

Species Status Assessment

Class: Actinopterygii
Family: Clupeidae
Scientific Name: *Alosa sapidissima*
Common Name: American shad

Species synopsis:

This species of herring is anadromous and can be found along the Atlantic Coast from Florida to the Gulf of St. Lawrence in northeastern Quebec (Smith 1985, ASMFC 2007). American shad in New York are found in the Hudson River and Delaware River and are part of the mid-Atlantic population. This population has a migratory range of thousands of miles along the Atlantic Coast (Smith 1985, Kahnle and Hattala 2010, Stegemann and Stang 2013). The American shad spends most of its life at sea only entering fresh water to spawn (Smith 1985, NatureServe 2012). In New York, the American shad was historically found in the Delaware River and Hudson River in large numbers (ASMFC 2007). In the past two decades the Hudson and Delaware populations have declined (ASMFC 2007). Even with recent restoration efforts, population size is much smaller than historical levels as a result of dams, overfishing, and water pollution (Kart et al. 2005, Haas-Castro 2006, ASMFC 2007, DFO 2013).

I. Status

a. Current and Legal Protected Status

i. **Federal** Not listed **Candidate?** No

ii. **New York** Not listed: SGCN

b. Natural Heritage Program Rank

i. **Global** G5

ii. **New York** S4 **Tracked by NYNHP?** No

Other Rank:

Status Discussion:

This species is in decline throughout its range. There have been slight local increases in abundance, as a result of recent restoration efforts in the Susquehanna, Delaware, and Connecticut rivers, but many populations are still an order of magnitude or more smaller than historical levels (ASMFC 2007).

II. Abundance and Distribution Trends

a. North America

i. Abundance

 X declining ___increasing ___stable ___unknown

ii. Distribution:

___ declining ___increasing X stable ___unknown

Time frame considered: Past 20 years (ASMFC 2007)

b. Regional

i. Abundance

 X declining ___increasing ___stable ___unknown

ii. Distribution:

___ declining ___increasing X stable ___unknown

Regional Unit Considered: New England

Time Frame Considered: Past 20 years (ASMFC 2007)

c. Adjacent States and Provinces

CONNECTICUT **Not Present** _____ **No data** _____

i. Abundance

 X declining ___ increasing ___ stable ___ unknown

ii. Distribution:

 ___ declining ___ increasing X stable ___ unknown

Time frame considered: Past 20 years (ASMFC 2007) _____

Listing Status: Not listed _____ SGCN? Yes _____

MASSACHUSETTS **Not Present** _____ **No data** _____

i. Abundance

 X declining ___ increasing ___ stable ___ unknown

ii. Distribution:

 ___ declining ___ increasing X stable ___ unknown

Time frame considered: Past 20 years (ASMFC 2007) _____

Listing Status: Not listed _____ SGCN? Yes _____

NEW JERSEY **Not Present** _____ **No data** _____

i. Abundance

 ___ declining ___ increasing X? stable ___ unknown

ii. Distribution:

 ___ declining ___ increasing X stable ___ unknown

Time frame considered: Past 20 years (ASMFC 2007). _____

Listing Status: Not listed _____ SGCN? No _____

ONTARIO Not Present _____ No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 20 years (NatureServe 2012)

Listing Status: Not listed

PENNSYLVANIA Not Present _____ No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 10 years (ASMFC 2007)

Listing Status: Not listed SGCN? No

QUEBEC Not Present _____ No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 20 years (NatureServe 2012)

Listing Status: Vulnerable

VERMONT Not Present _____ No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 10 years (ASMFC 2007)

Listing Status: Not listed SGCN? Yes

d. NEW YORK No data _____

i. Abundance

declining increasing stable unknown

ii. Distribution:

declining increasing stable unknown

Time frame considered: Past 20 years

Monitoring in New York.

Annual field sampling is conducted by the Hudson River Estuary Program (Kahnle 2010). The Hudson River Fisheries Unit of the NYSDEC tracked 40 prespawning American shad in the spring of 2009 using radio tags (Kahnle 2010). Tracking helped to identify specific spawning locations (Kahnle 2010).

Trends Discussion:

The New York American shad population is at an all time low since 1880 (Kahnle and Hattala 2010). Since the 1990s, some local populations in Connecticut, Massachusetts, Maine and Vermont have increased as a result of improvements in water quality, stocking programs, and the use of fish passage ways to increase access to spawning waters; however, shad abundance in these states is still far below historical levels (Kart et al. 2005, Haas-Castro 2006, ASMFC 2007). Current data indicate that Hudson River shad stock is at a historic low (ASMFC 2007a, Hattala and Kahnle 2009).

Adult mortality has increased and is well above acceptable levels while mean age, size and stock size has also decreased (Hattala and Kahnle 2009).

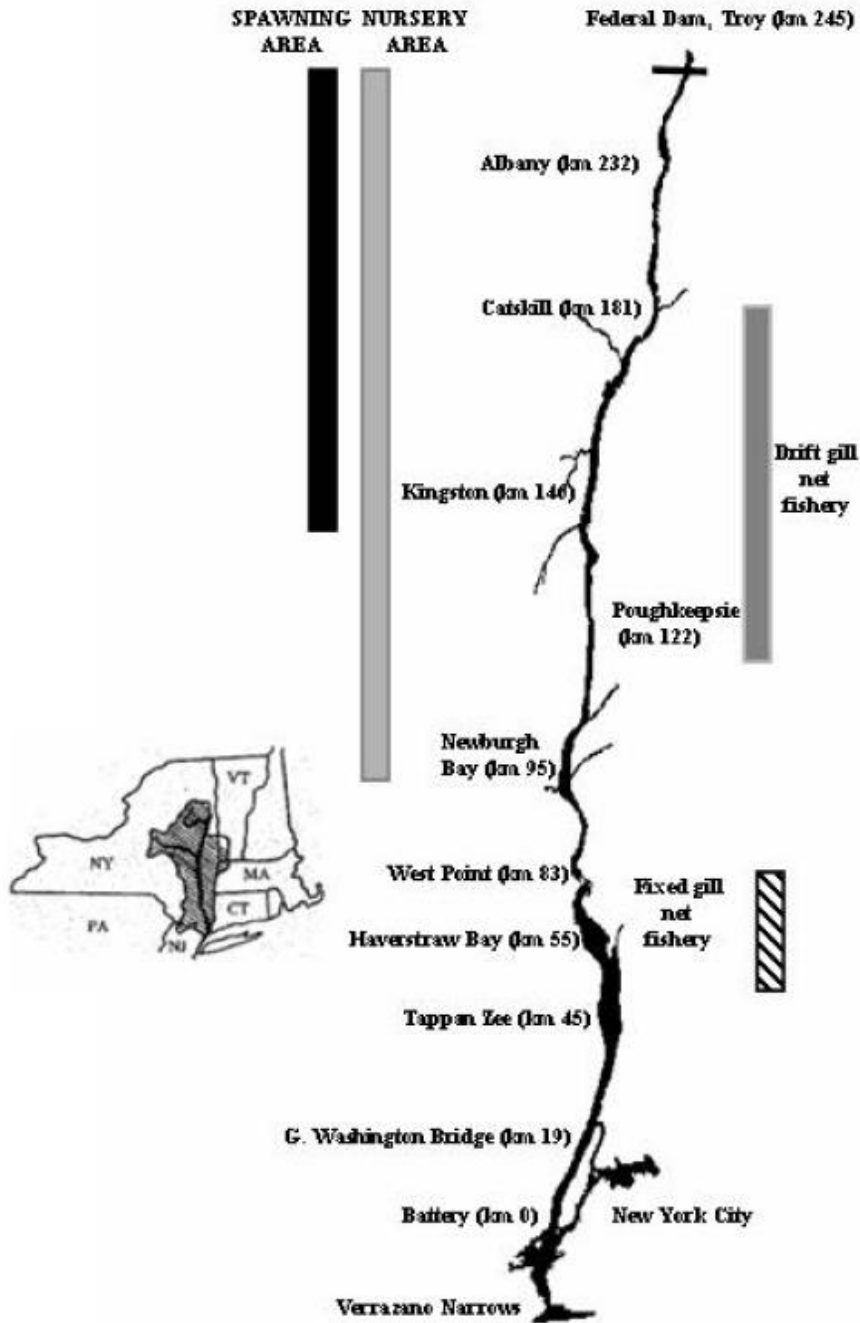


Figure 1: Hudson River Estuary with spawning, nursery, and fishery areas for American shad (ASMFC 2007a).

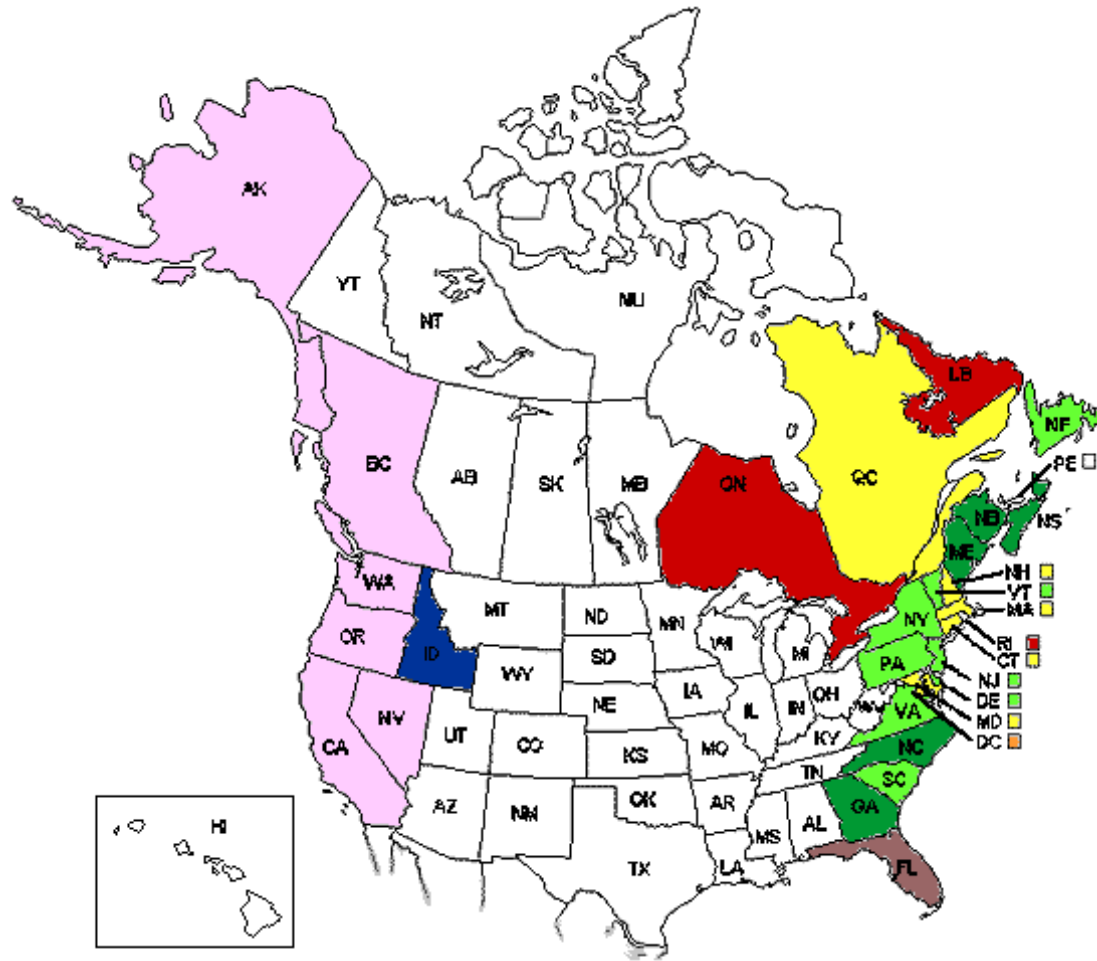


Figure 2: Conservation status of the American shad in North America (NatureServe 2012).
 *outdated.

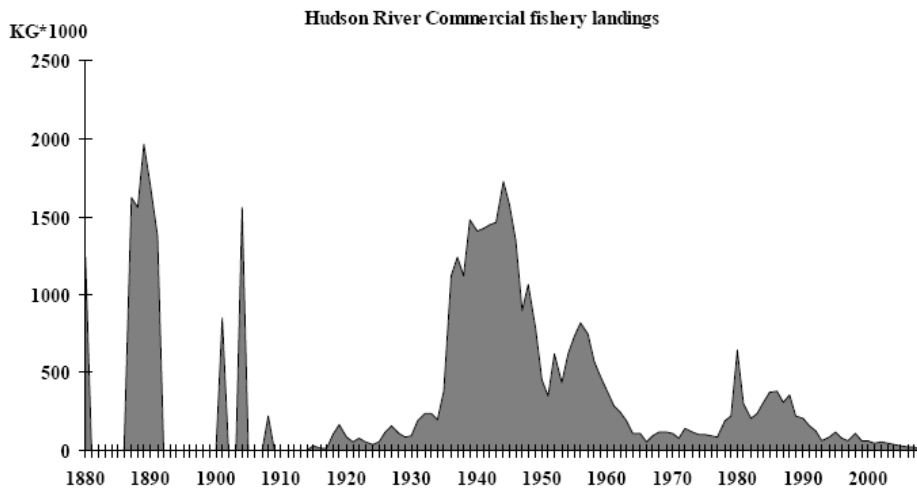


Figure 3. Hudson River commercial shad fishery landings from 1880 to 2005 (ASMFC 2007).

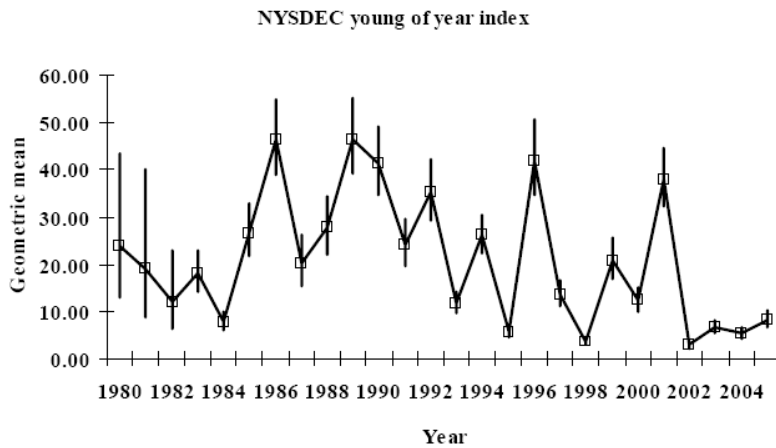


Figure 4. Young-of-year indices for American shad collected in the Hudson River Estuary from 1980 to 2005 (ASMFC 2007a).

III. New York Rarity, if known:

Historic	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
prior to 1970	_____	_____	_____
prior to 1980	_____	_____	_____
prior to 1990	_____	_____	_____

Details of historic occurrence:

This species historically occurred in the Hudson River and its tributaries, the Delaware River, and streams/coastal waters of Long Island (Hattala and Kahnle 2009). American shad were also found in New York's portion of the Susquehanna River, as far upstream as Binghamton, Broome County (Stegemann and Stang 2013). Large hydropower dams built in the 1920s currently prevent fish from reaching this portion of the Susquehanna (Stegemann and Stang 2013).

Current	<u># of Animals</u>	<u># of Locations</u>	<u>% of State</u>
	_____	_____	_____

Details of current occurrence:

The American shad is still found in the Hudson River, Delaware River, streams on Long Island, and coastal waters off Long Island.

New York's Contribution to Species North American Range:

% of NA Range in New York	Classification of New York Range
___ 100 (endemic)	___ X Core
___ 76-99	___ Peripheral
___ 51-75	___ Disjunct
___ 26-50	Distance to core population:
___ X 1-25	_____

IV. Primary Habitat or Community Type:

- 1. Large/Great River
- 2. Marine, Shallow Subtidal
- 3. Estuarine, Brackish Shallow Subtidal
- 4. Estuarine, Brackish Intertidal, Benthic Geomorphology, Tidal Creek

Habitat or Community Type Trend in New York:

Declining Stable Increasing Unknown

Time frame of decline/increase: _____

Habitat Specialist? Yes No

Indicator Species? Yes No

Habitat Discussion:

American shad spend most of the year at sea, only coming into fresh waters to spawn. While in the ocean, fish are found near shore often in bays. Adult shad spend summers in the Gulf of Maine, Bay of Fundy, and off the coast of Nova Scotia (ASMFC 2007). In the fall, fish migrate south to overwinter off Maryland, Virginia, and North Carolina (ASMFC 2007). When spring arrives, fish migrate back to their natal rivers (Smith 1985). Spawning in the Hudson River occurs on sandy, gravelly shoals and other shallow areas in the upper half of the river, from Kingston to Troy (ASMFC 2007a). Nursery habitat for juvenile shad in the Hudson River extends from Kingston south to Newburgh Bay (ASMFC 2007a).

V. New York Species Demographics and Life History

- Breeder in New York**
- Summer Resident**
- Winter Resident**
- Anadromous**
- Non-breeder in New York**
- Summer Resident**
- Winter Resident**
- Catadromous**
- Migratory only**
- Unknown**

Species Demographics and Life History Discussion:

Shad spawn in February in the south, but not until June or July in the northern extent of its range (Smith 1985, NatureServe 2012). Spawning in the Hudson River happens in late spring, normally around mid-May (ASMFC 2007). Populations in the south are semelparous and those in the north tend to be iteroparous (ASMFC 2007). A female can release 100,000 to 600,000 eggs that drift with the current and hatch in two to seventeen days (Smith 1985, ASMFC 2007, USGS 2013, NatureServe 2012). Most shad south of Cape Hatteras, North Carolina die after spawning; repeat spawners in rivers north of North Carolina increases with latitude (Neves and Depres 1979). Fish spend the fall in the northwestern Atlantic normally in the Gulf of Maine, but as far north as the Bay of Fundy (Neves and Depres 1979, ASMFC 2007). Shad migration follows a temperature isotherm between approximately 3 and 15 degrees Celsius (Neves and Depres 1979). As temperatures decrease in fall, shad move from the Gulf of Maine to off the Coast of Long Island (Neves and Depres 1979). During winter shad move further south and can be found along the Middle Atlantic coast as far south as North Carolina (Neves and Depres 1979). When spring arrives fish migrate north or south to their natal rivers to spawn (Neves and Depres 1979).

VI. Threats:

The main known cause of the decline in Hudson River American shad was overharvest by commercial and recreational fisheries (ASMFC 2007, Kahnle and Hattala 2010). While commercial ocean fisheries that targeted American shad were closed in all Atlantic coastal states in 2005, in-river fishing still occurs in some watersheds (Kahnle and Hattala 2010). Losses of young and adult shad to ocean commercial bycatch could be a factor in the decline, but the magnitude of these losses is uncertain (Kahnle and Hattala 2010). Young American shad in-river are also lost to cooling water intakes (Kahnle and Hattala 2010). Habitat loss from dredge and fill operations in the Hudson River was a problem in the early 1900s and losses during that time may have influenced the current rate of stock recovery (ASMFC 2007a, Kahnle and Hattala 2010). It is estimated that about 57% of the shallow water habitat in the Hudson River was lost during that time (ASMFC 2007a). The introduction of the zebra mussel into the Hudson River may have decreased zooplankton numbers decreasing prey available for juvenile shad (ASMFC 2007a, Kahnle and Hattala 2010).

Are there regulatory mechanisms that protect the species or its habitat in New York?

No Unknown

Yes

Commercial ocean fisheries have been closed for the American shad since 2005 (ASMFC 2007a). In 2009, the Shad and River Herring Management Board approved an amendment restricting all commercial and recreation shad fishing in state waters starting in 2012 (Taylor et al. 2011). Atlantic coastal states are working together through the Atlantic States Marine Fisheries Commission using a cooperative interstate fishery management plan to protect, enhance, and restore East Coast migratory spawning stocks of American shad to achieve stock restoration and maintain sustainable levels of spawning stock biomass (ASMFC 2007a, Hattala and Kahnle 2009, Taylor et al. 2011).

The American shad is protected under the Anadromous Fish Conservation Act.

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Fishing in all waters in New York for this species is prohibited (Taylor et al. 2011, Stegemann and Stang 2013). The Draft 2010-2014 Hudson River Estuary Action Agenda of NYSDEC calls for the restoration of the Hudson River shad by 2050 (Hattala and Kahnle 2009). This recovery plan defines short and long term objectives associated with this goal and describes activities needed to achieve the goal and objectives. The plan has three major objectives: 1) Reduce mortality by reducing known sources of mortality on the stock by restricting directed fisheries and identifying bycatch in other ocean fisheries; 2) Restore and protect habitat by identifying adult spawning habitat through an adult sonic tagging project, then verify habitat use by early life stages of American shad through a plankton survey of shallow inshore areas; 3) identify and describe overall ecosystem change (Hattala and Kahnle 2009). Once habitat use is understood, protective measures can be taken to preserve areas, as well as help with future restoration projects (Hattala and Kahnle 2009).

In the New York State Wildlife Action Plan, objectives have been identified to maintain estuarine forage base at levels adequate to sustain their ecological function and continue to support harvest for bait and food. Current recommendations include:

- Conduct field and laboratory research to determine the effects of mosquito control measures on all life stages of the fish species in question, their habitat and their forage.
- Conduct field and laboratory research to determine the effects of predation on all life stages of the fish species in question, their habitat and their forage.
- Seek regulatory authority over the fish species in question or seek legislation to implement management measures proposed in the strategic plan.
- If regulatory authority is granted, develop pursuant regulations to implement management measures proposed in the strategic plan.
- Conduct an investigation into the bait fish fishery which will identify participants; identify locations where the fishery is conducted; estimate harvest; estimate by-catch; and assess potential impacts on fish stocks and habitat.
- Conduct compliance monitoring of vessel trip reporting (VTRs) which will be used to determine fishing mortality (F).
- Conduct an investigation to determine the impacts of power plant cooling intake entrainment and impingement on stocks of estuarine forage fish.
- Continue existing surveys that document distribution and abundance of this species group, adjusting if possible to more adequately characterize stock status. Implement additional sampling program to fill in data gaps. Analyze these data to identify trends.
- Develop a strategic plan for fishery management that also addresses needs for mitigating impacts (if any) from other identified sources, including mosquito control, water quality and habitat degradation, and others.

VII. References

- Atlantic States Marine Fisheries Commission. 2007a. Stock assessment report no. 07-01 (supplement) of the Atlantic states marine fisheries commission American shad stock assessment report for peer review volume I. Available at: <<http://www.asmfc.org/speciesDocuments/shad/stockassmtreports/2007ShadStockAssmtReportVolumeI.pdf>> (Accessed: April 1, 2013).
- Atlantic States Marine Fisheries Commission. 2007b. Stock assessment report no. 07-01 (supplement) of the Atlantic states marine fisheries commission American shad stock assessment report for peer review volume II. Available at: <<http://www.asmfc.org/speciesDocuments/shad/stockassmtreports/2007ShadStockAssmtReportVolumeII.pdf>> (Accessed: April 1, 2013).
- Fisheries and Oceans Canada (DFO). 2013. Underwater world American shad. Government of Canada. Available at: <<http://www.dfo-mpo.gc.ca/Science/publications/uww-msm/articles/shad-alose-eng.htm>> (Accessed: April 5, 2013).
- Haas-Castro, R. 2006. Status of fishery resources off the northeastern U.S. American shad. National Oceanic and Atmospheric Administration. Available at: <<http://www.nefsc.noaa.gov/sos/spsyn/af/shad/>> (Accessed: April 1, 2013).

- Hattala, K. and A. Kahnle. 2009. Status of American shad in the Hudson River, New York. New York State Department of Environmental Conservation. Available at: <www.dec.ny.gov/docs/fish_marine_pdf/hrshadstatus.pdf> (Accessed: April 1, 2013).
- Kahnle, A. 2010. Hudson River American shad an ecosystem-based plan for recovery status report – 4 January 2010. New York State Department of Environmental Conservation. Available at: <http://www.dec.ny.gov/docs/fish_marine_pdf/shadplanstatus.pdf> (Accessed: April 2, 2013).
- Kahnle A. and K. Hattala. 2010. Hudson River American shad an ecosystem-based plan for recovery. Hudson River Fisheries Unit New York State Department of Environmental Conservation. Available at: <http://www.dec.ny.gov/docs/remediation_hudson_pdf/shadrecoveryplan.pdf> (Accessed: April 2, 2013).
- Kart, J., R. Regan, S.R. Darling, C. Alexander, K. Cox, M. Ferguson, S. Parren, K. Royar, B. Popp, editors. 2005. Vermont's Wildlife Action Plan. Vermont Fish & Wildlife Department. Waterbury, Vermont. www.vtfishandwildlife.com.
- Leggett, W.C. 1977. Ocean migration rates of American shad. J. Fish. Res. Board Can. 34: 1422-1426.
- NatureServe. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available at: <http://www.natureserve.org/explorer>. (Accessed: April 1, 2013).
- Neves, R.J. and L. Depres. 1979. The oceanic migration of American shad, *Alosa sapidissima*, along the Atlantic Coast. Fishery Bulletin 77(1): 199-212.
- Smith, L.C. 1985. The Inland Fishes of New York State. NYSDEC. Albany, NY.
- Stegemann, C. and D. Stang. 2013. Herrings. Fresh Water Fishes of New York. New York State Department of Environmental Conservation. Available at: <<http://www.dec.ny.gov/animals/7043.html>> (Accessed: April 2, 2013).
- Taylor, K., Hendricks, M., and C. Patterson. 2011. Review of the Atlantic States Marine Fisheries Commission fishery management plan for shad and river herring (*Alosa spp.*) 2010. Shad & River Herring Plan Review Team. Atlantic States Marine Fisheries Commission.
- United States Fish and Wildlife Service. 2013. American shad *Alosa spidissima*. Chesapeake Bay Field Office. Available at: <<http://www.fws.gov/chesapeakebay/SHAD.HTM>> (Accessed: April 1, 2013).

Date last revised: January 29, 2014