## APPENDIX A

**Project Title:**

Temperature tolerance of migratory Arctic Char (2018)

**Project Description:**

Warm temperatures can limit the maximum performance of fish hearts, which results in an oxygen shortage that can impair migration. While this limitation has been well studied in more southern fish, little research has been conducted on culturally and economically important arctic fish such as Arctic Char. This lack of information is especially concerning as the Arctic is warming much faster than the other parts of the world. Based on these concerns our project has three goals:

1.Determine the ability of adult migratory Arctic Char to tolerate warm water
2.Use this information to help make predictions about how char migrations will be affected by climate change
3.Demonstrate that we are able to conduct this type of research in a remote Arctic field setting using the newly developed research infrastructure in the Cambridge Bay area.

To achieve these goals we will capture adult Arctic Char by angling or gill netting, move them in cool water to a holding pen and then warm them in a tank while monitoring their maximum heart rate. Fish will be anaesthetized (put to sleep) during these experiments so that they do not experience discomfort and maximum heart rate will be achieved through injections of two pharmaceutical drugs that are commonly used in humans, one that prevents the brain from slowing down the heart and another that acts like adrenaline to stimulate the heart. As the fish are warmed up their maximum heart rate increases to a point where it cannot increase any further and then it begins to fail. By looking at these points we can determine optimal (good), sub-optimal (harmful) and critical (lethal) temperatures for migratory Arctic Char. We can then compare these temperatures to those measured in streams and rivers in the area and to predicted temperatures to identify areas where the performance of Arctic Char migration may be impaired, information that would be useful for management. In 2018 research will take place at the commercial fisheries sites at Lauchlan River (Byron Bay) and Jayko River (Tahiryuaq). One researcher and one local field assistant will camp at the commercial fisheries sites. The local field assistant will be hired through the

**Schedule:**
Earliest Start: July 27
End: September 15

**Personnel:**

- Estimated Number of Personnel: 2
- Estimated Number of Days on site: 30
- Total Number of person days: 60

**Land use:**

- Scientific Research
- Temporary Structures

**Licensing Agencies:**

- NWB, DFO, KitIA, Nunavut Planning Commission, EHTO

**Equipment:**

- Generator x1: Backup power supply
- Inflatable boat with outboard motor
- 2 personal tents, 2 wall tents

**Fuel use (On site)*:**

- Gasoline: 5x 20L (100L total), Supply for outboard motor.
- Diesel: 5x20L (100L total), Backup supply for Generator.

*Spill contingency plan in place on site

**Water Consumption:**
0.22$m^3$/day

**Environmental Impacts:**
We have specifically chosen these locations because they are the sites of commercial and subsistence fisheries and are routinely used by residents of the Cambridge Bay area. As such there is already has some level of disturbance including regular camping and permanent structures (e.g. Cabins). We do not anticipate any substantial environmental impacts based on the fact the area is already in active use, and given the small scale of the proposed project, with operations consisting of only 2 people camping and conducting fisheries research for up to 30 days. To further mitigate risk of environmental impacts we will keep stored fuel and waste away from shore (>100ft) and have a spill contingency plan in place.

**Locations:**
Lauchlan River: 68.94°N -108.53°W
Jayko River: 69.7°N -103.3°W