ATLANTIC STATES MARINE FISHERIES COMMISSION

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN

FOR ATLANTIC STURGEON
(Acipenser oxyrinchus oxyrinchus)

2015 FISHING YEAR

Prepared by the Plan Review Team

Approved by the Atlantic Sturgeon Management Board
April 2017

REVIEW OF THE INTERSTATE FISHERY MANAGEMENT PLAN FOR ATLANTIC STURGEON *(Acipenser oxyrinchus)* FOR 2015

I. Status of the Fishery Management Plan

Date of FMP Approval:	November 1990
Amendments:	Amendment 1 (July 1998)
Addenda:	Technical Addendum #1 (October 2000) Addendum I (January 2001) Addendum II (May 2005) Addendum III (November 2006) Addendum IV (September 2012)
Management unit:	Migratory stocks of Atlantic sturgeon from Maine through Florida
Jurisdictions with declared interest:	Maine through Florida, including District of Columbia and the Potomac River Fisheries Commission
Committees:	Sturgeon Management Board, Plan Review Team, Plan Development 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 (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 which was approved by ASMFC in June 1998. The goal of the Amendment "is to restore Atlantic sturgeon spawning stocks to population levels which 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 thereof including eggs, is prohibited. Exemptions to the moratorium on possession for

the purpose of scientific research or educational display are detailed in Technical Addendum 1. Applicants for exemption for the purpose of aquaculture and importation of non-indigenous Atlantic sturgeon (i.e., originating from outside U.S. jurisdiction) must adhere to the terms, limitations, enforcement and reporting requirements which were approved by the Commission in January 2001, and receive approval from the Board through the adaptive management process (e.g., see Addenda I-III detailed below).

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., including any additional reporting requirements outlined in the ASMFC Terms, Limitations, Enforcement and Reporting Requirements Document (2001).

Addendum I (2001) to the Atlantic Sturgeon FMP exempts 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 stocks along the Atlantic coast, they are suggestive 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 historical overfishing, incidental bycatch, and the degradation and loss of essential fish habitat

(e.g., spawning and nursery grounds). The 1998 report also suggested that aside from 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) evaluated 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 Population Segments (DPS) – discrete population units with distinct physical, genetic, and physiological characteristics – along the Atlantic coast. The SRT concluded that there was a greater than 50% chance that the Carolina, Chesapeake Bay, and New York Bight 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 under the provisions of the ESA based on the recommendations from the 2007 Status Review. In January 2010, NMFS reported that the petition may be warranted, and after further review, NMFS published two proposed rules (75 FR 61872 and 75 FR 61904) 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 two final rules (77 FR 5880 and 77 FR 5914) 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 Atlantic sturgeon population segments (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 ESA listing, the Board initiated the development of a coastwide benchmark stock assessment to evaluate stock status, stock delineation, and bycatch. Data (including bycatch, survey, tagging, and genetic data) has been collected from dozens of state and federal agencies and academic programs throughout the coast. In 2014, the Board evaluated progress on the benchmark assessment and decided to push the completion date to 2017 to allow for the most comprehensive assessment possible.

The benchmark assessment is on schedule for completion in late-2017. An assessment workshop was held in July 2016 where the Stock Assessment Subcommittee (SAS) made considerable progress towards model development. Considering that neither an assessment update or a

benchmark assessment for Atlantic sturgeon have been conducted since 1998, the SAS is exploring a number of modeling approaches, including a custom-built acoustic tagging model, that will be applied at the coastwide, DPS, and river-system level depending on the available data. At the workshop, the SAS also decided to extend the terminal year of the assessment through 2015. A second assessment workshop will be held at the ASMFC Arlington Office in February, 2017 where the SAS will rigorously evaluate modeling results, ensure appropriate use of the data in the models, and determine stock status where possible.

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 and Chesapeake systems, although commercial fisheries rapidly expanded to include most known spawning rivers. Reported landings of Atlantic sturgeon peaked in 1890 at 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 sturgeon in other fisheries. 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.

A primary management objective of Amendment 1 is to reduce or eliminate bycatch mortality. As such, one of the primary goals of the 2017 benchmark assessment is to quantify bycatch mortality at various spatial scales (i.e., coastwide, DPS, and river-level), however, the accuracy of bycatch estimates will be 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 Atlantic sturgeon bycatch although the quality of available data varies. Table 1 provides a summary of Atlantic sturgeon reported as bycatch from other directed fisheries in 2014-2015.

Aquaculture

Another management objective of the 1990 FMP is to enhance and restore Atlantic sturgeon stocks. The use of aquaculture aims to achieve that objective 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 38 hatchery-reared fish (5 year classes) at the Northeast Fishery Center in Lamar, Pennsylvania. Primary research goals include cryo-preservations 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 8,394 fry were hatched during the 2015 effort (approximately 17,100 fry were hatched from the 2014 effort). Lastly, the U.S. FWS Welaka National Fish Hatchery in Florida maintains 153 Atlantic sturgeon from three year classes. These fish were obtained from the Bears Bluff 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 Atlantic sturgeon for captive brood research at Maryland-based research laboratories in cooperation with NRG Energy and the University of Maryland. NRG Energy's Chalk Point Generating Station houses 74 adult and sub-adult Atlantic sturgeon and 137 juveniles. The University of Maryland's Restoration Ecology Laboratory houses 20 adult and sub-adults and 109 juveniles, and the Cooperative Oxford Laboratory houses 57 individuals. All research and restoration activities were suspended due to the ESA listing. Maryland DNR filed a full application for an ESA Section 10 scientific research permit to continue research activities, and the application was approved in January 2015 (NMFS culture permit #17364).

In 2005, via Addendum II, LaPaz LLC of Lenoir, North Carolina, received approval from the ASMFC and North Carolina Department of Marine Fisheries to commercially rear Atlantic sturgeon for the purpose of sale of meat and caviar. All eggs, fry, and fingerlings were imported from Canadian sources. During 2013-2014, 937 Atlantic sturgeon were culled from this facility. Later in 2014, La Paz accepted an offer from Horse Creek Aquafarm (a commercial food farm in Arcadia, Florida) to purchase the remaining 679 fish; Horse Creek Aquafarm received 600 Atlantic sturgeon in February 2015. Unfortunately, several power outages resulted in mortalities and only 120 Atlantic sturgeon remain on the farm. The farm received a Division of Aquaculture certificate from the Florida Department of Agriculture and Consumer Services. La Paz no longer has Atlantic sturgeon in their possession.

ESA Section 10 Incidental Take Permits

It is recommended that states and jurisdictions coordinate with the ASMFC regarding the progress of ESA Section 10(a)(1)(b) Incidental Take Permit (ITP) applications. As of 2015, North Carolina and Georgia have acquired ESA Section 10 ITPs for Atlantic sturgeon relative to commercial gill net fisheries. Rhode Island, New Jersey, Delaware, and Virginia are currently developing Section 10 ITP applications. Rhode Island intends to use a modeling approach similar to that which will be used in the 2017 ASMFC Atlantic sturgeon benchmark stock assessment. Also, New York is currently funding two years of increased NMFS observer coverage to develop better estimates of Atlantic sturgeon bycatch for its Section 10 ITP permit application.

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 1999, NMFS 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 addenda shall be developed by the Atlantic Sturgeon Plan Development Team (PDT), 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 coastwide 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 PRT. Compliance reports must cover the previous calendar year at a minimum and should include significant findings of the current year. In 2015, 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 2015.

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.

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.
- 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.
- Develop methods to determine sex and maturity of captured sturgeon.
- Determine length, fecundity, and maturity-at-age for north, mid, and south Atlantic stocks.
- Refine maturation induced spawning procedures. Refine sperm cryopreservation techniques to assure availability of male gametes.

- 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.
- Conduct research to identify suitable stocking protocols for hatchery fish (e.g., fish size, time of year, site, marking technique).
- Conduct and monitor pilot scale stocking programs before conducting large-scale efforts that encompass broad geographic area.
- 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.
- Establish tolerance of different life stages in all populations to important contaminants and environmental factors (e.g., dissolved oxygen, pH, temperature, salinity).
- 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 substrate types for suitable sturgeon spawning and nursery habitat.
- Determine behavior and effects on life history from the effects of dredging and increased suspended sediment loads.
- Determine impacts of pile driving and other in-river construction on behavior and life history.

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.

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 2016 Compliance Reports

Amendment 1 does not require any research in participating jurisdictions/states. Nonetheless, several state and federal agencies are conducting research projects to further understand Atlantic sturgeon life history, genetics, behavior, and aquaculture. Ongoing research and other notable comments highlighted in the 2016 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 – nine year collaboration between Maine DMR, University of Maine, University of New England, and U.S. Geological Survey; submitting 4 manuscripts for publication.

New Hampshire:

- Fisheries-independent surveys have been conducted in New Hampshire estuarine waters for over 35 years, with only one Atlantic sturgeon encountered (June 1981, Oyster River). Additionally, very low harvest occurred before the moratorium. Therefore, there is no evidence that Atlantic sturgeon have used New Hampshire waters as spawning and nursery habitat in recent times.

Massachusetts:

- 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 2015, 5 Atlantic sturgeon were detected by acoustic telemetry receivers.

Rhode Island:

- Intend to submit an application for ESA Section 10 ITP permit. The bycatch modeling approach for the application will follow that of the 2017 Benchmark Assessment.
- Due to the shallow nature of the three largest river systems in the state, it is believed that no suitable spawning habitat is found in Rhode Island.

New York:

- NYS DEC funded NMFS to expand the current level of observer coverage for an initial period of two years. Expanded coverage will began during the winter of 2016.
- Delaware State University (DSU), Monmouth College and New York DEC currently has a project with fishermen to test experimental gillnet configurations in the New Jersey and New York monkfish fishery
- Juvenile emigration from the Hudson River Estuary shows increase in abundance and cyclical pattern, 2015 results pending – NYS DEC and U.S. FWS
- Understanding adult sturgeon ocean migration movements – NYS DEC
- Final report is being developed for adults tagged with 5-year PSATs to identify specific Hudson River habitats.
- Acoustic arrays have been maintained off the south shore of Long Island since 2010. Currently there are over 400 Atlantic sturgeon with active tags. Seasonal survival rates and transition probabilities among areas have been estimated, Melnychuk et al., 2016.
- BOEM and NYDEC funded Stony Brook University and Monmouth College acoustic telemetry project to determine Atlantic sturgeon use of New York Bight proposed Wind Energy Area.

New Jersey:

- In 2015, 440 Atlantic sturgeon were captured within the Marcus Hook, Chester, Eddystone, and Tinicum ranges of the Delaware River as part of the Delaware River Main Channel Deeping Project. There were two mortalities. Sturgeon were tagged and relocated upriver from the blast sight.
- In 2015, acoustic receivers (n=19) were deployed on the New Jersey side of the Delaware Bay, and detected 220 Atlantic sturgeon.
- In 2015, seven Atlantic sturgeon were reported through the NJ DFW online reporting system (launched May 2013). Three fish were alive and four were dead.

Pennsylvania:

- In 2015, the U.S. Army Corps of Engineers interacted with Atlantic sturgeon during the Delaware River Main Channel Deepening Project. Thirty-two sturgeon were collected and safely released for pre-blasting tagging efforts, and two died during relocation trawling.

Delaware:

- DE DFW will likely resume bycatch monitoring in some form after the Atlantic Sturgeon Habitat Conservation Plan is finalized. Bycatch monitoring through voluntary logbook was terminated in 2012 due to decrease in participation.
- An investigation into sturgeon carcass reporting rate is planned to assess vessel strike mortality, to begin in 2017– DE DFW, U.S. FWS, and DSU
- In 2015, DE DFW began sampling for and tagging spawning Atlantic sturgeon in the Nanticoke River watershed.
- DE DFW was funded by NMFS to develop a recruitment index of age-0 and 1 Atlantic Sturgeon. This work was initiated in the fall of 2015 but has suffered a number of setbacks as a result of the U.S. Army Corps of Engineers Delaware River Main Channel Deepening Project.
- State of Delaware has developed age-0 recruitment indices of Atlantic Sturgeon in the Delaware River. Model currently under peer-review.

Maryland:

- A riverbed habitat mapping project was conducted by the NOAA Chesapeake Bay Office in Broad Creek, Marshyhope Creek, and the Nanticoke River in 2015.
- In 2015, the MD DNR Anadromous Restoration Project added 5 acoustic receivers to an effort to identify critical sturgeon habitats in Maryland tributaries to the Chesapeake Bay. 5 Atlantic sturgeon were detected.—Maryland and Virginia government agencies and universities; funded by NMFS Species Recovery Grants
- Adult Atlantic sturgeon recently found in spawning condition in Marshyhope Creek will refocus MD DNR surveys to early life stages and habitat assessment in this tributary.

Virginia:

- A fisheries-dependent, state run observer program began in May 2016 as part of the Incidental Take Permit program for which VMRC is applying. It observed 1% of commercial gillnet trips in 2016.
- 2013 Species Recovery Grant objectives include investigating habitat use by sub-adult and juvenile Atlantic sturgeon in the Chesapeake Bay. Results soon forthcoming.
- Installed three Atlantic sturgeon spawning reefs in the James River in recent years. - Virginia Commonwealth University, James River Association, U.S. FWS, ACFHP, and other partners.

North Carolina:

- NCDMF continues to review proposed sites for Strategic Habitat Area designation to be incorporated into conservation and restoration efforts.
- Considerable progress has been made on the addition of a rock rubble arch ramp at Lock and Dam #1 on the Cape Fear River.

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.

- A Diadromous Fish Restoration Plan is under development for the Savannah River Basin.
- The SC DNR, U.S. FWS, The Nature Conservancy, the U.S. Army Corp of Engineers, and NMFS are discussing fish passage options for the Savannah River at the New Savannah Bluff Lock and Dam near Augusta, Georgia.
- SC DNR has been examining the genetics of Atlantic sturgeon in SC waters. Initial findings suggest marked genetic diversity between races (i.e. spring vs. fall) which may be greater than diversity between adjacent DPSs.
- SCDNR is currently monitoring sturgeon behavior as part of dredging events in Savannah and Charleston.

Georgia:

- Work continued on a 3-year project on the Ogeechee, Satilla, and Altamaha Rivers to quantify recruitment, define and compare nursery habitat, and evaluate genetic discreteness and migratory behavior. –University of Georgia (UGA) sturgeon research team
- Assessment to quantify Atlantic and shortnose sturgeon populations continues in the Savannah River; 2015 objective to estimate annual abundance of age-1 juveniles. Results suggest that Atlantic sturgeon populations in the Savannah River are likely the second largest within the South Atlantic DPS. – UGA sturgeon research team
- Work continues to quantify seasonal habitat availability and identify spatial/temporal distribution of sturgeon in St. Marys and St. Johns Estuaries.—UGA sturgeon research team
- A 3 year construction project to deepen the Savannah Harbor began in 2015.
- Over 3,000 captive-propagated Atlantic sturgeon, 4,500 developing embryos, and fin spines were distributed to permitted partners (UGA, Mississippi State University, SC DNR, and NOAA) for research purposes in 2015.

Florida:

- Two Special Activity Licenses (i.e., scientific collection permits) were issued by FL FWC's Division of Marine Fisheries Management and were active in 2015. Some sampling was conducted in conjunction with GA DNR.

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. The PRT stresses the importance of mandatory reporting and/or observer coverage requirements to effectively monitor Atlantic sturgeon bycatch in state fisheries. Additionally, the PRT notes that several voluntary logbook programs that reported bycatch were terminated in recent years.

IX. Work Cited

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Table 1. Atlantic sturgeon bycatch (number of fish) reported from fishery-dependent data sources, 2014 and 2015. Fishery-dependent bycatch likely underreported due to majority reporting through voluntarily-based programs. Source: 2015 and 2016 ASMFC state compliance reports and NEFOP/ASM. *confidential information

State	Location	Fisheries	Target Species	Data Source	State-Directed Monitoring	2014	2015	Comments
ME	ocean	gillnet, trawl, purse seine	multiple	NEFOP	NO	100lbs	0	Bycatch usually highest in November (1991-2014)
NH	ocean	unspecified	unspecified	**see comment	NO	3	0	
MA	ocean	pot, trawl, hook, gillnet	multiple	at-sea observers	NO	0	0	Fisheries-Dependent Investigations project via ad hoc at-sea observer program
RI	ocean	unspecified	unspecified	NEFOP & ASM	NO	0	1	
CT	Connecticut River	drift gillnet	American shad	logbooks	NO	8	37	Includes both Atlantic and shortnose sturgeon spp., mortality thought to be rare due to actively fished gear. No Long Island Sound bycatch data obtained
NY	ocean	unspecified	unspecified	mandatory reports	NO	0	0	No shad or striped bass gill net fishery on Hudson River since 2010. No marine district bycatch data obtained for 2013-2015.
NJ	Delaware Bay	gill net	American shad	logbooks	NO	*	9	Reporting of Atlantic sturgeon by shad permit holders is voluntary; all released alive.
PA	No commercial fishing permitted in the PA portion of the Delaware River or Estuary							
DE	Delaware River	gillnet	multiple	voluntary logbook	NO	0	0	Reporting program terminated in 2012; No bycatch data obtained 2013 – 2015; expected to resume bycatch monitoring in near future
MD	ocean	Trawl	unspecified	DNR Observers	YES	0	0	A reporting reward program was terminated in 2012
VA	Currently no fishery-dependent programs that monitor for Atlantic sturgeon in Virginia state waters							

Table 1 continued.

State	Location	Fisheries	Target Species	Data Source	State-Directed Monitoring	2014	2015	Comments
NC	NC Estuaries	gillnet	Southern Flounder (primarily)	observers	YES	56	74	Large and small mesh fisheries throughout the state; two mortalities in 2014 and three in 2015
SC	Winyah River	gillnet	American shad	reporting	YES	14	10	Winyah Bay and Santee System; no mortality data available
GA	Altamaha River	gillnet	American shad	GA DNR	YES	7	19	Reported and observed. Only one was observed. All released unharmed
	Savannah River	gillnet	American shad	GA DNR		0	2	
FL	Atlantic coast	unspecified	unspecified	FL FWC	NO	0	0	Small sub-adult captured and released by rec. angler from the Jacksonville Beach Pier
NMFS	Atlantic coast	Trawl and gillnet	Unspecified	NEFOP/ASM	N/A	110 (14)	154 (45)	Observations coded as “sturgeon, Atlantic” (observations coded as “unknown sturgeon”)

Table 2. Atlantic sturgeon catches (number of fish) reported from fishery-independent data sources, 2014-2015. Source: 2015-2016 ASMFC state compliance reports. * tagging efforts by DSU and ERC in 2014

State	Location	Method	Type of Survey or Research	Data Source	2014	2015	Comments
ME	ocean	trawl	Groundfish	ME/NH joint survey	2	5	60 captured from 2000-2015
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 No known reproducing populations within MA jurisdiction
RI	RI Sound	trawl	Coastal Trawl Survey	RI DFW	1	0	Only 3 Atlantic Sturgeon since 1979 (1997, 2005, and 2014)
CT	Connecticut River	unspecified	Research	CT DEP	86	175	Directed research; efforts highly variable over time
	Long Island Sound	unspecified	Research	CT DEP	33	0	Directed research collections
		trawl	Survey	CT DEP	13	1	multi-species survey; unreliable for abundance trends
NY	Hudson R. Estuary	anchored gillnet	Survey	NYSDEC-USFWS	340	552	Juveniles and sub-adults; juvenile abundance sampling
NJ	Coastal ocean	trawl	-	NJ DEP-DFW	7	32	Sandy Hook to Cape May; 0.17 mean tow per haul
	Delaware Bay	unspecified	Striped Bass & American Shad	NJ DEP-DFW	0	4	tagging program
	State waters	unspecified	Voluntary reporting	NJ DEP-DFW	11	7	Online volunteer reporting for sturgeon interactions.
NJ/PA/DE	Delaware River	Trawl	DRMCD Project.	ERC/USACE	N/A	442	All sturgeon were relocated upriver of blasting area; two mortalities (ERC 2016).
DE	Delaware River	ship strike	-	DE DFW-Reporting	23	12	Collaboration with DSU. Includes fish reported in PA's portion of Delaware Estuary
	Delaware River	trawl	Juvenile abundance	DE DFW	2	6	two otter trawl surveys; large (30') and small (16')
	Delaware River and Bay	gill and trammel nets	Juvenile abundance	DE DFW	188	61	
MD	Chesapeake Bay	gill net	Striped Bass spawning stock survey	MD DNR	0	0	
	Nanticoke River System	gill net	Adult Atlantic Sturgeon Tagging	MD DNR	8	7	

Table 2 continued.

State	Location	Method	Type of Survey or Research	Data Source	2014	2015	Comments
VA	Chesapeake Bay	trawl	Juvenile fish and Blue Crab survey	VIMS	0	0	63 Atlantic Sturgeon since 1955; 62 in James and York River
	James River	gillnet	Adult Atlantic Sturgeon Tagging	VCU	115	81	>600 sturgeon tagged and released since 2009
	James, York & Rapp. Rivers	anchored gillnet	American Shad monitoring	VIMS	20	10	31 of 41 captured in James River
NC	Albemarle Sound	gillnet	Survey	NCDMF	72	86	Mortalities: three in 2014; 15 in 2015
	Pamlico Sound and River, New and Cape Fear Rivers	gillnet	Survey	NCDMF	1	24	Five mortalities in 2015
SC	Edisto River System	unspecified	Juvenile Atlantic Sturgeon	SCDNR	110	64	2015; 2 recaptures, 27 nominal age-1 fish
	Freshwater and estuarine rivers	gillnet	Shortnose Sturgeon	SCDNR	2	53	Freshwater Fisheries Section; designed for Shortnose
GA	Altamaha River	drift gillnet	Adult shad	GADNR-WRD	1	0	All measured and released alive
	ocean	trawl	Commercial crustaceans	GADNR-CRD	5	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	trammel & gill nets	Research	UGA	713	364	
	Savannah River	trammel & gill nets	Juvenile Sturgeon	UGA	470	434	May-August, fresh/salt interface
FL	St. John's River	gill net	-	FL FWC	1	1	2015; UGA scientific collection permit. Released alive.
				TOTAL	2224	2426	Total number of Atlantic sturgeon encountered

Table 3. State-by-State compliance, 2015. 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	NA	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	C	NA	C
MD	C	C	C	C	C
PRFC	C	NA	C	NA	C
DC	NA	NA	NA	NA	C
VA	C	C	NA	NA	C
NC	C	C	C	NA	C
SC	C	C	C	NA	C
GA	C	C	C	C	C
FL	C	C	NA	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.