

NUNAVUT PLANNING COMMISSION APPLICATION 149242

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

2020

Overview of Proposed Activities: June 24, 2020 - July 8, 2020

June 24, 2020 – June 30, 2020: Community consultation and outreach

July 1, 2020 – July 8, 2020: Preliminary lake surveys

Project Description – Summer 2020 component

June 24, 2020 - June 30, 2020

We will consult with community members in the Hamlet of Cambridge Bay. Our goal is to obtain feedback from the community on our proposed research. We would like to ensure that we are conducting research that is important for the community. We are open and flexible in our methodology and we will integrate feedback from the community into our proposed research. We are also planning to conduct outreach events on freshwater health in the elementary and secondary school, and in the community hall or library.

July 1, 2020 - July 8, 2020

We will travel to 10 lakes within a 2.5 hr ATV ride of the Canadian High Arctic Research Station. We will collect small (1L) samples of water from these lakes and identify the invertebrate species in these samples. These lakes are part of a larger research project on Arctic aquatic ecosystem health being conducted by Prof. Milla Rautio and colleagues. Their study is funded by NSERC and by POLAR (NST-1718-0013).

2021-2024

Overview of Proposed Future Activities: 2021-2024

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 – FULL PROJECT (2020-2024)

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)