

**FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC STURGEON
AUGUST 2020**

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 1990
Amendments:	Amendment 1 July 1998 Technical Addendum #1 October 2000 Addendum I January 2001 Addendum II May 2005 Addendum III November 2006 Addendum IV September 2012
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	To Be Determined

Amendment 1 to the Interstate Fishery Management Plan (FMP) for Atlantic Sturgeon was developed by the Atlantic States Marine Fisheries Commission (ASMFC) with a goal to restore Atlantic sturgeon spawning stocks to population levels which will provide for sustainable fisheries, and ensure viable spawning populations. Addendum I was completed to allow importation of non-indigenous Atlantic sturgeon and permit the development of private aquaculture facilities. Addendum II required the compliance with ASMFC Terms, Limitations, Enforcement and Reporting Requirements for each exemption to the harvest and possession moratoria as outlined in Section 4 of the FMP. It also allowed for Lapaz, Inc. to import Atlantic sturgeon fingerlings, produce fish, and sell the meat. Further exemption was provided to Acadian Sturgeon and Caviar to import Atlantic sturgeon from Canada to North Carolina. Addendum III complements Addendum II and provides authority for LaPaz Inc. to import Atlantic sturgeon from Supreme Sturgeon and Caviar for commercial aquaculture. Addendum IV is the Atlantic Sturgeon Habitat Addendum.

To ensure compliance with interstate requirements, North Carolina also manages this species under the North Carolina Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP). The goal of the IJ FMP is to adopt fishery management plans, consistent with N.C. law, approved by the Mid-Atlantic Fishery Management Council, South Atlantic Fishery

Management Council, or the ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved fishery management plans and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (ASMFC plans) are like the goals of the Fisheries Reform Act of 1997 to “ensure long-term viability” of these fisheries (NCDMF 2015).

Management Unit

Atlantic sturgeon from Maine through Florida.

Goal and Objectives

The goal is to restore Atlantic sturgeon spawning stocks to population levels which will provide for sustainable fisheries and ensure viable spawning populations (ASMFC 1998). Amendment 1 to the Atlantic Sturgeon FMP was approved in July 1998. In order to achieve this goal, the plan sets forth the following objectives:

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

STATUS OF THE STOCK

Life History

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are an anadromous species, which means they reside primarily in oceans as adults but migrating up rivers to spawn. The species is found from Labrador, Canada, south to the St. Johns River, Florida. Atlantic sturgeon spend their first few years of life in their natal estuary before becoming highly migratory and travelling throughout the coastal Atlantic waters and various estuaries to feed.

Once mature, Atlantic sturgeon exhibit natal homing, returning to the specific river where they were spawned to reproduce. Migratory patterns are seasonal, with northern migrations in spring as water temperatures rise and southern movements in fall as water temperatures decrease. Some adult sturgeon will return to spawning grounds in consecutive years but others may only spawn

once every two or three years. Adult fish that reproduce in the Roanoke River enter the Albemarle Sound basin during the spring of the year. They spend the summer in the western Albemarle Sound and lower Roanoke River. Once temperatures begin to fall around September the fish ascend the Roanoke River to the rapids near Weldon to spawn. When spawning is complete and as water temperatures fall they leave the river and proceed to the ocean through the Albemarle Sound.

Atlantic sturgeon are thought to have historically spawned within the Roanoke, Tar-Pamlico, Neuse, and Cape Fear rivers. Currently the Roanoke River is the only North Carolina river with a known spawning population. Evidence from the collection of young of year fish exists for the other North Carolina rivers but collections of eggs has not been documented. Additionally, telemetry tagged sturgeon (tracked with radio signals) have been documented within the Cape Fear and Northeast Cape Fear rivers potentially making a spawning run.

Atlantic sturgeon at various life stages are found within most estuarine waters of North Carolina throughout the entire year. Due to their highly migratory behavior, Atlantic sturgeon spawned in other regions often enter North Carolina waters. Sturgeon from the Hudson, Chesapeake, Carolina, and South Atlantic Distinct Population Segments have been identified in North Carolina waters.

Atlantic sturgeon are opportunistic bottom feeders that prey on various types of worms, shrimps, crabs, snails and small fishes.

Atlantic sturgeon may live to a maximum age of 70 years; however, in more southern locations the maximum age is from 30 to 40 years. Age at which Atlantic sturgeon reach sexual maturity is unknown for specimens in North Carolina, but other fish within the Carolina and South Atlantic Distinct Population Segment mature as early as 5 to 13 years for males and 7 to 19 years for females. In contrast, sturgeon in more northern latitudes (Hudson River) mature at 11 to 20 years for males and 20 to 30 years for females. Research conducted in South Carolina show spawning intervals of one to five years for males and three to five years for females.

Stock Status

Reported coastwide landings peaked in 1890 at 3.4 million kg (7,495,717 pounds) and declined precipitously thereafter. The 1998 Atlantic Sturgeon Stock Assessment Report indicated populations of Atlantic sturgeon throughout their range were either extirpated or at historically low abundance. Recruitment was variable at low levels in all regions. The stock was considered overfished but overfishing was not occurring. The target fishing mortality (F) 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 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 southern stocks, where more signs toward recovery are being seen.

Stock Assessment

The Atlantic States Marine Fisheries Commission completed a benchmark assessment on Atlantic sturgeon in July 2017. Due to the limited availability of data, this assessment employed a number of approaches including Mann-Kendall test, Autoregressive Integrated Moving Average (ARIMA) model, and power, cluster, dynamic factor, and population viability analyses for the coastwide stock and by Distinct Population Segment (DPS). Several of these analyses indicated no significant trends in various time series with the exception that both the Mann-Kendall and population viability analysis detected a significant increasing trend of young of year and juvenile abundance in North Carolina's Albemarle Sound Independent Gill Net Survey. Results also indicated that analyses based on indices indicated a coast-wide structure rather than a DPS-structured stock. The Arima analysis indicated the time series had no significant trend or an increasing trend when using all available years of data for all indices and the terminal year index values were all credibly above the 25th percentile for their unique time series. Coast-wide abundance values are not available however stock reduction analysis indicated that the population declined to a low but stable level in the early 1900's but began to increase from the late 1990's onwards. In addition, estimates of coast-wide total mortality were below the Z50%EPR threshold, suggesting current levels of total mortality are sustainable. However, Z estimates for the New York Bight, Chesapeake, and South Atlantic DPS had less than 50% chance that Z was above the threshold while the Maine and Carolina had greater than 70% chance that Z was above the threshold, indicating that mortality is too high within these DPS's.

STATUS OF THE FISHERY

Current Regulations

Coastwide commercial and recreational moratorium.

Commercial Landings

No landings recorded since 1991.

Recreational Landings

No recreational fishery.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The North Carolina Division of Marine Fisheries (NCDMF) provides at sea observer coverage for the estuarine gill net fisheries throughout North Carolina.

North Carolina developed a Section 10 Incidental Take Permit for the estuarine waters of North Carolina relative to gill net fishing. Through this process North Carolina developed a zero inflated poisson general linear model that estimated bycatch in the gill net fisheries. This model

divided the state estuarine waters into management units and estimated takes (live and dead) within each of these units, by season, and mesh size. Results from this model are available in the Application for an Incidental Take Permit submitted to the National Oceanic and Atmospheric Administration (NOAA) Fisheries in December 2012 by the NCDMF.

A total of 401 Atlantic sturgeon have been encountered in the North Carolina on-board observer program from 2001 through 2019. These sturgeon have ranged from 270 to 1,580 mm Total Length (TL) and averaged 670 mm TL (Table 1). Three-hundred and four of the 401 sturgeon have been encountered in the Albemarle Sound Management Unit. An additional 85 Atlantic sturgeon were observed through the alternate platform observer program during 2013-2019. These trips are conducted from division-owned vessels where the observers do not ride with the fisherman but observe from a distance. These fish ranged in size from 390 to 1,219 mm TL and averaged 688 mm TL. Seventy-four of the 85 sturgeon encountered were observed in the Albemarle Sound Management Unit.

Fishery-Independent Monitoring

The NCDMF currently has three independent gill net surveys that encounter and tag Atlantic sturgeon. The Albemarle Sound Independent Gill Net Survey (IGNS) is a stratified random gill net survey that employs gill nets with mesh sizes that range from 2.5 inch stretch mesh (ISM) through 7 ISM (0.5 ISM increments) and 8 ISM and 10 ISM of floating and sinking nets. Gill nets are fished in 40-yard shots totaling 960 yards per set. Each set is fished for approximately 24-hours before retrieval. Nets were fished from January through May, November, and December each year from 1991 through 2019. Lengths of sturgeon collected have ranged from 153 to 1,714 mm FL and averaged 529 mm FL (Table 2). Nine fish were collected with a fork length greater than 1,000 mm, and only five of 2,157 fish collected were likely adults. The relative abundance index shows an increasing trend over the entire time series but annual values are variable (Figure 1).

The Fishery Independent Assessment Survey (FIAS) is conducted in Pamlico Sound, Pungo, Pamlico, and Neuse rivers, and consists of gill net sets, ranging in mesh size from 3.0 ISM through 6.5 ISM (0.5 ISM increments) and are fished for approximately 12 hours before retrieval. The Pamlico Sound portion has been conducted since 2001 and the rivers portion since 2003. A total of 58 sturgeon have been collected in Pamlico Sound and an additional 89 have been collected in the Pamlico, Pungo, and Neuse rivers. Average lengths are larger than those seen in the Albemarle, indicating capture of more sub-adult fish than young-of-year fish (Tables 3, 4). Three adults have been collected in the Pamlico Sound Survey and three adults have been collected in the Rivers Survey.

The Southern Independent Gill Net Survey is modeled after the (FIAS) but with periods of reduced soak times. The areas fished include the New and Cape Fear rivers. Two-hundred forty yards were fished per sample and 120 samples were completed per year. Effort has been ongoing since 2008. Additional sampling occurred in the coastal ocean waters off the New and Cape Fear rivers. Two-hundred and seventy yards were fished per sample in these ocean waters. However, sampling in the coastal ocean waters was discontinued on July 1, 2015. Seventeen fish have been

collected in the Cape Fear River IGNS and they ranged from 545 to 949 mm FL (Table 5). No adult Atlantic sturgeon have been collected in this survey.

During 2010, the NCDMF joined a multi-state grant entitled “Research and Management of Endangered and Threatened Species in the Southeast: Riverine Movements of Shortnose and Atlantic Sturgeon” cooperating with South Carolina Department of Natural Resources, The University of Georgia, and North Carolina State University. Funding was provided through NOAA Fisheries, Section 6. Ninety-four Atlantic sturgeon were tagged with acoustic transmitters from 2011 through 2013 in the Cape Fear River and Albemarle Sound. These fish ranged from 772 to 1,753 mm FL and averaged 928 mm FL (Table 6).

MANAGEMENT STRATEGY

Atlantic coastal states implemented a moratorium on harvest and possession of Atlantic sturgeon in coastal waters (0-3 miles) in 1998, while NOAA Fisheries banned harvest in the exclusive economic zone. The best available data indicate that river-specific populations are appropriate management units. It is recommended that the moratorium remain in place for each population until it can be documented that the spawning population includes at least 20 year classes of mature females (half the number of year classes that probably existed in unfished populations). Given that female Atlantic sturgeon do not mature until about 20 years of age, the moratorium can be expected to remain in place for several decades from when harvest of a given population ended. As populations increase during restoration, bycatch of sturgeon will increase; hence, managers should ensure that mechanisms are in place to monitor the level of bycatch and make reductions where necessary.

In 2012, NOAA Fisheries listed the Carolina DPS of Atlantic sturgeon as an endangered species under the 1973 Endangered Species Act (ESA). This listing determination drastically influenced the management strategy in North Carolina. The largest influence was the requirement of the NCDMF to obtain a Section 10 Incidental Take Permit to allow the estuarine gill net fisheries to continue. Without the Section 10 Permit, interactions in the fishery would have been illegal. In 2016, NOAA Fisheries published a proposed rule to designate Atlantic sturgeon critical habitat (specific areas that are considered essential to the conservation of the species) in each of the DPSs. The final rule to designate critical habitat was published in September 2017. This rule designated approximately 1,939 km (1,205 miles) of aquatic habitat for the Carolina DPS, including the following rivers in North Carolina: Roanoke, Tar-Pamlico, Neuse, Cape Fear, Northeast Cape Fear, and Pee Dee. Any future fishery for Atlantic sturgeon will only be possible if NOAA Fisheries removes Atlantic sturgeon from the ESA. However, additional protections provided through the ESA listing should increase the potential recovery.

RESEARCH NEEDS

Biological/Captive Propagation

- Standardize and obtain baseline data on population status for important sturgeon rivers. Data should include assessment of stock status in various rivers, size and composition of the spawning population, reproductive success and juvenile production;

- Develop long-term marking/tagging procedures to provide information on individual tagged Atlantic sturgeon for up to 20 years;
- Establish success criteria in order to evaluate the effectiveness of stocking programs;
- Determine size at maturity for North, Mid- and South Atlantic sturgeon;
- Monitor catch/effort and size/age composition of landings of any future authorized directed fisheries;
- Determine length at age by sex for North, Mid- and South Atlantic stocks;
- Determine maturity at age by sex for North, Mid- and South Atlantic stocks;
- Determine fecundity at age, length, and weight for North, Mid-, and South Atlantic stocks;
- Characterize size and condition of Atlantic sturgeon by gear and season taken as bycatch in various fisheries;
- Establish environmental tolerance levels (dissolved oxygen, pH, temperature, etc.) for different life stages;
- Establish coastal tagging projects to delineate migratory patterns (this measure is being implemented by the USFWS and member states.);
- Expand tagging of juveniles in major spawning rivers to allow estimates of rates of loss to bycatch;
- Establish a tag recovery clearinghouse and database for consolidation and evaluation of tagging and tag return information including associated biological, geographic, and hydrographic data (this measure is being implemented by the USFWS through the Maryland Fisheries Resources Office located in Annapolis, Maryland.);
- Encourage shortnose sturgeon researchers to include Atlantic sturgeon research in their projects;
- Establish methods for the recovery of tags and associated information (this measure is being implemented through ASMFC/USFWS cooperative efforts.);
- Evaluate existing groundfish survey data to determine what can be learned about at-sea migratory behavior;
- Conduct basic culture 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;
- Determine the extent to which Atlantic sturgeon are genetically differentiable among rivers;
- Conduct research to identify suitable fish sizes, and time of year for stocking cultured fish;
- Conduct and monitor pilot-scale stocking programs before conducting large-scale efforts over broad geographic areas;
- Determine effects of contaminants on early life stages;
- Develop methods to determine sex and maturity of captured sturgeon;
- Develop sperm cryopreservation techniques and refine to assure availability of male gametes;
- Refine induced spawning procedures;
- Develop the capability to capture wild broodstock and develop adequate holding and transport techniques for large broodstock;
- Conduct studies to identify tissue(s) suitable for genetic analyses and the techniques for their collection and storage. In those states which permit future harvest of Atlantic sturgeon, material for genetic analysis should be collected from up to 50% of the fish landed in the commercial fisheries. In states with no future directed fisheries, federal and state programs

which encounter sturgeon should be encouraged to collect specified tissues for genetic analysis;

- Standardize collection procedures to obtain biological tissues, and identify a suitable repository to archive all materials;
- Conduct research to determine the susceptibility of Atlantic sturgeon to sturgeon adenovirus and white sturgeon iridovirus. Methods should be developed to isolate the sturgeon adenovirus and an Atlantic sturgeon cell line should be established for infection trials;
- Conduct research to identify the major pathogens of Atlantic sturgeon and a cell line for this species should be developed.

Social

- To evaluate the social impacts the needed data might include the following for consumptive and non-consumptive users: demographic information (e.g. age, gender, ethnicity/race, etc.), social structure information (e.g. historical participation, affiliation with NGOs, perceived conflicts, etc.), other cultural information (e.g. occupational motivation, cultural traditions related to resource's use), and community information.
- A cost and benefit analysis of possible stocking protocols is needed.

Assessment

- Identify spawning units along the Atlantic coast at river or tributary and coastwide level.
- **Expand and improve the genetic stock definitions of Atlantic sturgeon, including developing and updated genetic baseline sample collection at the coastwide, DPS, and river-specific level for Atlantic sturgeon, with the consideration of spawning season-specific data collection.
- Determine habitat use by life history stage including adult staging, spawning, and early juvenile residency.
- Expand the understanding of migratory ingress of spawning adults and egress of adults and juveniles along the coast.
- Identify Atlantic sturgeon spawning habitat through the collection of eggs or larvae.
- Investigate the influence of warming water temperatures on Atlantic sturgeon, including the effects on movement, spawning, and survival.
- Evaluate the effects of predation on Atlantic sturgeon by invasive species (e.g., blue and flathead catfish).
- **Establish regional (river or DPS-specific) fishery-independent surveys to monitor Atlantic sturgeon abundance or expand existing regional surveys to include annual Atlantic sturgeon monitoring. Estimates of abundance should be for both spawning adults and early juveniles at age.
- **Establish coastwide fishery-independent surveys to monitor mixed stock abundance or expand existing surveys to include annual Atlantic sturgeon monitoring.
- **Continue to collect biological data, PIT tag information, and genetic samples from Atlantic sturgeon encountered in surveys that require it (e.g., NEAPMAP). Consider including this level of data collection from surveys that do not require it.

- **Encourage data sharing of acoustic tagged fish, particularly in underrepresented DPSs, and support program that provide a data sharing platform such as The Atlantic Cooperative Telemetry Network. Data sharing should be accelerated if it was required or encouraged by funding agencies.
- **Maintain and support current networks of acoustic receivers and acoustic tagging programs to improve the estimates of total mortality.
- **Collect DPS-specific age, growth, fecundity, and maturity information.
- **Collect more information on regional vessel strike occurrences, including mortality estimates. Identify hot spots for vessel strikes and develop strategies to minimize impacts on Atlantic sturgeon.
- **Monitor bycatch and bycatch mortality at the coastwide level, including international fisheries where appropriate (i.e., the Canadian weir fishery). Include data on size, health condition at capture, and number of fish captured.
- **Establish recovery goals for Atlantic sturgeon to measure progress of and improvement in the population since the moratorium and ESA listing.
- **Expand the acoustic tagging model to obtain abundance estimates and incorporate movement.
- Evaluate methods of imputation to extend timeseries with missing values.

Recommendations with asterisks (**) indicate improvements that should be made before initiating another benchmark stock assessment.

Monitoring population trends through juvenile abundance indices, characterizing the incidence of bycatch and mortalities in various fisheries and conducting tag/recapture studies for estimates of bycatch loss are being addressed through current sampling. It should be noted that any sampling or research that encounters Atlantic sturgeon whether incidental or targeted now require Section 10 permits through NOAA Fisheries or a Section 7 consultation if funded through a federal grant program. These permit requirements directly influence the data collection abilities of the NCDMF, potentially impacting the completion of research recommendations.

LITERATURE CITED

Atlantic States Marine Fisheries Commission (ASMFC). 1998. Amendment 1 to the interstate fishery management plan for Atlantic Sturgeon. Atlantic States Marine Fisheries Commission, Atlantic Sturgeon Plan Development Team, Washington, D.C.

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National Oceanic and Atmospheric Administration (NOAA). 2017. Critical Habitat for the Gulf of Maine, New York Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments (DPSs) of Atlantic Sturgeon. Federal Registry 82: 39160.

North Carolina Division of Marine Fisheries (NCDMF). 2015. Fishery Management Plan for Interjurisdictional Fisheries: Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. Morehead City, North Carolina. 85 pp.

TABLES

Table 1. Atlantic Sturgeon total length data (inches) collected from the North Carolina Division of Marine Fisheries Onboard Observer Program, 2001-2019.

Year	Mean Total Length	Minimum Total Length	Maximum Total Length	Collection Number
2001	39	36	41	2
2002				0
2003	*	*	*	1
2004	23	13	32	25
2005	25	18	32	28
2006	28	13	47	71
2007				0
2008	25	19	33	18
2009				0
2010				0
2011	30	18	55	4
2012	26	18	35	10
2013	25	19	36	29
2014	27	16	60	42
2015	27	11	39	54
2016	27	17	62	54
2017	25	17	41	45
2018	27	19	34	14
2019	32	15	54	4

- Length not recorded

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – ATLANTIC STURGEON

Table 2. Atlantic Sturgeon length data (inches) collected from the Albemarle Sound Independent Gill Net Survey, 1991-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
1991	20	10	28	26
1992	17	8	23	17
1993	20	12	37	13
1994	18	10	29	40
1995	19	10	30	21
1996	17	8	22	27
1997	17	9	27	60
1998	19	6	29	92
1999	21	11	28	55
2000	15	7	30	139
2001	19	12	27	132
2002	21	9	29	29
2003	20	10	39	22
2004	19	10	31	30
2005	20	9	33	48
2006	22	9	58	62
2007	21	9	30	66
2008	21	10	33	124
2009	25	15	31	55
2010	23	16	32	32
2011	24	15	59	47
2012	23	12	42	64
2013	22	11	55	139
2014	24	14	46	70
2015	23	14	39	86
2016	21	10	37	124
2017	22	14	40	173
2018	23	15	67	152
2019	21	8	52	212

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – ATLANTIC STURGEON

Table 3. Atlantic Sturgeon length data (inches) collected from the Pamlico Sound Independent Gill Net Survey, 2001-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Collection Number
2001				0
2002	26	26	26	1
2003	30	30	30	1
2004	19	18	21	4
2005	26	14	31	19
2006	39	19	31	12
2007	33	16	59	5
2008	26	25	37	2
2009	38	38	38	1
2010	24	8	27	4
2011				0
2012	56	56	56	1
2013				0
2014				0
2015	*	*	*	1
2016	30	29	30	2
2017	61	61	61	1
2018	24	21	27	3
2019	38	38	38	1

- Length not recorded

ASMFC AND FEDERALLY-MANAGED SPECIES WITH N.C. INDICES – ATLANTIC STURGEON

Table 4. Atlantic Sturgeon length data (inches) collected from the Pamlico, Pungo, and Neuse Rivers Independent Gill Net Survey, 2003-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Collection Number
2003				
2004	24	19	32	10
2005	19	14	31	30
2006	25	19	29	4
2007	20	16	28	3
2008	21	21	21	1
2010				0
2011	91	91	91	1
2012	25	25	25	1
2013				0
2014	*	*	*	1
2015	24	14	56	23
2016	28	18	38	8
2017	45	45	45	1
2018	28	22	40	4
2019	19	13	25	2

- Length not recorded

Table 5. Atlantic Sturgeon length data (millimeters) collected from the Cape Fear and New Rivers Independent Gill Net Survey, 2008-2019.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Collection Number
2008	28	28	28	1
2010				1
2011	34	34	34	1
2012	30	30	30	1
2013	*	*	*	0
2014	*	*	*	0
2015	26	26	26	1
2016	29	25	37	5
2017	30	27	37	3
2018	25	21	28	3
2019	25	25	25	1

- Length not recorded

Table 6. Atlantic Sturgeon length data (inches) collected through section 6 funding in the Cape Fear River and Albemarle Sound, North Carolina, 2011-2013.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Collection Number
2011	38	25	64	45
2012	37	30	69	21
2013	34	24	46	28
Total	37	30	69	94

FIGURES

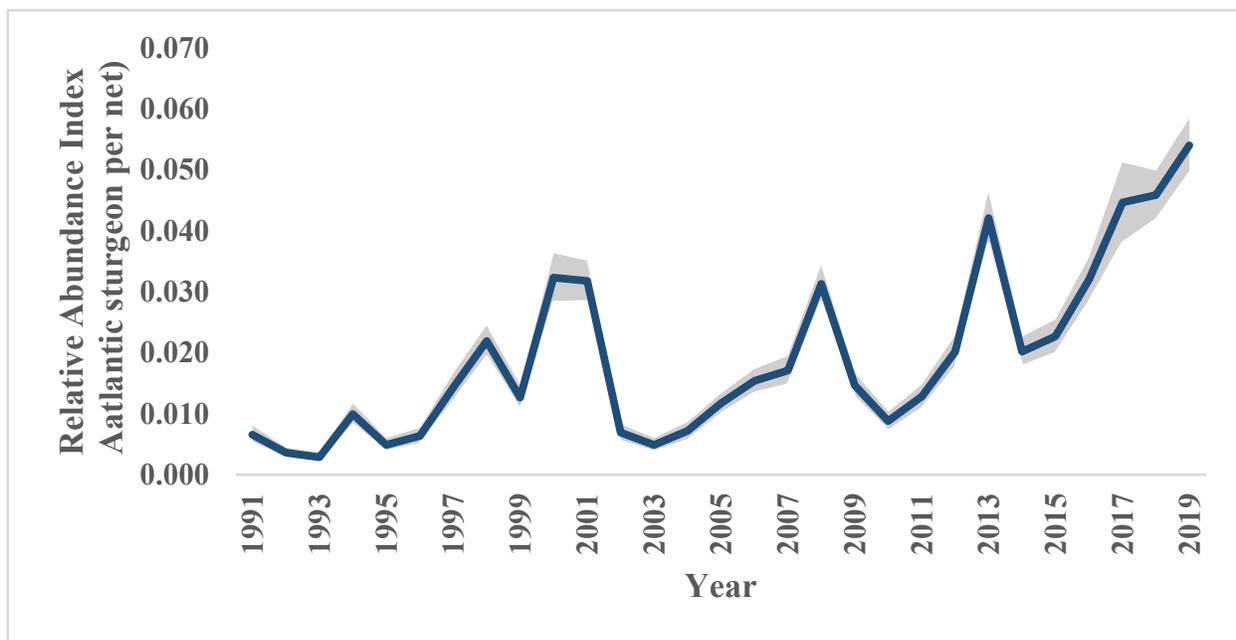


Figure 1. Annual nominal relative abundance index with standard error shaded in grey for Atlantic sturgeon collected from the Albemarle Sound Independent Gill Net Survey from 1991-2019.