

Final Project Report

1. NWRT Project Number: NWRT0013

2. Project Title: Multi-species aerial survey of the Eastern High Arctic

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4. Summary

Aerial surveys of Atlantic walrus (*Odobenus rosmarus rosmarus*) and narwhals (*Monodon monoceros*) were conducted in the Eastern Canadian High Arctic in August 2022 using fixed wing aircraft (Twin Otter). Counts from these surveys will be used to estimate abundances of the three High Arctic walrus stocks (Baffin Bay, West Jones Sound, and Penny Strait-Lancaster Sound), and the Jones Sound and Smith Sound narwhal stocks. Surveys of both species, as well as other marine mammal species encountered opportunistically, were photographic only. The entire survey period was August 1 to 28, with narwhals surveyed during the first two weeks of that period and walrus the latter two, corresponding to timing of previous surveys for both species in the Eastern Canadian High Arctic. Surveys were flown along coastlines (walrus) and systematic transect lines over water (narwhal) using two Twin Otters concurrently (although only one aircraft was available from August 1-4 and August 22-28). Coastlines or partial coastlines of Ellesmere, Devon, Cornwallis, and Bathurst Islands were surveyed for walrus, resulting in two replicate surveys of both the West Jones Sound and Penny Strait-Lancaster Sound stocks, and three surveys of the Alexandra Fiord complex of the Baffin Bay stock. Fuel closures and other logistics limitations prevented completely surveying the east coast of Ellesmere Island, and Baffin Bay stock estimates will therefore be conservative. Only small portions of Jones and Smith Sounds could be surveyed for narwhals, such that no strata were sufficiently surveyed. Stationary time-lapse cameras were placed at several walrus haulout locations prior to the survey, and satellites were tasked to take images of 13 individual haulout sites, as well as one polygon covering Ellesmere Island fiords that had relatively high numbers of one or both species in previous surveys. These data were intended to characterize haulout variability and thus inform availability bias adjustment factors to account for walrus at sea during the survey.

5. Project Objectives

The main purpose of this survey was to provide new abundance estimates and associated advice on Total Allowable Harvest for the High Arctic walrus population and for the Jones Sound and Smith Sound narwhal stocks. The research objectives were:

1. Determine the abundance of the High Arctic walrus population
2. Update sustainable removal levels using total allowable harvest (TAH) calculations and population trajectory models for the High Arctic walrus population
3. Generate distribution maps for the High Arctic walrus population based on survey results (on track)
4. Determine the abundance of the Jones Sound and Smith Sound narwhal stocks: *we won't be able to produce a abundance estimate for the narwhal stocks because of heavy ice conditions and weather challenges during the survey.*
5. Update sustainable removal levels using total allowable harvest (TAH) calculations and population trajectory models for the Jones and Smith Sound narwhal stocks: *similarly, we won't be able to update TAH.*
6. Generate distribution maps for the narwhal stocks based on survey results: *similarly, we won't be able to produce maps of narwhal distribution.*
7. Depending on observations, determine abundance estimate for other whale species (bowhead whales, killer whales) and generate distribution maps: *we did not have enough sightings of other species to produce abundance estimates nor distribution maps.*

6. Materials and Methods

Surveys were scheduled to take place from August 1 to August 28, 2022, focusing on narwhals from August 1 to 12, and on walrus from August 13-28. Surveys for both species were conducted from DeHavilland Twin Otters (DH-6) fitted with two bubble windows, each placed at the most rear windows, and a ventral camera port to allow surface photographs to be taken. The walrus survey was flown largely along the coastlines to photograph walrus hauled out on land. Known terrestrial haulout sites were included, but so was intervening coastline to identify new haulout sites. The narwhal survey was flown along predetermined systematic transect lines that spanned four strata in Jones Sound and the western portion of Smith Sound at a ground speed of 200 km/hr (110 knots). Survey design was based on previous aerial surveys and Inuit Qaujimagatuqangit of walrus haulout locations and narwhal distribution.

Surveys for both species included two observers looking through bubble windows to note walrus and narwhal occurrence, including the presence of calves, behaviour, and direction of travel of the group. Ice concentration, sea state, fog, and glare were also recorded throughout the surveys, particularly when conditions changed noticeably. Both planes had a third member of the team controlling the cameras and computer equipment. Initial plans were also to use a FLIR infrared camera to assist with identifying walrus and narwhals in camera images (as well as other features like narwhal fluke prints). However, the FLIR cameras had many technical problems and they were abandoned after several attempts to use them.

Heavy ice conditions in most of narwhal survey areas made it impossible to complete the narwhal survey. However, survey conditions were suitable for the walrus survey.

We trained one Inuk beneficiary (B. Pijamini) in conducting photographic aerial survey of narwhals and walrus. This included taking marine mammal observations, setting up and operating the camera system. B. Pijamini also attended a training on the basic principles of distance sampling.

7. Preliminary results/discussion:

This was a very successful survey of the High Arctic walrus population, with both the West Jones Sound (WJS) and Penny Strait-Lancaster Sound (PS-LS) stocks covered twice, and the Alexandra Fiord complex of the Baffin Bay (BB) stock covered three times. However, much of the planned survey along the east Ellesmere coast could not be completed due to fuel closures in Grise Fiord making much of that area inaccessible; therefore, some of the potential range of the Baffin Bay stock was excluded from the survey.

The main goal had been to survey all three walrus stocks simultaneously to account for possible movements from the BB stock into the WJS and PS-LS stocks. While the surveys of the Alexandra Fiord complex encompassed much of the area previously surveyed for the BB stock, any counts should be considered conservative, as the entire range of the BB stock could not be surveyed, and some far north sightings of walrus made during previous Last Ice surveys were also excluded (would require flights out of Alert).

The first surveys of each walrus stock encompassed entire coastlines, which allowed for thorough searching of previously unknown haulout sites. However, replicate surveys were focused on flying over haulout sites in a “connect-the-dots” manner. This allowed replicate surveys to be carried out quicker given just one plane was available during the final week of the survey.

The two replicates of the WJS and PS-LS stocks were quickly (i.e., roughly) counted in the field and considerably higher numbers were observed for both stocks during the second surveys (approx. double the first). At the same time, the Alexandra Fiord survey had much higher numbers the first time (Aug 7) than the second two times on August 16 and 26. This was a late ice year according to Grise Fiord residents (one of whom said it was the latest in the past 10-15 summers), and it is possible that the higher counts during the

replicate surveys of both the WJS and PS-LS stocks reflect movements into those stocks, possibly from the BB stock, or movements from melting ice and onto terrestrial haulouts during the period between the replicate surveys. It will not be possible to independently assess these hypotheses as no satellite tagging could be performed prior to this survey (the community of Grise Fiord did not support research proposals to do so).

Initial assessments of Maxar satellite images indicated one site (CHA_10 – Borgen Mount) was photographed on the same day that aerial photos were obtained. The satellite and aerial photographs were obtained within hours of each other, making it an ideal opportunity to validate the satellite image using counts from the aerial photos. Borgen Mount is also a site for which multiple flyovers were performed, with each capturing hauled out walrus in 25 mm, 35 mm, and 55 mm photographs.

8. Discussion/Management Implication

The aerial photos obtained during the survey are still being analysed, with final results expected in 2024. The objective of this project is to update the abundance estimate for the three management stocks in the High Arctic walrus population, which were last estimated in 2009. Abundance estimates will be used to generate advice on the sustainable hunt levels for the population. This advice will be peer-reviewed by DFO scientists, and will be presented to the NWMB and DFO Fisheries Management. Walrus are currently hunted without quota limits at the stock level, but managers at DFO and NWMB can use the updated population assessment to determine whether current reported hunts are within the recommended levels, and make appropriate management decisions.

9. Report by Inuit participants

There was one Inuit participant from Grise Fjord who took part in the aerial survey as a visual observer. We did not receive any formal written report from the participant but it was not part of the participant’s role to write a report. However, during the field program, the Inuit participant had several occasions to provide informal input about the project.

10. Reporting to communities/resource users

Community / HTO	Before Research (date/type)	During Research (date/type)	After Research: (date/type)
Grise Fjord, Iviq HTO	Nov. 2021-June 2022: email and phone calls	Aug. 2022: phone calls	Dec. 2022: field report In community consultation will take place when the analysis of the data is completed
Resolute Bay HTA	Nov. 2021-June 2022: email and phone calls	Aug. 2022: phones calls	Dec. 2022: field report In community consultation will take place when the analysis of the data is completed