



Electric "wands" send shock waves through the water, stunning fish and bringing them to the surface. Once the fish are identified, they are returned to the stream.

EELS
FROM AS

A few meters up the creek, Henning lets out a triumphant whoop: There is an eel in his net, which he will later estimate is a 3-year-old juvenile. The elver — and others caught by the survey teams that day — offer proof that nearly 100 years after it all but disappeared from the Susquehanna, the species is again making inroads, and a home in this chocolate-colored tributary of the Susquehanna River.

STOCKING THE RIVER

Ten miles from the mouth of the Susquehanna, U.S. Route 1 crosses the river across the Conowing Dam, the first hydroelectric dam on the river and one of the primary impediments to fish migrations. Built at the end of the 1920s and today owned and operated by Exelon Corp., the dam must periodically undergo recertification, a process that includes assessing its ecological impacts and how they can be mitigated.

Previous negotiations had led to the construction

of a fish lift for shad in the early 1990s, but not eels. The thinking at the time was, according to Steve Minniken, a researcher with the U.S. Fish and Wildlife Service, that if eels were not getting caught in the fish lifts, they must not be present in the area.

But Minniken wasn't so sure about that.

So in 2004, he started looking for eels at the downstream base of the dam using an Irish elver trap, by appearance a floating box contraption.

He and his fellow researchers' goals were to gather basic data on American eels in the river, how many there were, when they appeared and, critically, how easy they would be to catch. That summer, they caught 42 elvers in the trap, hardly a bountiful harvest. The next year, only 19.

But the team refined its collection efforts and in 2007 collected more than 3,800 eels at the dam. The following year, it expanded the program and number of elvers the team



A group of watershed conservationists surveys the fish species in the Conewago Creek, a tributary of the Susquehanna River near Elizabethtown. Photos by Joe Hermit, PennLive

caught soared to more than 40,000.

The captured eels were measured, counted and shipped north where they were released into Deer and Conestoga creeks. Over the next eight years, Fish and Wildlife captured, transported and released more than 800,000 eels into the Susquehanna River or its tributaries.

With proof that the eels were attempting (unsuccessfully) to swim up the river, state and federal agencies were able to negotiate with Exelon to assume control of the eel capture, transportation and stocking efforts as of 2016 and run it through 2030.

In 2017, the company transported another 110,000-plus eels into the river basin and this year has stocked roughly 12,000 eels at Harrisburg's City Island, 3,000 along the West Shore and another thousand at Fort Hunter in Susquehanna Township.

The American eel is back.

ECOLOGICAL IMPACT

In the last several years, numerous eels have been captured in the Harrisburg area and the lower reaches of the river where stocking has been heavy. But there have also been reports of eels from the west branch near Clearfield; on the Juniata River by Lewistown and Huntingdon; and on the north branch around Towanda.

Henning said he even received reports of a pair of eels found way up in the



Aron Henning, a fish biologist with the Susquehanna River Basin Commission, measures one of the American eels collected from the Conewago Creek.

Susquehanna's headwaters near Oneonta, New York, 20 miles from where the river begins and 189 miles from the nearest stocking point.

"So these things are trying to run upstream as far as possible," Henning said. "We're just trying to get them out there so they can complete the ecological mission they serve."

There are signs that the eels are starting to have an ecological impact, as well. Following the success of their eel stocking experiments, Minniken and the Fish and Wildlife Service researchers began tracking and studying the surviving populations of fresh-

water mussels found in the Susquehanna River system.

The mussels have a symbiotic relationship with fish: They rely on them to reproduce. The mussels "fish" by displaying a piece of tissue that looks like a mayfly or minnow. When a fish approaches for a bite, the mussel responds by spraying the fish with larvae which ride on the fishes gills until they mature into baby mussels.

In the Susquehanna, the mussels' fish of choice was the eel, and when the eels disappeared, the mussels effectively stopped reproducing. The reintroduction of the eels raised the question, would the mussels respond?

Researchers tracked mussel reproduction and found that five years after eels had been reintroduced to Buffalo Creek the number of juvenile mussels in the stream doubled.

There is also hope that as they become re-established the eels, which eat almost anything, could prey on invasive species such as the rusty crayfish.

But getting up the river is only half of the eel's story. To complete their life cycle, they will have to get back down, as well, which can be a treacherous journey even without active eel weirs and hungry river dwellers.

That, Henning said, could be tackled through operational changes at the river's dams as opposed to active transportation methods, such as shutting down the dams' turbines during the downstream run or opening sluice gates.

In a way, researchers have been so focused on getting the eels back into the river that getting them back down has been something of a secondary concern. After all, the eels will mature for as long as two decades before they begin their migration.

LIFE CYCLE

The American eel exists in a cycle, its life journey a great circle. Born in the ocean, it rides the tides to the rivers, where it lives

and matures before once again returning to the sea to spawn and to die.

In a way, the story of the American eel in the Susquehanna mirrors that cycle: Once so prolific that it was a diet staple, man's intervention in the river caused it to all but disappear. And it has only been through man's intervention yet again that the eel has returned, a great turning of the ecological wheel of life.

There is a lot that researchers still don't know about the fish: How and where will the population stabilize over the next decade? Will it lead to a larger resurgence of mussels? What effect will eels (voracious generalist eaters) have on invasive species?

The eel is not a pretty fish, but it is, in some ways, an enigmatic one, which brings with it secrets for researchers to unlock. For example, what causes the variability between annual collections? Is it weather-related? Or is something else affecting how many eels make their way toward the river's mouth?

Even within a season, the numbers of eels captured can fluctuate or pulse almost day to day. Researchers aren't sure if the movement of elvers is more closely related to the cycles of the moon (they move at night) or if it is dependent on water flow (more water would give the eels a better path over impediments).

"It's tough to nail that down because there's so many variables in nature," Henning said. "And there's all these hydro operations that affect those variables."

"There's a lot of mysteries behind the American eel and its life cycles." But with the reintroduction of the species to the river, he and other biologists will finally have the opportunity to solve those mysteries.

And who knows? If they're successful enough, maybe Susquehanna eel will once again be a savored delicacy along the banks of the river.



Matt Kofroth of the Lancaster County Conservation District and other conservationists take inventory of fish species in the Conewago Creek.

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