

The Incredible Journey

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Great journeys make great tales of mystery, peril, and triumph. Consider the voyage of Columbus to the Americas, the expedition of Lewis and Clark, the celebrated journey of Mary Draper Ingles, and the fascinating journey of the American Eel (Fig. 1). The American Eel? Admittedly, the journey of the American Eel is not found in books on American history. However, the journey of the American Eel is as intriguing as any historical account of a mysterious and perilous journey.

Although the American Eel's snake-like body is alarming to some, I find this unusual fish to be one of the most interesting of all aquatic species within West Virginia, as well as within North America. The American Eel is catadromous which means that it lives most of its adult life in freshwater and spawns in the ocean. This life history is rare among North American fishes, and includes a long journey that begins and ends within or near the Sargasso Sea (an area that spans Bermuda to the Azores, and includes the mysterious Bermuda Triangle).

Interestingly, spawning of the American Eel remains a mystery to science, in part, owing to the difficulty of sampling due to the deep waters of the Sargasso Sea and the masses of floating aquatic grass called Sargassum weed. The spawning area is inferred based on the collection of the American Eel's ribbon-shaped larvae, called leptocephali, in the Sargasso Sea. Columbus traversed the Sargasso, and his diary (dated Sunday, September 16, 1492) noted:

"... Here the Admiral says that today and thenceforth they always encountered the most gentle breezes, that the enjoyment of the mornings was a great pleasure, that all they needed was to hear nightingales, he says; and the weather was like April in Andalusia.

Here they began to see great clumps of deep green seaweed which (so it seemed to him) had only recently been torn from land."

At this time, Columbus was in the Sargasso Sea and the Sargassum grass provided a false hope of land. In fact, Columbus and the three ships (*Pinta*, *Nina*, and *Santa Maria*) took another 25 days and traveled over 2,400 miles to reach land. This distance only represents a small portion of a young eel's travel itinerary. Although Columbus (with boats and sails) made the trip from the Sargasso to the land in 25 days using wind and ocean currents, the young eels take about one year to travel the distance to the mainland and rely on ocean currents to reach the Atlantic coastline or the Gulf of Mexico.

American Eels undergo several shape changes during their life cycle. Once they reach areas over the continental shelf and near coastal estuaries (where rivers enter the ocean) the young eels change shape. They go through a metamorphosis from a leaf-like ribbon-shape to a transparent eel-shape (called a glass eel). As the eel ages its skin darkens (referred to as an elver). The journey continues, as many of the elvers swim through estuaries and up rivers. Next, the eels transform into "yellow eels" and feed on aquatic life, including crayfish and small fishes. Yellow eels continue to grow until eventually maturing to adulthood, marked by a change of color from a yellowish back and white underbelly to darker bluish-silver back and white belly. The Sargasso Sea is the end destination for the silver eel as it swims back to the sea where it triumphantly spawns (and dies), and where its ribbon-larvae begin another journey in the circle of life.

American Eels become temporary West Virginia residents after swimming upstream from either the Gulf of Mexico or the Chesapeake Bay. From the Gulf of Mexico, eels swim upstream in the Mississippi River to West Virginia's Ohio River, and up tributaries of the Ohio River system. In West Virginia, eels are known from the Ohio River, the



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Fig. 1.

The American Eel (*Anguilla rostrata*).


Kanawha River, and as far upstream as the New River and Greenbrier River. From the Chesapeake Bay, eels enter West Virginia by swimming up the Potomac River. No one knows the exact number of eels within West Virginia streams, but most Atlantic coast states have reported large declines in eel populations – a cause for concern. In a recent three-year study, we documented over 6,000 eels at Millville Dam, Shenandoah River, near Millville, West Virginia. These eels were counted after swimming up an eel ladder, a device installed on the dam to help eels swim upstream.

Studies of American Eels at Millville Dam have been possible through collaborative efforts among Allegheny Energy Supply, U.S. Geological Survey, West Virginia Division of Natural Resources, and West Virginia University. These studies have not only documented a large number of eels in the lower Shenandoah River, but also have provided information relative to the ecology of eel movements and the effectiveness of eel ladders.

Based on these studies, most upstream movements of yellow-phase eels occur during times of high river flows or on dark nights near a new moon. Although the river does support eels of over three feet in length, the eels migrating upstream in the lower Shenandoah River are usually from three to nine years of age, between eight and 20 inches in length, and average around 12 inches in length.

American Eels do have a place in American history. Not long after the journey of the *Mayflower*, Native Americans taught the colonists how to catch and eat eels. Eels have one

of the highest nutritional values among freshwater fishes, and smoked eels were very useful in a time before refrigeration. Sometime after the Civil War, the American Eel practically vanished from North and South menus, another mystery – although this is probably due to the eel's snake-like appearance and changes in attitudes toward food. The European Eel (a close relative of the American Eel) has been a staple of the European's table fare throughout history. The exclusion from American diets, however, may be a good thing for the eel, given its large population decline in recent years.

Hopefully, after reading this fascinating account of the mysterious journey of the American Eel, you will develop a fondness or at least an appreciation for this wonderful fish as an important part of the diversity of fishes in West Virginia. Consider that American Eels were making the journey up the Missouri River long before the Lewis and Clark expedition, and up the treacherous New River Gorge long before Mary Draper Ingles. American Eels not only make these long journeys upstream, but also make the journey back downstream and ultimately to the Sargasso Sea. So, next time you are whitewater rafting in the New River Gorge or float fishing for Smallmouth Bass on the South Branch of the Potomac River, consider the eel – a fascinating journey by a mysterious yet unmistakably magnificent fish. 

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