2001 REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR **ATLANTIC STURGEON** ***(Acipenser oxyrhincus)***

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I. Status of the Fishery Management Plan

Year of plan's adoption:	1990
Amendments:	Amendment 1 (June 1998)
Addenda:	Technical Addendum #1 (October 16, 2000) Addendum I (January 31, 2001)
Management unit:	Migratory stocks of Atlantic sturgeon from Maine through Florida
States with a declared interest:	Maine through Florida, including District of Columbia, Potomac River Fisheries Commission
Active committees:	Sturgeon Management Board, Plan Review Team, Technical Committee, Stock Assessment Subcommittee, Advisory Panel

In 1995, the states determined that the original 1990 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, and its goal is to restore Atlantic sturgeon spawning stocks to population levels, which will provide for sustainable fisheries, and ensure viable spawning populations. Specific objectives include:

- Establish 20 protected yearclasses 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

To achieve this goal, states must maintain 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. 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 states report annually (beginning Oct. 1, 1999) 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.

II. Status of the Stock[1]

Reported landings peaked in 1890 at 3.4 million kg and declined precipitously thereafter. Currently, populations of Atlantic sturgeon throughout the species' range are either extirpated or at historically low abundance. Recruitment is variable at low levels in all regions. Survival of Atlantic sturgeon during the 20th century implies that enough spawning and nursery habitats exist to perpetuate the species. In the absence of major threats to existing habitat, reduced fishing mortality is of greater importance to stock restoration efforts than habitat limitations.

The target fishing rate was defined 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 recent 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

III. Status of the Fishery

Currently, all states and the National Marine Fisheries Service have enacted bans on harvest and possession of Atlantic sturgeon and sturgeon parts. As per Amendment 1, these moratoria will remain in effect until stocks at least exhibit 20 protected yearclasses of spawning adults and the FMP is modified to permit harvest and possession.

[1] Portions of this report were taken from "Atlantic States Marine Fisheries Commission: Atlantic Sturgeon stock assessment peer review. Terms of reference and advisory report." ASMFC, Wash., D.C. 29 pp.

Addendum I 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.

IV. Prioritized Research Needs (As of October 1, 2001)

1. Obtain baseline data on habitat condition and quantity in important sturgeon rivers. Data should address both spawning and nursery habitat.
2. Characterize size, condition, and relative abundance of Atlantic sturgeon by gear and season taken as bycatch in various fisheries.
3. Determine the extent to which Atlantic sturgeon are genetically differentiable among rivers.
4. Develop methods to determine sex and maturity of captured sturgeon.
5. Research should be conducted to determine the susceptibility of Atlantic sturgeon to sturgeon adenovirus and white sturgeon iridovirus. Methods should be developed to isolate the sturgeon adenovirous and an Atlantic sturgeon cell line should be established for infection trials.
6. Develop sperm cryo-preservation techniques and refine to assure availability of male gametes. Refine induced spawning procedures.
7. Establish tagging programs to delineate migratory patterns and stock composition and rates of loss to bycatch. Priority should be given to marking of juveniles in important sturgeon rivers before they begin ocean life phase.
8. Encourage shortnose sturgeon researchers to include Atlantic sturgeon research in their projects.
6. Develop long-term marking/tagging procedures to provide information on individual tagged Atlantic sturgeon for up to 20 years.
7. Evaluate aging techniques for Atlantic sturgeon with known age fish. Emphasis should be placed on verifying current methodology based on fin rays. Determine length, fecundity, and maturity at age for North, Mid and South Atlantic stocks.
8. Conduct basic cultural experiments to provide information on: a) efficacy of alternative spawning techniques, b) egg incubation and fry production techniques, c) holding and rearing densities, d) prophylactic treatments, e) nutritional requirements and feeding techniques, and f) optimal environmental rearing conditions and systems.
9. Establish a tag recovery clearinghouse and database for consolidation and evaluation of tagging and tag return information including associated biological, geographic, and hydrographic data.
10. Establish stocking goals and success criteria prior to development of stock enhancement or recovery programs.
11. Conduct research to identify suitable fish sizes, and time of year for stocking cultured fish.
12. Conduct and monitor pilot-scale-stocking programs before conducting large-scale efforts over broad geographic area.
13. Identify rates of tag loss and tag reporting.
14. Evaluate existing sea sampling data to characterize at-sea migratory behavior.

15. Establish tolerance of different life stages to important contaminants and levels of such environmental factors such as DO, pH, and temperature.
16. Standardize collection procedures and develop suitable long-term repository for biological tissues for use in genetic and other studies.
17. Develop the capability to capture wild broodstock and develop adequate holding and transport techniques for large broodstock.
18. Research should be conducted to identify the major pathogens of Atlantic sturgeon and a cell line for this species should be developed.
19. Conduct a cost benefit analysis of various stock protocols.
20. Conduct further analyses to assess the sensitivity of F50 to model inputs.

V. Ongoing Research

Amendment 1 does not require any research in participating jurisdictions/states. Nonetheless, several state and federal agencies are conducting or have completed research projects on Atlantic sturgeon to further understand the species' life history, genetics, behavior, and aquaculture. Some of these include:

- Reproductive conditions of Hudson River stock (U. Calif./Davis - Hudson River Foundation)
- Diet in marine waters (National Biol. Service, assisted by NJ Dept. of Environmental Protection)
- Hydroacoustic surveys in Connecticut River and Hudson River (National Biol. Service - U.S. Fish and Wildlife Service)
- Mitochondrial DNA analysis to delineate subspecies (NY Univ. and Hudson River Foundation)
- mtDNA analysis to determine stock contributions in NY fishery (NY Univ. and Hudson River Foundation)
- Behavior and diet studies in early life history stages (National Biol. Service)
- Juvenile sturgeon habitat use in Hudson River (U. Mass. and NMFS, Cornell U.)
- Ultrasonic telemetry studies of sturgeon movement (National Biol. Service, Hudson River Foundation, Cornell U.)
- Fin ray aging studies (Chesapeake Biol. Lab and U. Calif./Davis)
- Sturgeon bycatch in Winyah Bay shad fisheries (SC Dept. of Nat. Resources)
- Tagging of juvenile and adult Atlantic sturgeon in the Delaware and Hudson Rivers (National Biol. Service and DE Dept. of Natural Resources & Environmental Control)
- Survival of juvenile Atlantic sturgeon with pectoral spine and barbel removal (SC Dept. of Nat. Resources)
- Seasonal abundance of juvenile Atlantic sturgeon in lower Edisto River (SC Dept. of Nat. Resources)
- Movement and distribution of stocked Atlantic sturgeon in Nanticoke River, MD, through the use of sonic tags (Ches. Biol. Lab, MD DNR, NBS)

- Release of approximately 3,500 coded wire tagged juvenile Atlantic sturgeon of Hudson River parentage in Nanticoke River, MD (Ches. Biol. Lab, MD DNR, and the USFWS)
- Tagging program/rewards for live Atlantic sturgeon captured in Chesapeake Bay (USFWS, VMRC, MD DNR, and the Chesapeake Bay Foundation)
- Tagging of juvenile Atlantic sturgeon in A.C.E. (Ashepoo-Combahee-Edisto) Basin, SC (SC DNR)
- Identification of genetic diversity in Atlantic sturgeon using microsatellite markers is underway at the Leetown Science Center (USGS-BRD).
- Domestic Atlantic sturgeon (ASN) held on station at USFWS-Lamar from the 1993-1994 year classes were biopsied for gender determination and degree of gonadal maturity. Tissue samples from 24 fish were sent to UC-Davis for histology. Numerous photos and body measurements were taken from these fish in an effort to use image discrimination analysis with the objective of developing a discrete index which may be used to determine gender of sub-adults without surgery.[2]

Many of the states and jurisdictions with a declared interest in Atlantic sturgeon continue to participate in the coastwide sturgeon tagging program. In 2000 and 2001, a total of 554 sturgeons where reported to the USFWS tagging database in Annapolis, MD. These included 520 Atlantic (wild and hatchery) and 34 Shortnose sturgeon, which were purposely or incidentally captured, tagged and released, and, tag returns (with live release) reported by outside interests – usually commercial fishermen.

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.

2. In addition, states shall implement any restrictions in <u>other</u> 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

[2] The ASN Hatchery Manual is still under development at Lamar. Recent work to be added include (1) comparison of growth performance using various diets and culture conditions; (2) effectiveness of various anesthetants on reducing stress levels. Also, tissue samples of all domestic and captive (wild) fish have been forwarded to the genetics lab at Leetown Science Center (USGS) for genetics characterization in an effort to ensure that any future matings will maximize genetic diversity in offspring. All fish on station are PIT-tagged to allow individual identification.

<u>ASN inventory at Lamar as of November 2001</u>: Wild captive fish (Hudson and Delaware) = 15; Domestic fish - 1998 year-class = 416; 1996 year-class = 67; 1995 year-class = 119; 1994 year-class = 103; 1993 year-class = 70

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, culture techniques, incorporation of shortnose sturgeon issues in Atlantic sturgeon research (and vice versa), stock identification, and habitat restoration.

A number of new habitat restoration initiatives have resulted in the removal of barriers to Atlantic Sturgeon migration. The State of Maine and the Federal Energy Regulatory Commission (FERC) joined efforts to remove the Edwards Dam on the Kennebec River in 1999. This removal resulted in the restoration of 18 miles of historic Atlantic sturgeon spawning and nursery habitat. In addition, the State of North Carolina removed Mill Dam on the Little River, opening up an additional 49 miles of spawning area to sturgeon species.

On September 21, 1998, the Secretaries of Commerce and Interior determined that listing of Atlantic sturgeon under the Endangered Species Act (ESA) is not warranted. This finding was in response to a petition filed on June 2, 1997 for listing the species as endangered or threatened under ESA. Additionally in May of 1998, the National Marine Fisheries Service imposed a harvest and possession moratorium on Atlantic sturgeon in the EEZ.

VII. Current State-by-State Implementation of FMP Compliance Requirements (as of November 20, 2001)

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, with the exception of the District of Columbia who has not yet submitted an annual report, maintain compliance with Amendment 1 at this time.
***See Attached Table 1

VIII. Recommendations/findings of FMP Review Team

1. All States should implement the requirements and recommendations of Amendment 1.
2. The PRT continues to encourage states to develop and/or maintain tagging initiatives and data storage programs.