NEW HAVEN REGISTER

Date: Tuesday, May 29, 2012
Location: NEW HAVEN, CT
Circulation (DMA): 69,405 (28)
Type (Frequency): Newspaper (D)
Page: A3
Keyword: lakes

Yale lake study: Ecology shaped by evolution

By Mark Zaretsky

Register Staff

mzaretsky@nhregister.com

NEW HAVEN — Environmental changes made back when the damming of Connecticut streams stranded some alewife herring in inland lakes 300 to 500 years ago have changed both the alewives and critters they feed on, such as water fleas, new Yale University research has found.

But the evolutionary changes in alewives and daphnia, as the water fleas are called, in turn have changed the areas in which they live, according to the research by a team led by Yale professor of ecology and evolutionary biology David Post.

One result of the whole process is cloudier water in those lakes each spring, according to a paper being published Wednesday in the journal Proceedings of the Royal Society B.

"People have long accepted that ecology shapes evolution, but it has been less clear how evolution can shape our ecology, and do so in a relatively short time frame," said Post, senior author of the paper. "In this case, we see a cascade of evolution that was propagated throughout the food web within the last three centuries."

Other members of the research team included lead author Matthew R. Walsh, professor of ecology and evolutionary biology, and John DeLong and Torrance Hanley.

The research centers on lakes created when Connecticut rivers were dammed by settlers during Colonial times, including Lake Quonnipaug in Guilford, Rogers Lake in Old Lyme, Patagansett Lake in East Lyme and Amos Lake and Avery Pond in Preston, Post said in an interview.

When rivers were dammed to create those lakes, some alewives remained and adapted to live year-round in the lakes, he said.

Alewives are a type of herring that elsewhere in Connecticut and along the East Coast still swim up rivers to spawn in the spring and give birth to offspring that live the first few months of their lives in those rivers, and then swim back down into Long Island Sound and the Atlantic Ocean.

Daphnia are a type of crustacean that feed on algae that might otherwise cloud up inland lakes, "the cow of the aquatic world," said Post. They also eat smaller forms of plankton.

Normal anadromous alewives — the ones that swim up rivers to spawn — are voracious eaters of daphnia. They also eat a type of plankton that thrive in lakes, called zooplankton.

The Yale researchers found that alewives that have adapted to live year-round in the lakes have smaller mouths and gills that have changed through natural selection to make them better able to eat smaller plankton that are common in the lakes, rather than larger plankton that anadromous alewives eat.

"Natural selection favored survival of fish with smaller mouths and gills with filters more closely spaced that helped them harvest the smaller plankton," said Walsh. "This, in turn, drove genetic changes in the rates of population growth of daphnia, and these two changes then determine the amount of algae present in lakes."

While the alewives still eat daphnia, they do not eat them as intensively as their anadromous cousins do, which means that instead of disappearing entirely at times of the year, daphnia in lakes that are home year-round to alewives tend to exist in smaller concentrations year-round, said Post.

Without such intense pressure to reproduce before they themselves are consumed, the daphnia in turn don't feed as intensely on algae — which means that the lakes tend to be cloudier each spring than lakes without year-round alewives, he said.

"So what we're seeing is evolution at multiple positions" within an ecosystem, resulting in corresponding changes to the environment, he said.

Post estimated that the evolutionary changes in alewife probably happened within 50 to 100 years of the damming of the lakes.

In lakes that only see migrating, or anadromous alewives, alewives eat lots of daphnia and zooplankton between now and middle of June. Then the daphnia supply is exhausted and they disappear until daphnia eggs hatch in the fall to replenish the supply, Post said.

In landlocked lakes, however "you never find a lot of daphnia because there are always alewives eating them," he said.

In the overall scheme of things, daphnia eating algae in order to build up enough energy to reproduce result in "the major transfer of energy between algae and fish," Post

NEW HAVEN REGISTER

Date: Tuesday, May 29, 2012
Location: NEW HAVEN, CT
Circulation (DMA): 69,405 (28)
Type (Frequency): Newspaper (D)
Page: A3
Keyword: lakes

said.

But daphnia in anadromous lakes "reproduce much quicker and consume much more algae," he said.

Call Mark Zaretsky at 203-789-5722. Follow us on Twitter @nhregister or @markzar.

Account: 7308 (8783)
CT-49