Mitchell Students get a Grasp on Enigmatic American Eels

by Kristen Lester

The American eel is more than just an olive-yellow slimy three-foot-long surprise on the end of your fishing hook. At one time, the fish was a staple of the colonial diet. Older New Englanders still tell tales of 3-foot long eels hung in their grandparents’ chimneys to smoke for weeks at a time. Today, this species is still important as a fisheries resource. Besides being an economically important fisheries species, eels are ecologically important as well. Their diet consists of dead fish, invertebrates, carrion and insects. Due to its economic and ecological importance, the American eel is very well studied. However, parts of the eel’s life history still remain an enigma.

As adults, eels live in fresh water, though male adult eels are frequently found in the brackish waters of estuaries. After living in fresh or brackish water for up to 30 years, the eels begin to undergo a series of changes that prepare them for their autumn journey to the Saragasso Sea to spawn. These changes include increased fat deposition, gut degradation, increased eye size, and a change in the color of the underside of the skin to silver. The eels move downstream in autumn and out into the open ocean. The spawning location of the American eel within the Saragasso Sea is as of yet unknown, though it is presumed that adult silver eels die after spawning.

Upon hatching, larval eels resemble a transparent willow leaf, a stage of their life known as leptocephali (“leaf-heads”). Over the course of the following year, the larvae drift on the Gulf Stream and begin to take on the appearance of eels as they near shore. At this stage, they are still transparent and very small; typically on the order of 40-60 millimeters. Because of their transparency, they are referred to as glass eels at this stage.

Each spring along the Atlantic coast, huge numbers of these glass eels amass at the mouths of rivers and streams. In Connecticut, the glass eels begin to navigate upstream as temperatures rise through April and May. The eels swim and wriggle over dams, rapids and grassy areas to finally arrive at the freshwater ponds or lakes where they will complete their transformation to yellow eels.

Fisheries data indicates that this upstream migration of tiny glass eels that has occurred in Connecticut waters for thousands of years may soon be a thing of the past.
The American eel population appears to be in decline, as does the population of its close cousin, the European eel. The cause of this decline is unknown, but researchers suspect that several factors may be to blame, including habitat loss through the construction of hydroelectric dams, heavy metal toxicity, and overfishing. The magnitude and geographical extent of the decline are likewise unknown.

Students in Mitchell College’s Marine Ecology classes are assisting the Connecticut Department of Environmental Protection (DEP) in their efforts to acquire more data about this critical fish population. Each spring, representatives from the DEP measure “young of the year,” or “glass eels.” This previous year, Mitchell College students took on the responsibility of setting up and sampling one of a small number of eel capture stations in southeastern Connecticut. Typically, an elevated ramp-like device (dubbed the “eel-a-vator”) is used to capture eels. This device provides the eels with a damp, roughened surface, and takes advantage of the innate desire of glass eels to swim against the current by using an attraction stream of water that is angled down the ramp. The eels drop into a capture device at the top of the ramp, and are sampled several times a week. In addition to gathering an abundance of data for the entire catch, a subset of 60 glass eels are measured, weighed and assessed for pigment stage each week. The remaining eels in the bucket are released further upstream to continue their journey. The sampling period lasts from mid-April through June.

Mitchell’s sampling site is located on the Tributary River in Lyme, Connecticut, at the Tributary Mills Conservancy (TMC) property. The TMC is a nonprofit group that seeks to merge science and art, and has received national recognition for their work with Atlantic Salmon hatcheries. Members of the TMC work closely with Mitchell and the DEP to ensure site access and sampling equipment set up. Greg Chapman, an Environmental Studies student at Mitchell College, particularly enjoyed getting familiar with the TMC site. “I thought that seeing all the technology that went into the salmon and eel set ups was really interesting.”

This year, the TMC provided an improved eel capture device that may reduce predation problems encountered with previous eel-a-vator designs. In Spring 2009, Mitchell students will conduct a study to compare capture success rates of the two devices to determine which will provide the highest catch rate. Since the ramped eel-a-vator design is the current standard used by regulatory agencies all along the United States and Canadian Atlantic coast, the development of a new, more efficient eel capture device may have implications for eel studies beyond those in Connecticut.

The American eel project has evolved into a major component of the Marine Ecology course at Mitchell College. Besides collecting and measuring eel particulars, students prepare data for submittal to the DEP and write research papers on the American eel life cycle.

Jenna Wilder, a Mitchell College student who participated in the project, felt that the project made the
course more accessible to her. “I started the course as someone that was not a big fan of science but had to take it as a requirement. But the eel project gave me a new look at what science is all about. Being able to take what I learned doing my research project and actually use it for hands on research made the course memorable for me.”

Juliana Huber, another student in the last spring’s marine ecology class, said “I am much more confident now when I talk to my friends and family about marine environmental issues.”

In the upcoming year, the eel project is expected to go campus wide with Mitchell’s annual Earth Day celebration in April. Interdisciplinary teams consisting of students studying ecology, fine arts, journalism, literature and public relations will develop “Environmental Stories” for Earth Day 2009. Each team will present a view of the American eel through visual or written means.

By assisting with this project, students have acquired hands on experience in data collection, data management, and logistical issues involved in sampling. More importantly, they have observed first hand the importance of trying to save a species. Chapman, who will be heading up the research project this spring, sees the importance of continuing the project. “I hope we can continue this for future generations of Mitchell students to follow.” Mitchell College and the TMC are currently working with the DEP to identify critical gaps in the state of the American eel life cycle research in Connecticut. It is only through understanding this species that the eel migrations in Connecticut rivers will continue on through future generations.

**About the Author:**

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