GREAT LAKES TALE: THE ALEWIFE AND THE OPOSSUM SHRIMP

Cornell graduate student and NYSG scholar Brent Boscarino (foreground) and Gideon Gal count alewife caught in a gillnet suspended mid-water column in Lake Ontario. The research team compared alewife vertical distribution and gut contents on both new moon (dark) and full moon nights on Lake Ontario. Results show that alewife have higher feeding rates on mysids because of increased light penetration. Photo courtesy of Brent Boscarino

Sea Grant Researchers Examine an Important Predator-Prey Relationship

In recent decades, Lake Ontario has become increasingly clear. The grazing of invasive zebra mussels and the reduction of inputs of compounds such as phosphorus have combined to improve its water clarity. Does an increase in light penetration affect how predators in lake food chains find their prey? Yes, says **Dr. Lars Rudstam**, Associate Professor in the Department of Natural Resources at Cornell University. Increased predation is one consequence of the "illumination of the food web" associated with the increasing water clarity in the Great Lakes.

In several New York Sea Grant funded projects, Rudstam, along with his colleagues and students at Cornell, the USGS Great Lakes Science Center, and the Canadian Centre for Inland Waters, has been examining the interaction of forage fish and invertebrates in Lake Ontario and predicting trends in their populations.

The main forage fish of economically-important sportfish species such as Chinook salmon and other salmonids in Lake Ontario is the alewife. The relatively high abundance of alewife is the reason for the faster growth of Lake Ontario salmon compared to those in other Great Lakes. Alewife may be switching from a diet consisting primarily of zooplankton to one that also includes the opossum shrimp, *Mysis relicta*, a small shrimp that feeds on zooplankton. The alewife benefits from this addition to its diet; the opossum shrimp's high content of unsaturated fatty acids is beneficial for the alewife's successful overwinter survival.

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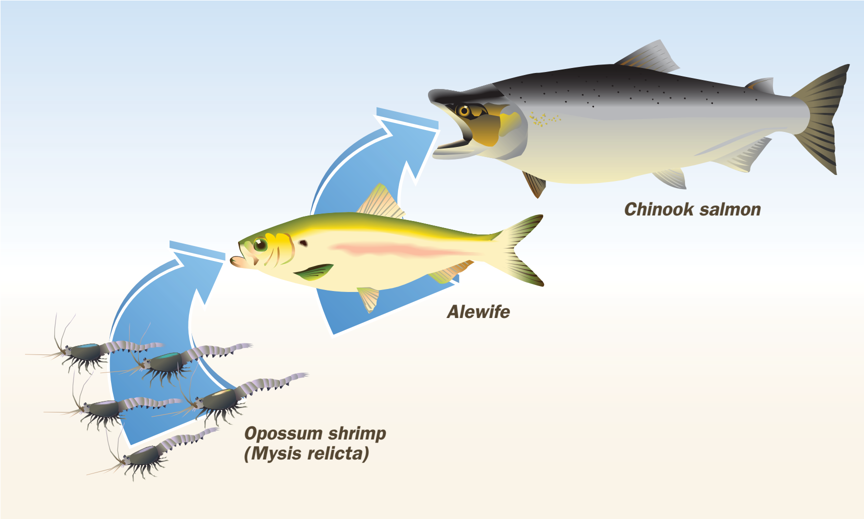
... for more on Dr. Rudstam and his research



Food chain artwork by Loriann Cody

At night, mysids migrate from the bottom of the lake towards the surface to feed, making them vulnerable to alewife predation. Says Dr. Rudstam, "We have shown that light levels associated with the top of the mysid layer are usually too low for alewife to use vision to feed on mysids. We therefore hypothesize that much of the predation we see in the field is occurring at the upper edge of the mysid distribution, where it is still light enough for alewife to utilize vision to feed."

“Mysis in Crisis” crew on a sampling trip on Lake Ontario led by Lars Rudstam (top row second from left.) Also in crew was Robert O’Gorman (middle row, second from right) who recently retired from USGS, Biological Resources Division, Oswego, NY after many years of service.
Photo courtesy of Brent Boscarino

By comparing alewife vertical distribution and gut contents on both new moon and full moon nights, Rudstam’s team has also shown that alewife can feed on mysids in darkness, although capture success declines in such conditions.

In addition to potential increases in alewife feeding, increased water clarity may also limit mysids’ access to their own food. Mysids feed on the zooplankton in the warmer, upper layer of water where they are at greater risk of predation. Mysids may therefore grow more slowly, decreasing reproductive rates. The combination of decreased reproductive rates and increased mortality rates should lead to declines in the mysid population. Early indications show this may be occurring. In 2006, the population had decreased to half of the density in 2005. Future work will determine if this is a continuing trend. If so, the future will be hard to predict because the complex alewife-mysis-zooplankton food web interactions are not known.

— Barbara A. Branca