AMERICAN EEL

Anguilla rostrata

Life History and Habitat Needs

Geographic Range

American eel are found in fresh, brackish, and coastal waters from the southern tip of Greenland to northeastern South America.

Movement/Migration

The American eel has a complex life cycle that begins in the Sargasso Sea, which is a large portion of the western Atlantic Ocean east of the Bahamas and south of Bermuda. After hatching, the planktonic leptocephalus larvae are carried to the eastern seaboard by surface currents. As they approach the continental shelf, the larvae metamorphose into miniature transparent eels, called glass eels. Glass eels enter estuaries by drifting on flood tides and actively swimming along shore in estuaries above tidal influence. Movements are primarily nocturnal. In estuaries, glass eels eventually change into pigmented elvers, which are active mostly at night. Triggered by a temperature decrease to about 12 to 14°C, elvers migrate upstream in waves and become more active during the day. The rate of movement upstream is determined by the water discharge and possibly nightly tidal height. The next life stage is the yellow eel. Some yellow eels continue to migrate upstream, while others remain in brackish portions of rivers until they mature into adult or silver eels. Silver eels migrate downriver to marine waters and return to the Sargasso Sea, where they spawn. Downstream migration is characterized by spurts with long periods of no movement and peaks of intensive movement.

Spawning

American eel has a single spawning region in in the Sargasso Sea. Spawning occurs during the winter and the spring, from February to April, and possibly beyond. Spawning is thought to occur in the mid-upper water column and occurs on the side of the front in the Sargasso Sea that has warmer temperatures and more saline waters. Adults are believed to spawn once and die.

Habitat Use

American eel habitat includes the open ocean, the coastal shelf, coastal estuaries, rivers, small freshwater streams, lakes, and ponds. They can also travel short distances over land and are sometimes found in land locked lakes, particularly in the Northeastern U.S. Water temperature and salinity may be important to spawning adults. Substrate might be an important habitat parameter for elvers, as they may burrow during the day and in between movements upstream. Yellow eels can remain in estuaries, rivers or lakes for up to 20 years or more before they fully mature into silver eels.

Threats to Habitat

American eel is depleted in part due to habitat loss, particularly obstructions to access for different habitats needed for progression through the life stages.

- Blockage of stream access (e.g. dams)
- Turbine passage mortality
- Pollution
- Nearshore habitat destruction
- Oceanic changes, affecting larval transport
- Introduction of non-native parasites

ASMFC Fish Habitats of Concern

As the eel's only spawning ground, the Sargasso Sea is essential to the survival of the species. Continental shelf waters are critical for the larval feeding, growth, and transitioning into freshwater. Estuaries and freshwater areas serve as habitats for the later stages in the American eel's life, as it grows and matures into adults.

Recommendations to Improve Habitat Quality

- Identify, categorize, and prioritize important and historic American eel habitat and reestablish eel into historic habitats by mitigating the effects of various hazards to the upstream and downstream migration of American eel (e.g., by requiring fish (eel) passage facilities).
- Restore habitat in areas where residential and commercial development is adjacent to American eel habitat. Ensure American eel habitat is identified and considered in river basin and wetland restoration plans.
- Protect American eel habitat by obtaining land adjacent to critical migration corridors and staging areas and pursuing acquisition, deed restrictions, or conservation easements.
- Improve fish passage by improving access to upstream reaches of streams currently restricted by dams with no ladders and by investigating changes in turbine design.
- Monitor enhancement efforts and report on the amount of habitat opened through upstream passage projects.
- Establish windows of compatibility for activities known or suspected to adversely affect American eel life stages and their habitats (e.g. dredging, filling, aquatic construction, water diversions/withdrawal from important habitats and from rivers tributary to important habitats).
- Limit the introduction of contaminants that are a threat to human or American eel health
- Prohibit the use of any fishing gear or practice, which is documented by managers to have an unacceptable impact on American eel (e.g., habitat damage) within the affected important habitats.
- Restrict introductions of non-native parasites into uninfected habitats.

Habitat Research Needs

- Identify migratory routes and guidance mechanisms of silver eels migrating to the ocean.
- Verify specific spawning locations in the Sargasso Sea.
- Research behaviors and movements of eel during their freshwater residency.
- Research the changes in ocean climate and environmental quality that might influence larval and adult eel migration, spawning, and survival.
- Document characteristics and distribution of eel habitat, and the value of that habitat with respect to growth and sex determination.
- Many research needs have been identified relating to upstream/downstream passage and impacts from contaminants.
- Determine relative contribution of historic loss of habitat to potential eel population and reproductive capacity.
- Assess characteristics and distribution of American eel habitat and value of habitat with respect to growth and sex determination; develop GIS of American eel habitat in U.S.
- Assess available drainage area over time to account for temporal changes in carrying capacity; develop GIS of major passage barriers.
- Improve understanding of within-drainage behavior and movement and the exchange between freshwater and estuarine systems.
- Monitor non-harvest losses such as impingement, entrainment, spill, and hydropower turbine mortality

Additional Information

American eel are currently managed under the Interstate Fishery Management Plan for American Eel, approved in 1999, and Addendum I (2006), Addendum II (2008), Addendum III (2013), and Addendum IV (2014). Addenda III and IV seek to reduce mortality and increasing conservation of American eel stocks across all life stages. Long-term FMP objectives include: encourage protection of eel spawning, nursery and growth habitats; and protect and enhance inland and coastal water quality to protect the health of the eel population and to reduce bioaccumulation of toxic substances. Additional information is contained in the ASMFC's Habitat Source Document for Diadromous Fish (2009) and Proceedings of a Workshop on American Eel Fish Passage Technologies (2013). These documents can be found on the ASMFC website at www.asmfc.org or by contacting the ASMFC Habitat Program Coordinator at 703.842.0740. The most recent American eel stock assessment, which was completed in May 2012, concluded that the species is depleted in US waters (http://www.asmfc.org/species/american-eel).

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