

Final Project Report to NWMB – September 2024

- 1. NWRT Project Number:** NWRT-23-0000000006
- 2. Project Title:** Foxe Basin bowhead telemetry, photo-id, and biopsy collection
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- 4. Summary:**

This project was a continuation of the 2022 Foxe Basin bowhead research and was based out of Igloolik/Sanirajak, NU. The project consisted of three main components: 1) drones collected high resolution aerial photographs of bowhead whales, for the development of a photo-identification (photo-id) catalogue; 2) crossbows were used to collect small biopsy samples consisting of both skin and blubber to contribute to updated population abundance estimates, and 3) satellite tags were deployed to track whale movements.

Unique scars and markings captured in the photographs allow for individual whales to be identified and tracked over time through subsequent sightings. The development of a photo-id catalogue will contribute to our overall understanding of important life history traits and will provide measures of body condition, growth rates, calving intervals, and abundance. The continued collection of biopsy samples is important for providing new samples needed for updating genetic mark-recapture abundance estimates. In addition, biopsy samples are used for dietary studies using stable isotope and fatty acid biomarkers, for hormone analysis to investigate pregnancy rate, and to develop a method of estimating age using epigenetics. Telemetry provides updated data on bowhead movements and dive behaviour that is necessary to monitor habitat-use, to detect any changes in movement patterns, to assess risk of ship strikes, and to help in planning future research activities.

5. Project Objectives:

The specific objectives of the proposed project, as outlined in the original proposal to NWMB, were to:

- Collect high resolution aerial photographs of bowhead whales to develop a photo-id catalogue
- Collect bowhead biopsy samples for use in genetic mark-recapture abundance estimates of the EC-WG bowhead population
- Deploy satellite transmitters on bowhead whales to track movements

6. Materials and Methods:

The methods used for the work in Foxe Basin were the same as those outlined in the project proposal; however, there were a few changes that will be outlined below.

- All of the field work was based out of the community of Igloolik.
- An additional objective was added after our proposal was submitted but was supported by the HTA board. In collaboration with the Wildlife Conservation Society, we deployed LIMPET satellite transmitters and collected passive acoustic recordings via hydrophones to examine the movement and vocalization behaviour of bowhead whales in the presence and absence of ship noise.
- Three passive hydrophones were deployed in June 2022 to record underwater vocalizations throughout a year. These will help to monitor the seasonal use of the floe edge by bowhead whales, the use of winter ice by walrus and bearded seals, and the use of a calving area by walrus, respectively. One of the hydrophones was placed close to the proposed southern route for the Baffinland Mary River mine near Steensby Inlet.

A small rotary wing drone was used to collect high resolution photographs of whales for development of a photo-id catalogue. When whales were sighted, the operator launched the drone and took photographs and video from directly above the whales (typically flown at an altitude of 20 m). Due to the small size of the drone, the whales were generally not disturbed or even aware of the presence of the drone.

Biopsy samples were obtained using crossbows with special bolts equipped with biopsy tips from a distance of approximately 5 to 20 m. After the whale was hit, these bolts bounced back into the water, with a small piece of skin and sometimes blubber in the tip, and floated until they are retrieved by boat. A Styrofoam float/stopper prevented the bolt from penetrating any deeper than 4 cm. The biopsy samples were very small – less than 5 grams each.

An Aerial Rocket Tag System, or ARTS, was used to deploy the transdermal satellite tags and a crossbow was used to deploy LIMPET tags with short anchors from a distance of approximately 6 to 15 m. The ARTS is a pressurized launcher ‘powered’ by a SCUBA tank that is used to deploy subdermal satellite tags (transdermal SPLASH tags, Wildlife Computers). Tags were deployed at 10-12 bar pressure with lower pressure used at shorter distances. Tags were targeted at the middle of the back, with the body of the tag embedding in the blubber and the antenna protruding from the skin surface.

7. Results:

The field work in Foxe Basin was carried out between June 15-July 5, 2022 by a research team consisting of community members from Igloolik, members from Fisheries and Oceans Canada (DFO), University of Manitoba, and the Wildlife Conservation Society Canada. An in-person meeting with the HTA board was held on June 21 to introduce the field team, discuss all project plans, plan the contracts with the local boat captains and field assistants, and address any concerns or answer questions. The DFO members as well as Travis Qaunaq, one of the boat captains, set up a table for community outreach

at the entrance of the Igloolik Northern Store on the afternoon of June 21. We had a laptop to show bowhead drone videos, satellite tracking maps and animations of whale movement, and photos from the 2022 field season as well as an example of a biopsy dart, DFO marine mammal sample kits, and printed posters discussing research techniques and activities available in English and Inuktitut.

Tagging and biopsying were done from both boats and from the floe edge, with the latter allowing for minimal disturbance to the whales (as they were not pursued or chased). The floe edge in 2023 was solid and was the preferred location for tagging, biopsy, and drone flights as the whales were moving in and out of the ice in the Fury/Hecla Strait.

In summary, 18 transdermal SPLASH10 satellite tags were deployed (Figure 1) using the ARTS and 5 LIMPET SPLASH10-F-333 satellite tags using a crossbow, 46 skin biopsies were collected, over 20 hours of acoustic recordings and observations were collected, and over 1,420 files equaling 126 GB of drone images and videos, most with multiple whales, were collected over the 6 days of active field work. Additionally, five ship noise playbacks were undertaken from the floe edge, with drone and acoustic data collected simultaneously. GoPro footage was also captured of 3/5 LIMPET (SPLASH10-F-333) tagging events and 13/18 transdermal (SPLASH10-373A) tagging events. Satellite telemetry data indicated that tagged whales were starting to move through Fury and Hecla Strait and into the Gulf of Boothia on July 10, 2023.

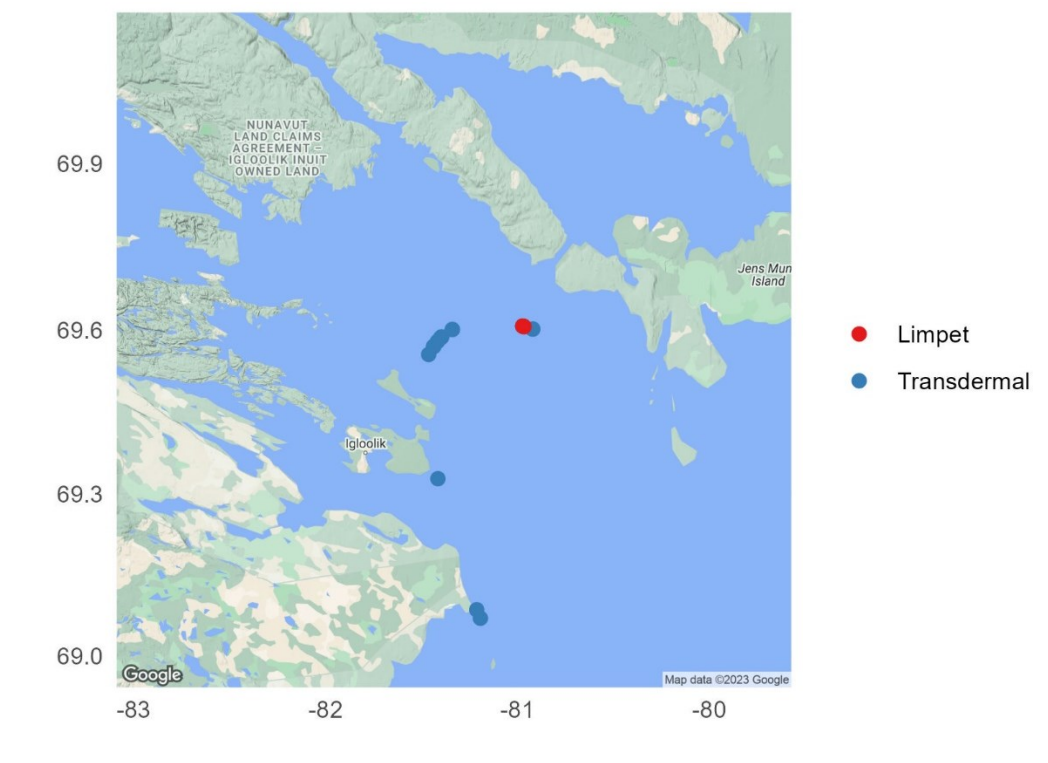


Figure 1. Locations of the 18 transdermal and 5 LIMPET satellite tag deployments onto bowhead whales along the Igloolik floe edge, June 28-July 3, 2023.

Aerial drone photographs of bowhead whales from the ECWG population have been collected by DFO since 2016. Our bowhead photo-id catalogue currently consists of over 10,000 raw photographs and over 3,500 processed and cropped images from over 900 individual encounters. A scoring criteria has been used to determine that nearly half of these individuals are sufficiently marked (with unique scars) to be re-identified in photos taken in other years. The work in Foxe Basin in 2023 has contributed photographs of over 100 individual bowheads to the photo-id catalogue (example images: Figures 2, 3).



Figure 2. A bowhead adult and calf photographed in Foxe Basin on 2 July 2023.



Figure 3. A bowhead whale photographed in Foxe Basin on 2 July 2023.

8. Discussion/Management Implications:

As of December 1, 2023, 11 transdermal tags and 1 LIMPET tag from 2023, along with 6 transdermal tags from 2022, were still transmitting. As of September 1, 2024, 8 transdermal tags from 2023, and 4 from 2022 were still transmitting. Satellite telemetry data from bowheads tagged in Foxe Basin in 2022 and 2023 have already provided valuable insights into bowhead movements (Figure 4), and data will be more thoroughly analysed as part of a PhD thesis.

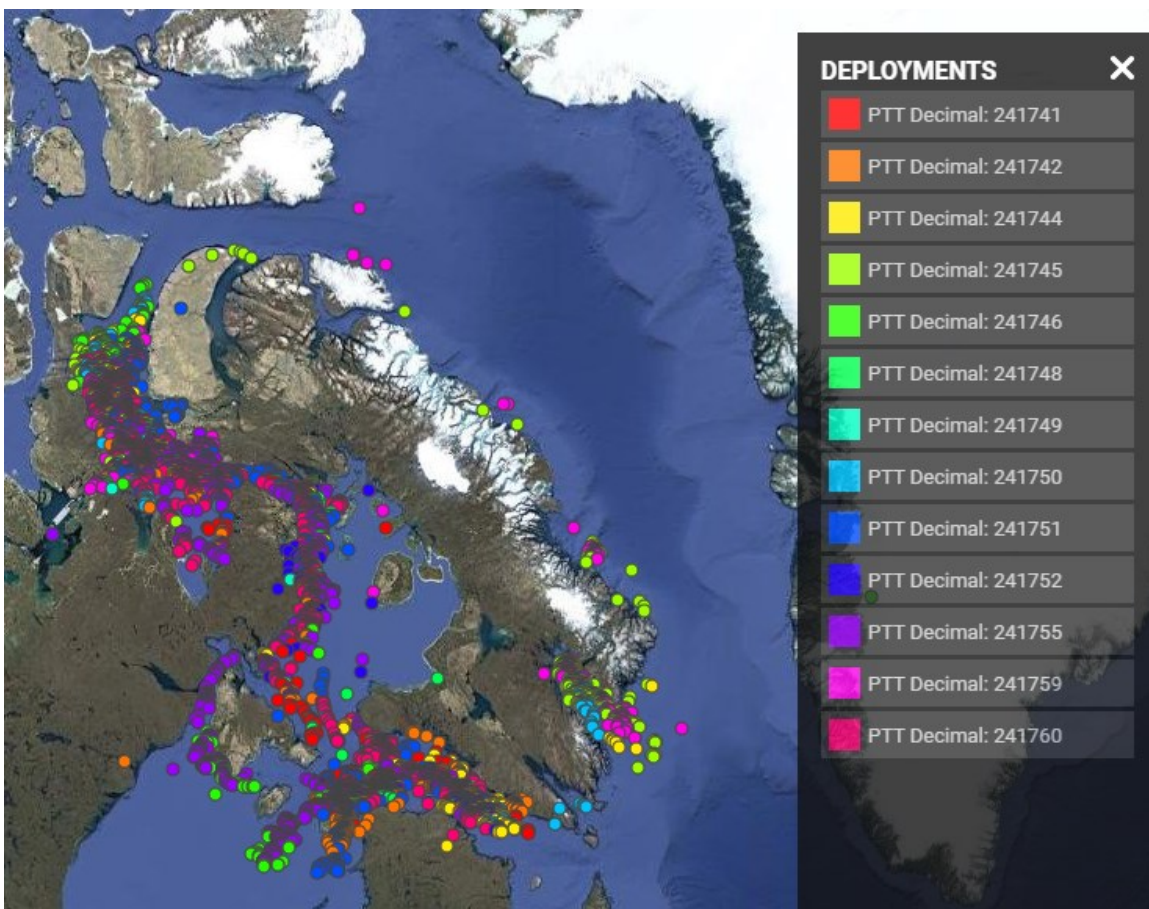


Figure 1. Tag locations of the bowhead whales tagged in 2023 with the transdermal tags from tagging origin (Igloolik floe edge) to September 25, 2024.

We consider the 2023 field trip to be a success and are gaining great insight into in the ECWG bowhead whale population. Bowhead whale movement updates have been shared with project partners and nearby community HTO/As on an ongoing basis. The samples collected in Foxe Basin in 2023 will contribute towards future

genetic mark-recapture abundance estimates as well as diet studies, epigenetic ageing studies, and analysis of hormones to assess pregnancy status.

Individual bowheads photographed in 2023 will be evaluated using our scoring criteria to determine photo quality and markedness, before undergoing a matching process to determine re-captures between years. Photographs taken in Foxe Basin in 2023 are also currently being measured to assess body condition (Figure 5) as part of a MSc thesis (Dalhousie University). If we detect that whales are in poor body condition, it could be an early sign of a future decrease in abundance, which would have important management implications.

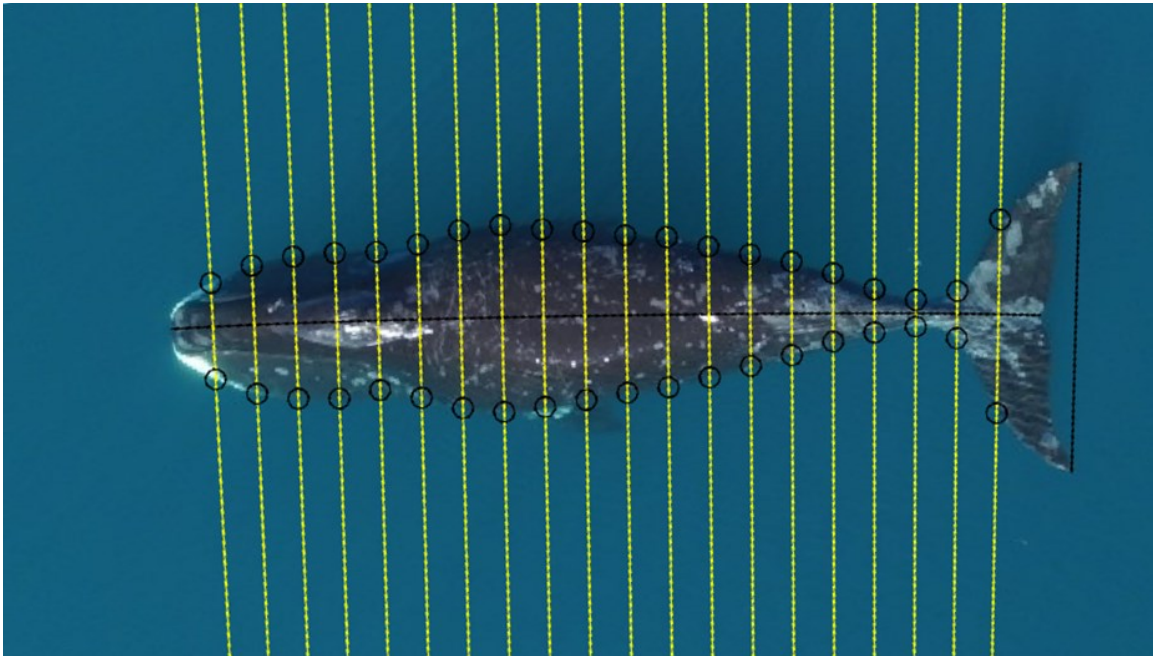


Figure 2. An example of morphometric measurements including total length, fluke width, and widths (at 5% increments along the body) made on a bowhead whale to assess body condition.

The successful field seasons in Foxe Basin in 2022 and 2023 have important management implications because they have provided samples and data from a part of the ECWG bowhead range that is not well represented in our previous sample collections. The majority of recent bowhead whale samples have come from Cumberland Sound, so the addition of samples and data from Foxe Basin, is vital for estimating abundance through genetic and photographic capture-recapture analysis. In future years, it will be important to continue work in Foxe Basin and Cumberland sound, while further expanding our field program to other locations with the goal of achieving better representation of the entire population.

9. Report by Inuit participants:

In 2023, 5 local Inuit participants were employed as boat captains and field assistants. They assisted in a variety of capacities including providing use of their boat, driving their boats and approaching the whales safely, and learning and performing the biopsy and subsampling procedures. Two of the participants have also recently received training on flying drones through a DFO-led initiative, and in 2024 they assisted in collecting drone footage of bowheads.

Following the 2022 field season, one of the Inuit participants provided this quote: *“I think the research is important to see if there’s changes in the migration routes and health of the bowhead’s. I’m ok with working with southerners so both sides can benefit off the project.”*

Following the 2023 field season, two of the Inuit participants were asked if they would like to provide a report, or if they had any comments on the project. One participant said *“I enjoy being apart of the bowhead project and being a boat captain and working with all the team!”*.

Another participant had this to say about the project: *“I like working with you guys doing the research at first I joined the crew for walrus biopsy back in 2020 and I've been with the crew since I join them for walrus work cause as a hunter I wanted to know what the impact changes throughout the years and before the shipping starts around Steensby inlet and I wanted to learn on what can be done to try and prevent it from dramatic changes.”*

Two of the participants returned for both the 2023 and 2024 bowhead field season and have been leading some other field work with our group which we feel is a testament to the success of the project and our cooperative relationship. We have also had several communications with the members of the HTA board in Igloolik who have all been very supportive of the project continuing.

10. Reporting to Communities/Resource Users:

Schedule of Consultations with Igloolik HTA and Hall Beach HTA

Consultation	Date	Type	Status/Changes
Before Research	Winter 2023	Email correspondence proposing project and requesting support.	Completed- Igloolik and Sanirajak HTAs
Before Research	Winter 2023	In-person meeting with the HTA board	Completed- Igloolik HTA
During Research	June/July 2023	In person meeting with HTA prior to field work activities commencing.	Completed- Igloolik. We have also provided ongoing updates of the bowhead movements since the completion of the field

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			trip to the following community HTO/As: Igloolik, Sanirajak, Coral Harbour, Iqaluit, Kugaaruk, Rankin Inlet, and Taloyoak.
Completion of Research	March 2024	Email field report after field season and in person meetings.	<p>Completed- English and Inuktitut versions of the field report were emailed to the following community HTO/As: Igloolik, Sanirajak, Coral Harbour, Iqaluit, Kugaaruk, Rankin Inlet, and Taloyoak.</p> <p>In person meetings were held with HTAs in both Igloolik and Sanirajak to review 2023 work and discuss plans for 2024.</p>