# Assessment of Water Quality at the Chatanika River, Alaska


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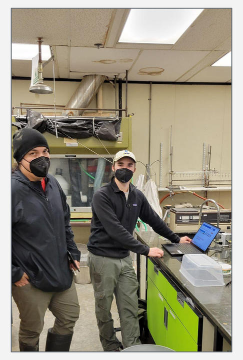

## Introduction

Understanding baseline water quality in boreal and arctic rivers is increasingly important due to a changing climate(Rust et al.,2019). Warmer temperatures have accelerated disturbances such as flooding and wildfire, which could influence water quality and surrounding ecosystems (Viereck,1973). Water quality indicators such as macroinvertebrate diversity, dissolved oxygen, and water temperature have a direct effect on subsistence fish populations and the people who depend on them (López-López et al., 2015).

In this study we established a baseline assessment for water quality monitoring at the Chatanika River bridge near the Caribou Poker Creek Research Watershed in the interior of Alaska.

**Fig. 1.** Photo taken from the LTER bridge over the chatanika bridge, overlooking our transect and water sample sites.

## Methods

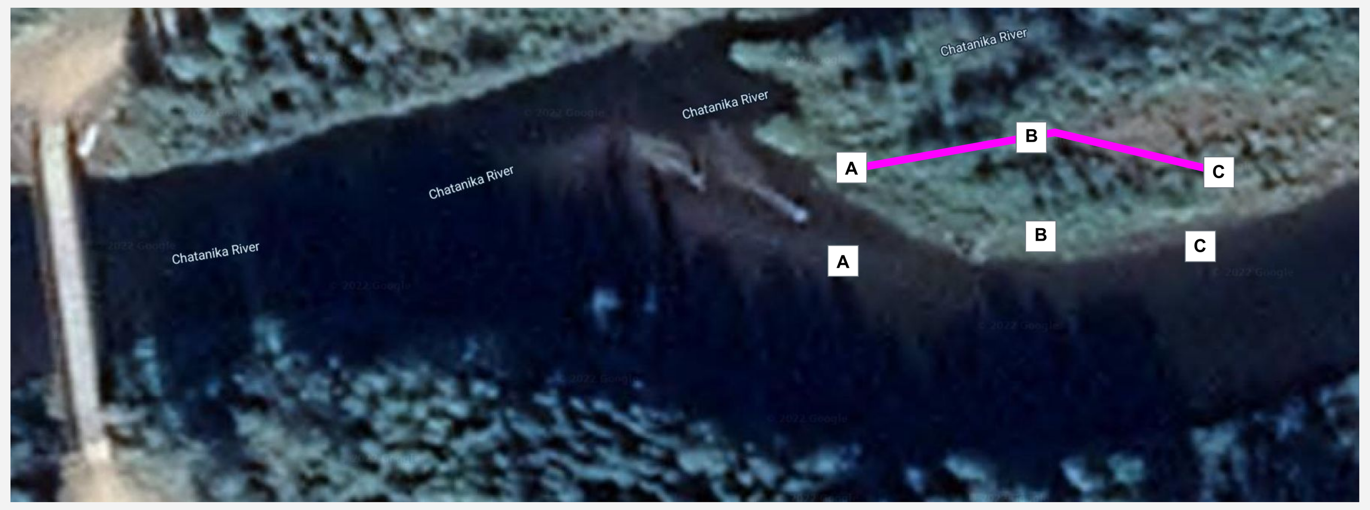


**Fig. 2.** Overhead view of our transect and overall site.

- Vegetation was surveyed along a 50 m transect using the point-intercept method near the Chatanika River (65.14100, -147.45525).
- From the transect pts A, B, and C at 0m 25 m and 50 m respectively, we approached the adjacent water(river) at approximately 90 degrees to place the flag from which we sampled our water parameters (DO, temp, turbidity, etc.).
- To assess water quality, the following were measured using GLOBE (Global Learning and Observations to Benefit the Environment) protocols: turbidity, dissolved oxygen, water temperature, and water pH.
- Using STROUD's Stream Study: Sample Record and Assessment to count the macroinvertebrates and then calculate the total index value as an indicator of water quality.
- Used GLOBE mobile app to document land cover to describe dominant vegetation along point-intersect of transect.

**Fig. 3.** Linnaea Doerner and Matt Shavlik conducting macroinvertebrate sorting.

**Fig. 4.** Microscope image of a mite.

## Results

**Table 1.** Summary of Habitat Assessment

| Habitat Assessment Variable | Site A | Site B | Site C | Mean (±S.D) |
|---|---|---|---|---|
| ***Riparian Characteristics*** | | | | |
| Dominant Vegetation | grasses, shrubs | shrubs, tree | grasses, shrubs | --- |
| Tree Height (m) | 0 | 10.7 | 0 | --- |
| ***Water Characteristics*** | | | | |
| Mean Dissolved Oxygen (mg/L) | 9.88 | --- | 11.45 | 10.7 (± 1.1) |
| Mean Water Temperature (C) | 10.64 | 16.29 | 16.29 | 14.4 (± 3.3) |
| Turbidity (cm) | > 120 | > 120 | > 120 | > 120 |
| Mean pH | 5.5 | 5.0 | 5.2 | 5.2 (± 0.3) |

### Macroinvertebrate Indicators of Water Quality

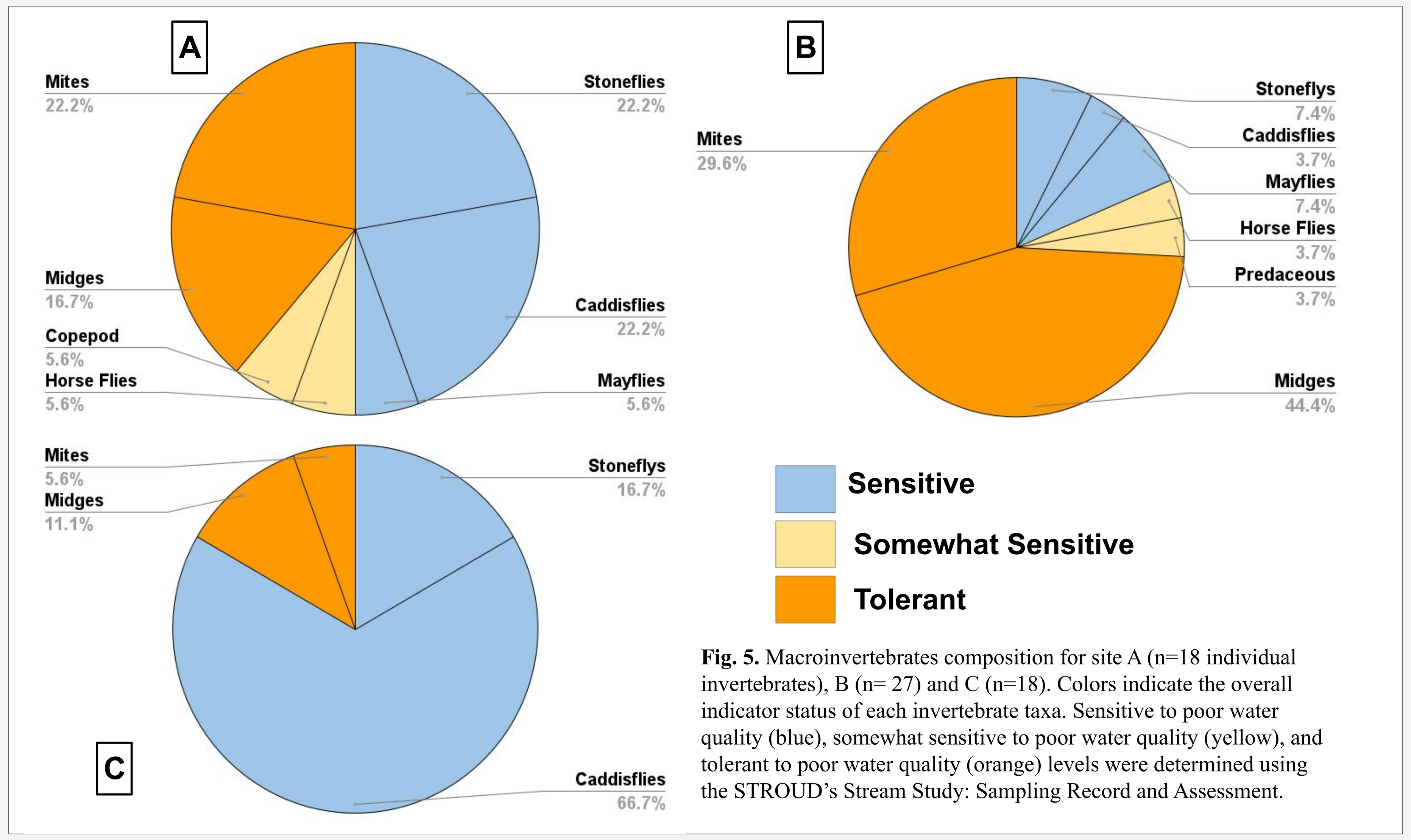


**Fig. 5.** Macroinvertebrates composition for site A (n=18 individual invertebrates), B (n= 27) and C (n=18). Colors indicate the overall indicator status of each invertebrate taxa. Sensitive to poor water quality (blue), somewhat sensitive to poor water quality (yellow), and tolerant to poor water quality (orange) levels were determined using the STROUD's Stream Study: Sampling Record and Assessment.

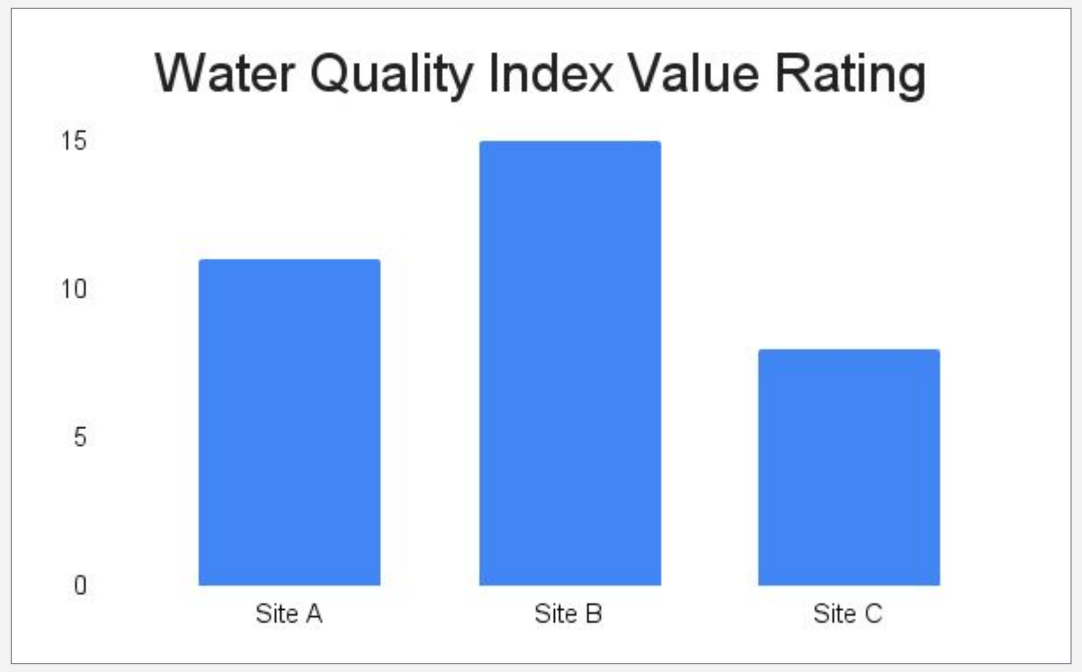


**Fig. 6.** Macroinvertebrate water quality at each site as described by STROUD's macroinvertebrate sensitivity index t. Site A (good), Site B (good), and Site C (poor).

## Discussion

- The overall dissolved oxygen, temperature, and turbidity indicate good water quality.
- The mean dissolved oxygen across our sites on the Chatanika river was 10.7 (±1.1), which salmon are able to live and reproduce in (Sear et al., 2014).
- The macroinvertebrates data suggests that longer term water quality assessments may differ.
- Site B macroinvertebrate composition consisted of 75% of tolerant species.
- Overall the sites showed sizeable variation in macroinvertebrate biodiversity in a small section of the Chatanika River (**fig. 5**).
- The variation in macroinvertebrate communities across the sites could be due to differences in water velocity (site B in an eddy) or habitat structure from downed trees or substrate type.

**Fig. 7.** Matt Shavilk, Linnaea Doerner, and Christi Buffington at the Chatanika River site.

## Future Directions

- Explore the difference between a population dependent macroinvertebrate index rather than a presence absence method.
- Extend our sampling size to better represent the Chatanika River ecosystem and its water quality, and incorporate longer time scales.
- Further investigate and collect data on riparian vegetation along the Chatanika river system to support our results on water quality.

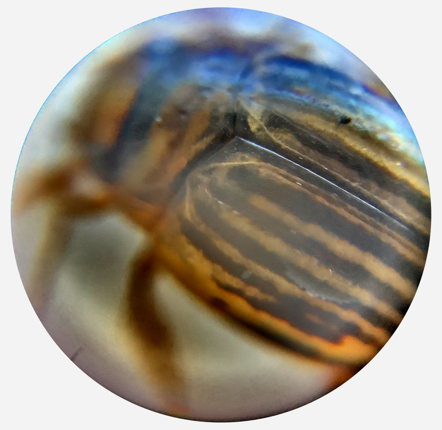

**Fig. 8.** Predaceous beetle under a microscope

**Fig. 9.** Caddisfly larva under a microscope

**Fig. 10.** Stonefly under a microscope

## Citations


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