



Marine Fisheries
ENVIRONMENTAL QUALITY

Annual Atlantic Sturgeon Interaction Monitoring of the Gill-Net Fisheries in North Carolina for
Incidental Take Permit Year 2015

Annual Completion Report for Activities under Endangered Species Act
Section 10 Incidental Take Permit No. 18102

Jacob Boyd

North Carolina Department of Environmental Quality
North Carolina Division of Marine Fisheries
Protected Resources Section
3441 Arendell Street
Morehead City, NC 28557

January 2016

TABLE OF CONTENTS

LIST OF TABLES	iii
LIST OF FIGURES	iv
BACKGROUND	5
METHODS	7
OBSERVER ACTIVITY	7
Seasons.....	8
AUTHORIZED TAKES	9
COMPLIANCE.....	9
RESULTS	10
OBSERVER ACTIVITY	10
Fall 2014.....	10
Winter 2014-2015	10
Spring 2015	11
Summer 2015	11
AUTHORIZED TAKES	12
COMPLIANCE.....	13
DISCUSSION	14
MANAGEMENT HISTORY	14
OBSERVER ACTIVITY	15
COMPLIANCE.....	16
Estuarine Gill Net Permit.....	16
LITERATURE CITED	17
TABLES	19
FIGURES	33

LIST OF TABLES

Table 1. Authorized and actual annual estimated incidental takes per fishing year (for a total of 10 years; the life of the permit) with confidence intervals (95% shown in brackets []) using a bootstrap resampling method based on observer data for coverage and Atlantic sturgeon interaction levels in North Carolina’s large mesh (>5.0 ISM) inshore gill net fishery for ITP Year 2015 (September 1, 2014 - August 31, 2015).....	19
Table 2. Authorized and actual annual estimated incidental takes per fishing year (for a total of 10 years; the life of the permit) with confidence intervals (95% shown in brackets []) using a bootstrap resampling method based on observer data for coverage and Atlantic sturgeon interaction levels in North Carolina’s small mesh (<5.0 ISM) inshore gill net fishery for ITP Year 2015 (September 1, 2014 - August 31, 2015).....	20
Table 3. Categories and descriptions of fisherman responses for the Observer Program's contact logs used for analysis.....	21
Table 4. Regulations for management units by date and regulation change for large and small mesh gill nets for ITP Year 2015 (September 1, 2014 - August 31, 2015).....	22
Table 5. Summary of observed Atlantic sturgeon interactions in large and small mesh gill nets through the NCDMF Observer Program for ITP Year 2015 (September 1, 2014 - August 31, 2015).	23
Table 6. Summary of reported Atlantic sturgeon interactions in large mesh gill nets through the NCDMF Observer Program for ITP Year 2015 (September 1, 2014 - August 31, 2015).	25
Table 7. Observer coverage calculated from previous year's trip ticket data and observer data for large mesh gill nets by season and management unit through the NCDMF Observer Program through August 2015 for ITP Year 2015 (September 1, 2014 - August 31, 2015).	26
Table 8. Observer coverage calculated from previous year's trip ticket data and observer data for small mesh gill nets by season and management unit through the NCDMF Observer Program through August 2015 for ITP Year 2015 (September 1, 2014 - August 31, 2015).	27
Table 9. Number of gill-net checks made and citations issued by Marine Patrol for large and small mesh gill nets by season during ITP Year 2015 (September 1, 2014 - August 31, 2015).....	28
Table 10. Citations written by Marine Patrol for large and small mesh gill nets by season and violation code during ITP Year 2015 (September 1, 2014 - August 31, 2015).....	29
Table 11. The number of calls (n = 8,870) made by the observers trying to set up trips by season and month categorized by call type (0-14) and defined in Table 3 for ITP Year 2015 (September 1, 2014 - August 31, 2015).	31
Table 12. Notice of Violations issued by season, date and violation code for the Estuarine Gill Net Permit for ITP Year 2015 (September 1, 2014 - August 31, 2015).	32

LIST OF FIGURES

Figure 1. Management units (A1, A2, A3, B, C, D, and E) as outlined in the Conservation Plan and utilized.....	33
Figure 2. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit A for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	34
Figure 3. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit B for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	35
Figure 4. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit C for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	36
Figure 5. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit D for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	37
Figure 6. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit E for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	38
Figure 7. Length-frequency (total length) of observed incidental captures of Atlantic sturgeon where measurements were obtained (n = 49) collected by the Observer Program from onboard and alternative platform observations for ITP Year 2015 (September 1, 2014 – August 31, 2015).....	39

BACKGROUND

The North Carolina Division of Marine Fisheries (NCDMF) applied for an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 (Public Law 93-205, ESA) on April 5, 2012 for a 10 year period covering gill-net fisheries in internal coastal waters of North Carolina for Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). This request was prompted by notification from the National Marine Fisheries Service (NMFS) in February indicating the intent to list the Carolina Distinct Population Segment (DPS) of Atlantic sturgeon as endangered under the ESA. The NCDMF requested an ITP to implement a proposed conservation plan that ensured only a reasonable level of authorized Atlantic sturgeon incidental takes will occur, while allowing North Carolina estuarine gill-net fisheries to operate. The NCDMF requested the NMFS to authorize such takes that are incidental to normal fishing activity with increased public outreach by the NCDMF to help fishermen avoid, minimize, and mitigate incidental takes of Atlantic sturgeon.

Feedback on the ITP application was received from the NMFS on May 29, 2012 via a teleconference with the NCDMF and the NMFS staff. After further review, on July 20, 2012 the NMFS requested the NCDMF to submit a revised permit application and Conservation Plan that addressed issues that were provided. In response to requested changes from the NMFS, the NCDMF made extensive revisions and resubmitted the application on December 20, 2012. Upon further review the NMFS provided the NCDMF with a list of questions they had regarding the application. On February 4, 2013 the NMFS and the NCDMF went over questions regarding the ITP application and Conservation Plan. Another revised ITP application was resubmitted to the NMFS on June 28, 2013 encompassing all comments and concerns raised by the NMFS. On July 9, 2013, the NMFS published a notice of receipt of the NCDMF application (File No. 18102) in the Federal Register (78 FR 41034). The comment period ended August 8, 2013. After further deliberation with the NMFS another revision of the Atlantic Sturgeon ITP was resubmitted on January 2, 2014.

The NCDMF received the Atlantic Sturgeon ITP on July 22, 2014. This ITP authorized the implementation of adaptive management measures to protect endangered Atlantic sturgeon and other ESA listed species, while allowing estuarine gill-net fisheries prosecuted by commercial license holders to fish in the internal coastal (estuarine) waters of North Carolina. The Annual Completion report for ITP Year 2014 was submitted January 30, 2015 (Boyd 2015b).

The NCDMF's Conservation Plan specifies further measures, which the NMFS had determined will minimize, monitor, and mitigate the impacts of incidental takes of ESA-listed Atlantic sturgeon from the Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs, associated with the otherwise lawful commercial fisheries operating in inshore North Carolina waters and deploying anchored gill nets. Anchored gill nets are passive sets deployed with an anchor, stake, or boat at one or both ends of the net shots or operation. Anchored gill nets do not include the following types of gill nets: run around, strike, drop or drift gill nets.

During review of the 2014 Atlantic Sturgeon ITP Annual Report, the NMFS requested modifications to certain tables in the annual report. These modifications were addressed in the current report and include: tables which have all of the estimated/observed takes exactly as portrayed in the permit with 95% confidence intervals included.

Prior to the federal listing, North Carolina had taken steps to protect Atlantic sturgeon. The NCDMF implemented a statewide moratorium on the possession of Atlantic sturgeon in 1991 (15A NCAC 03M.0508).

METHODS

OBSERVER ACTIVITY

The conservation plan includes managing inshore gill-net fisheries by dividing estuarine waters into seven management units (A1, A2, A3, B, C, D, and E; Figure 1). Existing observer data from previous years is used when estimating the amount of trips needed for the current year in each management unit and season. Also, real time trip ticket data is used for areas where effort may be increasing. Each year effort can potentially shift from one management unit to another, making it important for the NCDMF to not base the observer effort solely on previous years' trip ticket data, but also on current effort changes. To account for fluctuations in trip ticket data caused by management unit closings, a four-year average was used for estimating large mesh gill-net fishing trips and a two year average was used for estimating small mesh gill-net fishing trips for ITP Year 2015. This method of estimating trips proves to more accurately reflect the current fishing effort. Once trip ticket data are finalized in May of 2016, the final observer coverage will be recalculated and the finalized estimates of observer coverage will be provided to the NMFS.

Traditional, onboard trips are the preferred method of obtaining observer data and are used most frequently where observers ride aboard fishermen's vessels. For alternative platform trips, observers and Marine Patrol follow the same protocols using the NCDMF vessels to observe the fishing trip. Each observer attempts to obtain a minimum of three to four trips per working week when fishing activity is occurring. Observers are assigned a management unit to work weekly and the amount of observers assigned to a management unit depends upon the season and fishing effort. Fishing effort is estimated from the previous year's trip ticket data by week and by month and management unit to determine where and how much observer coverage is needed each week and for each management unit by month/season. Reports from observers and other staff are used to determine if effort is fluctuating between management units. Trends from the previous year's trip ticket data are also analyzed to determine if fishing effort is shifting from one management unit to another. Fishermen holding a Standard Commercial Fishing License (SCFL) and landing fish in North Carolina using gill nets in the previous years are pooled by management unit and further split into lists by geographic area within units. The contact information is then given to the observers assigned to that area and the observers contact the fishermen to set up trips from the list of names given. Preliminary trip ticket information is also used when pooling fishermen to contact along with contacting fishermen at fish houses. Observers hand out business cards with their contact information and brochures explaining the Observer Program and giving the fishermen another outlet to allow observers on their vessels. Additionally, the Observer Program utilizes a website (<http://portal.ncdenr.org/web/mf/observers-program>) to provide outreach to fishermen to obtain trips.

Alternative platform trips are utilized for areas that may be hard to get onboard trips (i.e., fishermen in remote locations that leave from their residence by boat). Alternative platform trips are also utilized in areas where fishing effort may increase quickly or Atlantic sturgeon

abundance is high. Marine Patrol also conducts alternative platform trips weekly in all management units based on the same methodology as the Observer Program. Coordination of onboard, alternative platform, and Marine Patrol alternative platform trips is done daily, monthly, and yearly to avoid sampling bias and to achieve the maximum amount of observer coverage possible for each management unit. Changes in effort, Atlantic sturgeon abundance (i.e., observed and reported interactions), and other protected species interactions are monitored on a daily, weekly, and monthly basis to ensure proper observer coverage is being maintained. The ITP requires a minimum of 7% observer coverage with a goal of 10% of the total large mesh gill-net (≥ 5 inches stretched mesh-ISM) fishing trips and 1% coverage with a goal of 2% of the total small mesh gill-net (< 5 ISM) fishing trips per management unit for the spring, summer, fall, and winter seasons.

Each observer is trained to identify, measure, evaluate condition, and tag Atlantic sturgeon by the NCDMF. Date, time, tag numbers, location (latitude and longitude, when possible), condition (i.e., no apparent harm, injury including a description of the nature of the injury, or mortality), species, Total Length (TL mm), and Fork Length (FL mm) are recorded for each sturgeon observed. Dead Atlantic sturgeon are retained by the observer when feasible. Observers collect data on location, gear parameters, catch, and bycatch for each haul. The landed catch is sampled throughout each trip including weights, lengths, and disposition (alive/dead). Data are coded on the NCDMF data sheets and uploaded to the NCDMF Biological Database for analysis. All observers are debriefed within 24 hours of each trip to obtain data on catch, set locations, gear parameters, and Atlantic sturgeon interactions to provide estimates of Atlantic sturgeon bycatch.

The total bycatch of Atlantic sturgeon for each management unit was estimated using the stratified ratio method (SAS 1989). The bycatch rate (Atlantic sturgeon caught per fishing trip) estimated from observer data was multiplied by the total fishing trips. To estimate confidence intervals (95%), the bootstrap method was used to sample estimates. Strata consisted of five management units (A, B, C, D, and E) where management unit A1-A3 (A) and D1-D2 (D) were combined for analysis (Figure 1). Estimates were calculated by date of capture, management unit, and disposition. Estimates were accumulated each week to implement necessary management measures if authorized take thresholds were approached.

$$\text{Estimated Interactions} = \frac{\# \text{ Atlantic sturgeon interactions observed}}{\text{total gill-net trips observed}} \times \text{total gill-net trips}$$

Seasons

The Observer Program's activities are reported on a monthly and annual basis. Monthly progress reports include information such as take estimates, cumulative totals, number of observed trips, and observed takes with all associated. Annual reports include actual and estimated takes including mortality and the level of uncertainty of the estimates (i.e., 95% confidence intervals) by management unit, size composition along with all other interaction information, one or more maps illustrating the geographic distribution of all observed large and small mesh gill-net hauls and the locations of all interactions, and a description of the mitigation

activities, adaptive management actions, and enforcement activities conducted during the ITP year.

AUTHORIZED TAKES

Authorized levels of annual incidental takes are specified in Tables 1 and 2. The amount of incidental takes are expressed as either estimated or observed takes depending on the amount of data available for modeling predicted takes. Management unit A has estimated allowable takes per season for both large and small mesh gill nets due to having robust data sets for the area. All other management units (i.e., B, C, D, E) have observed allowable takes which are actual takes and not estimated due to the lack of data for modeling estimated takes. Extrapolated Atlantic sturgeon takes were computed by dividing observed interactions by observer coverage. Nonparametric confidence intervals (95%) were calculated using standard bootstrapping techniques (Efron and Tibshirani 1993) using the 'boot' package in R (Canty and Ripley 2015; Davison and Hinkley 1997; R Core Team 2015). Bootstrap replicates were generated by sampling observer trips with replacement 5,000 times within strata (mesh/season/management unit; Tables 1 and 2). Takes must be incidental to otherwise lawful activities associated with the large and small mesh gill-net fisheries, and as conditioned herein. The permit covers incidental takes from the date of issuance through July 17, 2024. The NCDMF will use the total number of live and dead takes per unit and season to determine if the NCDMF is approaching or has reached the allowable Atlantic sturgeon takes. However, there is no "real time" method to determine the actual DPS taken. The required genetic sampling will provide the actual take numbers per DPS, but this will not be determined until after genetic samples are processed and if funding allows.

COMPLIANCE

The NCDMF observers and Marine Patrol conduct weekly fish house visits, boat patrols, fisherman spot checks, gear checks, aerial surveys, and continued outreach to the industry for the purpose of ensuring industry compliance and communicating efforts throughout the state.

The Observer Program has various ways to contact fishermen to set up trips. The most common method is by phone due to limited resources, fishermen leaving from their residence, and efficiency. The Observer Program has a contact log which is filled out for every phone call that is made when attempting to obtain a trip. Beginning in the spring of 2014 each call was put into a specific category and other information was gathered (Table 3). The contact log was analyzed by month and category to determine what percentage of phone calls resulted in positive observer trips.

RESULTS

OBSERVER ACTIVITY

Fall 2014

The fall season for large and small mesh gill nets in North Carolina is September through November as defined in ITP No. 18102. The NCDMF opened large mesh gill nets via proclamation M-25-2014 on September 1, 2014 in management unit A and via proclamation M-29-2014 on September 15, 2014 in management units C and D2 (Table 4; Boyd 2015a). On September 22, 2014 the NCDMF opened management units B and E to large mesh gill nets via proclamation M-30-2014. On September 24, 2014 management unit E was closed via proclamation M-31-2014 due to sea turtle interactions and reopened on November 2, 2014 via proclamation M-39-2014. On October 1, 2014 management unit A was closed via proclamation M-33-2014 due to sea turtle interactions with the western Albemarle Sound and Currituck Sound reopening on October 27, 2014 via proclamation M-36-2014. The remainder of management unit A was reopened on November 6, 2014 via proclamation M-41-2014. The annual management unit D1 opening occurred on October 14, 2014 via proclamation M-34-2014. On October 26, 2014 the eastern portions of management unit B were closed via proclamation M-37-2014 due to sea turtle interactions and were reopened on November 6, 2014 via proclamation M-40-2014 (Table 4; Boyd 2015a).

There was a total of 35 observed Atlantic sturgeon interactions from large mesh gill nets for the fall season (Table 5; Figures 2 - 7). Of the 35 interactions, 94.2% were alive (Table 5). The majority of the interactions (94.3%) occurred in management unit A (Table 5; Figures 2 - 7). Management units B and C had one interaction each during this time period (Table 5). There was a total of 9 reported Atlantic sturgeon interactions during this time period (Table 6).

The Observer Program exceeded the 7% requirement for coverage within each of the management units for large mesh gill nets with 637 total trips (Table 7; Figures 2 - 7). The Observer Program exceeded the 1% requirement for coverage in all management units for small mesh gill nets with 95 total trips (Table 8; Figures 2 - 7; Boyd 2015a).

Winter 2014-2015

The winter season for large and small mesh gill nets in North Carolina is December through February as defined in ITP No. 18102. The flounder commercial harvest season in internal coastal waters closed on December 1, 2014 via proclamation FF-72-2014 as per Amendment 1 to the Southern Flounder Fishery Management Plan. All management units remained open to large and small mesh gill nets for the duration of the winter season.

There was a total of two observed Atlantic sturgeon interactions from large mesh gill nets for the winter season (Table 5; Figures 2 - 7). Both Atlantic sturgeon interactions were

alive and observed in management unit A (Table 5). There was also one reported Atlantic sturgeon interaction during this time period (Table 6).

The Observer Program exceeded the 7% requirement for coverage for large mesh gill nets in management units C, D, and E with 60 total trips (Table 7; Figures 2 - 7). Coverage was not met in management units A and B due to limited fishing effort (Table 7). The Observer Program exceeded the 1% requirement for coverage for small mesh gill nets in management units A, C, and E with 81 total trips (Table 8; Figures 2 - 7). Coverage was not met in management units B and D due to limited fishing effort throughout much of the season (Table 8).

Spring 2015

The spring season for large and small mesh gill nets in North Carolina is March through May as defined in ITP No. 18102. The NCDMF closed anchored large mesh gill nets via proclamation M-6-2015 on May 8, 2015 in management unit D1 through October 14, 2015 as part of the annual closure from the Sea Turtle ITP (No. 16230; Table 4). All other management units remained open for the duration of the spring season (Boyd 2015c).

There was a total of 25 observed Atlantic sturgeon interactions from large mesh gill nets ($n = 16$) and from small mesh gill nets ($n = 9$) for the spring season (Table 5; Figures 2 - 7). Of the 25 interactions, 96.0% were alive (Table 5). The majority of the observed interactions (64.0%) occurred in management unit A with 16.0% in management unit B, 12.0% in management unit D, and 8.0% in management unit E (Table 5; Figures 2 - 7). There was a total of two reported Atlantic sturgeon interactions during this time period (Table 6).

The Observer Program exceeded the 7% requirement for coverage within each of the management units for large mesh gill nets with 342 total trips (Table 7; Figures 2 - 7). The Observer Program exceeded the 1% requirement for coverage in all management units for small mesh gill nets with 108 total trips (Table 8; Figures 2 - 7; Boyd 2015c).

Summer 2015

The summer season for large and small mesh gill nets in North Carolina is June through August as defined in ITP No. 18102. The NCDMF closed anchored large mesh gill nets via proclamation M-10-2015 on June 8, 2015 in management unit B through the end of ITP Year 2015 (August 31, 2015) due to approaching allowable sea turtle interactions (Table 4; Boyd 2015d). The NCDMF closed anchored large and small mesh gill nets via proclamation M-11-2015 on June 12, 2015 in management unit A through the end of ITP Year 2015 due to reaching allowable sea turtle interactions. The NCDMF closed anchored large and small mesh gill nets via proclamation M-12-2015 on July 23, 2015 in management unit C through the end of ITP Year 2015 due to reaching allowable sea turtle interactions after a minor modification combined the authorized sea turtle interactions in management units A and C. Management unit D1 remained closed to large mesh gill nets through the summer season as part of the annual

closure outlined in the Sea Turtle ITP (May 8 – October 14; Table 7). All other management units remained open for the duration of the summer season (Boyd 2015d).

There was a total of three observed Atlantic sturgeon interactions from large mesh gill nets ($n = 1$) and from small mesh gill nets ($n = 2$) for the summer season (Table 5; Figures 2 - 7). All of the Atlantic sturgeon interactions were alive (Table 5). Observed interactions occurred in management unit A ($n = 1$), management unit B ($n = 1$), and management unit C ($n = 1$) during this time period (Table 5). There were no reported Atlantic sturgeon interactions during this time period (Table 6).

The Observer Program exceeded the 7% requirement for coverage within each of the management units for large mesh gill nets with 183 total trips except in management unit A where coverage averaged 5.3% (Table 7; Figures 2 - 7). Coverage was not met in management unit A due to the minimal amount of fishing effort that occurred prior to the closure of 80 days in the management unit (Table 7). The Observer Program exceeded the 1% requirement for coverage in all management units for small mesh gill nets with 33 total trips (Table 8; Figures 2 - 7; Boyd 2015d).

AUTHORIZED TAKES

There was a total of 65 observed Atlantic sturgeon interactions in large mesh gill nets ($n = 54$) and in small mesh gill nets ($n = 11$) for ITP Year 2015 (Table 5; Figures 2 – 7). Of the 65 interactions, 95.4% were alive (Table 5). Observed interactions mostly occurred in management unit A (80.0%), with interactions in management unit B (9.2%), management unit C (1.5%), management unit D (4.6%), and management unit E (4.6%; Table 5; Figures 2 - 7). Of the 12 reported Atlantic sturgeon interactions for ITP Year 2015, 10 were reported by fishermen and two were reported by Marine Patrol from illegally set gill nets (Table 6).

The size distribution of Atlantic sturgeon ($n = 49$) ranged from a total length (TL) of 405 mm to 1,651 mm (Figure 8).

The cumulative total estimated and observed takes for large and small mesh gill nets did not reach the threshold of allowed takes for any management unit for ITP Year 2015 (Tables 1 and 2). Management unit A consisted of live (estimated $n = 21$, 95% CI [0, 56]) Atlantic sturgeon in large mesh gill nets for the winter season (Table 1). For the spring season, management unit A consisted of live (estimated $n = 171$, 95% CI [90, 306]) Atlantic sturgeon in large mesh gill nets and live (estimated $n = 124$, 95% CI [0, 564]) Atlantic sturgeon in small mesh gill nets (Tables 1 and 2). For the summer season, management unit A consisted of live (estimated $n = 29$, 95% CI [0, 87]) Atlantic sturgeon in large mesh gill nets (Table 1). For the fall season, management unit A consisted of live (estimated $n = 297$, 95% CI [167, 439]) and dead (estimated $n = 26$, 95% CI [0, 75]) Atlantic sturgeon in large mesh gill nets (Table 1). Management unit B consisted of three live (observed) and one dead (observed) Atlantic sturgeon in small mesh gill nets during the spring season (Table 2). For the summer season, management unit B consisted of one live (observed) Atlantic sturgeon in small mesh gill nets (Table 2). For the fall season, management unit B consisted of one live (observed) Atlantic

surgeon in large mesh gill nets (Table 1). Management unit C consisted of one live observed Atlantic sturgeon in large mesh gill nets during the fall season (Table 1). Management unit D consisted of three live (observed) Atlantic sturgeon in small mesh gill nets during ITP Year 2015 (Table 2). Management unit E consisted of two live (observed) Atlantic sturgeon in large mesh gill nets and one live (observed) in small mesh gill nets during ITP Year 2015 (Tables 1 and 2).

COMPLIANCE

Marine Patrol made 465 gill-net checks for the fall 2014 season (Table 9). Of these 465 gill-net checks, there were five citations (Tables 9 and 10). Marine Patrol made 306 gill-net checks for the winter 2014-2015 season (Table 9). Of these 306 gill-net checks, there was one citation (Tables 9 and 10). Marine Patrol made 512 gill-net checks for the spring 2015 season (Table 9). Of these 512 gill-net checks, there were 14 citations (Tables 9 and 10). Marine Patrol made 309 gill-net checks for the summer 2015 season (Table 9). Of these 309 gill-net checks, there were 14 citations issued (Tables 9 and 10).

In the fall 2014 season a total of 2,083 phone calls was made with 46.3% being categorized as 1, 8, 11, 12, 13, and 14, which inclusively represents not being able to get in touch with fishermen or fishermen refusing trips (Table 11). In the winter 2014-2015 season 1,902 phone calls were made with 49.9% being categorized as 1, 8, 11, 12, 13, and 14 which inclusively represents not being able to get in touch with fishermen or fishermen refusing trips. In the spring 2015, 4,080 season phone calls were made with 57.2% being categorized as 1, 8, 11, 12, 13, and 14. In the summer 2015 season, 815 phone calls were made with 50.7% being categorized as 1, 8, 11, 12, 13, and 14 (Table 11). Proclamation M-24-2014 implemented the Estuarine Gill-Net Permit (EGNP) on September 1, 2014 (Table 4). Notices of Violations (NOV) were issued when fishermen were found to be out of compliance with the EGNP with 20 NOVs issued during the fall 2014 season and 14 NOVs issued during the spring 2015 season (Table 12).

DISCUSSION

MANAGEMENT HISTORY

Initial reviews of the Atlantic sturgeon status began in 1977, when the Research Management Division of the NMFS sponsored the preparation of a report on the biology and status of Atlantic sturgeon (Murawski and Pacheco 1977). In 1980 at the request of the NMFS, another document was prepared by Hoff (1980) to assist in making future Atlantic sturgeon fisheries decisions and to determine what action was required, if any, to conserve the species under the ESA. In 1988, the NMFS requested information regarding the status of Atlantic sturgeon. The NMFS added Atlantic sturgeon to its candidate species list published in the Federal Register (FR) in 1997 (62 FR 37560, 14 July 1997, NMFS 1997a). In April 2004, the NMFS published a subsequent notice announcing that the NMFS “candidate species list” was being changed to the “Species of Concern (SOC) list” to better reflect the ESA definition of candidate species while maintaining a separate list of species potentially at risk (69 FR 19975 - 15 April 2004, NMFS 2004a; ASSRT 2007).

On June 2, 1997, a petition dated May 29, 1997 was received by the NMFS from the Biodiversity Legal Foundation. The petitioner requested that the NMFS list Atlantic sturgeon, where it continues to exist in the United States, as threatened or endangered and designate critical habitat. The NMFS reviewed the request and determined that the petition presented substantial information indicating that the petitioned action may be warranted and announced the initiation of a status review (62 FR 54018, 12 October 1997, NMFS 1997b; ASSRT 2007).

The NMFS and United States Fish and Wildlife Service (USFWS) completed their status review in 1998 and concluded at that time Atlantic sturgeon were not threatened or endangered based on any of the five factors (NMFS and USFWS 1998). Concurrently, the Atlantic States Marine Fisheries Commission (ASMFC) completed Amendment 1 to the 1990 Atlantic Sturgeon FMP in 1998 that imposed a 20–40 year moratorium on all Atlantic sturgeon fisheries until the Atlantic Coast spawning stocks could be restored to a level where 20 subsequent year-classes of adult females were protected (ASMFC 1998). The NMFS followed this action by closing the Exclusive Economic Zone (EEZ) to Atlantic sturgeon harvest in 1999. In 2003, a workshop on the “Status and Management of Atlantic Sturgeon” was held to discuss the current status of Atlantic sturgeon along the Atlantic Coast and determine what obstacles, if any, were impeding the recovery of Atlantic sturgeon (Kahnle et al. 2005; ASSRT 2007).

Based on the information gathered from the 2003 workshop on Atlantic sturgeon, the NMFS decided that a second review of Atlantic sturgeon status was needed to determine if listing as threatened or endangered under the ESA was warranted. The 2007 analysis from the Atlantic Sturgeon Status Review Team (ASSRT) determined that at least three (New York Bight, Chesapeake Bay, and Carolina) of the five DPSs should be considered threatened under the ESA, as it was determined that they had a moderately high risk of becoming threatened in the foreseeable future (next 20 years). The ASSRT determined that the remaining two DPSs (Gulf of Maine, South Atlantic) had a moderate risk of becoming extinct, though there were insufficient

data to allow for a full assessment of these subpopulations; thus, a listing recommendation was not provided (ASSRT 2007).

On October 6, 2009, the NMFS received a petition from the Natural Resources Defense Council to list Atlantic sturgeon throughout its range as endangered under the ESA. As an alternative, the petitioner requested that the species be listed as the five DPSs described in the 2007 Atlantic sturgeon status review (ASSRT 2007), with the GOM and South Atlantic DPSs listed as threatened and the remaining three DPSs listed as endangered. The petitioner also requested that critical habitat be designated for Atlantic sturgeon under the ESA. The NMFS published a Notice of 90-Day Finding on January 6, 2010 (75 FR 838, 6 January 2010, NMFS 2010) stating that the petition presented substantial scientific or commercial information indicating that the petitioned actions may be warranted. The NMFS considered the information provided in the status review report, the petition, other new information available since completion of the status review report, and information submitted in response to the Federal Register announcement of the 90-day finding (75 FR 838, 6 January 2010, NMFS 2010). On October 6, 2010, the NMFS published a proposed rule to list the Carolina DPS of Atlantic sturgeon as endangered under the ESA (75 FR 838, 6 January 2010, NMFS 2010). On February 6, 2012 the NMFS issued a final determination to list the Carolina DPS of Atlantic sturgeon as an endangered species under the ESA (77 FR 5914, 6 February 2012, NMFS 2012).

Implementation of management actions such as gear restrictions, fishing seasons, soak times, area closures, mesh size restrictions, FMPs, and ITPs (Sea Turtle ITP No. 16230) for other species have likely had a positive effect on reducing takes and minimizing the mortality associated with the incidental bycatch of Atlantic sturgeon. The North Carolina management system has shown the ability to effectively manage fisheries throughout the state and reduce incidental bycatch of finfish and protected species. Gill-net restrictions implemented by the proclamations for the Sea Turtle ITP included: a range of 4 ISM to, and including, 6 ½ ISM for large mesh gill nets; soak times limited to overnight soaks an hour before sunset to an hour after sunrise, Monday evenings through Friday mornings; large mesh gill nets were restricted to a height of no more than 15 meshes, constructed with a lead core or leaded bottom line and without corks or floats other than needed for identification; a maximum of 2,000 yards of large mesh gill nets allowed to be used per vessel; and maximum individual net (shot) length of 100 yards with a 25-yard break between shots. Fishermen in the southern portion of the state were allowed to set large mesh gill nets an hour before sunset to an hour after sunrise, Sunday evenings through Friday mornings, and use floats on nets but were restricted to the use of a maximum of 1,000 yards of large mesh gill net per fishing operation.

OBSERVER ACTIVITY

There was turnover within the Observer Program with positions being filled as quickly as possible to maintain coverage. The Observer Program actively placed observers in areas where fishing effort was high and where known Atlantic sturgeon interactions occur. During the fall 2014 and summer 2015 seasons during ITP Year 2015 there were closures throughout the

state due to sea turtle interactions. When a management unit closes for a portion of time the observers are shifted to the open management units to increase coverage in those management units. The contact log, which includes different categories to place each contact that was made to a fisherman, was beneficial for analyzing the type of contact that was being made and to see the number of positive observer trips that were obtained through the calling system.

COMPLIANCE

The previous ITPs (PSGNRA) did not require observer coverage in the northern portion of North Carolina (management unit A). Although ITP Year 2015 is the second year for the statewide ITP, fishermen were still not as familiar with the Observer Program and requirements of the ITP, so more time was needed to educate the industry. Management unit A had compliance issues throughout ITP Year 2015. The NCDMF discussed the situation with industry leads to improve awareness and increase compliance (i.e., inform fishermen about the requirements of the Observer Program). While overall compliance has improved, difficulties still arose from fishermen compliance in certain areas of the state.

Estuarine Gill Net Permit

As per the ITP the NCDMF established a permit to register all fishermen participating in the large and small mesh gill-net fisheries via proclamation M-24-2014 on September 1, 2014 (Table 4). The ITP's Implementing Agreement states that the NCDMF has two years to implement this permit to serve as a certificate of inclusion for fishermen. However, due to the compliance issues the NCDMF was facing during ITP Year 2014, the permit was developed (EGNP) and became effective September 1, 2014 (one year from ITP issuance). This multifaceted permit allows the NCDMF to closely monitor for compliance with the already successful permit system the NCDMF has in place. The EGNP is also used as a tool to improve fishermen compliance by requiring fishermen to allow the NCDMF observers aboard their vessels to monitor catches. Failure to comply with this permit provision results in a permit suspension. This results in more effective regulation and better compliance. There were 2,678 EGNPs issued for Fiscal Year 2015 (July 1, 2014 – June 30, 2015).

An issue that was discovered during the spring season was the appeal process for the NCDMF's permitting system, which includes the EGNP. General Counsel for the North Carolina Department of Environmental Quality (NCDEQ) deliberated the situation during which time NOV's were not issued (i.e., summer 2015 season). Their findings determined that any NOV issued by the NCDMF for permits can be appealed by the fisherman. However, the permit will still be suspended for the duration of the violation (i.e., 10-days, 30-days, 6-months).

LITERATURE CITED

- ASMFC. 1998. Amendment 1 to the Interstate Fishery Management Plan for Atlantic sturgeon. July 1998. Atlantic States Marine Fisheries Commission, Washington D.C. Fishery Management Report No. 31. 42 pp.
- Atlantic Sturgeon Status Review Team (ASSRT). 2007. Status review of Atlantic sturgeon (*Acispenser oxyrinchus oxyrinchus*). Report to the National Marine Fisheries Service, Northeast Regional Office. February 23, 2007. 174 pp.
- Boyd, J.B. 2015a. North Carolina Division of Marine Fisheries Incidental Take Permit Seasonal Report for Fall 2014 Section 10 ITP # 16230 (September 1 – November 30, 2014). North Carolina Division of Marine Fisheries Seasonal Report for Incidental Take Permit # 16230. 9pp.
- Boyd, J.B. 2015b. North Carolina Division of Marine Fisheries Incidental Take Permit Annual Report for ITP Year 2014 Section 10 ITP # 18102 (September 1, 2013 – August 31, 2014). North Carolina Division of Marine Fisheries Annual Report for Incidental Take Permit # 18102. 32pp.
- Boyd, J.B. 2015c. North Carolina Division of Marine Fisheries Incidental Take Permit Seasonal Report for Spring 2015 Section 10 ITP # 16230 (March 1 – May 31, 2015). North Carolina Division of Marine Fisheries Seasonal Report for Incidental Take Permit # 16230. 7pp.
- Boyd, J.B. 2015d. North Carolina Division of Marine Fisheries Incidental Take Permit Seasonal Report for Summer 2015 Section 10 ITP # 16230 (June 1 – August 31, 2015). North Carolina Division of Marine Fisheries Seasonal Report for Incidental Take Permit # 16230. 10pp.
- Canty, A. and B. Ripley. 2015. boot: Bootstrap R (S-Plus) Functions. R package version 1.3-17.
- Davison, A.C., and D.V. Hinkley. 1997. Bootstrap Methods and Their Applications. Cambridge University Press, Cambridge. ISBN 0-521-57391-2.
- Efron, B., and R.J. Tibshirani. 1993. An introduction to the bootstrap. Chapman and Hall, New York. 436 pp.
- ESA 1973. Endangered Species Act, 1973.
- Hoff, J.G. 1980. Review of the present status of the stocks of the Atlantic sturgeon *Acispenser oxyrhynchus*, Mitchill. Prepared for the National Marine Fisheries Service, Northeast Region, Gloucester, Massachusetts.
- Kahnle, A.W. R.W. Laney, and B.J. Spear. 2005. Proceedings of the workshop on status and management of Atlantic sturgeon. 3-4 November 2003, Raleigh, NC. ASMFC Special Report No. 84, Washington, D.C.

- Murawski, S.A., and A.L. Pacheco. 1977. Biological and fisheries data on Atlantic sturgeon, *Acipenser oxyrinchus* (Mitchill). National Marine Fisheries Service Technical Series Report 10:1–69.
- NMFS (National Marine Fisheries Service). 1997a. Notice of Modification of List of Candidate Species. Federal Register 97:18326 (14 July 1997):37560–37563.
- NMFS (National Marine Fisheries Service). 1997b. 90-Day Finding for a Petition to List the Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the United States as Endangered or Threatened. Federal Register 62:201 (17 October 1997):54018–54020.
- NMFS (National Marine Fisheries Service). 2004a. Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act. Federal Register 69:73 (15 April 2004):19975–19979.
- NMFS (National Marine Fisheries Service). 2010. Endangered and Threatened Wildlife; Notice of 90-Day Finding on a Petition to List Atlantic Sturgeon as Threatened or Endangered under the Endangered Species Act (ESA). Federal Register 75:3 (6 January 2010): 838–841.
- NMFS (National Marine Fisheries Service). 2012. Endangered and Threatened Wildlife and Plants; Final Listing Determinations for Two Distinct Population Segments of Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). Federal Register 77:24 (6 February 2012):5914–5982.
- NMFS and USFWS (National Marine Fisheries Service and United States Fish and Wildlife Service). 1998. Status review of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service and United States Fish and Wildlife Service. 126 pp.
- R Core Team. 2015. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>.
- SAS 1989. Institute. SAS version 9.1 Cary, NC.

TABLES

Table 1. Authorized and actual annual estimated incidental takes per fishing year (for a total of 10 years; the life of the permit) with confidence intervals (95% shown in brackets []) using a bootstrap resampling method based on observer data for coverage and Atlantic sturgeon interaction levels in North Carolina's large mesh (≥ 5.0 ISM) inshore gill net fishery for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS ²	
		Carolina DPS	Other DPS	Alive	Dead
A	Winter	149 (6)	50 (2)	21 [0,56]	0
	Spring	460 (19)	154 (6)	171 [90,306]	0
	Summer	157 (6)	52 (2)	29 [0,87]	0
	Fall	838 (34)	279 (11)	297 [167,439]	26 [0,75]
B	Winter	2 (1) ¹	n/a	0	0
	Spring	1 (1) ¹	1 (0)	0	0
	Summer	4 (2) ¹	2 (0)	0	0
	Fall	17 (2) ¹	6 (0)	1	0
C	Winter	2 (1) ¹	n/a	0	0
	Spring	3 (1) ¹	1 (0)	0	0
	Summer	2 (1) ¹	1 (0)	0	0
	Fall	4 (2) ¹	2 (0)	1	0
D	Annual	8 (2) ¹	n/a	0	0
E	Annual	8 (2) ¹	n/a	1	0
Total		1,655 (80)	548 (21)	521	26

¹ Total interaction number represents actual observed and not estimated based on observer coverage. Mortality estimates could not be completed for management units B-E due to low take; thus, if observed interactions were ≤ 5 mortality was one; if observed interactions were >5 mortality was two.

² Fin clip samples have been sent to the lab for genetic analysis. Confidence Intervals (95%) in brackets [].

Table 2. Authorized and actual annual estimated incidental takes per fishing year (for a total of 10 years; the life of the permit) with confidence intervals (95% shown in brackets []) using a bootstrap resampling method based on observer data for coverage and Atlantic sturgeon interaction levels in North Carolina’s small mesh (<5.0 ISM) inshore gill net fishery for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS ²	
		Carolina DPS	Other DPS	Alive	Dead
A	Winter	175 (14)	35 (3)	0	0
	Spring	219 (17)	44 (4)	124 [0,564]	0
	Summer	72 (6)	14 (1)	0	0
	Fall	103 (8)	21 (2)	0	0
B	Winter	2 (1) ¹	n/a	0	0
	Spring	6 (2) ¹	1 (0)	3	1
	Summer	3 (1) ¹	1 (0)	1	0
	Fall	3 (1) ¹	1 (0)	0	0
C	Winter	2 (1) ¹	n/a	0	0
	Spring	2 (1) ¹	n/a	0	0
	Summer	2 (1) ¹	n/a	0	0
	Fall	2 (1) ¹	n/a	0	0
D	Annual	8 (2) ¹	n/a	3	0
E	Annual	8 (2) ¹	n/a	2	0
Total		607 (58)	117 (10)	133	1

¹ Total interaction number represents actual observed and not estimated based on observer coverage. Mortality estimates could not be completed for management units B-E due to low take; thus, if observed interactions were ≤ 5 mortality was one; if observed interactions were >5 mortality was two.

² Fin clip samples have been sent to the lab for genetic analysis. Confidence Intervals (95%) in brackets [].

Table 3. Categories and descriptions of fisherman responses for the Observer Program's contact logs used for analysis.

Categories	Category description
1	Left message with someone else
2	Not fishing general
3	Fishing other gear
4	Not fishing because of weather
5	Not fishing because of boat issues
6	Not fishing because of medical issues
7	Booked trip
8	Hung up, got angry, trip refused
9	Call back later time/date
10	Saw in person
11	Disconnected
12	Wrong number
13	No answer
14	No answer, left voicemail

Table 4. Regulations for management units by date and regulation change for large and small mesh gill nets for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Year	Date(s)	Regulation change
2014	May 5 ¹	Use of large mesh gill nets prohibited in Internal Coastal Waters to avoid discards of red drum. Major portions of management units A and C and the New River were allowed to open Jun 1-Sep 15 (M-16-2014 and M-21-2014).
2014	Sept 1	The remainder of management unit A is reopened from the red drum closure (M-25-2014).
2014	Sept 1	The Estuarine Gill-Net Permit (EGNP) is implemented (M-24-2014).
2014	Sept 15	The remainder of management unit C is reopened and all of management unit D2 is reopened from the red drum closure (M-29-2014).
2014	Sept 22	Management units B and E are opened to large mesh gill nets (M-30-2014).
2014	Sept 24	Management unit E closed to large mesh gill nets due to turtle interactions (M-31-2014).
2014	Oct 1	Management unit A closed to large mesh gill nets due to turtle interactions (M-33-2014).
2014	Oct 15	Management unit D1 open to large mesh gill nets (M-34-2014).
2014	Oct 26	Shallow water portions of area B closed to large mesh gill nets due to turtle interactions (M-37-2014).
2014	Oct 27	Portions of western Albemarle Sound and Currituck (management unit A) reopened (M-36-2014).
2014	Nov 2	Management unit E open to large mesh gill nets (M-39-2014).
2014	Nov 6	Remainder of management unit A reopened (M-41-2014).
2014	Nov 6	Shallow water portions of area B reopened to large mesh gill nets (M-40-2014).
2015	May 8	Management unit D1 closed to large mesh gill nets for annual ITP closure (M-6-2015).
2015	May 18	Established attendance requirements for <5 inches for Subunit B.1 (small portion of management unit B located south and west of Oregon Inlet (M-7-2015).
2015	June 8	Closed management unit B to large mesh gill nets due to approaching allowable sea turtle interactions (M-10-2015).
2015	June 12	Closed management unit A to large and small mesh gill nets due to reaching allowable sea turtle interactions (M-11-2015).
2015	July 23	Closed management unit C to large and small mesh gill nets due to reaching allowable sea turtle interactions because. The NCDMF requested a minor modification to the Sea Turtle ITP that combines the authorized takes for management units A and C to provide more flexibility in managing the fishery and ensure that authorized take levels are not exceeded during the ITP year. For management units A and C the number of allowable takes had been reached (n=8; M-12-2015).

¹ Although this regulation change occurred during ITP Year 2014 it was included as reference for other regulatory changes which occurred in the fall season of ITP Year 2015

Table 5. Summary of observed Atlantic sturgeon interactions in large and small mesh gill nets through the NCDMF Observer Program for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Date	Management Unit	Latitude	Longitude	Species	Disposition	Tag	Length	
						PIT	Total	Fork
9/16/2014	A	3611.343	7601.684	Atlantic sturgeon	dead	n/a	1,024	931
9/17/2014	A	3600.109	7613.757	Atlantic sturgeon	alive	989.001001951938	817	752
9/20/2014	A	3604.151	7623.711	Atlantic sturgeon	dead	n/a	405	370
9/30/2014	A	3558.208	7628.040	Atlantic sturgeon	alive	980.010007162890	410	380
9/30/2014	A	3558.414	7620.942	Atlantic sturgeon	alive	n/a	1,092	n/a
9/30/2014	A	3558.433	7620.041	Atlantic sturgeon	alive	n/a	n/a	n/a
10/1/2014	A	3604.921	7620.832	Atlantic sturgeon	alive	n/a	n/a	n/a
10/13/2014	C	3506.185	7701.058	Atlantic sturgeon	alive	4A17164A56	720	660
10/28/2014	A	3559.518	7616.578	Atlantic sturgeon	alive	989.001001951908	708	640
10/28/2014	A	3559.281	7616.540	Atlantic sturgeon	alive	n/a	703	658
10/28/2014	A	3559.165	7616.439	Atlantic sturgeon	alive	n/a	717	705
10/28/2014	A	3559.125	7616.437	Atlantic sturgeon	alive	n/a	735	715
10/28/2014	A	3559.030	7616.411	Atlantic sturgeon	alive	n/a	704	666
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	691	596
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	770	667
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	915	793
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	511	437
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	549	474
10/29/2014	A	3558.136	7629.753	Atlantic sturgeon	alive	n/a	917	819
10/29/2014	A	3559.578	7615.452	Atlantic sturgeon	alive	n/a	609	n/a
10/29/2014	A	3558.802	7617.403	Atlantic sturgeon	alive	989.001001951953	n/a	692
10/29/2014	A	3558.689	7617.403	Atlantic sturgeon	alive	n/a	n/a	561
10/30/2014	A	3600.305	7612.800	Atlantic sturgeon	alive	989.001001951931	1,651	1,524
10/30/2014	A	3600.217	7612.681	Atlantic sturgeon	alive	n/a	500	450
11/4/2014	A	3602.103	7636.478	Atlantic sturgeon	alive	3DD.003BA5B7C7	510	442
11/6/2014	A	3605.548	7545.678	Atlantic sturgeon	alive	n/a	n/a	n/a
11/7/2014	A	3600.021	7552.614	Atlantic sturgeon	alive	n/a	737	637
11/9/2014	A	3600.242	7613.124	Atlantic sturgeon	alive	989.001001951682	838	749
11/9/2014	A	3600.089	7613.611	Atlantic sturgeon	alive	n/a	724	n/a
11/10/2014	A	3557.081	7538.810	Atlantic sturgeon	alive	BB89283	875	750
11/12/2014	A	3605.091	7619.898	Atlantic sturgeon	alive	989.001001951716	715	704
11/13/2014	A	3600.257	7630.263	Atlantic sturgeon	alive	n/a	n/a	n/a
11/13/2014	B	3538.954	7531.448	Atlantic sturgeon	alive	n/a	n/a	n/a
11/17/2014	A	3600.048	7612.044	Atlantic sturgeon	alive	989.001001951739	803	703
11/20/2014	A	3555.466	7545.122	Atlantic sturgeon	alive	989.001001951709	709	672

Table 5. Cont...

Date	Management Unit	Latitude	Longitude	Species	Disposition	Tag	Length	
						PIT	Total	Fork
1/7/2015	A	3615.883	7607.655	Atlantic sturgeon	alive	3DD.003B9C5DBC	632	551
1/13/2015	A	3602.726	7641.570	Atlantic sturgeon	alive	n/a	n/a	n/a
3/5/2015	A	3604.055	7619.851	Atlantic sturgeon	alive	989.001001951923	n/a	n/a
3/5/2015	A	3603.641	7619.699	Atlantic sturgeon	alive	984.001001951030	684	610
3/7/2015	A	3559.489	7629.750	Atlantic sturgeon	alive	989.001001951756	617	514
3/10/2015	A	3556.893	7632.775	Atlantic sturgeon	alive	989.001001951887	810	730
3/10/2015	A	3556.893	7632.775	Atlantic sturgeon	alive	989.001001951872	760	675
3/12/2015	A	3605.871	7615.675	Atlantic sturgeon	alive	989.001001952680	700	621
3/23/2015	A	3600.281	7629.660	Atlantic sturgeon	alive	989.001001952706	795	685
3/24/2015	A	3559.860	7629.554	Atlantic sturgeon	alive	989.001001951702	791	730
3/27/2015	E	3416.862	7800.352	Atlantic sturgeon	alive	989.001001195268	755	643
4/7/2015	A	3604.490	7620.145	Atlantic sturgeon ¹	alive	989.001001951787	595	510
4/10/2015	E	3416.836	7800.331	Atlantic sturgeon	alive	n/a	n/a	n/a
4/15/2015	D	3444.573	7627.779	Atlantic sturgeon ¹	alive	n/a	n/a	n/a
4/15/2015	D	3444.365	7628.398	Atlantic sturgeon ¹	alive	989.001001951896	n/a	625
4/16/2015	B	3526.334	7600.555	Atlantic sturgeon ¹	alive	989.001001951699	733	660
4/17/2015	B	3451.730	7624.063	Atlantic sturgeon ¹	alive	n/a	n/a	n/a
4/17/2015	B	3451.361	7623.821	Atlantic sturgeon ¹	alive	989.001001952674	n/a	490
4/17/2015	B	3451.447	7623.772	Atlantic sturgeon ¹	dead	n/a	740	764
4/18/2015	A	3557.995	7539.186	Atlantic sturgeon ¹	alive	989.001001951750	650	570
4/20/2015	D	3443.339	7628.483	Atlantic sturgeon ¹	alive	989.001001951705	652	555
4/29/2015	A	3615.694	7606.486	Atlantic sturgeon	alive	n/a	600	530
5/1/2015	A	3613.307	7607.041	Atlantic sturgeon	alive	n/a	n/a	n/a
5/4/2015	A	3604.136	7606.315	Atlantic sturgeon	alive	989.001001952796	810	750
5/5/2015	A	3603.723	7622.863	Atlantic sturgeon	alive	989.001001952857	655	563
5/13/2015	A	3601.387	7543.613	Atlantic sturgeon	alive	90011E001183698	960	876
5/19/2015	A	3610.784	7600.054	Atlantic sturgeon	alive	989.001001951761	722	705
6/12/2015	A	3551.035	7537.413	Atlantic sturgeon	alive	n/a	n/a	n/a
7/23/2015	E	3440.824	7721.825	Atlantic sturgeon ¹	alive	989.001001952829	605	534
8/25/2015	B	3515.603	7629.127	Atlantic sturgeon ¹	alive	989.001001952774	804	703

¹ Indicates small mesh gear

Table 6. Summary of reported Atlantic sturgeon interactions in large mesh gill nets through the NCDMF Observer Program for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Date	Management Unit	Latitude	Longitude	Species	Disposition	Length	
						Total	Fork
10/1/2014	A	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/1/2014	A	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/1/2014	A	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/11/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/11/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/12/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/13/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/13/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
10/22/2014	C	n/a	n/a	Atlantic sturgeon	alive	n/a	813
12/23/2014 ¹	A	n/a	n/a	Atlantic sturgeon	alive	n/a	n/a
3/29/2015 ¹	A	3555.330	7546.622	Atlantic sturgeon	dead	1,016	953
4/9/2015	E	3423.046	7814.588	Atlantic sturgeon	alive	n/a	n/a

¹ Reported Atlantic sturgeon interactions from illegally set large mesh gill nets and were reported by Marine Patrol

Table 7. Observer coverage calculated from previous year's trip ticket data and observer data for large mesh gill nets by season and management unit through the NCDMF Observer Program through August 2015 for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season	Management Unit	Large Mesh		
		Fishing Trips ²	Observed Trips	Coverage ³
Fall 2014	A	2,529	192	7.6
	B	1,448	154	10.6
	C	904	152	16.8
	D	287	81	28.2
	E	282	58	20.6
Winter 2014-2015	A	890	38	4.3
	B	125	0	0.0
	C	160	14	8.8
	D	2	1	50.0
	E	39	7	17.8
Spring 2015 ¹	A	2,254	158	7.0
	B	614	44	7.2
	C	839	72	8.6
	D	83	7	8.4
	E	251	61	24.3
Summer 2015 ¹	A	228	12	5.3
	B	117	16	13.7
	C	184	40	21.7
	D	125	17	13.6
	E	446	98	22.0
Total		11,808	1,222	10.3

¹ Number of days management units closed factored into estimated fishing trips for the spring and summer 2015 seasons

² Final trip ticket data for 2014 (September - December) and preliminary trip ticket data for 2015 (January - August)

³ Based on final trips for 2014 (September - December) and estimated trips for 2015 (January - August) compared to observer large mesh trips

Table 8. Observer coverage calculated from previous year's trip ticket data and observer data for small mesh gill nets by season and management unit through the NCDMF Observer Program through August 2015 for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season	Management Unit	Small Mesh		
		Fishing Trips ²	Observed Trips	Coverage ³
Fall 2014	A	566	18	3.2
	B	1,381	22	1.6
	C	309	15	4.9
	D	405	16	4.0
	E	624	24	3.8
Winter 2014-2015	A	1,681	55	3.3
	B	703	4	0.6
	C	183	12	6.6
	D	99	0	0.0
	E	117	10	8.6
Spring 2015 ¹	A	1,436	52	3.6
	B	1,337	23	1.7
	C	276	12	4.4
	D	91	7	7.7
	E	209	14	6.7
Summer 2015 ¹	A	58	3	5.2
	B	1,104	12	1.1
	C	114	6	5.3
	D	59	1	1.7
	E	292	11	3.8
Total		11,040	317	2.9

¹ Number of days management units closed factored into estimated fishing trips for the spring and summer 2015 seasons

² Final trip ticket data for 2014 (September - December) and preliminary trip ticket data for 2015 (January - August)

³ Based on final trips for 2014 (September - December) and estimated trips for 2015 (January - August) compared to observer large mesh trips

Table 9. Number of gill-net checks made and citations issued by Marine Patrol for large and small mesh gill nets by season during ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season	# Gill Net Checks	# Citations
Fall 2014	465	5
Winter 2014-2015	306	1
Spring 2015	512	14
Summer 2015	309	14
Total	1,592	33

Table 10. Citations written by Marine Patrol for large and small mesh gill nets by season and violation code during ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season	Violation		
	Date	Code	Description
Fall 2014	9/14/2014	NETG04	Leave gill nets in waters when could not be legally fished
	9/26/2014	NETG04	Leave gill nets in waters when could not be legally fished
	10/21/2014	NETG03	Using gill net with improper buoys or identification
	10/22/2014	NETG22	Improperly set gill net
	10/25/2014	NETG10	Gill net with illegal mesh size
Winter 2014-2015	12/5/2014	NETG26	Use gill net in excess of 800 yards M-2-2008
Spring 2015	3/4/2015	NETG09	Gill net set too close to bridge
	3/9/2015	NETG09	Gill net set too close to bridge
	3/21/2015	NETG22	Improperly set gill net
	3/21/2015	NETG53	Use large mesh gill net with corks or floats on top line
	3/21/2015	NETG38	Use large mesh gill net in Pamlico Sound later than 1 hour after sunrise
	4/2/2015	NETG08	Gill net within 200 yards of pound net
	4/2/2015	NETG12	Net in middle third of marked navigational channel
	4/2/2015	NETG08	Gill net within 200 yards of pound net
	4/2/2015	NETG12	Net in middle third of marked navigational channel
	4/5/2015	NETG10	Gill net with illegal mesh size
	4/10/2015	NETG29	RCGL gear without proper buoys
	5/4/2015	NETG04	Leave gill net in waters when could not be legally fished
	5/5/2015	NETG03	Using gill net with improper buoys or identification
	5/20/2015	NETG01	Leave gill net in coastal waters unattended
	Summer 2015	6/2/2015	NETG46
6/8/2015		NETG22	Improperly set gill net
6/14/2015		NETG10	Gill net with illegal mesh size
6/24/2015		NETG03	Using gill net with improper buoys or identification
6/24/2015		NETG04	Leave gill net in waters when could not be legally fished
7/3/2015		NETG22	Improperly set gill net
7/4/2015		NETG22	Improperly set gill net
7/16/2015		NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday
7/21/2015		NETG01	Leave gill net in coastal waters unattended
7/21/2015		NETG04	Leave gill net in waters when could not be legally fished
7/21/2015		NETG29	RCGL gear without proper buoys
7/22/2015		NETG03	Using gill net with improper buoys or identification
7/22/2015		NETG04	Leave gill net in waters when could not be legally fished
7/22/2015	NETG30	Leave RCGL gill net unattended	

Table 10. Cont...

Season	Date	Code	Violation
			Description
Summer 2015	7/22/2015	NETG39	Use large mesh gill nets more than 15 meshes in height and w/out lead core or leaded bottom
	7/30/2015	NETG03	Using gill net with improper buoys or identification
	8/5/2015	NETG29	RCGL gear without proper buoys
	8/8/2015	NETG12	Net in middle third of marked navigational channel
	8/10/2015	NETG03	Using gill net with improper buoys or identification
	8/10/2015	NETG16	Use an unattended gill net in a restricted area
	8/10/2015	NETG37	Leave small mesh gill nets unattended
	8/13/2015	NETG03	Using gill net with improper buoys or identification
	8/14/2015	NETG22	Improperly set gill net
	8/14/2015	NETG30	Leave RCGL gill net unattended
	8/15/2015	NETG22	Improperly set gill net
	8/15/2015	NETG29	RCGL gear without proper buoys
	8/15/2015	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday
	8/19/2015	NETG03	Using gill net with improper buoys or identification
	8/19/2015	NETG10	Gill net with illegal mesh size
	8/19/2015	NETG22	Improperly set gill net
	8/19/2015	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday
	8/20/2015	NETG30	Leave RCGL gill net unattended
	8/23/2015	NETG03	Using gill net with improper buoys or identification
	8/23/2015	NETG04	Leave gill net in waters when could not be legally fished
8/28/2015	NETG04	Leave gill net in waters when could not be legally fished	
8/28/2015	NETG29	RCGL gear without proper buoys	

Table 11. The number of calls (n = 8,870) made by the observers trying to set up trips by season and month categorized by call type (0-14) and defined in Table 3 for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season	Month	Categories (%) ¹														Total
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Fall 2014	September	0.0	0.3	0.2	0.0	0.0	0.0	1.3	0.0	0.8	0.0	0.1	0.0	0.5	1.2	4.6
	October	1.5	9.8	3.3	1.5	0.9	0.8	6.9	0.1	4.7	0.0	1.2	0.3	5.2	16.0	52.4
	November	1.2	11.0	3.1	1.1	0.8	0.2	3.2	0.1	3.2	0.3	0.9	0.2	4.8	12.9	43.0
	Total	2.8	21.2	6.7	2.6	1.7	1.1	11.4	0.2	8.7	0.3	2.1	0.5	10.5	30.1	100.0
Winter 2014-2015	December	1.5	10.5	1.7	0.1	0.5	0.6	1.0	0.1	4.8	0.1	1.9	0.3	3.5	9.9	36.5
	January	1.3	15.6	1.8	2.5	0.5	0.9	1.3	0.1	4.9	0.2	2.6	0.7	9.7	16.5	58.5
	February	0.0	1.6	0.2	0.1	0.1	0.1	0.8	0.0	0.3	0.0	0.1	0.1	0.4	1.4	5.0
	Total	2.8	27.8	3.7	2.6	1.1	1.5	3.2	0.1	10.0	0.3	4.6	1.1	13.6	27.8	100.0
Spring 2015	March	1.3	9.5	2.1	0.6	0.5	0.6	2.5	0.0	2.0	1.3	2.2	0.7	5.7	15.2	44.2
	April	1.3	5.7	2.0	0.2	0.4	0.3	1.4	0.1	2.3	0.3	1.8	0.5	3.5	9.5	29.2
	May	1.0	5.4	2.7	0.1	0.3	0.3	0.8	0.0	1.2	0.4	1.0	0.2	3.0	10.1	26.6
	Total	3.6	20.6	6.8	1.0	1.2	1.2	4.6	0.1	5.4	2.1	5.0	1.4	12.2	34.8	100.0
Summer 2015	June	4.5	21.2	9.0	1.0	1.2	2.0	5.2	0.4	6.5	0.7	3.2	1.8	10.8	27.4	94.8
	July	0.0	0.9	0.1	0.0	0.0	0.1	0.0	0.0	0.5	0.1	0.4	0.1	0.5	1.1	3.8
	August	0.0	0.5	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.3
	Total	4.5	22.6	9.1	1.0	1.2	2.1	5.5	0.4	7.0	0.9	3.6	2.0	11.3	29.0	100.0
Total	3.5	21.0	7.0	1.4	1.4	1.2	6.7	0.2	6.6	1.4	4.0	1.2	11.6	32.7	100.0	

¹ Categories as defined in Table 3: 1) Left message with someone else, 2) Not fishing general, 3) Fishing other gear, 4) Not fishing because of weather, 5) Not fishing because of boat issues, 6) Not fishing because of medical issues, 7) Booked trip, 8) Hung up, got angry, trip refused, 9) Call back later time/date, 10) Saw in person, 11) Disconnected, 12) Wrong number, 13) No answer, 14) No answer, left voicemail

Table 12. Notice of Violations issued by season, date and violation code for the Estuarine Gill-Net Permit for ITP Year 2015 (September 1, 2014 - August 31, 2015).

Season ¹	Date	Code	Description
Fall 2014	9/13/2014	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	9/17/2014	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	9/18/2014	EGNP25	Refuse to allow fisheries observers onboard or collect data
	9/23/2014	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	9/23/2014	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	9/24/2014	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	9/29/2014	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	9/25/2014	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	10/2/2014	EGNP14	Mislead observers to avoid fishing trip
	10/2/2014	EGNP14	Mislead observers to avoid fishing trip
	10/3/2014	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/3/2014	EGNP11	Failure to attend nets
	10/3/2014	EGNP99	Failure to comply with statute(s), rule(s) and/or proclamation(s)
	10/3/2014	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/3/2014	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	10/10/2014	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	10/17/2014	EGNP99	Failure to comply with statute(s), rule(s) and/or proclamation(s)
	10/29/2014	EGNP99	Failure to comply with statute(s), rule(s) and/or proclamation(s)
	10/23/2014	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	10/31/2014	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
Spring 2015	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/12/2015	EGNP08	Failure to notify DMF of a change in phone number within 14 days
	3/13/2015	EGNP25	Refuse to allow fisheries observers onboard or collect data
	3/17/2015	EGNP25	Refuse to allow fisheries observers onboard or collect data
3/17/2015	EGNP25	Refuse to allow fisheries observers onboard or collect data	
3/25/2015	EGNP09	Failure to set or retrieve nets in accordance with time restrictions	
4/6/2015	EGNP25	Refuse to allow fisheries observers onboard or collect data	

¹ Notices of Violation were not issued during the summer 2015 season due to the legal review of the permit appeal process

FIGURES

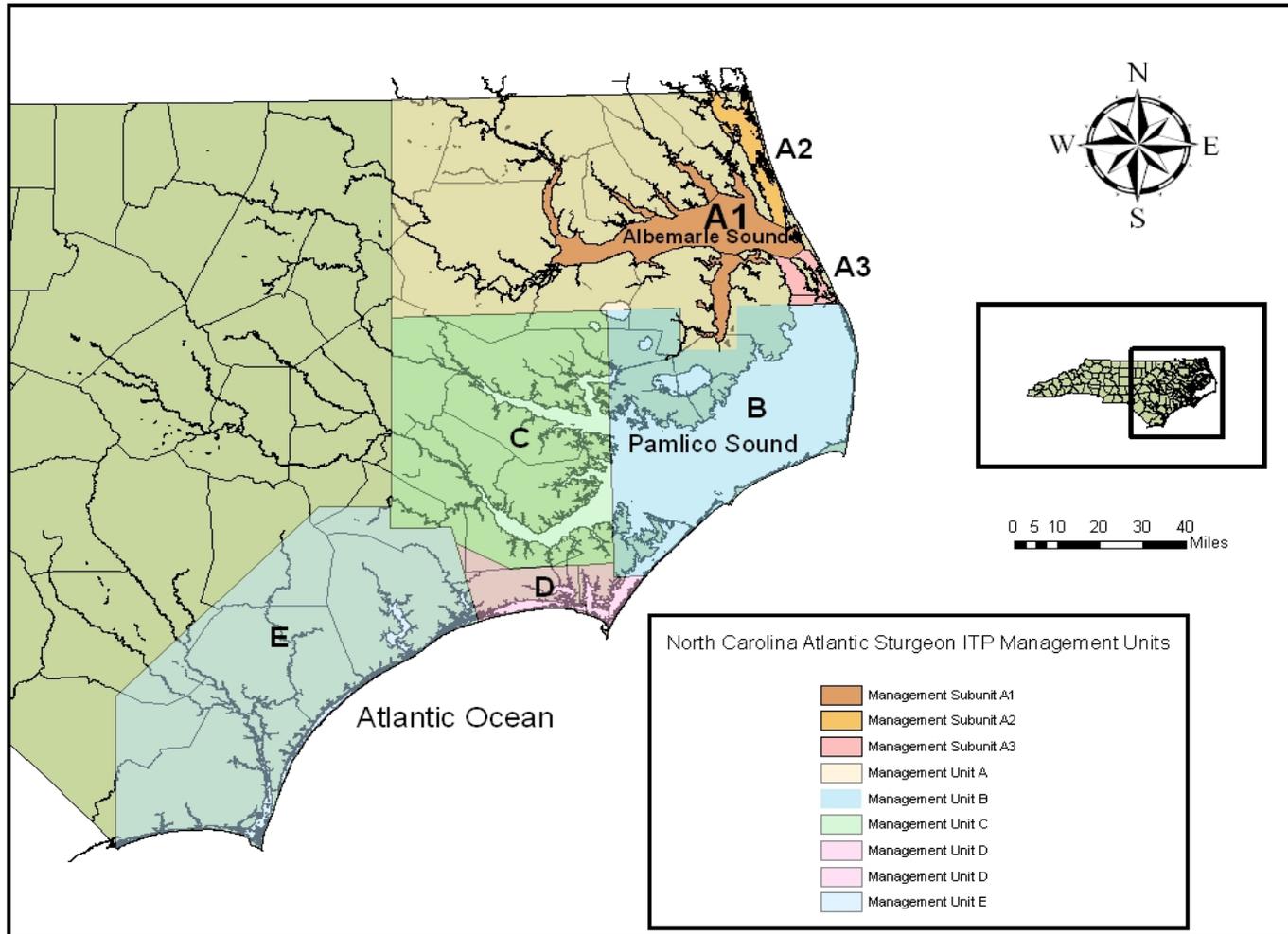


Figure 1. Management units (A1, A2, A3, B, C, D, and E) as outlined in the Conservation Plan and utilized by the Observer Program for ITP Year 2014 (September 1, 2013 – August 31, 2014).

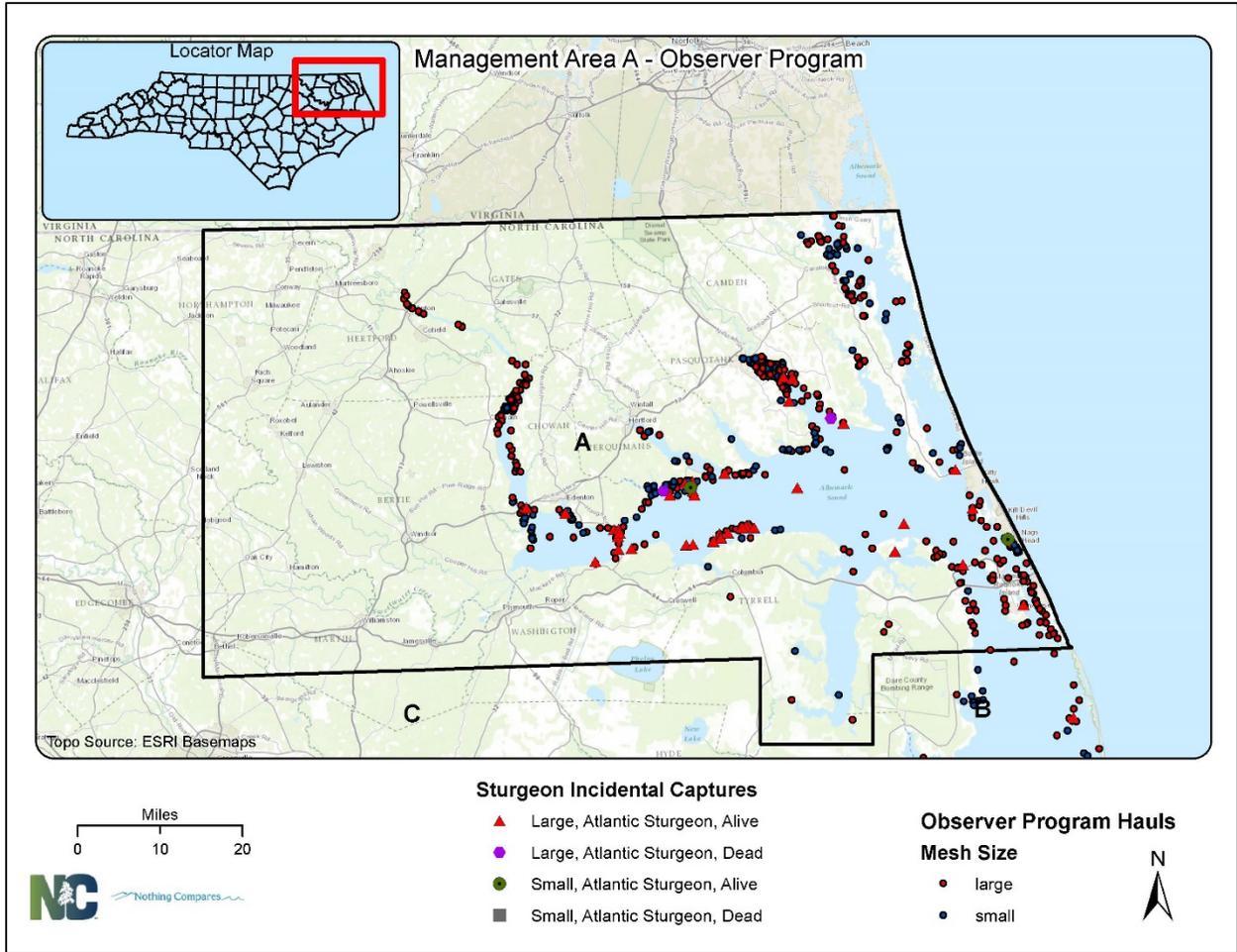


Figure 2. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit A for ITP Year 2015 (September 1, 2014 – August 31, 2015).

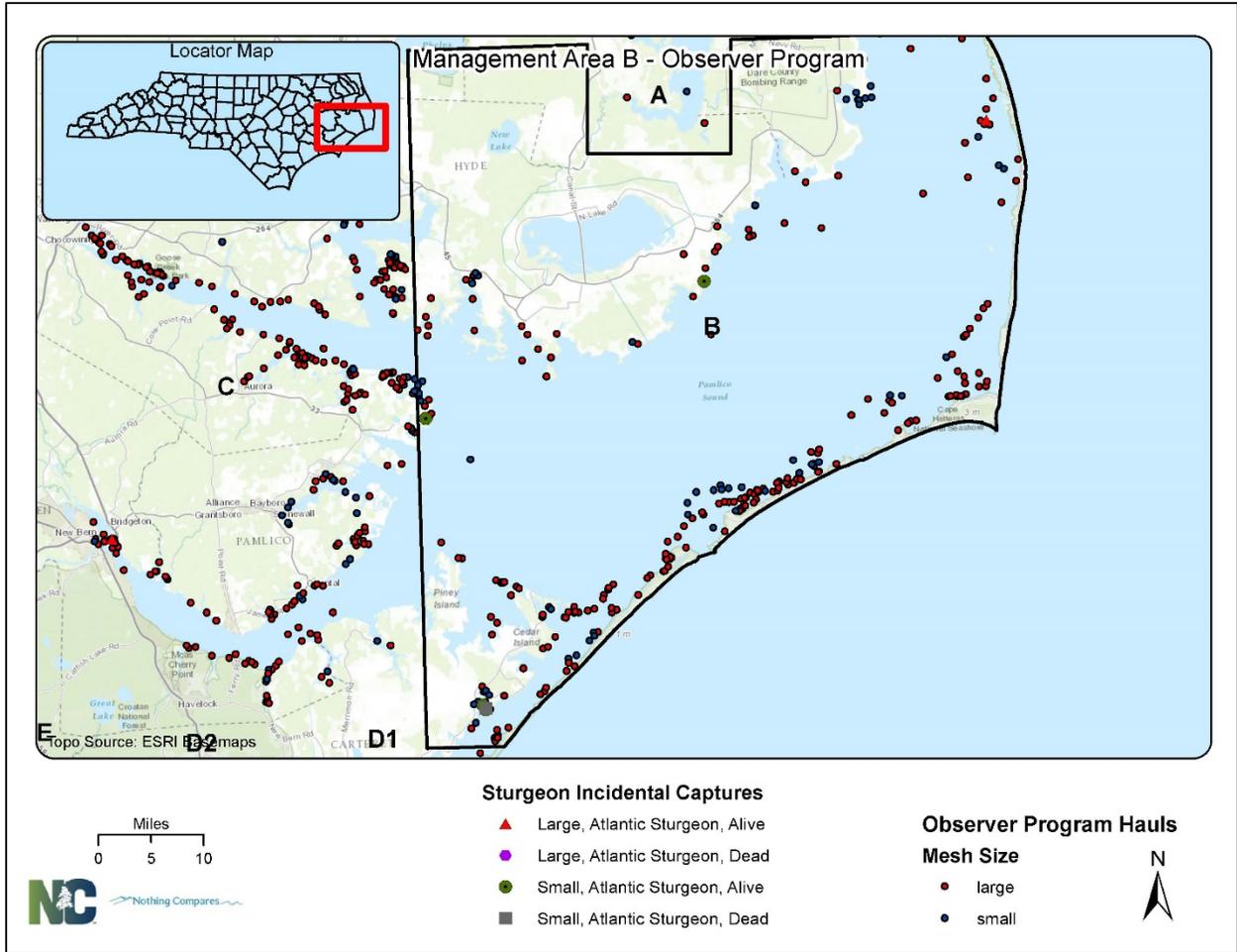


Figure 3. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit B for ITP Year 2015 (September 1, 2014 – August 31, 2015).

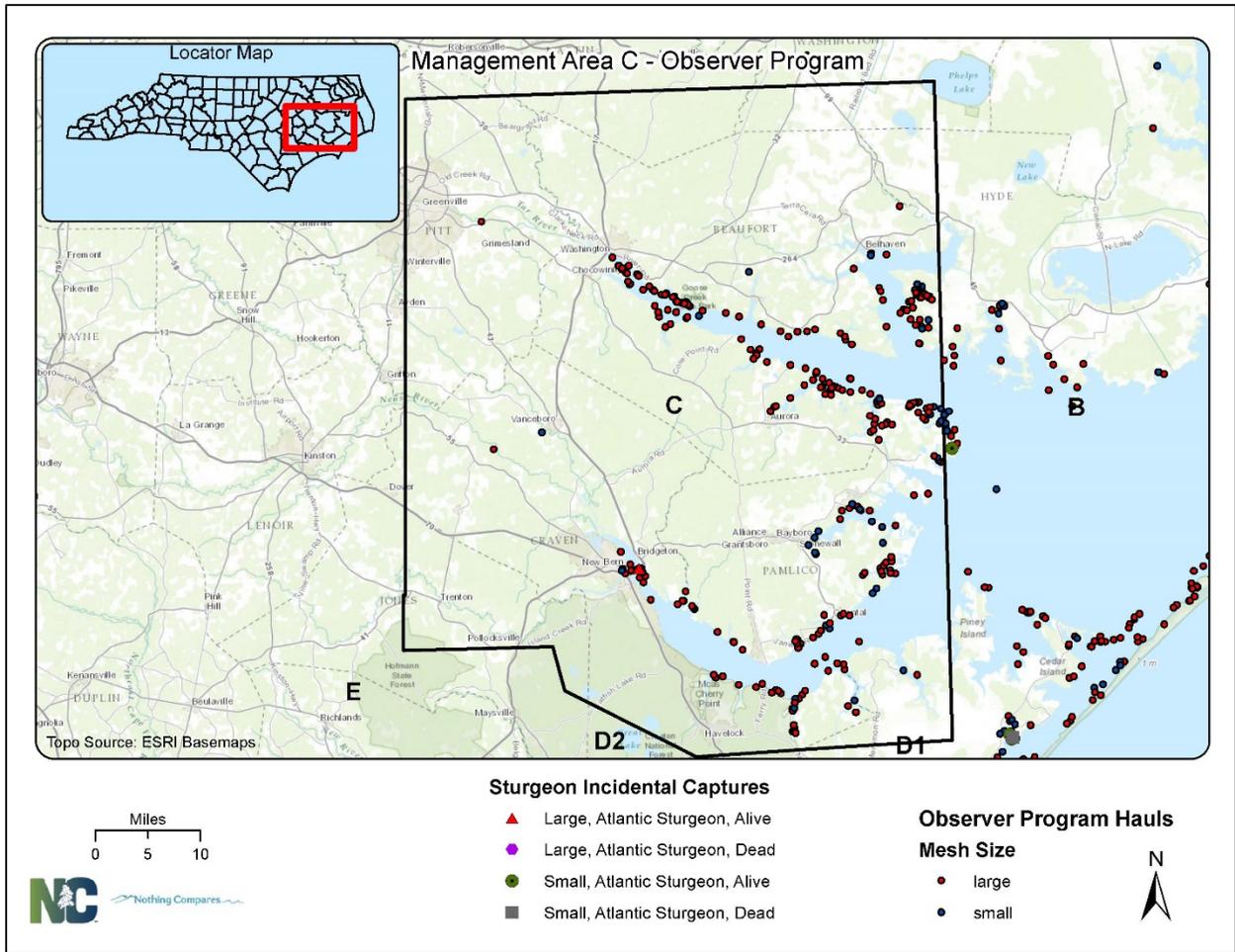


Figure 4. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit C for ITP Year 2015 (September 1, 2014 – August 31, 2015).

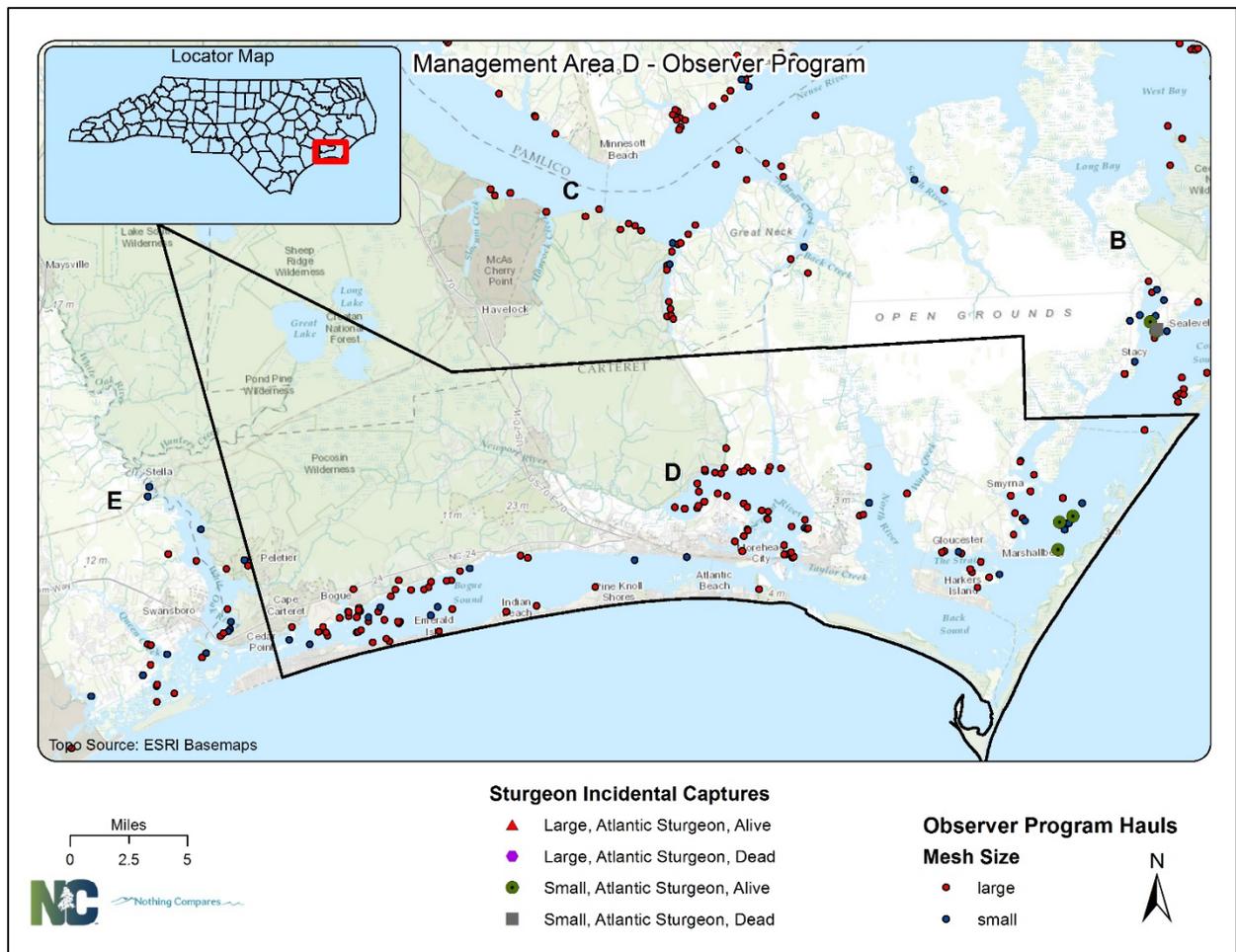


Figure 5. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit D for ITP Year 2015 (September 1, 2014 – August 31, 2015).

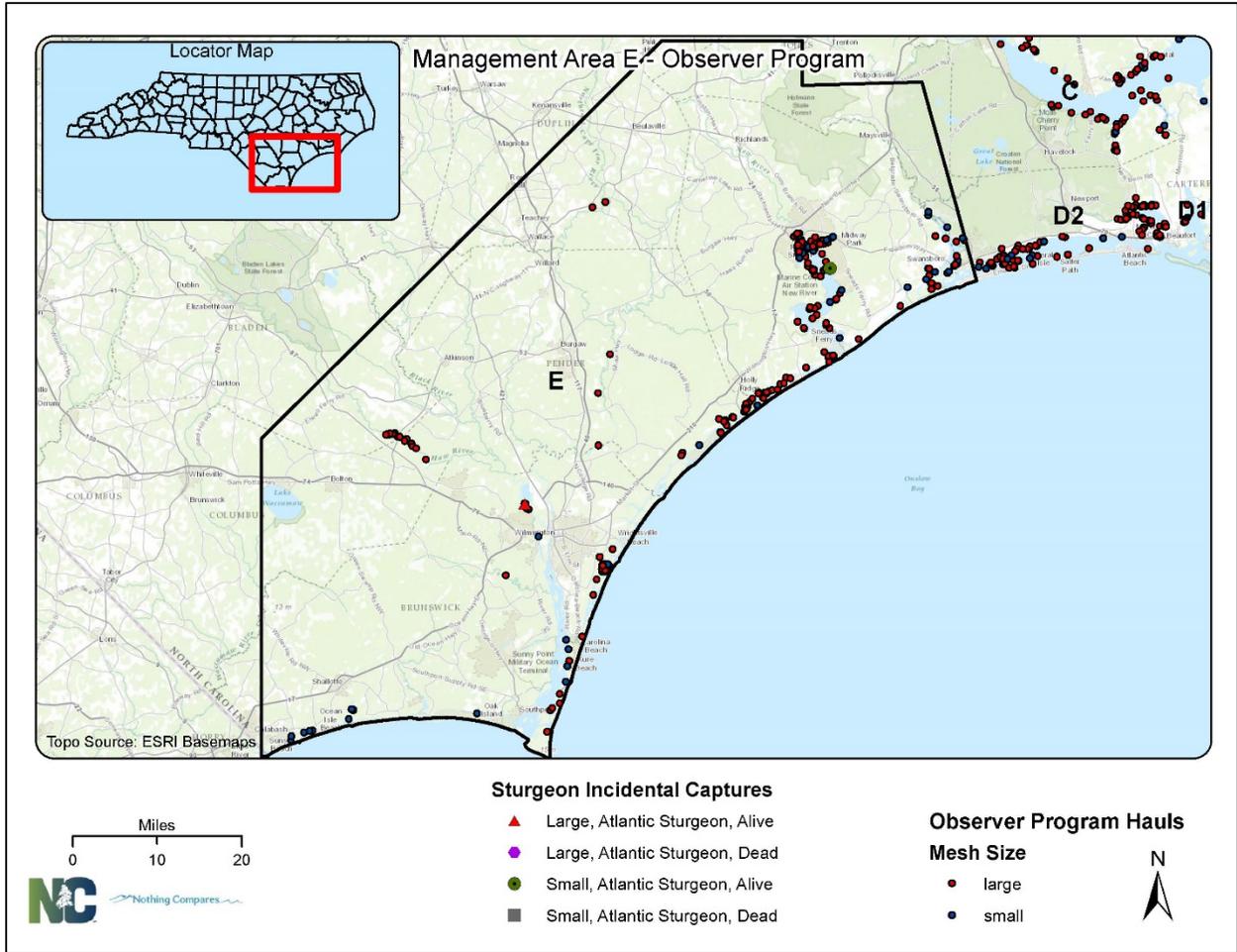


Figure 6. Atlantic sturgeon interaction locations by species, disposition, and gear and observer trips (hauls) by gear in management unit E for ITP Year 2015 (September 1, 2014 – August 31, 2015).

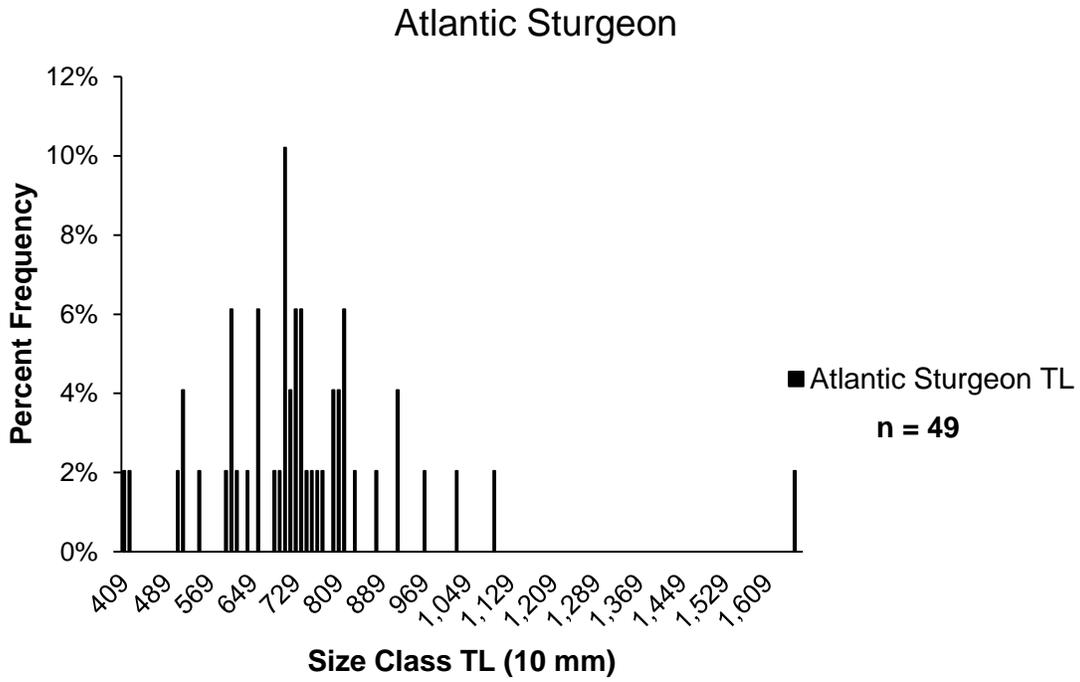


Figure 7. Length-frequency (total length) of observed incidental captures of Atlantic sturgeon where measurements were obtained (n = 49) collected by the Observer Program from onboard and alternative platform observations for ITP Year 2015 (September 1, 2014 – August 31, 2015).