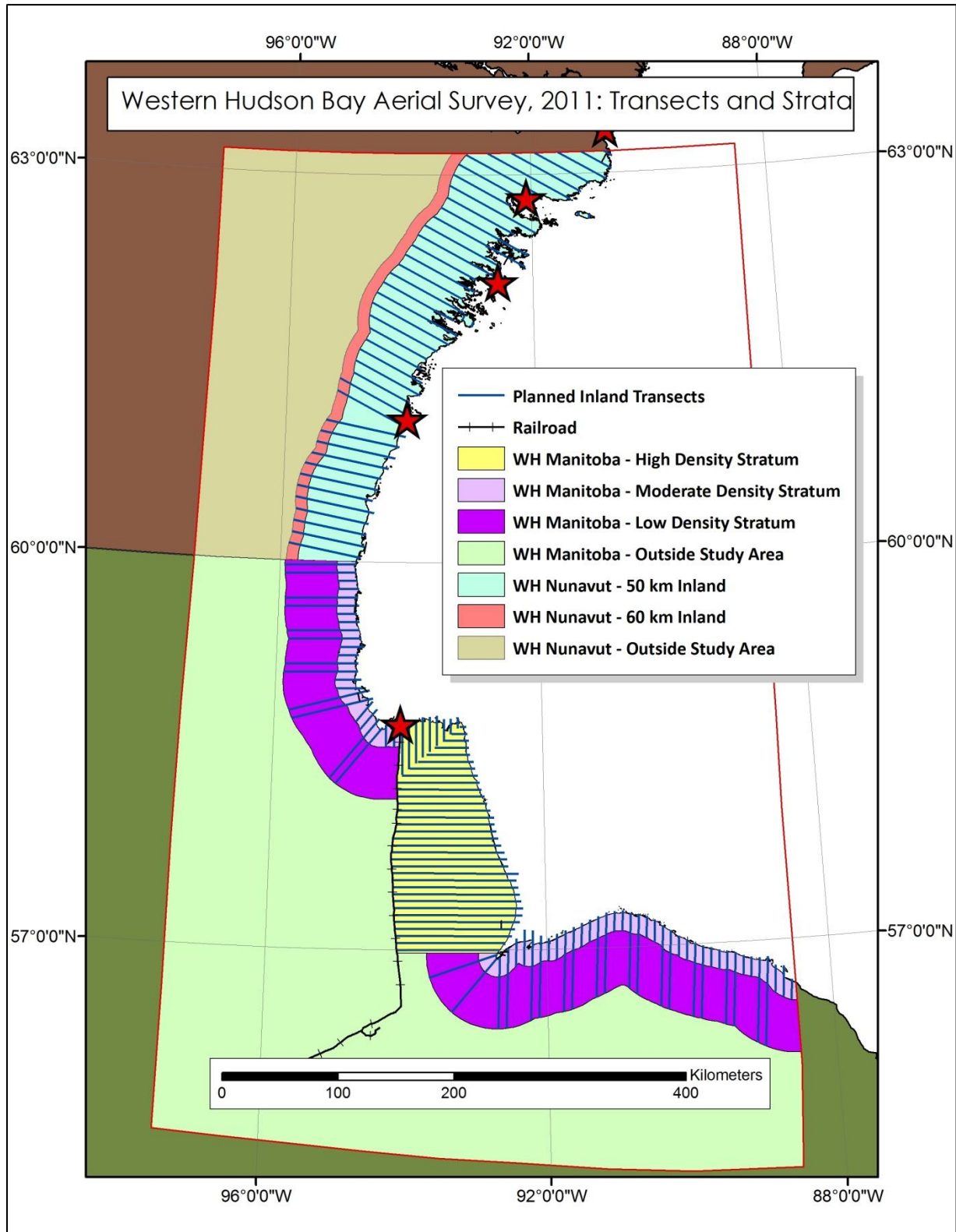


Figure 2. Polar bear sightings recorded during the Western Hudson Bay polar bear aerial survey, August, 2011.

