



Annual Atlantic Sturgeon Interaction Monitoring of Anchored Gill Net Fisheries
in North Carolina for Incidental Take Permit Year 2019
(1 September 2018 – 31 August 2019)

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

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INTRODUCTION

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 5 April 2012 for Atlantic Sturgeon *Acipenser oxyrinchus* interactions with anchored gill-net fisheries in North Carolina's estuarine waters. Anchored gill nets are a passive gear deployed with an anchor, stake, or boat at one or both ends of the net string or operation; they do not include run-around, strike, drop, or drift gill nets. The application for the ITP was prompted by notification from the National Marine Fisheries Service (NMFS) in February 2012 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 would occur, while allowing North Carolina's estuarine anchored gill-net fisheries to operate. The NCDMF requested NMFS to authorize such takes that are incidental to normal fishing activity. For this report, the term "gill net" refers to anchored gill nets unless stated otherwise.

The NCDMF received the Atlantic Sturgeon ITP (No. 18102) on 22 July 2014 after a series of revisions based on comments by the NMFS and a final application submitted on 2 January 2014 (Daniel 2014, NMFS 2014, McConnaughey et al. 2019). This ITP defined an ITP Year as 1 September through 31 August of the following year and defined large-mesh gill nets as ≥ 5 inch stretched mesh. In addition, the ITP established authorized levels of incidental takes across seven geographic regions (Management Units A1, A2, A3, B, C, D, E) (Figure 1). To maintain incidental takes below authorized levels, the ITP included a Conservation Plan that consisted of a variety of measures the NMFS determined would monitor, minimize, and mitigate incidental takes of ESA-listed Atlantic Sturgeon from the Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs. These measures included the continuation of restrictions put in place by the NCDMF sea turtle ITP for gill nets with a mesh size of ≥ 4 inch stretched mesh operating in estuarine waters across the state (NMFS 2013). Specifically, these restrictions prohibited gill nets in the deep waters of Pamlico Sound, limited soak times to between an hour before sunset to an hour after sunrise, limited days of fishing to Monday evenings through Friday mornings, restricted net height to no more than 15 meshes, restricted total net yardage to a maximum of 2,000 yards per vessel; and required net configurations for a string of nets (each net is called a 'shot') be constructed of shots no longer than 100 yards with a 25-yard break between shots. The only exception to these restrictions was that fishermen in the southern portion of the state were allowed to set large-mesh gill nets an extra day (Sunday evenings through Friday mornings), but were restricted to a maximum of 1,000 yards per fishing operation. The reason that these regulations were in place for gill nets ≥ 4 inch stretched mesh was because the sea turtle ITP defined large-mesh gill nets as ≥ 4 inch stretched mesh in contrast to the Atlantic Sturgeon ITP, which defined them as ≥ 5 inch stretched mesh. In addition to establishing regulations on how fisheries could be prosecuted, the Conservation Plans for both ITPs included

a state-wide estuarine gill-net observer program of estuarine gill nets that would allow for interactions to be counted and where possible extrapolated across the fishery within a given season and area. Observer data also would allow the NCDMF to use an adaptive management approach to mitigate incidental takes by implementing temporary management options using the NCDMF director's proclamation authority (General Statute 143B-289.52).

On 13 July 2017, the NCDMF requested a minor modification to the Atlantic Sturgeon ITP's allocation of allowed Atlantic Sturgeon takes in Management Units A and C to be listed as annual takes rather than seasonal takes. The NCDMF explained that annual take thresholds would provide greater flexibility in using adaptive management measures to manage the fishery while minimizing the frequency of full seasonal closures. Further, the NCDMF emphasized that they would actively monitor fisheries and take levels daily to limit takes, particularly dead takes. On 19 July 2017, the NMFS sent a letter to the NCDMF concurring with the NCDMF's request for the minor modification and encouraging staff to incorporate any further anticipated minor modifications into the application process for an updated ITP (Appendix A).

In early September 2018 North Carolina suffered a direct hit by Hurricane Florence, dramatically affecting fishing and observation effort in estuarine gill-net fisheries during the 2019 ITP Year. The effects occurred prior to the storm due to preparation and evacuations, and after the storm due to the catastrophic damage to roads, structures, and electrical infrastructure in many areas. Although the NCDMF Central District Office (CDO), where Observer Program operations were located, reopened 24 September, four observers had significant damage to their homes that delayed their return to work. Three of them were left homeless and had to collect their belongings and secure new housing; the other observer was unable to return to their home until early October. Once commercial fishing resumed, communicating with commercial fishermen and traveling to obtain trips proved to be difficult because of clean-up efforts, power outages, flooding, and storm debris. Additionally, Marine Patrol officers, who usually contribute a considerable amount of gill net observations, were unable to conduct observations for some time because of new storm-related tasks. Not only did Marine Patrol officers rescue over 60 people, they conducted numerous wellness checks, provided meals and supplies to disaster victims, assisted other law enforcement agencies with securing property, and even managed to rescue storm victims' pets.

Two regulations in place during the 2019 ITP Year also greatly affected gill-net fishing effort. First, Proclamation M-19-2017, issued during the 2018 ITP Year, remained in effect for the entire 2019 ITP Year (<http://portal.ncdenr.org/web/mf/proclamation-m-19-2017>). This proclamation closed the eastern portion of Management Unit D to gill nets with a mesh size of \geq 4 inches as a result of high levels of incidental green sea turtle takes that exceeded authorized levels during the 2018 ITP Year. In an effort to avoid exceeding authorized levels again during the 2019 ITP Year, the decision was made to maintain the partial closure of Management Unit D. A separate proclamation was issued on 18 March that prohibited the use of all gill nets upstream

of the ferry lines from the Bayview Ferry to Aurora Ferry on the Pamlico River and the Minnesott Beach Ferry to Cherry Branch Ferry on the Neuse River (<http://portal.ncdenr.org/web/mf/proclamation-m-06-2019>).

During an emergency meeting, the North Carolina Marine Fisheries Commission directed the NCDMF Director to issue the proclamation with the intent of reducing bycatch of Striped Bass *Morone saxatilis* in gill-net fisheries operating in the affected waters, which are part of Management Unit C.

This annual report outlines observer activity, fishing activity, and total or estimated takes of Atlantic Sturgeon for the previous ITP year, 1 September 2018 – 31 August 2019. The deadline for annual reports was originally 31 January per the ITP; however, in January 2017 the deadline was extended to the last day in February following a request by the NCDMF (McConnaughey et al. 2019). Additional requests were made by the NCDMF to extend the report deadline to 14 April for one year only due to staffing vacancies and changes that delayed the report generation, and also work interruptions from the coronavirus pandemic. Data for fishing activity, measured in number of trips, are finalized for 2018 (fall and part of winter). After the preliminary data for 2019 are finalized in May 2020, observer coverage and authorized estimated Atlantic Sturgeon takes will be recalculated and finalized estimates will be provided to the NMFS in the form of an addendum.

METHODS

Observer Activity

Observer activity was distributed across seven management units outlined in the Conservation Plan (A1, A2, A3, B, C, D, and E) (Figure 1). Per the sea turtle ITP, Management Unit B was unique in that large-mesh gill nets operating in Pamlico Sound were confined to specific subunits (Shallow Water Gillnet Restricted Area [SGNRA] 1, SNGRA2, SNGRA3, SGNRA4, and Mainland Gillnet Restricted Area [MGNRA]), effectively closing the fishery in the deep waters of Pamlico Sound and in corridors near the Ocracoke, Hatteras, and Oregon inlets (Daniel 2013) (Figure 1). Within the management units, observer activity was also distributed across four seasons that crossed calendar years: fall (September–November 2018), winter (December 2018–February 2019), spring (March–May 2019), and summer (June–August 2019). Per the Conservation Plan, the number of projected observer trips was based on the required 7-10 % coverage of the total large-mesh (≥ 5 inch stretched mesh) gill-net fishing trips, and 1-2 % coverage of the total small-mesh (< 5 inch) gill-net fishing trips state-wide across all seasons. To meet the overall state-wide requirement of observer coverage levels, the Observer Program made every effort to maintain the necessary level of coverage for each season and management unit. This approach was also consistent with observer coverage requirements for the sea turtle ITP,

which were by each season and management unit. As such, projected observer trips were stratified across seasons and management units proportional to Trip Ticket Program (TTP) data for large-mesh and small-mesh gill net trips from the previous five years (2014-2018).

Each observer attempted to obtain three to four trips per working week when fishing activity was occurring. Observers were assigned a management unit to work weekly, and the number of observers assigned to a management unit depended on the season and projected fishing effort. Reports from observers, fishermen, and other NCDMF staff (e.g., fish house samplers) were used to determine if effort was fluctuating between management units. Trends from the previous years' TTP data and current area closures were also assessed to determine if fishing effort was shifting from one management unit to another.

Obtaining observer trips was facilitated by the requirement that fishermen participating in estuarine anchored gill net fisheries were required to obtain an Estuarine Gill Net Permit (EGNP) (M-24-2014) (<http://portal.ncdenr.org/web/mf/proclamation-m-24-2014>). The most recent list of permit holders was stratified by management unit and then by geographic area within units. Contact information for these fishermen was then given to observers assigned to specific management units so they could attempt to schedule an onboard trip. Preliminary TTP information was also used to identify individuals who were actively participating in fishing activities. In addition to calling fishermen, observers visited fish houses where they provided business cards and brochures explaining the Observer Program, giving the fishermen another outlet to allow observers on their vessels. Additionally, the Observer Program used a website (<http://portal.ncdenr.org/web/mf/observers-program>) to provide outreach to fishermen to facilitate obtaining trips.

The Observer Program employed two methods to obtain trips for documenting protected species interactions. The preferred method has always been onboard observations where observers ride onboard fishermen's vessels. The other method was alternative platform observations, whereby two observers used a state-owned vessel to monitor commercial fishers hauling their gill nets. In addition to traditional observers, Marine Patrol officers also obtained alternative platform trips, following similar data collection protocols. Alternative platform trips were used for areas where fishing effort increased quickly, when a fisherman's vessel was too small to safely accommodate an onboard observer, and when observers were unable to set up onboard trips due to fisherman avoidance or non-compliance. Coordination of onboard, alternative platform, and Marine Patrol alternative platform trips was done regularly to achieve the maximum efficiency, avoid multiple observations of a single trip, 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 were monitored on a daily, weekly, and monthly basis to ensure proper observer coverage was being maintained.

Observers were trained by experienced NCDMF staff to identify, measure, evaluate condition of, and tag (with Passive Integrated Transponders [PIT]) Atlantic Sturgeon. 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), total length (TL mm), and fork length (FL mm) were recorded for each Atlantic Sturgeon observed. Photographs, fin clips (for genetic analyses), and data on environmental parameters (i.e., salinity, water temperature) were also collected when feasible. Dead Atlantic Sturgeon were retained by the observer when possible. Observers also collected data on location, gear parameters, catch, and bycatch for each haul depending on the observed trip type (onboard or alternative platform). For onboard observations, the catch was sampled throughout each onboard trip including species, quantities, weights, lengths, and disposition (alive or dead). All data were coded onto NCDMF data sheets and uploaded to the NCDMF Biological Database for analysis. All observers were debriefed within 24 hours of each trip to obtain data on catch, set locations, gear parameters, and Atlantic Sturgeon interactions to provide total counts and estimates of bycatch in near real time.

Ongoing estimates of observer coverage were calculated for each season in each management unit by estimating fishing trips using an average of the previous five years' TTP data for large-mesh and small-mesh gill nets, while taking reduced season dates in each management unit into account by calculating the proportion of actual to possible fishing days. This estimated fishing effort was compared to the number of observer trips completed throughout the ITP year. The average, normalized effort was used when estimating fishing trips to account for the fluctuation of fishing effort throughout the years due to closures and other regulations put in place throughout the time series.

At the end of the 2019 ITP year, observer coverage was calculated by comparing the number of observed trips to the number of reported trips in the TTP database for each mesh size category, season, and management unit. The TTP data for 2018 were finalized (fall and part of winter), but the data for 2019 were preliminary (part of winter, spring, and summer). As a result, observer coverage calculated for winter, spring, and summer were considered estimates.

Reductions in fishing effort, particularly for large-mesh gill nets, was expected due to Hurricane Florence and the regulations for Management Unit C and part of D. As such, the percent change in fishing effort with large-mesh and small-mesh gill nets between the 2018 and 2019 ITP Years was calculated by management unit and season.

Incidental Takes

Authorized levels of annual incidental takes in the ITP were expressed as either estimated total takes based on observer data (Management Unit A) or counts of observed takes (Management Unit B, C, D, E) (Tables 1 and 2). The difference was based on the amount of data available for modeling predicted takes in the original ITP application (Daniel 2014). To compare annual

numbers of incidental takes of Atlantic Sturgeon during the 2019 ITP year to authorized levels, actual observed takes were counted for Management Units B, C, D, E and estimated for Management Unit A. All Atlantic Sturgeon were assumed to be the Carolina DPS because genetic results were not available. Incidental take estimates for Management Unit A were calculated using the stratified ratio method where the bycatch rate (Atlantic Sturgeon caught per observed trip) calculated from observer data was multiplied by the total reported fishing trips.

$$\text{Estimated Interactions} = \left(\frac{\text{\# of Atlantic Sturgeon interactions observed}}{\text{total gill-net trips observed}} \right) * \text{total gill-net trips}$$

Throughout each season, this calculation was employed each time there was an incidental take to determine the estimated number of interactions in Management Unit A by date of capture and disposition. For the real-time estimates, the average number of TTP reported trips for the previous five years was used. Estimated numbers of interactions were accumulated by interaction date for Management Unit A and running totals of observed interactions were maintained for Management Units B, C, D, and E to determine if interactions were approaching authorized take thresholds. The ongoing comparisons allowed for the implementation of management measures to prevent interactions from exceeding authorized levels. The estimated and/or total observed interactions were provided in weekly (when required) and monthly reports.

At the end of the 2019 ITP year, the estimated number of interactions for Management Unit A was recalculated using actual number of trips, albeit preliminary for 2019, reported in the TTP rather than an average from the previous five years. Nonparametric confidence intervals (95%) were calculated using standard bootstrapping techniques (Efron and Tibshirani 1993) using the ‘boot’ package in R (Davison and Hinkley 1997, Canty and Ripley 2015, R Core Team 2015). Bootstrap replicates were generated by sampling observer trips with replacement 5,000 times within strata (mesh/Management Unit).

Compliance

The NCDMF observers and Marine Patrol conducted weekly fish-house visits, boat patrols, fisherman spot checks, gear checks, and continual outreach to the industry, attempting to ensure industry compliance and to track gill-net fishing effort in near real time.

The Observer Program used various methods to contact fishermen to schedule trips. The most common method was by phone, due to fishermen leaving from private launches and overall efficiency. For each contact made to obtain a trip (phone call or in-person), observers

documented the contact in a log maintained by the Observer Program. For each contact, observers assigned a category of the response and noted any additional information (e.g., fisherman stated he did not fish until October) (Table 3). Data in the contact log was summarized by month and response category to determine what percentage of phone calls resulted in observer trips.

RESULTS

Observer activity

Overall state-wide observer coverage during the 2019 ITP Year was 7.3 % of the large-mesh gill-net fishery and 4.0 % of the small-mesh gill-net fishery exceeding the minimum requirements outlined in the ITP (Tables 4 and 5, Figure 2). This level of coverage was based on 774 observed large-mesh gill-net trips (261 onboard and 513 alternative platform) and 245 observed small-mesh gill-net trips (90 onboard and 155 alternative platform). During these trips, observers documented nine Atlantic Sturgeon in large-mesh and four in small-mesh gill nets (Table 6, Figure 2). A series of proclamations was issued throughout the ITP year to regulate gill-net fisheries as part of the adaptive management approach to limit Atlantic Sturgeon or sea turtle takes and for other management needs unrelated to protected species interactions (Table 7). As a result, changes in fishing activity influenced the Observer Program's efforts to find trips and maintain coverage levels.

Fall 2018

During fall 2018 (September – November), the Observer Program achieved 7.5 % state-wide coverage of large-mesh gill nets, and exceeded 7 % in all management units except D (6.4 %) (Table 4, Figure 3). For small-mesh gill nets, the Observer Program achieved 4.6 % state-wide coverage, and exceeded 1 % observer coverage in all management units (Table 5, Figure 3).

Nine of the 13 (69.2 %) observed Atlantic Sturgeon interactions during the 2019 ITP Year occurred during fall 2018 (Table 6, Figure 3). Seven Atlantic Sturgeon were live interactions in large-mesh gill nets; six interactions occurred in Management Unit A and one interaction occurred in Management Unit E. The remaining two Atlantic Sturgeon interactions (both live) occurred in small-mesh gill nets in Management Unit E. In addition to observed takes, there was one fisherman self-reported Atlantic Sturgeon interaction (Management Unit C) during fall (Table 8).

Winter 2018-2019

During winter 2018-2019 (December 2018 – February 2019), the Observer Program achieved an estimated 5.9 % state-wide coverage of large-mesh gill nets, and exceeded 7 % in two of five management units (C = 7.4 %, E = 15.0 %) (Table 4, Figure 4). Coverage of large-mesh gill nets was below 7 % in Management Units A (4.8 % of 795 reported trips), B (0 % of reported 13 trips), and D (0 % of 7 reported trips). For small-mesh gill nets, the Observer Program achieved an estimated 6.4 % state-wide coverage during winter 2018-2019, and exceeded 1.0 % in all management units (Table 5, Figure 4).

There was one observed Atlantic Sturgeon interaction in a small-mesh gill net and none in large-mesh gill nets during winter 2018-2019. The single interaction was observed dead in Management Unit C (Table 6, Figure 4). In addition to observed takes, there were two fisherman self-reported Atlantic Sturgeon interactions (one dead, one alive) in large-mesh gill nets during winter, both in Management Unit A (Table 8).

Spring 2019

During spring 2019 (March – May), the Observer Program achieved an estimated 7.6 % state-wide coverage of large-mesh gill nets, and exceeded 7 % in each management unit except A (5.9 %) and B (6.5 %) (Table 4, Figure 5). For small-mesh gill nets, the Observer Program achieved an estimated 3.4 % state-wide coverage, and exceeded 1 % in all management units (Table 5, Figure 5).

There were two observed Atlantic Sturgeon interactions during spring 2019: one in a large-mesh gill net in Management Unit A and one in a small-mesh gill net in Management Unit B (Table 6, Figure 5). Both Atlantic Sturgeon were released alive. In addition to observed takes, there were two fisherman self-reported Atlantic Sturgeon interactions (both dead) in large-mesh gill nets during spring; both interactions were in Management Unit A (Table 8).

Summer 2019

During summer 2019 (June – August), the Observer Program achieved an estimated 7.1 % state-wide coverage of large-mesh gill nets, and exceeded 7 % in each management unit except A (4.4 %) and B (3.5 %) (Table 4, Figure 6). For small-mesh gill nets, the Observer Program achieved an estimated 1.1 % state-wide coverage, and exceeded 1 % in all management units except for B (0 of 844 reported trips) (Table 5, Figure 6).

There was one observed Atlantic Sturgeon interaction in a large-mesh gill net and none in small-mesh gill nets during summer 2019 (Table 6, Figure 6). The single interaction was observed

alive in Management Unit A. There was no fisherman self-reported Atlantic Sturgeon interaction during summer.

Changes in Fishing Effort

Overall fishing effort (measured by trips) during the 2019 ITP Year compared to the 2018 ITP Year was 9.6 % lower for large-mesh gill nets and 13.0 % lower for small-mesh gill nets. The patterns among seasons and management units showed the effects of Hurricane Florence and regulation changes between years for gill nets in Management Units B, C, and part of D (Figure 7). Large-mesh and small-mesh fishing effort during fall of the 2019 ITP Year (when Hurricane Florence hit) was lower than the 2018 ITP Year for all management units except one. In Management Unit A, small-mesh fishing effort increased slightly from 193 trips during fall 2017 to 239 trips during fall 2018. For large-mesh gill nets, one of the most striking changes between ITP years was during summer in Management Unit B, which was closed during summer 2018 (M-7-2018) to ≥ 4 -inch mesh gill nets. As a result, no fishing effort was reported during summer 2018, but effort increased to 974 trips during summer 2019 when the closure was no longer in effect. During spring and summer, reductions in large-mesh fishing effort between the 2018 and 2019 ITP Years in Management Unit C were likely a result of gill-net closures in upstream areas of the Neuse and Pamlico Rivers. Similar reductions during spring and summer in Management Unit D were likely a result of the closure of ≥ 4 -inch mesh gill nets in the eastern portion of the management unit. Outside of fall, small-mesh fishing effort among management units was more variable, not exhibiting specific trends.

Incidental Takes

Of the 13 Atlantic Sturgeon interactions documented by observers during the 2019 ITP Year, 85 % (n = 11) were alive (Table 6, Figures 2 – 6). Observed interactions occurred primarily in Management Units A (62 %) and E (23 %) with one interaction each in Management Unit B and C. In addition to observed takes, there were five self-reported Atlantic Sturgeon interactions for the 2019 ITP Year: two alive and three dead (Table 8). All but one of the self-reported interactions occurred in Management Unit A. The size range of Atlantic Sturgeon measured by observers was 483 – 1,016 mm TL (n = 11, mean = 755, SD = 148.1) and 554 - 863 mm FL (n = 8, mean = 685, SD = 101.6) (Table 6, Figures 8 and 9).

Observed take levels during the 2019 ITP year did not reach the thresholds of allowed takes for any management unit (Tables 1 and 2). For Management Unit A, 4.4 % of the 2,139 estimated allowable live sturgeon takes and 26.7 % of the 76 estimated allowable dead sturgeon takes were captured in gill nets during the 2019 ITP year. Across all other management units, only one live incidental take out of the 64 authorized and zero dead incidental takes out of the 15 authorized occurred in large-mesh gill nets during the 2019 ITP Year. The observed incidental takes in

small-mesh gill nets represent 0.4 % of the authorized live takes (3 out of 751) and 1.5 % of the authorized dead takes (1 out of 68).

Compliance

There were 2,217 EGNPs issued during the 2019 ITP year. Using the list of EGNPs, 5,852 phone calls or in-person contacts were made with 57.4 % (n = 3,361) representing categories for which the observer was unable to get in touch with fishermen or the fishermen refused a trip (categories 1, 8, 11, 12, 13, and 14) (Figure 10). The greatest number of calls was in spring and the least number of calls was in summer. Nevertheless, the general pattern of distribution across contact response types was similar across all seasons.

Marine Patrol officers made 1,844 gill net checks and issued 91 citations during the 2019 ITP Year (Tables 9 and 10). The number of gill net checks were spread out across seasons. The greatest percentage (7.2 %) of citations occurred during fall 2018. In addition to citations, officers issued 43 Notice of Violations (NOVs) for fishermen found to be out of compliance with the EGNP (Table 11). The NOVs were distributed across seasons as follows: fall, n = 11; spring, n = 13; summer, n = 6; and winter, n = 13.

Marine Mammals

There was no observed marine mammal take during the 2019 ITP year.

DISCUSSION

Incidental takes of Atlantic Sturgeon during the 2019 ITP Year were below authorized levels as a result of a combination of management actions as outlined in the ITP, an adaptive management strategy for Atlantic Sturgeon and sea turtles, and decreased fishing effort due to Hurricane Florence. The number of observed interactions was less than half of the number for the 2018 ITP Year, with the most notable difference being the low number of interactions observed during spring 2019 compared to spring 2018 (McConnaughey et al. 2019). During the 2019 ITP Year, observed Atlantic Sturgeon interactions were primarily (69 %) during fall in Management Units A and E with a few interactions in other combinations of seasons or management units. In addition to Southern Flounder *Paralichthys lethostigma*, large-mesh gill nets were used in Management Unit A to target American Shad *Alosa sapidissima* and the invasive Blue Catfish *Ictalurus furcatus*. During the 2019 ITP year, the NCDMF successfully employed an adaptive management strategy for Management Unit A, issuing nine proclamations that allowed these fisheries to operate during certain times while monitoring and limiting incidental takes of Atlantic Sturgeon using observer data in near real time (Table 7). The Atlantic Sturgeon

interactions that did occur in Management Unit A and elsewhere were primarily alive even for takes in the spring and summer, thereby limiting negative effects of these interactions on the DPS.

Overall minimum coverage levels were met or exceeded for large-mesh and small-mesh gill nets when combined across the ITP year and management units. However, for particular combinations of mesh category, season, and individual management unit, minimum levels were not always reached. The observer program actively monitors gill-net fisheries and makes real-time adaptations to shifts in activity due to events such as fishery closures in certain areas or changes in targeted fish species. For the large-mesh gill-net fishery, observer coverage was below 7 % in Management Units A and B for both spring and summer. During spring and summer, fishing effort is often not as high or geographically concentrated as it is during fall. It can be especially difficult to obtain trips and meet minimum coverage requirements when effort is spread out over a large area, such as Management Units A and B. Observer coverage for small-mesh gill nets was generally above the minimum coverage levels for most combinations of mesh category, seasons, and management unit. The notable exception was during summer in Management Unit B for which there were no observed trips despite 844 reported fishing trips. The observer program continues to have difficulty getting coverage especially during spring and summer when gill-net activity can be occurring at night or while fishermen are participating in other fisheries. For example, fishermen may tell observers that they are crabbing even though they have set some gill-net gear at the same time. Efforts were made to increase observations during times and in areas of difficulty. The observer program continuously communicated with Marine Patrol, fish house samplers, and industry leaders to increase opportunities for observer coverage. Nonetheless, coverage was also impacted by weather events, staff availability, and compliance issues.

Obtaining observed trips continues to be a challenge for the NC Observer Program, not unlike other observer programs (e.g., Lyssikatos and Garrison 2018). The EGNP is a useful tool to improve fishermen compliance by including Specific Permit Conditions requiring fishermen to allow observers aboard their vessels to monitor catches and by providing contact information of permit holders. Phone calls made using the contact information contribute to observers scheduling trips, but the low success rate of observers even talking to a fisherman (<42 %) requires an alternative method of getting trips. Although onboard observations are the preferred method, alternative platform observations play a critical role to achieving the minimal coverage levels. In fact, 66 % of all observed trips during the 2019 ITP Year were alternative platform observations. Alternate platform observations have several advantages. Primarily, they do not rely on previous contact with fishermen to obtain an observable trip. Alternative platform observations also allow Marine Patrol to conduct observations as part of their daily patrols; their observed trips contribute a substantial portion of the total alternative platform observations. Even for fishermen who would willingly take an observer, many vessels used by gillnetters in estuarine waters are too small to easily accommodate an observer, making alternative platform

observations ideal for capturing trips with this size class of vessel (Kolkmeier et al. 2007). The alternative platform method, however, has several drawbacks. First, it requires two observers, halving observer effort and program efficiency. Also, observers cannot collect the same breadth of biological data for kept catch and discards (e.g., length and weight of individual fish) compared to onboard observer trips. Another drawback is that observers can spend a significant amount of time searching for fishing activity, sometimes unsuccessfully, when fishing activity is less concentrated. Obtaining alternative platform observations also can be a challenge as some fishermen avoid being observed by retrieving their gear before sunrise or changing fishing locations if observers have been seen in an area. Although refusal of an observed trip by a fisherman can result in a suspension of their EGNP, non-compliance typically does not include such a direct refusal. As such, non-compliance continues to be a hurdle for ensuring the observer coverage requirements for both ITPs are met. Outreach activities are an ongoing necessity to improve fishermen compliance.

The observer program uses a combination of real-time monitoring of Atlantic Sturgeon takes and an adaptive management approach to successfully control the number of interactions in estuarine gill-net fisheries. Although it is not known what impacts Hurricane Florence had directly on Atlantic Sturgeon populations in North Carolina, indirectly the hurricane reduced fishing effort and contributed to reduced takes. Management measures implemented for other species also reduced fishing effort. For future ITP years, significant reductions in effort are expected because of regulatory changes for large-mesh gill nets and other gears targeting Southern Flounder. These regulations were included in Amendment 2 of the Southern Flounder Fishery Management Plan (NCDMF 2019) adopted by the North Carolina Marine Fisheries Commission on 23 August 2019. This action was taken because the most recent Southern Flounder stock assessment indicated that the stock is overfished and overfishing is occurring. North Carolina state law requires management actions be taken to end overfishing within two years and recover the stock from an overfished condition within 10 years. To meet these legal requirements, the NCDMF implemented a 62 % reduction in harvest for 2019 (2020 ITP Year) and a 72 % reduction in 2020 (2021 ITP Year) (NCDMF 2019). In addition to the effects on gill-net fisheries, these changes will require the Observer Program to incorporate new approaches to project observer coverage rather than relying on the average number of trips from the previous five years.

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TABLES

Table 1. For large-mesh (≥ 5.0 inch) gill nets, a comparison of actual annual incidental takes of Atlantic Sturgeon by management unit during the 2019 ITP Year to authorized thresholds expressed as either estimated total takes based on observed takes (Management Unit A) or counts of actual observed takes (Management Units B – E). 95% confidence intervals are provided in brackets. Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS	
		Carolina DPS	Other DPS	Alive	Dead
A	Annual	1,604 (65)	535 (21)	93 [35, 204]	23 [0, 70]
B	Annual	24 (6)	9 (0)	0	0
C	Annual	11 (5)	4 (0)	0	0
D	Annual	8 (2)	n/a	0	0
E	Annual	8 (2)	n/a	1	0
Total	Annual	1,655 (80)	548 (21)	94	23

Table 2. For small-mesh (<5.0 inch) gill nets, a comparison of actual annual incidental takes of Atlantic Sturgeon by management unit during the 2019 ITP Year to authorized thresholds expressed as counts of actual observed takes. Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS	
		Carolina DPS	Other DPS	Alive	Dead
A	Annual	596 (45)	114 (10)	0	0
B	Annual	14 (5)	3 (0)	1	0
C	Annual	8 (4)	n/a	0	1
D	Annual	8 (2)	n/a	0	0
E	Annual	8 (2)	n/a	2	0
Total	Annual	634 (58)	117 (10)	3	1

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

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
15	Not fishing because of natural disaster (e.g., hurricane)

Table 4. For large-mesh (≥ 5.0 inch) gill nets, observer coverage calculated from observer data and reported trips from the Trip Ticket Program by season and management unit for the 2019 ITP Year. Trip Ticket Program data are considered finalized for 2018 and preliminary for 2019.

Season	Management Unit	Large Mesh		
		Fishing Trips	Observed Trips	Coverage
Fall 2018	A	1,812	131	7.2
	B	955	79	8.3
	C	485	37	7.6
	D	375	24	6.4
	E	713	53	7.4
	Overall	4,340	324	7.5
Winter 2018-2019	A	795	38	4.8
	B	13	0	0.0
	C	19	9	47.4
	D	7	0	0.0
	E	20	3	15.0
	Overall	854	50	5.9
Spring 2019	A	1,699	100	5.9
	B	448	29	6.5
	C	45	20	44.4
	D	61	11	18.0
	E	247	30	12.1
	Overall	2,500	190	7.6
Summer 2019	A	1,044	46	4.4
	B	974	34	3.5
	C	313	27	8.6
	D	124	10	8.1
	E	497	93	18.7
	Overall	2,952	210	7.1
Annual	Overall	10,646	774	7.3

Table 5. For small-mesh (< 5.0 inch) gill nets, observer coverage calculated from observer data and reported trips from the Trip Ticket Program by season and management unit for the 2019 ITP Year. Trip Ticket Program data are considered finalized for 2018 and preliminary for 2019.

Season	Management Unit	Small Mesh		
		Fishing Trips	Observed Trips	Coverage
Fall 2018	A	239	5	2.1
	B	580	22	3.8
	C	81	9	11.1
	D	101	16	15.8
	E	261	6	2.3
	Overall	1,262	58	4.6
Winter 2018-2019	A	572	12	2.1
	B	469	28	6.0
	C	313	40	12.8
	D	52	8	15.4
	E	81	7	8.6
	Overall	1,487	95	6.4
Spring 2019	A	727	13	1.8
	B	1,351	39	2.9
	C	97	16	16.5
	D	48	6	12.5
	E	81	5	6.2
	Overall	2,304	79	3.4
Summer 2019	A	118	2	1.7
	B	844	0	0.0
	C	45	1	2.2
	D	23	5	21.7
	E	116	5	4.3
	Overall	1,146	13	1.1
Annual	Overall	6,199	245	4.0

Table 6. Summary of observed Atlantic Sturgeon interactions in large-mesh (≥ 5.0 inch, $n = 9$) and small-mesh (< 5.0 inch, $n = 4$) gill nets during the 2019 ITP Year. PIT = Passive Integrated Transponders

Date	Season	Management Unit	Mesh Size Category	Latitude (N)	Longitude (W)	Disposition	PIT Number	Length (mm)	
								Total	Fork
10/4/2018	Fall	A	large	36.09681	76.21384	Alive	n/a	n/a	n/a
10/15/2018	Fall	E	large	34.00817	77.91715	Alive	989.001001951729	748	700
10/17/2018	Fall	E	small	34.00235	77.92023	Alive	989.001001951681	832	750
10/17/2018	Fall	E	small	34.00243	77.92065	Alive	989.000364048740	848	742
10/17/2018	Fall	A	large	35.99552	76.24012	Alive	n/a	609	554
10/23/2018	Fall	A	large	35.98162	76.26979	Alive	n/a	914	863
11/13/2018	Fall	A	large	35.99198	76.24169	Alive	n/a	787	n/a
11/18/2018	Fall	A	large	36.01470	76.59228	Alive	n/a	483	n/a
11/18/2018	Fall	A	large	36.01738	76.59060	Dead	n/a	1,016	n/a
2/27/2019	Winter	C	small	35.09200	77.01485	Dead	982.000364297068	685	586
4/13/2019	Spring	B	small	35.25760	75.61168	Alive	n/a	660	609
5/25/2019	Spring	A	large	36.49610	76.03364	Alive	n/a	n/a	n/a
7/30/2019	Summer	A	large	36.44310	75.99639	Alive	982.00036231167	723	676

Table 7. Regulations for Management Units by date and regulation change for large-mesh (≥ 5.0 inch) and small-mesh (< 5.0 inch) gill nets for the 2019 ITP Year.

Year	Date(s)	Regulation change
2018	September 1	This proclamation opened a previously closed area in the western part of Management Unit A to gill nets with stretched mesh lengths of 5 ½ inches through 6 ½ inches in accordance with the Sea Turtle ITP. It maintained small-mesh gill net attendance requirements in Management Unit A. (M-8-2018)
2018	September 3	This proclamation opened Management Unit B Subunit MGNRA to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches for the new ITP year (September 1, 2018 through August 31, 2019) in accordance with the Sea Turtle ITP. This proclamation maintained attendance requirements for gill nets with a stretched mesh length less than 4 inches in Management Subunit B. 1. It maintained openings for Management Units C, D2 and portions of Management Unit E (except those described in Section II.) to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches. This proclamation also maintained the closure of Management Unit D1 to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches. (M-9-2018)
2018	October 1	This proclamation opened Management Unit B Subunits SGNRA 1-4, and CGNRA to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches for the new ITP year (September 1, 2018 through August 31, 2019) in accordance with the Sea Turtle ITP. (M-10-2018)
2018	November 24	This proclamation closed a portion of the lower Chowan River and western Albemarle Sound to all gill nets with stretched mesh lengths of 5 ½ through 6 ½ inches due to dead sturgeon takes nearing the authorized amount for Management Unit A, and maintained additional gill net restrictions in accordance with the Sea Turtle and Atlantic Sturgeon ITPs. (M-13-2018)
2018	December 1	This proclamation implemented the December closed commercial season provision identified in the N.C. Southern Flounder Fishery Management Plan Amendment 1. Commercial flounder harvest in Internal Coastal Waters opened by this proclamation at 12:01 A.M., Tuesday, January 1, 2019. (FF-48-2018)
2018	December 1	In Management Unit A, this proclamation closed the Albemarle Sound proper to the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches, limited large-mesh gill net length to 1,000 yards in open areas, and maintained nets must have been set to fish the bottom of the water column and not to have exceeded a vertical height of 48 inches. Anchored small-mesh gill nets (gill nets with a stretched mesh of 3 ¾ inches and smaller) could be unattended but must have been set to fish the bottom of the water column and not to have exceeded a vertical height of 48 inches. This action was taken due to low observer coverage and approaching the take limit of dead Atlantic Sturgeon. (M-14-2018)

Table 7 cont.

Year	Date(s)	Regulation change
2019	January 1	In Management Unit A, this proclamation made it unlawful to use gill nets with a stretched mesh length other than 3 ¼ inches, or from 5 ½ inches through 6 ½ inches, EXCEPT IN THE AREAS DESCRIBED IN SECTION IV. It also maintained large-mesh gill net closures and vertical height restrictions for all anchored gill net sets. This action was taken to allow various directed gill net fisheries while minimizing interactions with endangered Atlantic Sturgeon and to reduce river herring regulatory discards. (M-17-2018)
2019	February 1	This proclamation superseded proclamation M-17-2018 dated December 21, 2018. In a portion of Management Unit A, it made it lawful to use runaround, strike, and drop gill nets with a stretched mesh length from 5 ½ inches through 6 ½ inches. It also maintained large-mesh gill net closures and vertical height restrictions for all anchored gill net sets. This action was taken to allow a directed fishery for invasive blue catfish and continued to allow other various directed gill net fisheries while minimizing interactions with endangered Atlantic Sturgeon and to reduce river herring regulatory discards. (M-2-2019)
2019	February 15	This proclamation implemented gear exemptions for portions of the Internal Coastal Waters south of Management Unit A to allow fishermen to set gill nets for the shad fishery (See Section III.). It opened the remaining portions of Management Unit B to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with the Sea Turtle Incidental Take Permit. This proclamation also maintained openings for Management Units C, D2 and portions of Management Unit E (except those described in Section II.) to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches. This action was taken to allow directed gill net fisheries for shad while minimizing interactions with threatened and/or endangered species. (M-3-2019)
2019	March 2	This proclamation opened all of Management Unit A to the use of gill nets and allowed gill net configurations for harvesting American shad by removing vertical height restrictions for up to 1,000 yards of gill net with stretched mesh lengths of 5 ¼ through 6 ½ inches. This proclamation also implemented additional gill net restrictions for Management Unit A, Subunit A1-South of US-64-BYP/US-64, in accordance with the Sea Turtle and Atlantic Sturgeon ITPs. Proclamation FF-56-2018 made it unlawful to possess American shad for commercial purposes prior to 12:01 A.M. Sunday, March 3, 2019 and after 12:01 A.M. Sunday, March 24, 2019. (M-4-2019)
2019	March 11	This proclamation implemented tie-down (vertical net height restrictions) and distance from shore restrictions for gill nets with a stretched mesh length five inches or greater in the western Pamlico Sound and rivers in accordance with Supplement A to Amendment 1 to the N.C. Estuarine Striped Bass Fishery Management Plan. (M-5-2019)

Table 7 cont.

Year	Date(s)	Regulation change
2019	March 18	During an emergency meeting on March 13, 2019, the N.C. Marine Fisheries Commission directed the N.C. Division of Marine Fisheries Director to issue this proclamation pursuant to N.C. General Statute 113-221.1 (d). The Director has no legal authority to modify or change a proclamation when the proclamation is specifically directed by the Commission under this statute. This proclamation superseded proclamation M-5-2019, dated March 7, 2019. This proclamation prohibited the use of ALL gill nets upstream of the ferry lines from the Bayview Ferry to Aurora Ferry on the Pamlico River and the Minnesott Beach Ferry to Cherry Branch Ferry on the Neuse River. It maintained tie-down (vertical net height restrictions) and distance from shore restrictions for gill nets with a stretched mesh length 5 inches and greater in the western Pamlico Sound and rivers (excluding the areas described in Section I. B.) in accordance with Supplement A to Amendment 1 to the N.C. Estuarine Striped Bass Fishery Management Plan. (M-6-2019)
2019	March 25	In Management Unit A, this proclamation removed the use of gill nets configured for harvesting American shad by implementing vertical height restrictions for all stationary gill nets. This proclamation also closed portions of Management Unit A to large-mesh stationary gill nets, allowed the use of run-around, strike, and drop nets with a stretched mesh length of 5½ inches through 6½ inches in a portion of Management Unit A, and maintained additional gill net restrictions for Management Unit A, Subunit A1, South of US-64-BYP/US-64, in accordance with the Sea Turtle and Atlantic Sturgeon ITPs. (M-7-2019)
2019	April 8	This proclamation opened additional portions of Management Unit A to the use of stationary large-mesh gill nets with vertical height restrictions. It also maintained the allowance for the use of run-around, strike, and drop nets with a stretched mesh length of 5½ inches through 6½ inches in a portion of Management Unit A, Subunit A2, and maintained additional gill net restrictions for Management Unit A, Subunit A1, South of US-64-BYP/US-64, in accordance with the Sea Turtle and Atlantic Sturgeon ITPs. (M-9-2019)
2019	May 1	This proclamation implemented attendance requirements for gill nets with a stretched mesh length less than 4 inches in Management Subunit B.1. It also decreased mesh size allowance for exempted gears in Section III. It maintained openings of Management Units B, C, D2 and E to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches. (M-10-2019)
2019	May 1	This proclamation implemented small-mesh gill net attendance requirements in Management Unit A and implemented additional gill net restrictions in accordance with the Sea Turtle and Atlantic Sturgeon ITPs. (M-11-2019)

Table 7 cont.

Year	Date(s)	Regulation change
2019	June 13	This proclamation closed Management Unit D2 to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with the Sea Turtle Incidental Take Permit. Take levels for endangered and/or threatened sea turtles for gill nets with a stretched mesh length of 4 inches through 6 ½ inches in Management Unit D2 had been reached and the fishery needed to be closed. This proclamation maintained attendance requirements for gill nets with a stretched mesh length less than 4 inches in Management Subunit B.1. (M-12-2019)

Table 8. Summary of self-reported Atlantic Sturgeon interactions in anchored large-mesh (≥ 5.0 inch) gill nets during the 2019 ITP Year. None were reported in small-mesh (< 5.0 inch) gill nets.

Date	Season	Management Unit	Latitude (N)	Longitude (W)	Disposition	Length (mm)	
						Total	Fork
10/23/2018	Fall	C	35.49100	77.01850	Alive	546	n/a
2/15/2019	Winter	A	35.97190	76.47887	Dead	457	n/a
2/15/2019	Winter	A	35.97065	76.48342	Alive	813	n/a
5/10/2019	Spring	A	35.94802	76.60299	Dead	914	n/a
5/10/2019	Spring	A	35.94802	76.60299	Dead	n/a	n/a

Table 9. Number of gill-net checks made and citations issued by Marine Patrol for large-mesh (≥ 5.0 inch) and small-mesh (< 5.0 inch) gill nets by season during the 2019 ITP Year. See Table 10 for details on individual citations.

Season	# Gill Net Checks	# Citations	Citation Percentage
Fall 2018	513	37	7.2
Winter 2018-2019	413	17	4.1
Spring 2019	487	18	3.7
Summer 2019	431	19	4.4
Total	1,844	91	4.9

Table 10. Citations written by Marine Patrol for large-mesh (≥ 5.0 inch) and small-mesh (< 5.0 inch) gill nets by season and violation code during the 2019 ITP Year.

Season	Date	Violation code	Violation description
Fall 2018	9/6/2018	NETG04	Leave gill net in waters when could not be legally fished
	9/6/2018	NETG60	Use gill nets with a mesh size of more than 6.5 inches (stretched mesh) in violation of proclamation M-7-12
	9/12/2018	NETG27	Gill Net set within 50 yards from shore
	9/12/2018	NETG27	Gill Net set within 50 yards from shore
	9/23/2018	NETG04	Leave gill net in waters when could not be legally fished
	9/24/2018	NETG03	Using gill net with improper buoys or identification
	9/26/2018	NETG04	Leave gill net in waters when could not be legally fished
	9/26/2018	NETG03	Using gill net with improper buoys or identification
	9/27/2018	NETG38	Use large-mesh gill net in Pamlico Sound later than 1 hour after sunrise in violation of proclamation M-8-10
	9/30/2018	NETG02	Using gill net without buoys or identification
	10/1/2018	NETG03	Using gill net with improper buoys or identification
	10/2/2018	NETG02	Using gill net without buoys or identification
	10/2/2018	NETG54	Violate provisions of Proclamation M-30-2011 to wit failed to have 25 yard space between nets
	10/3/2018	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	10/5/2018	NETG05	Use a stationery gill net in channel of ICWW
	10/5/2018	NETG06	Gill net causing hazard to navigation
	10/9/2018	NETG03	Using gill net with improper buoys or identification
	10/10/2018	NETG37	Leave small-mesh gill nets unattended
	10/10/2018	NETG03	Using gill net with improper buoys or identification
	10/17/2018	NETG48	Having large-mesh gill net set in violation of Proclamation M-14-2010
	10/18/2018	NETG30	Leave RCGL gill net unattended
	10/18/2018	NETG27	Gill Net set within 50 yards from shore
	10/19/2018	NETG04	Leave gill net in waters when could not be legally fished
	10/19/2018	NETG53	Use large-mesh gill net with corks or floats on top line
	10/19/2018	NETG03	Using gill net with improper buoys or identification

Table 10. cont.

Season	Date	Violation code	Violation description
Fall 2018	10/20/2018	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	10/22/2018	NETG02	Using gill net without buoys or identification
	10/24/2018	NETG04	Leave gill net in waters when could not be legally fished
	10/24/2018	NETG02	Using gill net without buoys or identification
	10/25/2018	NETG37	Leave small-mesh gill nets unattended
	10/25/2018	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	10/25/2018	NETG30	Leave RCGL gill net unattended
	10/25/2018	NETG29	RCGL gear without proper buoys
	10/30/2018	NETG01	Leave gill net in coastal waters unattended
	10/31/2018	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday
	11/1/2018	NETG03	Using gill net with improper buoys or identification
	11/7/2018	NETG30	Leave RCGL gill net unattended
	11/7/2018	NETG29	RCGL gear without proper buoys
	11/8/2018	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday
	11/10/2018	NETG03	Using gill net with improper buoys or identification
	11/10/2018	NETG30	Leave RCGL gill net unattended
	11/13/2018	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday
	11/16/2018	NETG38	Use large-mesh gill net in Pamlico Sound later than 1 hour after sunrise in violation of proclamation M-8-10
	Winter 2018-2019	12/1/2018	NETG04
12/8/2018		NETG03	Using gill net with improper buoys or identification
12/18/2018		NETG01	Leave gill net in coastal waters unattended
12/29/2018		NETG02	Using gill net without buoys or identification
2/6/2019		NETG09	Gill net set too close to bridge
2/12/2019		NETG22	Improperly set gill net
2/13/2019		NETG02	Using gill net without buoys or identification

Table 10 cont.

Season	Date	Violation code	Violation description
Winter 2018-2019	2/15/2019	NETG04	Leave gill net in waters when could not be legally fished
	2/15/2019	NETG03	Using gill net with improper buoys or identification
	2/15/2019	NETG09	Gill net set too close to bridge
	2/15/2019	NETG04	Leave gill net in waters when could not be legally fished
	2/17/2019	NETG03	Using gill net with improper buoys or identification
	2/17/2019	NETG09	Gill net set too close to bridge
	2/22/2019	NETG10	Gill net with illegal mesh size
	2/22/2019	NETG08	Gill net within 200 yards of pound net
Spring 2018	2/22/2019	NETG22	Improperly set gill net
	2/22/2019	NETG61	Gill net tie down violation
	3/29/2019	NETG03	Using gill net with improper buoys or identification
	4/5/2019	NETG22	Improperly set gill net
	4/5/2019	NETG22	Improperly set gill net
	4/5/2019	NETG22	Improperly set gill net
	4/5/2019	NETG22	Improperly set gill net
	5/3/2019	NETG01	Leave gill net in coastal waters unattended
	5/7/2019	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	5/10/2019	NETG04	Leave gill net in waters when could not be legally fished
	5/11/2019	NETG01	Leave gill net in coastal waters unattended
	5/14/2019	NETG03	Using gill net with improper buoys or identification
	5/22/2019	NETG02	Using gill net without buoys or identification
	5/23/2019	NETG03	Using gill net with improper buoys or identification
	5/23/2019	NETG10	Gill net with illegal mesh size
5/23/2019	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday	
5/23/2019	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday	
5/23/2019	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday	

Table 10 cont.

Season	Date	Violation code	Violation description
Spring 2018	5/29/2019	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
Summer 2019	5/29/2019	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	5/30/2019	NETG04	Leave gill net in waters when could not be legally fished
	6/27/2019	NETG22	Improperly set gill net
	6/28/2019	NETG03	Using gill net with improper buoys or identification
	7/4/2019	NETG01	Leave gill net in coastal waters unattended
	7/4/2019	NETG03	Using gill net with improper buoys or identification
	7/6/2019	NETG29	Improperly set gill net
	7/12/2019	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday
	7/21/2019	NETG03	Using gill net with improper buoys or identification
	7/27/2019	NETG30	Leave RCGL gill net unattended
	7/29/2019	NETG04	Leave gill net in waters when could not be legally fished
	7/31/2019	NETG04	Leave gill net in waters when could not be legally fished
	8/6/2019	NETG45	Set or retrieve large-mesh gill nets no sooner than one hour before sunset on Monday through Thursday
	8/6/2019	NETG29	Improperly set gill net
	8/10/2019	NETG04	Leave gill net in waters when could not be legally fished
	8/11/2019	NETG02	Using gill net without buoys or identification
	8/15/2019	NETG44	Use large-mesh gill nets w/out leaving a space of at least 25 yards between separate lengths of net
	8/17/2019	NETG02	Using gill net without buoys or identification
	8/17/2019	NETG32	Set gill net w/ stretched mesh of 5 inches or greater without proper tie downs
	8/30/2019	NETG34	Use unattended gill net w/mesh less than 5" in commercial operation from May 1 through November 30 in coastal waters of the State
8/31/2019	NETG04	Leave gill net in waters when could not be legally fished	

Table 11. Notice of Violations issued by season, date and violation code for the Estuarine Gill Net Permit during the 2019 ITP Year.

Season	Date	Violation code	Violation description
Fall 2018	10/8/2018	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	10/29/2018	EGNP11	Failure to attend nets
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	11/5/2018	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	11/6/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	11/6/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	11/6/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
		EGNP30	Failure to comply with gill net configurations outlined in proclamation
	11/6/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
11/19/2018	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)	
Winter 2018 -2019	12/4/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	12/14/2018	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	12/14/2018	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	12/19/2018	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
		EGNP30	Failure to comply with gill net configurations outlined in proclamation
	1/3/2019	EGNP11	Failure to attend nets
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
		EGNP30	Failure to comply with gill net configurations outlined in proclamation
	2/5/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	2/20/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	2/25/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	2/25/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	2/26/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
2/26/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation	
Spring 2019	4/4/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	4/8/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	4/15/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	4/16/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)

Table 11 cont.

Season	Date	Violation code	Violation description
Spring 2019	5/1/2019	EGNP11	Failure to attend nets
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	5/14/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	5/15/2019	EGNP11	Failure to attend nets
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	5/31/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
		EGNP09	Failure to set or retrieve nets in accordance with time restrictions
		EGNP09	Failure to set or retrieve nets in accordance with time restrictions
			EGNP30
Summer 2019	6/5/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	6/5/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	6/5/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	6/5/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	7/31/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions
	8/5/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)

FIGURES

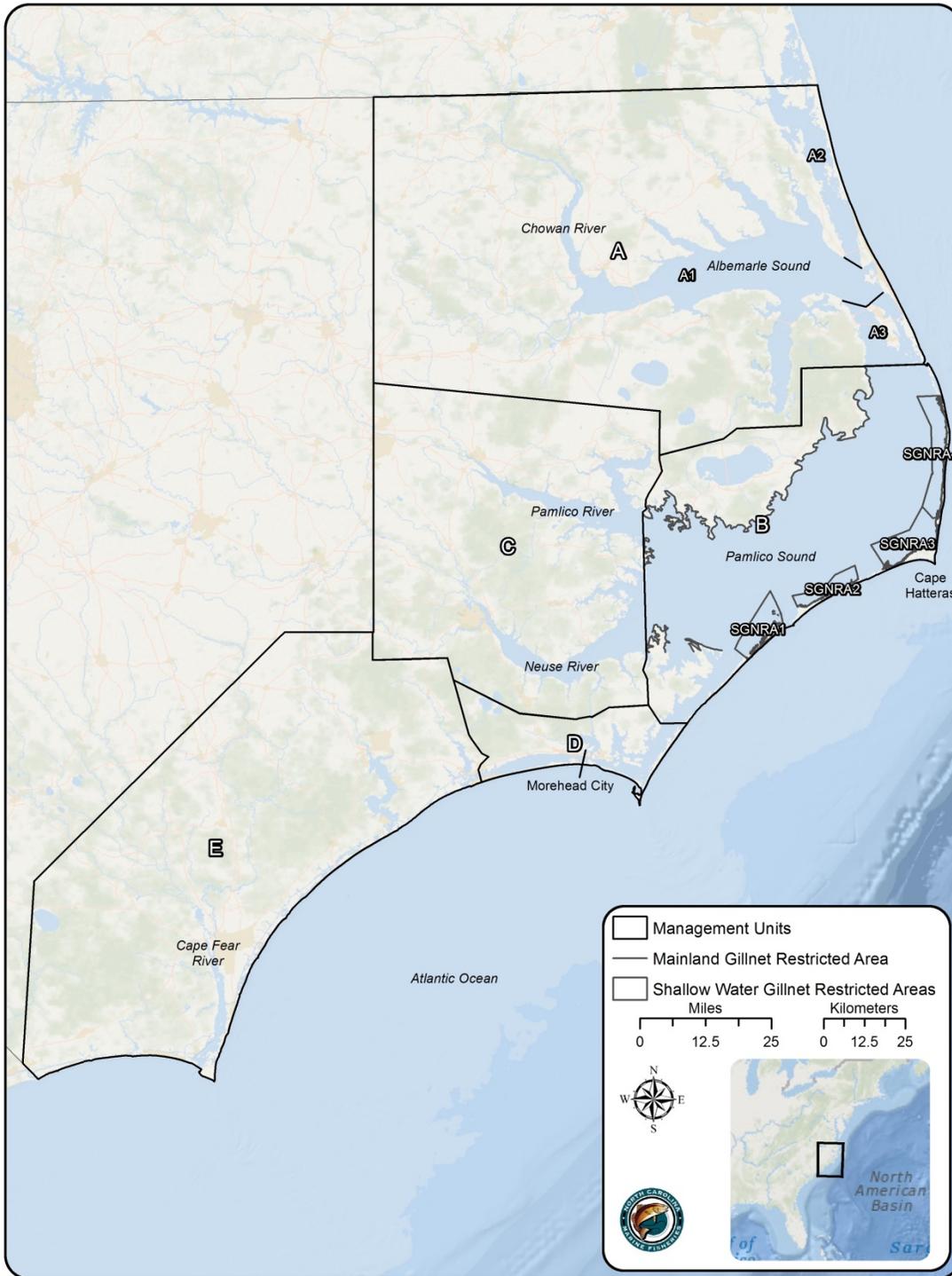


Figure 1. Management units (A1, A2, A3, B, C, D, and E) as outlined in the Incidental Take Permit (ITP) Conservation Plan and used by the Observer Program during the 2019 ITP Year. In the Pamlico Sound portion of B, gill nets with a mesh size of ≥ 4 inches were confined to Shallow Water Gillnet Restricted Areas (SGNRA) 1-4 and the Mainland Gillnet Restricted Area (200 yards from shore).

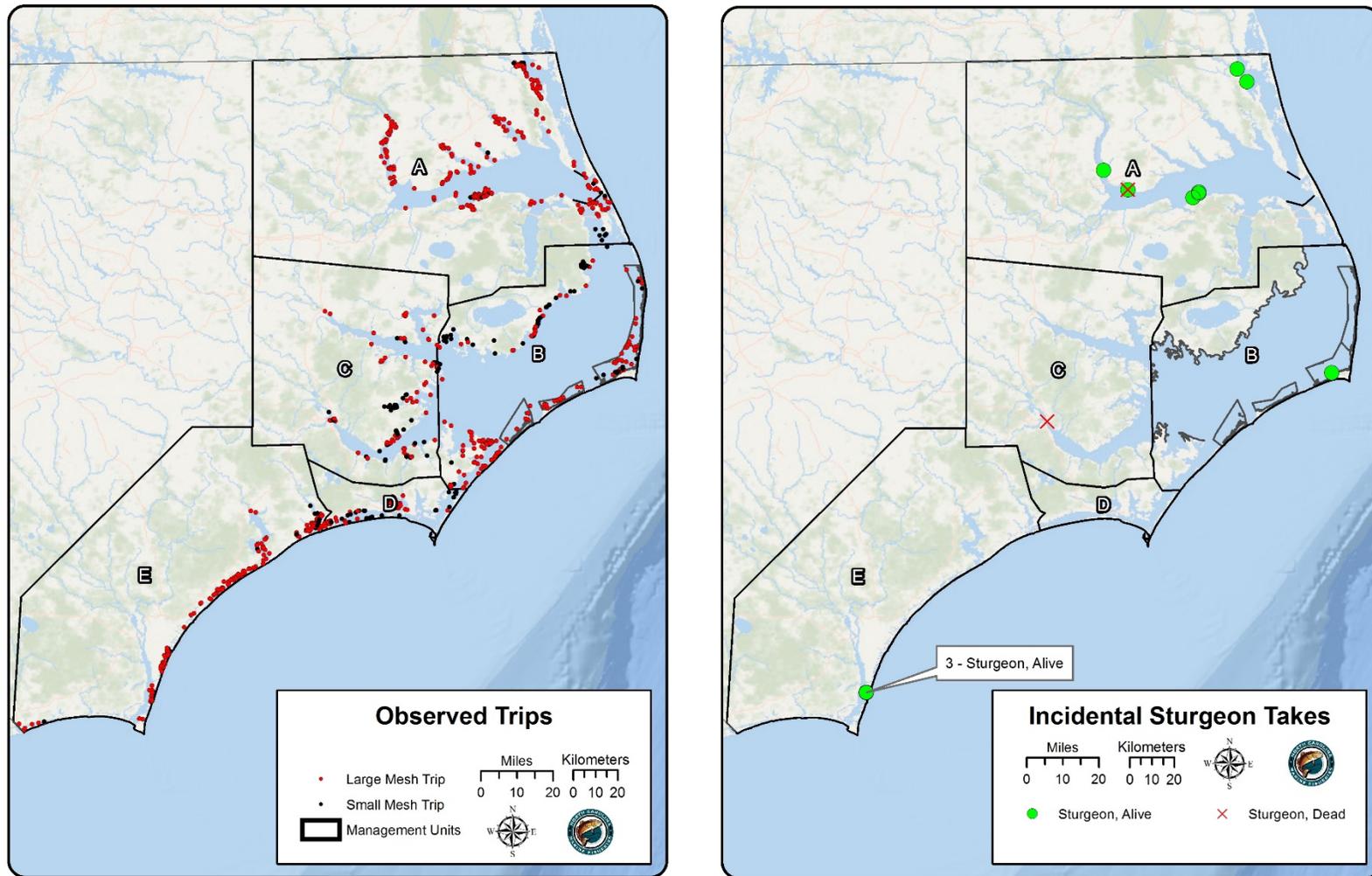


Figure 2. For the entire 2019 ITP Year, observed gill-net trips (left) by mesh-size category (774 large-mesh = ≥ 5 inch; 245 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 11$; dead, $n = 2$) across management units.

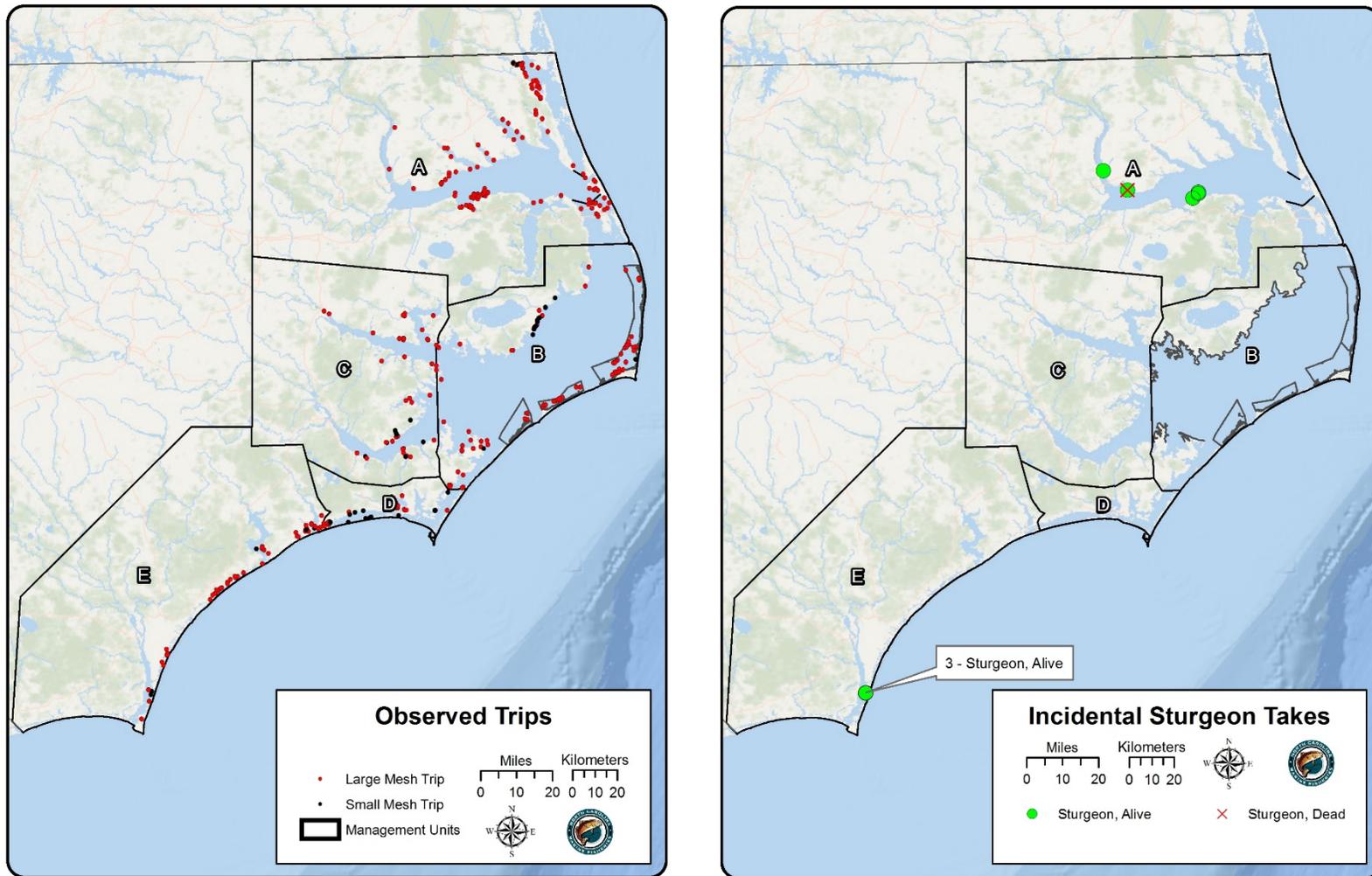


Figure 3. For fall 2018, observed gill-net trips (left) by mesh-size category (324 large-mesh ≥ 5 inch; 58 small-mesh < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 8$; dead, $n = 1$) across management units.

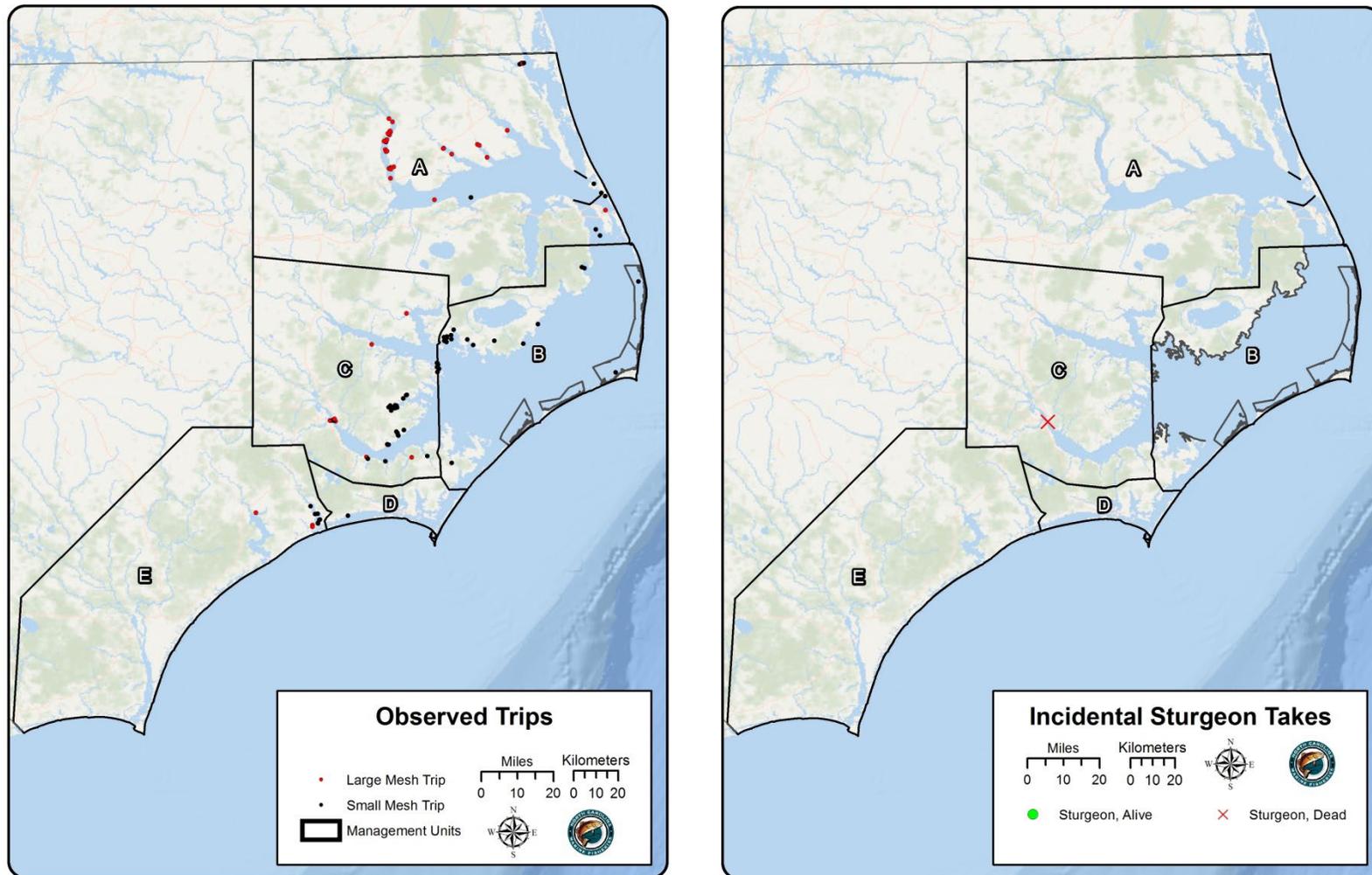


Figure 4. For winter 2018-2019, observed gill-net trips (left) by mesh-size category (50 large-mesh = ≥ 5 inch; 95 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 0$; dead, $n = 1$) across management units.

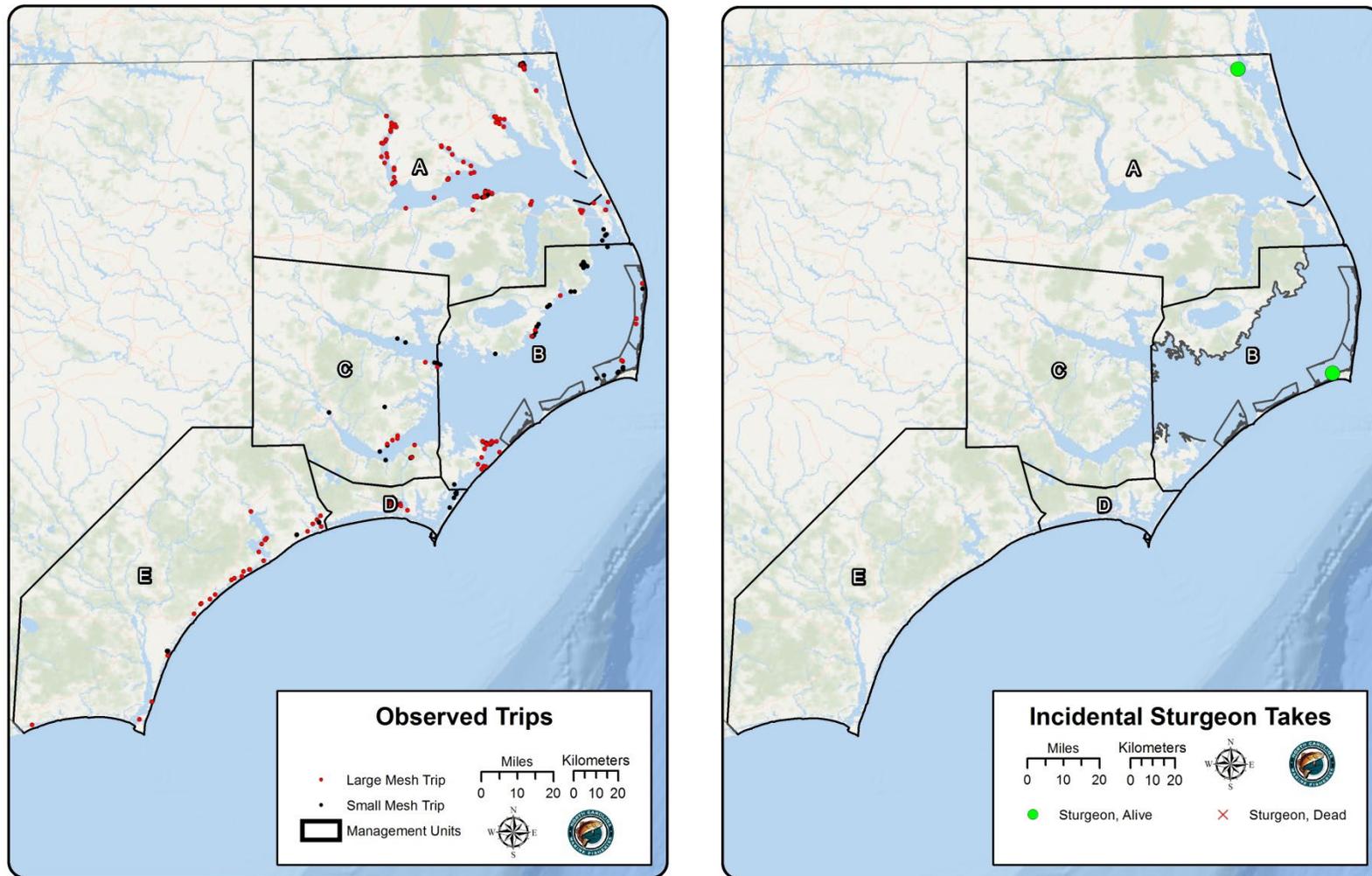


Figure 5. For spring 2019, observed gill-net trips (left) by mesh size-category (190 large-mesh = ≥ 5 inch; 79 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 2$; dead, $n = 0$) across management units.

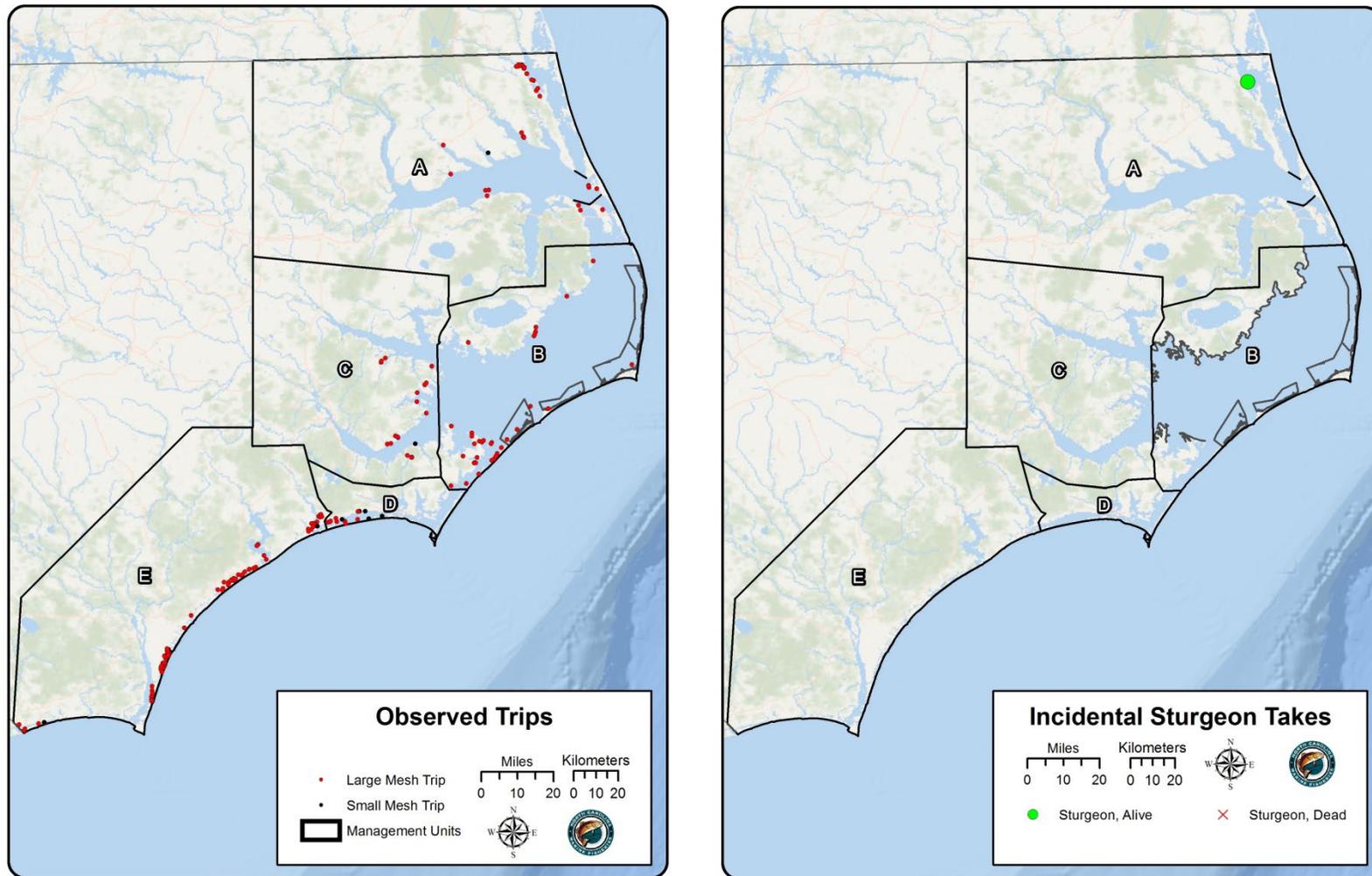


Figure 6. For summer 2019 observed gill-net trips (left) by mesh-size category (210 large-mesh = ≥ 5 inch; 13 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 1$; dead, $n = 0$) across management units.

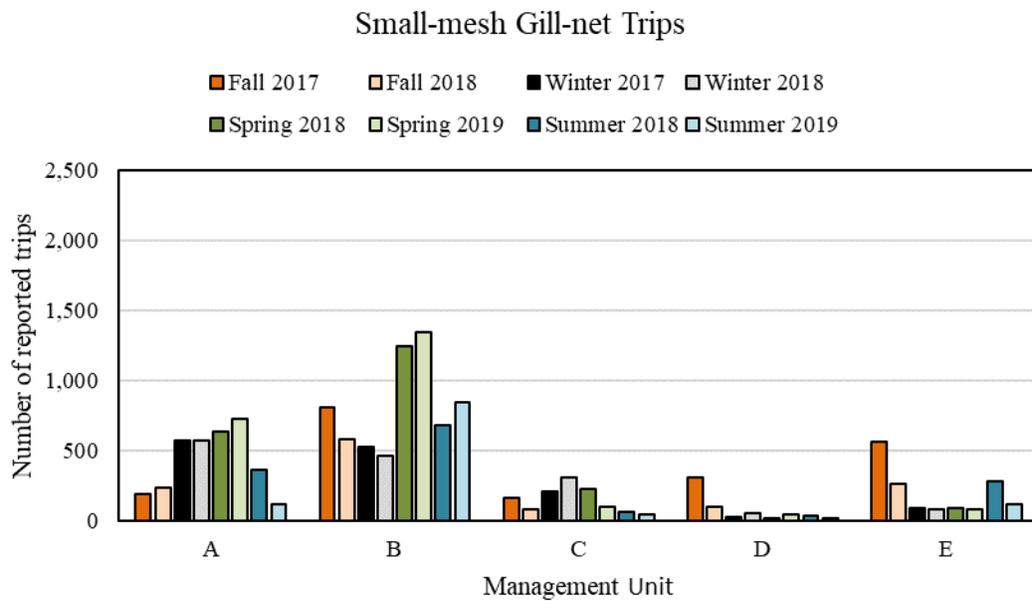
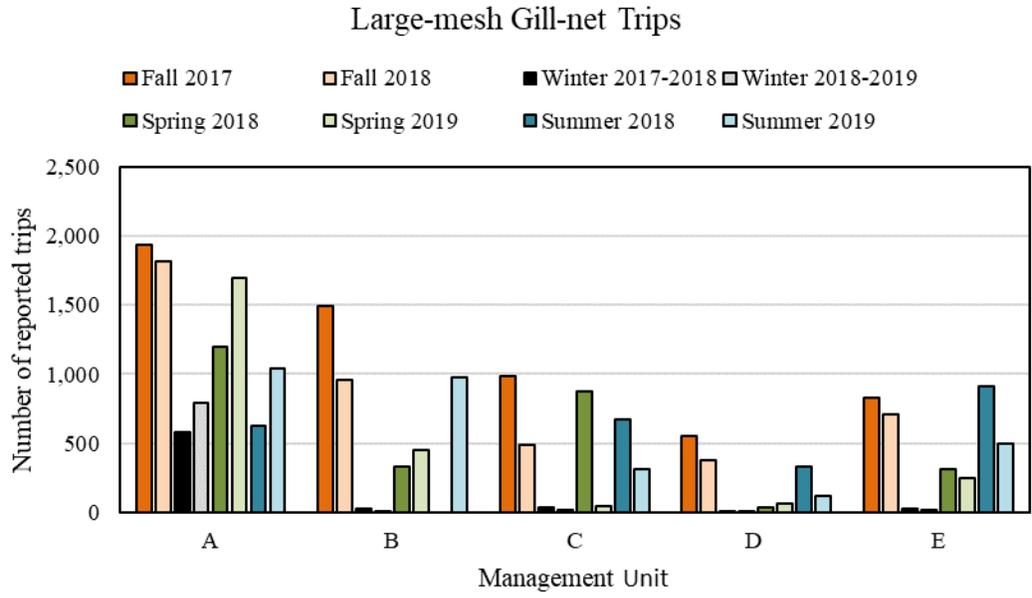


Figure 7. Number of fishing trips using large-mesh (≥ 5 inch, top) and small-mesh (< 5 inch, bottom) gill nets reported to the Trip Ticket Program during the 2018 and 2019 ITP Years by season and management unit. Seasons for the 2018 ITP Year (fall 2017, winter 2017-2018, spring 2018, summer 2018) are shown with darker shades that those for the 2019 ITP Year (fall 2018, winter 2018-2019, spring 2019, summer 2019). The eastern portion of Management Unit D was closed to ≥ 4 -inch mesh gill nets during fall 2017 and did not re-open during either ITP Year. Management Unit B was closed to ≥ 4 -inch mesh gill nets during late spring through summer 2018.

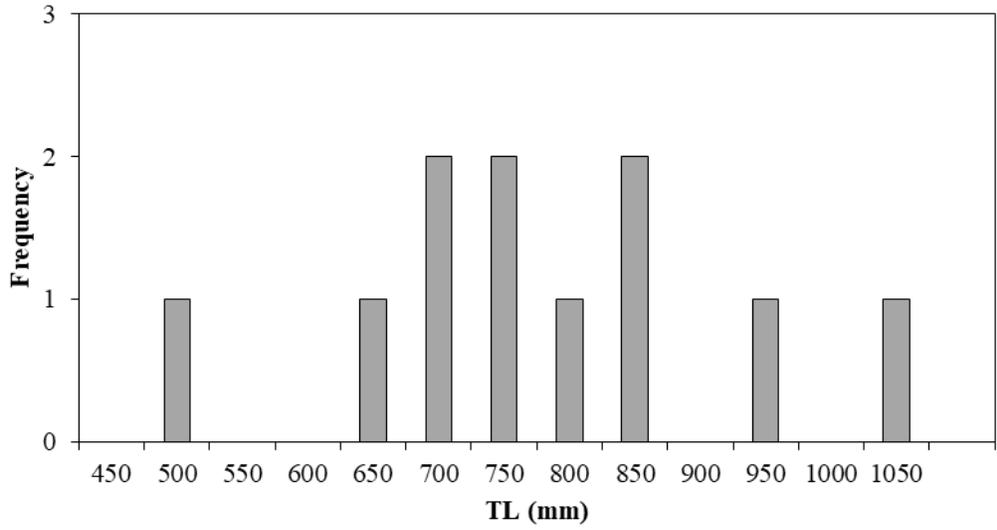


Figure 8. Length-frequency (total length [TL, mm]) of observed and measured incidental takes of Atlantic Sturgeon (n = 11 of 13 observed) during the 2019 ITP Year.

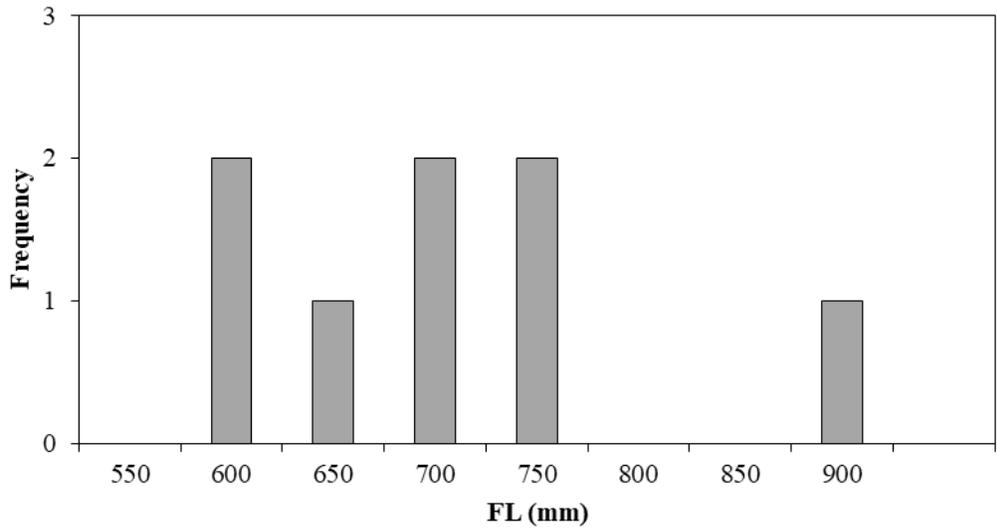


Figure 9. Length-frequency (fork length [FL], mm) of observed and measured incidental takes of Atlantic Sturgeon (n = 8 of 13 observed) during the 2019 ITP Year.

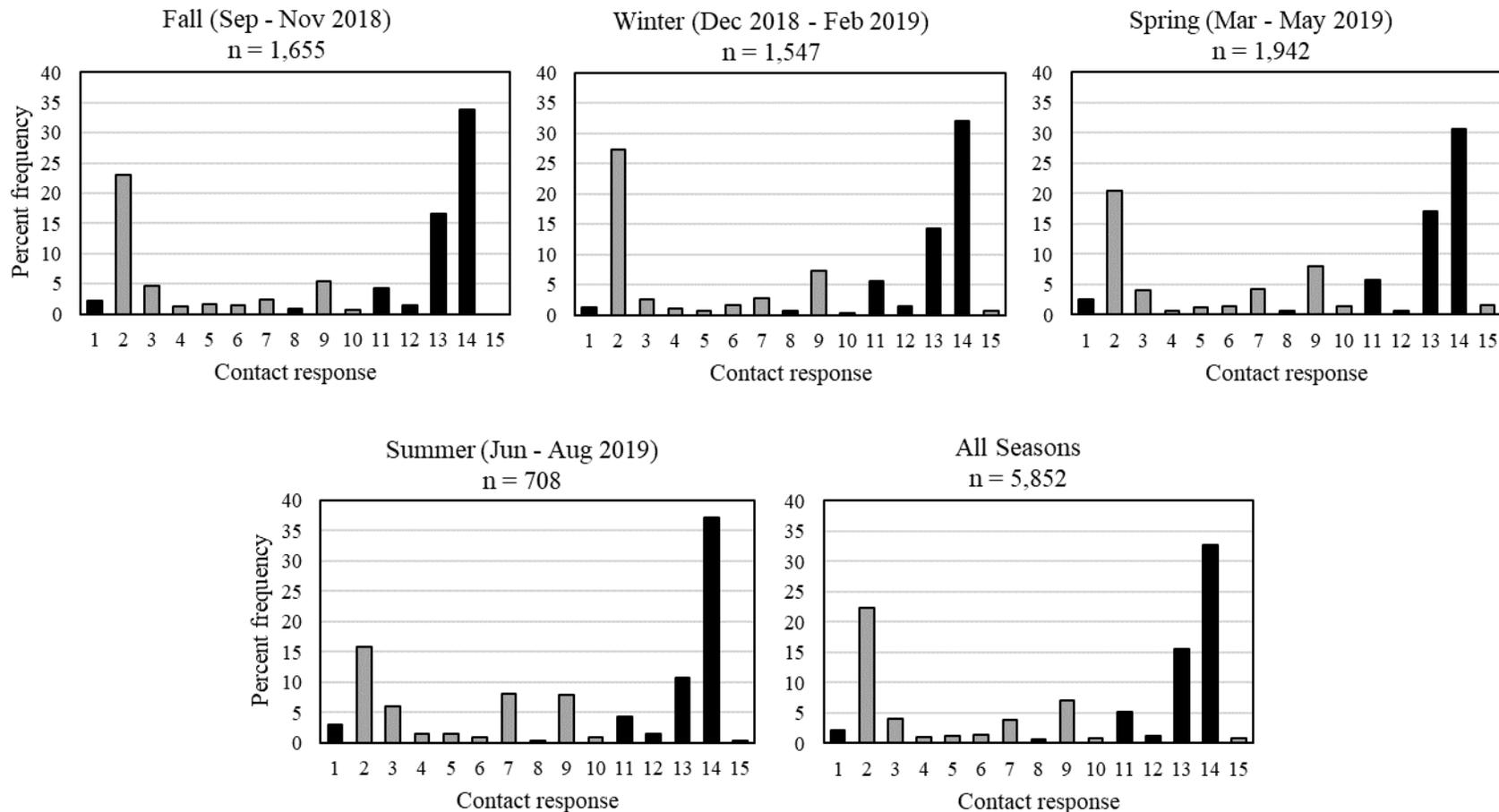


Figure 10. For the 2019 ITP Year, contacts attempted (n = 5,852) by observers to set up trips categorized by contact type (0-15) and presented as a percentage of the total for fall, winter, spring, summer, and all seasons combined. Contact type categories include the following: 1) Left message with someone 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; 15) Not fishing because of natural disaster (e.g., hurricane). Contact types are shown as those when the observer talked to a fisherman (gray bars) and when the observer did not (black bars).

APPENDIX A



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, MD 20910

JUL 19 2017

Braxton C. Davis
Director, North Carolina Division of Marine Fisheries
3441 Arendell Street
P.O. Box 769
Morehead City, NC 28557

Dear Mr. Davis:

On July 13, 2017, the N.C. Division of Marine Fisheries (NCDMF) requested a minor modification to the Atlantic Sturgeon Incidental Take Permit (ITP) no. 18102 to allocate the takes in management units A – C as annual takes rather than seasonal takes. You note in your request that the number of allowed seasonal takes is very low in some cases, and the seasonal takes have been reached on a few occasions and have resulted in seasonal closures.

In your request, you also address the concern of takes occurring in warmer waters (20°C – 30°C) being correlated with more mortalities by noting that lower fishing effort in the summer season due to increasing water temperatures and fish availability should prevent sturgeon mortalities from exceeding the take limit. In our discussions, your staff also noted that the flexibility gained from this minor modification will allow you to adaptively manage fishing effort for times when the fishery is most productive from the fall through the spring, and that fishing effort in the summer decreases as productivity wanes. You also note that you actively monitor the fisheries and take levels daily to ensure take levels, including mortality levels, are not exceeded.

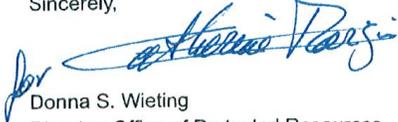
We have considered this minor modification request and determined it to be reasonable. NMFS therefore concurs with your request for this minor modification.

I appreciate you proactively requesting minor modifications to maximize permit implementation as you identify them. Also, as we have discussed with you previously, we understand that you are in the process of developing an updated ITP application and we look forward to analyzing all aspects of that updated application. I encourage you to incorporate any further anticipated minor modifications into that application process so my staff can more efficiently analyze these requests. Please sign below to acknowledge that you will comply with the minor modifications specified in this letter and send a copy of the signed letter to Ron Dean on my staff at your earliest convenience.



We look forward to continuing to work with you on Endangered Species conservation in North Carolina.

Sincerely,


Donna S. Wieting
Director, Office of Protected Resources

I acknowledge the minor modification specified above to Permit No. 18102 issued under Section 10 (a)(1)(B) of the Endangered Species Act to incidentally take endangered Atlantic Sturgeon in gillnet fisheries operating in inshore waters of North Carolina.



Braxton C. Davis
Director
N.C. Division of Marine Fisheries

7/21/17

Date



ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

26 June 2020

Angela Somma
Office of Protected Resources (F/PR)
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910

Dear Angela:

The North Carolina Division of Marine Fisheries (NCDMF) Observer Program data have been updated using the finalized 2019 Trip Ticket Program (TTP) data for reported fishing trips. The Annual Completion Report for the Atlantic Sturgeon Incidental Take Permit (ITP) No. 18102 was completed for ITP Year 2019 and submitted in April 2020. Using the finalized 2019 TTP data, Tables 1, 2, 5, and 6 from the Completion Report were updated to reflect the final estimates of observer coverage and sturgeon takes (Tables 1 - 4). Although the fall 2018 season was based on finalized 2018 TTP data, small changes to the dataset were found during the recent data pull.

Anchored Large Mesh

Using finalized TTP data, there were 10,647 reported large-mesh gill net trips during the 2019 ITP Year (Table 1) as compared to the 10,646 trips included in the 2019 annual completion ITP report. The small net difference (1 trip) between the finalized data and the preliminary data was due, in part, because there were 12 fewer large mesh trips in the finalized data for management unit A during spring 2019. The 12 fewer trips offset additional trips reported for other management units and seasons. Outside of spring 2019, there were seven additional trips during fall 2018 in management units A and B, one less trip during winter 2018-2019 in management unit B, and seven additional trips during summer 2019 in management units A, B, and E. The finalized data barely changed the percent observer coverage (0.1% or less) and did not reduce coverage below the minimum target for any season and management unit combination

Anchored Small Mesh

Using finalized TTP data, there were 6,249 reported small-mesh gill net trips during the 2019 ITP Year (Table 2) as compared to the 6,199 trips included in the 2019 annual completion ITP



report. The net difference of 50 more trips in the finalized data was due primarily to additional trips reported for management unit A in winter (n=13), spring (n=26), and summer (n=11). Otherwise, the maximum difference in trips for a given management unit and season was three fewer trips in the finalized data during summer in management unit B. The finalized data did not significantly affect percent observer coverage (change of 0.9% or less) and did not reduce coverage to below the minimum target for any season and management unit combination.

Atlantic Sturgeon Takes

The NCDMF's ITP outlines authorized levels of annual incidental takes of Atlantic sturgeon that are expressed as estimated total takes in large-mesh gill nets for management unit A, counts of observed takes in small-mesh gill nets for management unit A, and counts of observed takes regardless of mesh-size category in the other management units (B, C, D, E). Eight of the 13 incidental takes during the 2019 ITP Year were in large-mesh gill nets in management unit A. As such, recalculations of annual estimated incidental takes using finalized TTP data incorporated those eight takes only (Table 3). Changes to the number of estimated Atlantic sturgeon takes from the Annual Completion Report were negligible with an increase of only 0.1 for live and 0.1 for dead sturgeon in management unit A (Table 3). Although no changes occurred in the counts of observed incidental takes in small-mesh gill nets, the data are presented in this addendum (Table 4). In summary, the annual estimated Atlantic sturgeon takes during the 2019 ITP Year remained well below authorized thresholds.

Sincerely,



Barbie L. Byrd
NC Division of Marine Fisheries
NC Department of Environmental Quality
3441 Arendell Street / P.O. Box 769
Morehead City, NC 28557

cc: Kathy Rawls
Steve Murphey
Dee Lupton
John McConnaughey
Kristy Long
Wendy Piniak
Celeste Stout



Table 1. For large-mesh (≥ 5.0 inch) gill nets, percent observer coverage calculated from observer data and finalized reported fishing trips from the Trip Ticket Program (TTP) by season and management unit for the 2019 ITP Year. Differences are shown for the number of fishing trips and percent observer coverage using finalized TTP data versus the preliminary TTP data as reported in the Annual Completion Report; positive numbers indicate more reported trips and higher coverage using finalized data while negative numbers indicate fewer reported trips and lower coverage.

Season	Management Unit	Large Mesh				
		Fishing Trips	Observed Trips	Percent Coverage	Difference in Fishing Trips	Difference in Percent Coverage
Fall 2018	A	1,817	131	7.2	5	0.0
	B	957	79	8.3	2	0.0
	C	485	37	7.6	0	0.0
	D	375	24	6.4	0	0.0
	E	713	53	7.4	0	0.0
	Overall	4,347	324	7.5	7	0.0
Winter 2018-2019	A	795	38	4.8	0	0.0
	B	12	0	0.0	-1	0.0
	C	19	9	47.4	0	0.0
	D	7	0	0.0	0	0.0
	E	20	3	15.0	0	0.0
	Overall	853	50	5.9	-1	0.0
Spring 2019	A	1,687	100	5.9	-12	0.0
	B	448	29	6.5	0	0.0
	C	45	20	44.4	0	0.0
	D	61	11	18.0	0	0.0
	E	247	30	12.1	0	0.0
	Overall	2,488	190	7.6	-12	0.0
Summer 2019	A	1,045	46	4.4	1	0.0
	B	977	34	3.5	3	0.0
	C	313	27	8.6	0	0.0
	D	124	10	8.1	0	0.0
	E	500	93	18.6	3	-0.1
	Overall	2,959	210	7.1	7	0.0
Annual		10,647	774	7.3	1	0.0



Table 2. For small-mesh (< 5.0 inch) gill nets, percent observer coverage calculated from observer data and finalized reported trips from the Trip Ticket Program (TTP) by season and management unit for the 2019 ITP Year. Differences are shown for the number of fishing trips and percent observer coverage using finalized TTP data versus the preliminary TTP data as reported in the Annual Completion Report; positive numbers indicate more reported trips and higher coverage using finalized data while negative numbers indicate fewer reported trips and lower coverage.

Season	Management Unit	Small Mesh				
		Fishing Trips	Observed Trips	Percent Coverage	Difference in Fishing Trips	Difference in Percent Coverage
Fall 2018	A	239	5	2.1	0	0.0
	B	581	22	3.8	1	0.0
	C	81	9	11.1	0	0.0
	D	101	16	15.8	0	0.0
	E	262	6	2.3	1	0.0
	Overall	1,264	58	4.6	2	0.0
Winter 2018-2019	A	585	12	2.1	13	0.0
	B	469	28	6.0	0	0.0
	C	313	40	12.8	0	0.0
	D	52	8	15.4	0	0.0
	E	81	7	8.6	0	0.0
	Overall	1,500	95	6.3	13	-0.1
Spring 2019	A	753	13	1.7	26	-0.1
	B	1,349	39	2.9	-2	0.0
	C	97	16	16.5	0	0.0
	D	49	6	12.2	0	-0.3
	E	81	5	6.2	0	0.0
	Overall	2,329	79	3.4	25	0.0
Summer 2019	A	129	2	1.6	11	-0.1
	B	841	0	0.0	-3	0.0
	C	46	1	2.2	1	0.0
	D	24	5	20.8	0	-0.9
	E	116	5	4.3	0	0.0
	Overall	1,156	13	1.1	10	0.0
Annual		6,249	245	3.9	50	0.0



Table 3. For large-mesh (≥ 5.0 inch) gill nets, a comparison of actual annual incidental takes of Atlantic Sturgeon by management unit during the 2019 ITP Year to authorized thresholds expressed as either estimated total takes based on observed takes (Management Unit A) or counts of actual observed takes (Management Units B – E). Estimated takes and 95% confidence intervals (in brackets) for management unit A were updated using finalized data for reported fishing trips from the Trip Ticket Program (TTP). Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS	
		Carolina DPS	Other DPS	Alive	Dead
A	Annual	1,604 (65)	535 (21)	93 [35.5, 203.6]	23 [0, 69.8]
B	Annual	24 (6)	9 (0)	0	0
C	Annual	11 (5)	4 (0)	0	0
D	Annual	8 (2)	n/a	0	0
E	Annual	8 (2)	n/a	1	0
Total	Annual	1,655 (80)	548 (21)	94	23



Table 4. For small-mesh (<5.0 inch) gill nets, a comparison of actual annual incidental takes of Atlantic Sturgeon by management unit during the 2019 ITP Year to authorized thresholds expressed as counts of observed takes. Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

Management Unit	Season	Total Interactions			
		Authorized (Mortality)		Actual All DPS	
		Carolina DPS	Other DPS	Alive	Dead
A	Annual	596 (45)	114 (10)	0	0
B	Annual	14 (5)	3 (0)	1	0
C	Annual	8 (4)	n/a	0	1
D	Annual	8 (2)	n/a	0	0
E	Annual	8 (2)	n/a	2	0
Total	Annual	634 (58)	117 (10)	3	1

