NWRT Final Report

1. NWRT Project Number: 3-17-10
2. Project Title: Aerial survey of the Cumberland Sound beluga population
3. Project Leader:
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4. Summary:
Commercial exploitation from the late 1800s to the early 1900s has depleted the Cumberland Sound (CS) beluga population relative to historical levels. Aerial surveys over the past several decades have produced population estimates of ~1000-2000 animals, and on 13 April 2017 the population was listed under Canada's Species at Risk Act as "Threatened" (P.C. 2017-395 April 13, 2017). The most recent population estimate (2014) was ~1150 whales (Marcoux et al. 2016). A population model incorporating survey abundance estimates and animals removed during annual subsistence harvests indicated the population is in decline, and unlikely to recover even with a large reduction in the current annual harvest (Marcoux and Hammill 2016, DFO 2016).

Our assessment of CS beluga population trends and modeling of population dynamics is based on just four surveys conducted since 1990. We complete an aerial survey in Cumberland Sound in August 2017 to provide an updated abundance estimate for Cumberland Sound beluga, and additional input data for the population model. The survey design was an improve version of the one conducted in 2014, using a combination of aerial photography in Clearwater fiord, where the highest densities of belugas are expected, and visual surveys in areas where lower densities are expected (Marcoux et al. 2015). After consultation with the Pangnirtung Hunters & Trappers Association, we added new survey lines to the south west of Cumberland Sound and in Kangilo Fjord.

DFO. 2016. Status of beluga (*Delphinapterus leucas*) in Cumberland Sound, Nunavut. DFO Can. Sci. Advis. Sec. Sci. Advis. Rep. 2016/nnn.

Marcoux, M and Hammill, M.O. 2016. Model Estimate of Cumberland Sound beluga (Delphinapterus leucas) population size and total allowable removals. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/XXX. XX + XX p.

Marcoux, M., Young, B.G., Asselin, N.C., Watt, C A., Dunn, J.B., and Ferguson, S.H. 2016. Estimate of Cumberland Sound beluga (Delphinapterus leucas) population size from the 2014 visual and photographic aerial survey. DFO Can. Sci. Advis. Sec. Res. Doc. 2016/037. iv + 19 p.

5. Project Objective:
   a) To estimate CS beluga whale abundance by conducting aerial visual and photographic surveys of their summering distribution.

b) To determine trends in population abundance of CS beluga population by incorporating this most recent survey abundance estimate with previous abundance estimates (1990s-2000s) and harvest removals.
c) To update sustainable removal levels using total allowable harvest (TAH) calculations and population trajectory models.
[NO UPDATES]

6. Material and Methods

The aerial survey was conducted from July 29 to August 12. Our study area was divided into three strata: (1) Clearwater Fiord, (2) North Stratum and (3) West Stratum. Complete coverage photographic surveys was conducted of high densities of belugas in Clearwater Fiord, while visual line-transect surveys was be conducted in the North and West Strata (see map at the end of the report). Survey was flown in a de Havilland Twin Otter 300 along pre-determined transect lines at a target altitude of 1,000 ft (305 m). Two observers were seated on each side of the aircraft. Photographic transects (Clearwater Fiord) were flown at a target altitude of 2,000 ft (610 m). Visual line-transect survey data will be analyzed using conventional distance sampling (CDS) using Distance 6.2 software. Photographs will be examined for belugas on a high resolution monitor by an experienced reader. [NO UPDATES]

A local Inuit observer was hired through the Pangnirtung HTA. This person learned about the camera set-up and the techniques used in the survey. This person was only available to participate in 4 days of the survey.

7. Project Schedule

Output or step	Start date (dd/mm/yyyy)	End date (dd/mm/yyyy)
Preliminary HTO consultation	11/01/2017	
HTO contracts and local participant hiring; field work preparation	01/04/2017	30/06/17
Conduct aerial survey	25/07/2017	15/08/2017
Photo reading and analysis to estimate CS beluga whale abundance	01/09/2017	31/03/2018
Model trends in population abundance of CS beluga population	01/04/2018	31/08/2018
Present study results to the DFO National Marine Mammal Peer Review Committee	04/02/2019	08/02/2019
Present results to Pangnirtung HTA and residents	Spring 2019	

8. Preliminary results/discussion

Thanks to good weather, the survey team was able to complete each stratum of the survey at least one time. The stratum in Clearwater Fiord was repeated 5 times. The table below summarizes the daily flights.

Date	Stratum	Type	Repeat	Transects
29-Jul	Clearwater Fiord	Photo	1	1-26
1-Aug	West	Visual	1	18-12
2-Aug	West	Visual	1	11-1
3-Aug	Kangilo Fiord	Visual	1	1-13
3-Aug	North	Visual	1	1-6
4-Aug	West	Visual	2	1-10
4-Aug	Clearwater Fiord	Photo	2	1-26
5-Aug	Kangilo Fiord	Visual	2	1-13
5-Aug	North	Visual	2	1-6
7-Aug	Clearwater Fiord	Photo	3	1-26
8-Aug	Clearwater Fiord	Photo	4	1-26
12-Aug	Clearwater Fiord	Photo	5	1-26

The photos are currently being read by an experienced photo analyst. This part of the analysis usually takes several months.

9. Reporting to communities/resource users

Community / HTO	Date	Type of consultation
Pangnirtung HTA	January 11th, 2017	In-community consultation
Pangnirtung HTA	April 2017	In-community consultation
Pangnirtung HTA	June 12th, 2017	In-community consultation
Pangnirtung HTA	December 2017	Send Field report by mail and email
Pangnirtung HTA	November 2018	In-community reporting progress and consultation
Pangnirtung HTA	Spring 2019	In-community reporting of results

We consulted with the Pangnirtung HTA two additional times in April and June to get their input for the survey design. As a result of the consultation, we added new survey lines to the south

west of Cumberland Sound and in Kangilo Fjord. We did not formally report to the Pangnirtung HTA during or after the field season because a member of the HTA participated in the study.

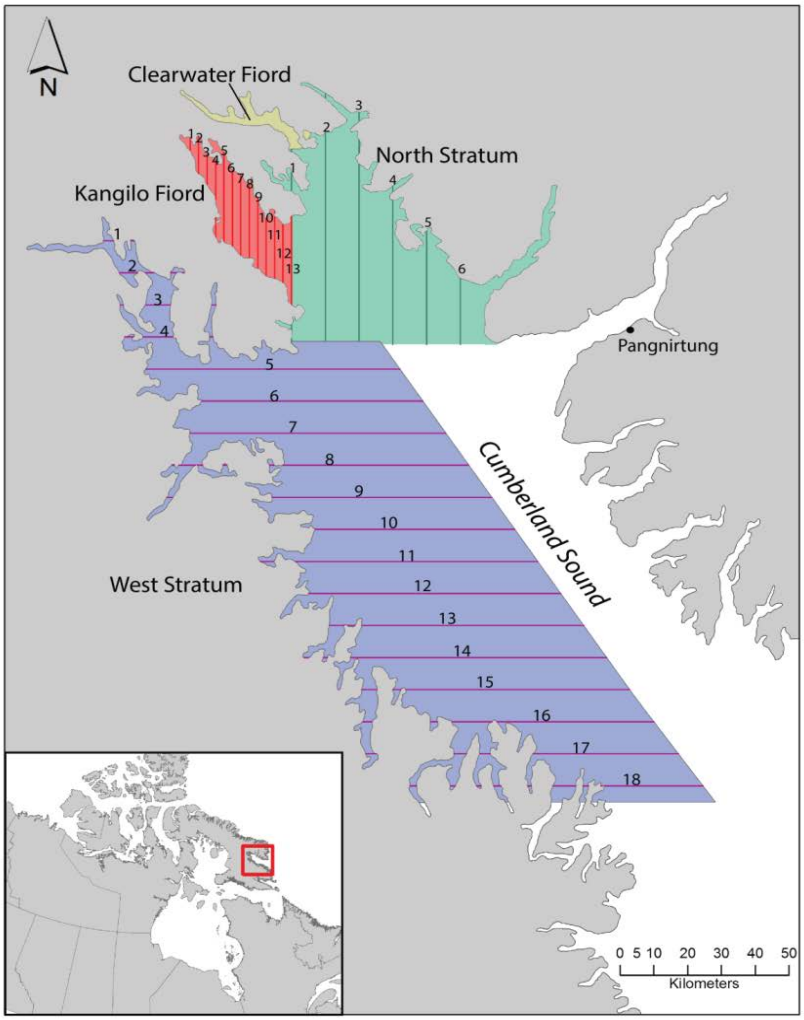

Figure 1. Map of Cumberland Sound beluga survey area and four surveyed strata (with transects): (1) Clearwater Fiord (yellow; photographic), (2) North Stratum (green, visual), (3) Kangilo Fiord (red; visual), and (4) West Stratum (purple; visual)