

# **SUBMISSION TO THE NUNAVUT WILDLIFE MANAGEMENT BOARD**

## **FOR**

**Information:** X

**Issue:** Update from DFO Science Program regarding summer field work in Nunavut, 2013.

**Background:** In the past, Fisheries and Oceans Canada (DFO) Science provided an update on the Science programs currently operating in Nunavut. It was requested that DFO Science update the board on field work outcomes from the 2013 field season. Due to the timing of the NWMB's September meeting we were not able to provide any formal updates at that time as field work was ongoing. Since September, all field work from the summer has concluded and we have been able to compile initial summary reports for many of the projects to present to the NWMB. Summaries for the following projects are presented in this briefing note:

- 1) Arctic Char Stock Assessment in Cumberland Sound
- 2) Orcas of the Canadian Arctic: August 2013 research in Pond Inlet, NU
- 3) Bowhead whale tagging and genetic Mark-Recapture project in Foxe Basin and Cumberland Sound 2013
- 4) High Arctic Cetacean Survey

## **Arctic Char Stock Assessment in Cumberland Sound:**

### **Introduction**

The community of Pangnirtung harvests Arctic Char from approximately 60 stocks around the Cumberland Sound area. The commercial fishery of this area is one of the largest in Nunavut, and is supported by a modern fish processing plant located in Pangnirtung. With the construction of a new harbour in Pangnirtung the future potential for commercial development is great. In addition to the commercial harvest, subsistence harvest of Arctic Char from stocks in Cumberland Sound is the largest in Nunavut. Despite this, most (about ¾'s) of the harvested stocks remain under exploratory fishery licenses because there is insufficient data to conduct stock assessments to determine safe harvest levels. As a result, a number of Arctic Char stocks in Cumberland Sound may not be presently fished to their full potential. The community believes that some of these stocks are thought to be abundant with fish of sufficient size to make them suitable for commercial fishing.

There is a desire in the community to partner with government agencies to gather data that could be used by Fisheries & Oceans Canada (DFO) Science Branch to perform stock assessments for these populations with the goal of determining safe long-term harvest levels.

### **Field Research Summary**

Stock assessment research occurred in August/September 2013, at Millut Bay and Irvine Inlet. At Millut Bay 201 fish were captured and fishing took place at the outflow of the Ranger River. At Irvine Inlet 211 fish were captured and fishing took place in the open fresh water below the first set of falls in the McKeand River. A field crew consisting of one to four DFO representatives and up to four residents of Pangnirtung set gill nets of various mesh sizes ranging from 1.5 to 5.5 inch in known Char fishing locations. All fish were sampled for length, weight, sex, maturity,

gonad (reproductive organs) weight, ageing structures, muscle tissue, and fin tissue. Gonads of all mature females were collected and frozen for determination of fecundity (number of eggs). All stomachs appearing to contain food were collected and frozen for potential future diet analysis. All carcasses were returned to the community for distribution and consumption.

**Table 1. Maximum, minimum, and average lengths of Char caught in the 2013 fishing locations**

	<u>Maximum of Fork Length</u>		<u>Minimum of Fork Length</u>		<u>Average of Fork Length</u>	
	(in)	(mm)	(in)	(mm)	(in)	(mm)
Millut Bay	28.6	727	6.5	165	19.5	495
Irvine Inlet	27.8	707	7.3	185	19.2	489

**Table 2. Maximum, minimum, and average weights of Char caught in the 2013 fishing locations.**

	<u>Maximum of Round Weight</u>		<u>Minimum of Round Weight</u>		<u>Average of Round Weight</u>	
	(lbs)	(g)	(lbs)	(g)	(lbs)	(g)
Millut Bay	10.5	4778	0.1	45	3.6	1643
Irvine Inlet	7.2	3272	0.1	55	3.2	1452

Completion of the stock assessment sampling process will occur in winter 2014. During this time the structures that were removed in the field will be analyzed in the lab to determine age and fecundity (number of eggs per mature female), where applicable. Additional statistical analysis will be performed after the lab work is completed. The remaining structures taken from fish in the field will be stored for potential analyses in the future.

This research contributes to the data collected for the purpose of Stock Assessment analysis of Arctic Char fisheries in Cumberland Sound.

**Orcas of the Canadian Arctic: August 2013 research in Pond Inlet, NU:**

**Introduction**

Killer whales (*Orcinus orca*) occur seasonally in the Eastern Canadian Arctic (ECA), yet relatively little is known about their ecology. With only limited knowledge on their distribution, dietary preferences, and population size, an understanding of the killer whales' role in the ECA ecosystem remains incomplete. In August of 2013, a field team that comprised researchers from the University of Manitoba (U of M) travelled to Pond Inlet, NU with an overall objective to learn more about killer whales in the ECA. Specifically, research objectives were to deploy satellite transmitters and collect tissue biopsies using crossbows, collect photographs of killer whales for identification and record killer whale vocalizations.

**Field Research Summary**

Researchers arrived to Pond Inlet on August 6 and reached Milne Inlet on August 10. The field team encountered killer whales on two occasions, first on August 11 and second on August 12. The first encounter was in Milne Inlet at approximately 19h00. Upon initial contact with the whales, 30 minutes was given to allow the whales to habituate to the research boat. This allowed photographs to be taken and researchers to estimate group size and composition while

preparing research equipment. During this first encounter, two satellite transmitters were attached to killer whales in their saddle patch region (Figure 1) and six biopsies were collected. The field team also saw the killer whales with a tusked narwhal carcass (Figure 2). An attack was not directly observed, but the killer whales were seen pulling chunks off and playing with the carcass. The field team estimated approximately 18 killer whales in the group. This estimate included at least four males, evident from their tall dorsal fins.

The second encounter took place in Tremblay Sound. The field team made initial contact with the killer whales at 19h30. The whales that were tagged the previous evening were sighted; therefore it was assumed this was the same group. Three additional satellite tags were attached to killer whales on their dorsal fins (Figure 1), and one tissue biopsy was collected. This was the last time killer whales were encountered by the field team. Researchers departed Pond Inlet on August 20.

In total, five satellite tags were attached to killer whales; seven tissue biopsies were collected as well as hundreds of photographs. Previously in 2009, two satellite transmitters were attached to killer whales in Admiralty Inlet, marking the first time killer whales had been tracked in the Canadian Arctic. The success of the 2013 field season builds on preliminary accomplishments during 2009 fieldwork, indicating a promising approach to studying ECA killer whales in future years.



**Figure 1.** Satellite transmitters attached to four of the five killer whales on August 11, 2013 (a, b) and August 12, 2013 (c, d) (Photos: G. Freund).



**Figure 2.** (a, b) Killer whales observed by the research team with a tusked narwhal carcass on August 11, 2013 (c, d) Portions of a narwhal carcass sampled by the research team during the morning of August 12 in Milne Inlet, and (e) in the evening of August 12 in Tremblay Sound (Photos: G. Freund).

**Bowhead whale tagging and genetic Mark-Recapture project in Foxe Basin and Cumberland Sound 2013:**

The field work component of the Bowhead whale tagging and genetic Mark-Recapture project took place in Foxe Basin and Cumberland Sound during the months of July and August 2013, respectively. Bowhead whales were sampled for skin biopsy in both locations and fitted with satellite tags in Foxe Basin only. A total of nine tags were deployed and more than 200 biopsies sampled.

The sampling effort in Foxe Basin was performed near the community of Igloolik prior to the breakup of land-fast ice. Two experienced local hunters with their boat and one assistant were hired through a contract with the Igloolik HTA, to provide local knowledge and assist with DFO research. As of 21 October, seven satellite tags were still providing valuable location and diving data. A total of 159 skin biopsy samples were collected during the course of the 3 weeks. Eight of the nine whales tagged near Igloolik moved to Gulf of Boothia/Prince Regent Inlet complex through Fury and Hecla Strait shortly after ice breakup and spent the whole summer in this region.

The Cumberland Sound work was performed out of Pangnirtung where a local outfitter and his assistant were hired for one week. A total of 51 skin biopsies were sampled during that period.

The 200+ skin biopsy samples will be analyzed for genetic signatures in the coming months. This will add to a growing genetic database and provide means for improved local abundance estimate confidence and kinship relationships.

Please note that to give the most current tagging data possible a map of results from December 1, 2013 will be provided at the meeting but cannot be included in this briefing note.

**High Arctic Cetacean Survey:**

**Post-survey Summary**

Fisheries and Oceans Canada's 2013 High Arctic Cetacean Survey was completed between August 1 and August 26. The three survey teams flew a combined total of 241 hours and surveyed the majority of the planned areas (Figure 3) that covered the summering range of the Baffin Bay narwhal. Survey teams were composed of DFO scientists and trained Inuit marine mammal observers, and crews were accompanied by HTO members from local communities. Poor weather conditions towards the end of the survey period prevented the teams from completing eastern Ellesmere Island (Smith Sound), Barrow Strait, Lancaster Sound and Foxe Basin. Overall, the survey was extremely successful and represents DFO's largest scale assessment of cetacean populations in the Canadian Arctic.

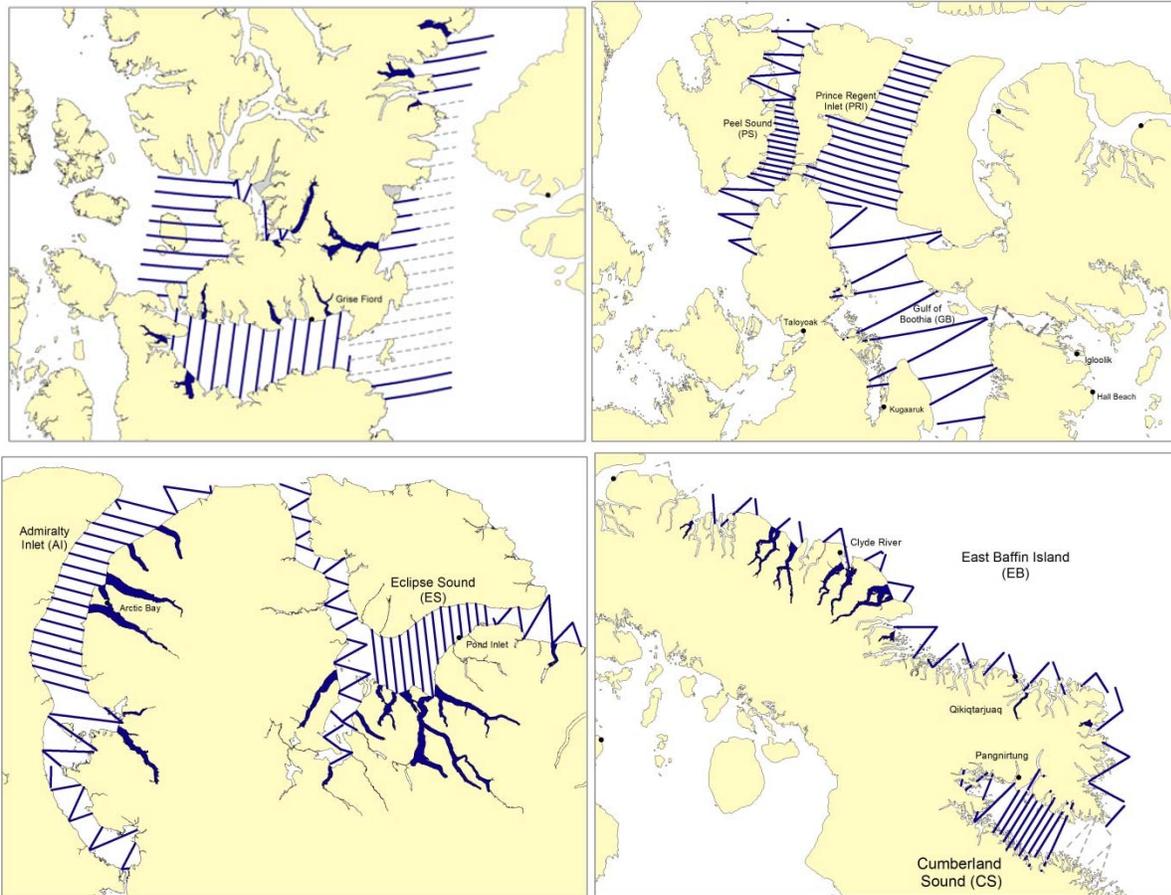


Figure 3. Areas surveyed during the 2013 High Arctic Cetacean Survey. Thick, solid dark blue lines indicate transects that were surveyed; thin, dashed grey lines indicate transects that were not surveyed because of poor weather conditions. Fiords marked in blue were surveyed; fiords marked in grey were included in the survey plan but were not surveyed because of poor weather conditions. General areas of marine mammal sightings are indicated by stars: red, Narwhal; white, Beluga Whales; black, Bowhead Whales.

In fall and winter 2013 the survey team will begin processing and analyzing the survey data. Initial data processing will include completing data transcription, data assembly, data verification, photo verification of uncertain sightings and to count large groups that were observed in fiords (high resolution digital photographs were taken by two belly-mounted cameras on each plane; Figure 4), distance calculations and the acquisition of weather data. A pre-analysis phase will involve assessing capture-recapture for the double platforms, time-in-view calculations, comparing plot tracks and sightings, calculating transect lengths and stratum areas (flown vs. design) and plotting the footprints of photographs (e.g. location, angle, area). Additional analyses will be undertaken as possible and necessary to improve the accuracy of the stock assessments, including re-analyzing dive times from tag data to improve availability adjustments (e.g. fiords vs. offshore) and spatial density modelling (fiords only or all strata).

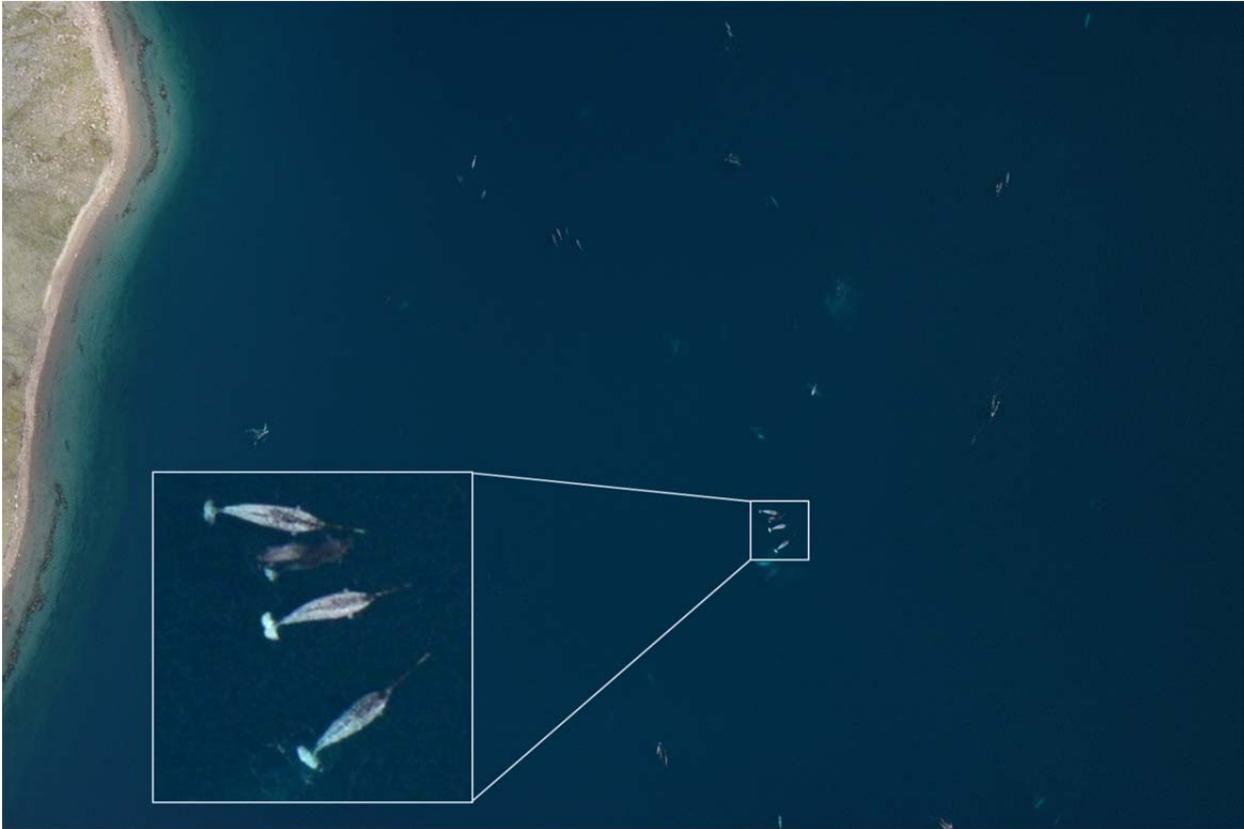


Figure 4. Photograph of Narwhals taken by a fixed, belly-mounted camera.

An initial assessment of the survey results will be completed in Spring 2014. A complete assessment and primary publications will be completed in 2014-2015.

**Conclusion:**

The information in this briefing note is provided as a progress update and should not be taken as advice from Science. All research presented here will provide advice in the future through formal DFO processes including reports and primary publications. Additionally, all communities involved with the research projects will be provided updates directly from the lead researchers (Principal Investigators or Head Biologists) over the next few months.

**Consultations:**

DFO Central & Arctic Region and Eastern Arctic Area

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