

**Issue:** Brief update on DFO Science Program in specific updates will cover the summer field season of 2017

**Background:**

Fisheries and Oceans Canada (DFO) Science conducts research in the Qikiqtaaluk Region of Nunavut by working closely with local Hunters and Trappers Organizations/Associations and communities. DFO consults with the communities and tries to meaningfully engage the communities in research questions, develop, planning and execution. It has been the practice and continues to be the practice that DFO consults by face-to-face meetings where all products (reports, presentations) are available in English and Inuktitut and an interpreter is hired for the meetings. Through these practices DFO has had the pleasure of working with communities on many successful research projects in the Qikiqtaaluk region. We wish to share brief updates from the field work completed this year on the current research projects in this region.

**Current Situation:**

**MARINE MAMMALS**

***Walrus***

DFO conducted a large-scale aerial survey to determine the abundance of Atlantic walrus across the central Arctic. The survey was a joint initiative with researchers from Central & Arctic and Quebec regions, and included observers from local communities. During the first 3 weeks of September, 3 planes covered the area from Clyde River, south along the eastern coast of Baffin Island, both the north and south shores of Hudson Strait across to western Hudson Bay. Photographs were taken of any walrus observed, and over the next year these will be counted to determine abundance estimates. DFO researchers also visited the communities of Igloodik and Hall Beach to provide updates to the HTOs and communities on Total Allowable Harvest of walrus.

***Bowhead Whales***

From August 15 to 24, a field team conducted boat-based field work in Cumberland Sound out of Pangnirtung and collected skin biopsy samples and aerial photographs of bowhead whales. Biopsy samples were collected using crossbows and bolts equipped with floats and 40mm biopsy tips. Photographs were collected using a small quadcopter unmanned aerial system (UAS) the DJI Phantom 4. In total, 108 bowhead tissue biopsy samples and 1014 bowhead photographs were collected

## **Seals**

This spring we did a photographic/infrared aerial survey of seals in Eclipse Sound, Milne Inlet, and Navy Board Inlet, from June 6 to 11, using twin otter. All was successful. Combining last year and this year's results, we plan to publish findings and return to the community to share and discuss the results.

## **Killer Whales**

Boat-based crew used Arctic Bay as a base for two weeks in late August to conduct non-systematic survey of the Admiralty Inlet area with an emphasis on Kakiak Point where they held camp. Killer whales were observed; however the field crew was unable to approach them close enough to conduct photographic work. Considerable killer whale activity was recorded in the Eclipse Sound region (Pond Inlet) and a sighting database was developed that included photographs submitted from local people.

## **Beluga**

An aerial survey of beluga found in Cumberland Sound was conducted in July and August 2017. This survey was designed to include both hunters information and past science information on the summer range of beluga in Cumberland Sound. The survey covered high density areas (e.g. Kangila Fiord), Clearwater Fiord and was expanded towards to the mouth of the Sound. The HTO Chair Noah Mosese attended all flights expect those over Clearwater Fiord. All strata were flown twice with Clearwater Fiord being flown 5 times - this repetition of flights adds confidence to the survey. The last abundance estimate for Clearwater Fiord Beluga was in 2014, this survey from 2017 will feed into the new abundance estimate scheduled for the end of 2018.

In addition to the aerial survey conducted in Pangnirtung, DFO lead research using UAS to photograph beluga whales in Clearwater Fiord. These photos were used to assess the possibility of photo-id studies on belugas. On 18 August 2017, 222 photographs of belugas were taken using the drone to evaluate the potential to use a small unmanned aerial system (sUAS) to survey the high concentration area typically occupied by beluga whales. Photographs were considered suitable for age class and body condition assessment but further analysis is required to assess use for photo-id. However, it was determined that the relatively large geographic size of the area used by belugas in Clearwater Fiord makes the use of a quadrotor impractical as a survey platform. Also, the quadrotor is not as stable a platform to collect imagery over a large area and the camera is not as good as the cameras in small fixed wing UAS.

## **MULTISPECIES RESEARCH**

### ***EAT Program***

EAT (Ecosystem Approach in Tremblay), was a success! The following animals were tagged: 20 Narwhals, 31 sharks, 2 Ring Seals and more than 170 fish (Arctic Char, Arctic and Polar Cod, Forn Horn and Slimy Sculpin). The environmental data collected included: water conductivity, water temperature, water depth, and five hydrophones were deployed along with two ocean current trackers (ADCP). Additionally, biomass estimates of primary food sources were completed – specifically we were able to collect

data on zooplankton and fish. This research was only a success because of the support from the community of Pond Inlet, local Inuit researchers and collaborations outside of DFO (Parks Canada, GN, Ocean Wise, WWF, Winnipeg Zoo, University of Calgary, University of Windsor, York University, UQAR, Golder and University of Montreal). The field camp had a total of over 40 participants that came and went over the course of the fieldwork. The Inuit researchers who were trained in tagging throughout the field camp successfully tagged 15 Narwhal, 20 sharks and 30 fish by themselves.

### ***Aquatic Invasive Species***

Experimental research on risks associated with domestic ballast (currently unregulated in Canada) is finished and published (MSc Theses). Recommendations based on this research are currently being brought forward for consideration by Transport Canada in the development of revised ballast water regulations this year.

Screening level risk assessment using Canadian Marine Invasive Screening Tool (CMIST) completed on a suite of 30 species considered to have potential for invading the Arctic. Species distribution modelling is underway on highest risk invasive species (identified through screening level risk assessment) to evaluate potential geographic locations in the Arctic with environmental suitability under current and future climate change scenarios. Initial results from a subset of 8 benthic species were recently published in the journal *Bioinvasions*.

There is ongoing research on developing a basis for a standardized monitoring and early detection program in the Canadian Arctic through development of environmental DNA (eDNA) as a potential tool for monitoring species introductions and shifts in biodiversity. Field work in and around the Milne Inlet port was conducted in August 2017 by DFO, University collaborators and 4 locally hired Inuit youth to characterize native and introduced biodiversity. This included collection of water samples for eDNA analysis, sampling of benthos, sampling for zooplankton and phytoplankton, and collection of CTD profiles on water quality as well as more detailed testing on effects of season and tidal cycles on efficacy of eDNA recovery.

Prior to conducting the field work, training workshops were held in Pond Inlet with local Inuit Youth who have an interest in environmental monitoring (January and August 2017). A subset of these youth participated in field work and are continuing to carryout data collection through the fall in support of eDNA research and community-based biodiversity monitoring. Hiring and workshops were coordinated through the Mittimatilik HTO and Ikaarvik.

This research on Aquatic Invasive Species will help in identifying key high risk areas and species for the coastal marine region of Baffin Island and marine waters adjacent to the Nunavut. Additionally, this research will help develop a cost-effective mechanism for regular monitoring at high risk port sites that involves the development of user-friendly sampling approaches and training/engagement at the community level. This information will enable further monitoring programs for invasive species in order to maintain the integrity of coastal marine ecosystems which are critical to the production and survival of harvested fish and marine mammal stocks in Nunavut.

## ***Coastal Environmental Baseline Program***

Iqaluit has been selected as the Arctic pilot site for this initiative. The baseline data collection program will be developed through engagement with northern partners.

### **FISH**

#### ***Arctic Char***

We were not able to complete Stock Assessment research in Cumberland Sound this year due to contracting issues within DFO. We look forward to speaking with the new HTO board in January about winter research ideas and continuing plans for Arctic Char Stock Assessment summer research in 2018.

The Stock Assessment Arctic Char research in Pond Inlet was a great success – we were able to collect samples from 200 fish from Koluktoo and Saatut, along with catch effort information and environmental data. Local fishers and youth were hired by the HTO to assist with the field research and be trained in fish sampling protocols. The Pond Inlet research was developed in collaboration with Pond Inlet; interviews, community meetings and HTO meetings were done in advance of research being developed. This current model of community engagement is on-going for this research with interviews of local fishers being planned for winter 2018.

We have a community-based Stock Assessment monitoring program running in Qikiqtarjuaq, but the timing for this fishing is the fall and winter. This research was developed in collaboration with the community of Qikiqtarjuaq and the Nattivak Hunters and Trappers Organization. We held meetings to discuss areas of concerns or interest for the community. The research question was developed in collaboration with the community to meet community concerns, interests and needs. In addition to the meetings, we interviewed fishers for their knowledge. This information was published as a DFO document (available on-line). DFO continues to work collaboratively with Qikiqtarjuaq on this research and we look forward to updating the Board in the future on the data collection for 2017/18 by email and if possible at a meeting.

Sylvia Grinnell Arctic Char project was a huge success! The Amaruq HTO, DFO and community field assistants worked together to collect the following data: stock assessment biological samples and catch effort information on 211 Arctic Char from Sylvia Grinnell; deployed and monitored a DIDSON that recorded the August migration of Arctic Char up the Sylvia Grinnell River (11 days); collected environmental data and ran an exhaustive creel survey on both anglers and gillnetters (121 creel surveys). Three technicians were hired through the HTO to help with the research, one was a returning employee from last summer and two were 1<sup>st</sup> year students from the Environmental Technology Program. We look forward to working with the Amaruq HTO over the winter to plan for next the field season.

Cambridge Bay Arctic Char program had a very successful summer field season in 2017. We were able to retrieve and redeploy 100% of our acoustic equipment in 2017 in both marine and fresh water environments. An additional 17 receivers were added to the Ferguson Lake acoustic array to help us understand what char do when they return

to freshwater to overwinter. These receivers will also help us understand behaviour of post-spawning char and how this species interacts with lake trout in fresh water habitats,

We were able to collect juvenile and spawning samples from three additional lakes in the Ferguson lake system for subsequent genetic analyses. 70 additional Arctic char and 30 lake trout were also tagged in the Ferguson Lake system

All told, our study will address key challenges in the current management of this important fishery relating to dispersal and stock mixing, provide information on critical freshwater and marine habitats and provide detailed information on the timing of migrations between these habitats all of which will provide important baselines in the face of climate change. This work continues to build on an already existing research program in the region that has tracked the marine migrations of Arctic char since 2013, and offers the opportunity of ensuring the continued operation of the longest uninterrupted acoustic telemetry program monitoring Arctic char in Canada.

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