Citizen scientists' 'glass eel' data helps protect Hudson River

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Juvenile American eels, also called “glass eels.” Credit: Chris Bowser

The Hudson River Eel Project—which has netted, counted and released roughly 2 million juvenile eels since its inception in 2008—owes its success to a cadre of nearly 1,000 high school, college and adult citizen

scientists donating time and effort each spring along the Hudson River.

This year, for the first time, the project's citizen science data will be treated as official data to be entered in the Atlantic States Marine Fisheries Commission's (ASMFC) peer-reviewed eel stock assessment report.

The data helps agencies make conservation management decisions, as eels are an essential part of the Hudson River system's food web. Juvenile eels serve as important prey, while older eels become apex predators that keep ecosystems in balance.

The project, which has about a dozen monitoring sites between Troy, New York, and New York City, specifically tracks numbers of transparent "glass eels," which are juvenile American eels. As the eels migrate each February through May into the Hudson River from the ocean, tributaries and estuaries create a bottleneck for juveniles, which--when caught and counted--provide a census of larger population trends.

"When done right, citizen science can be very helpful because it can greatly expand an agency's or a biologist's geographic spread, and also a time series [spread over time] with tens of thousands of volunteer hours over the years," said project leader Chris Bowser, education coordinator at Cornell's New York State Water Resources Institute in the College of Agriculture and Life Sciences and the New York State Department of Environmental Conservation (NYS DEC).

The ASMFC's acceptance of the data last August was due in part to the eel project's strong data quality-control procedures, which were developed in consultation with NYS DEC partners and Cornell

researchers to make sure the protocols were simple, standardized and replicable each year. Citizen scientists are solidly trained and numbers and procedures are checked.

"We have tried to collect data that is as robust as what's been done at the agency level," Bowser said.

American eels are migratory fish that hatch in the saltwater of the Sargasso Sea and migrate as willow leaf-like larvae to freshwaters of the Caribbean islands, South America, the Gulf of Mexico and the East Coast from Florida to Canada. When they arrive in the brackish waters of coastal estuaries, they transform into translucent, 2-inch juvenile glass eels. As they move into muddy freshwater creeks and streams, they develop pigment, and become miniature adults called "elvers."

In their next adult phase, they become sexually immature "yellow eels," appearing brown, dark green, gray or mustard yellow. They may remain as yellow eels for five to 30 years before becoming sexually mature, when they head back to the Sargasso Sea as "silver eels" to spawn and likely die.

Along the 150-mile Hudson River tidal estuary, eels enter every waterway that connects with the Hudson, including urban rivers such as the Saw Mill River in Yonkers, the Fall Kill Creek in Poughkeepsie and the Poesten Kill creek in Troy. They also enter rural areas, such as Hannacroix Creek in New Baltimore and Black Creek in Esopus.

"The widespread geographic diversity of eels means that you also have widespread diversity of volunteers," Bowser said. "Different ages, different socioeconomic backgrounds, different experiences."

For example, monitoring at the Fall Kill Creek site in Poughkeepsie began in late February.

"Every weekday at 4 p.m., you will see a team of volunteers there," accompanied by an educator or intern, Bowser said. High schoolers wading into the 2-foot-deep water around nets are a common sight, he said. The 12-foot nets are consistently set up along a shoreline where the glass eels travel. Another group may be carefully counting and weighing eels, while others are collecting water and air temperature data.

Overfishing, pollutants, habitat loss, climate change and obstructions such as dams have all taken a toll on eels.

"Every single dam is a potential barrier for eels on their migration route," Bowser said. As a result, according to protocols based on an ASMFC request, once counted, glass eels are released past at least the first migration barrier, such as a culvert, road or dam.

"What I love about the eel project," Bowser said, "is it takes another step deeper toward volunteers actually becoming scientists and thinking about research methods and the research questions we're trying to answer."

Provided by Cornell University

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