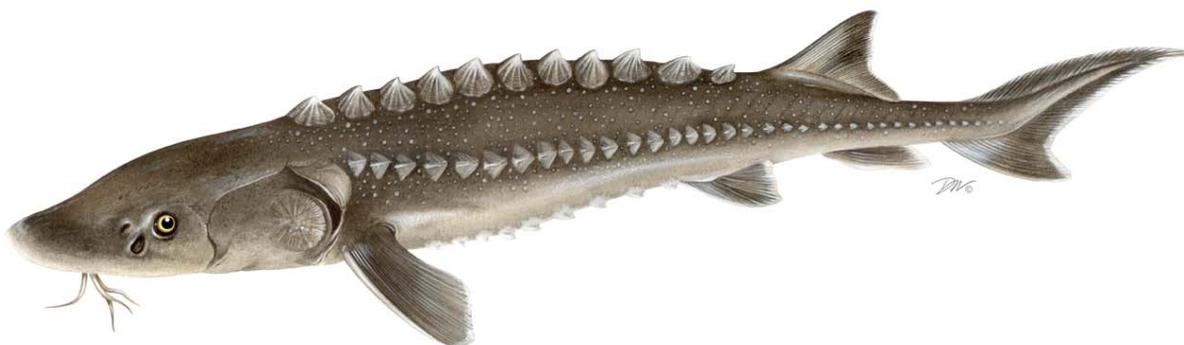


REVIEW OF THE  
ATLANTIC STATES MARINE FISHERIES COMMISSION  
FISHERY MANAGEMENT PLAN FOR  
ATLANTIC STURGEON (*Acipenser oxyrinchus oxyrinchus*)  
FOR FISHING YEAR 2012



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**REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR  
ATLANTIC STURGEON (*Acipenser oxyrhincus*) FOR 2012**

**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 in June 1998 by ASMFC. 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 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;
- Monitoring results (tagging, juvenile abundance indices, etc.);
- 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.

Annual reports must cover the previous calendar year at a minimum and should include significant findings of the current year.

## **II. Status of the Stock**

Current Atlantic sturgeon populations throughout the species' range are either extirpated and are at or close to historically low abundances. Recruitment is variable at low levels in most regions. Survival of Atlantic sturgeon during the 20<sup>th</sup> Century implies that enough spawning and nursery habitats exist to perpetuate the species. In the absence of major threats to existing habitat, including climate change, reduced bycatch mortality is of greater importance to stock restoration efforts than habitat limitations. Adult population abundance in some systems may be so low as to significantly impede reproduction success and timely recovery.

The 1998 Atlantic Sturgeon Stock Assessment report defined the target fishing 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., virgin stock). This 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 fishing moratoria, which ranged from 0.01 - 0.12 for females and 0.15 - 0.24 for males in the Hudson River. These numbers may not apply to specific southern stocks or current Hudson River stock, where more signs toward recovery are being seen.

Undertaken concurrently with the Commission 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 concluded that listing was not warranted at the time (<http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html>).

In February 2007 a status review team, convened by the National Marine Fisheries Service (NMFS), finalized its report on the status of Atlantic sturgeon in the U.S. (NOAA 2007). The status review identified five Distinct Populations Segments (DPS) – discrete population units with distinct physical, genetic, and physiological characteristics – along the east coast. The review team 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 twenty 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 review did not have enough information to make a determination on the Gulf of Maine and South Atlantic DPSs.

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). NMFS is currently considering protective regulations (referred to as a 4(d) rule) for the threatened Gulf of Maine DPS which would essentially provide the same protection as an endangered listing. Additionally, pursuant to section 7 of the ESA, NOAA Fisheries 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).

In 2013 the ASMFC initiated a new benchmark stock assessment for Atlantic sturgeon. The assessment is expected to be peer reviewed in early 2015.

### **III. Status of the Fishery**

Reported landings of Atlantic sturgeon peaked in 1890 at 3.4 million kilograms and declined precipitously thereafter. Since 1997, all states have enacted bans on harvest and possession of Atlantic sturgeon and sturgeon parts. The NMFS enacted a ban on harvest and possession of Atlantic sturgeon in federal waters in 1998. As 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.

Addendum I (2001) to the Interstate Fishery Management Plan 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. Addendum III (2006) exempts a private company in North Carolina from a moratorium on possession, propagation, and sale of Atlantic sturgeon meat and eggs and exempting a Canadian exporter from exporting Atlantic sturgeon fry and fingerlings into North Carolina. Addendum IV (2012) updates habitat information for Atlantic sturgeon and identifies areas of concern and research needs.

In 2003 an Atlantic Sturgeon Technical Committee workshop on the status of Atlantic sturgeon identified several new issues regarding bycatch of Atlantic sturgeon. Another workshop focused on recovery techniques, held in 2004, 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.

Table 1 provides a summary of commercial bycatch of Atlantic sturgeon data reported by the states in the most recent compliance reports. Note that sources of data across states are not consistent. Not all fisheries or water bodies are monitored.

#### **IV. Research Needs**

##### **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.<sup>1</sup>
- 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.<sup>2</sup>
- Develop methods to determine sex and maturity of captured sturgeon.<sup>3</sup>
- 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.<sup>4</sup>
- 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

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<sup>1</sup> There are two surveys in the Hudson River estuary, one by Hudson Valley 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. Additionally, there are ongoing telemetry studies in many southeastern rivers which capture spawning adults.

<sup>2</sup> Work done by Tim King.

<sup>3</sup> 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 Dr. Rob Bakal.

<sup>4</sup> 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.

rearing densities, prophylactic treatments, nutritional requirements and feeding techniques, and optimal environmental rearing conditions and systems.<sup>5</sup>

- Conduct research to identify suitable stocking protocols for hatchery fish (e.g., fish size, time of year, site, marking technique).<sup>6</sup>
- Conduct and monitor pilot scale stocking programs before conducting large-scale efforts that encompass broad geographic area.<sup>7</sup>
- 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.<sup>8</sup>
- Establish tolerance of different life stages in all populations to important contaminants and environmental factors (e.g., DO, pH, temperature, salinity).<sup>9</sup>
- 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.<sup>10</sup>
- Determine behavior and effects on life history from the effects of dredging and increased suspended sediment loads.<sup>11</sup>
- 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.<sup>12</sup>

#### ***Low***

- Identify rates of tag loss and tag reporting.
- Encourage shortnose sturgeon researchers to include data collection for incidentally captured Atlantic sturgeon.

## **V. Ongoing Research Highlighted in Compliance Reports**

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<sup>5</sup> Transport, long-term holding, and feeding work done at Bears Bluff National Fish Hatchery. Atlantic sturgeon also being held at USFWS Northeast Fishery Center.

<sup>6</sup> Work has been done on long-term survival of hatchery-produced fish stocked in the Hudson River (Mohler et al. 2012).

<sup>7</sup> Stocking programs were initiated in the Hudson River in 1994 and 2004 and in the Nanticoke River in 1994.

<sup>8</sup> 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 SCDNR assessing telomeres as a possible method to age Atlantic sturgeon.

<sup>9</sup> 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.

<sup>10</sup> Data on benthic substrate and telemetry of juvenile and mature fish available for the Hudson River Estuary.

<sup>11</sup> SCDNR is currently monitoring sturgeon behavior as part of dredging events in Savannah and Charleston.

<sup>12</sup> Work done by Erickson et al. and Dunton et al. with PSAT tags and trawl surveys. Work done by Laney et al. 2007 in AFS Symposium 56. Telemetry work in progress along the coast.

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. Some of these include:

- Connectivity and demographic correspondence among sturgeon stocks in Maine (and Beyond) – Maine DMR, University of Maine, and University of New England
- Sturgeons in the mid-Atlantic region: a multi-state collaboration on research and conservation (2010 through 2014) – Connecticut DEP, New York DEC, Delaware DFW, and New Jersey DEP
- Coastwide Cooperative Tagging Program –US Fish and Wildlife Service
- 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
- Juvenile emigration from the Hudson River Estuary – New York DEC and USFWS
- Understanding adult sturgeon ocean migration movements – New York DEC
- 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
- Cryo-preservation and viability of fresh milt of wild vs. hatchery-reared sturgeon - The University of Maryland and USFWS
- Atlantic sturgeon ship strike mortalities – DE DFW and Delaware State University
- 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
- 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
- Reducing sturgeon interactions in striped bass anchored gill nets – 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
- Availability of Atlantic sturgeon spawning habitat in the James and Appomattox Rivers - Virginia Institute of Marine Science, U.S. Fish and Wildlife Service
- 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

- Movements of Atlantic and shortnose sturgeon in the Altamaha, Ocmulgee, Oconee, Ogeechee, Satilla and St Marys Rivers – University of Georgia and Florida Fish and Wildlife

## **VI. 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.

## **VII. Current State-by-State Implementation of FMP Compliance Requirements**

Compliance requirement: 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. 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. All states and jurisdictions maintain compliance with Amendment 1 at this time. See Table 2 for a state-by-state summary of compliance.

## **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 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 sturgeon bycatch in their fisheries. The PRT notes that several voluntary logbook programs that reported bycatch were terminated in 2012.

**Table 1. Bycatch of Atlantic sturgeon in 2012**

State	Location	Fisheries	Target Species	Data Source	Type of Program	Number	Dead
ME	ocean	trawl, purse seine, gillnet	multiple	mandatory logbook	bycatch	0	
NH	ocean	unspecified	unspecified	NMFS observers	bycatch	0	
MA	Merrimack River	hook and line	unspecified	reported	bycatch	2	0
RI	ocean	unspecified	unspecified	NMFS observer	bycatch	15	unknown
CT	Connecticut River	drift gillnet	American shad	logbook	bycatch	9	0
NY	ocean	unspecified	unspecified	mandatory reports	bycatch	0	
NJ	Delaware Bay	gill net	American shad	voluntary logbook	bycatch	24	0
DE	Delaware Bay and River	gillnet	striped bass, American shad & weakfish	voluntary logbook	bycatch	unknown+	
	Delaware Bay and River	ship strike	unspecified	reporting	ship strike	20	20
MD*	unspecified	gill net	unspecified	reward program	bycatch	12	unknown
	unspecified	pound net	unspecified	reward program	bycatch	unknown*	
VA	York or Rappahannock unspecified	Anchored gill net	American shad	VIMS monitoring program	bycatch	1	0
VA	James River	Anchored gill net	American shad	VIMS monitoring program	bycatch	3	0
<sup>1</sup> VA	James River	Anchored gill net	Striped Bass	Fisheries Resources Grant Project, Virginia Sea Grant	Experimental bycatch project <sup>1</sup>	31	unknown
NC	Estuaries	gillnet, large mesh	unspecified	observers	bycatch	8	2
	Estuaries	gillnet, small mesh	unspecified	observers	bycatch	2	
SC	Winyah Bay and Santee System	gillnet	American shad	reporting	bycatch	194	unknown
	unspecified	gillnet	American shad	reporting	bycatch	11 (+ 35 shortnose)	unknown
GA	ocean	gillnet	American shad	GA CRD	bycatch	0	0
FL	St Johns River	hook and line	unspecified	unspecified	bycatch	0	
<b>TOTAL</b>						<b>332</b>	<b>24</b>

\*Reward program discontinued in February 2012

+Bycatch estimate from voluntary logbooks was too uncertain in 2012

^ number extrapolated from logbook data and effort

<sup>1</sup>Experimental gill net project in area where sturgeon known to frequent

**Table 2. State-by-state summary of compliance for 2012**

	Bycatch Monitoring <sup>1</sup>	Monitoring Results <sup>2</sup>	Habitat Status <sup>3</sup>	Aquaculture Operations <sup>4</sup>	Moratorium on Harvest and Possession <sup>5</sup>
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

NOTE \*\* C = IN COMPLIANCE, P = PARTIAL, N = NOT IN COMPLIANCE/NO REPORT SUBMITTED, NA = NOT APPLICABLE

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

<sup>2</sup>\*\* **RECOMMENDED** Monitoring Results should include:

- a). Programmatic details of how juvenile abundance survey will be performed (recommended every 5 years)
- b). Calculated CPUE estimates of juveniles (when survey is completed)
- c). Report on juvenile tag and release programs
- d). Assessment of spawning stock status including examination of sex ratio, size, and age structure by sex of the larger sub-adults and adults.

<sup>3</sup>\*\* **RECOMMENDED** Habitat Monitoring reports should include:

- a). Assessment of sturgeon habitats of particular concern
- b). Restoration programs
- c). FERC relicensing evaluations

<sup>4</sup>\*\* **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
- f). Monitoring effectiveness of restoration programs

**REQUIRED** for states with private aquaculture exemptions to the harvest and possession moratorium <sup>5</sup>\*\* **REQUIRED** State moratorium on the harvest and possession of Atlantic Sturgeon currently applies throughout ASMFC jurisdiction