

Final Project Reports

1. **NWRT Project Number:** 3-19-09
2. **Project Title:** Community-based fisheries monitoring in Qikiqtarjuaq Fishing Areas.
3. **Project Leader:**

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4. **Summary:**

Qikiqtarjuaq is an island community located on the north shore of Baffin Island along the Davis Strait at the northern end of Auyuittuq National Park. Arctic char is an important subsistence and commercial fish and is an important factor in maintaining traditional lifestyles for the community. As compared to other Arctic char fisheries in Nunavut, only a few studies have been done in Qikiqtarjuaq community fisheries areas. The objective of this project is to monitor Arctic char stocks in Qikiqtarjuaq commercial fishing areas through a community-based fisheries monitoring program. The community was consulted, and a TEK survey was conducted. Information from that TEK survey is being used as a baseline for scientific research on Arctic char. A multi-year information collection program has been developed to gather the commercial fisheries monitoring data utilizing the skills and local knowledge of the fishermen in the community and the administrative and management support of local Hunters and Trappers Organizations (HTO). DFO researchers have trained the community in fish sampling and fisheries data collection, including fish size, weight, age structures, sex, maturity, and catch and effort data collection. This study will provide indicators of Arctic char commercial stocks health and relative abundance. This is a step towards evaluating total allowable harvests for char stocks, developing a comprehensive sustainable fisheries management plan. The information collected will provide the basis for developing effective management of Qikiqtarjuaq char fisheries in the coming years. The current year, 2019-2020, is the fourth year of this study.

5. **Project Objectives:**

The objectives of this research are:

- Collection of biological data from Arctic Char commercial fisheries for stock assessment
- The identification of indicator stocks in Qikiqtarjuaq fishing areas
- Utilising the skills and local knowledge of the fishermen in the communities
- Completion of an integrated Inuit Qaujimagatuqangit-scientific stock assessment
- The training of community fishery monitors and community co-researchers
- Gather information to provide scientific advice for the management of char

- Promoting fisheries development while ensuring conservation and sustainability of Arctic Char resources

6. **Materials and Methods:**

Qikiqtarjuaq is an island community located on the north shore of Baffin Island along the Davis Strait at the northern end of Auyuittuq National Park. Arctic char is an important subsistence and commercial fish for the community of Qikiqtarjuaq. The Qikiqtarjuaq community traditionally harvests char from the lake and river systems around Qikiqtarjuaq, including Natluksiak Lake, Nudluit Lake, Tunusuk Lake, Avaliggut Lake, Kagniliajuk Lake within and outside the boundaries of Auyuittuq National Park.

The monitoring of commercial Arctic char was continued during the financial year 2019-2020. During 2019-2020, two water bodies were sampled in winter, including Circle Lake and Paddle River in Paddle Fiord. Due to COVID-19 restrictions, Nudluit Fiord sampling was not completed in March 2020. 400 fish were sampled from two locations to study their relative abundance and biology, including size and age structure and sex ratio. Fishers also provided information about their effort and catch to calculate Catch Per Unit Effort (CPUE). Due to COVID-19 restrictions and remote working, datasheets and samples from 2019-2020 sampling are still with the HTO and will be analyzed when received. Last year, ageing was delayed due to COVID-19 restrictions. Stock assessment models, including life history invariants and maximum surplus production models, will be used to determine the stock abundance and total harvest levels after analysis of data. Results will be compared with previous surveys and will be shared with the stakeholders.

7. **Results:**

Size-based indicators are used to describe the response of fish populations to exploitation. Fork length of Arctic char in data from 2016-2019 was analyzed for length frequency, and data from 2016-2018 was analyzed for age frequency distribution. Initial results are indicating a good number of large size fish in the populations (Figures 1 to 3). There is a higher frequency of large fish in Nudluit Lake in recent years compared to 1996 (Read 2000), which is a healthy sign (Figure 1). However, in 2019, data is showing a decrease in the number of young recruits to the fisheries. Data for 2019-2020 is still with the HTO and will be analyzed later to follow the trend.

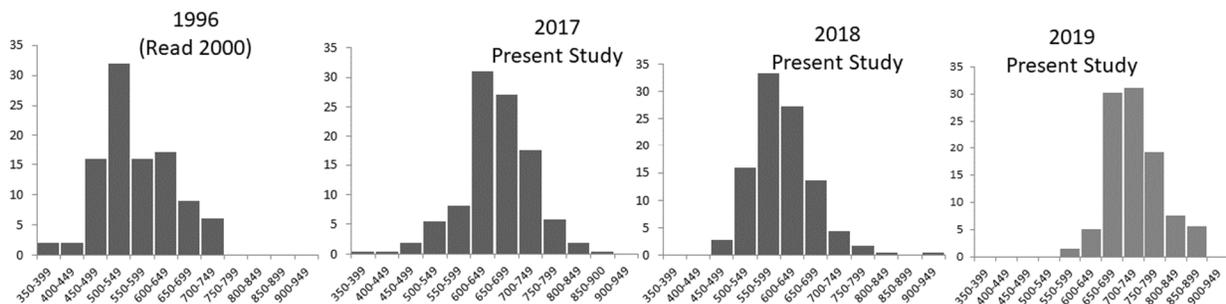


Figure 1: Comparing Nudluit Lake Length Frequency. A comparison of the years 2017 to 2019 with 1996 (Read 2000). 2019-2020 data is not shared with the HTO yet.

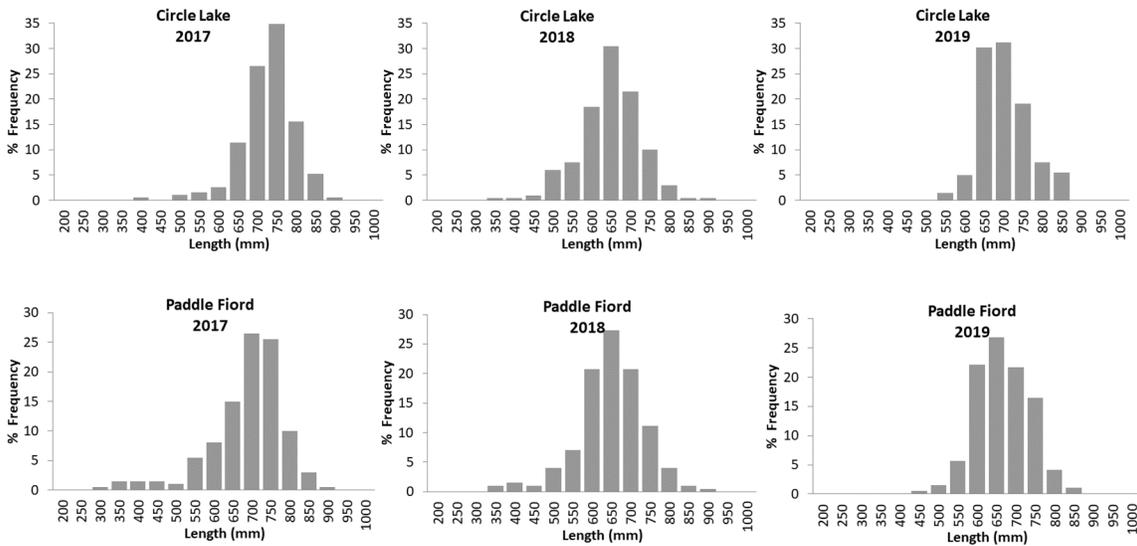


Figure 2: Length-frequency distributions of Arctic Char from the Paddle Fiord and Circle Lake in Qikiqtarjuaq commercial fisheries areas 2016-2017 and 2017-2018 2018-2019. 2019-2020 data is not shared with the HTO yet.

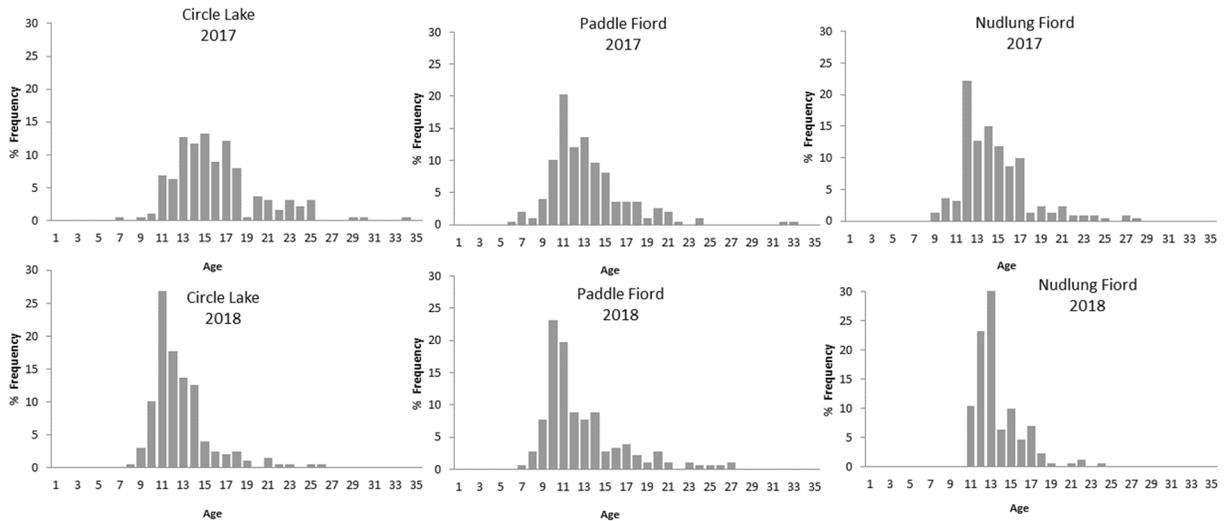


Figure 3: Age-frequency distributions of Arctic Char from the Paddle Fiord, Nudlung Fiord and Circle Lake in Qikiqtarjuaq commercial fisheries areas (2016-2017). Ageing for 2019 samples is still in progress.

Mortality is a key component to understand the population dynamics of fish species. Total mortality can be estimated from in sequence decline observed in age classes of fish. It can be used to measure the Annual survival rate. Annual mortality and survival rates in all water bodies in 2016-2017 and 2017-2018 are at a moderate level (Table 1). Fish ageing for 2019-2020 samples is delayed and under process in the lab.

Table 2: Calculations of the instantaneous mortality (z), natural mortality (N), Fishing mortality (F), annual total mortality (A) and rate of survival (S) for Arctic Char from Paddle Fiord, Circle Lake and Nudlung Fiord in Qikiqtarjuaq commercial fisheries areas (2016-2017, 2017-2018).

	Fishing Area	Total Mortality (Z)	Natural Mortality (N)	Fishing Mortality (F)	Annual Mortality (A)	Annual Survival rate (S)
2016-2017	Paddle Fiord	0.204	0.141	0.063	18.5%	81.5%
	Circle lake	0.185	0.134	0.050	16.7%	83.3%
	Nudluit Fiord	0.238	0.155	0.084	21.2 %	78.8%
2017-2018	Paddle Fiord	0.197	0.143	0.054	17.9%	82.1%
	Circle lake	0.279	0.16	0.119	24.4%	75.6%
	Nudluit Fiord	0.269	0.154	0.115	23.6%	76.4%
2018-2019	Paddle Fiord	*Ageing is in process				
	Circle lake	*Ageing is in process				
	Nudluit Fiord	*Ageing is in process				
2019-2020	Paddle Fiord	*Awaiting samples from HTO				
	Circle lake	*Awaiting samples from HTO				

8. Discussion/Management Implications:

Initially, this project was proposed for five years. However, NWMB funding was not available to continue the fifth year (2020-2021). After completing data analysis, stock assessment models, including life history invariants and maximum surplus production models, will be used to determine the stock abundance and total harvest levels. Results will be compared with previous surveys and TEK. This study will provide indicators of Arctic char commercial stocks health and relative abundance. This is a step towards evaluating total allowable harvests for char stocks and the development of a comprehensive sustainable fisheries management plan. The information collected will provide the basis for developing effective management of Qikiqtarjuaq char fisheries in the coming years. It will help in developing sustainability criteria and make recommendations to the community and stakeholders.

9. Report by Inuit participants:

HTO has been requested to provide information on the project and Inuit involvement by providing a questionnaire.

10. Reporting to communities/resource users:

After completion of analysis and end of COVID-19 restrictions, a results reporting workshop will be held in Qikiqtarjuaq with HTO Boards members and to report and discuss results and plans.

11. References

Read, C.J. 2000. Information from Arctic charr fisheries in the Baffin Region, Nunavut, 1995 to 1999. Can. Data Rep. Fish. Aquat. Sci. 1067: x + 176 p