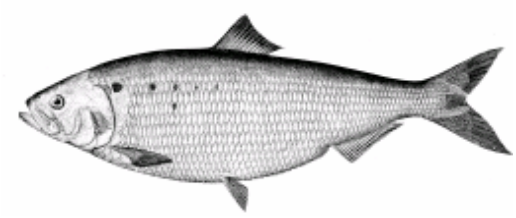

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American Shad

by

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Distribution, Biology and Management

American shad, *Alosa sapidissima*, is an anadromous species distributed along the Atlantic coast from southern Labrador to northern Florida (Figure 39.1). An introduced stock occurs along the Pacific coast. American shad undergo extensive seasonal migrations, moving into rivers for spawning beginning in January in southern rivers, and continuing until July in the northernmost portion of their range. After spawning, shad migrate north along the coast to Canada where they feed during the summer. A southward migration occurs later along the continental shelf where the fish overwinter prior to spring spawning migrations to their natal rivers.

Life history patterns of shad vary depending on the latitudinal location of their natal rivers. Most shad remain in the ocean for four years before returning for their first spawn, although the mean age at first spawning is age 5 for the more northern fish. Fecundity also changes with latitude, ranging from 300,000 to 400,000 eggs per mature female in southern rivers decreasing to 125,000 for fish in northern rivers. After spawning, American shad north of Cape Hatteras move offshore to feed and overwinter and may return to their natal rivers to spawn in several subsequent years; however, southern members of the species usually die after spawning.

Most major rivers along the Atlantic coast have historically supported distinct spawning stocks of American shad. The species has been exploited for its meat and roe since the late 17th century. In 1896, Atlantic coast commercial landings exceeded 22,000 mt as compared to between 100 and 1000 mt annually since 1996 (Table 39.1, Figure 39.2). American shad are harvested primarily by gillnets in a coastal intercept fishery. A recreational angling fishery also occurs but no comprehensive catch data are available.

Historic declines in abundance of American shad in the Hudson and Connecticut Rivers (as well as in rivers in Maryland, North Carolina, and Florida) have been attributed to overfishing and degradation of riverine habitat quality. Dam construction and pollution have also been factors contributing to the decline and almost complete disappearance of shad in many watersheds.

American shad are managed by the Atlantic States Marine Fisheries Commission (ASMFC) under a Fisheries Management Plan for American shad and river herring implemented in 1985 to facilitate cooperative management and stock restoration among the states. Restoration efforts have involved habitat improvement, fish passage, stocking, and transfer programs. Despite improved returns in some major river systems such as the Susquehanna, Delaware and Connecticut Rivers, the range-wide abundance of American shad remains well below historic levels. The Fishery Management Plan was amended in 1999 with specific measures to control exploitation of shad. The amendment mandated that: (a) all ocean-intercept fisheries for American shad be phased out by the end of 2004; (b) mortality rates be reduced in in-river fisheries; and (c) an aggregate 10-fish daily creel limit in recreational fisheries be established for American and hickory shad.

The Fishery

A 1998 assessment characterized fishing mortality for 9 river stocks and resource trends for 13 river stocks of American shad. Based on a conservative definition of overfishing, F_{30}, estimates ranged from .39 - .48. Total fishing mortality rates (river and coastal) were below the overfishing definition for the nine stocks that were evaluated. In addition, juvenile shad production indices for seven of these stocks suggested recruitment failure only in Maine. Although these results suggest that recent levels of exploitation in coastal intercept fisheries had not adversely impacted these stocks, the F_{30} values are considered rough approximations of true values and did not consider smaller stocks. However, the total range of extant American shad populations includes additional populations in small river systems and small populations in larger river systems that are actively being restored. Also, much historical shad habitat is still vacant and may be targeted for restoration in the future. For these stocks, individual states have developed fishing mortality targets to protect small stocks and rebuild others. Assessment studies have not quantitatively addressed these systems because of limited biological data. Like all mixed stock fisheries, small stocks can be at risk under conditions of uncertainty.

Landings for 2005 were at an all-time low, but this is a direct result of the closure of all ocean-intercept fisheries. At the time of the 1998 assessment, American shad stocks overall were considered fully exploited and at low levels of abundance. The current status of this resource is pending the completion of a comprehensive assessment by the ASMFC Shad and River Herring Assessment Subcommittee, which is in progress and is scheduled to be completed by the end of 2007.

Assessment Results

Assessment results are pending completion of a comprehensive 2007 assessment.

Biological Reference Points

Fishing mortality was calculated in 1998 using a threshold of F_{30} as part of the development of Amendment 1 to Interstate Fishery Management Plan for Shad and River Herring (ASMFC 1999) (Table 39.2). The definition was to be used as a conservative estimate and managers were

encouraged to consider lower levels of fishing based on the abundance of shad in the smaller stocks.

Biological reference points will be updated pending the completion of the 2007 American shad stock assessment.

Summary

Stock abundances of American shad are well below historic levels of the early 20th century as a result of overfishing and habitat destruction. Ocean-intercept fisheries for shad was phased out between the year 2000 and 2005 as mandated by the amended Fishery Management Plan. Research into the biology, habitat requirements and stock status of American shad continues, with the goal of restoring American shad to sustainable levels of spawning stock biomass.

Table 39.1 Recreational and commercial landings of American shad (thousand metric tons).

Category	1986-95 Average	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
U. S. Recreational	-	-	-	-	-	-	-	-	-	-	-
Commercial											
United States	1.3	0.7	0.8	1.0	0.6	0.8	0.7	0.8	0.7	0.5	0.1
Canada	-	-	-	-	-	-	-	-	-	-	-
Other	-	-	-	-	-	-	-	-	-	-	-
Total Nominal Catch	1.3	0.7	0.8	1.0	0.6	0.8	0.7	0.8	0.7	0.5	0.1

Table 39.2 Summary of MSY-based reference points for American shad.

MSY Based Reference Points		
Long-term potential catch (MSY)	=	Unknown
Biomass corresponding to MSY	=	Unknown
Minimum biomass threshold	=	N/A
Overfishing definition = $F_{30\%}$	=	0.39-0.48 depending on stock
$F_{1992\text{-}96}$	=	< $F_{30\%}$ range in all cases evaluated
(Implies overfishing was not occurring)		

For further information

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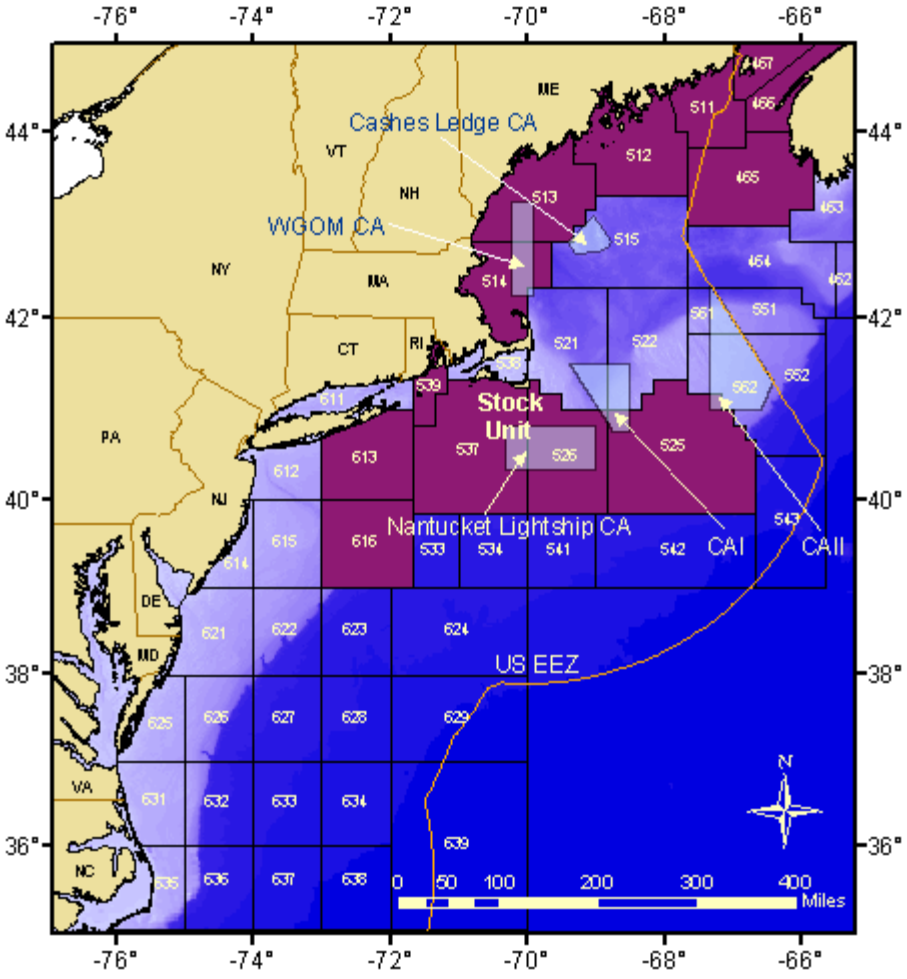

Figure 39.1. Statistical areas used to define the American shad stock.

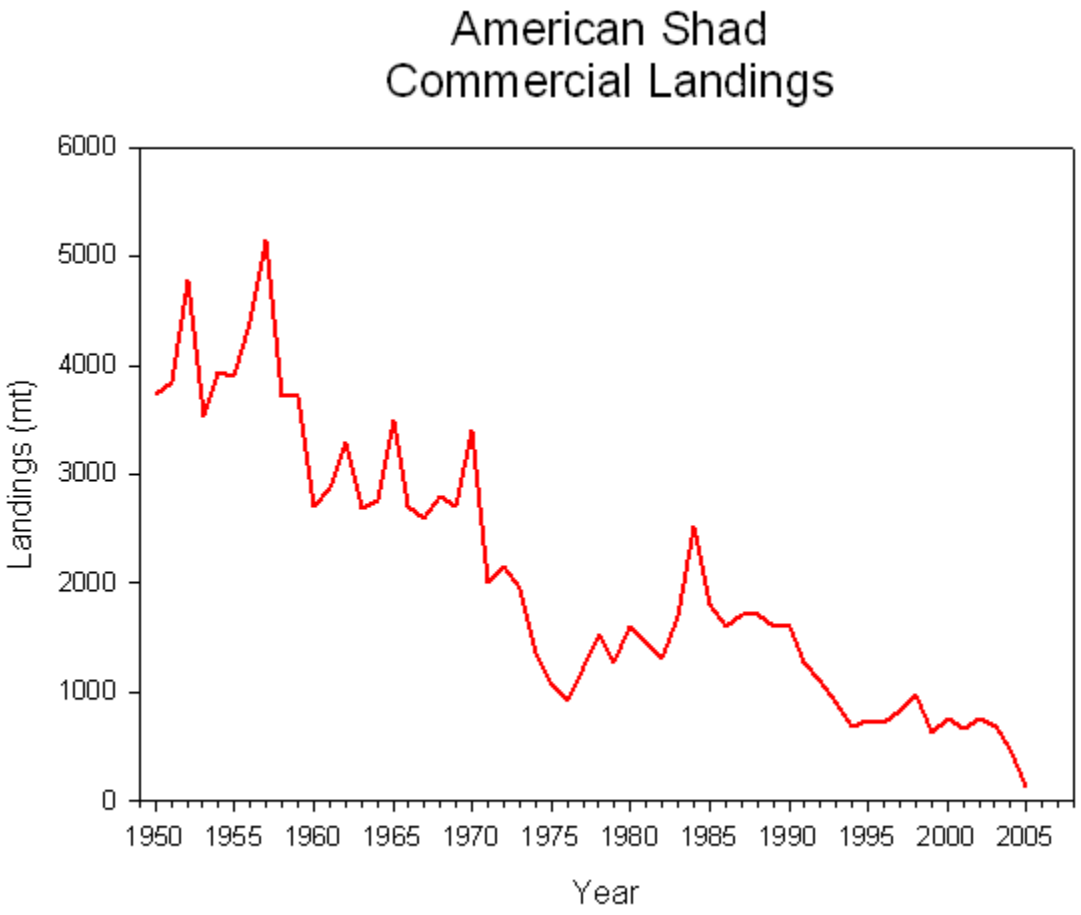

Figure 39.2. Commercial landings for American shad, 1950-2005.