American Eel in North Carolina

Anguilla rostrata
Class: *Actinopterygii*
Order: *Anguilliformes*
Family: *Anguillidae*
Status: *Under review*
View photos on Flickr:
http://www.flickr.com/photos/usfwsnortheast/sets/72157627551792381

Description

The American eel is one of 15 fish species of the genus Anguilla, whose members spawn in ocean waters, migrate to coastal and inland continental waters to grow, and then return to ocean spawning areas to reproduce - a life history strategy known as catadromy.

The American eel's slender body is covered with a mucous layer, which makes the eel appear to be slimy despite the presence of minute scales. A long dorsal fin runs from the middle of the back and is continuous with a similar ventral fin. Pelvic fins are absent, and a relatively small pectoral fin can be found near the midline, followed by the head and gill-covers. Variations exist in coloration; the back may be olive-green to brown shading to greenish-yellow on the sides and light gray or white on the belly. Eels from clear water are often lighter than those from dark, tannic acid streams.

Catadromous? Anadromous? Something else?

The more familiar anadromous fish, like salmon or striped bass, are born in freshwater streams, travel to the ocean to mature, and return to freshwater to spawn. Catadromous fish are born in the ocean, mature in fresh water and return to the ocean to spawn. American eels are the best example of a widespread catadromous fish in North American. Other examples include the mountain mullet in the Caribbean.

American Eel, by Ellen Edmonson and Hugh Chrisp via Wikimedia Commons

Diet

The American eel is a nocturnal species, swimming and eating at night. Eels eat other fish, octopus, shrimps, seaweed, plankton, crayfish, and other items depending on what is available. With its relatively weak jaws and many small teeth, it jerks or pulls on food that cannot be consumed whole or readily broken into pieces. Holding on with their mouths, adult eels spin their bodies to break apart food, and have been recorded at six to 14 spins per second. In comparison, Olympic ice skaters can spin five times per second.

Wide Distribution

The American eel is found in the Atlantic Ocean from Greenland to Brazil. Along the Atlantic coast of the United States, eels between Maine and Florida are considered part of a single population.

Life History

The American eel begins its life in the Sargasso Sea near Bermuda within the North Atlantic Ocean, where eggs hatch into larvae that are transported by ocean currents to the Atlantic coasts of North America and northern South America, and the Gulf coast.

American eels are known by several names that describe the coloration of progressive stages of development (glass eel, elver, yellow eel and silver eel) as well as changes in where they occur.

Juveniles arrival to the coast and migrate to mature in rivers or estuaries

Eel juveniles arrive in coastal waters as colorless "glass eel" in great numbers, though with considerable yearly variation (ICES 2001, p. 2). Glass eels metamorphose (change) to pigmented "elvers," that later develop into "yellow eels," which resemble the adults in size and are usually yellow or green in color. The timing and duration of yellow eel upstream migration depends on latitude and can occur over a broad period of time from January through October. Depending on where they cease their upstream migration, some yellow eels reach the extreme upper portions of the rivers while others stay behind in the brackish areas.

Adults reproduce in the sea

American eels begin sexual differentiation at a length of about 20 to 25 centimeters (cm) (7.9 to 9.8 inches (in)) and, depending on eel density, become male or female. Female eels grow the largest, and any eel greater than 33 cm is female. Much later they make a final change into a mature stage as "silver eels", with a distinctive silvery color, and enlarged eyes. Upon nearing sexual maturity, the eels begin migration back downstream, toward the Sargasso Sea, completing sexual maturation en route. Spawning occurs in the Sargasso Sea. After spawning, it is assumed that adult eels die.

Habitat in North Carolina

Some scientists consider the highly adaptive American eel to have the broadest diversity of habitats of any fish species in the world. In North Carolina, estuarine areas like the Albemarle-Pamlico Sound provide suitable habitat for the early glass eel and elver stages. Fresh water habitat, including lacustrine areas (lakes and ponds) have historically been considered among the most important habitats for eel maturation because eels maturing in such habitats usually become female. At one time, American eels were found throughout North Carolina, even described by early fish collectors as "everywhere abundant" in the upper Catawba River. The American eel finds fresh water habitat in North Carolina in streams and large rivers in the Piedmont and Coastal Plain, but numbers are reduced upstream of many dams.

Threats

Habitat loss and fragmentation

Hydroelectric and other dams block or slow movements of elvers and subadult eels to upstream habitats. American eels continue to be distributed throughout the lower areas of watersheds closest to the sea and sounds. They are prevented from reaching extreme headwaters where they had historically been reported as "everywhere common" in 1889 by early scientist D.S. Jordan.

Turbine mortality

Silver eel females migrating downstream often die in the turbines of hydropower plants, as a consequence of the eel's long and slender body form, which does not easily pass through turbine blade openings.

Diseases

Worm parasites *Anguillicolla crassus* and *Daniconema anguillae* may impair the capacity of the eel to undertake the migration to the Sargasso Sea. In one North Carolina study, the percentage of American eels infected ranged from 10 to 100 percent (Moser et al. 2001, p. 1). These worms infest the eel swim bladder. While it may not be a problem in shallow water, once the eels mature and begin their long return swim to the Sargasso, a nonfunctioning or even somewhat impaired swim bladder could cause bouyancy and swimming problems in the open ocean, before they have successfully spawned.

Elvers, juvenile eels that migrate to brackish waters and begin to develop gray to greenish-brown pigmentation.
Credit: Maryland Fishery Resources Office, USFWS

Contaminants

Toxic substances too, may impair eels, although which contaminants and how much harm they do are as yet largely unknown. Studies have shown American eels are sensitive to petroleum products, and accumulate other contaminants in fat cells.

Predation

In all its life stages, the American eel serves as an important prey species for many fish, aquatic mammals, reptiles (e.g., rainbow snakes, snapping turtles) and fish-eating birds.

Harvest

Since the early 17th century, people have harvested American eel for food and cultural sustenance. American eels continue to support valuable seasonal commercial, recreational and subsistence fisheries along the Atlantic coast. In the Carolinas, harvest has been greatest for small yellow eels used for bait to catch striped bass. Global markets have been volatile, sometimes commanding high prices for glass eel exports.

Conservation Opportunities in North Carolina

Eel passage projects have been completed at the Roanoke Rapids Dam and similar projects are in different stages of planning and construction. While upstream passage facilities are not present everywhere within the American eel's range, more American eels are passed into the upper reaches of watersheds now, beginning with renewed efforts by fishery scientists in recent years.

The American eel may need federal protection under the Endangered Species Act. The US Fish & Wildlife Service is conducting a Status Review for the American eel to determine if adding the species to the Federal List of Endangered and Threatened Wildlife is warranted.

Species Contacts in North Carolina

R. Wilson Laney, PhD
South Atlantic Fisheries Coordinator
South Atlantic Fish and Wildlife Conservation Office
wilson_laney@fws.gov
919/515 5019
U.S. Fish and Wildlife Service
P.O. Box 33683
Raleigh, North Carolina 27636-3683

Mark Cantrell
Fish and Wildlife Biologist
mark_a_cantrell@fws.gov
828/258 3939 x 227
U.S. Fish and Wildlife Service
Ashville Field Office
160 Zillicoa Street
Asheville, NC 28801

U.S. Fish and Wildlife Service
Raleigh Field Office
P.O. Box 33726
Raleigh, NC 27636-3726
919/856 4520
www.fws.gov/Raleigh/aeel.html