



HICKORY SHAD

Alosa mediocris

Life History and Habitat Needs

Geographic Range:

Hickory shad (*Alosa mediocris*) are distributed along the Atlantic coast, historically as far north as the Bay of Fundy to the Tomoka River, Florida. Currently, the northern boundary is Cape Cod, Massachusetts, with the greatest abundance of hickory shad centered between South Carolina and Delaware (ASMFC 2009; Murauskas and Rulifson 2011).

Movement/Migration:

Hickory shad are anadromous fish, spending most of their adult lives at sea but ascend coastal rivers during spawning migrations. Freshwater entry by spawning adults are directly associated with latitude, typically delayed with increasing latitude (Murauskas and Rulifson 2011). It is assumed that adults descend gradually downstream and return to the ocean by mid-summer. Several studies suggest that most young juveniles move downstream in summer and migrate to estuarine nursery areas at an earlier age than other anadromous alosines, while other juveniles move directly into saltwater. Furthermore, juveniles may forego the oligohaline portion of the estuary in favor of more saline nursery environment (ASMFC 2009). Little is known about juvenile and adult distribution and movements once in their ocean habitat.

Spawning:

Hickory shad are considered batch spawners, one individual can spawn multiple times in one season; reproducing predominantly in freshwater reaches of coastal rivers, flooded swamps, and channels of tributary creeks from Maryland south. Spawning may occur once or several times in an individual's life span. Research indicates that reproductive success is influenced by physical characteristics (size, age, energy reserves) of adult hickory shad, geographic location and environmental conditions, migration length, and time of year. Spawning activity has been reported in water temperatures ranging from 8-22°C, although temperature during peak spawning has been documented to vary from river to river (Harris and Hightower 2011). Adults are noted to prefer deep and dark-water tributaries for spawning in the Neuse River, North Carolina.

Habitat Use:

Little is known about its life history and specific habitat requirements; however, coastal migrations and habitat requirements are thought to be similar to that of other alosines, especially American shad. Adult hickory shad have been reported in Maryland waters where structures such as ledges and fallen trees are present. Bottom composition for spawning in these waters tends to be mud, sand, and gravel.

Threats to Habitat

- Dams and other physical obstructions
- Water withdrawal facilities
- Thermal and toxic discharges
- Channelization and dredging
- Land use (farming, logging and urbanization)
- Aluminum and other metals
- Changes in pH and dissolved oxygen
- Atmospheric deposition
- Climate change

ASMFC Habitat Areas of Particular Concern

Habitat Areas of Particular Concern include good spawning substrate; healthy nursery areas; inlets that provide access to coastal bays, estuaries, and riverine habitat upstream to spawning grounds; and sub-adult and adult nearshore ocean habitat.



Recommendations to Improve Habitat Quality

- Remove obstructions or improve passage to upstream migration. Evaluate effectiveness of passage at existing bypass facilities. Mitigate hydrological changes from dams and develop water use and flow regime guidelines. Modify fish passage facilities to address climate change impacts. Determine if passing migrating adults upstream earlier in the year in some rivers would increase production and larval survival and opening downstream bypass facilities sooner would reduce mortality of early emigrants.
- Take into account water flow needs for alosine migration, spawning, and nursery use when deciding river flow allocation. Alter water withdrawal rates or water intake velocities to reduce alosine mortality. Locate water withdrawal facilities along the river where impingement rates will be low.
- Improve and maintain water quality and suitable habitat. Upgrade wastewater treatment plants and reduce thermal effluent into rivers and discharge earlier in the year to reduce impacts to migrating fish. Identify and reduce non-point and point source pollution. Determine the effects of dredging on alosine habitat. Implement erosion control measures and best management practices.
- Identify, quantify, and evaluate potential alosine spawning and nursery habitat. Coordinate with other agencies responsible for habitat restoration plans and promote cooperative interstate research, monitoring and law enforcement. Evaluate water quality standards and criteria to ensure they meet special needs of alosines. Review proposed projects for alosine spawning and nursery areas. Limit development projects
- Determine biotic effects of alosine passage into previously restricted habitats and on other native species.

Habitat Research Needs

- Investigate impacts of climate change to hickory shad habitats
- Determine habitat requirements and optimal tolerances for variables such as temperature or depth for all life stages
- Use a multiple scale approach for restoring alosine habitat and identify and assess indicators of suitable habitat, including potential spawning habitat
- Document the impact of power plants and other water intakes on early life stage mortality in spawning areas
- Focus research on within-species variation in genetic, reproductive, morphological, reproductive, and ecological characteristics
- Review studies dealing with effects of acid deposition on anadromous alosines
- Determine how abundance and distribution of potential prey affect growth and mortality of early life stages
- Conduct additional studies on the effects of land use on riverine stages
- Determine if pH and aluminum levels lead to reduced reproductive success and if chlorinated sewage effluent slows recovery of depressed stocks
- Determine factors that regulate and potentially limit downstream migration, seawater tolerance, and early ocean survival of juveniles

Additional Information

Hickory shad are managed under Amendment 3 (2010) to the Fishery Management Plan for Shad and River Herring. Amendment 3 required states to develop habitat plans for shad and river herring, including hickory shad. Additional information is contained in the ASMFC's Diadromous Fish Habitat document (2009). These documents can be found on the ASMFC website at www.asmfc.org or by contacting the ASMFC Habitat Program Coordinator at (703) 840-0740.

References

- Atlantic States Marine Fisheries Commission (ASMFC). 2009. Atlantic Coast Diadromous Fish Habitat: A Review of Utilization, Threats, Recommendations for Conservation, and Research Needs.
- J. G. Murauskas & R. A. Rulifson. 2011. Reproductive Development and Related Observations during the Spawning Migration of Hickory Shad, Transactions of the American Fisheries Society, 140:4, 1035-1048, DOI: 10.1080/00028487.2011.607036
- Julianne E. Harris & Joseph E. Hightower. 2011. Spawning Habitat Selection of Hickory Shad, North American Journal of Fisheries Management, 31:3, 495-505