

A Drastic Decline of River Herring

TINY STONES IN FISH HOLD CLUES TO HELP RESTORE POPULATIONS *by Kate Madin*

Many New Englanders still recall the vast springtime runs of river herring. Millions of the small silvery fish swam up coastal freshwater streams, returning from the sea to spawn.

Two species of river herring, alewives and blueback herring, are critical components of marine food webs, right up to the fishermen on shore and at sea who harvest them. But in the late 1960s, herring populations sharply declined to as little as one percent of their historic size.

Ever more efficient commercial fishing fleets have swept them up in coastal waters. But even after states banned or limited catches, the fish have not rebounded. To expand access to historical spawning habitats, some communities have also begun removing dams.

These efforts focus on conserving adult fish and helping them reproduce. But perhaps as critical to these fishes' survival is what happens right after the fish spawn. Surprisingly little research has been conducted on understanding the factors that allow larval and juvenile herring to survive and grow in the several-month period before they migrate back out to the ocean, said Joel Llopiz, a biologist at Woods Hole Oceanographic Institution.

In 2014, Llopiz launched a project, funded by Woods Hole Sea Grant, with colleagues at the Massachusetts Division of Marine Fisheries. The researchers are collecting and examining larval herring in four coastal river/pond systems of different sizes in Massachusetts. The systems also vary in their impacts from pollution, urban development, and agriculture.

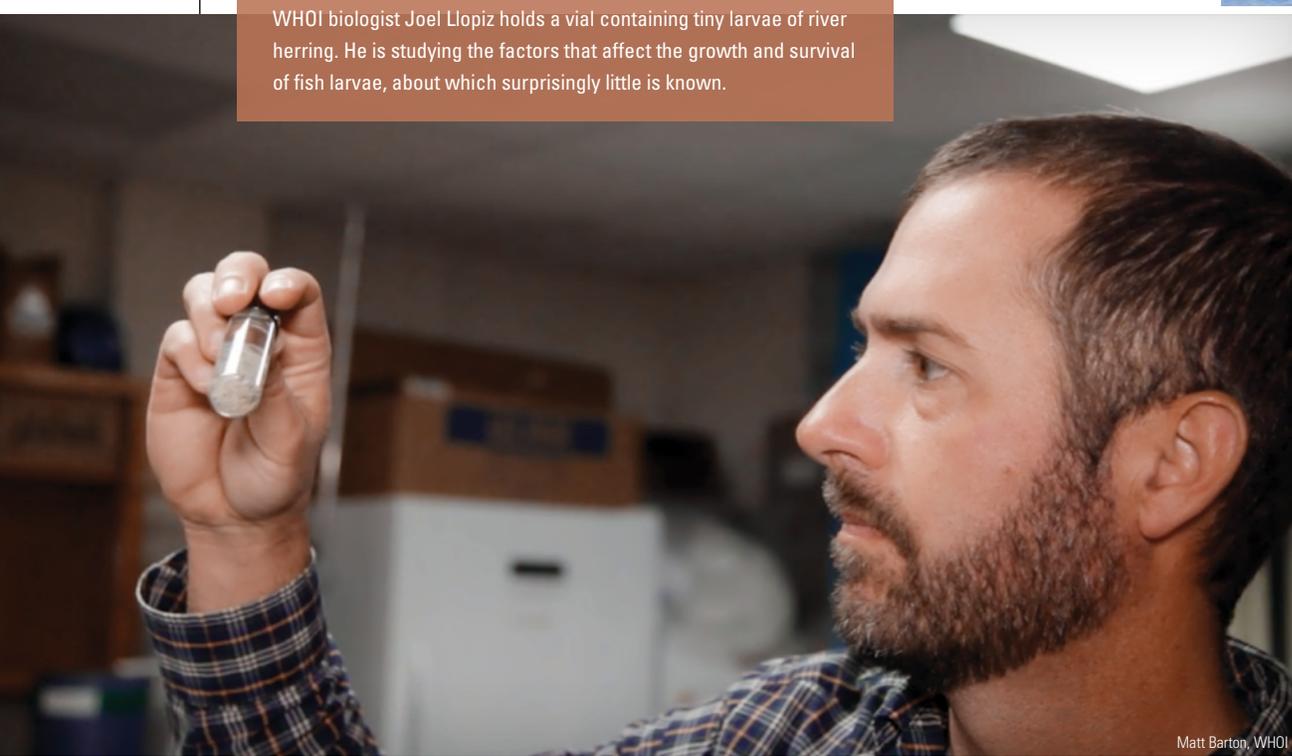
The keys to Llopiz's research are tiny calcium carbonate stones, called otoliths, that grow from birth in fishes' heads.

"The otolith is a record of the growth of each individual," Llopiz said. "We extract an otolith, put it under a high-powered microscope, and there are rings on it. Each ring corresponds to one day in the life of a larval or baby fish, so measuring the rings gives an indication of how fast the larvae are growing."

Llopiz also samples gut contents to investigate what zooplankton the herring larvae are eating, and he monitors environmental conditions in the four pond systems.

"We're filling in a critical gap in our knowledge of the life history of these fish species and increasing our understanding of the conditions and factors that govern their survival at this critical early life stage," Llopiz said. ▲

WHOI biologist Joel Llopiz holds a vial containing tiny larvae of river herring. He is studying the factors that affect the growth and survival of fish larvae, about which surprisingly little is known.



Matt Barton, WHOI



Joel Llopiz, WHOI



Joel Llopiz, WHOI



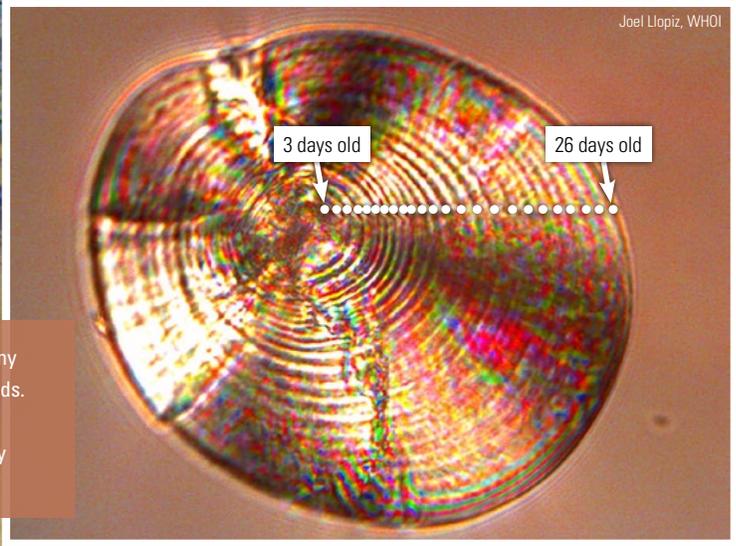
Joel Llopiz, WHOI

River herring used to run up coastal streams in great numbers in springtime, returning from the ocean to spawn in fresh water. But their populations have plummeted. New research is focusing on critical gaps in understanding the fishes' larval stage just after they hatch. Below, summer student Sara Hamilton (left) and WHOI lab assistant Julie Pringle collect specimens.



Tom Kleindinst, WHOI

A magnified image of a fish otolith, a tiny calcium carbonate deposit in their heads. A new layer grows each day around otoliths, so scientists use them to study how fish grow and develop.



Joel Llopiz, WHOI

3 days old

26 days old

