

1. NWSF Project Number: NWSF-2019-007

2. Project Title: Establishing a community-based sampling program for Arctic Char stomachs, tissue and biological data in Coral Harbour

3. Project Leader:

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4. Summary:

For millennia Arctic char have been a traditional, stable food source for the Inuit of Nunavut, including the residents of the communities along the Kivalliq coast. In addition to the important subsistence fisheries that occur throughout the region, commercial harvesting of Arctic char began in various communities throughout the Kivalliq in the early 1960's. Despite its importance in both subsistence and commercial fisheries in the region, there is a lack of samples and there is a scarcity of data on the general biological characteristics of these fish stocks. The purpose of this research program was to establish a community-based monitoring program in the community of Coral Harbour that will permit the collection of Arctic char samples and biological data. Up to 200 samples (including stomachs, tissue and biological data) will be collected from the waterbodies surrounding the participating communities where Arctic char are typically harvested. Arctic char. The motivation for this research stemmed from the Kivalliq Arctic char Workshop that was held in Rankin Inlet in February 2019. This workshop consisted of representatives from Fisheries and Oceans Canada (DFO), the Government of Nunavut (GN), the Nunavut Wildlife Management Board (NWMB), the Kivalliq Wildlife Board (KWB), and Hunter and Trapper Organization (HTO) representatives from each of the Kivalliq communities. The goal of this meeting was to identify regional interests and research priorities pertaining to Arctic char. A top priority for community representatives that emerged from this meeting was to have a better understanding of Arctic char diet. DFO proposed the idea of a co-managed (between DFO and participating HTOs) Arctic char sampling project for future diet and food web analysis. The premise was to initiate a community-based sampling program within each interested community where local subsistence fishers would be offered payment for providing stomachs, tissue samples and biological data from harvested Arctic char. This NWSF proposal sought funds to cover the payments for fishers and shipping costs associated with transporting samples to DFO for analysis. DFO will cover costs associated with the analyses. Reports summarizing the results will be provided to each community within the Kivalliq region as well as other co-management partners.

5. Project Objectives:

Based on discussions at the 2019 Kivalliq Arctic char workshop, the specific objectives of this project aimed to:

- Establish a community based sampling program in Coral Harbour with the intent that local fishers would collect stomachs and tissues from subsistence harvested Arctic char in the region.
- Assess stomach contents in Arctic char for diet analysis.
- Report the results back to the community (via community reports and posters).

6. Materials and Methods:

DFO supplied sampling kits to the Aiviit HTO and the HTO distributed sampling kits to local Arctic char fishers from the community. Local fishers sampled their subsistence catch of Arctic char for stomachs and a piece of tissue. When possible, biological data (length, weight, sex and maturity) were recorded as well as the date and location of harvest. Rewards were offered for sample kits that were returned to the HTO that contained Arctic char stomachs and a piece of tissue. At the end of the summer fishing season, the sample kits were returned to DFO for processing.

Stomach content analyses were performed on a subset of Arctic char samples. The stomach sample was briefly thawed and sample ID and, if available, location and date of capture were recorded. The degree of stomach fullness (F = Full (distended); PF = partially full (obvious contents, not completely distended); NE = near empty (few contents); or E = empty) and State of Digestion (I = Intact; PD = partially digested; D = digested (individual stomachs may include some intact and some digested prey items)) was also recorded. Total stomach weight and stomach lining weight were recorded. Diet items in each stomach were identified to the lowest practical taxonomic level (preferably to species) and all individual diet items per stomach were enumerated (counted) and total wet weight of unique items per stomach was determined. Photographs of all stomach contents for each sample were taken. If gonads were present in the sample, sex, maturity and gonad weight ($\pm 0.01g$) were all recorded. Weights of any other potential organs (if available) were also recorded. For this report, the top 10 most consumed prey items by number and weight are described

7. Results:

Arctic char were collected in the summer of 2019 by local fishers from the community of Coral Harbour. The samples were shipped from Coral Harbour, however the cooler went missing in Rankin Inlet. We were unable to locate cooler, therefore we are unable to provide any information on these samples (locations, sample sizes, etc.) and no subsequent diet analyses could be performed.

8. Discussion/Management Implications

Having a clear understanding of Arctic char diet is important when managing this species in changing Arctic ecosystems. Fisheries management of Arctic char in the Kivalliq region should focus on promoting char health and sustainability, but it should also consider potential impacts to the entire food web by examining short and long-term diet patterns and trophic structuring as a way to identify potential shifts in foraging as a result of changing conditions or perturbations the ecosystem. Ecosystem-based approaches to management are now becoming an increasingly popular framework for conservation

efforts, especially within the marine environment. Indeed, a primary objective of DFO Sustainable Fisheries Framework (SSF) is to establish ecosystem-based approaches to fisheries management and this management approach is increasingly being used across Canada. Ecosystem-based management also allows for comparisons between historical baseline information and contemporary findings, which in turn have supported the conservation of species and critical biological integrity within this ecosystem. Indeed, observing changes within the marine food web through methods of diet analysis for culturally and economically important species, such as the Arctic char, will be crucial for informing future management decisions. Using the results from future studies will provide important baseline information for future research and assist in the successful implementation of ecosystem-based management across Arctic environments.

The SSF also aims to manage fisheries through the implementation of Integrated Fisheries Management Plans (IFMPs). The long-term objective for this fishery involves the eventual development of an IFMP which includes, among other things, information on the biology and ecology of Arctic char that will help make informed management decisions. Thus, the results of future work will be relevant for inclusion in an eventual IFMP for Arctic char in the region that will include the most recent biological and stock status information on this species. Additionally, the data collected as part of future project will increase our understanding of food-web dynamics in the region which will be directly relevant for developing ecosystem-based approaches to fisheries management.

All told, future studies such as this will provide important baseline information on the foraging of anadromous Arctic char in the marine environment, particularly in the Coral Harbour region of Nunavut. Exploring the diet of anadromous char in different areas along the Kivalliq coast and across Nunavut will provide a clearer picture of char diet across this species' range and if the results observed here for the Coral Harbour area are common in other areas of the territory. With the continuing impacts of climate change and the poleward migration of temperate species, additional diet studies on Arctic char will be crucial for examining potential shifts in the food web structure. This study now provides important baseline data that could be used to test for such shifts in diet and/or trophic positioning, the results of which should prove to be valuable in future ecosystem-based management initiatives. Given the historic data poor conditions of Arctic char in the Kivalliq region, future research studies should build off of this project, incorporating methods of stable isotope and fatty acid analysis to examine diet shifts over longer periods of time. Results from this research will be a key component of ensuring the long-term sustainability of species and the integrity of changing Arctic ecosystems through the holistic approach of ecosystem-based management.

9. Reporting to communities/resource users

The results of the overall program (including all communities) were presented at the 2020 Kivalliq Arctic Char Workshop held in Rankin Inlet that consisted of representatives from Fisheries and Oceans Canada (DFO), the Government of Nunavut (GN), the Nunavut Wildlife Management Board (NWMB) and Hunter and Trapper Organization (HTO) representatives from each of the Kivalliq communities. The results of this work were also presented at KWB annual general meeting. Community reports that will be translated to Inuktitut are currently being finalized and will be provided to the HTO for subsequent distribution within the community.