

NWRT Final Project Report

1. **NWRT Project Number:** 3-17-09
2. **Project Title:** Implementation of an ecosystem approach in Tremblay Sound, Nunavut
3. **Project Leader:**
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4. Summary

Narwhal studies in Tremblay Sound are primarily focused on clarifying stock management boundaries between summering whales in Eclipse Sound and Admiralty Inlet. Tagging narwhal is currently the best approach to address this question. Building on, and continuing previous narwhal tagging efforts, DFO led tagging activities from July 15th to September 13th 2017. This longer duration of study allowed the project to be 100% successful in tagging the target number (20) of narwhals. Data are still being analysed, but this preliminary report summarizes field work completion, narwhal movements (to November 11th 2017) and examples of preliminary data analysis.

5. Objectives

- 1) Attach satellite location and dive tags on 20 *[Updated from 15]* narwhal to determine degree of segregation between Eclipse Sound and Admiralty Inlet stocks.
- 2) Examine timing and numbers of whales entering and using Tremblay Sound using drone-surveys, and obtain details on group sizes, animal condition and mother-calf pairs. *Update: Minimal drone surveys were able to be completed due to qualified staff availability and weather.*
- 3) Assess fine scale movements of narwhal in Tremblay Sound, habitat use and links to ecological drivers of Arctic cod distribution and movements;
- 4) Establish baseline data of noise and vocalizations of narwhal while in their critical summer habitat in Tremblay Sound and relate these data to narwhal movement and behaviour. This will then inform discussion on the potential impacts of shipping within this context.

6. Methods

- (a) Narwhal are captured in 50-100m long nets set perpendicular from shore. *(No Updates to this Method)*
- (b) Weather permitting, drone surveys will be repeated over areas of greatest narwhal abundance *(no update to methods)*
- (c) Small bottom anchored moorings will be placed within Tremblay Sound in order to record ambient noise and narwhal vocalizations. *(No update to methods)*

7. Project Schedule

Date Start	Date End	Activity	Completion Status
01-Apr-17	14-Jul-17	Planning and Preparation for Field	Complete
15-Jul-17	13-Sep-17	Field camp (Tremblay Sound)	Complete
14-Sep-17	31-Dec-17	Field Reports, Data management, Interim Reporting	Ongoing

14-Sep-17	Indefinite	Data Analysis	Ongoing
05-Dec-17	05-Dec-17	Interim face-to-face reporting NWMB	Complete
01-Jan-18	30-Mar-18	Final Reporting	Complete
08-Mar-18		HTO reporting and consultation (face-to-face)	Complete
04-Feb-19	08-Feb-19	DFO Science advisory meeting to provide new science data on Narwhal Stock delineation in the North Baffin region	Pending
Mar-19		CSAS science advise on narwhal stock delineation	Pending

8. Preliminary Results/Discussion

The project successfully tagged 20 narwhal in the 9-week 2017 field season. Measurements of captured whales and tag types are shown in the table below.

Whale number	Tag Type	Deploy. Date	Total Length (cm)	Fluke Width (cm)	Tusk Length (cm)	Girth (cm)	Sex (determined in the field)
1	Argos Dive w/ GPS	31-Jul	466	116	183		Male
2	Argos Dive w/ GPS	31-Jul	400	90			Female
3	Argos Dive w/ GPS	01-Aug	400	90		218	Female
4	Argos Dive w/ GPS	03-Aug	432	110	113	282	Female
5	Argos Dive w/ GPS	03-Aug	488	110	221		Male
6	Argos Dive w/ GPS	03-Aug	458	131			Female
7	Argos Dive w/ GPS	06-Aug	430	100	124	251	Male
8	Argos Dive w/ GPS	12-Aug	375			235	Female
9	Argos Dive w/ fish detection	16-Aug	385	95			Female
10	Pop-off	18-Aug	400	115	65 broken		Male
11	Argos Dive w/ Salinity & GPS	30-Aug	390				Female
12	Argos Dive w/ GPS	02-Sep	425	100		240	Female
13	Argos Dive w/ GPS	02-Sep	298	65	27		Male
14	Suction Cup	03-Sep	250	61		162	Male
15	Argos Dive w/ Salinity & GPS	03-Sep	380	90	78		Female
16	Argos Dive	03-Sep	370	82			Male
17	Argos Dive	11-Sep	360	95	92		Male
18	Argos Dive	11-Sep	370	82			Female
19	Argos Dive	11-Sep	380	90			Female
20	Argos Dive	11-Sep	408	90			Female

Field estimated sex would distribute captures as 8/20 male, 12/20 female. Size of captured narwhal seemed to decrease over the 9 week study period. However this is not statistically significant and requires further study as group composition and residency in these summering grounds may follow a meaningful pattern that may indicate behavioural or ecological factors.

The majority of the tags have stopped transmitting as of November 11th 2017 (Table below). The tags were configured to utilize 75% of their power resources in the summer-fall period (deployment to End of October when whales typically leave the north Baffin area and begin migration to wintering grounds in Baffin Bay near south-central Baffin Island). Factors that affect tag longevity are still unverified. Tag electronics may fail due to power, antenna damage, temperature effects or other malfunction. Tags may also be shed

prematurely from whales due to the effects of drag and lift or collisions with forming ice layers. Collection of winter location and dive data was not a focus of this study however data from the 3 tags still functioning will be valuable to researchers and managers. In total, as of November 11th there was a total of 1591 equivalent days of tag operation, 9678 reported whale locations and 43,209 total messages received (messages contain largely dive data but also tag diagnostics and GPS locations). Using the numbers as a measurement of study success, this is the most successful Arctic tagging program ever.

Whale number	Tag type	Deploy. date	Last Confirmed date with data	Number of messages received	Number of location received	Days in operation
1	Argos Dive w/ GPS	31-Jul	22-Nov	29278	4255	114
2	Argos Dive w/ GPS	31-Jul	17-Oct	29331	2737	78
3	Argos Dive w/ GPS	01-Aug	03-Oct	24655	1995	63
4	Argos Dive w/ GPS	03-Aug	31-Oct	28370	2881	89
5	Argos Dive w/ GPS	03-Aug	25-Oct	13003	2394	83
5	Pop-off	03-Aug	10-Sep	227	32	37
6	Argos Dive w/ GPS	03-Aug	22-Nov	16249	3329	111
7	Argos Dive w/ GPS	06-Aug	07-Oct	21454	1818	61
7	Pop-off	06-Aug	13-Sep	3	0	38
8	Argos Dive w/ GPS	12-Aug	27-Oct	19267	2540	75
8	Pop-off	12-Aug	07-Sep	689	14	26
9	Argos Dive w/ fish detection	16-Aug	04-Oct	5333	1177	49
9	Pop-off	16-Aug	13-Sep	2	0	29
10	Pop-off	18-Aug	07-Sep	22	4	20
11	Argos Dive w/ Salinity & GPS	30-Aug	03-Nov	8337	2083	65
11	Argos Dive w/ Salinity & GPS	30-Aug	03-Nov	6996	1861	65
11	Pop-off	30-Aug	13-Sep	7	0	14
12	Argos Dive w/ GPS	02-Sep	22-Nov	11479	2568	81
12	Pop-off	02-Sep	13-Sep	6	0	11
13	Argos Dive w/ GPS	02-Sep	12-Oct	6762	1442	40
14	Acousonde	03-Sep				
15	Argos Dive w/ Salinity & GPS	03-Sep	16-Oct	5348	1394	43
15	Argos Dive w/ Salinity & GPS	03-Sep	16-Oct	4463	1257	43
15	Pop-off	03-Sep	13-Sep	159	39	9
16	Argos Dive	03-Sep	13-Nov	8802	1639	71
16	Pop-off	03-Sep	12-Sep	13	0	9
17	Argos Dive	10-Sep	05-Nov	5920	1417	55
18	Argos Dive	11-Sep	22-Nov	7168	1484	72
19	Argos Dive	11-Sep	17-Nov	5828	1219	67
19	Pop-off	11-Sep	03-Oct	46	3	22
20	Argos Dive	11-Sep	01-Nov	5462	1226	51

A new technology for detecting satellite transmissions from a ground station was used for the 2017 tagging study. These ground stations (named 'Mote' stations by the manufacturer) increased recovered data by 1.5-2.5 times that which would have been recovered by satellite alone. The Eclipse Sound narwhal study was suited to the use of these stations due to the relatively long and confined presence of narwhal. Dive data from recovered pop-off tags provides 1 second resolution data. Previous studies have been limited to summarized dive information; for example time-at-depth summaries provide the percentage of time the tag/whale was in a range of depth (e.g. 20% of time between 0-2 m depth). Actual dive profiles created from 1 and 75 second data will help increase the accuracy of correction factors for population surveys and will also allow researchers to better understand dive types, and dive responses to ecological or environmental factors. Golder and Associates is collaborating on this study and aims to understand dive and movement responses of narwhal to ship and boat traffic.

Ten of the twenty whales tagged show data well into the migration route south in Baffin Bay. Approximately eight of the twenty whales spent time outside of the Eclipse Sound area during the time typically associated with summering grounds residency. Whales ranged as far as Prince Regent Inlet/Somerset Island, south Devon Island coast, as well as Admiralty Inlet. Data still needs to be fully analysed, however the larger sample size (20 tagged whales compared to previous tagging studies where typically 4-8 whales were tagged) is helping us understand the diversity of movement and behaviour in north Baffin area narwhal. DFO is proposing to repeat the tagging of narwhals in Eclipse Sound in 2018 to increase the sample size and to capture most of the variation in narwhal movement. In addition, we want to understand the potential drivers that influence their movement (i.e. food, presence of killer whales). DFO science will complete analysis of 2017 data and make results available to DFO management and local/regional authorities.

9. Reporting to Communities

Reporting and consultations are on track as per the schedule presented in the NWRT project proposal (shown below). Meetings with the Pond Inlet HTO and an open house for the community were attempted in December 2017, to coincide with project leads presenting at the NWMB meeting December 5th. Unfortunately the HTO was overwhelmed in early December with meetings regarding Baffinland Mine and they asked us to remain on the January reporting timeframe (which we will do).

Community and/or HTO	Before research	During research	Completion of research
Pond Inlet	1) 11/01/2017 letter via email – project planning and funding support	1) 11/07/17 – HTO meeting and presentation pre-field work	01/03/2018 – community visit and meeting to present results and draft final report
	2) 14/03/2017 project planning and support meeting (face-to-face in Pond)	2) Open communication during fieldwork for safety and in the event of anything of note	
	3) 01/07/2017 Contract setup	3) 12/09/17– HTO meeting and presentation post-field work	

For inquiries regarding this ongoing research please contact:

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