

**NUNAVUT WILDLIFE RESEARCH TRUST FUND
FINAL PROJECT REPORT
2021/2022**

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PROJECT TITLE: Pond Inlet Arctic Char Fishery Development Research Program

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SUMMARY

The community of Pond Inlet has been trying to redevelop their Arctic Char fisheries over the past few years. The local fishers have put in great efforts to collect biological samples in accordance with their exploratory fishing licence. Data the fishers' have collected will be used in a stock assessment analysis to provide managers, the HTO and the community with a stock status update. To support the fishers' data and provide a complete and well executed stock assessment analysis fishery independent baseline biological data is required. This research aims to work with the community of Pond Inlet to collect baseline biological data from two (2) Arctic Char stocks in the Pond Inlet area (Koluktoo Bay and Saatut), as well as, local knowledge and fishing practices on these stocks. Collectively this information will fill knowledge gaps on Pond Inlet Arctic Char fisheries and provide managers more information to inform their future decisions regarding the fishery.

To augment the fishery independent survey, we collected data to address which stocks are contributing to the mixed-stock fishery. It is known that the Pond Inlet

Arctic Char fishery harvests in the open ocean where multiple stocks may be present at any given time. This is called a mixed-stock fishery.

In addition, during 2020, the community expressed concern that the marine shipping traffic from the Mary River development has caused a substantial decline in the Koluktoo Bay stock (See Appendix B). The gathering of data and analysis of the stock status will be a powerful test of the habitat impact from marine shipping on the stock.

PROJECT OBJECTIVES

The main purpose of this study is to develop and implement a fishery enhancement research project in the community of Pond Inlet. Over the next few years we are looking to provide stock status updates, document current fishing practices and document the local knowledge of the Arctic Char fisheries. For this project year (2021-22) we collected baseline data from Koluktoo Bay and juveniles from their proposed natal stocks that will meet the following objectives:

SPECIFIC OBJECTIVES:

- 1) Continue data collection that will be used to compare current data to historical data to determine the current status of the stocks. This data will support the already existing fishers' data and not be a duplicate effort in that information on sex, age at sexual maturity, reproductive capacity as well as standard age and size information will be collected using multi-mesh nets (the fisherman's data was age and size from commercial nets). These data will be used to estimate stock biomass;
- 2) Continue data collection for abundance estimate analysis (e.g. CPUE and catch information);
- 3) Continue gathering local knowledge on Arctic Char fisheries in the Pond Inlet area (interviews and consults from past research will continue to be used as well); and
- 4) Collect juvenile Arctic Char from natal lakes or rivers to begin baseline data collection to determine mixed stock fishery input.

MATERIALS AND METHODS

This project includes four (4) components within the research design: Field Data Collection, Local Knowledge Gathering, Laboratory Processing and Data Analysis, and Natal Stock Juvenile Data Collection. Each method is presented individually for clarity and then followed by an explanation to illustrate how all of the components fit together to achieve the overall research objective.

Field Data Collection:

The collection of biological data from Pond Inlet Arctic Char stock was conducted on Koluktoo Bay exploratory stock. Two hundred (200) Arctic Char were sampled

using multi-mesh gillnets (VanGerwen-Toyne and Tallman 2011). The use of multi-mesh gillnets permitted sampling of Arctic Char of all sizes and ages.

Location data such as position (determined by GPS), time of year, time of day, net depth, water temperature, weather and other environmental conditions were recorded for each net set. To estimate catch effort, the net type, set time, lift time and soak time was recorded. The fork length (mm), round weight (g), gonad weight (g), sex and maturity stage, structures for determining the age and stomach contents of each fish were collected. Additionally, ovaries from mature females were collected and preserved as a means to estimate fecundity (egg number per female). Tissue samples that could be used in future molecular assessments were also collected. Finally, observations of parasites and general health of the fish were also recorded.

Local Knowledge Gathering:

Interviews of local fishers were completed in 2014 (funded by NWRT) and this information has informed this current study. To continue the collaboration of local knowledge and science within this research the Mittimatalik HTO was engaged and fisher interviews will continue for the duration of the project. The interviews are designed to be open format with guiding questions relating to the Pond Inlet Arctic Char fisheries. All questionnaires were approved by the Mittimatalik HTO and conducted in a face-to-face format in both Inuktitut and English.

Laboratory Processing and Data Analyses:

Ages of sampled fish will be determined by embedding, sectioning and reading the aging structures (pelvic fins and otoliths). Preserved eggs will be measured and counted to determine egg size and fecundity.

The data collected from this research along with the data collected by the local fishers (fork length, weight, sex and maturity) allowed for the assessment of the age and length structure, growth rate, sex ratio, physical condition, age-at-maturity, egg-number-per-female (fecundity), reproductive potential, mortality rates and abundance estimates for these Arctic Char populations. The data analysis will involve a standard stock assessment protocol with age-based parameters and catch-curve based abundance estimates being presented.

Natal Stock Juvenile Data Collection:

Juvenile Arctic Char from proposed natal stocks were collected to determine baseline genetic structure of each stock. The natal stocks selected were advised on by a panel of elders, fishers and knowledge holders from Pond Inlet. We will hold a workshop to allow for the knowledge sharing and conduct individual interviews should this be requested/advised. From each natal stock 30-50

juvenile Arctic Char were captured using a variety of methods: small mesh gill nets, dip nets and seines. Whole fish were preserved and sent to the Freshwater Institute in Winnipeg for analysis. Genetic samples taken by fishers and from the fishery independent survey will be compared to these natal stocks to determine how many stocks are contributing to the fishery, which stocks and at what rate. This will be fundamentally important information for managers, the community and stakeholders to have to be able to make decisions on sustainable fishery development.

Collectively, all the components of this research along with the fishers' data will feed directly into a stock assessment analysis which should provide managers knowledge on the current stock status, analysis of mixed-stock fishery inputs, document current fishing practices in the area and document local knowledge of the fisheries. Since managers will be asked to make decisions on these stocks in the near future, filling these knowledge gaps is important.

Training:

This research program hired 4 Inuit fishers to undertake fishing and data collection. All fishers were trained in DFO Scientific Stock Assessment Data Collection. As well, Inuit youth were also part of the Data Collection team. The youth were afforded the opportunity to learn about general life of the land by the experienced Inuit fishers.

REPORT BY INUIT PARTICIPANTS

The Report by Inuit Participants will be handed out. We hope to speak with people when we are in Pond Inlet to collect their reports and feedback to include in our final report to the NWMB and help us understand their report so we can meaningful respond to feedback with improvements to the project.

PROJECT SCHEDULE

Summer sampling at Koluktoo Bay (2021) was accomplished. We are planning to complete Saatut research in 2023. We are moving forward with plans to propose and develop a Mixed-Stock Fishery Analysis which is essential to have when all Stock Assessment Research is complete. With the Stock Assessment Research, Traditional Knowledge and the Mixed-Stock Fishery Analysis we aim to provide a complete picture of the fishery as it currently stands.

RESULTS/DISCUSSION/MANAGEMENT IMPLICATIONS

Field Data Collection:

Samples of Arctic Charr were collected as planned at Koluktoo Bay (Figure 1 and 2). 203 Arctic Charr were sampled for length, weight, sex, sexual maturity, ageing structures (otoliths and fin clips) and genetic structures (fin clips)

Local Knowledge Gathering:

DFO met with the MHTO in May of 2016 and again in May of 2017 and August 2021. The MHTO was happy with our research plans and asked that we keep them updated by email. They were not interested in annual meetings; they have enough meetings at the moment and are happy with this research project. We have been in contact with the MHTO by email on an almost monthly basis and in person when field work is being conducted. We plan to meet with the MHTO and the community in the next funding year.

REPORTS TO COMMUNITIES/RESOURCE USERS

Results for 2021-2022 were reported back to the MHTO via in-person or on-line meetings in 2022. Our goal will be to stay in close contact with the MHTO and community by in-person visits, phone calls and emails. Following our May 2018 meeting the MHTO stated that they were glad to see that we were planning to continue the work and provided DFO with multi-year support.

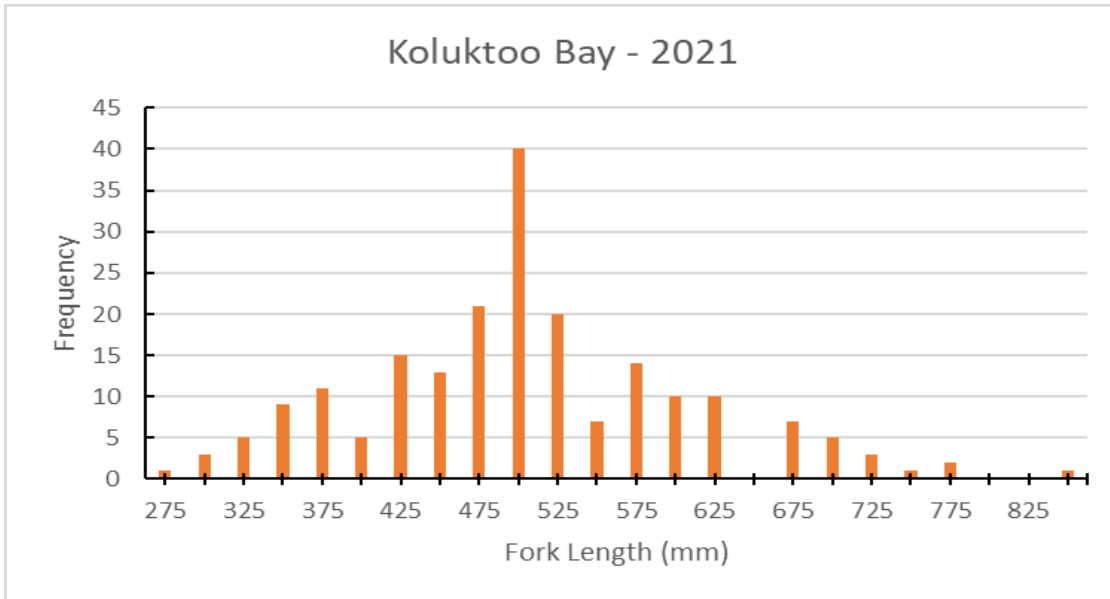


Figure 1. Length frequency distribution of Arctic Char caught at Koluktoo Bay 2021.

	<u>Maximum Fork Length</u>		<u>Minimum Fork Length</u>		<u>Average Fork Length</u>	
	(in)	(mm)	(in)	(mm)	(in)	(mm)
Koluktoo	33.1	840	9.9	251	19.4	493

	<u>Maximum Round Weight</u>		<u>Minimum Round Weight</u>		<u>Average Round Weight</u>	
	(lbs)	(g)	(lbs)	(g)	(lbs)	(g)
Koluktoo	10.5	4766	0.3	148	3.0	1389

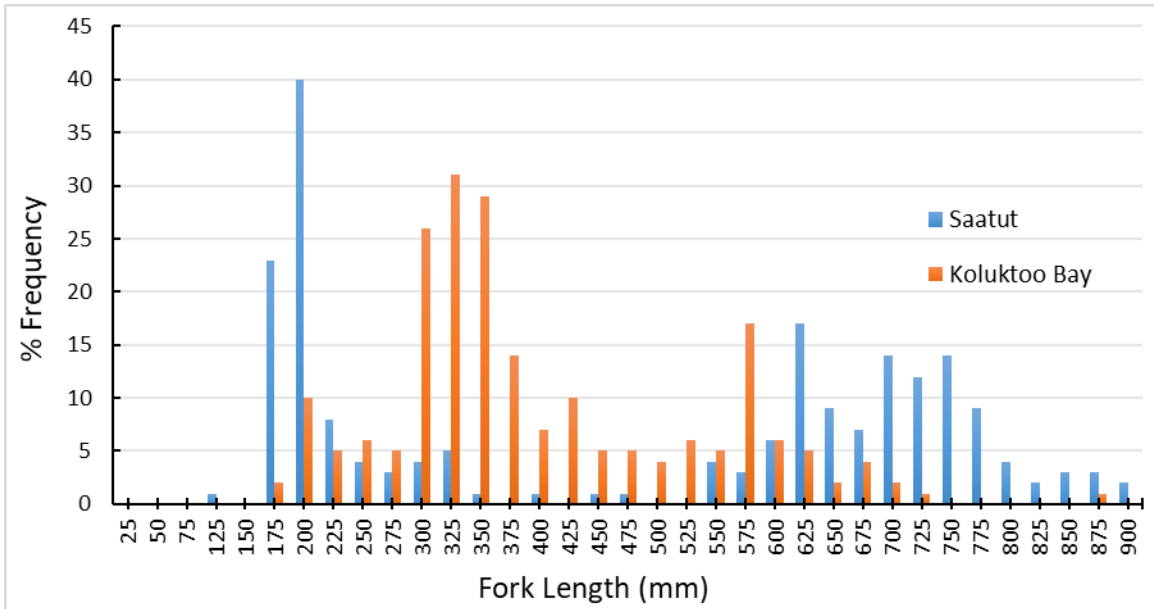


Figure 2. Length frequency distribution of Arctic Char caught at Koluktoo Bay and Saatut fishing locations in 2019.

** Mr. O'Dell has recently moved to a new position the DFO Pacific Region in Whitehorse. We will still be in collaboration but there will be a new biologist selected for the Iqaluit position in the coming months.

APPENDIX A. Map of Pond Inlet Region showing study sites.

Figure 1. Locations to Satuut and Koluktoo Bay relative to Pond Inlet.



Figure 2. Locations for collection of juvenile samples for genetics work.



APPENDIX B Communication

Normally, communication would be accomplished by some remote means but mainly by having a meeting with the HTO in late May and early June and then possibly again in the September to December months. However, our communication has been limited by the COVID-19 and restrictions on travel. Simon Wiley (DFO) sent messages about once per month from April to August. Understandably with the concerns over the Mary River Iron Mine the community was busy with other things. Attached is an email connection regarding our main proposal. Recently, We have been having much more involved communications to set up our work this winter and in the summer. See below for the email string. Note the initial message was one to DFO regarding the community concerns about the mine effects on Kuluktoo Bay Arctic Charr.



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