Final Project Report to NWMB – September 2021

1. **NWRT Project Number: 3-20-07**
2. **Project Title:** Foxe Basin bowhead telemetry, photo-id, and biopsy collection
3. **Project Leader:** Steve Ferguson, Fisheries and Oceans Canada, 501 University Crescent, Steve.Ferguson@dfo-mpo.gc.ca, 204-983-5057
4. **Summary:**

The proposed project was planned to take place in Foxe Basin, based out of the community of Igloolik. The three main components of the project were to be: 1) Unmanned Aerial Systems (UAS), or drones, used to collect high resolution aerial photographs of bowhead whales, for the development of a photo-identification (photo-id) catalogue; 2) crossbows used to collect small Biopsy samples consisting of both skin and blubber to contribute to updated population abundance estimates, and 3) up to 5 satellite tags 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, over time, 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. Updated data on bowhead movements is necessary to continue to monitor habitat-use, to detect any changes in movement patterns, and to help in planning future research activities. Bowhead whales in Foxe Basin were last tagged in 2013.

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

As a result of travel restrictions due to the pandemic, the specific objectives of our field efforts changed over the course of the year. While we made attempts to arrange for community-lead biopsy and UAV work in Foxe Basin, our efforts were unsuccessful. Instead, we were able to arrange for local guides to collect biopsy samples and conduct UAV work in Cumberland Sound. New project objectives included collecting samples from beached bowhead whales for investigation following the discovery of multiple dead bowheads (11) in southern Gulf of Boothia. In addition, we were able to set-up time-lapse cameras with the intention of monitoring scavenger-use of a bowhead carcass (from harvest) near the community of Sanirajak.

6. Materials and Methods:

The methods used for biopsy collection and UAV work in Cumberland Sound, were the same as those outlined in the project proposal, the only difference being the location of the work and the fact that the field work was carried out entirely by Nunavut Beneficiaries. Satellite tagging work was not completed.

For sample collection from beached bowhead whales, sample collection kits were provided to Kurtairojuark HTA in Kugaaruk and Spence Bay HTA in Taloyoak. With assistance from the HTAs, local hunters were employed to collect samples from 8 out of the 11 beached bowheads that have been reported to DFO in the area.

Monitoring of bowhead carcasses involves setting up time-lapse cameras to take pictures at set-intervals to monitor the use of the carcass by polar bears and other animals. This work is of particular interest to polar bear researchers and will inform on the potential importance of bowheads (harvest, killer whale predation, unusual mortalities) in the diet of bears and other scavengers.

7. Results:

The field work in Cumberland Sound was carried out successfully by Ricky Kilabuk and Eric Kilabuk between August and September 2020. 81 skin biopsy samples were collected and will be analysed and used towards future genetic mark-recapture abundance estimates as well as diet studies and epigenetic ageing studies. Analyses of UAV photographs identified 95 different whales in 2020. These whales have been incorporated into the photo ID catalogue.

In early October, four dead bowhead whales were discovered 60 km from the community of Kugaaruk. With assistance from Kurtairojuark HTA, local hunters were employed to collect samples. Samples were successfully collected from 3 of the 4 whales. In early November, Kurtairojuark HTA reported that another 4 dead bowhead whales were discovered in Committee Bay. On November 26, another beached bowhead in the Gulf of Boothia was reported by hunters from Taloyoak, followed by another carcass located near Keith Bay, and then one more additional carcass located again by Hunters from Taloyoak. In total, 11 carcasses were reported from the region between October 2020 and April 2021. Sample collection kits were provided to the HTAs in the two communities and contracts were set up to hire local hunters to collect samples and data. Despite the difficulties in accessing and sampling the whales in harsh winter conditions, samples were successfully collected from 8 out of the 11 whales. Tissue samples from seven of the whales were sent for inspection by a veterinarian and reports indicate no obvious underlying health concerns or evidence of starvation as a cause of death. Additional analyses are underway, however, a final determination of cause of death may be difficult due to the condition of whales.

In addition to collecting samples from the bowhead carcasses, we were also successful in setting up a time-lapse camera to monitor scavenger use of a bowhead carcass (harvested whale) near the community of Sanirajak. This work is of particular

interest to polar bear researchers and one of the goals was to gain insight on the potential importance of bowheads (harvest, killer whale predation, unusual mortality) in the diet of bears and other scavengers. While the camera deployment and operation was a success, the camera captured very little polar bear activity, likely due to the proximity to the community.

8. Discussion/Management Implications:

Tissue biopsy samples collected as part of this research program continue to provide the data necessary for updating bowhead abundance estimates through genetic capture mark recapture methods. These abundance estimates are important for management considerations, including determining appropriate harvest levels and modelling potential effects of implementing harvest carry-over provisions. To continue to improve abundance estimation there is a need to expand biopsy sampling efforts to cover a larger spatial scale, to sample a greater portion of the population. While our efforts to set-up community led field work in Foxe Basin were unsuccessful in 2020, the experience has better prepared us to set-up community led work in Foxe Basin in the future. Through conversations with the HTA managers, we began to develop a working relationship and have identified important contacts and potential field personnel for work in 2021 out of both Igloolik and Sanirajak. This lead to hiring a field crew out of Sanirajak who successfully carried out bowhead fieldwork in Foxe Basin in July 2021.

With the collection of UAV photographs in 2020, we now have 5 years worth of photo-id data from Cumberland Sound. To continue the development of the catalogue, additional analyses of UAV photographs was conducted to develop a revised scoring system (manuscript in review) for classifying photo quality and degree of marking for bowheads photographed by drone (as opposed to manned aircraft). Development of this new scoring system and classifying all photographed whales is a necessary step in identifying re-sightings between years. As with biopsy sample collection, an important next step in the photo-id study will be to expand data collection to cover more areas and sample a greater portion of the population.

9. Report by Inuit participants:

The field work conducted in 2020 relied heavily on Inuit participants in the form of conducting field work and reporting information through regular communications. While our Inuit partners haven't provided comments specifically for this report, the success of this past field season is directly due to their involvement and commitment to this work. In Kugaaruk, Joshua Kringorn regularly reported information on the bowhead carcasses, relayed observations from hunters, and helped to coordinate sample collections. In Pangnirtung, Ricky Kilabuk provided regular updates on his observations in the field, including reporting killer whale sightings and predation events as well as locations of bowhead carcasses reported by other hunters. To highlight our ongoing collaboration with Inuit research partners for research in

Cumberland Sound, we recently produced a manuscript (currently under review) detailing the mutual benefits of such a partnership.

10. Reporting to Communities/Resource Users:

Schedule of Consultations with HTOs.

Consultation	Date	Type	Status/Changes
Before Research	Nov 2019	Email correspondence proposing project and requesting support.	Completed
During Research	Aug 2020	In person meetings with HTO manager before and during field work to update on field research activities.	Not completed – In person meetings were not possible due to the pandemic. Instead we corresponded regularly through email and phone to coordinate community-lead field work.
Completion of Research	Fall/Winter 2020/2021	In person meeting to discuss findings from previous field season and to propose work for the coming year.	In person meeting have been delayed, but email and phone communications are on-going. Reports will be provided upon completion of analysis of samples from bowhead carcasses.