Hickory Shad − *Alosa mediocris*

Overall Vulnerability Rank = Very High

Biological Sensitivity = High

Climate Exposure = Very High

Data Quality = 62% of scores ≥ 2

	Alosa mediocris	Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Stock Status	2.9	0.4	
	Other Stressors	3.6	1.6	
	Population Growth Rate	2.3	1.0	
	Spawning Cycle	3.7	2.4	
	Complexity in Reproduction	3.4	1.8	
	Early Life History Requirements	3.4	2.0	
	Sensitivity to Ocean Acidification	1.3	1.8	
	Prey Specialization	1.7	1.8	
	Habitat Specialization	2.8	2.2	
	Sensitivity to Temperature	2.5	2.0	
	Adult Mobility	1.3	2.8	
	Dispersal & Early Life History	3.0	1.4	
	Sensitivity Score	High		
Exposure variables	Sea Surface Temperature	4.0	3.0	
	Variability in Sea Surface Temperature	1.0	3.0	
	Salinity	1.9	3.0	
	Variability Salinity	1.2	3.0	
	Air Temperature	4.0	3.0	
	Variability Air Temperature	1.0	3.0	
	Precipitation	1.3	3.0	
	Variability in Precipitation	1.4	3.0	
	Ocean Acidification	4.0	2.0	
	Variability in Ocean Acidification	1.0	2.2	
	Currents	2.0	1.0	
	Sea Level Rise	2.4	1.5	
	Exposure Score	Very High		
Overall Vulnerability Rank		Very High		

Low
Moderate
High
Very High

Hickory Shad (*Alosa mediocris*)

Overall Climate Vulnerability Rank: **Moderate** (100% certainty from bootstrap analysis).

Climate Exposure: **Very High**. Three exposure factors contributed to this score: Ocean Surface Temperature (4.0), Ocean Acidification (4.0) and Air Temperature (4.0). Hickory Shad are anadromous, spawning in freshwater, developing in freshwater and estuarine habitats, feeding as adults in marine habitats.

Biological Sensitivity: **High**. Five sensitivity attributes scored above 3.0: Spawning Cycle (3.7), Other Stressors (3.6), Complexity in Reproduction (3.4), Early Life Stage Requirements (3.4), and Dispersal and Early Life History (3.0). Hickory Shad are diadromous and exposed to a number of other stressors including habitat destruction, blockage to spawning habitats, and contaminants (Limburg and Waldman, 2009). Spawning time varies latitudinally and is linked to spring warming (Monroe, 2002). Eggs and larvae inhabit freshwaters and then juveniles move to estuarine and ocean waters. Dispersal of eggs and larvae is limited.

Distributional Vulnerability Rank: **Moderate** (56% certainty from bootstrap analysis). Hickory Shad have a relatively high degree of spawning site fidelity, limiting the ability of the species to shift distribution.

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Blueback Herring is estimated to be neutral, but this estimate has a high degree of uncertainty (<66% certainty in expert scores). Of the alosiids species along the U.S. East Coast, Hickory Shad is the least well known. Warming temperatures may impact various aspects of the life cycle, but the direction and magnitude of these impacts is difficult to determine. The effect of ocean acidification over the next 30 years is likely to be minimal.

Data Quality: 62% of the data quality scores were 2 or greater indicate that data quality is moderate.

Climate Effects on Abundance and Distribution: Relative to other alosiids, little is known regarding the effects of climate change and variability on Hickory Shad. Spawning migration timing has been linked to water temperature as well as size, age, and energy reserves (Murauskas and Rulifson, 2011). Egress to saltwater in the fall is also linked temperature (Able et al., 2014). Studies on other alosiids in the region (Alewife, Blueback Herring) indicate that climate will impact Hickory Shad productivity. Distribution will be affected less, owing to spawning site fidelity (NMFS, 2012; Lynch et al., 2014; Tommasi et al., 2015).

Life History Synopsis**:** Hickory Shad is an anadromous, iteroperous, coastal species found from the Gulf of Maine to St. John's River, Florida (Munroe, 2002). Most Hickory Shad are mature by age 3-5 years (Munroe, 2002). Mature adults migrate to freshwater around Chesapeake Bay and to the south in spring to spawn (Munroe, 2002). Little is know about the specific location of spawning, but Hickory Shad seem to prefer freshwater streams with some current (Munroe, 2002; Able and Fahay, 2010). Spent adults return to sea (Able and Fahay, 2010). Eggs are slightly adhesive and semi-demersal (Munroe, 2002). Larvae and small juveniles leave the freshwater spawning areas for tidal-freshwater and estuarine nursery areas (Able and Fahay, 2010). Young shad migrate from the nursery areas to the ocean in early summer (Able and Fahay, 2010). Little is known about the oceanic part of the Hickory Shad life cycle. Adult shad occur in estuarine and coastal areas, occasionally ranging as far north as the Gulf of Maine in fall, but probably overwinter in North and South Carolina (Munroe, 2002; Able and Fahay, 2010). Hickory Shad are more piscivorous than their congeners and in addition to squid, fish eggs, and small crabs, have been know to consume Sand Lance, anchovies, Cunner, Atlantic Herring, Scup, and Atlantic Silversides (Munroe, 2002). The Atlantic States Marine Fisheries Commission manages Hickory Shad through the Interstate Fishery Management Plan for Shad and River Herring (ASMFC, 1999).

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