

2016 REVIEW OF THE
ATLANTIC STATES MARINE FISHERIES COMMISSION
FISHERY MANAGEMENT PLAN FOR
ATLANTIC STURGEON (*Acipenser oxyrinchus oxyrinchus*)
FOR FISHING YEAR 2013 AND 2014



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**REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR
ATLANTIC STURGEON (*Acipenser oxyrinchus*) FOR 2013**

I. Status of the Fishery Management Plan

<u>Year of plan's adoption:</u>	1990
<u>Amendments:</u>	Amendment 1 (June 1998)
<u>Addenda:</u>	Technical Addendum #1 (October 16, 2000) Addendum I (January 31, 2001) Addendum II (May 2005) Addendum III (November 2006) Addendum IV (September 2012)
<u>Management unit:</u>	Migratory stocks of Atlantic Sturgeon from Maine through Florida
<u>Jurisdictions with a declared interest:</u>	Maine through Florida, including District of Columbia and the Potomac River Fisheries Commission
<u>Committees:</u>	Sturgeon Management Board, Plan Review Team, Technical Committee, Stock Assessment Subcommittee, Advisory Panel, Culture and Stocking Committee

The Atlantic Sturgeon Fishery Management Plan (FMP) was approved by the Atlantic Sturgeon Management Board in 1990. By 1995, the member states and jurisdictions determined that the FMP was insufficient for conservation and restoration of Atlantic Sturgeon stocks, and initiated development of Amendment 1. The amendment was approved by ASMFC in June 1998. Its goal is to restore Atlantic Sturgeon spawning stocks to population levels that will provide for sustainable fisheries, and ensure viable spawning populations. Based on recommendations of the 1998 ASMFC Atlantic Sturgeon stock assessment, the specific objectives to achieve this goal include:

- Establish 20 protected year classes of females in each spawning stock;
- Close the fishery for a sufficient time period to reestablish spawning stocks and increase numbers in current spawning stocks;
- Reduce or eliminate bycatch mortality of Atlantic Sturgeon;
- Determine the spawning sites and provide protection of spawning habitats for each spawning stock;
- Where feasible, reestablish access to historical spawning habitats for Atlantic Sturgeon; and
- Conduct appropriate research as needed, especially to define unit stocks of Atlantic Sturgeon.

Under Amendment 1, states must maintain complete closure of any directed fishery for Atlantic Sturgeon and prohibit landings from any fishery. Additionally, possession of Atlantic Sturgeon or any parts (including eggs) is prohibited. Exceptions to the moratorium on possession were approved via Technical Addendum # 1 for the purposes of scientific research and educational display.

Formal exemptions to the harvest and possession moratorium may be permitted to states that intend to import non-indigenous Atlantic Sturgeon (i.e., originating from outside U.S. jurisdiction) for the purposes of private aquaculture development.

Amendment 1 requires that, beginning in 1999, states report annually on the following topics to ASMFC:

- Results of bycatch monitoring for Atlantic Sturgeon in other fisheries (Table 1);
- Monitoring results (tagging, juvenile abundance indices, etc.; Table 2);
- Habitat status (restoration efforts, FERC relicensing studies, etc.), in accordance with the recommendations in the FMP; and
- Aquaculture operations authorized, status of regulations, disease-free certification status, etc. Additional reporting requirements for aquaculture are outlined in the ASMFC Terms, Limitations, and Enforcement Document. These requirements are specific to states exempted from the harvest and possession moratorium by the Sturgeon Management Board for the purposes of importation and development of private aquaculture facilities.

Addendum I (2001) to the Interstate FMP for Atlantic Sturgeon exempts the State of Florida from the possession moratorium for the purposes of developing private aquaculture facilities for cultivation and propagation of the species. Addendum II (2005) exempts a private company in North Carolina from the moratorium on possession, propagation, and sale of Atlantic Sturgeon meat and eggs, and allows a Canada-based exporter to export Atlantic Sturgeon fry and fingerlings into North Carolina. Addendum III (2006) similarly allows a private company in North Carolina to import Atlantic Sturgeon from a Canada-based exporter. Addendum IV (2012) updates habitat information for Atlantic Sturgeon and identifies areas of concern and research needs.

II. Status of the Stock

According to the 1998 Atlantic Sturgeon Stock Assessment Report, Atlantic Sturgeon populations throughout the species' range were either extirpated or considered to be at historically low abundances. The report defined the target fishing mortality (F) rate as that level of F that generated an eggs-per-recruit (EPR) equal to 50% of the EPR at $F = 0.0$ (i.e., a "virgin stock," or a stock that is yet to experience mortality due to fishing). This target rate (F_{50}) equals 0.03 (annual harvest rate of 3%) for a restored population. This target is far below estimates of F prior to enactment of the fishery moratoria, which ranged from 0.01 - 0.12 for females and 0.15 - 0.24 for males (ASMFC 1998). It is important to note that while these numbers were determined for the Hudson River stock and may not apply to other specific Atlantic Sturgeon stocks along the Atlantic coast, they are indicative of the coastwide population.

Recruitment is variable at low levels in most regions. Although populations of Atlantic Sturgeon have persisted, adult population abundance in some systems may be so low as to significantly impede reproduction success and timely recovery. Impediments to recovery largely include over fishing and loss of essential fish habitat (e.g., spawning and nursery grounds). The 1998 report also suggested that in the absence of major threats to existing habitat, including climate change, reducing bycatch mortality is of greatest importance to restoring Atlantic Sturgeon.

Undertaken concurrently with the Commission's stock assessment in 1998, the National Marine Fisheries Service (NMFS) investigated the status of the species with regard to listing under the Endangered Species Act (ESA). That Status Review Report concluded that listing was not warranted at the time (NOAA 1998).

In February 2007, a Status Review Team (SRT) finalized its report on the status of Atlantic Sturgeon in the U.S. (NOAA 2007). The SRT identified five Distinct Populations Segments (DPS) – discrete population units with distinct physical, genetic, and physiological characteristics – along the Atlantic coast. The SRT concluded that there was greater than a 50% chance that the Chesapeake Bay, New York Bight and Carolina DPSs would become endangered within the next 20 years. The biggest threats to the recovery of the DPSs included bycatch mortality, water quality, lack of adequate state and/or federal regulatory mechanisms, and dredging activities. The SRT did not have enough information to make a determination on the Gulf of Maine and South Atlantic DPSs at that time.

In 2009, the National Resources Defense Council petitioned NMFS to list Atlantic Sturgeon on the ESA based on the recommendations from the 2007 Status Review. In January 2010, NMFS reported that the petition may be warranted. After further review, NMFS published a proposed rule in October 2010 to list the Gulf of Maine DPS as threatened and the remaining DPSs as endangered. Over 400 public comments were submitted to NMFS on the proposed rule.

NMFS published the final rule in February 2012, declaring the Gulf of Maine DPS as threatened and the remaining four DPSs as endangered (effective April 2012). Additionally, pursuant to section 7 of the ESA, NMFS released a draft biological opinion in May 2013 stating that seven Northeast fisheries will likely not jeopardize the continued existence of the five distinct population segments of Atlantic Sturgeon (NOAA Fisheries Consultation No. F/NER/2012/01956). NMFS published an Interim Final 4(d) Rule for the threatened Gulf of Maine DPS in December 2013 which essentially provides the same protection as an endangered listing.

In 2013, in response to the 2012 ESA listing, the ASMFC initiated a new benchmark stock assessment for Atlantic Sturgeon to evaluate stock status, stock delineation, and bycatch. In 2014, the Sturgeon Board evaluated progress on the development of the coastwide benchmark stock assessment. In order to allow for the most comprehensive assessment, and based on the Atlantic Sturgeon Stock Assessment Subcommittee's (SAS) recommendation, the Board decided to push the completion date to 2017 to allow the incorporation of data from studies currently underway. For example, several assessment approaches at the DPS or stock-level would become possible from the analysis of genetic samples currently underway at the U.S. Geological Survey's Leetown Science Center in West Virginia. In 2015, the SAS developed a draft report outline and identified each task of the assessment, from data needs to modeling approaches, to ensure the benchmark assessment is completed on schedule. Currently, the SAS and its working groups are developing methodologies for estimating mortality, bycatch, stock status and other variables, while Commission staff works to acquire all viable data (fishery-dependent and –independent) through 2014, the terminal year of the assessment.

III. Status of the Fishery

Directed Harvest

Atlantic Sturgeon have been harvested for their flesh and eggs (i.e., caviar) along the Atlantic coast since pre-colonial times. Commercial landings records for Atlantic Sturgeon were first kept in 1880. At that time landings were high and concentrated in the Delaware River and Chesapeake systems, although commercial fisheries rapidly expanded to include most known spawning rivers. Reported landings of Atlantic Sturgeon peaked in 1890 at 3.4 million kilograms (7.5 million pounds) and declined precipitously thereafter. During the 1970's and 80's the bulk of fishing effort and landings shifted to South Carolina, North Carolina, and Georgia (NOAA 1998).

By 1996, following approval of the 1990 Interstate FMP which suggested that dramatic decline in landings was likely caused by overfishing, Atlantic Sturgeon fishery closures were instituted in 10 states and jurisdictions along the Atlantic coast. Since 1997, all states have enacted bans on harvest and possession of Atlantic Sturgeon and sturgeon parts. NOAA Fisheries enacted a ban on harvest and possession of Atlantic Sturgeon in federal waters in 1998. Per Amendment 1, these moratoria will remain in effect until stocks exhibit a minimum of 20 protected year classes of spawning females and the FMP is modified to permit harvest and possession.

Bycatch

Since Atlantic Sturgeon are an anadromous species spending portions of their lives in rivers, estuaries, and both nearshore and offshore ocean waters, they are vulnerable to incidental capture in many different fisheries conducted along the Atlantic coast. Accordingly, bycatch was evaluated as one of the most significant threats to the viability of Atlantic Sturgeon populations (NOAA 2007). The 2007 status review identified gillnets, trawls and pound nets, as the most notable gear types encountering Atlantic Sturgeon, with highest mortality rates observed from gillnets (mortality of Atlantic Sturgeon captured from trawls seems to be low, and mortality from pound nets is assumed to be near zero).

In 2003 an Atlantic Sturgeon Technical Committee Workshop on the status of Atlantic Sturgeon identified several issues regarding bycatch of Atlantic Sturgeon. Another workshop held in 2004 focused on recovery techniques, and provided more recommendations for dealing with bycatch. ASMFC hosted an Atlantic Sturgeon Bycatch Workshop in 2006 and 2007 that (1) evaluated genetic and mark-recapture data and approaches to identifying stock composition of bycatch, (2) reviewed and summarized jurisdictional reports on bycatch, and (3) estimated fishery-specific bycatch and bycatch mortality of Atlantic Sturgeon during the past ten years in New England and Mid-Atlantic waters.

Since one of the management objectives of Amendment 1 to the Atlantic Sturgeon FMP is to “reduce or eliminate bycatch mortality,” quantitative bycatch estimates will be a critical component to the 2017 benchmark stock assessment. However, the accuracy of bycatch estimates is limited due to the lack of effective monitoring for Atlantic Sturgeon bycatch in many Atlantic coast fisheries and inland river systems. Anecdotal evidence suggests that many fishery-dependent Atlantic Sturgeon encounters are unreported indicating the need for reliable state-directed reporting programs. Amendment 1 requires states and jurisdictions to report on Atlantic Sturgeon bycatch in other fisheries, but the quality of available data varies. Table 1 provides a summary of commercial bycatch of Atlantic Sturgeon data reported by states in their compliance reports for the 2013 and 2014 fishing years.

Aquaculture

Another management objective of the 1990 FMP is to “enhance and restore Atlantic Sturgeon Stocks.” The use of aquaculture aims to achieve that goal by providing a unique opportunity to research conservation, restoration, and recovery techniques for wild-spawning Atlantic Sturgeon.

The U.S. Fish and Wildlife Service (FWS) received an Endangered Species Act Section 10(a)(1)(A) Permit for Scientific Research from NMFS on March 14, 2013 (permit number 17367-01). The U.S. FWS maintains five wild Atlantic Sturgeon (collected from 1993-1998 from the Hudson River) and 47 hatchery-reared fish (5 year classes) at the Northeast Fishery Center in Lamar, Pennsylvania. Primary research goals include cryo-preservation and extending the viability of fresh milt of wild versus hatchery-reared sturgeon. The U.S. FWS also maintains eight adult Atlantic Sturgeon at the Bears Bluff National Fish Hatchery in South Carolina. These fish were collected from 2008-2010 from the Altamaha River. Fertilized eggs have been produced from at least one tank of Atlantic Sturgeon at Bears Bluff every year since 2011 and approximately 17,100 fry were hatched during the 2013 effort. Lastly, the U.S. FWS Welaka National Fish Hatchery in Florida maintains 272 Atlantic Sturgeon from three year classes. These fish were obtained from the Bear Bluffs National Fish Hatchery for future research, and as a refugium for endangered species.

Maryland’s Department of Natural Resources Sturgeon Conservation Partnership is currently rearing 61 Atlantic Sturgeon for captive brood research at Maryland-based research laboratories (NRG Energy’s Chalk Point Generating Station, the University of Maryland’s Restoration Ecology Laboratory, and the Cooperative Oxford Laboratory). All research and restoration activities were suspended due to the ESA listing. Maryland DNR has filed a full application for an ESA Section 10 scientific research permit to continue research activities. The application is currently pending approval.

In 2005, under the requirements of Addendum II, LaPaz LLC located in Lenoir, NC, received approval from the ASMFC and North Carolina Department of Marine Fisheries to commercially aquaculture Atlantic Sturgeon for the purpose of sale of meat and caviar. All Atlantic Sturgeon eggs, fry, and fingerlings were exported from Canadian sources. During 2013-2014, 937 Atlantic Sturgeon were culled from this facility. As of August 31, 2014, 679 fish remained.

ESA Section 10 Incidental Take Permits

As of December 31, 2014, North Carolina and Georgia have acquired Section 10(a)(1)(B) Incidental Take Permits (ITP) for Atlantic Sturgeon relative to commercial gill net fisheries. Rhode Island is currently developing a Section 10 ITP application and intends to use a modeling approach similar to that which will be used in the 2017 ASMFC Atlantic Sturgeon Stock Assessment. It is recommended that states and jurisdictions coordinate with the ASMFC regarding the progress of Section 10(a)(1)(b) permits of the ESA.

IV. Status of Management Measures and Issues

Mandatory management measures include:

1. Complete closure, through prohibiting possession of Atlantic Sturgeon, and any and all parts thereof including eggs, and of any directed fishery for and landings of Atlantic Sturgeon until the fishery management plan is modified to reopen fishing in that jurisdiction. In February of 1999, the National Marine Fisheries Service imposed a harvest and possession moratorium on Atlantic Sturgeon in the EEZ.
2. In addition, states shall implement any restrictions in other fisheries as outlined in bycatch reduction sections of the FMP.
3. States may grant limited specific exceptions to prohibitions on possession for imports of non-U.S. Atlantic Sturgeon and/or cultured Atlantic Sturgeon upon adoption of FMP addenda that specify the terms, limitations, and enforcement requirements for each such exception. It is intended that each such addendum shall be developed by a PRT, in consultation with representatives of the ASMFC federal partners, applicable state aquaculture authorities, the ASMFC Law Enforcement Committee, the state(s) for which shipments are intended, and the party(ies) requesting the exception.

In addition to these mandatory regulations, states are implementing several recommendations in the FMP including development of a coast-wide tagging database and culture techniques, incorporation of Shortnose Sturgeon issues in Atlantic Sturgeon research (and vice versa), stock identification, and habitat restoration.

V. Current State-by-State Implementation of FMP Compliance Requirements

As described in *Sections 3.4* and *5.1.2* of Amendment 1, states/jurisdictions must report on monitoring programs and provide estimates of bycatch of Atlantic Sturgeon in other fisheries under their jurisdiction.

Reports on compliance are submitted by each jurisdiction annually, no later than October 1st, and are reviewed by the Plan Review Team. Compliance reports must cover the previous calendar year at a minimum and should include significant findings of the current year. In 2013 and 2014, all states and jurisdictions met the requirements of Amendment 1 and its four addenda. See Table 3 for a state-by-state summary of compliance in 2013 and 2014.

VI. Research Needs

The following research priorities and recommendations were identified to support interjurisdictional fisheries management for Atlantic Sturgeon in state and federal waters (ASMFC 2013).

Fishery-Independent Priorities

High

- Determine levels of bycatch and compare to F_{50} target levels for individual populations. Characterize Atlantic Sturgeon bycatch in various fisheries by gear and season. Include data on fish size, health condition at capture, and number of fish captured.

- A benchmark stock assessment is currently underway which aims to evaluate stock status, stock delineation, and bycatch, utilizing fishery-dependent and –independent data sources. The stock assessment is scheduled for review in 2017.
- Delaware State University completed projects with the fishermen to test experimental gillnet configurations in the Monkfish fishery in New Jersey.

Modeling / Quantitative Priorities

High

- Conduct assessments of population abundance and age structure in various river systems. Particular emphasis should be placed in documenting occurrence of age 0-1 juveniles and spawning adults as indicators of natural reproduction.
 - There are two surveys in the Hudson River estuary, one by Hudson River Power Generating Companies started in 1985 and one by NYSDEC started in 2004.
 - There is a survey in Edisto River, SC that started in 2004.
 - There are ongoing telemetry studies in many coastal rivers which capture spawning adults (e.g., Kennebec River, Hudson River, Delaware River, James River, and Roanoke and Cape Fear Rivers).
- Conduct further analyses to assess the sensitivity of F_{50} to model inputs for northern and southern stocks.

Life History, Biological, and Habitat Priorities

High

- Continue development of genetic markers to determine the extent to which Atlantic Sturgeon are genetically differentiable among rivers and that permit identification of bycatch by population origin. Interpret biological significance of findings.
 - Work done by Tim King at the U.S. Geological Survey's Leetown Science Center in Kearneysville, West Virginia
- Develop methods to determine sex and maturity of captured sturgeon.
 - Work being done by James Sulikowski investigating the use of steroid hormones to determine sex by maturity.
 - Laparoscopic techniques have been developed to visually inspect gonads by U.S. FWS
- Determine length, fecundity, and maturity-at-age for north, mid, and south Atlantic stocks.
 - Keith Dunton (SUNY/NY DEC) work on New York Bight Atlantic Sturgeon
- Refine maturation induced spawning procedures. Refine sperm cryopreservation techniques to assure availability of male gametes.
 - Successful spawning of wild female sturgeon in captivity has been documented at Bears Bluff National Fish Hatchery. There has been some work done on sperm cryopreservation techniques by William Wayman and Curry Woods.
- Continue basic cultural experiments at all life stages to provide information on efficacy of alternative spawning techniques, egg incubation and fry production techniques, holding and rearing densities, prophylactic treatments, nutritional requirements and feeding techniques, and optimal environmental rearing conditions and systems.
 - Transport, long-term holding, and feeding work done at Bears Bluff National Fish Hatchery. Atlantic Sturgeon also being held at U.S. FWS Northeast Fishery Center.
- Conduct research to identify suitable stocking protocols for hatchery fish (e.g., fish size, time of year, site, marking technique).

- Work has been done on long-term survival of hatchery-produced fish stocked in the Hudson River (Mohler et al. 2012).
- Conduct and monitor pilot scale stocking programs before conducting large-scale efforts that encompass broad geographic area.
 - Stocking programs were initiated in the Nanticoke River in 1994.
- Establish stocking goals and success criteria prior to development of large-scale stock enhancement or recovery programs.
- Evaluate aging techniques for Atlantic Sturgeon with known age fish. Emphasis should be placed on verifying current methodology based on fin spines.
 - Work done by Stevenson and Secor, Dunton et al. in the NJ-NY region, and Balazik et al. in the James River. Work also in progress by SC DNR assessing telomeres as a possible method to age Atlantic Sturgeon.
- Establish tolerance of different life stages in all populations to important contaminants and environmental factors (e.g., DO, pH, temperature, salinity).
 - Work done by Secor (D.O.), Roy et al. (contaminants) and Matsche et al. (nitrite). Work in progress by Markin and MDNR (salinity, temperature, D.O. and turbidity) for different ages and life history stages.
- Quantify the amount and quality of sturgeon habitat in important sturgeon estuaries and rivers, including spawning and nursery habitats. Define and map bottom water quality, velocity, and substrates types for suitable sturgeon spawning and nursery habitat.
 - Data on benthic substrate and telemetry of juvenile and mature fish available for the Delaware and Hudson River Estuaries.
- Determine behavior and effects on life history from the effects of dredging and increased suspended sediment loads.
 - SCDNR is currently monitoring sturgeon behavior as part of dredging events in Savannah and Charleston.
 - Delaware State University conducted a study of behavioral interactions between Atlantic Sturgeon and commercial shipping traffic in the Delaware River in 2013 with an additional sampling year planned for 2015.
 - Work done in the St. Lawrence River by Nellis et al., Hatin et al., and McQuinn and Nellis; 2007 in AFS Symposium 56.
- Determine impacts of pile driving and other in-river construction on behavior and life history.
 - Shifting Distributions of Adult Atlantic Sturgeon Amidst Post-Industrialization and Future Impacts in the Delaware River: a Maximum Entropy Approach — Breece MW, Oliver MJ, Cimino MA, Fox DA. Published in PloS ONE, 2013.

Moderate

- Analyze existing sea sampling data to characterize at sea migratory behavior. Use electronic tagging to model coastal migrations of juvenile and adult Atlantic Sturgeon.
 - Work being done by Delaware, New Jersey and New York with gillnet and trawl surveys using PSAT and acoustic tags.
 - Work done by Laney et al. 2007 in AFS Symposium 56. Telemetry work in progress along the coast.

Low

- Identify rates of tag loss and tag reporting.

- Encourage Shortnose Sturgeon researchers to include data collection for incidentally captured Atlantic Sturgeon.

VII. Ongoing Research and Notable Comments Highlighted in Compliance Reports

Amendment 1 does not require any research in participating jurisdictions/states. Nonetheless, several state and federal agencies are conducting research projects on Atlantic Sturgeon to further understand the species' life history, genetics, behavior, and aquaculture. Ongoing research and other notable comments highlighted in the 2013 and 2014 compliance reports include:

Maine:

- Identify critical habitat, estimate population sizes, examine the connectivity and demographic correspondence among sturgeon stocks in the Gulf of Maine, determine migration routes, identify river of origin of individual fish, and study feeding habits – Maine DMR, University of Maine, University of New England, and U.S. Geological Survey
- The Veazie Dam (constructed 1833) was removed from the Penobscot River in 2013, marking the last of the three dams blocking historical habitat since 1830; Great Works Dam (constructed 1830, removed 2012), and the Bangor Water Works Dam (constructed 1874, removed 1995).
 - Maine DMR telemetry studies demonstrate that Atlantic Sturgeon use this newly available habitat for spawning.

New Hampshire:

- Fisheries-independent surveys have been conducted in New Hampshire estuarine waters for over 35 years, and only one Atlantic Sturgeon has been encountered during that time (June 1981, Oyster River)

Massachusetts:

- In 2013 and 2014, MA DMF received reports of multiple sturgeon breaching in the Merrimack River.
- No Atlantic Sturgeon have been observed utilizing the fish lift at the Essex Dam Hydroelectric facility on the Merrimack River in its 30-year history.
- In 2013 and 2014, 12 Atlantic Sturgeon were detected by acoustic telemetry receivers in Massachusetts state waters; seven were detected in Federal waters adjacent to state waters.

Rhode Island:

- Intend to apply for Incidental Take Permit under section 10(a)(1)(b) of the ESA following the 2017 Benchmark Assessment in order to follow the same bycatch modeling approach.

New York:

- Juvenile emigration from the Hudson River Estuary – New York DEC and U.S. FWS
- Understanding adult sturgeon ocean migration movements – New York DEC
- 2013 was the final year for returning adult fish tagged with 5-year sonic tags as part of the New York DEC sonic tag program to identify specific Hudson River habitats used by adult Atlantic Sturgeon by matching fish movement and location data with detailed bottom maps.
- The New York DEC has provided NMFS with funds to expand the current observer coverage level for an initial period of two years.

- Acoustic arrays have been maintained off the south shore of Long Island since 2010. Currently there are 495 Atlantic sturgeon with active tags.
- Seasonal survival rates and transition probabilities among areas – Stony Brook University (manuscript abstract available)

New Jersey:

- In 2013, 18 acoustic receivers were deployed on the New Jersey side of the Delaware River, and detected 152 Atlantic Sturgeon.
- In 2013, sixteen Atlantic Sturgeon were reported through the New Jersey DFW online reporting system (launched May 15, 2013). Nine fish were alive, seven were dead.
- Sturgeons in the mid-Atlantic region: a multi-state collaboration for research and conservation (2010 through 2014) – Connecticut DEP, New York DEC, Delaware DFW, and New Jersey DEP

Pennsylvania:

- In 2014, there were three incidental takes of Atlantic Sturgeon by the U.S. Army Corps of Engineers during dredging operations in PA's portion of the Delaware River and Estuary.

Delaware:

- In 2012, the Delaware DFW terminated the voluntary logbook program to monitor bycatch of Atlantic Sturgeon in the spring gillnet fishery
 - The Division is preparing an Atlantic Sturgeon Habitat Conservation Plan and will resume monitoring in a different format which has yet to be finalized.
- Online reporting form resulted in more rapid reporting which increase ability to ascertain the cause of death for alleged ship strike mortalities– DE DFW and Delaware State University
- The Delaware DFW did not tag any Atlantic Sturgeon in 2013 due to budgetary limitations. Program resumed in 2014 with 188 sturgeon sampled.
- Identification of Atlantic Sturgeon critical habitat and interbasin exchange – Delaware State University
- Seasonal movement and behavior patterns of juvenile sturgeons – Delaware DFW, Delaware State University and Environmental Research Consultants, Inc.

Maryland:

- Cryo-preservation and viability of fresh milt of wild vs. hatchery-reared sturgeon - The University of Maryland and U.S. FWS
- Maryland Sturgeon Reward Program terminated February, 2012, following the ESA listing Atlantic Sturgeon
- As of September 2013, there are no blockages to historic Atlantic Sturgeon spawning habitat in Maryland; all remaining blockages are upstream of spawning habitat.
- In 2013, DNR Anadromous Restoration Project began placing acoustic receivers in an effort to identify critical sturgeon habitats in Maryland tributaries to the Chesapeake Bay—Maryland and Virginia government agencies and universities; funding provided by NMFS Species Recovery Grants
- The co-occurrence of male and female Atlantic Sturgeon in putative spawning condition in Marshyhope Creek (Nanticoke River) indicates possible fall spawning population.

Virginia:

- Reducing sturgeon interactions in striped bass anchored gillnets – Virginia Sea Grant

- Installation of Atlantic Sturgeon spawning reefs in the James River - Virginia Commonwealth University, James River Association, U.S. Fish and Wildlife Service, Atlantic Coast Fish Habitat Partnership, Luck Stone, Vulcan Materials, and the Fish America Foundation
- Mapping putative sturgeon spawning habitat in the tidal freshwater James River using side scan sonar and GIS analysis—Virginia Commonwealth University, U.S. Geological Survey
- Availability of Atlantic Sturgeon spawning habitat in the James and Appomattox Rivers - Virginia Institute of Marine Science, U.S. Fish and Wildlife Service

North Carolina:

- In June 2013, the North Carolina DMF submitted a complete application for an ESA Section 10(a)(1)(b) Incidental Take Permit for estuarine waters of NC relative to anchored gillnet fisheries (received July 2014, NMFS Permit No. 18102).

South Carolina:

- In recent years, no Atlantic Sturgeon recapture events were reported from sources other than SC DNR, indicating that commercial fishers may be hesitant to report sturgeon captures or tags found in such animals.
- The SCDNR, USFWS, The Nature Conservancy, the U.S. Army Corp of Engineers, and NMFS have discussed fish passage options as recently as 2014 for the Savannah River at the New Savannah Bluff Lock and Dam near Augusta, GA.

Georgia/Florida:

- Georgia DNR received Section 10 Incidental Take Permit #16645 for commercial shad fishery in the Altamaha and Savannah Rivers.
- Assessment of the Atlantic Sturgeon and Shortnose Sturgeon populations in the Savannah River, GA – University of Georgia (UGA). During 2014, 470 Atlantic Sturgeon captured. Shortnose Sturgeon Projects initiated in 2014:
 - Quantifying annual recruitment and nursery habitats of Atlantic Sturgeon in Georgia – UGA with 234 Atlantic Sturgeon captured.
 - Movements and occurrence of Shortnose and Atlantic Sturgeon in vicinity of Mayport and King’s Bay Naval Facilities- UGA with 9 Atlantic Sturgeon captured.
- Movements of Atlantic and Shortnose Sturgeon in the Altamaha, Ocmulgee, Oconee, Ogeechee, Satilla and St. Mary’s Rivers – University of Georgia (UGA) and Florida Fish and Wildlife (project completed). No sturgeon were captured or tagged for this project in 2014.
- Fifteen Atlantic Sturgeon were implanted with acoustic transmitters on the Altamaha River – UGA
- Two Special Activity Licenses (i.e., scientific collection permits) issued by Florida FWC’s Division of Marine Fisheries Management during 2013 calendar year. No Atlantic Sturgeon were captured or collected under these permits.

Other Notable Research:

- Development of an Effective Area-Based management Scenario to Reduce Bycatch and Improve the Population of Hudson River Atlantic Sturgeon (2010 – 2013) – New York DEC, Stony Brook University
- Determining the connectivity among and fine-scale habitat use within Atlantic Sturgeon aggregation areas in the Mid-Atlantic Bight: Implications for gear restricted management areas to reduce bycatch – New York DEC, Stony Brook University, Maine DMR, and New Jersey DEP

- Captive Atlantic Sturgeon spawning and experimental streamside stocking – Maryland DNR, US Fish and Wildlife Service, University of Maryland and GenOn Potomac River Generating Station.
- Analysis of the effects of various prepared diets on gonadal development and sex steroid levels of Atlantic Sturgeon – University of Maryland's Center for Environmental Science Aquatic and Restoration Ecology Laboratory
- The Influence of Sink Gillnet Profile on Bycatch of Atlantic Sturgeon in the Mid-Atlantic Monkfish Fishery – Endeavor Fisheries, MAFMC, and Delaware State University
- Research and Management of Endangered and Threatened Species in the Southeast: Riverine Movements of Shortnose and Atlantic Sturgeon – North Carolina DMF, South Carolina DNR, University of Georgia, and North Carolina State University
 - Forty-nine Atlantic Sturgeon collected in the Cape Fear River

VIII. Recommendations of Plan Review Team

The PRT recommends that states:

1. Coordinate with the ASMFC regarding the progress of incidental take permits under Section 10(a)(1)(b) of the ESA.
2. Incorporate ongoing research to the extent possible in the upcoming benchmark stock assessment to aide in the understanding of stock structure and status.
3. The PRT stresses the importance of mandatory reporting requirements to effectively monitor Atlantic Sturgeon bycatch in state fisheries. The PRT notes that several voluntary logbook programs that reported bycatch were terminated in recent years.

IX. Work Cited

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- National Marine Fisheries Service: Status review of the Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). p.133.
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Table 1. Atlantic Sturgeon bycatch reported from Fishery-Dependent data sources, 2013-2014. Fishery-dependent bycatch likely underreported due to majority reporting through voluntarily-based programs. NMFS is not required to submit Annual Compliance Reports to the ASMFC per Amendment 1 to the FMP, however NEFOP and ASM are the primary monitoring programs in ocean waters and therefore data from these programs are included. Source: 2014 and 2015 ASMFC state compliance reports and NEFOP/ASM.

State	Location	Fisheries	Target Species	Data Source	State-Directed Monitoring	2013 (number)	2014 (number)	Comments
ME	ocean	trawl, purse seine, gillnet	multiple	NEFOP	NO	100lbs	100lbs	Hail weight; bycatch highest in November (1991-2014)
NH	ocean	unspecified	unspecified	see comments	NO	2	3	No Atlantic Sturgeon were reported as bycatch in commercial fisheries. Reports in 2013 and 2014 were from recreational fisheries.
MA	ocean	pot, trawl, hook, and gillnet	multiple	at-sea observers	NO	0	0	Fisheries-Dependent Investigations project via at-sea observers
RI	ocean	unspecified	unspecified	NEFOP & ASM	NO	1	1	
CT	Connecticut River	drift gillnet	American shad	logbooks	NO	8	8	Sturgeon spp., mortality thought to be rare due to actively fished gear
NY	ocean	unspecified	unspecified	mandatory reports	NO	0	0	No ocean data obtained for 2013 & 2014 – NEFOP data provided in Dunton et al., 2015.
NJ	Delaware Bay	gill net	American shad	logbooks	NO	1	9	Reporting of Atlantic Sturgeon by permit holders is voluntary; all released alive
PA	Pennsylvania does not permit commercial fishing in the Delaware River and Estuary							
DE	Delaware River	gillnet	multiple	voluntary logbook	NO	0	0	Reporting program terminated in 2012; expected to resume in near future
MD	unspecified	gill net	unspecified	reward program	YES	0	0	Terminated February 2012 following ESA listing
	ocean	Trawl	unspecified	DNR Observers		0	0	
VA	Currently no fishery-dependent programs that monitor Atlantic Sturgeon in Virginia state waters							

State	Location	Fisheries	Target Species	Data Source	State-Directed Monitoring	2013 (number)	2014 (number)	Comments
NC	NC Estuaries	large and small mesh	unspecified	observers	YES	30	56	Flounder and other large and small mesh fisheries
	Cape Fear River Brunswick River	drift gillnet, anchored gillnet	American shad	NC DMF Interviews		0	N/A	Only nine fishing trips interviewed in 2013; none in 2014
SC	Winyah River	gillnet	American shad	reporting	YES	158	14	Mostly Winyah Bay and Santee System; no mortality data available
GA	Altamaha River	gillnet	American shad	GA DNR	YES	20	7	Reported and observed. Only one was observed. All released unharmed
	Savannah River	gillnet	American shad	GA DNR		6	0	
FL	Atlantic coast	unspecified	unspecified	FL FWC	NO	1	0	Small sub-adult captured and released by rec. angler from the Jacksonville Beach Pier
NMFS	Atlantic coast	Unspecified	Unspecified	NEFOP/ASM	N/A	61	110	Gillnet or trawl gear only. 19 additional observations coded "unknown sturgeon" in 2013; 14 in 2014
TOTAL						288	208	Likely under-estimated due to low reporting rates in most fisheries

Table 2. Atlantic Sturgeon catches reported from Fishery-Independent data sources, 2013-2014. Source: 2014 and 2015 ASMFC state compliance reports.

State	Location	Method	Type of Survey or Research	Data Source	2013	2014	Comments
ME	ocean	shrimp trawl	Groundfish	ME/NH joint survey	1	2	55 captured from 2000-2014; mostly near mouth of Kennebec R.
NH	Estuarine	NA	-	USGS	0	0	No known reproducing populations within NH jurisdiction
MA	ocean	trawl	-	DMF	0	0	last and only capture in this survey occurred in 1986
RI	RI Sound	trawl	Coastal Trawl Survey	RI DFW	0	1	Only 3 Atlantic Sturgeon since 1979 (1997, 2005, and 2014)
CT	Connecticut River	unspecified	Research	CT DEP	45	86	Directed research; efforts highly variable over time
	Long Island Sound	unspecified	Research	CT DEP	66	33	Directed research collections
	Long Island Sound	trawl	Survey	CT DEP	4	13	multi-species trawl survey; unreliable for abundance trends
NY	Hudson R. Estuary	trawl	Survey	NYSDEC	72	71	Hudson River Power Generator's Fall Shoals Survey
	Hudson R. Estuary	anchored gillnet	Survey	NYSDEC-USFWS	115	340	Juveniles and sub-adults; juvenile abundance sampling
NJ	Coastal ocean	trawl	-	NJ DEP-DFW	10	7	Sandy Hook to Cape May; 0.054 per haul
	Delaware Bay	unspecified	Striped Bass & American Shad	NJ DEP-DFW	2	0	Caught and tagged; only 4 prior to 1999
	State waters	unspecified	Voluntary reporting	NJ DEP-DFW	16	0	Online reporting for sturgeon interactions
DE	Delaware River	ship strike	-	DE DFW-Reporting	26	23	Includes fish reported in PA's portion of Delaware Estuary
	Delaware River	trawl	Juvenile abundance	DE DFW	4	2	two otter trawl surveys; large (30') and small (16')
	Delaware River and Bay	gill net/trammel net	Juvenile abundance	DE DFW	N/A	188	Sampling terminated in 2013 due to budget; resumed in 2014
	Delaware River and Bay	unspecified	Atlantic Sturgeon Tagging	DSU, ERC	61	170	Efforts by DSU and Environmental Research Consultants

State	Location	Method	Type of Survey or Research	Data Source	2013	2014	Comments
MD	Chesapeake Bay	gill net	Striped Bass spawning stock survey	MD DNR	3	0	All in Potomac River in April and May (2013)
	Nanticoke River System	gill net	Adult Atlantic Sturgeon Tagging	MD DNR	0	8	reports of fish breaching but no captures
VA	Chesapeake Bay	trawl	Juvenile fish and Blue Crab survey	VIMS	0	0	62 Atlantic Sturgeon since 1955; 61 in James and York River
	James River	gillnet	Adult Atlantic Sturgeon Tagging	VCU	6	115	>600 sturgeon tagged and released since 2009
	James, York & Rapp. Rivers	anchored gillnet	American Shad monitoring	VIMS	11	20	21 of 31 captured in James River
NC	Albemarle Sound	gillnet	Survey	NCDMF	140	72	Survey; January-May, November and December
	Pamlico Sound and River	gillnet	Survey	NCDMF	0	1	
	New River, Cape Fear River	gillnet	Survey	NCDMF	3	0	All in March, Atlantic Ocean off Lockwoods Folly Inlet
	Cape Fear River	unspecified	Research	-	47	1	Sampling from NMFS-funded multi-agency grant
SC	Edisto River System	unspecified	Juvenile Atlantic Sturgeon	SCDNR	101	110	Nine recaptures; zero nominal age-1 fish
	Freshwater and estuarine rivers	gillnet	Shortnose Sturgeon	SCDNR	2	2	Freshwater Fisheries Section; designed for Shortnose
GA	Altamaha River	drift gillnet	Adult shad	GADNR-WRD	2	1	All measured and released alive
	ocean	trawl	Commercially important crustaceans	GADNR-CRD	1	5	Released alive
	Altamaha & Wassaw Sound	trammel & gill nets	Spotted Sea Trout & Red Drum	GADNR-CRD	0	0	entanglement gear surveys
	Ogeechee, Satilla and Altamaha Rivers	trammel & gill nets	Research	UGA	16	713	2014: 243 sturgeon caught as part of two newly initiated studies; 470 caught as part of an ongoing study. Increase between years could also reflect change in effort, or size class targeted.
FL	Atlantic coast	unspecified	-	FL FWC	1	1	2013, carcass washed up. 2014, FWC's F-I survey.
TOTAL					755	1,985	Total number of Atlantic Sturgeon encountered

Table 3. State-by-State compliance, 2013-2014. Note: C = In Compliance, P = Partial, N = Not in Compliance/No Report Submitted, NA = Not Applicable

State	Bycatch Monitoring ¹	Monitoring Results ²	Habitat Status ³	Aquaculture Operations ⁴	Moratorium on Harvest and Possession ⁵
ME	C	C	C	NA	C
NH	C	NA	C	NA	C
MA	C	C	C	NA	C
RI	C	C	C	NA	C
CT	C	C	C	NA	C
NY	C	C	C	NA	C
NJ	C	C	NA	NA	C
PA	C	C	NA	NA	C
DE	C	C	NA	NA	C
MD	C	C	C	C	C
PRFC	C	C	C	NA	C
DC	NA	NA	NA	NA	C
VA	C	C	NA	NA	C
NC	C	C	C	C	C
SC	C	C	C	NA	C
GA	C	C	C	C	C
FL	C	C	C	C	C

¹**REQUIRED** Bycatch Monitoring may be implemented via law enforcement observations, FI surveys, ACCSP and/or at-sea observer programs.

²**RECOMMENDED** Monitoring Results should include: (a) details of how juvenile abundance survey will be performed (recommended every 5 years), (b) calculated CPUE estimates of juveniles, (c) reports on tag and release programs, and (d) assessment of spawning stock status including examination of sex ratio, size, and age structure by sex of the larger sub-adults and adults.

³**RECOMMENDED** Habitat Monitoring reports should include: (a) assessment of sturgeon habitats of particular concern, (b) restoration programs, and (c) FERC relicensing evaluations.

⁴**RECOMMENDED** Aquaculture monitoring reports should include: (a) aquaculture research and development, (b) collection of brood stock and release of cultured progeny, (c) translocation of sturgeons and inadvertent spread of diseases, (d) introduction of non-native sturgeons for commercial aquaculture, (e) collection and archiving tissue samples for genetic analysis, and (f) monitoring effectiveness of restoration programs. **REQUIRED** for states with private aquaculture exemptions to the harvest and possession moratorium.

⁵**REQUIRED** State moratorium on the harvest and possession of Atlantic Sturgeon currently applies throughout ASMFC jurisdiction.