

2020 Executive Summary

Lead investigator: Karen Jorgenson, MS Student, University of Wyoming

Title of grant: The role of food web structure and resource availability in providing refugia for threatened alpine invertebrates.

Although it is well established that alpine aquatic invertebrates are highly threatened by climate change due to rising stream temperatures, we still know very little about how food web structure and resource use influence the resilience of these taxa. This project is building off five years of alpine stream monitoring in the Teton Range by Dr. Tronstad at the University of Wyoming and colleagues. I aim to assess how food web structure and resource availability impact the potential for glacial, subterranean ice, and snowpack fed alpine streams to harbor threatened alpine invertebrates. I am using stable isotope analysis to determine food web structure and analysis of food resource carbon, nitrogen and phosphorus content to determine the nutritional quality of available food resources. My main research questions are: (1) How does resource availability vary between alpine stream types? (2) How does the utilization of these resources by invertebrates vary? (3) Do invertebrates exhibit selective feeding, or does feeding choice appear constrained by resource availability?

Fieldwork was successfully completed in August 2020. Ten streams were sampled in Grand Teton National Park and adjacent wilderness areas. I collected aquatic invertebrates from all abundant taxa and food resources such as algae, leaf litter, and seston. Invertebrates that were collected included two target stonefly taxa: the genus *Zapada* (which includes *Zapada glacier* which has recently been listed as Threatened under the Endangered Species Act) and *Lednia Tetonica* (a meltwater species endemic to the Teton Range). I prepped and submitted all samples for stable isotope analysis this fall and these data have been received and are ready for statistical analysis. The remaining lab work is to analyze food resources for phosphorous content, and statistical analysis to answer my research questions are in preliminary stages. Funding from MBRWF made a significant contribution to this project by covering a substantial portion of sample analysis costs as well as supporting travel and research supplies.

