Annual Atlantic Sturgeon Interaction Monitoring of Anchored Gill-Net Fisheries in North Carolina for Incidental Take Permit Year 2021 (1 September 2020–31 August 2021)

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

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1 INTRODUCTION

The North Carolina Division of Marine Fisheries (NCDMF) applied to National Marine Fisheries Service (NMFS) 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 NMFS in February 2012 indicating the intent to list the Carolina Distinct Population Segment (DPS) of Atlantic Sturgeon as endangered under the ESA. The application proposed a Conservation Plan that ensured only an authorized level of Atlantic Sturgeon incidental takes would occur, while allowing North Carolina's estuarine anchored gill-net fisheries to operate. The ITP authorizes such takes that are incidental to otherwise lawful fishing activity. For this report, the term "gill net" refers to anchored gill nets and mesh sizes are provided as stretched mesh 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. 2019a). The ITP had similarities with the Section 10 ITP (No. 16230) that NCDMF already had for incidental takes of sea turtles in estuarine anchored gill nets. For example, the Atlantic Sturgeon ITP defined an ITP Year as 1 September through 31 August of the following year, established annual authorized levels of incidental takes across geographic regions (Tables 1 and 2), and included a Conservation Plan to monitor, minimize, and mitigate incidental takes (i.e., of Gulf of Maine, New York Bight, Chesapeake, Carolina, and South Atlantic DPSs) in otherwise lawful gill-net fisheries operating in North Carolina estuarine waters. The Conservation Plan in both ITPs included a state-wide estuarine gill-net observer program to monitor interactions that can be counted and extrapolated when applicable across the fishery within a given season and area. In contrast to the sea turtle ITP, the Atlantic Sturgeon ITP defined large-mesh gill nets as ≥5 inch and small-mesh gill nets as <5 inch stretched mesh, included four not three seasons (fall, winter, spring, and summer), and defined five not six geographic regions (Management Units A, B, C, D, E; Figure 1). Similar to the sea turtle ITP, the Atlantic Sturgeon ITP set required observer coverage thresholds as a minimum of 7% with a goal of 10% for large-mesh gill nets and a minimum of 1% with a goal of 2% for small-mesh gill nets. In contrast, however, the observer coverage requirements were set across management units for a given season, not within each management unit in a season. For both ITPs, if observer data indicated that takes were approaching or exceeding authorized thresholds, the NCDMF could use an adaptive management approach to mitigate incidental takes by implementing temporary management options when needed using the NCDMF director's Proclamation authority (General Statute 143B-289.52).

To maintain incidental takes below authorized levels, the Conservation Plan consisted of a variety of measures for gill nets operating in estuarine waters across the state. These measures primarily included the continuation of restrictions put in place by the NCDMF sea turtle ITP (16230) (NMFS 2013). Specifically, the restrictions prohibited large-mesh (as defined by the sea turtle ITP as ≥4 inch) gill nets in the deep waters of Pamlico Sound, limited soak times to an hour before sunset to an hour after sunrise in portions of the state, limited days of fishing depending on location, restricted net height to no more than 15 meshes, restricted total net yardage to a maximum of 2,000 yards per vessel in portions of the state; and required for some areas that 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. Gill nets (≥4 inch stretched mesh) set in the southern portion of the state were restricted to a maximum of 1,000 yards per fishing operation (M-31-2014) (http://portal.ncdenr.org/web/mf/proclamation-m-31-2014).

On 13 July 2017, the NCDMF requested a minor modification to the Atlantic Sturgeon ITP allocation of authorized takes in Management Units A and C to be listed as annual rather than seasonal takes. The NCDMF explained that annual take thresholds would provide greater flexibility in managing 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 agreeing with the request for the minor modification but encouraged staff to incorporate any further anticipated minor modifications into the application process for an updated ITP (McConnaughey et al. 2019a).

Significant regulatory changes were enacted during fall 2019 (the 2020 ITP Year) for the Southern Flounder (*Paralichthys lethostigma*) fisheries. These regulations were included in Amendment 2 of the Southern Flounder Fishery Management Plan (FMP) adopted by the North Carolina Marine Fisheries Commission on 23 August 2019 (NCDMF 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 to recover the stock from an overfished condition within 10 years. To meet these legal requirements, the NCDMF determined that a 62% reduction in overall harvest was necessary for 2019 and a 72% reduction would be needed beginning in 2020. To meet this reduction, regulations were implemented that, among other measures, severely limited where and when large-mesh gill nets were allowed. For the commercial gill-net fishery, these regulations included drastic reductions in the number of days the fishery would open, 25% reductions in allowed yardage of large-mesh gill nets and soak-time limits of large-mesh gill nets to overnight soaks state-wide where before this was not required for nets in Management Units A and C.

Another significant event that occurred during the 2020 ITP Year and continued during the 2021 ITP Year was the COVID-19 pandemic. On 20 March 2020, the NMFS waived the requirement for boats fishing in federally managed fisheries to carry observers or at sea monitors due to concerns about the transmission of COVID-19. The NMFS extended this waiver to the NCDMF Observer Program on 23 March 2020; the waiver was in place throughout the rest of the 2020 ITP Year and all of the 2021 ITP Year.

This annual report outlines observer activity, fishing activity, and total or estimated takes of Atlantic Sturgeon for the 2021 ITP year, 1 September 2020–31 August 2021. The original deadline for annual reports was 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. 2019a). Data for fishing activity, measured in number of trips, are finalized only for 2020 (fall and part of winter). After the preliminary data for 2021 are finalized in May 2022, 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.

2 METHODS

2.1 Observer Activity

A sea-day schedule of projected observer trips for each season by month and management unit during the 2021 ITP Year was developed during the prior season, recognizing that the COVID-19 pandemic would likely impact planned observer activity. The number of projected observer trips by month and management unit was based on the maximum goal for coverage outlined in the Conservation Plan: 10% coverage of the total large-mesh gill-net fishing trips and 2% coverage of the total small-mesh gill-net fishing trips. Data on commercial fishing effort come from the NCDMF Trip Ticket Program (TTP), whereby fish dealers complete a trip ticket every time a commercial fisher sells finfish and shellfish. Trip tickets record information such as gear type, area fished, species harvested, and total weight by species. For anchored gill nets, the TTP defines large-mesh and small-mesh gill nets the same as the Atlantic Sturgeon ITP. As such, projected observer trips were stratified across each month within four seasons and six management units proportional to the NCDMF TTP data of reported fishing trips. The seasons crossed calendar years and were defined as follows: fall (September–November 2020), winter (December 2020–February 2021), spring (March–May 2021), and summer (June–August 2021). Although the Conservation Plan outlined in the Atlantic Sturgeon ITP identified five management units (A, B, C, D, and E), projected observer trips were allocated according to the Conservation Plan in the sea turtle ITP, which splits Management Unit D into D1 and D2 (Figure 1). Within Management Unit B, large-mesh gill nets operating in Pamlico Sound were confined to specific subunits (Shallow Water Gill-Net Restricted Areas 1-4, and Mainland Gill-Net Restricted Area), effectively closing the fishery in the deep waters of Pamlico Sound and in corridors near Ocracoke, Hatteras, and Oregon inlets (Daniel 2013; Figure 1).

Projecting observer trips for the sea-day schedule typically has been calculated based on the average of reported small-mesh and large-mesh gill-net trips by month and management unit from the previous five years. However, this approach was not a viable prediction of all large-mesh fishing effort during the 2021 ITP Year due to restrictions on anchored large-mesh gill-net fisheries. Similar to fall 2019, Southern Flounder commercial fisheries (e.g., gill nets and pound nets) were constrained by setting specific dates when fishing was allowed across three flounder management areas, Northern, Central, and Southern (Figure 1). These flounder management areas generally aligned with the ITP management units except for the Core Sound portion of Management Unit B, which was split into a different flounder management area (Southern) than the rest of Management Unit B (Central; Figure 1). During the fall of 2020, the Northern area was open 15 September–6 October, the Central area was open 1–19 October, and the Southern area was open 1 October–2 November (Table 3). Flounder management areas were still subject to conditions put forth in ITPs for sea turtle and sturgeon incidental takes and could be closed by proclamation should authorized take thresholds be approached or exceeded. After November 2, limited allowances for anchored large-mesh gill nets were made during winter and spring for American Shad (*Alosa sapidissima*) fisheries. Portions of Management Unit C were re-opened to anchored large-mesh gill nets from February 15–April 15 (Table 3). Portions of Management Unit A were re-opened to anchored large-mesh gill nets from March 2–18 (Table 3). These dates for Management Unit A differed from the 2020 ITP Year when limited allowances for large-mesh gill nets were made during late fall and winter for the harvesting of Blue Catfish (*Ictalurus furcatus*) (Byrd et al. 2021).

To estimate the number of fishing trips during the fall flounder fishery, the number of reported fishing trips per month and management unit was divided by the number of days the fishery was open during each of the previous five years. Then, the average number of fishing trips per day was calculated across the five years and expanded to the number of days the fishery would be open during fall 2020. The projected number of observer trips for each month and management unit was based on that expanded number. For the short winter and spring shad seasons, the five-year average was calculated for the number of reported fishing trips during the months the fishery would be open during the 2021 ITP year. However, outside of the fall flounder and winter/spring shad seasons in Management Units A and C, projected large-mesh observer trips were set to zero in Management Units B, D, and E during winter and spring, and all management units during summer. Accommodations also had to be made to estimate fishing effort in Management Unit D because the D1 portion has been closed to large-mesh gill nets since November 9, 2017, when estimated green sea turtle takes exceeded the authorized threshold (McConnaughey et al. 2019b, Byrd et al. 2020). Additionally, Management Unit D1 has been closed small-mesh gill nets since April 2020 (Byrd et al. 2021).

The COVID-19 pandemic impacted the approach to planned, and realized, observer activity during the 2021 ITP Year. Using the sea-day schedule as a guide, observers were distributed as much as possible across management units depending on the season and projected fishing effort. Most staff at NCDMF teleworked during the 2021 ITP Year through June 2021 due to COVID-19, so hiring temporary observers to help cover the busiest months was not pursued. All observed trips used an alternative platform approach whereby observers used a state-owned vessel to observe at a distance. This method requires two observers, so that the person that serves as the observer/data recorder does not have to also serve as the boat driver. Because this approach halves observer capacity, the Observer Program was aided by other NCDMF programs that provided staff to serve as boat drivers on observer teams during the fall flounder fishery. Their participation increased the capacity for completing alternative platform trips during the short flounder season. Additionally, the sea-day schedule was shared with Marine Patrol officers as in past years, who attempted to obtain alternative platform trips as part of their regular duties year around. During fall, observers began overnight travel to cover the fall flounder fishery. By winter, however, the NCDMF temporarily suspended overnight travel for observers due to increased infection rates in the state and related concerns for staff exposure to COVID-19. Observers, all based out of Morehead City, still were able to obtain trips in Management Unit C and portions of B, C, and E. Observer Program staff coordinated with NCDMF staff in the Elizabeth City office to help obtain observer trips in Management Unit A, albeit at reduced levels. The Elizabeth City staff were trained on data collection methods for the observer program and some of them had been observers in the past.

Obtaining observer trips was facilitated by the requirement for fishers participating in estuarine anchored gill-net fisheries to obtain an Estuarine Gill-Net Permit (EGNP; M-24-2014; http://portal.ncdenr.org/web/mf/proclamation-m-24-2014). As part of this permit, fishers provide their contact information so that observers can call and schedule an observed trip. However, the permit is free and many fishers get an EGNP but do not report trips using estuarine gill nets (Byrd et al. 2021). To streamline the contact attempts by observers, the License and Statistics Section of NCDMF provided data on EGNP holders that had reported anchored estuarine fishing trips during the last three years. The dataset included number of reported trips by mesh size category (large and small) and management unit along with the name and contact information for the permit holder. This dataset was used to create a priority call list that was divided among observers. Other outreach efforts, such as visiting fish houses, were limited during the 2021 ITP Year. The Observer

Program website (http://portal.ncdenr.org/web/mf/observers-program) was available, but fishers were not necessarily reminded to access it during the 2021 ITP Year.

Observers were trained by experienced NCDMF staff to identify, measure, evaluate condition of, and tag (with Passive Integrated Transponders, or PIT) Atlantic Sturgeon. Date, time, tag numbers, location (latitude and longitude, when possible), condition (e.g., 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 (e.g., salinity, water temperature) were also collected when feasible. Observers were instructed to retain any dead Atlantic Sturgeon when possible.

Observers also collected data on location and gear parameters. Because all trips were alternative platform, additional data on fish catch and bycatch were not collected. Limited data such as date and waterbodies surveyed were also collected for unsuccessful alternative platform attempts (hereafter termed "No Contact" trips) by observers and Marine Patrol. All data were coded onto NCDMF data sheets and uploaded to the NCDMF Biological Database for analysis. 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 by comparing the number of observed trips to the predicted number of fishing trips by mesh-size category and month. The numbers of 'No Contact' trips were not included in calculations of observer coverage. At the end of the ITP year, the TTP provided actual numbers of reported trips to calculate actual observer coverage. The TTP data for 2020 (September–December) were finalized, but the data for 2021 (January–August) were preliminary. As a result, observer coverage calculated for winter, spring, and summer were considered estimates. However, the TTP data for fall were conspicuously missing reported large-mesh gill-net trips in Core Sound. The Core Sound portion of Management Unit B is typically a common location used by fishers targeting Southern Flounder with large-mesh gill nets. Staff with the TTP were alerted to this situation so they could investigate the issue. In the meantime, the predicted number of trips for Management Unit B during the fall was used to calculate observer coverage and estimate sturgeon bycatch (see Section 2.3).

2.2 Incidental Takes

The ITP outlines authorized levels of incidental takes 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). Both types (estimated and counted) were necessary because there were insufficient data available for modeling predicted estimated takes in the ITP application for some combinations of management unit and gear type (Daniel 2014). To compare numbers of incidental takes of Atlantic Sturgeon during the 2021 ITP year to authorized levels, actual observed takes were counted for Management Units B, C, D, E and estimated for Management Unit A. The DPS of the Atlantic Sturgeon could not be determined 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.

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

Throughout each month, this calculation was employed for each 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 projected number of fishing trips was used. Estimated numbers of interactions for Management Unit A and running totals of observed interactions in Management Units B, C, D, E were additive across interaction dates to determine if interactions were approaching authorized take thresholds. The ongoing comparisons allowed for the implementation of management measures, if needed, 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 ITP year, the estimated number of interactions for Management Unit A was recalculated using actual numbers of trips, albeit preliminary for 2021, reported in the TTP rather than the projected numbers of fishing trips. 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 2019). Bootstrap replicates were generated by sampling observer trips with replacement 5,000 times within strata (mesh/management unit).

2.3 Compliance

The Observer Program used various methods to contact fishers to schedule trips. The most common method was by phone, due to fishers leaving from private launches and overall efficiency. For each contact made to obtain a trip (phone call or in-person), observers logged the contact in a database, assigning a category of the response and noting any additional information (e.g., fisher stated they did not fish until October). Contact response categories included 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). Observers also documented calls returned from fishers, including the response category and notes. Data in the contact log were summarized by season and response category to determine what percentage of phone calls resulted in observer trips.

As part of their regular duties, Marine Patrol officers checked gill nets for compliance. Citations and/or Notice of Violations (NOVs) were issued to fishers when gear or fishing practices were out of compliance. A citation is an enforcement action taken by a Marine Patrol officer for person(s) found to be in violation of General Statues, Rules, or Proclamations under the authority of the Marine Fisheries Commission and is considered a proceeding for District Court. An NOV is the NCDMF administrative process to suspend a permit (e.g., EGNP) and is initiated by an officer or NCDMF employee when a permit holder is found to be in violation of general or specific permit conditions. A citation and NOV may both be initiated by the same violation; however, they are two separate actions. For this report, NOVs or citations under the codes "EGNP" and "NETG" were compiled, as they are applicable to the EGNP and gill-net violations.

3 RESULTS

3.1 Observer Activity

Overall state-wide observer coverage during the 2021 ITP Year was 12.1% of the reported large-mesh gill-net fishery and 2.1% of the small-mesh gill-net fishery (Tables 4 and 5, Figure 2). This level of coverage was based on 379 observed large-mesh gill-net trips and 165 observed small-mesh gill-net trips. Additionally, there were 1,092 No Contact trips (Table 6). Observer activity during winter and spring was hindered by the ongoing COVID-19 pandemic. In addition to the aforementioned limitations that NCDMF imposed on overnight travel, there were instances when observers had to quarantine due to exposure to COVID-19, further limiting opportunities to obtain trips even in areas within distances that did not necessitate overnight travel.

During the 544 total observed trips, observers documented 16 Atlantic Sturgeon in large-mesh and one in small-mesh gill nets (Table 7, Figure 2). Two sturgeon that could not be identified to species were also observed. No self-reported interactions were received by the Observer Program.

A series of proclamations was issued throughout the ITP year for management needs unrelated to protected species interactions (Table 3).

3.1.1 Fall 2020

During fall 2020 (September–November), the Observer Program achieved 15.3% state-wide coverage of large-mesh gill-net trips, exceeding 7% coverage in all management units (Table 4; Figure 3). For small-mesh gill nets, the Observer Program achieved 2.9% state-wide coverage, exceeding 1% observer coverage in all management units (Table 5; Figure 3). There were 225 No Contact trips (Table 6).

Thirteen of the 17 (76%) observed Atlantic Sturgeon interactions during the 2021 ITP Year occurred during fall (Table 7; Figure 3). All fall interactions were released alive from large-mesh gill nets (12 in Management Unit A and one in Management Unit C).

3.1.2 Winter 2020-2021

During winter 2020–2021 (December 2020–February 2021), the Observer Program achieved an estimated 3.1% state-wide coverage of large-mesh gill-net trips in the only open management unit, C (3.1%; Table 4; Figure 4). This level did not meet the minimum coverage; the shortage represents two trips that were not obtained. For small-mesh gill nets, the Observer Program achieved an estimated 1.8% state-wide coverage during winter 2020–2021, exceeding 1.0% in all management units except D (Table 5; Figure 4). There were 231 No Contact trips (Table 6).

There were no observed Atlantic Sturgeon interactions in gill nets during winter 2020–2021 (Table 7).

3.1.3 Spring 2021

During spring 2021 (March–May), the Observer Program achieved an estimated 5.4% state-wide coverage of large-mesh gill-net trips, not meeting the minimum 7% coverage overall (Table 4; Figure 5). Only Management Units A and C were open to large-mesh gill nets. The Observer Program would have had to observe 14 additional trips in Management Unit A and two trips in Management Unit C to meet the 7% coverage. For small-mesh gill-net trips, the Observer Program achieved an estimated 1.9% state-wide coverage with most reported and observed trips occurring

in Management Unit B (Table 5; Figure 5). Observer coverage exceeded 1% in Management Units A and B, but not in C, D, or E. There were 267 No Contact trips (Table 6).

Four of the 17 (32%) observed Atlantic Sturgeon interactions during the 2021 ITP Year occurred during spring (Table 7). Three of the four were released alive (2 in large-mesh gill nets and 1 in small-mesh gill net). The remaining Atlantic Sturgeon was recovered dead from a large-mesh gill net. In addition to sturgeon positively identified as Atlantic Sturgeon, two additional sturgeon were observed, but they fell out of the large-mesh gill net and swam away before observers could identify the species (Figure 5).

3.1.4 Summer 2021

During summer 2021 (June–August), the Observer Program did not observe any large-mesh gill-net trips as the gear was prohibited state-wide (Table 4; Figure 6). For small-mesh gill-net trips, the Observer Program achieved an estimated 1.9% state-wide coverage, exceeding 1.0% in all management units (Table 5; Figure 6). There was a single observed trip of small-mesh gear in D, but no small-mesh fishing trips were reported there. There were 369 No Contact trips (Table 6).

There were no observed Atlantic Sturgeon interactions in gill nets during summer 2021 (Table 7).

3.2 Incidental Takes

Of the 19 sturgeon takes during the 2021 ITP Year, 18 were released alive. Interactions occurred primarily in Management Unit A (>89%; 17 of 19) and during fall (>68%; 13 of 19). A single Atlantic Sturgeon was observed in a small-mesh gill net; otherwise, all interactions occurred in large-mesh gill nets (Table 7; Figures 2–6). The size range of Atlantic Sturgeon measured by observers was 665–1,195 mm TL (n=15, mean=861.4, SD=238.5) and 610–1,075 mm FL (n=15, mean=750.5, SD=138.9; Table 7; Figure 7). There were no self-reported Atlantic Sturgeon interactions.

Observed take levels during the 2021 ITP year did not reach the thresholds of allowed takes for any management unit (Tables 1 and 2). The 17 observed Atlantic Sturgeon interactions resulted in an estimated 85.0 total live interactions and 11.9 total dead interactions in large-mesh gill nets and 1.0 live interaction in small-mesh gill nets. The total live interactions in large-mesh gill nets represents 3.9% of the 2,203 allowable sturgeon takes; the total dead interactions in large-mesh gill nets represents 11.8% of the 101 allowable sturgeon takes. The single take observed alive in small-mesh gill nets represents <1% of the 724 allowable sturgeon takes for that mesh-size category.

3.3 Compliance

During the 2021 ITP Year, there were 2,572 fishers with an ENGP; 88% (n=2,276) of the permit holders were commercial fishers (i.e., had a Standard Commercial Fishing License [SCFL] or Retired Standard Commercial Fishing License [RSCFL]) and 12% (n=296) were recreational fishers (i.e., had a Recreational Commercial Gear License [RCGL]). Of the commercial fishing permit holders, only 527 (23%) reported trips using anchored estuarine gill-net gear.

Using the priority call list of EGNP holders, 1,396 phone calls or in-person contacts were made with 35% (n=489) representing occasions where observers and fishers spoke to each other. Of the 489 conversations, 54 of them (11%) were a result of fishers returning observer phone calls. Nevertheless, only 1.0% (n=14) of the 1,396 contacts resulting in a booked trip (Figure 8). The greatest number of calls occurred during fall, and the least number of calls occurred in winter.

During the 2021 ITP Year, Marine Patrol officers issued 74 citations: summer=42, Winter=9, Spring=11, Summer=12 (Table 8). No NOVs were issued. The NCDMF was in the process of updating NOV procedures to better follow rule and statutes as well as afford permittees their rights set out in those rules and statutes, and to streamline and automate the internal permit suspension and revocation process. Updated NOV procedures were finalized 1 August 2021.

3.4 Marine Mammals

There was no observed marine mammal take during the 2021 ITP year.

4 DISCUSSION

Incidental takes of Atlantic Sturgeon during the 2021 ITP Year were below authorized levels. All but one of the interactions were alive, thereby limiting negative effects of these interactions on the DPS. Interactions continue to be more common in large-mesh than small-mesh gill nets. No new proclamations had to be imposed during the 2021 ITP Year to maintain take levels below thresholds. However, regulations from Amendment 2 imposed on the state-wide Southern Flounder fishery greatly reduced large-mesh gill-net effort during fall and prevented the previous low levels of effort in this fishery during spring and summer. Limited allowance for anchored large-mesh gill nets occurred only during winter and spring for portions of Management Unit A and C.

During the 2021 ITP Year, the COVID-19 pandemic presented challenges for the Observer Program. The Observer Program worked with other NCDMF programs and Marine Patrol to leverage assistance in obtaining coverage. Their assistance allowed for observer coverage in fall to exceed the minimum threshold for both mesh-size categories in each management unit and overall. In spring, however, limitations on observer travel contributed to not meeting minimum thresholds for large-mesh gill nets in overall and in open Management Units (A and C) and not meeting minimum thresholds for small-mesh gill nets in three of the five open Management Units. Observers cannot reach all of Management Units B, C, and E without overnight travel. Additionally, few large-mesh gill-net trips were reported in Management Unit C during winter and spring, and finding this effort was difficult. While looking for large-mesh gill nets, observers did find and observe 14 runaround (all small mesh) gill-net trips during winter and seven runaround (all small mesh) gill net trips during spring. Although observer coverage of large-mesh gill-net trips during spring in Management Unit A did not meet the 7% minimum threshold, using the estimated number of fishing trips observer coverage was estimated to be close to the threshold (6.8%).

Even without the effects that COVID-19 had on observer coverage, scheduling 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 compliance by including specific permit conditions requiring fishers to allow observers aboard their vessels to monitor catches and by providing contact information for permit holders. Phone calls made to EGNP holders contributed some to observers scheduling trips, but the success rate of observers even talking to a fisher is low (~35%). The success rate did not improve much over last year even with the use of a priority call list for EGNP holders that reported fishing trips during the last several years. The NCDMF is in the beginning stages of developing a call-in system whereby fishers

would be required to contact the Observer Program prior to fishing to determine if they were selected to take an observer for a given period of time (e.g., week).

Although onboard observations are the preferred method, alternative platform observations played a critical role to the continuation of observing gill nets during the COVID-19 pandemic. Alternative platform observations have several other advantages. Primarily, they do not rely on previous contact with fishers 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 fishers 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 (Kolkmeyer et al. 2007). Nevertheless, the alternative platform method has several drawbacks. First, it requires two observers, halving observer effort and program efficiency. The Observer Program leveraged assistance from other NCDMF staff to help build teams to increase the capacity of the program during the 2021 ITP Year. Obtaining alternative platform observations also can be a challenge as some fishers 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 fisher 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. Because few observer trips were scheduled in advance, a significant amount of time was spent searching for fishing activity, especially when fishing activity was less concentrated. However, this effort by observers and Marine Patrol officers was sometimes unsuccessful at finding trips to observe. Outreach activities are an ongoing necessity to improve fisher compliance even when a call-in system is implemented. Outreach will resume when risks associated with COVID-19 are abated.

The NCDMF 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 anchored gill-net fisheries. Specific actions to limit sturgeon take were not necessary during the 2021 ITP Year. Other restrictions were already in place, however. Management Unit D1 was kept closed to large-mesh gill nets based on historical sea turtle densities and take levels. The new management measures for Southern Flounder significantly reduced large-mesh gill-net effort throughout the year, especially during fall 2020 when effort was historically high. These management measures, along with challenges faced from the COVID-19 pandemic and associated field restrictions, presented additional and unique challenges in predicting fishing effort and obtaining coverage during the 2021 ITP Year. The Observer Program will continue to assess when adjustments are needed for the approach of projecting fishing effort. It is more difficult to determine how COVID-19 will affect future observer effort as infection rates tend to rise and fall. At the time of writing this report, the observer program continues to operate only alternative platform trips to limit close contact between observers and fishers. This approach will be reevaluated on an ongoing basis to determine when onboard observations could resume. The NCDMF is committed to incorporating new approaches to project observer coverage and overcome the challenges of COVID-19.

5 LITERATURE CITED

Byrd, B. L., J. K. McConnaughey, and S. A. Smith. 2020. Annual sea turtle interaction monitoring of the 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 # 16230. North Carolina Department of Environmental Quality, North Carolina Division of Marine Fisheries (NCDMF), Morehead City, North Carolina (NC).

Byrd, B. L., J. K. McConnaughey, and S. A. Smith. 2021. Annual Atlantic Sturgeon interaction monitoring of anchored gill-net fisheries in North Carolina for Incidental Take Permit year 2020 (1 September 2019–31 August 2020). Annual Completion Report for Activities under Endangered Species Act Section 10 Incidental Take Permit # 16230. North Carolina Department of Environmental Quality, NCDMF, Morehead City, NC.

Canty, A., and B. Ripley. 2015. Boot: bootstrap R (S-Plus) functions. R package version 1.3-17.

Daniel, L. B. 2013. Application for an Individual Incidental Take Permit under the Endangered Species Act of 1973 for Atlantic Sea Turtle Populations of: Loggerhead, *Caretta caretta*, Green, *Chelonia mydas*, Kemp's ridley, *Lepidochelys kempii*, Leatherback, *Dermochelys coriacea*, Hawksbill, *Eretmochelys imbricata*. 13 June 2013. NCDMF, Morehead City, NC. (https://www.fisheries.noaa.gov/webdam/download/66756029)

Daniel, L. B. 2014. Application for an Individual Incidental Take Permit under the Endangered Species Act of 1973 for Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). North Carolina Division of Marine Fisheries (NCDMF). Morehead City, NC. 2 January 2014. (https://www.fisheries.noaa.gov/webdam/download/66755942)

Davison, A.C., and D.V. Hinkley. 1997. Bootstrap Methods and their Applications. Cambridge University Press, Cambridge.

Efron, B., and R.J. Tibshirani. 1993. An Introduction to the Bootstrap. Chapman and Hall, New York.

Kolkmeyer, T., B. Guthrie, B. L. Byrd, and A. A. Hohn. 2007. Report on the alternative platform observer program in North Carolina: March 2006 to March 2007. NOAA Technical Memorandum. National Marine Fisheries Service (NMFS), NMFS-SEFSC-558, Beaufort, NC.

Lyssikatos, M. C., and L. P. Garrison. 2018. Common bottlenose dolphin (*Tursiops truncatus*) gillnet bycatch estimates along the US Mid-Atlantic coast, 2007-2015. NMFS, Northeast Fisheries Science Center, Reference Document 18-07, Woods Hole, Massachusetts.

McConnaughey, J.K., J. Boyd, and L. Klibansky. 2019a. Annual Atlantic Sturgeon interaction monitoring of the gill-net fisheries in North Carolina for Incidental Take Permit year 2018. Annual Completion Report for Activities under Endangered Species Act Section 10 Incidental Take Permit # 16230. North Carolina Department of Environmental Quality, NCDMF, Morehead City, NC.

McConnaughey, J.K., J. Boyd, and L. Klibansky. 2019b. Annual sea turtle interaction monitoring of the gill-net fisheries in North Carolina for Incidental Take Permit year 2018. Annual Completion Report for Activities under Endangered Species Act Section 10 Incidental Take Permit # 16230. North Carolina Department of Environmental Quality, NCDMF, Morehead City, NC.

NMFS. 2013. Endangered Species; File No. 16230. Notice of permit issuance. Federal Register 78: 57132-57133. (https://www.federalregister.gov/d/2013-22592)

NMFS. 2014. Endangered Species; File No. 18102. Issuance of permit. Federal Register 79:43716-43718 (https://www.federalregister.gov/d/2014-17645).

NCDMF. 2019. North Carolina Southern Flounder (*Paralichthys lethostigma*) Fishery Management Plan Amendment 2. September 2019. North Carolina Department of Environmental Quality, NCDMF, Morehead City, NC.

R Core Team. 2019. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

6 TABLES

Table 1. For large-mesh (≥5 inch) gill nets, a comparison of actual (n=16) annual incidental takes of Atlantic Sturgeon by management unit during the 2021 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). Authorized takes in Management Units D and E were for the Carolina Distinct Population Segment (DPS) only and listed as not applicable (n/a) for Other DPS. 95% confidence intervals are provided in brackets. Genetic results were not available to determine DPS of observed interactions.

		Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
Management Unit	Season	Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	1,604	65	535	21	84.0 [32.61, 199.43]	11.9 [0, 35.71]
B	Annual	24	6	9	0	0	0
C	Annual	11	5	4	0	1	0
D	Annual	8	2	n/a	n/a	0	0
E	Annual	8	2	n/a	n/a	0	0
Total	Annual	1,655	80	548	21	85.0	11.9

Table 2. For small-mesh (<5 inch) gill nets, a comparison of actual (n=1) annual incidental takes of Atlantic Sturgeon by management unit during the 2021 ITP Year to authorized thresholds expressed as counts (not estimates) of actual observed takes. Authorized takes in Management Units C, D, and E were for the Carolina Distinct Population Segment (DPS) only and listed as not applicable (n/a) for Other DPS. Genetic results were not available to determine DPS of observed interactions.

		Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
Management Unit	Season	Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	569	45	114	10	0	0
B	Annual	14	5	3	0	1	0
C	Annual	8	4	n/a	n/a	0	0
D	Annual	8	2	n/a	n/a	0	0
E	Annual	8	2	n/a	n/a	0	0
Total	Annual	607	58	117	10	1	0

Table 3. Regulations for Management Units by effective date and regulation change for anchored gill nets during the 2021 ITP Year.

Year	Date(s)	Proclamation Number	Regulation change
2020	15-Sep	FF-25-2020	This proclamation supersedes Proclamation FF-34-2019, dated September 12, 2019. It establishes commercial flounder season dates for Internal Coastal Waters by Flounder Management Area. It maintains a 15-inch total length minimum size limit. It also maintains the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It makes it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action is being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan.
2020	Sep-20	M-13-2020	This proclamation supersedes proclamation M-10-2020 dated April 28, 2020. In Management Unit A, it maintains small mesh gill net attendance requirements. It expands the portion of Management Unit A to include the Chowan River that allows the use of run around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches to harvest blue catfish.
2020	Sep-20	M-14-2020	This proclamation supersedes proclamation M-13-2020 dated September 2, 2020. It opens the previously closed Management Unit A to the use of gill nets for the purpose of harvesting flounder in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan and the Sea Turtle ITP. It maintains the exempted areas in MUA open to the use of run-around, strike, drop, and trammel gill nets to harvest blue catfish. It also maintains small mesh gill net attendance requirements in the entirety of Management Unit A.
2020	Sep-20	M-15-2020	This proclamation supersedes proclamation M-6-2020 dated April 8, 2020. This proclamation opens Management Units B (subunits only), C, D2 and E 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 Amendment 2 to the N.C. Southern Flounder Fishery Management Plan.
2020	Oct-20	M-16-2020	This proclamation supersedes proclamation M-14-2020 dated September 10, 2020. It closes Management Unit A to the use of large mesh gill nets with overnight soaks for the purpose of harvesting flounder. It maintains the exempted portion of Management Unit A that allows the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches to harvest blue catfish. It maintains small mesh gill net attendance requirements in the entirety of Management Unit A.
2020	Oct-20	M-19-2020	This proclamation supersedes proclamation M-15-2020 dated September 25, 2020. This proclamation closes Management Unit B (subunits SGNRA 1-4, MGNRA and portions of CGNRA) and Management Unit C 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 Amendment 2 to the N.C. Southern Flounder Fishery Management Plan.

Table 3. (*continued*) Regulations for Management Units by effective date and regulation change for anchored gill nets during the 2021 ITP Year.

Year	Date(s)	Proclamation Number	Regulation change
2020	Nov-20	M-20-2020	This proclamation supersedes proclamation M-19-2020 dated October 16, 2020. This proclamation closes all management units south of Management Unit A 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 Amendment 2 to the N.C. Southern Flounder Fishery Management Plan.
2020	Dec-20	M-21-2020	This proclamation supersedes proclamation M-16-2020 dated October 1, 2020. In Management Unit A, it removes attendance requirements and imposes vertical height restrictions for anchored gill nets with a stretched mesh length of 3 inches through 3 ¾ inches. It maintains the exempted portion of Management Unit A that allows the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches to harvest blue catfish.
2020	Jan-21	M-3-2021	This proclamation supersedes proclamation M-21-2020 dated November 20, 2020. In Management Unit A, it is unlawful to use fixed or stationary gill nets with a stretched mesh length other than 3 ¼ inches. It maintains the exempted portion of Management Unit A that allows the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches to harvest blue catfish.
2021	Feb-21	M-5-2021	This proclamation supersedes proclamation M-3-2021 dated November 20, 2020. It opens an additional portion of Management Unit A that allows the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches. It maintains that it is unlawful to use fixed or stationary gill nets with a stretched mesh length other than 3 ¼ inches.
2021	Feb-21	M-6-2021	This proclamation supersedes proclamation M-20-2020 dated October 30, 2020. This proclamation opens Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches and implements gear exemptions for the shad fishery in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan.
2021	Mar-21	M-7-2021	This proclamation supersedes proclamation M-5-2021 dated January 29, 2021. It opens a portion of Management Unit A to the use of floating gill nets configured for harvesting American shad by removing vertical height and setting restrictions for all gill nets with stretched mesh lengths of 5 ¼ through 6 ½ inches. FF-2-2021 makes it unlawful to possess American shad for commercial purposes prior to 12:01 A.M. Wednesday, March 3, 2021 and after midnight Wednesday, March 24, 2021.
2021	Mar-21	M-8-2021	This proclamation supersedes proclamation M-12-2020 dated July 20, 2020. It increases the yardage limits for gillnets with a stretched mesh length less than 4 inches in Management Unit B and maintains yardage limits for Management Units C, D1, D2 and E. It also maintains attendance requirements for gillnets with a stretched mesh length less than 5 inches.

Table 3. (*continued*) Regulations for Management Units by effective date and regulation change for anchored gill nets during the 2021 ITP Year.

Year	Date(s)	Proclamation Number	Regulation change
2021	Mar-21	M-9-2021	This proclamation supersedes proclamation M-7-2021 dated February 25, 2021. It closes a portion of Management Unit A to the use of all gill nets and reduces the maximum amount of yards allowed for gill nets configured for harvesting American shad
2021	Mar-21	M-10-2021	This proclamation supersedes proclamation M-9-2021 dated March 9, 2021. In Management Unit A, it removes gill nets configured for harvesting American shad. It maintains that it is unlawful to use fixed or stationary gill nets with a stretched mesh length other than 3 ¼ inches, and opens a portion of Management Unit A to the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches for harvesting blue catfish.
2021	Apr-21	M-11-2021	This proclamation supersedes proclamation M-6-2021 dated January 29, 2021. This proclamation closes Management Unit C and maintains closures in all other management units south of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section II.: coincides with the commercial shad fishery closure) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan
2021	Apr-21	M-12-2021	This proclamation supersedes proclamation M-10-2021 dated March 17, 2021. In Management Unit A, it implements small mesh gill net attendance requirements. It maintains that it is unlawful to use fixed or stationary gill nets with a stretched mesh length other than 3 inches through 3 ¾ inches and keeps open a portion of Management Unit A to the use of run-around, strike, drop, and trammel gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches for harvesting blue catfish.
2021	May-21	M-13-2021	This proclamation revises proclamation M-13-2021 and changes the issue date only. This proclamation supersedes proclamation M-8-2021 dated March 4, 2021. It increases the yardage limits for the commercial Spanish mackerel drift gill net fishery in Management Unit B. It also reduces the yardage limit for anchored gill nets in Management Unit B.
2021	Jun-21	M-14-2021	This proclamation supersedes proclamation M-13-2021 (REVISED) dated May 4, 2021. It reduces the yardage limit for gill nets with a stretched mess length less than 4 inches in Management Unit B
2021	Sep-21	FF-40-2021	This proclamation supersedes Proclamation FF-25-2020, dated June 15, 2020. It establishes commercial flounder season dates for Internal Coastal Waters by Flounder Management Area. It maintains a 15-inch total length minimum size limit. It also maintains the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It makes it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action is being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan

Table 4. For large-mesh (≥5 inch) gill nets, observer coverage (observed trips/fishing trips) calculated by season and management unit for the 2021 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data and actual reported trips from the program for the 2021 ITP Year with the exception of Management Unit B during fall when estimated fishing trips were used, denoted by an asterisk (*). Estimated trips="*closed*" when and where anchored large-mesh gill nets were prohibited. Trip Ticket Program data are considered finalized for 2020 and preliminary for 2021.

		Large Mesh				
Season	Management Unit	Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2020	A	555	1,050	113	20.4	10.8
	B	370	370*	73	19.7	19.7
	C	190	122	40	21.1	32.8
	D	182	74	37	20.3	50.0
	E	349	521	63	18.1	12.1
	Overall	1,646	2,137	326	19.8	15.3
Winter 2020-2021	A	*closed*	*closed*	*closed*	*closed*	*closed*
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	29	32	1	3.4	3.1
	D	*closed*	*closed*	*closed*	*closed*	*closed*
	E	*closed*	*closed*	*closed*	*closed*	*closed*
	Overall	29	32	1	3.4	3.1
Spring 2021	A	762	949	52	6.8	5.5
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	376	16	0	0.0	0.0
	D	*closed*	*closed*	*closed*	*closed*	*closed*
	E	*closed*	*closed*	*closed*	*closed*	*closed*
	Overall	1,138	965	52	4.6	5.4
Summer 2021	A	*closed*	*closed*	*closed*	*closed*	*closed*
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	*closed*	*closed*	*closed*	*closed*	*closed*
	D	*closed*	*closed*	*closed*	*closed*	*closed*
	E	*closed*	*closed*	*closed*	*closed*	*closed*
	Overall	*closed*	*closed*	*closed*	*closed*	*closed*
Annual		2,813	3,131	379	13.5	12.1

Table 5. For small-mesh (<5 inch) gill nets, (observed trips/fishing trips) calculated by season and management unit for the 2021 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data and actual reported trips from the program for the 2021 ITP Year. Trip Ticket Program data are considered finalized for 2020 and preliminary for 2021.

		Small Mesh				
Season	Management Unit	Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2020	A	263	496	8	3.0	1.6
	B	812	1,375	26	3.2	1.9
	C	137	161	4	2.9	2.5
	D	244	69	10	4.1	14.5
	E	430	402	24	5.6	6.0
	Overall	1,886	2,503	72	3.8	2.9
Winter 2020-2021	A	800	600	6	0.8	1.0
	B	556	693	11	2.0	1.6
	C	255	173	2	0.8	1.2
	D	41	46	0	0.0	0.0
	E	106	139	10	9.4	7.2
	Overall	1,758	1,651	29	1.6	1.8
Spring 2021	A	656	550	11	1.7	2.0
	B	1,363	1,245	27	2.0	2.2
	C	212	121	1	0.5	0.8
	D	59	8	0	0.0	0.0
	E	111	101	0	0.0	0.0
	Overall	2,401	2,025	39	1.6	1.9
Summer 2021	A	172	159	5	2.9	3.1
	B	848	1,200	13	1.7	1.2
	C	92	54	1	2.2	3.7
	D	31	0	1	3.2	--
	E	193	134	5	3.1	4.5
	Overall	1,336	1,547	25	2.2	1.9
Annual		7,381	7,726	165	2.2	2.1

Table 6. Number of "No Contact" trips (n=1,092) by season and management unit completed by Marine Patrol and observers during the 2021 ITP Year. No Contact refers to unsuccessful attempts to find and observe anchored gill-net effort.

Season	Management Unit	Marine Patrol No Contact Trips	Observer No Contact Trips	Total No Contact Trips
Fall 2020	A	37	9	46
	B	17	12	29
	C	15	4	19
	D	24	8	32
	E	97	2	99
	Overall	190	35	225
Winter 2020-2021	A	42	0	42
	B	15	8	23
	C	12	12	24
	D	7	2	9
	E	132	1	133
	Overall	208	23	231
Spring 2021	A	36	2	38
	B	15	12	27
	C	10	15	25
	D	29	5	34
	E	139	4	143
	Overall	229	38	267
Summer 2020	A	60	1	61
	B	41	29	70
	C	35	13	48
	D	22	4	26
	E	162	2	164
	Overall	320	49	369
Annual		947	145	1,092

Table 7. Summary of observed Atlantic sturgeon (AS: n=17) and unidentified sturgeon (UND: n=2) interactions in large-mesh (≥5 inch) and small-mesh (<5 inch) gill nets during the 2021 ITP Year. PIT=Passive Integrated Transponders. n/a=not applied. n/r=not recorded. TL=Total Length. FL=Fork Length.

Date	Season	Management Unit	Species	Mesh Size Category	Latitude (N)	Longitude (W)	Disposition	PIT Number	TL (mm)	FL (mm)
9/16/2020	Fall	A	AS	Large	36.27690	-76.12250	Alive	982000410638484	790	650
9/17/2020	Fall	A	AS	Large	36.12183	-76.17841	Alive	982000410638420	732	647
9/17/2020	Fall	A	AS	Large	36.12183	-76.16440	Alive	982000410638353	665	610
9/23/2020	Fall	A	AS	Large	36.12717	-76.14754	Alive	n/a	n/r	n/r
9/23/2020	Fall	A	AS	Large	36.12488	-76.15739	Alive	3D60018795D78	746	650
9/23/2020	Fall	A	AS	Large	36.12441	-76.16273	Alive	3D6001879A148	875	750
9/23/2020	Fall	A	AS	Large	36.11036	-76.16401	Alive	3D60018797B00	750	664
9/23/2020	Fall	A	AS	Large	36.11056	-76.16509	Alive	3D60018793CF8	1195	1075
9/23/2020	Fall	A	AS	Large	36.10997	-76.16294	Alive	3D6001879D503	850	722
9/29/2020	Fall	A	AS	Large	36.10206	-76.18642	Alive	982000410637883	732	644
9/29/2020	Fall	A	AS	Large	36.10064	-76.18560	Alive	982000410637868	712	636
9/30/2020	Fall	A	AS	Large	36.43410	-75.9533	Alive	982000410599101	955	830
10/16/2020	Fall	C	AS	Large	35.36068	-76.64999	Alive	n/a	1143	1016
3/4/2021	Spring	A	UNK	Large	36.09653	-76.18230	Alive	n/a	n/r	n/r
3/4/2021	Spring	A	UNK	Large	35.94553	-75.79685	Alive	n/a	n/r	n/r
3/15/2021	Spring	A	AS	Large	36.07975	-76.29626	Alive	989001032053690	905	770
3/15/2021	Spring	A	AS	Large	36.07692	-76.29626	Dead	n/a	n/r	n/r
3/15/2021	Spring	A	AS	Large	36.07855	-76.29517	Alive	989001030160036	921	790
4/14/2021	Spring	B	AS	Small	35.52191	-75.49059	Alive	n/a	950	803

Table 8. All EGNP and NETG citations written by Marine Patrol for anchored gill nets by season and violation code during the 2021 ITP Year.

Season	Violation Date	Violation Code	Violation Description
Fall	2020-09-01	NETG09	Gill net set too close to bridge
Fall	2020-09-04	NETG23	Use gill/seine net within 1/4 mi of state/national park
Fall	2020-09-13	NETG02	Using gill net without buoys or identification
Fall	2020-09-13	NETG10	Gill net with illegal mesh size
Fall	2020-09-29	NETG03	Using gill net with improper buoys or identification
Fall	2020-09-29	NETG45	Set or retrieve large mesh gill nets no sooner than one hour before sunset on Mon through Thurs Proclamation M-8-2010
Fall	2020-10-01	NETG04	Leave gill net in waters when could not be legally fished
Fall	2020-10-02	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-02	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-02	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-02	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-02	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-02	NETG04	Leave gill net in waters when could not be legally fished
Fall	2020-10-02	NETG04	Leave gill net in waters when could not be legally fished
Fall	2020-10-03	NETG04	Leave gill net in waters when could not be legally fished
Fall	2020-10-05	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday Proclamation M-8-2010
Fall	2020-10-06	NETG37	Leave small mesh gill nets unattended 3J.0103
Fall	2020-10-07	EGNP30	Failure to comply with gill net configurations outlined in proclamation
Fall	2020-10-07	NETG04	Leave gill net in waters when could not be legally fished
Fall	2020-10-08	EGNP30	Failure to comply with gill net configurations outlined in proclamation
Fall	2020-10-08	NETG55	Violate the provisions of Proclamation M-30-2011 to wit set gill nets before one hour before sunset Proclamation M-30-11
Fall	2020-10-08	NETG55	Violate the provisions of Proclamation M-30-2011 to wit set gill nets before one hour before sunset Proclamation M-30-11
Fall	2020-10-12	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Fall	2020-10-12	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Fall	2020-10-12	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Fall	2020-10-14	EGNP11	Failure to attend nets
Fall	2020-10-14	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tues through Fri Proclamation M-8-2010
Fall	2020-10-14	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tues through Fri Proclamation M-8-2010
Fall	2020-10-15	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-15	NETG01	Leave gill net in coastal waters unattended

Table 8. (*continued*) All EGNP and NETG citations written by Marine Patrol for anchored gill nets by season and violation code during the 2021 ITP Year.

Season	Violation Date	Violation Code	Violation Description
Fall	2020-10-15	NETG37	Leave small mesh gill nets unattended 3J.0103
Fall	2020-10-15	NETG37	Leave small mesh gill nets unattended 3J.0103
Fall	2020-10-16	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-23	NETG37	Leave small mesh gill nets unattended 3J.0103
Fall	2020-10-27	NETG01	Leave gill net in coastal waters unattended
Fall	2020-10-27	NETG03	Using gill net with improper buoys or identification
Fall	2020-10-28	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Fall	2020-10-28	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Fall	2020-10-28	NETG01	Leave gill net in coastal waters unattended
Fall	2020-11-05	NETG02	Using gill net without buoys or identification
Fall	2020-11-10	NETG01	Leave gill net in coastal waters unattended
Fall	2020-11-19	NETG01	Leave gill net in coastal waters unattended
Winter	2020-12-03	NETG04	Leave gill net in waters when could not be legally fished
Winter	2020-12-17	NETG03	Using gill net with improper buoys or identification
Winter	2020-12-17	NETG10	Gill net with illegal mesh size
Winter	2021-01-02	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Winter	2021-01-02	NETG02	Using gill net without buoys or identification
Winter	2021-01-02	NETG10	Gill net with illegal mesh size
Winter	2021-02-17	NETG16	Use an unattended gill net in a restricted area
Winter	2021-02-27	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Winter	2021-02-27	NETG29	RCGL gear without proper buoys 3J.0103©
Spring	2021-03-06	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Spring	2021-03-10	NETG03	Using gill net with improper buoys or identification
Spring	2021-03-14	EGNP10	Set more than the legal length of gill net
Spring	2021-04-05	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Spring	2021-04-06	NETG03	Using gill net with improper buoys or identification
Spring	2021-04-06	NETG12	Net in middle third of marked navigational channel
Spring	2021-04-08	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Spring	2021-04-08	NETG04	Leave gill net in waters when could not be legally fished
Spring	2021-04-23	NETG10	Gill net with illegal mesh size
Spring	2021-04-27	EGNP26	Observer harassment

Table 8. (*continued*) All EGNP and NETG citations written by Marine Patrol for anchored gill nets by season and violation code during the 2021 ITP Year.

Season	Violation Date	Violation Code	Violation Description
Spring	2021-05-19	NETG22	Improperly set gill net
Summer	2021-06-17	NETG27	Gill Net set within 50 yards from shore 3H.0103 M-9-2008
Summer	2021-07-26	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Summer	2021-07-26	NETG03	Using gill net with improper buoys or identification
Summer	2021-07-26	NETG10	Gill net with illegal mesh size
Summer	2021-08-16	NETG04	Leave gill net in waters when could not be legally fished
Summer	2021-08-20	NETG02	Using gill net without buoys or identification
Summer	2021-08-25	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Summer	2021-08-25	NETG10	Gill net with illegal mesh size
Summer	2021-08-26	NETG01	Leave gill net in coastal waters unattended
Summer	2021-08-26	NETG04	Leave gill net in waters when could not be legally fished
Summer	2021-08-31	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
Summer	2021-08-31	NETG10	Gill net with illegal mesh size

7 FIGURES

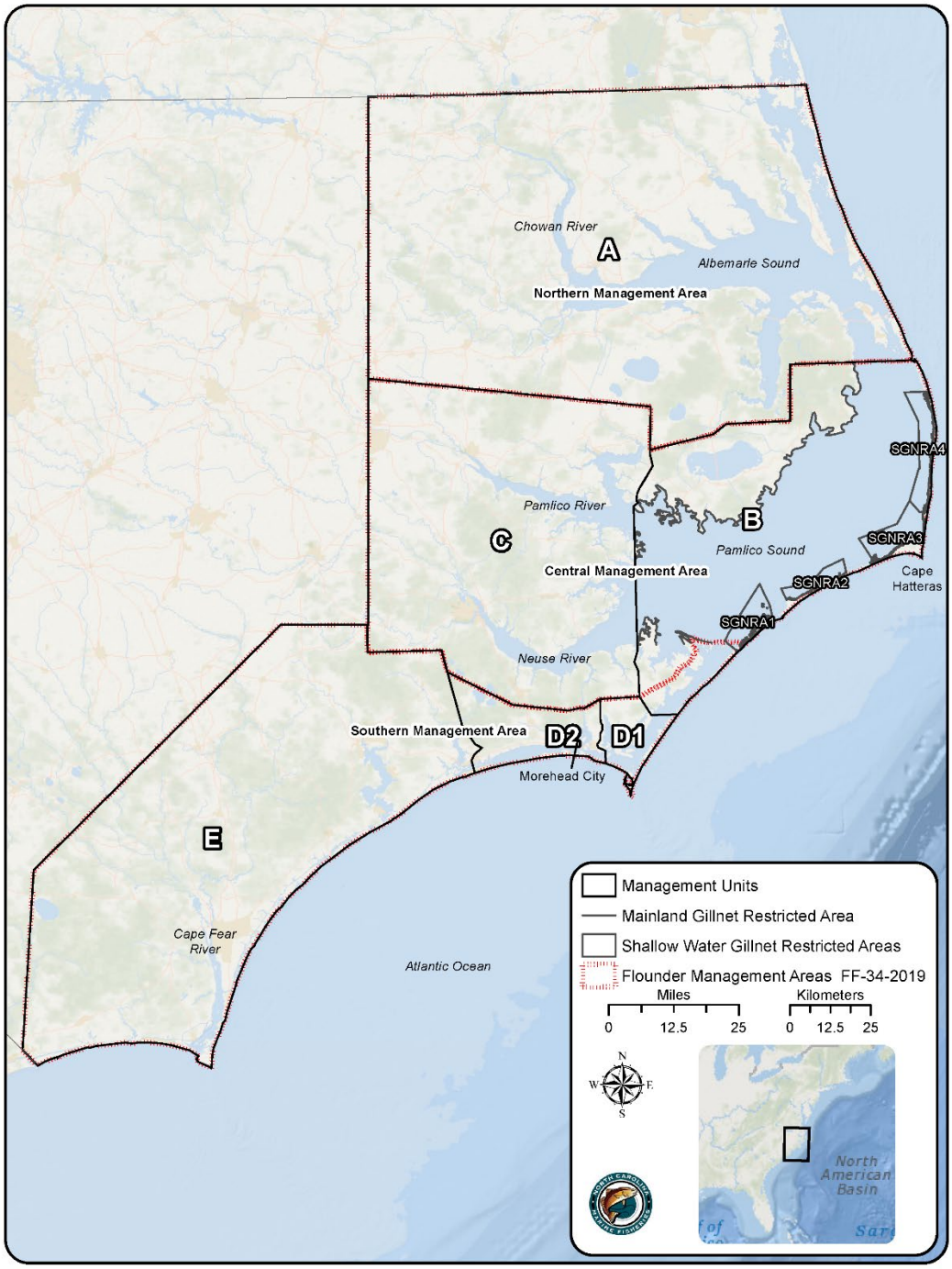

Figure 1. Management Units (A, B, C, D [D1 and D2], and E) as outlined in the Incidental Take Permit (ITP) Conservation Plan and used by the Observer Program during the 2021 ITP Year. In the Pamlico Sound portion of B, gill nets with a mesh size of ≥4 inches were confined to Shallow Water Gill-Net Restricted Areas (SGNRA) 1–4 and the Mainland Gill-net Restricted Area (200 yards from shore). The three Southern Flounder Management Areas are shown with red hatched lines: northern, central, and southern.

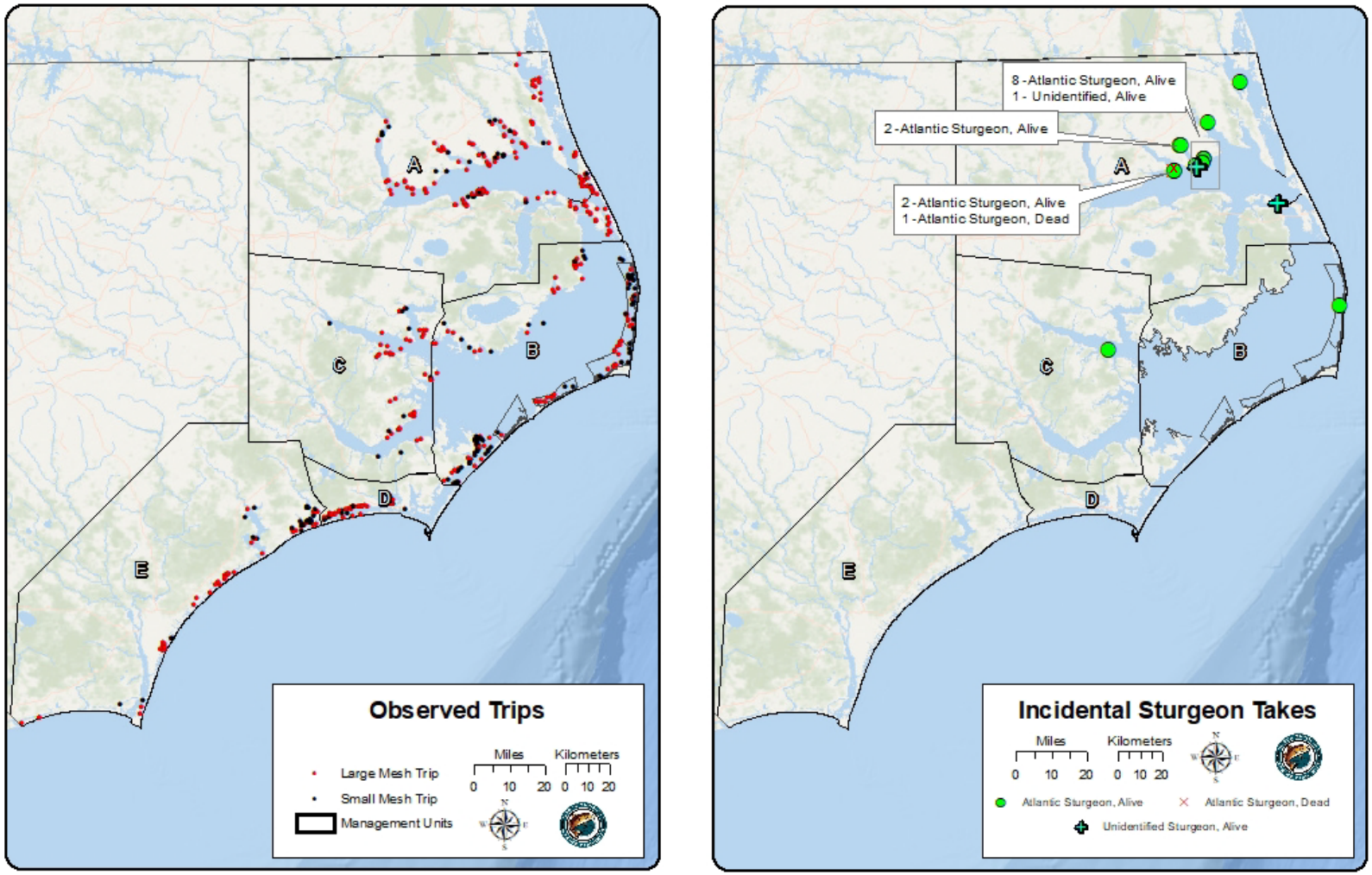

Figure 2. For the entire 2021 ITP Year, observed gill-net trips (left) by mesh-size category (379 large-mesh=≥5 inch; 165 small-mesh=<5 inch) and sturgeon interactions (right) by species and disposition (Atlantic Sturgeon: 16 alive, 1 dead; unidentified sturgeon: 2 alive, 0 dead) across management units.

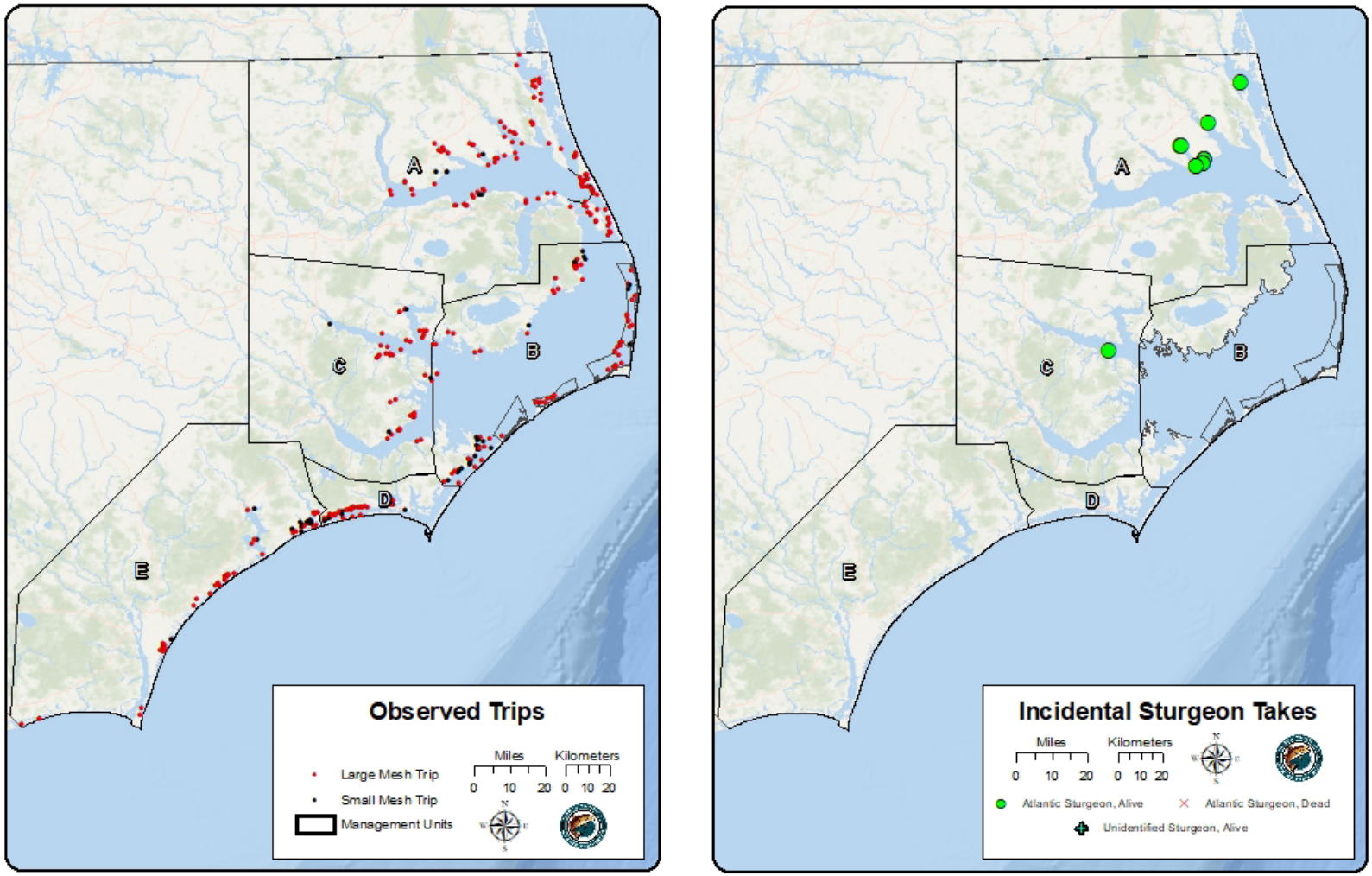

Figure 3. For fall 2020, observed gill-net trips (left) by mesh-size category (326 large-mesh=≥5 inch; 72 small-mesh=<5 inch) and Atlantic Sturgeon interactions (right) by disposition (13 alive, 0 dead) across management units.

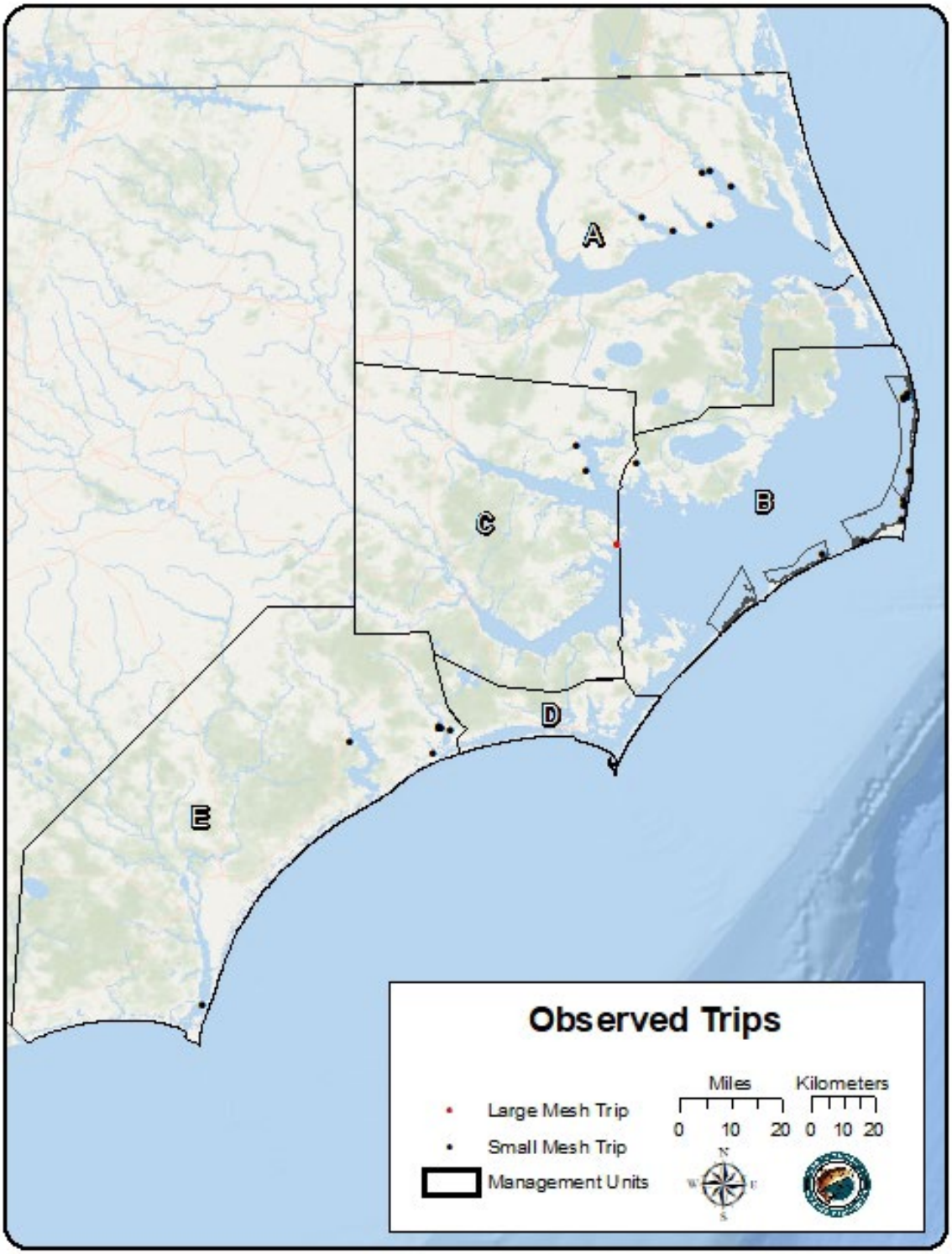

Figure 4. For winter 2020–2021, observed gill-net trips by mesh-size category (1 large-mesh=≥5 inch; 29 small-mesh=<5 inch). No sturgeon interactions were observed during winter.

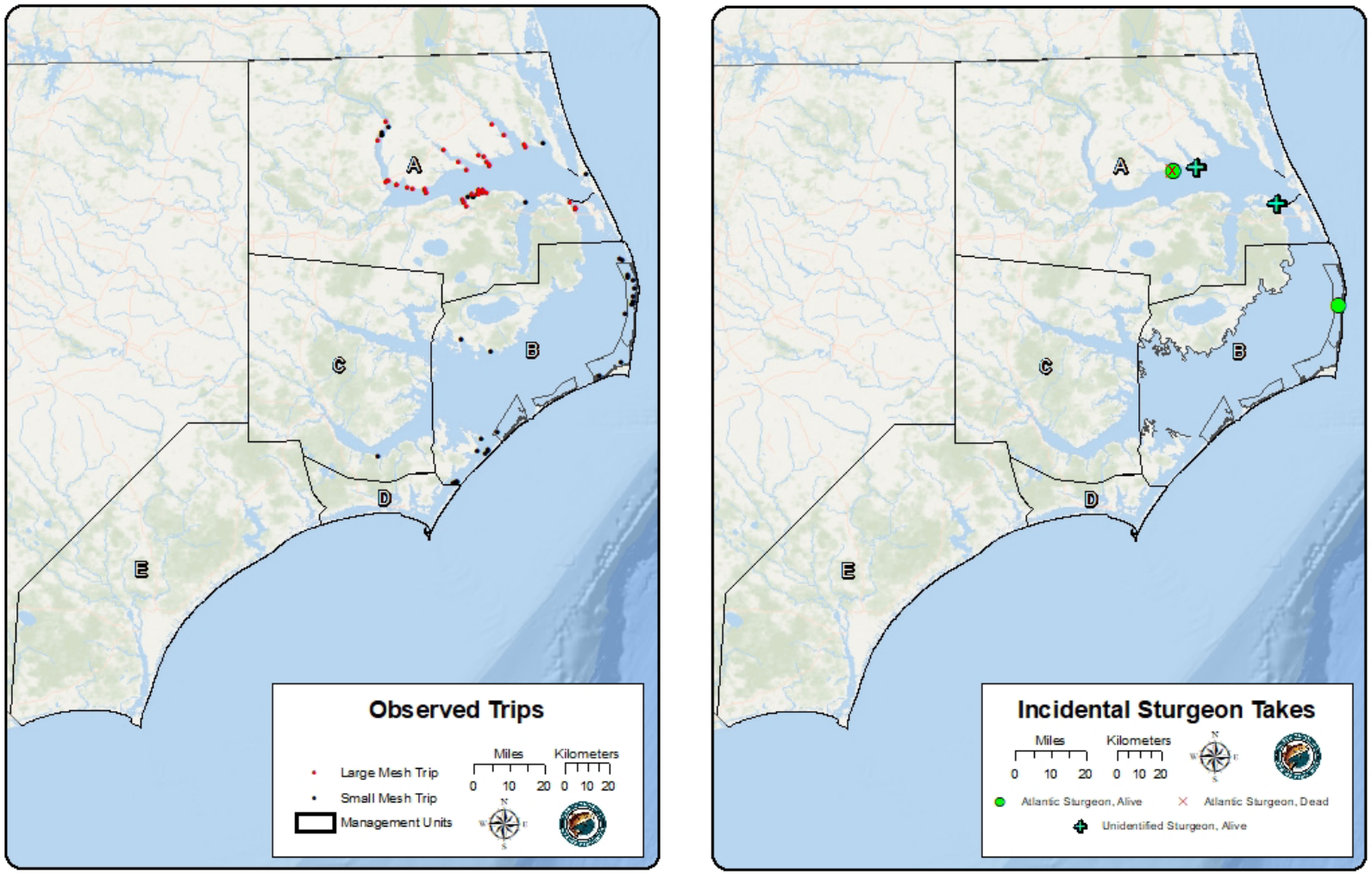

Figure 5. For spring 2021, observed gill-net trips (left) by mesh size-category (52 large-mesh=≥5 inch; 39 small-mesh=<5 inch) and sturgeon interactions (right) by species and disposition (Atlantic Sturgeon: 3 alive, 1 dead; unidentified sturgeon: 2 alive, 0 dead) across management units.

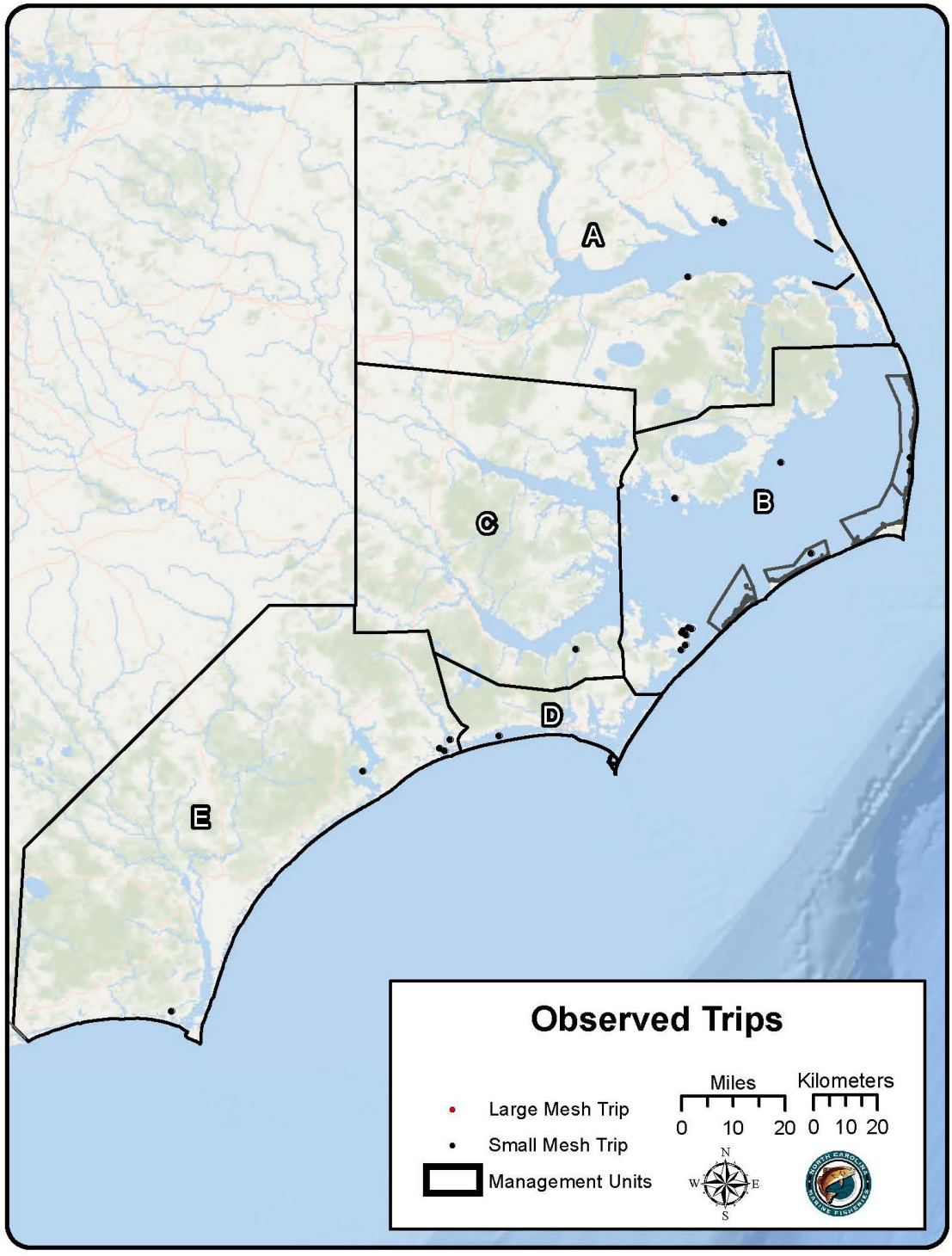

Figure 6. For summer 2021 observed gill-net trips by mesh-size category (0 large-mesh=≥5 inch; 25 small-mesh=<5 inch). No sturgeon interactions were observed during summer.

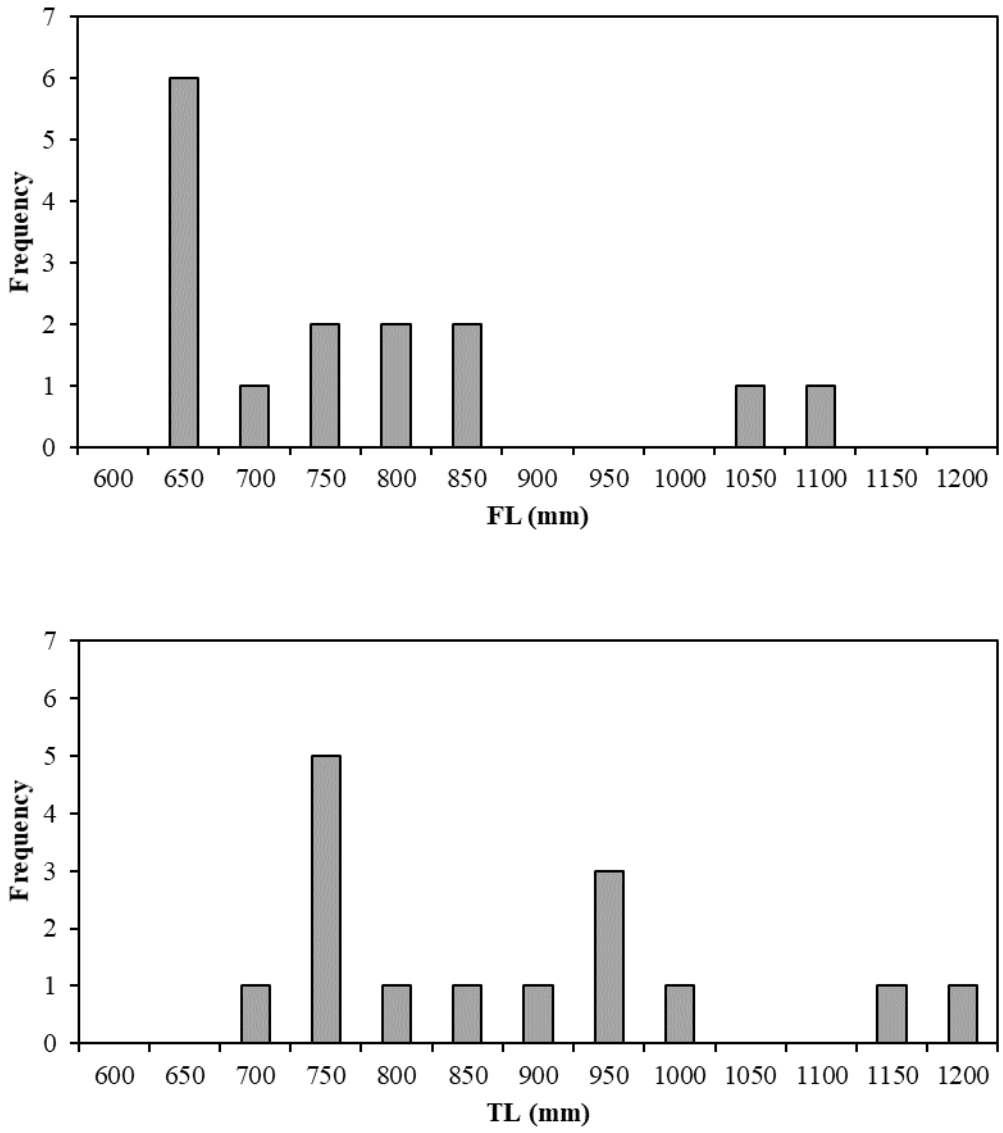

Figure 7. For observed and measured incidental takes of Atlantic Sturgeon during the 2021 ITP Year, length-frequency of (top) fork length (FL, mm; n=15 of 17 observed) and (bottom) total length (TL, mm; n=15 of 17 observed).

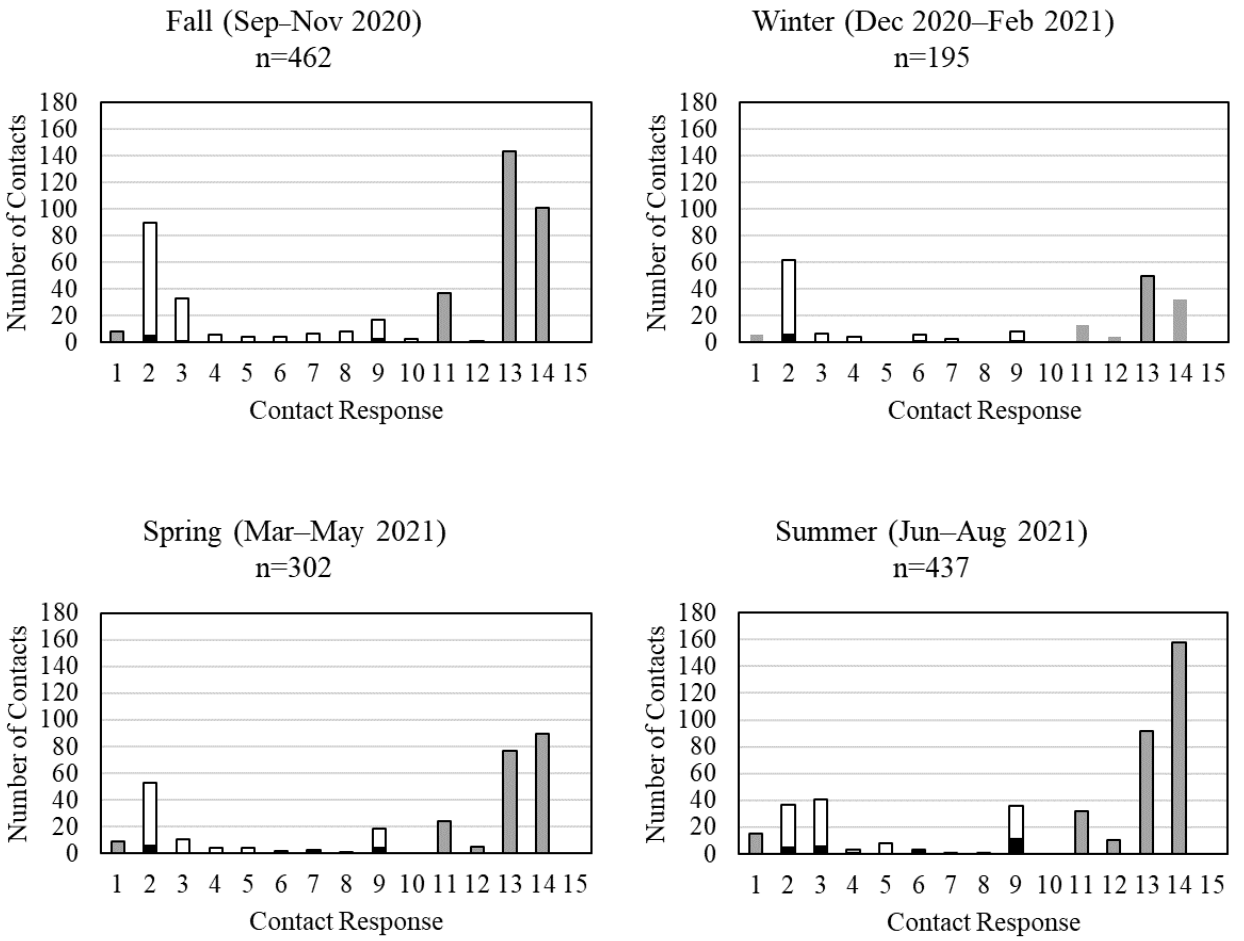

Figure 8. For the 2021 ITP Year, contacts attempted (n=1,396) by observers to schedule trips categorized by contact type (0-15) and presented as a percentage of the total for fall, winter, spring, and summer. Contact type categories include the following: 1) Left message with someone else; 2) Not fishing 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 fisher (white bars), when the observer did not (gray bars), and when the fisher returned an observer's call (black bars).

ROY COOPER
Governor

ELIZABETH S. BISER
Secretary

KATHY B. RAWLS
Director

5 July 2022

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

Dear Celeste:

The North Carolina Division of Marine Fisheries (NCDMF) submitted the Annual Completion Report for the Atlantic Sturgeon Incidental Take Permit (ITP) No. 18102 in February 2022 for the 2021 ITP Year (September 2020 through August 2021). Since then, the NCDMF Trip Ticket Program (TTP) finalized the 2021 data for reported fishing trips. Using the finalized TTP data, Tables 1, 4, and 5 from the Annual Completion Report were updated and presented in this memo to reflect the final estimates of observer coverage and sturgeon takes. Although TTP data for fall 2020 were finalized in the Annual Completion Report, changes to the dataset were found during the recent data pull for reported small-mesh and large-mesh gill-net trips (Tables 1 & 2). These differences in reported trips are due to dealers reporting data after the deadline, data edits discovered when processing applications related to the Coronavirus Aid Relief and Economic Security (CARES) Act, and data edits resulting from identification of potential errors by Protected Resources Program staff.

Anchored Large Mesh

Using finalized TTP data, there were 3,197 reported large-mesh gill-net trips during the 2021 ITP Year (Table 1), a net difference of 66 more trips than reported in the 2021 Annual Completion Report. This difference is driven by a large increase in trips during fall in Management Units B and C (97 and 84 more trips, respectively). The increase during fall in Management Unit B was influenced by the fact that the number of large-mesh fishing trips included in the Annual Completion Report was the predicted number of fishing trips not the reported number. The decision was made to include the predicted number of fishing trips for the Annual Completion Report because the TTP data available at the time was conspicuously missing reported large-mesh gill-net trips in Core Sound during fall. The Core Sound portion of Management Unit B is typically a common location used by fishers to target Southern Flounder with large-mesh gill nets. Staff with the TTP were alerted to this situation so the issue could be investigated; corrections were made, and the finalized data included large-mesh gill-net trips in Core Sound. The remaining differences in reported trips were spread among Management Unit A in fall and spring (73 and 53 fewer trips, respectively), Management Unit C in winter and spring (25 and 10 fewer trips, respectively), and Management Unit D and E during fall (19 and 27 more trips, respectively). The finalized data sometimes caused large changes in the percent observer coverage (from 0% up to a difference of 13.4%). There was only one instance where the change in percent observer coverage pushed final observer coverage above the 7% threshold (Management Unit C 11.2% increase in winter) and no instances where the change in percent observer covered reduced final observer coverage below the 7% threshold.

Anchored Small Mesh
Using finalized TTP data, there were 8,904 reported small-mesh gill net trips during the 2021 ITP Year (Table 2), a net difference of 1,178 more trips than reported in the 2021 Annual Completion Report. The net difference in the finalized data was due primarily to large increases in reported trips in Management Unit B during fall, spring, and summer (949 trips total). Although there were only three reported fishing trips in the finalized data for Management Unit D during summer, the difference resulted in a perceived increase of 33.3% observer coverage. This is because there were no reported fishing trips in that management unit and season for the Annual Completion Report so observer coverage could not be calculated for the one observed trip. Otherwise, finalized data affected observer coverage by management unit and season only slightly, but changed the percent observer coverage from 1.0% in Management Unit A during winter and 1.2% in Management Unit B during summer to 0.9%, below the 1% threshold, when presented as a tenth of one percent. For calculating observer coverage state-wide for a given season, the finalized data had a negligible effect on percent observer coverage and did not reduce observer coverage below the 1% threshold for any season or for the 2021 ITP Year overall.

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, estimated total takes in small-mesh gill nets for Management Unit A, and counts of observed takes for each mesh-size category in the other Management Units (B, C, D, E). There were 15 incidental takes of Atlantic Sturgeon during the 2021 ITP Year for which estimates were recalculated using the finalized 2021 TTP data (i.e., in large-mesh gill nets in Management Unit A). The number of estimated Atlantic Sturgeon takes using finalized TTP data was negligibly lower (alive: 82.5 vs 84.0, dead: 11.2 vs 11.9; Table 3). The other two observed takes of Atlantic Sturgeon were in management units for which takes are expressed as counts only and were not affected by finalized TTP data: one in a large-mesh gill net in Management Unit C and one in a small-mesh gill net in Management Unit B. Similarly, the two observed takes of sturgeon that could not be identified to species are expressed as counts only and were not affected by finalized TTP data. In summary, the annual estimated Atlantic Sturgeon takes during the 2021 ITP Year remained well below authorized thresholds.

Sincerely,

Barbie L. Byrd

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, Dee Lupton, Steve Poland, Casey Knight, Matthew Doster (NCDMF); Angela Somma, Wendy Piniak, and Kristy Long (NMFS)

Table 1. For large-mesh (≥ 5 inches stretched mesh) gill nets, percent observer coverage calculated from observer data and finalized reported fishing trip data from the Trip Ticket Program (TTP) by season and management unit for the 2021 ITP Year. Differences are shown for the number of reported fishing trips and percent observer coverage using finalized TTP data versus those reported in the Annual Completion Report, which included preliminary and finalized data. Positive difference numbers indicate more reported trips or higher coverage using finalized data while negative numbers indicate fewer reported trips or lower coverage. "*closed*" represents when/where anchored large-mesh gill nets were prohibited.

		Large Mesh				
Season	Management Unit	Reported Fishing Trips	Observed Trips	Percent Observer Coverage	Difference in Reported Fishing Trips	Difference in Observer Coverage
Fall 2020	A	977	113	11.6	-73	0.8
	B	467	73	15.6	97	-4.1
	C	206	40	19.4	84	-13.4
	D	93	37	39.8	19	-10.2
	E	548	63	11.5	27	-0.6
	Overall	2,291	326	14.2	154	-1.1
Winter 2020-2021	A	*closed*	*closed*	*closed*	*closed*	*closed*
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	7	1	14.3	-25	11.2
	D	*closed*	*closed*	*closed*	*closed*	*closed*
	E	*closed*	*closed*	*closed*	*closed*	*closed*
	Overall	7	1	14.3	-25	11.2
Spring 2021	A	896	52	5.8	-53	0.3
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	3	0	0.0	-13	0.0
	D	*closed*	*closed*	*closed*	*closed*	closed
	E	*closed*	*closed*	*closed*	*closed*	closed
	Overall	899	52	5.8	-66	0.4
Summer 2021	A	*closed*	*closed*	*closed*	*closed*	*closed*
	B	*closed*	*closed*	*closed*	*closed*	*closed*
	C	*closed*	*closed*	*closed*	*closed*	*closed*
	D	*closed*	*closed*	*closed*	*closed*	*closed*
	E	*closed*	*closed*	*closed*	*closed*	*closed*
	Overall	*closed*	*closed*	*closed*	*closed*	*closed*
All Seasons		3,197	379	11.9	63	-0.2

Table 2. For small-mesh (< 5 inches stretched mesh) gill nets, observer coverage calculated from observer data and finalized reported fishing trip data from the Trip Ticket Program (TTP) by season and management unit for the 2021 ITP Year. Differences are shown for the number of reported fishing trips and percent observer coverage using finalized TTP data versus those reported in the Annual Completion Report, which included preliminary and finalized data. Positive difference numbers indicate more reported trips or higher coverage using finalized data while negative numbers indicate fewer reported trips or lower coverage. The exception is denoted by an asterisk (*) for which there were no reported fishing trips in the Annual Completion Report; therefore, observer coverage could not be calculated for the one observed trip. The finalized data included three reported fishing trips, resulting in a perceived increase in observer coverage.

		Small Mesh				
Season	Management Unit	Reported Fishing Trips	Observed Trips	Percent Observer Coverage	Difference in Reported Fishing Trips	Difference in Observer Coverage
Fall 2020	A	496	8	1.6	0	0.0
	B	1,761	26	1.5	386	-0.4
	C	174	4	2.3	13	-0.2
	D	130	10	7.7	61	-6.8
	E	416	24	5.8	14	-0.2
	Overall	2,977	72	2.4	474	-0.5
Winter 2020-2021	A	632	6	0.9	32	-0.1
	B	696	11	1.6	3	0.0
	C	175	2	1.1	2	-0.1
	D	9	0	0.0	-37	0.0
	E	174	10	5.7	35	-1.5
	Overall	1,686	29	1.7	35	-0.1
Spring 2021	A	612	11	1.8	62	-0.2
	B	1,632	27	1.7	387	-0.5
	C	134	1	0.7	13	-0.1
	D	11	0	0.0	3	0.0
	E	103	0	0.0	2	0.0
	Overall	2,492	39	1.6	467	-0.3
Summer 2021	A	185	5	2.7	26	-0.4
	B	1,376	13	0.9	176	-0.2
	C	55	1	1.8	1	-0.1
	D	3	1	33.3	3	33.3*
	E	130	5	3.8	-4	1.0
	Overall	1,749	25	1.4	202	-0.2
All Seasons		8,904	165	1.9	1,178	-0.2

Table 3. For large-mesh (≥ 5.0 inch) gill nets, a comparison of actual (n=16) annual incidental takes of Atlantic Sturgeon by management unit during the 2021 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. Estimated total takes were based on finalized Trip Ticket Program data. Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

		Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
Management Unit	Season	Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	1,604	65	535	21	82.5 [31.5, 183.2]	11.2 [0, 33.7]
B	Annual	24	6	9	0	0	0
C	Annual	11	5	4	0	1	0
D	Annual	8	2	n/a	n/a	0	0
E	Annual	8	2	n/a	n/a	0	0
Total	Annual	1,655	80	548	21	83.5	11.2