

## **Project Summary**

### **Rocky Mountains Cooperative Ecosystem Studies Unit**

**Project Title:** Assessing Climate Change Using Aquatic Invertebrate Assemblages in High-Elevation Lakes and Streams in Grand Teton NP

**Discipline:** Natural Resources  
**Type of Project:** Research  
**Funding Agency:** National Park Service  
**Other Partners/Cooperators:** University of Wyoming  
**Effective Dates:** 9/30/2011 - 6/1/2014  
**Funding Amount:** \$ 30,000

**Investigators and Agency Representative:**

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**Project Abstract:** Climate change is a global issue that is predicted to strongly impact high elevation ecosystems. Aquatic ecosystems in mountainous regions may greatly change due to altered hydrology (e.g., receding glacier and different precipitation patterns), increased temperature, and higher nutrient deposition. Such changes may contribute to the decline or extinction of animals that live in high elevation areas. To target species at risk, animals that only live in these ecosystems should be identified.

Many aquatic invertebrate species only live in high elevation streams or lakes, such as certain caddisflies and stoneflies. In fact, the stonefly, *Lednia tumana*, in Glacier National Park is threatened by climate change and was recently listed as a candidate species for Endangered Species Act listing. Knowing the current distribution, abundance, and status (increasing, decreasing, or static) of these vulnerable animals is strong evidence if any of these species were petitioned for listing.

Aquatic invertebrates are an integral part of food webs. Decreased invertebrate density will likely affect other animals in the ecosystem. For example, a decrease in invertebrate food may negatively impact the fish assemblages in mountain lakes or the song bird communities along mountain streams. Invertebrates are not only food for higher trophic levels, they are also responsible for breaking down organic matter and recycling nutrients, processes that are vital to plants and algae. Aquatic invertebrates are a fundamental part of high elevation ecosystems.

Aquatic invertebrates are also excellent indicators of water quality. By sampling the invertebrates in streams and lakes in Grand Teton National Park during 2 time periods, we can compare the water quality during these two time periods. For example, increased atmospheric deposition of nitrogen would increase the algae in streams and likely change the invertebrates found in mountain streams and lakes. Using aquatic invertebrates to assess water quality is a cost-effective alternative to analyzing water chemistry or algal assemblages in these waters.

**Outcomes with Completion Dates:** Final Report by June 30, 2012

**Keywords:** Aquatic invertebrates, climate change, water quality, Grand Teton National Park, University of Wyoming