## How does a permafrost lake influence downstream carbon cycling? Iva Thomason; Project Mentors: Sarah Ellen Johnston and Paige Kehoe

The Arctic is warming at nearly twice the rate of the midlatitudes. Due to this warming, there are drastic changes in the environment, including in waterways. Permafrost releases ancient organic carbon (OC) into the modern environment as i thaws in warming Arctic temperatures. This permafrost has been found to be highly available for microbes to decompose into  $CO_2$  and  $CH_4$  representing a positive climate feedback. By measuring the rate of biodegradable dissolved organic carbon (BDOC) consumption by microbes in lakes and streams around the Fairbanks area, we can assess the impact of seasonal changes and permafrost thaw on BDOC. One of the biggest expected impacts is the freshet, the flooding of the river due to the melting of the snow that happens in early to mid May. Studies of permafrost in Siberia have also shown high rates of microbial consumption of dissolved OC (DOC) owing to the very energy rich composition of organic matter in frozen soils. These studies and previous work at Big Trail Lake, a recently formed permafrost lake showing very high methane emissions, are the inspiration of this research. Here I build on these findings to investigate the influence of permafrost thaw on lake carbon cycling. Big Trail Lake is a natural laboratory that would provide answers to pressing questions related to permafrost thaw and biogeochemistry.

| e  |  |
|----|--|
|    |  |
| it |  |
|    |  |
|    |  |
| ,  |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
| n  |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |
|    |  |

Project Continuation: This project is currently in progress. I will continue to collect and analyze samples throughout the fall semester. I also plan to continue this into next spring to evaluate seasonal changes in **BDOC** in this permafrost influenced system.

