**Nunavut Planning Commission Application 149242 – Draft**

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**Project Name**: The effect of warming on aquatic invertebrates in the Kitikmeot

**Proposed Dates**: June 24, 2020 - July 8, 2020.

**Proposed Activities**:
June 24, 2020 – June 30, 2020: Community consultation and outreach
July 1, 2020 – July 8, 2020: Preliminary lake surveys
May-Sept 2021: Data collection & outreach
May-Sept 2022: Data collection & outreach
May-Sept 2023: Data collection & outreach
Summer 2024: Town halls, community consultation, outreach

**Project Description**

**a) Contribution to field of research and relevance to northerners**

Temperature has significant effects on individuals and populations. However, we lack the ability to predict how temperature shapes multi-species communities. To help fill this knowledge gap, the long-term focus of this research program is to characterize and predict how temperature structures zooplankton and insect communities in the Canadian Arctic. Over the next five years we will focus on two broad hypotheses. Hypothesis 1. Warming has resulted in an increased prevalence of smaller-bodied and warm-tolerant individuals, and an increase in the number of smaller-bodied species. These body size shifts can be due to species redistributions, phenotypic plasticity, and evolutionary adaptation, and they have important ecological consequences. Hypothesis 2. Warming decreases the availability of essential fatty acids in aquatic systems. This decrease reduces the overall productivity of aquatic communities, and reduces the species diversity and productivity of nearby terrestrial communities.

This research is relevant to northerners because it focuses on how temperature affects freshwater zooplankton and insect communities in the north. These animals are key food items of fish like Arctic char and juvenile trout. The presence of healthy zooplankton populations also indicates that water bodies are low in toxins.

**b) Main project objectives / research question(s)**

There are two main research questions and we anticipate collecting three years of data for each project. Project 1. We will test the prediction that warmer lakes house a higher proportion of smaller-bodied and warm-tolerant zooplankton species. Project 2. We will test the prediction that semi-aquatic insects (e.g. mosquitoes) that emerge from warmer lakes are smaller in size, and contain fewer nutrients, compared to semi-aquatic insects emerging from colder lakes.

**c) Field methodology**

Project 1: a) Survey zooplankton from 20 lakes; b) assay temperature tolerance of two species of zooplankton from each lake (to be done at CHARS); c) assay long-term evolutionary responses of zooplankton to increased temperature (to be done at the University of British Columbia). Project 2: a) collect and assay nutrient profiles of semi-aquatic insects emerging from the same 20 lakes as in Project 1; b) create insect-exclusion plots at each lake; quantify plant species diversity and productivity inside and outside exclusion plots; c) grow Arctic mosquito larvae at 5 different temperatures in the lab, assay nutrient profiles of all adult mosquitoes (to be done at UBC)