LAKE TIDES

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Restoration Works

A Summer of Shoreline Science

By Madeline Hetland, Littoral Zones Fellow at Trout Lake Station and Extension Lakes Student Assistant, UW-Stevens Point

This summer, I had the opportunity to spend a few months at UW-Madison's Center for Limnology-Trout Lake Station. My work was part of an undergraduate research fellowship through the North Temperate Lakes Long-Term Ecological Research program. Under the guidance of Dr. Katie Hein, my project focused on a topic that's close to home for many lake residents: shoreline restoration, and how changes we make on land ripple into the lake itself.

In particular, I looked at how shoreline condition affects aquatic insects and other tiny creatures that live in the shallow, nearshore area of the lake known as the littoral zone. These insects, like mayflies and caddisflies, are often overlooked, but they play an essential role in lake ecosystems. They break down organic material, cycle nutrients, and provide food for fish, amphibians, and birds. In short, if you care about lake health, you should care about bugs.

A Living Laboratory on Crystal Lake

Our main site was Crystal Lake, entirely surrounded by Wisconsin DNR state campground and forest land. A major shoreline restoration project began here back in 2011 led by researchers at Michigan Technological University and Wisconsin DNR. Prior to the restoration, this portion of shoreline was mostly mowed lawn beneath a few scattered red pines. As part of the project, over 300 meters of shoreline were planted with thousands of native trees, shrubs, and grasses. The transformation was impressive, but until this summer no one had taken a close look at how the shoreline changes had affected the ecosystem over time.

That's where our team came in. We surveyed the vegetation along the shore, documenting the types and amounts of trees and shrubs that had taken hold. In the water, we looked at aquatic plants, fallen logs, and woody debris. Then, my favorite part: collecting aquatic insects.

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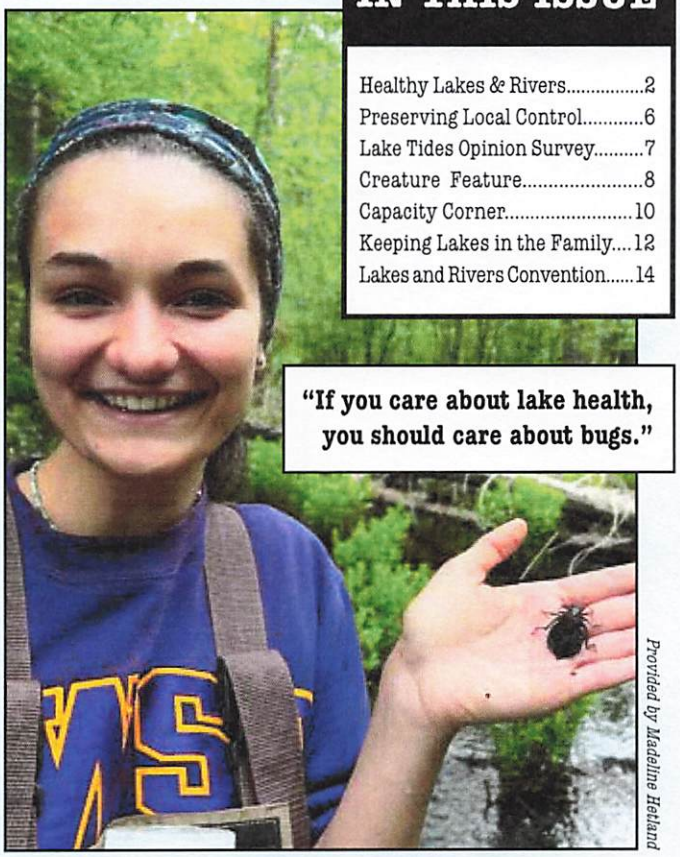

"If you care about lake health, you should care about bugs."

Provided by Madeline Hetland

Madeline loves water bugs – especially this dragonfly larva that she found along the shores of Crystal Lake in Vilas County. Find out more about this specific aquatic insect on page 8.

Photos provided by Madeline Hetland

Taken about 100 feet from the lakeshore, the boundary is evident between the restored and developed areas.

Macroinvertebrates are insects, snails, worms, and other small animals that live in the water. They are small enough to lack a backbone yet still big enough to see without a microscope.

The Bug Work

As someone especially interested in aquatic macroinvertebrates, I carried out an independent project to compare these communities at different types of shorelines. Insects especially respond to changes in habitat quality and shoreline structure – exactly what we were trying to quantify. I wanted to know:

1. How do shoreline development and restoration efforts influence aquatic macroinvertebrate communities?

And, as a follow up:

2. Can disturbed sites recover enough to support the same kinds of bugs and critters as a natural shoreline?

To find out, I sampled macroinvertebrates at three different types of shoreline:

- A developed swimming beach area with a manicured lawn,
- The Crystal Lake restoration site, and
- A natural shoreline with minimal human disturbance.

Using a dip net, I collected samples from each site and then spent hours in the lab sorting, identifying, and counting the insects under a microscope. I used a statistical program called R to analyze the data and compare the communities at each site.

The Results: Nature Bounces Back

What I found was both exciting and encouraging:

- The restored shoreline supported much more diverse insect communities than the developed shoreline. The restored communities were even comparable to those present in the sites with minimal human disturbance.

Madeline gets ready to collect aquatic insects with her bucket and dip net.

- Certain groups of insects, like mayflies, caddisflies, and some dragonflies, were found only at the restored and natural sites, and were completely absent from the developed shoreline.
- In terms of the number of different insect types (what we call "taxon richness"), the restored shoreline matched or even exceeded the natural sites in some cases!

This tells us something important: restoration works! Even years later, and even on land that used to be lawn, native vegetation and shoreline improvements can create conditions that support complex aquatic communities. Healthier insect populations mean better food for fish, more stable ecosystems, and improved water quality.

Why This Matters for Waterfront Property Owners

If you own lakefront property or are part of a lake organization, these findings are good news. They show that thoughtful shoreline restoration, like planting native species, reducing mowing near the water, and allowing natural processes to take place, can lead to meaningful ecological improvements. Restored shorelines benefit more than just bugs! Healthy littoral zones support better water quality, improved fish habitat, and long-term lake sustainability. This is not just a win for nature; it's a win for everyone who values lakes.

So, if you've been wondering whether it's worth letting your shoreline go a little wild or starting a restoration project of your own, the answer is a resounding yes! The lake will thank you, and so will the insects, fish, and future generations who get to enjoy a healthier lake.

Shannon Kearney

Science, Stewardship, and Gratitude

This fellowship was a defining experience for me. I got to ask real questions, do hands-on fieldwork, and contribute to a bigger picture of how we care for our lakes. Looking ahead, I plan to pursue graduate school after gaining a few more years of experience, with continued interests in aquatic ecology and watershed health (and bugs!). I left the Northwoods with a deeper appreciation for the connections between shorelines, science, and stewardship.

I'd like to give a special thank you to Dr. Katie Hein, research scientist at Trout Lake Station, for providing mentorship and guidance throughout this project. My research was funded by the National Science Foundation, specifically the North Temperate Lakes Long-Term Ecological Research (NTL LTER) Research Experiences for Undergraduates (REU). I am deeply thankful for the opportunity to have been part of the work at Trout Lake Station and research that will support healthy lakes for generations to come.

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