Winter-hatching midges: tiny indicators of the impacts of climate change

Tiny insects that live in the cold waters of trout streams could prove to be key predictors of the effects of climate change on Minnesota's rivers and streams, according to Leonard Ferrington, UM Entomology professor and member of the WRS graduate faculty.

Ferrington leads the Chironomidae Research Group, a team that includes entomologists as well as students in the Water Resources Sciences graduate program. They have developed a rapid biological assessment protocol involving the winter-hearty family of aquatic insects called Chironomidae. Chironomidae are extremely sensitive to temperature changes and highly affected by temperature swings, and that, Ferrington says, makes them a tiny but important indicator of climate change.

Dressed in parkas and insulated chest waders, the researchers begin in late November to collect larvae in the water and adult flies living on the snow along stream banks. With colorful names like *Diamesa nivicavernicola* (dweller of snow caves), *Diamesa cheimatophila* (lover of winter), and *Diamesa chiobates* (one that walks on the snow), winter-hatching chironomidae, commonly known as midges, are a welcome sight to a Minnesota entomologists's eyes. "Most people can't believe Minnesota has insects in the winter, but we sure do," says Ferrington, who, like the insects he studies, thrives in cold weather. "In fact, winter-hatching midges provide Minnesota with some of the best winter fly fishing spots in the Upper Midwest."

Ferrington's WRC-related research focuses on winter-hatching midges living in and along Minnesota's most celebrated trout streams, such as the Vermillion River in Farmington, Hay Creek near Red Wing, and Trout Brook near Cannon Falls.

Midges are mosquito-sized, non-biting aquatic flies found all over the world. They're rich in diversity—over 200 species in Minnesota alone—and tolerate a wide range of environments, from the most pristine to the highly degraded. But the insect's claim to fame is its role in fly-fishing—pop culture has immortalized them on the kitschy fishing hats of cabin-loving grandfathers everywhere.

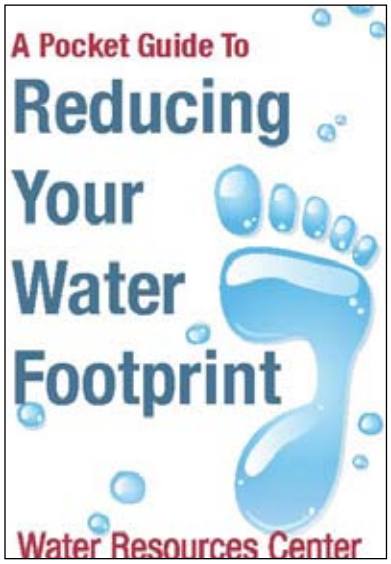
Ferrington's team tests the adults and larvae for temperature sensitivity in their environmental laboratory on the St. Paul campus by using tiny thermal probes to monitor their internal temperature. Climate change is predicted to have a greater impact in colder regions, and consequently it could have a dramatic impact on the organisms that live in cold environments like midges and the trout that eat them.

"Anthropogenically-induced climate change will likely result in range shifts and extinctions leading to alterations in the composition and structure of aquatic insect communities," says Ferrington. "Our research will improve the knowledge of how climate change impacts cold-adapted species in cold habitats."

WRC's water saving pocket guide simplifies conservation

Whether on a radio interview or talking before a group of volunteers, Water Resources Center co-director Deb Swackhamer often gets a receptive response from the public on the topic of Minnesota's water. "I'm constantly impressed by the number of people who ask me what they can do to help conserve and protect our water resources," she said. "And often, people are looking for answers to very basic stuff—like whether bottled water is safer to drink than tap water or how rain gardens work."

Scheduled to speak before the Annual Women's Breakfast sponsored by the Minnesota Center for Environmental Advocacy, Swackhamer consulted with her staff to create something beyond the typical who-we-are-and-what-we-do fact sheet. "We wanted something a little more playful, yet useful, something people might actually hang onto after the presentation," she said.



Inspired by the Monterey Bay Aquarium's Seafood Watch pocket guides, the Water Resources Center developed "A Pocket Guide to Reducing Your Water Footprint." The guide, which is downloadable at wrc.umn.edu, aims to make conserving water simple—something all of us can do each day,whether in the kitchen, in the bathroom, or out shopping for dinner.

Based on the idea that lots of small changes can make a big difference over time, the guide explains the concept of a water footprint and offers simple, consumer-friendly ways to make smart water choices on a daily basis. The guide offers simple tips like keeping a bottle of drinking water in the refrigerator to avoid running the tap for cold water, or choosing a commercial car wash that recycles water over washing your car in the driveway. It also busts popular myths on the topics of tap versus bottled water and antibacterial soap versus plain soap and water.

So far, the guides have proven very popular. "I had several people ask if they could take a handful, they wanted them for their offices. And just about everyone had folded one up and tucked it in her purse."