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UNH Scientist Examines State's Water Quality through the Eyes of Its Insects

By *Sharon Keeler*
UNH News Bureau

DURHAM, N.H. -- University of New Hampshire zoologist Don Chandler and his students are studying some of nature's tiniest creatures to help the state better manage its bodies of water.

They're inspecting aquatic insects, which Chandler says can tell scientists about the condition of the environment.

"There are several things you can examine to determine whether you have high water quality," says Chandler. "Dissolved oxygen, pollutants, chemical makeup. But you also want to examine the plants and animals present. We're looking at insects, because certain species will live only where conditions are pristine. You can quickly tell things about a river by its insect fauna that you can't tell by other indices."

Chandler explains that aquatic systems change with their surrounding habitat. They are easily disturbed by human activities like farming and urban development. Agricultural run-off, salt and the damming of rivers can all change stream fauna and flora. While the water may look healthy on the surface, what lies below can reveal a deeply troubled ecosystem.

Most recently, Chandler and his students have been working in the southern part of the state, determining which New Hampshire insect species indicate high water quality. They've sampled a river just west of Nashua, the Nissitissit River on the Brookline-Hollis line, which he says is fairly unique for its pristine condition.

"I work with a group of beetles, riffle¹/₄ beetles, which are very sensitive to poor water quality," Chandler explains. "In the Nissitissit, we found 13 out of the 17 species of this insect known for the state. We've never before been able to find so many species in one section of river. It indicates that this river is of very high quality."

Chandler says this contrasts with another river they sampled, which showed poor species richness.

"We looked at the Souhegan River in Greenville," he says. "We concentrated on one small tributary we call 'Vinegar Creek' because it appears as a small stream beneath a mustard/vinegar plant, and is very acidic. It joins the Souhegan just down stream from a sewage treatment plant. Now, this is a very nice-looking river at this point, so you'd never know the water was poor quality. But we took a sample and found only one beetle."

Chandler says this proves the point that determining the status of a river can be a complicated task. He says a two-to-three hour chemical spill, that may not look like it's left permanent damage, can wipe out many insect species, which may not reappear until the next year. There are long-term repercussions. Insects are important links in the food chain and help maintain the health of a river by breaking down organic debris.

"There are at least 16,000 insect species in the state, and, of these, perhaps 10 percent are associated with freshwater systems," Chandler says. "We'll continue our research, including Salem's Spickett River this year, to expand our inventory of southeastern New Hampshire's eco-region. Our goal is to create a manual for the identification of aquatic insects that will help scientists and state officials gauge the status of a river."

Chandler says they have a good understanding of insect species that indicate high water quality. They'll now be focusing on what species thrive in low quality water, and what pollutants impact what species.

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