# Impacts Of River Salinity and Water Quality On Macroinvertebrates



### Abstract

Our research examined the relationship of salinity and distance from the water from the when road salt is introduced into

macroinvertebrate communities. We selected three sites in Potsdam along the Raquette River (Leman Park, Postwood Beach, and Sandstoner Park) to test for salinity as well as species presence. We hypothesized that salinity would increase the closer the water was to the road, with negative impacts on macroinvertebrate diversity. At each of our locations, chosen with this idea in mind, we collected macroinvertebrate species in a net and

categorized them by species. This research will help us understand road salt's impact on freshwater ecosystems.

### Introduction

The health of our local freshwater ecosystems is an important part of local biodiversity in Potsdam. Human impact like road salt and other contaminates can greatly reduce the numbers of macroinvertebrate populations in the Raquette River. Decreased populations can negatively impact a large number of factors within food webs and ecosystems. We were unable to find any previous work on the Raquette River studying the impacts of road salt on macroinvertebrates. Previous studies have shown that macroinvertebrate communities do respond strongly to salinity, with sensitive species declining even at moderate conductivity levels (Horrigan et al. 2005).

In this study we tested the macroinvertebrate populations in 3 different spots along the Raquette River. We hypothesized that the further downstream the site, the less macroinvertebrates, due to changes in salinity and disturbance compared to sites upstream.

### Methodology

This data was collected on three different sites. Samples were collected a few feet offshore, using a D net dragged across the bottom about 4-6 feet across. 3 separate samples were taken for each collection site. We collected from Lehman Park on 3/26, Postwood and Sandstoner samples were collected on 4/3. Our samples were then separated by species into individual containers for an accurate count of each species per site.

We were unable to test the water for salinity at the same time as collection due to equipment issues. To substitute this, we used distance downstream as a proxy to estimate salinity.

To assess differences in species richness across the three sites, a oneway ANOVA test was used. The test was used to determine if there was significant differences in species counts at the sites. The significance level was set at p < 0.1.

A widely used EPT analysis was conducted to assess water quality based off the number of species in the orders: Ephemeroptera (Mayflies), Plecoptera (Stoneflies), and Trichoptera (Caddisflies).





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(Figure.1) Sample of Isopoda



(Figure.2) Sample cup of Plecoptera

(Figure.3) Sample collection at Leman Park

### Results

- Our ANOVA analysis showed a marginally significant difference in number of individuals at each site (p=0.093). Leman Park had a total of 72 organisms, Postwood beach had a total of 46, Sandstoner Park had significantly less organisms collected with a total of 9 organisms (Figure.4).
- Species richness results showed that Lehman Park had 8 different orders of macroinvertebrates, while Postwood Beach had 5 different orders and Sandstoner Park had only 3 different orders collected (Figure.4).
- Our EPT analysis indicated that Leman Park had a total of 23 individuals consisting of these sensitive orders of macroinvertebrates, Postwood Beach had 16 individuals and Sandstoner Park had 2 individuals (Figure.4). Postwood Beach which was the site furthest upstream had the largest quantity of the most sensitive order (Plecoptera) with Leman Park having the second most. Sandstoner Park had the least amount in every category and was the most downstream.

axa	Site 1 (Leman)	Site 2 (Postwood)	Site 3 (Sandstoner)
phemeroptera	19	9	0
lecoptera	4	7	2
richoptera	0	0	0
iptera	1	0	0
opoda	7	23	0
rchitaenioglossa	1	0	0
emiptera	18	3	5
phermerelidae	5	0	0
mphropoda	17	4	0
aplotaxida	0	0	2

(Figure.4) Numbers of individual of each order collected at all three sites

Hannaw

Sandstoner Park

Martin's Farmstand

arking Lot man Park

Postwood Park

igure.5) Map of 3 sites

Hampton Inn Potsdam

#### Conclusion

After we calculated an ANOVA test, alongside an EPT index on the collected data, we can conclude that there was a marginally significant difference in macroinvertebrate abundance across the three sites, with fewer individuals and a lower species richness found at Sandstoner Park.

The orders Ephemeroptera, Plecoptera, and Trichoptera (EPT) are each individually sensitive to environmental disturbances such as pollution and changes in salinity, with Plecoptera (P) generally considered the most sensitive among them. These sensitive orders were most common upstream, and nearly absent with a total of two individuals at Sandstoner Park. Although we were unable to measure salinity at the sites, this trend supported our hypothesis that macroinvertebrate density decreased further downstream.

Future studies should include water quality testing to compare and better understand the relationship between sensitive macroinvertebrate orders and salinity better.

### References

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