Development of Three Techniques to Improve Arctic Grayling (*Thymallus arcticus*) Enumeration and Habitat Design

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Baseline assessment, regulatory monitoring, and fisheries management in the Arctic are subject to limitations due to data collection and field program logistics. Field program limitations can lead to assumptions being made that will affect the design and implementation of fish habitat projects. Increased pressure of industrial development in the Arctic also creates the need for a better understanding of Arctic fish and their interaction with their habitat. The Arctic grayling (*Thymallus arcticus*) is a key and environmentally sensitive fish species, used for sport and food in the North. The Arctic is also expected to experience increased climate change effects and may impact Arctic Grayling and their behavior in response to the changing environmental conditions.

My thesis will develop three techniques to support improvement of Arctic Grayling enumeration and habitat design. Specifically, I will be determining Arctic grayling habitat preferences, migration timing cues and validating camera enumeration methodology. These techniques will provide:

1. an improved understanding of hydraulic habitat preferences to improve habitat designs and reduce the amount of post-construction modifications needed;
2. identify migration timing predictors to improve the understanding of Arctic grayling life history and response to their environment; and
3. validate a remote enumeration technique for Arctic streams to provide longer and more complete data sets.

These techniques will be developed using existing data sets that have been collected as part of regulatory compliance monitoring programs. The enumeration technique is a field project using wildlife cameras images that are compared to the existing, physical fish counting data near a Northwest Territories mine.