DIRECTOR'S REPORT

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

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Director

April 15, 2020

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Steve Poland, Executive Assistant for Councils

SUBJECT: Information on Recreational Hook and Line Modifications

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Issue

Information on the efficacy of circle hook and barbless treble hook requirements in North Carolina coastal waters.

Overview

The following information paper summarizes the most recent scientific information related to hook modifications in the recreational fishery to reduce dead discards from catch-and-release fishing and provides commentary on potential considerations for the implementation of circle and barbless treble hook requirements in North Carolina coastal waters. Summary findings from the information paper include:

- In general, science supports the use of circle hooks as a means to reduce hook trauma and discard mortality
    - Aside from extensive research on red drum, few studies have been conducted in North Carolina that evaluate the effectiveness of circle hooks
    - Studies suggests that off-set circle hooks negate the positive benefits of circle hooks
- Very little research exists on the effects of hook trauma by treble hooks
- No industry standard exists for circle hook style and size
    - If circle hook use is required, a clear definition is needed
- Other management jurisdictions that require the use of circle hooks focus on single species/fisheries or complexes to implement hook requirements
    - Reduces unintended consequences, i.e. live bait trolling, exclusion of species with unique mouth physiologies, etc.
    - Increases the likelihood of compliance and enforcement
- Consider positive and negative social and economic effects
    - Potential decrease in angler satisfaction through decreased catch rates for some species
    - Positive impact to catch rates if population responds to reduced discard mortality
    - Economic impact to anglers and tackle shops

Action Needed

For informational purposes only, no action is needed at this time.

Information on requiring the use of circle hooks and bent-barbed treble hooks in North Carolina

January 28, 2020

Prepared by the Recreational Hook-and-line Discard Work Group

I. ISSUE

Provide summary scientific information on the efficacy of using circles hooks and bent-barbed treble hooks to reduce discard mortality of captured-and-released fish in North Carolina joint, coastal, and Atlantic Ocean waters out to three nautical miles. Additionally, provide input on the pros and cons of implementation of circle hook and bent barbed requirements including summary information of neighboring states and jurisdictions, expected benefits and limitations, and enforcement applicability.

II. ORIGINATION

At the August 2019 meeting of the Marine Fisheries Commission, the Chairman asked for the consideration of a motion to instruct the Division of Marine Fisheries to initiate rulemaking to require the use of circle hooks larger than 2/0 when fishing with natural bait and that all treble hooks have barbs pinched down. After discussion and a withdrawal of the motion, the Chair asked the Division to provide information on the science supporting the use of circles hooks, bent-barbed treble hooks and input on the efficacy of requiring their use in North Carolina waters.

III. BACKGROUND

Literature Review

The location of hook-related injuries is an important factor in determining catch-and-release mortality. A number of studies have shown the use of circle hooks in marine recreational fisheries reduce deep hooking and release mortality in marine finfish species (Grover et al. 2002; Lukacovic and Uhhoff 2002; Skomal et al. 2002). The first use of circle hooks in modern fisheries were by long line fisherman in the Pacific Ocean in the 1970s. However, the basic style of the hook pre-dates this use by thousands of years, evidenced by the discovery of circle hooks fashioned from shell and bone discovered throughout ancient Polynesia, Japan, and Latin America. The style hook was adopted by commercial fisherman in an effort to increase retention of target species in longline and trot line fisheries and to reduce mortality of bycatch and regulatory discards. The basic mechanics of a circle hook are explained by Johanes (1981). As a fish consumes a baited-circle hook and moves away, the hook naturally slides to the edge of the mouth in an orientation that allows for the gap to position around the jaw (Figure 1). As the pressure begins to increases, the hook point begins to "bite" against the soft flesh around the mandible or hinge. As pressure further increases, the hook rotates fully around and the fish is hooked. The circular design with the hook pointed back towards the shank prevents the hook from backing out completely while steady pressure is applied. Because the orientation of the hook point is not the same as the shank (Figure 1), when pressure is applied to the hook via the fishing line, the point does not catch as it would with a traditional style "J" hook. This reduces the chance of deep hooking when a hook is swallowed past the esophageal sphincter (Kerstetter and Graves 2006).

Hook size, fishing style, fish feeding mode, and mouth morphology are all elements that contribute to the effectiveness of circle hooks. In a study on bluegills, circle hooks permanently impaired vision of up to 22% of the fish, much more than J-hooks (Cooke et al. 2003). Conversely, Graves and Horodysky (2008) state that the post-release survival of white marlin captured using circle hooks is significantly higher than J-hooks. There was no significant difference in survival among different configurations of non-offset circle hooks commonly employed in the white marlin troll fishery (i.e. offset, bite, gap, bend, etc.) suggesting that the use of a non-offset circle hook, regardless of configuration, is better. These varying factors make the implementation of circle hook regulations as a universal solution to reduce release mortality for all fisheries in coastal waters complex. Several studies have recommended that management agencies focus on recommending circle hooks only for instances for which appropriate scientific data exist (Cooke and Suski 2004, Serafy et al. 2012). While the use of circle hooks may present a conservation benefit in some of these fisheries, only the adult red drum fishery in Pamlico Sound has been fully evaluated comparing large J-hooks to circle hooks in our coastal waters (Beckwith and Rand 2005).

Literature for the effects of treble hooks on the survival of captured and released fish is limited and at this time, few studies have been reviewed for species that occur in the state. Studies in Texas, showed no significant differences in release mortality for red drum and spotted seatrout between J-hooks and treble hooks (Matlock et al. 1993; Stunz and McKee 2006). Unfortunately, these studies did not include circle hooks as a gear type for comparison.

Defining a circle hook

A growing body of literature suggests that the use of circle hooks by recreational saltwater anglers reduces discard mortality (Cooke et al. 2012). Despite this general consensus, inconsistency exists regarding the definition of a circle hook among federal, regional, and state management authorities (Table 1). This complicates the implementation of management actions across regulatory jurisdictions. However, an overlapping characteristic across all circle hook definitions include *"the point turned perpendicularly back to the shank"*.

Table 1. Definitions of a Circle Hook across multiple management authorities

National Marine Fisheries Service (NMFS) Highly Migratory Species Division (HMS)*: A circle hook is defined as "A hook with the point turned perpendicularly back to the shank to form a generally circular or oval shape." An offset circle hook is further defined as "a circle hook originally designed and manufactured so that the barbed end of the hook is displaced relative to the parallel plane of the eyed-end, or shank, of the hook when laid on its side."(50 C.F.R. § 635.2)*
Atlantic States Marine Fisheries Commission (ASMFC)*: A circle hook is defined as "Non-offset hook with the point turned perpendicularly back to the shank."*
Gulf of Mexico Fishery Management Council (GMFMC) and South Atlantic Fishery Management Council (SAFMC): *A circle hook is defined as "A fishing hook designed and manufactured so that the point is turned perpendicularly back to the shank to form a generally circular, or oval, shape" (50 C.F.R. § 622.2)*
North Carolina Marine Fisheries Commission (MFC): *A circle hook is defined as "A hook with the point of the hook directed perpendicularly back toward the shank, and with the barb either compressed or removed". (15A NCAC 03J.0306)*

Inconsistency among management authorities is further complicated by non-uniformity in circle hook design among and within major hook manufacturers. While hooks may have the same basic anatomy (Figure 1), extensive combinations of attributes (gap, bite, shank length, total length, gap, eye, barb, bend), and barb orientation (offset or inline) make it almost impossible to adequately classify a hook by the manufacturer sizing.

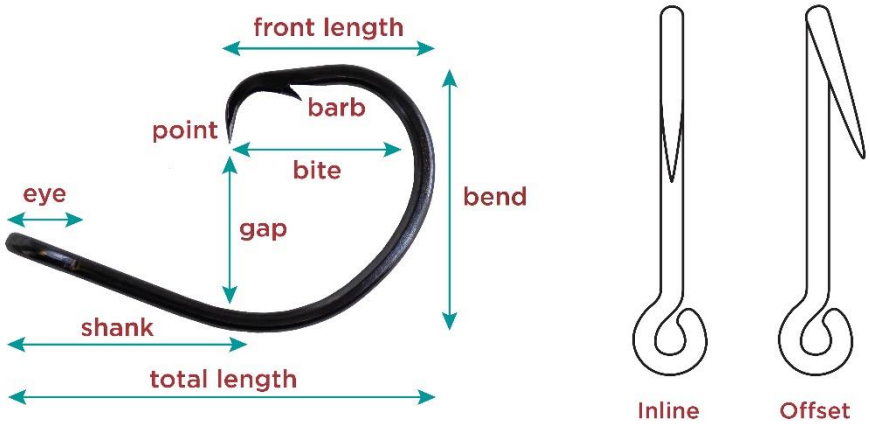

Figure 1. Basic hook anatomy and barb orientation. Reproduced from: www.in-fisherman.com/editorial/all-about-hooks/154924.

Hooks are manufactured from a myriad of metal and alloys (vanadium, high-carbon steel, stainless steel, etc.) and may come with an assortment of coatings for color preference and/or corrosion resistance. Most importantly, there is no size standardization within and among manufacturers. Figure 2 presents 4/0 hooks from three manufacturers (Eagle Claw, Mustad, Owner) with gap measurements ranging from 10mm to 14mm. The largest difference in gap shown is from two separate models of Eagle Claw 4/0 hooks. The same holds true for J-hook sizing as well. Although offerings are limited at this time, most hook manufactures do offer barbless versions of circle hooks and treble hooks.

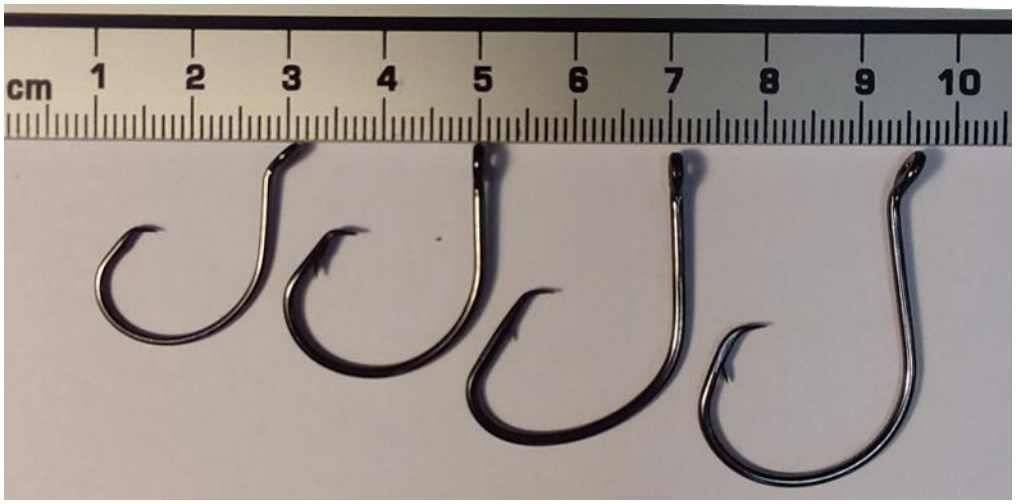

Figure 2. Left to right; Eagle Claw L2004EL, Mustad 3994-BN, Owner 5114T-141, Eagle Claw L7228BPG.

Other Jurisdictions

The Wildlife Resources Commission (WRC) restricts the use of multiple hooks and barbed hooks in the inland waters of the Roanoke River upstream of the U.S. 258 bridge. Only a single barbless hook or a lure with a single barbless hook may be used from April 1 to June 30. "Barbless" means that the hook either does not have a barb or that the barb is bent down. Tandem rigs are prohibited.

Many Atlantic coast states have rules that limit the time and area certain species can be harvested using traditional and/or barbed hooks and restrictions on the style of hooks used. The Florida Fish and Wildlife Commission (FWC) prohibits the harvest of Florida and African pompano, sheepshead, permit, spotted sea trout, snook, tarpon, flounder, and red and black drum with any multiple point hook in conjunction with live or natural bait. Multiple point hooks are defined as a hook with two or more points that share a common shaft. The FWC also requires angler who are shark fishing from shore or private vessel to use non-offset, non-stainless steel circle hooks when using live or dead natural bait. Further, an angler must also have in their possession a device that is capable of quickly cutting the hook or leader, i.e. bolt cutters, lineman pliers, cable cutters, etc.

Maryland Department of Natural Resources require the use of non-offset circle hooks while fishing in the Chesapeake Bay and its tidal tributaries when live-lining or chumming from May 16 to December 15. The use of treble hooks is prohibited when using other natural or processed baits while not live-lining or chumming. Additional restrictions on terminal tackle apply when fishing for striped bass depending on season and area. Some of these restrictions include the prohibition on using "stinger" hooks, use of barbless hooks when trolling, limited to six trolling lines per vessel, and require use of circle and J hooks with less than ½-inch gap.

The New York State Department of Environmental Conservation prohibits the take of sharks by baited hooking except with the use of non-stainless steel, non-offset circle hooks. Additionally, no person shall conduct, sponsor, or participate in any fishing tournament that offers a prize for sharks unless the tournament rules require the exclusive use of non-stainless steel, non-offset circle hooks.

Federal and interstate requirements for the use or restriction of certain types of hooks and terminal gear exist. The South Atlantic Fishery Management Council (SAFMC) requires the use of non-offset, non-stainless steel circle hooks North of 28^{o} latitude when in possession of any snapper-grouper species. The SAFMC recently approved Regulatory Amendment 29 to the Snapper-Grouper Fishery Management Plan which requires the use of non-stainless steel hooks throughout the South Atlantic and possession of a descender device.

For Highly Migratory Species (HMS) managed by NOAA Fisheries Highly Migratory Species Division, anglers aboard federally permitted vessels fishing recreationally for sharks are required to use non-offset, non-stainless steel circle hooks, except when fishing with flies or artificial lures. Anglers participating in Atlantic billfish tournaments must use only non-offset circle hooks when deploying natural bait or natural bait/artificial lure combinations. A billfish tournament is defined as any fishing tournament that awards points or prizes for billfishes, even if billfishes are not the main species targeted in the tournament. Billfish tournament anglers may deploy "J"-hooks only if they are fishing with artificial lures.

The Atlantic States Marine Fisheries Commission requires the use of non-offset, corrodible, non-stainless steel circle hooks when fishing for sharks recreationally, except when fishing with flies or artificial lures in state waters from Maine through the east coast of Florida. States must implement these management measures no later than July 1, 2020. The Atlantic States Marine

Fisheries Commission also requires the use of circle hooks when recreational fishing for striped bass with natural bait from Maine through North Carolina. In North Carolina, this measure only applies to striped bass fishing in ocean waters. States must implement these management measures no later than January 1, 2021.

Current circle hook regulation in North Carolina

Harvest of red drum greater than 27 inches in total length has been prohibited in North Carolina since 1998, however, recreational fishing for adult red drum for catch and release continues to be very popular. Given the popularity, release mortality of adult red drum in the recreational fishery has long been a management concern. Of particular concern is the tendency for a high incidence of deep hooking that occurs in the Pamlico Sound summer fishery where large adult red drum are aggregate prior to spawning. In this fishery, bait fishing on the bottom is a commonly employed method used from boats. This fishery creates somewhat of a unique scenario because the lack of strong currents often results in slack fishing lines and as a result can lead to a high incidence of deep hooking and elevated release mortality.

Each of the two prior FMPs for this species considered how to address this issue. The 2001 North Carolina Red Drum FMP considered various methods to reduce release mortality, but ultimately the plan opted to develop educational information on conservative angling practices for red drum, including the promotion of circle hooks and proper handling methods. Subsequent to the plan, educational information was provided by the Division and North Carolina Sea Grant including educational seminars to recreational fishing clubs, video productions, magazine and newspaper articles, as well as, distributing various types of educational pamphlets and other promotional giveaways. The plan also included research recommendations to characterize the adult red drum fishery and assess the mortality associated with the recreational releases of adult red drum.

In 2002, the Division and North Carolina Sea Grant conducted a survey of 456 anglers who target adult red drum in order to better characterize this fishery (unpublished data, NCDMF). Overall (all areas and modes of fishing), 56% of the respondents indicated that they always use circle hooks when fishing for adult red drum and another 27% occasionally used circle hooks. The results were similar for anglers in Pamlico Sound, with 52% of the respondents using circle hooks exclusively and 16% sometimes using circle for adult red drum.

Specific research was also conducted in the Pamlico Sound adult red drum fishery to estimate recreational release mortality, determine factors contributing to release mortality and determine the differences in deep hooking events between circle hooks and J-style hooks (Aguilar 2003, Beckwith and Rand 2004a, Beckwith and Rand 2004b). Studies by Aguilar (2003) and Beckwith and Rand (2004a) had overall mortality rates ranging from 3.8% to 6.7% based on adult red drum that were held for three days after being caught using either circle hooks or J-style hooks. Considering just fish that were deep hooked mortality rates were much higher (>15%) and all mortalities in the study showed evidence of internal bleeding from being deep hooked (Aguilar 2003, Beckwith and Rand 2004a). Aguilar (2003) found that circle hooks had a significantly lower incidence of deep hooking than J-style hooks when both were fished on standard bottom fishing rigs. Beckwith and Rand (2004b) advanced these findings and found that a large (Mustad 14/0 and 16/0 circle hook style: 39960D) or intermediate (Eagle Claw 8/0 circle hook (Style: L2004EL) sized circle hook combined with a short leader and a fixed weight resulted in the lowest incidence of deep hooking (4%) in the study. This was compared to greater than 50% deep hooking with a 7/0 J-style hook rigged with a standard leader and a slip weight (Beckwith and Rand 2004a).

Amendment 1 to the North Carolina Red Drum FMP reconsidered the issue of targeting adult red drum and the associated release mortality in light of this new research. Management options included hook requirements (size and type), seasonal closures and area closures. The primary focus was in protecting spawning aggregations of red drum in Pamlico Sound where catch rates were high and deep hooking and elevated mortality was known to be an issue. Impacts to other fisheries both in terms of species affected, seasons and areas played a major role in crafting the final rule that was adopted. Also, because the majority of the effort in the adult red drum fishery using bait occurred primarily at night, the final option limited the circle hook requirements to nighttime fishing to avoid conflicts with anglers using J-hooks to target tarpon. A further concern in rule adoption was the enforceability of a specific hook size given the lack of standardization in the tackle industry and the need to specifically define what constituted a circle hook. The benefit to the stock however was given paramount importance over these obstacles at the time the rule was passed. Efforts were made to educate the public on what constituted a legal rig both by giving rigs away at boating access points and by publishing the rig configuration on the Division website. The final rule was worded as follows:

15A NCAC 03J .0306 HOOK-AND-LINE

It is unlawful to use any hook larger than 4/0 from July 1 through September 30 in the internal coastal fishing waters of Pamlico Sound and its tributaries south of the Albemarle Sound Management Area as defined in 15A NCAC 03R .0201 and north of a line beginning at a point 34° 59.7942' N - 76° 14.6514' W on Camp Point; running easterly to a point 34° 58.7853' N - 76° 09.8922' W on Core Banks while using natural bait from 7:00 p.m. to 7:00 a.m. unless the terminal tackle consists of:

(1) A circle hook defined as a hook with the point of the hook directed perpendicularly back toward the shank, and with the barb either compressed or removed; and

(2) A fixed sinker not less than two ounces in weight, secured not more than six inches from the fixed weight to the circle hook.

History Note: Authority G.S. 113-182; 113-182.1; 143B-289.52;
Eff. April 1, 2009.

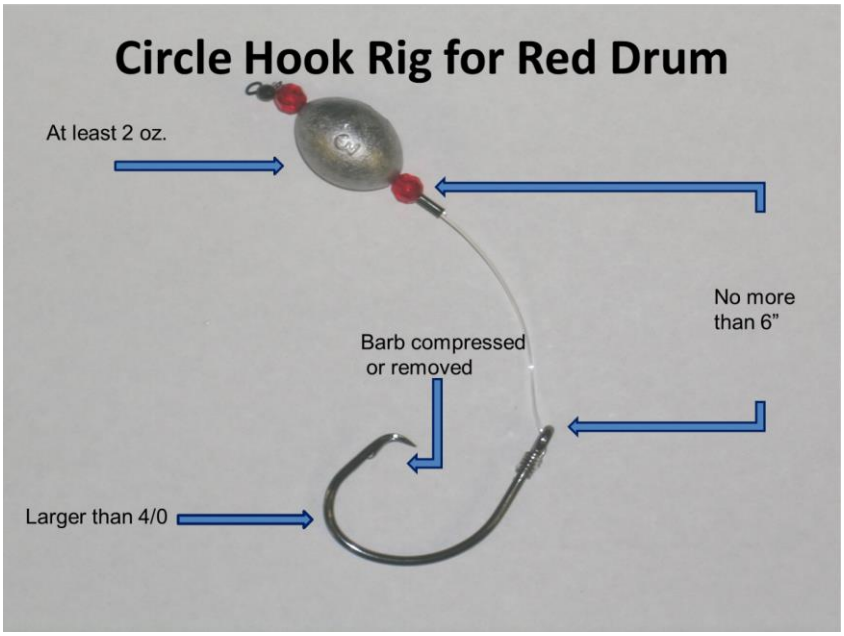

Figure 3. Current configuration of red drum natural bait rig described in Marine Fisheries Commission rule 15A NCAC 03J .0306.

IV. AUTHORITY

G.S. 113-182. Regulation of fishing and fisheries.

(a) The Marine Fisheries Commission is authorized to authorize, license, regulate, prohibit, prescribe, or restrict all forms of marine and estuarine resources in coastal fishing waters with respect to:
  (1) Time, place, character, or dimensions of any methods or equipment that may be employed in taking fish;
  (2) Seasons for taking fish;
  (3) Size limits on and maximum quantities of fish that may be taken, possessed, bailed to another, transported, bought, sold, or given away.

(b) The Marine Fisheries Commission is authorized to authorize, regulate, prohibit, prescribe, or restrict and the Department is authorized to license:
  (1) The opening and closing of coastal fishing waters, except as to inland game fish, whether entirely or only as to the taking of particular classes of fish, use of particular equipment, or as to other activities within the jurisdiction of the Department; and
  (2) The possession, cultivation, transportation, importation, exportation, sale, purchase, acquisition, and disposition of all marine and estuarine resources and all related equipment, implements, vessels, and conveyances as necessary to implement the work of the Department in carrying out its duties.
  (3) The possession, transportation, importation, exportation, sale, purchase, acquisition, and disposition of all fish taken in the Atlantic Ocean out to a distance of 200 miles from the State's mean low watermark, consistent with the Magnuson Fishery Conservation and Management Act, 16 U.S.C. § 1801, et seq., as amended. (1915, c. 84, s. 21; 1917, c. 290, s. 7; C.S., s. 1878; 1925, c. 168, s. 2; 1935, c. 35; 1945, c. 776; 1953, cc.774, 1251; 1961, c. 1189, s. 1; 1963, c. 1097, s. 1; 1965, c.957, s. 2; 1973, c. 1262, s. 28; 1995, c. 507, s. 26.5(c); 1997-400, s. 6.6.

V. DISCUSSION

Compliance with regulations requiring the use of circle hooks and bent barbs on treble hooks can only be achieved if the following factors are met; 1) enforceable rules for the use and modification of the gear including clear and quantifiable definitions of circle hooks and barbless treble hooks, 2) readily available gear that complies with aforementioned definition, 3) reasonable exclusions for fisheries and activities where catch rates may be disproportionally affected using the new required gear, 4) extensive public education on the proper use of new gear, and 5) clearly articulated benefits relative to current conservation and management strategies employed for our marine resources. Failing to consider or act on these factors will significantly curtail compliance with any regulations prescribing the use of circle hooks and bent barbed treble hooks and potentially undermine the conservation benefits of employing such practices.

To ensure effective and enforceable regulations, a definition of a circle hook including quantifiable metrics must be established. Numerous management agencies, including the NCDMF, already define what a circle hook is in rule with some variation. The circle hook requirements for sharks and striped bass are based on the Atlantic States Marine Fisheries Commission's circle hook definition (Table 1). The current Commission rule (*15A NCAC 03J.0306*) that defines a circle hook does not require the use of a non-offset hook but does require that the barb be pinched down. Research evaluating the effectiveness of circle hooks in reducing deep hooking suggests that the gear loses its intended effectiveness if the point is offset (Prince et al 2002). Additionally, rule *15A*

NCAC 03J.0306 requires the use of hooks larger than 4/0. As described previously, hook manufacturers do not standardize the sizes of their hook offerings. If hook size is to be considered, a definition including "the point turned perpendicularly back to the shank" and establishing discrete measurements for gap and offset should be included. In order for officers to testify in a court of law to the size of a circle hook, a gauge or measuring device will be needed similar to what is currently used for crabs, oysters, clams, and finfish. The current Commission rule defining a circle hook and prescribing its use is considered un-enforceable as written given the aforementioned inconsistencies in hook size. Officers can inspect the tackle relative to rig requirements listed in the rule but are unable to enforce hook size requirements. If the rule was modified to remove the size requirement, essentially making circle hooks a requirement regardless of size, an officer would have more discretion to enforce the regulation.

Circle hooks outperform J-hooks in reducing deep hooking of fish when using natural baits due to the manner in which natural bait is typically fished. These baits are often fished suspended or on the bottom with slack line which allows the fish to swallow the bait and hook without the tension or movement of the line or bait rig spooking or otherwise preventing the fish from consuming the bait. To aid in enforcement and ensure that anglers are using circle hooks when fishing with such bait, a clear definition of what does and does not constitutes natural bait is needed. Natural bait is not currently defined in rule so a definition will need to be developed if required use of circle hooks is subject to natural bait. Other jurisdictions have defined natural and artificial bait for the purpose of requiring or excluding their use in certain fisheries or areas. The Wildlife Resources Commission defines bait in mountain trout waters as "any living or dead organism (plant or animal), or parts thereof, or prepared substances designed to attract fish by the sense of taste or smell" (15A NCAC 10C .0205). Anglers are prohibited from using natural bait in mountain trout waters which includes not only live or dead bait, but also prepared or synthetic baits and attractants. A definition this broad applied to coastal waters could impact access to certain fisheries by limiting certain bait and lure configurations or undermine any conservation benefits to circle hooks by creating unintentional "loop holes" to avoid their use. Additionally, it could go beyond the intent of the rule by prohibiting fishing practices that do not pose a conservation concern. Careful consideration is needed in crafting an appropriate definition for natural bait that allows for its use or prohibition as intended.

Catch rates are another factor to consider with the implementation of circle hook regulations. Depending on the species targeted and style of fishing, rates of hook-up and landings can differ greatly between J- hooks and circle hooks. In a Maryland striped bass study, anglers using J-hooks landed a fish 42% of the time they detected a strike. When using non-offset circle hooks, anglers landed a fish 27% of the time. J-hooks were 52% more efficient than non-offset circle hooks in landing a fish once a strike was detected (Lukacovic and Uphoff 2002). The reduction in catch especially in trolling fisheries may present a significant concern with compliance. Trolling for king mackerel with strip baits or dead ballyhoo requires the use of 7/0 to 9/0 J-hooks. Catch rates for king mackerel using circle hooks while trolling has been shown to be reduced significantly (Rudershausen et al. 2011). Additionally, live bait trolling using barbed and barbless treble hooks have not been evaluated for differences in catch rates. Sheepshead are typically targeted using natural baits and either small, short shanked J-hooks or small treble hooks. Their hard mouth and dentition often require anglers to forcibly set the hook to ensure proper hooks set. A circle hook in this situation would not set. Catch rates may not differ using barbless treble hooks but there has been no research to evaluate the effectiveness of different hook types or the incidence of deep hooking using traditional methods and gear for this species. Another notable species that some anglers target in North Carolina using natural bait are flounder. They can be harvested drifting cut bait, fishing live bait, and with jigs in combination with natural or synthetic baits. Flounder are

ambush predators and engulf baits and prey as they drift or swim by and do not typically swim off after consuming a bait. It is up to the angler to set the hook either actively or passively by drifting by. The effectiveness of circle hooks for flounder fishing will depend on the fishing method with circle hooks likely more effective when anchored or shore fishing than from a drifting boat. No studies have evaluated the efficacy of circle hooks on the capture and survival of flounder in North Carolina. A study conducted on summer flounder in New York and Virginia tested for difference in hook type and survival in the recreational fishery and observed no significant difference between circle hooks and J-hooks (Malchoff and Lucy 1998).

The effective implementation of new gear regulations and best fishing practices will require an extensive public outreach and education campaign to educate anglers on the correct use of the new gear. A Texas study that evaluated hook types as well as rig configurations, bait, and angler experience level found that the only significant predictor of post release mortality was angler skill level with higher mortality associated with beginner/novice fisherman (Stunz and McKee 2006). The NC DMF has long prompted the use of ethical angling practices including the use of circle hooks. NC DMF publishes and distributes a pamphlet titled Ethical Angling: A Guide to Responsible Fishing, which details the use of circle hooks, catch and release, and proper handling of fish. NC DMF also distributes bumper stickers depicting a red drum and circle hook encouraging anglers to fish responsibly. Partnerships with the SAFMC, the FishSmart program supported by the Angler Action Foundation, and others have provided numerous other informational brochures and tackle giveaways to promote the use of circle hooks and other gears, such as fish descending devices, and information on best handling practices. Division staff have distributed over 500 red drum short leader rigs (with circle hook) obtained through its partnership with FishSmart. In addition to efforts by FishSmart, the NMFS Recreational Fisheries Policy Program provide 7,000 circle hooks of various sizes for distribution by the NC DMF. Staff assembled these hooks into "inshore" and "offshore" packages along with informational pamphlets for distribution. Over half of these were distributed during 2019. While it is challenging to quantify the impacts of information campaigns on angler use of circle hooks, anecdotal reports by Marine Patrol indicate that most anglers are using circle hooks while bait fishing in Pamlico Sound for red drum during the day, while regulations only require use at night.

The promotion of barbless treble hooks as a conservation measure has largely been replaced by the use of single inline hooks. The eye of this style of hook is turned inline and is meant to replace treble hooks on topwater and suspending hard baits. Their use has been promoted for a variety of reasons – less damage to fish, ease of unhooking, fish hooked more securely, less likely to collect grass or debris, and angler safety. This trend is gaining ground in the industry. Many manufacturers have started selling lures already rigged with single hooks. A local tackle shop in Eastern North Carolina advertised a promotion in June 2019 where anglers could bring 5 lures and have the trebles swapped out for inline single hooks. This trend is being driven by the tackle industry, retailers, and conservation-minded anglers. A coordinated public information campaign by NCDMF and tackle shops may shift the needle toward the use of single inline hooks in specific fisheries such as artificial lures for speckled trout.

Several North Carolina General Statutes (NCGS) address the authority for and requirements of implementing MFC rules. NCGS 113-134 authorizes the MFC to adopt rules to implement requirements of NCGS 113, Subchapter IV, Conservation of Marine and Estuarine and Wildlife Resources. The N.C. Fisheries Reform Act (FRA) of 1997 restructured the way North Carolina managed its coastal fisheries and enacted general statutes for the MFC, Coastal Habitat Protection Plan, Fishery Management Plans (FMPs), Marine Fisheries Law Enforcement, and Commercial Fishing Licenses. NCGS 143B-289.52 requires the MFC to adopt rules to be

followed in the management, protection, preservation, and enhancement of the marine and estuarine resources within its jurisdiction, including commercial and sports fisheries resources. NCGS 113-182.1 requires the NCDMF to develop FMPs for adoption by the MFC with the goal of the plans to ensure the long-term viability of North Carolina's commercially and recreationally significant species or fisheries. The N.C. Administrative Procedure Act (APA; NCGS 150B) applies to an agency's exercise of its authority to adopt a rule and states a rule is not valid unless it is adopted in substantial compliance with the requirements of the APA.

Currently, there are six species on the state FMP schedule that would be affected by changes in hook requirements. Estuarine Striped Bass, Kingfish, Red Drum, Sheepshead, Southern Flounder and Spotted Seatrout all support significant recreational fisheries and any changes to hook requirements could have potential impacts on the fisheries and associated anglers. Variations in size, location, and fishing techniques as they apply to the above species would require specific considerations when selecting appropriate hook size, shape, materials, etc. These variations make assigning one circle hook requirement across the board for various species problematic. What might work for one species may not be suitable for another. Additionally, given that paucity of research for state managed species and the current and potential future un-quantified metrics of use with circle hooks and barbless treble hooks the NC DMF may be unable to incorporate the positive effects of these management measures into stock assessments. Rather, any conservations gains realized by the required use of these gears will have to indirectly inferred from multiple assessments.

The FMP development process is a slow deliberate process that requires significant public input and legislative review. Considering the significant variability in effectiveness of circle hook requirements, developing this issue within each state FMP may be a more effective approach. This would allow the Division to evaluate existing literature, data, and current management to develop circle hook requirements that are specific to that species and associated fisheries and potentially evaluate their effectiveness directly. Development of FMP Amendments for Spotted Seatrout, Striped Bass, and Southern Flounder are currently underway, and consideration of circle hook and barbless treble hook requirements could be addressed in those upcoming amendments. Addressing hook requirements on a species-specific basis is also consistent with upcoming requirements for sharks and striped bass by the Atlantic States Marine Fisheries Commission and for snapper-grouper complex species by the South Atlantic Fishery Management Council.

VI. SUMMARY OF FINDINGS

- In general, science supports the use of circle hooks as a means to reduce hook trauma and discard mortality
    - Aside from extensive research on red drum, few studies have been conducted in North Carolina that evaluate the effectiveness of circle hooks
    - Studies suggests that off-set circle hooks negate the positive benefits of circle hooks
- Very little research exists on the effects of hook trauma by treble hooks
- No industry standard exists for circle hook style and size
    - If circle hook use is required, a clear definition is needed
- Other management jurisdictions that require the use of circle hooks focus on single species/fisheries or complexes to implement hook requirements
    - Reduces unintended consequences, i.e. live bait trolling, exclusion of species with unique mouth physiologies, etc.
    - Increases the likelihood of compliance and enforcement

- Consider positive and negative social and economic effects
    - Potential decrease in angler satisfaction through decreased catch rates for some species
    - Positive impact to catch rates if population responds to reduced discard mortality
    - Economic impact to anglers and tackle shops

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ASMFC SPRING SUMMARY WILL BE ADDED AS SUPPLEMENTAL MATERIAL PRIOR TO THE MAY MEETING

April 2020 Council Meeting Report

The following summary highlights actions taken and issues considered at the Mid-Atlantic Fishery Management Council's meeting April 2020 Council Meeting. This meeting was conducted by webinar due to the ongoing COVID-19 pandemic. Presentations, briefing materials, and webinar recordings are available at: http://www.mafmc.org/briefing/april-2020.

During this meeting, the Council:

- Adopted golden tilefish specifications for the 2021 and 2022 (interim) fishing years
- Voted to request an emergency action to allow a one-time 5% rollover of the unused 2020 fishing year golden tilefish IFQ allocation to the 2021 fishing year
- Recommended no changes to the previously-approved blueline tilefish specifications for the 2021 fishing year
- Approved a scoping document for the Black Sea Bass Commercial State Allocation Amendment
- Reviewed the 2020 Mid-Atlantic State of the Ecosystem Report
- Discussed climate change scenario planning and plan for potential East Coast/Mid-Atlantic exercise
- Received an update on South Atlantic for-hire reporting requirements

Golden Tilefish 2021 - 2022 Specifications

After reviewing recommendations from its Scientific and Statistical Committee (SSC), Tilefish Monitoring Committee (MC), and Tilefish Advisory Panel (AP), the Council voted to maintain status quo golden tilefish catch and landings limits for the 2021 and 2022 (interim) fishing years, except for the incidental total allowable landings (TAL) which was reduced from the 2020 level by slightly over 2,000 pounds. The Council did not recommend any changes to the current recreational bag limit or commercial/incidental trip limit. These specifications are summarized in the table below.

In addition, the Council discussed options to help mitigate the impacts of the COVID-19 pandemic on the fishery, which has experienced a drastic decrease in prices and low product demand. The Council passed a motion to request that NOAA Fisheries consider an emergency action to allow a one-time 5% rollover of the unused 2020 fishing year golden tilefish individual fishing quota (IFQ) allocation to the 2021 fishing year. This small roll-over of unused quota is intended to help the industry potentially recoup lost earnings due to COVID-19.

Summary of Golden Tilefish 2021 and 2022 (Interim*) Specifications	
Acceptable Biological Catch (ABC)	1,635,830 pounds
Commercial Quota – IFQ Fishery	1,554,038 pounds
Incidental Quota	70,621 pounds
Incidental Trip Limit	500 pounds
Recreational Trip Limit	8 fish per-angler, per-trip

**The 2021 management track assessment will be used to revise the 2022 interim management measures and set 2023 and 2024 specifications.*

Blueline Tilefish 2021 Specifications

The Council reviewed the 2021 blueline tilefish specifications previously set as part of the 2019-2021 specifications package. After reviewing recommendations from the staff, SSC, and MC, the Council determined that no changes to the 2021 specifications and management measures are warranted. These specifications are summarized in the table below.

The Council also reviewed the status of private permitting and reporting for blueline and golden tilefish which was approved with delayed implementation in 2017. Implementation was expected by May 1, 2020 prior to the COVID-

19 pandemic. Now, implementation may be slightly delayed to late spring/early fall. However, public outreach will continue to be provided by the Council and GARFO. Information regarding this action can be accessed here: https://www.mafmc.org/council-events/2020/tilefish-rec-reporting-webinar.

Summary of Blueline Tilefish 2021 Specifications	
ABC	100,520 pounds
Recreational TAL	71,912 pounds
Recreational trip limit	Private Boat: 3 fish USCG uninspected for-hire vessel (e.g., charter boats): 5 fish USCG inspected for-hire vessel (e.g., party boats): 7 fish
Commercial TAL	26,869 pounds
Commercial trip limit	500 pounds (until 70% of quota is met, then reduced to 300 pounds)

Black Sea Bass Commercial State Allocation Amendment

The Council reviewed a draft scoping plan and scoping document for a joint action with the Atlantic States Marine Fisheries Commission which will consider potential changes to the state-by-state allocations of the black sea bass commercial quota. This action will also consider whether these allocations should be added to the Council's FMP. The Council approved the scoping plan and scoping document after agreeing to a few revisions to the document. Two scoping hearing webinars will be held on May 11 and May 14, 2020. Written comments will be accepted through May 31, 2020. Additional details are available at https://www.mafmc.org/newsfeed/2020/bsb-com-state-allocation-scoping.

Mid-Atlantic State of the Ecosystem Report

Dr. Sarah Gaichas (NEFSC) presented a summary of the updates and findings from the 2020 Mid-Atlantic State of the Ecosystem report. The comprehensive report is developed by the NEFSC in collaboration with a number of universities, non-profit organizations, and state agencies. First provided to the Council in 2017, these annual reports provide ecosystem-level indicators that evaluate the status and trends of ecological, environmental, economic, and social components of the Mid-Atlantic ecosystem to help integrate this information and allow the Council to make more informed management decisions. The 2020 report provided a new 2-page summary with infographics and visualizations to highlight key take home messages. The report also included new indicators for recreational fishing, social science information tracking commercial engagement, the spatial overlap of wind lease areas and fisheries habitat, and forage fish energy density. Council members and the public provided feedback and suggestions for continued refinement of future versions of the report. This report and other ecosystem-related resources are available at https://www.mafmc.org/eafm.

Climate Change Scenario Planning

The Council discussed a plan for the climate change scenario planning process identified as a priority in their 2020 Implementation Plan. Scenario planning is a structured process that can be used to strategize in the context of uncontrollable and uncertain environmental and sociopolitical factors. The Council received a presentation on the basics of scenario planning from Diane Borggaard of GARFO's Protected Resources Division, including examples of its marine resource management applications. The Council then discussed a planned coordinated East Coast climate change scenario planning initiative as a way to explore jurisdictional and governance issues related to shifting stock distributions. The Northeast Regional Coordinating Committee (NRCC) has formed a working group to plan for this initiative. The working group will meet this spring to discuss finding a facilitator for this process and forming a core team for the project which should include representatives from all three Council regions on the East Coast.

South Atlantic Electronic Reporting

George LaPointe provided an overview of new South Atlantic for-hire reporting requirements. On February 24, NOAA Fisheries published a final rule which establishes electronic reporting requirements for vessels with a federal charter/headboat permit for Atlantic coastal migratory pelagics, Atlantic dolphin and wahoo, or South Atlantic snapper-grouper. Electronic reports from charter fishermen will be due by Tuesday following the end of

each reporting week, which runs from Monday through Sunday. This action also modifies the reporting deadline for headboats from Sunday to Tuesday following a reporting week. Mr. LaPointe reviewed the data elements that will be required in electronic reports and described how permit requirements for multiple reporting programs will be handled. These requirements will become effective September 1, 2020. A number of outreach and training opportunities have been planned for later this year. More information is available at: https://www.fisheries.noaa.gov/southeast/et.

Next Council Meeting

June 16-18, 2020

Hilton Virginia Beach Oceanfront
3000 Atlantic Avenue, Virginia Beach, VA 23451
Telephone: (757) 213-3000

http://www.mafmc.org/council-events/june-2020-council-meeting

NOTE: We are continuing to closely monitor the COVID-19 (coronavirus) situation. If necessary, this meeting may be conducted by webinar. Please check our website for updates as the June 2020 Council Meeting approaches. The meeting dates are subject to change if this shifts to a webinar-based meeting.

February 2020 Council Meeting Report

The following summary highlights actions taken and issues considered at the Mid-Atlantic Fishery Management Council's meeting February 11-13, 2020 in Duck, NC. Presentations, briefing materials, and webinar recordings are available at: http://www.mafmc.org/briefing/february-2020.

During this meeting, the Council:

- Appointed four new members to the Scientific and Statistical Committee
- Approved a public hearing document for the Mackerel, Squid, and Butterfish Goals and Objectives and *Illex* Permit Amendment and opted not to select any preferred alternatives
- Received an updated on the *Illex* Working Group
- Approved a 2020 Implementation Plan
- Received a presentation on the NEFSC Survey and Data Collection Programs
- Received a presentation on the Kitty Hawk Offshore Wind Project

New SSC Membership

In 2019, the Council completed a comprehensive review of its Scientific and Statistical Committee (SSC) membership in order to align new membership expertise with the future needs of the Council. Based on that review, the Council solicited applications to fill four vacancies that align with four different Council priority areas. The Council received applications from 11 highly qualified candidates covering a range of expertise and experiences. After reviewing all applications, the Council appointed the following four new members to the SSC:

- **Dr. Geret DePiper**, NMFS Northeast Fisheries Science Center, Social Sciences Branch (Economist/Social Scientist)
- **Dr. Gavin Fay**, University of Massachusetts Dartmouth's School of Marine Science and Technology (Fisheries Biologist/Ecologist)
- **Dr. Jorge Holzer**, University of Maryland, Dept. of Agricultural and Resource Economics (Economist/Social Scientist)
- **Dr. Alexei Sharov**, Maryland Department of Natural Resources, Fisheries Service (Stock Assessment)

The new members will serve a 3-year term beginning March 1, 2020.

Mackerel, Squid, and Butterfish Goals and Objectives and *Illex* Permit Amendment

The Council reviewed a public hearing document for the amendment considering changes to the Mackerel, Squid, Butterfish Fishery Management Plan (FMP) Goals and Objectives as well as changes to permitting for the *Illex* fishery. The Council approved taking the document out for public hearings once final editing is completed by staff. The Council decided not to identify any preliminary preferred alternatives at this time but did simplify the potential *Illex* fishery permitting requalification options by removing several redundant alternatives. Hearings are anticipated in April 2020, with final action considered in June 2020. The status of this action can be tracked at http://www.mafmc.org/actions/illex-permitting-msb-goals-amendment.

Update on *Illex* Working Group

The Council received an update on the Illex Working Group's progress related to analyses for modifying the Illex quota. The Working Group will have several products ready to present to the Council's SSC for the May 2020 SSC meeting. Additional information related to this working group is available at http://www.mafmc.org/actions/illex-working-group.

2020 Implementation Plan

The Council reviewed and approved its 2020 Implementation Plan. The annual implementation plan is developed each year as a tool for planning and prioritizing activities for the upcoming year within the broader context of the Council's longer-term goals and objectives. The 2020 Implementation Plan identifies the specific activities, amendments, frameworks, specifications, and other projects the Council expects to initiate, continue, or complete during the year. The plan also organizes the Council's planned work for the year within the context of the goals and objectives defined in the 2020-2024 Strategic Plan to ensure that progress is made in each area. During the meeting, the Council also discussed the planned meeting topics for 2020. The strategic plan and implementation plan are both available at www.mafmc.org/strategic-plan.

NEFSC Survey and Data Collection Programs

Dr. Jon Hare presented a comprehensive overview of the Northeast Fisheries Science Fisheries Science Center's (NEFSC) Survey and Data Collection Programs. The presentation included details on the NEFSC's organization, priorities and strategic goals, data collection programs, assessment and modeling programs, other scientific initiatives, and budget structure. Dr. Hare also described the Center's involvement with various MAFMC activities. Council members and members of the public noted that this agenda item was very informative and provided a great opportunity for questions and dialogue. The presentation can be viewed online here.

Kitty Hawk Wind Project

The Council received a presentation on the Kitty Hawk Offshore Wind Project from Brian Benito, the project's permitting manager. Kitty Hawk Wind is being developed by Avangrid Renewables in a lease area located 24 miles off the coasts of Virginia and North Carolina. Mr. Benito's presentation described recent and upcoming planning and assessment activities and fisheries outreach.

Other Business

Omnitracs VMS Units: The Council discussed the recent announcement that the McMurdo 'Omnitracs' VMS operated by vessels with Greater Atlantic Region permits will not be supported by its satellite provider after March 31, 2020. According to GARFO's notice to fishermen (distributed January 15, 2020) the 'Omnitracs' VMS unit will not function with any other satellite provider and must be replaced by April 1, 2020 or risk being out of compliance with VMS regulations in the region. Several stakeholders in the Mid-Atlantic region have voiced their concern with both the cost burden and the short timeframe allowed to complete this transition. The Council agreed to write a letter to the NOAA Office of Law Enforcement addressing these concerns.

Next Council Meeting

April 7-9, 2020

Stockton Seaview Hotel
401 South New York Road, Galloway, NJ 08205
Telephone: 609-652-1800

http://www.mafmc.org/council-events/april-2020-council-meeting

South Atlantic Fishery Management Council

News Release

FOR IMMEDIATE RELEASE
March 6, 2020

CONTACT: Kim Iverson
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Kim.Iverson@safmc.net

Federal Fisheries Managers Address Broad Range of Issues During Meeting This Week

This week's meeting of the South Atlantic Fishery Management Council in Jekyll Island, Georgia reflected the diversity of issues involved in managing fisheries in federal waters in the Southeast. During the meeting the Council developed recommendations on measures proposed in the Florida Keys National Marine Sanctuary, approved an amendment to modify transit provisions for shrimp vessels during cold-weather closures, addressed designating Special Management Zone areas off the coasts of the Carolinas, and received updates on the 2020 red snapper season, shark depredation, and wind farms.

The Council received presentations from the Florida Fish and Wildlife Conservation Commission (FWC) as well as the Florida Keys National Marine Sanctuary regarding proposed measures in the Sanctuary's *Restoration Blueprint* affecting fishing within the South Atlantic Council's portion of the Sanctuary. The proposed measures include expansion of the Sanctuary boundaries, modifying designated marine zones where fishing would be restricted or prohibited, eliminating baitfish permits, and prohibiting fish feeding activities. FWC held a series of stakeholder workshops in January 2020 and has developed recommendations based on input received at the workshops and other meetings. After reviewing the FWC recommendations, the Council discussed their role in the process and began drafting a letter to provide formal comments to the superintendent of the Florida Keys National Marine Sanctuary by mid-March. A final copy of the letter will be posted on the Council's website as part of the March 2020 meeting materials.

Council members voted to approve Amendment 11 to the Shrimp Fishery Management Plan that would modify current transit provisions for commercial shrimp vessels during cold-weather closures. The Council created the cold-weather closures and associated transit provisions to protect overwintering shrimp. During the most recent cold-weather closure for penaeid shrimp (brown, pink, and white shrimp) in 2018, shrimp fishermen indicated that gear stowage requirements were no longer feasible and asked that they be adjusted. Working together with members of the Council's advisory panels to find a solution, the amendment would modify the gear stowage requirements within the transit provisions. The amendment must undergo Secretarial review before the measures may be implemented.

At the request of state marine resource agencies in North Carolina and South Carolina, the Council is considering designating a series of artificial reef sites within federal waters (3 miles or greater) offshore of each state as Special Management Zones. Amendment 34 to the Snapper Grouper Fishery Management Plan would designate 30 artificial reef sites off of North Carolina and four sites off of South Carolina, where gear restrictions would be put into place for fishermen targeting species in the snapper grouper management complex. The Council approved the amendment for public hearings to be held via webinar prior to the June Council meeting. The hearings will be publicized as details become available.

(Continued)

Other Items

The Council received an update from NOAA Fisheries regarding a possible recreational season for red snapper in the South Atlantic of three days beginning the second Friday in July. The number of fishing days is determined by NOAA Fisheries each year. The 2020 opening is contingent on changing current regulations that prohibit opening the season for three days or less. The Council approved Snapper Grouper Regulatory Amendment 33 in December 2019 requesting the minimum number of days requirement be eliminated. The amendment is currently under review by NOAA Fisheries. Read more.

The Council also received a presentation from NOAA Fisheries Highly Migratory Species Division addressing concerns about shark depredation. The presentation acknowledged growing concerns about the impacts of shark depredation on fishing activities and outlined the challenges in addressing the concerns, including data needed to quantify shark encounters by fishermen. Council members also received an update on the status of the Kitty Hawk Wind Farm project proposed off the east coast of North Carolina, took action to table proposed changes for commercial Spanish mackerel trip limits in the northern zone, moved forward with developing an amendment to designate bullet mackerel and frigate mackerel as Ecosystem Component Species and began preliminary discussions of allocations. For additional meeting details, view the interactive Story Map for the March Council meeting or visit the Council's website at: https://safmc.net/safmc-meetings/council-meetings/ for committee reports and other meeting materials.

The next meeting of the South Atlantic Fishery Management Council is scheduled for June 8-12, 2020 in Key West, Florida.

The South Atlantic Fishery Management Council, one of eight regional councils, conserves and manages fish stocks from three to 200 miles offshore of North Carolina, South Carolina, Georgia and east Florida.

South Atlantic Fishery Management Council

SUMMARY MOTIONS

March 2 – 5, 2020

Jekyll Island, GA

This is a summary of the motions approved by the Council. Motions addressing actions and alternatives for FMP amendments are followed by text showing the result of the approved motion. Complete details on motions and other committee recommendations are provided in the Committee Reports available on the SAFMC website.

Committee of the Whole

MOTION 1: APPROVE THE DRAFT LETTER TO THE FKNMS AS THE COUNCIL'S COMMENTS REGARDING THE FLORIDA KEYS NATIONAL MARINE SACTUARY RESTORATION BLUEPRINT DRAFT ENVIRONMENTAL IMPACT STATEMENT AS MODIFIED.

APPROVED BY COUNCIL

MOTION 2: COMMITTEE DIRECTED STAFF TO COMPLETE THE FOLLOWING TASKS:

- Prepare a letter to be signed by the Council Chair to the Superintendent of the FKNMS with comments regarding the Restoration Blueprint DEIS.
- Bring back to the Snapper Grouper Committee a white paper regarding ecosystem component species designation for Cubera Snapper, Margate, Sailor's Choice, Coney, Yellowfin Grouper, and Saucereye Porgy.
- Bring back to the Snapper Grouper Committee the information regarding ACLs and allocations for unassessed species as directed above.

APPROVED BY COUNCIL

Habitat Committee

MOTION 1: DIRECT THE HABITAT (AND ECOSYSTEM) AP TO UPDATE OR CREATE AN ADDENDUM TO INTEGRATE AND ADDRESS CLIMATE CHANGE IN THE BEACH DREDGING AND FILLING, BEACH RENOURISHMENT AND LARGE SCALE COASTAL ENGINEERING POLICY STATEMENT.

APPROVED BY COUNCIL

MOTION 2. ADOPT THE FOLLOWING TIMING AND TASK(S):

- Staff support ongoing development of the South Atlantic Ecopath with Ecosim Model and SSC Workgroup review and presentation during June Committee meeting.
- Staff provide guidance and priorities supporting NOAA and partners mapping/characterization of South Atlantic deepwater ecosystem.
- Staff facilitate ongoing Habitat and Ecosystem AP sub-panel input highlighting state activities addressing FEP II Implementation Roadmap.

APPROVED BY COUNCIL

Mackerel Cobia Committee

MOTION 1: DISCONTINUE WORK ON CMP FRAMEWORK AMENDMENT 9 UNTIL THE STOCK ASSESSESSMENT.

APPROVED BY COUNCIL

Shrimp Committee

Amendment 11 Actions -- Motions 1 - 4:

MOTION 1: APPROVE IPT RECOMMENDATIONS TO THE PURPOSE AND NEED.

The *purpose* is to modify cold-weather closed area transit provisions to match current vessel design, reduce the socio-economic impact for fishermen avoiding the cold-weather closed areas if they cannot comply with regulations, and improve safety at sea while maintaining protection for overwintering white shrimp and regulation enforceability.

The *need* is to adjust current regulations because gear cannot be stowed below deck on many vessels.

APPROVED BY COUNCIL

MOTION 2: APPROVE THE IPT RECOMMENDED OPTIONS FOR SHRIMP. AMENDMENT 11

Status Quo. Brown shrimp, pink shrimp, or white shrimp may be possessed on board a fishing vessel in a closed area, provided the vessel is in transit and all trawl nets with a mesh size less than 4 inches (10.2 cm), as measured between the centers of opposite knots when pulled taut, are stowed below deck while transiting the closed area. A vessel is in transit when it is on a direct and continuous course through a closed area.

Option 1. A vessel may transit South Atlantic cold-weather closed areas while possessing brown shrimp, pink shrimp, or white shrimp provided the vessel is in transit and fishing gear appropriately stowed. Transit means non-stop progression through the area with fishing gear appropriately stowed. Gear appropriately stowed means trawl doors and nets out of the water and bag straps removed from the net.

Option 2. A vessel may transit South Atlantic cold-weather closed areas while possessing brown shrimp, pink shrimp, or white shrimp provided the vessel is in transit and fishing gear appropriately stowed. Transit means non-stop progression through the area with fishing gear appropriately stowed. Gear appropriately stowed means trawl doors in the rack (cradle), nets in the rigging and tied down, and try net on the deck.

APPROVED BY COUNCIL

MOTION 3: RECOMMEND OPTION 2 AS THE PREFERRED OPTION FOR SHRIMP. AMENDMENT 11

Option 2. A vessel may transit South Atlantic cold-weather closed areas while possessing brown shrimp, pink shrimp, or white shrimp provided the vessel is in transit and fishing gear appropriately stowed. Transit means non-stop progression through the area with fishing gear appropriately stowed. Gear appropriately stowed means trawl doors in the rack (cradle), nets in the rigging and tied down, and try net on the deck.

APPROVED BY COUNCIL

MOTION 4: RECOMMEND APPROVAL OF SHRIMP AMENDMENT 11 FOR FORMAL SECRETARIAL REVIEW AND DEEM THE CODIFIED TEXT AS NECESSARY AND APPROPRIATE. GIVE STAFF EDITORIAL LICENSE TO MAKE ANY NECESSARY EDITORIAL CHANGES TO THE DOCUMENT/CODIFIED TEXT AND GIVE THE COUNCIL CHAIR AUTHORITY TO APPROVE THE REVISIONS AND RE-DEEM THE CODIFIED TEXT.

APPROVED BY COUNCIL

MOTION 5. ADOPT THE FOLLOWING TIMING AND TASKS:

- Staff will prepare Shrimp Amendment 11 for Secretarial review and submit in April 2020.

APPROVED BY COUNCIL

Dolphin Wahoo Committee

Amendment 12 Actions -- Motions 1 - 3:

MOTION 1: APPROVE THE IPT'S SUGGESTED PURPOSE AND NEED STATEMENT.

The *purpose* and *need* is to add bullet mackerel and frigate mackerel to the Fishery Management Plan for the Dolphin Wahoo Fishery of the Atlantic as ecosystem component (EC) species to safeguard their ecological role as forage fish for wahoo.

APPROVED BY COUNCIL

MOTION 2: SELECT ALTERNATIVE 2 IN ACTION 1 AS THE PREFERRED ALTERNATIVE IN AMENDMENT 12.

Action 1. Designate bullet mackerel and frigate mackerel as ecosystem component species in the Dolphin Wahoo Fishery Management Plan

PREFERRED Alternative 2. Add bullet mackerel and frigate mackerel to the Dolphin Wahoo Fishery Management Plan and designate the two mackerel species as ecosystem component species.

APPROVED BY COUNCIL

MOTION 3: DIRECT STAFF TO COMPLETE THE FOLLOWING TASK:

- Continue work on Amendment 12 for review at the June 2020 meeting.

APPROVED BY COUNCIL

SOPPS Committee

MOTION 1: MODIFY THE EXISTING HANDBOOK LANGUAGE FOR THE TRAVEL REIMBURSEMENT SECTION TO REFLECT: ALL AIRLINE RESERVATIONS AND CAR RENTALS MUST BE MADE THROUGH THE COUNCIL'S DESIGNATED TRAVEL PROVIDER. TRAVEL EXPENSE REIMBURSEMENT WILL BE LIMITED TO THE PREVAILING AIRFARE RATE AS DETERMINED BY THE COUNCIL'S DESIGNATED TRAVEL PROVIDER. EFFECTIVE IMMEDIATELY.

APPROVED BY COUNCIL

MOTION 2: APPROVE THE FOLLOWING TASKS:

- Update the Council travel memos and instructions to reflect the new policy.
- Update the SAFMC handbook for future approval.

APPROVED BY COUNCIL

Executive Finance Committee

MOTION 1: ESTABLISH THE SAFMC AWARD OF EXCELLENCE AND GUIDELINES AS MODIFIED.

APPROVED BY COUNCIL

MOTION 2: APPROVE THE COMMITTEE CONSOLIDATION PLAN AS MODIFIED.

APPROVED BY COUNCIL

MOTION 3: APPROVE THE FOLLOWING TIMING AND TASKS:

- Notify Council, SSC, and AP members of the new Award of Excellence and the June 30, 2020 deadline for submitting nominations for the first award.
- Incorporate the committee consolidation plan for the June 2020 meeting and update Council guidance documents as required.
- Submit the NEPA changes comment letter by March 10, 2020.
- Coordinate with the GMFMC to arrange a meeting of the Joint Working Group between April and June 2020.
- Contact the NEFMC, MAFMC, and ASMFC to discuss next steps for addressing management concerns related to species distribution shifts.

APPROVED BY COUNCIL

MOTION 4: APPROVE THE DRAFT LETTER TO THE CEQ AS THE COUNCIL COMMENTS ON THE PROPOSED NEPA MODIFICATIONS.

APPROVED BY COUNCIL

Snapper Grouper Committee

MOTION 1: APPROVE THE STATEMENT OF WORK FOR THE RED SNAPPER ASSESSMENT AS MODIFIED.

APPROVED BY COUNCIL

Regulatory Amendment 34 Actions -- Motions 2 - 4:

MOTION 2: APPROVE THE PURPOSE AND NEED AS MODIFIED BELOW:

Purpose: Designate artificial reefs sites in the exclusive economic zone off North Carolina and South Carolina as special management zones and restrict fishing gear use within the areas.

Need: Reduce adverse effects to snapper grouper species and optimize fishing opportunities at the artificial reef sites.

APPROVED BY COUNCIL

MOTION 3: ACCEPT IPT'S EDITS TO ALTERNATIVES 1-3 AND SELECT ALTERNATIVE 3 AS PREFERRED UNDER ACTION 1.

Action 1. Designate artificial reefs in the exclusive economic zone off North Carolina as special management zones

Alternative 1 (No Action). There are currently no artificial reef sites in the exclusive economic zone off North Carolina designated as special management zones. The allowable gear for the snapper grouper fishery management plan for the commercial and recreational sectors are handline, rod and reel, spear, bandit gear, powerhead, pot, and longline (the last two are commercial sector only). Do not implement new restrictions on fishing gear used to harvest snapper grouper species from artificial reefs in the exclusive economic zone off North Carolina.

NEW Alternative 2. Designate 30 artificial reef sites in the exclusive economic zone off North Carolina as special management zones. Within the special management zones, harvest of snapper grouper species would only be allowed with handline, rod and reel, and spear. All harvest would be limited to the applicable recreational bag limit.

Alternative 3. Designate 30 artificial reef sites in the exclusive economic zone off North Carolina as special management zones. Within the special management zones, harvest of snapper grouper species would only be allowed with handline, rod and reel, and spear. All harvest by spear would be limited to the applicable recreational bag limit.

APPROVED BY COUNCIL

MOTION 4: ACCEPT SUGGESTED EDITS TO ACTION 2 AND ALTERNATIVES 1-3 AND MAINTAIN ALTERNATIVE 2 AS PREFERRED.

Action 2. Designate additional artificial reefs in the exclusive economic zone off South Carolina as special management zones

Alternative 1 (No Action). There are currently 28 artificial reef sites in the exclusive economic zone off South Carolina designated as special management zones. The allowable gear for the snapper grouper fishery management plan for the commercial and recreational sectors are handline, rod and reel, spear, bandit gear, pot, and longline (the last two are commercial sector only). Do not implement new restrictions on fishing gear used to harvest snapper grouper species from artificial reefs in the exclusive economic zone off South Carolina.

Preferred Alternative 2. Designate four additional artificial reef sites in the exclusive economic zone off South Carolina as special management zones. Within the special management zones, harvest of snapper grouper species would only be allowed with handline, rod and reel, and spear. All harvest would be limited to the applicable recreational bag limit.

Alternative 3. Designate four additional artificial reef sites in the exclusive economic zone off South Carolina as special management zones. Within the special management zones, harvest of snapper grouper species would only be allowed with handline, rod and reel, and spear. All harvest by spear would be limited to the applicable recreational bag limit.

APPROVED BY COUNCIL

MOTION 5: APPROVE REGULATORY AMENDMENT 34 FOR PUBLIC HEARINGS.

APPROVED BY COUNCIL

MOTION 6: APPROVE THE FOLLOWING TIMING AND TASKS:

- Prepare Regulatory Amendment 34 for public hearings.
- Hold webinar public hearings for Regulatory Amendment 34 prior to the June 2020 Council meeting.
- Begin work on white paper to determine need for conservation and management for the following species: Cubera Snapper, Margate, Sailor's Choice, Coney, Yellowfin Grouper, and Saucereye Porgy. Bring back to Council in June.

APPROVED BY COUNCIL

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

April 27, 2020

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Randy Gregory, Fisheries Biologist
Fisheries Management Section

SUBJECT: Highly Migratory Species Update

Issue
Highly Migratory Species activity update.

Action Needed
For informational purposes only, **no action is needed at this time.**

Overview
The Highly Migratory Species Advisory Panel meeting scheduled for May 19-21 will instead be an Advisory Panel conference call/webinar on May 19. The Advisory Panel will discuss Highly Migratory Species fishery management plan objectives, draft Amendment 13 to consider options for modifications to bluefin tuna management, and draft Amendment 14 for shark quota management.

Tuna
On Feb. 20, 2020, NOAA Fisheries closed the Atlantic bluefin tuna Angling category (recreational) fishery for large medium and giant "trophy" bluefin tuna (measuring 73 inches or greater) in the southern area. The fishery will remain closed through Dec. 31, 2020. The southern area is the area south of 39° 18' N (off Great Egg Inlet, NJ), outside the Gulf of Mexico. The Angling category (recreational) bluefin tuna daily retention limit is one school, large school, or small medium bluefin tuna (27 to <73 inches curved fork length).

On Feb. 24, 2020, NOAA Fisheries closed the General category (commercial) bluefin tuna fishery. Preliminary commercial landings for the General category January (January – March) sub-quota were 124.1 metric tons of the 100 metric ton adjusted sub-quota. The General category reopens on June 1, 2020 with a quota of 277.9 metric tons available for the June through August sub-quota.

On April 2, 2020, NOAA Fisheries published the final rule that modifies bluefin tuna bycatch management measures in the pelagic longline fishery. The final rule adjusts regulatory measures to manage bluefin tuna bycatch in the pelagic longline fishery for Atlantic highly migratory species. The final rule eliminates the Cape Hatteras Gear Restricted Area. The Individual Bluefin Quota Program limits the bluefin tuna incidental catch using individual vessel accountability and therefore, this restricted area is no longer needed.

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

April 27, 2020

MEMORANDUM

TO: Marine Fisheries Commission

FROM: Barbie Byrd, Biologist Supervisor
Protected Resources Program, Fisheries Management Section

SUBJECT: Protected Resources Program Update

Issue
Annual reports for Atlantic Sturgeon and Sea Turtle Incidental Take Permits (ITPs) are provided from the division's Protected Resources Program. The reports were submitted in April to the National Marine Fisheries Service as required for the 2019 ITP Year (Sept. 1, 2019 - Aug. 31, 2020).

Overview
During the 2019 ITP year, take levels for Atlantic Sturgeon and sea turtles in anchored estuarine gill nets did not reach or exceed allowable thresholds for any combination of species and management unit. Observers documented nine Atlantic Sturgeon and 22 sea turtles in large-mesh gill nets and four Atlantic Sturgeon and zero sea turtles in small-mesh gill nets. Observed sea turtle takes included 15 green, five Kemp's ridley, one loggerhead, and one unidentified sea turtle.

For the Atlantic Sturgeon ITP, state-wide observer coverage across four seasons during the 2019 ITP year met or exceeded the required coverage outlined in the permit (ITP) for anchored large-mesh (7.3%) and small-mesh (4.0%) gill net fisheries. For the sea turtle ITP, required observer coverage levels are at the season and management unit level. As such, observer coverage was below required levels for large-mesh gill nets (< 7%) in Management Units A and B during spring (5.9% and 6.5%) and summer (4.4% and 3.5%), and below required levels for small-mesh gill nets (<1%) in Management Unit D2 during spring (0%) and Management Units B and D1 during summer (0% and 0%). The Observer Program continues to have difficulty getting observed trips. Out of 5,852 phone calls and in-person contacts, observers spoke with a fisherman 43% of the time, but were only successful in scheduling a trip 4% of the time.

Due to concerns regarding COVID-19, the Observer Program received a waiver on 24 March from the National Marine Fisheries Service for maintaining observer coverage until further notice. As such, Protected Resources Program staff have temporary ceased all attempts to obtain onboard or alternative platform observations. Marine Patrol officers, however, continue to

conduct alternative platform observations as before. Fishermen are still required to self-report incidental captures in their gear.

The final document can be found at the following links:

2019 Annual Sea Turtle ITP Report
2019 Annual Atlantic Sturgeon ITP Report

Action Needed
For informational purposes only; **no action is needed at this time**.

Annual Sea Turtle Interaction Monitoring of the 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. 16230

Barbie L. Byrd, John K. McConnaughey, Scott A. Smith

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

April 2020

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1 INTRODUCTION

The North Carolina Division of Marine Fisheries (NCDMF) has actively addressed the incidental take of sea turtles in commercial estuarine gill nets since 2000. Between 2000 and 2011, the NCDMF had a series of Incidental Take Permits (ITP) from the National Marine Fisheries Service (NMFS) under Section 10(a)(1)(B) of the Endangered Species Act (ESA) of 1973 (Public Law 93-205) to "minimize, monitor, and mitigate" sea turtle interactions in anchored gill nets primarily in Pamlico Sound (Boyd 2012, Gearhart 2001, 2002, 2003, Murphey 2011, Price 2004, 2005, 2006, 2007, 2008, 2009, 2010). Five species of sea turtles can occur in North Carolina: green sea turtle (*Chelonia mydas*), Kemp's ridley sea turtle (*Lepidochelys kempii*), loggerhead sea turtle (*Caretta caretta*), hawksbill sea turtle (*Eretmochelys imbricata*), and leatherback sea turtle (*Dermochelys coriacea)*. Anchored gill nets are passive sets deployed with an anchor, stake, or boat at one or both ends of the net string; they do not include run-around, strike, drop, or drift gill nets. For this report, the term "gill net" refers to anchored gill net unless stated otherwise.

Evidence of incidental takes of sea turtles outside of Pamlico Sound was documented in June 2009 by NMFS observations of gill-net fisheries operating in Core Sound and nearby waterbodies (Byrd et al. 2016). These takes resulted in a series of temporary measures to address sea turtle interactions until the NCDMF obtained an ITP for gill-net fisheries state-wide (see McConnaughey et al. 2019). On 11 September 2013, the NCDMF received the Sea Turtle ITP (No. 16230), which expires on 31 August 2023 (McConnaughey et al. 2019, NMFS 2013). In addition to establishing authorized levels of incidental takes, the ITP included a Conservation Plan that consisted of measures the NMFS determined would monitor, minimize, and mitigate incidental takes of sea turtles in otherwise lawful gill net fisheries operating in North Carolina estuarine waters. The Conservation Plan included a continuation of restrictions implemented previously as temporary measures for large-mesh (≥ 4 inch stretched mesh) gill nets. Specifically, these restrictions prohibited gill nets in the deep waters of Pamlico Sound; limited soak times to an hour before sunset to an hour after sunrise; limited days of fishing to Monday evenings through Friday morning; 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 configuration 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 Management Units D2 (Figure 1) 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 (M-31-2014) (http://portal.ncdenr.org/web/mf/proclamation-m-31-2014). In addition to establishing regulations on how fisheries could be prosecuted, the Conservation Plan 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).

In July 2014, the NCDMF also received an ITP (No. 18102) to address incidental takes of Atlantic Sturgeon (*Acipenser oxyrinchus*) in gill-net fisheries operating in estuarine waters across the state (NMFS 2014). Although the ITPs and their Conservation Plans addressed different taxa, the fisheries included therein were the same. Both ITPs were reliant on observer coverage

to document incidental takes, and also to estimate total bycatch. Notably, however, the ITPs defined large mesh differently; the sea turtle ITP defined large-mesh gill nets as ≥ 4 inch stretched mesh and the Atlantic Sturgeon ITP defined them as ≥ 5 inch stretched mesh.

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 victim's pets.

Two regulations in place during the 2019 ITP Year also greatly affected gill-net fishing effort. First, Proclamation M-19-2017, issued in October 2017 (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 Management Unit D1 to gill nets with a mesh size of ≥ 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 D1. 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 in gill-net fisheries operating in the affected waters, which are part of Management Unit C.

Per the ITP requirements, the Observer Program provides weekly, seasonal, and annual reports to the NMFS for a given ITP year. As required, weekly progress reports were provided for any week in which a sea turtle interaction occurred. Seasonal reports for the 2019 ITP Year also were provided for fall (September-November 2018) (McConnaughey 2018), spring (March-May 2019) (McConnaughey 2019a), and summer (June-August 2019) (McConnaughey 2019b). The Conservation Plan does not require observer coverage or seasonal reports for winter because sea turtles are less likely to be present in North Carolina during this time. The deadline for annual reports is the last day in February. However, requests were made by the NCDMF to extend the report deadline into April for one year only due to staffing vacancies and changes that delayed the report generation, and also work interruptions from the coronavirus pandemic. This annual report outlines observer activity, fishing activity, and total or estimated takes of sea turtles for the

2019 ITP Year, 1 September 2018 – 31 August 2019. Data for fishing activity, measured in number of trips, are finalized for fall 2018. After the preliminary data for spring and summer 2019 are finalized in May 2020, observer coverage and authorized estimated sea turtle 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

Observer activity was distributed across six management units outlined in the Conservation Plan (A, B, C, D1, D2, and E) (Figure 1). Management Unit B is 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 Ocracoke, Hatteras, and Oregon inlets (Daniel 2013) (Figure 1). Within the management units, observer activity was also distributed across three seasons that cross calendar years: fall, spring, and summer. Per the Conservation Plan, the number of projected observer trips was based on the required 7-10% observer coverage of the total large-mesh (≥ 4 inches stretched mesh) gill-net fishing trips, and 1-2% coverage of the total small-mesh (< 4 inch stretched mesh) gill-net fishing trips per season and management unit. Projected observer trips were stratified across seasons and management units proportional to the NCDMF Trip Ticket Program (TTP) data for large-mesh and small-mesh gill-net trips from the previous five years. It is important to note that for the TTP, data are reported as the large-mesh category for gill nets using ≥ 5-inch webbing, not ≥ 4 inch. It is uncommon, however, for gill nets to have a mesh size between these two sizes; therefore, we assumed effort by mesh categories in the TTP dataset would not be greatly affected by the difference in definitions of mesh size. No coverage of large-mesh trips was assigned to Management Unit D1 because it was closed to ≥ 4-inch mesh gill nets for the entire 2019 ITP Year (M-19-2017). (http://portal.ncdenr.org/web/mf/proclamation-m-19-2017).

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 upon 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 are 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 maximize 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 and sea turtle abundance (i.e., observed and reported interactions) were monitored on a daily, weekly, and monthly basis to ensure proper observer coverage was being maintained.

Observers were trained to identify, measure, evaluate condition of, resuscitate, and tag sea turtles (depending on turtle size and accessibility) by experienced NCDMF and NMFS (Beaufort, NC) staff. Data collected on observed sea turtles included: date, time, tag numbers, location (latitude and longitude, when possible), condition (i.e., no apparent harm, injury including a description of the nature of the injury, or mortality), species, sex (if determinable), curved carapace length (CCL, mm), and curved carapace width (CCW, mm). Photographs of the turtles and environmental parameters (i.e., salinity, water temperature) were also collected when feasible. Dead and live, debilitated sea turtles were retained by the observer when possible and delivered to the North Carolina Wildlife Resource Commission (NCWRC) sea turtle biologist for necropsy or examination and treatment.

Observers also collected data on location, gear parameters, fish catch and bycatch (including regulatory discards) for each haul depending on the observed trip type (onboard or alternative platform). For onboard observations, the catch was sampled for each trip whereby the observer recorded species, quantities, weights, lengths, disposition (alive or dead), and whether the catch was kept or discarded. 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 sea turtle interactions to provide running totals and estimates of sea turtle bycatch in near real time.

Ongoing estimates of observer coverage were calculated by comparing the number of observed trips by large-mesh ($\geq$ 4 inch) and small-mesh ($<$ 4 inch) category to the average number of trips from the previous five years' TTP data (2014-2018) (large-mesh = $\geq$ 5 inch, small-mesh = $<$ 5 inch) by season and management unit. Reduced season dates in each management unit were taken into account by calculating the proportion of actual to possible fishing days. 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 ITP year, observer coverage was calculated similar to above, but using

the actual number of reported trips in the TTP database for the ITP year by season and management unit. The TTP data for 2018 (fall) were finalized, but the data for 2019 (spring and summer) were preliminary. As a result, observer coverage calculated for 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 Units C and D1. As such, the percent change in fishing effort with large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets, as defined by the TTP, between the 2018 and 2019 ITP Years was calculated by management unit and season.

2.2 Incidental Takes

Authorized levels of annual incidental takes outlined in the ITP were expressed as either estimated total takes based on observer data or counts of observed takes (Tables 1-5). Authorized levels of observed (not estimated) interactions were necessary for some combinations of species, management unit, and gear type due to insufficient data available for modeling predicted estimated takes in the ITP application (Daniel 2013). As a result, authorized levels of annual estimated interactions were only available for green and Kemp's ridley sea turtles in Management Units B, D1, and E in the large-mesh gill net fishery, and for Kemp's ridley sea turtles in D2 in the large-mesh gill net fishery. Authorized levels for all other combinations were based on counts of actual observed (i.e., not estimated) takes. Therefore, comparisons of interactions during the 2019 ITP Year to authorized interactions were based either on annual counts of observed sea turtle takes or annual estimates of sea turtle takes. Also, during summer 2015 a minor modification to the ITP was enacted through the NMFS combining authorized takes for Management Units A (n = 4) and C (n = 4) for a total authorized take limit of eight sea turtles from large-mesh or small-mesh gill nets and any species or disposition (Boyd 2016). Estimates of incidental take as outlined above were calculated using the stratified ratio method where the bycatch rate calculated from observer data (sea turtles caught per observed trip) was multiplied by the total reported fishing trips.

$$\text{Estimated interactions} = \left(\frac{\text{\# of sea turtle interactions observed}}{\text{total gill-net trips observed}}\right) * \text{total gill-net trips reported}$$

Throughout each season, this calculation was employed each time there was an incidental take to determine the estimated number of interactions by date of capture, management unit, species, 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 and running totals of observed interactions were accumulated by interaction date 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), monthly, and seasonal reports.

At the end of the ITP year, the estimated number of interactions 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/season/management unit).

2.3 Compliance

The NCDMF observers and/or Marine Patrol conducted weekly fish house visits, boat patrols, fisherman spot checks, gear checks, and continual outreach to the industry, attempting to facilitate 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 6). Data in the contact log was summarized by month and response category to determine what percentage of phone calls resulted in observer trips.

3 RESULTS

3.1 Observer Activity

Overall observer coverage during the 2019 ITP Year was 7.4% of the large-mesh gill-net fishery and 3.1% of the small-mesh gill-net fishery (Tables 7 and 8, Figure 2). This level of coverage was based on 729 large-mesh gill-net trips (243 onboard and 486 alternative platform) and 145 small-mesh gill-net trips (43 onboard and 102 alternative platform) during fall, spring, and summer. Only five out of 874 (<1%) observed trips recorded a mesh size ≥ 4 and < 5 inch; in each case the mesh size was exactly 4 inches. Across all trips, observers documented 22 sea turtles in large-mesh gill nets and zero in small-mesh gill nets (Table 9). A series of proclamations was issued throughout the ITP Year to regulate gill-net fisheries as part of the adaptive management approach to limit sea turtle or Atlantic sturgeon takes and for other management needs unrelated to protected species interactions (Table 10). As a result, changes in fishing activity influenced the Observer Program's efforts to find trips and maintain coverage level.

3.1.1 Fall 2018

During fall 2018 (September – November), the Observer Program achieved 7.6% state-wide coverage of large-mesh gill nets, and exceeded 7% in all management units (Table 7, Figures 3–8; McConnaughey 2018). Although D1 was closed to large-mesh gill nets during the 2019 ITP Year (M-19-2017), there was one observed trip and one reported trip during fall 2018. For small-mesh gill nets, the Observer Program achieved 4.2% state-wide coverage, and exceeded 1% coverage in all management units (Table 8, Figures 3 – 8) (McConnaughey 2018).

There were four observed sea turtle interactions in large-mesh gill nets (Table 9, Figures 3–8) and none observed in small-mesh gill nets during fall (McConnaughey 2018). Three of the four were green sea turtles (n = 3 alive; n = 0 dead) and one was a Kemp's ridley sea turtle (n = 1

alive; n = 0 dead). All four turtles were observed in Management Unit B. No fisherman self-reported sea turtle interactions were reported (Table 11).

3.1.2 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 Management Units A (5.9%) and B (6.5%) (Table 7, Figures 9 – 14) (McConnaughey 2019a). Management Unit D1 was closed to large-mesh gill nets for the entire season (M-19-2017). For small-mesh gill nets, the Observer Program achieved an estimated 3.4% state-wide coverage, and exceeded 1% in all management units except Management Units D2 where only nine trips were reported and no observed trips occurred (Table 8; Figures 9 – 14) (McConnaughey 2019a).

There were four observed sea turtle interactions in large-mesh gill nets and none observed in small-mesh gill nets during spring (Table 9, Figures 9 – 14). The interactions comprised two green sea turtles (n = 1 alive; n = 1 dead) and two Kemp's ridley sea turtles (n = 2 alive; n = 0 dead). One of the green sea turtles was observed in D2; the remaining sea turtles were observed in E. No fisherman self-reported sea turtle interactions were reported (Table 11).

3.1.3 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 Management Units A (4.5%) and B (3.4%) (Table 7, Figures 15 – 20) (McConnaughey 2019b). Management Unit D1 was closed to large-mesh gill nets for the entire season (M-19-2017). For small-mesh gill nets, the Observer Program achieved an estimated 1.1% state-wide coverage. Observer coverage exceeded 1% coverage in all management units except Management Units B where no observed trips occurred and 844 fishing trips were reported, as well as in D1 where no observed trips occurred and four fishing trips were reported (Table 8, Figures 15–20) (McConnaughey 2019b).

Fourteen of the 22 (63.6%) observed sea turtle interactions during the 2019 ITP Year occurred during summer. Half (n = 7 of 14) of the observed interactions during summer occurred in Management Unit B, followed by D2 (n = 4), E (n = 2), and A (n = 1). All 22 interactions occurred in large-mesh gill nets (Table 9, Figures 15 – 20) (McConnaughey 2019b). The interactions comprised 10 green sea turtles (n = 9 alive; n = 1 dead), two Kemp's ridley sea turtles (n = 2 alive; n = 0 dead), one loggerhead sea turtle (n = 1 alive; n = 0 dead), and one live turtle that was not identified because the fisherman discarded it. Of the green sea turtles recovered alive, one had significant carapace fractures and was transferred to the Karen Beasley Sea Turtle Rescue and Rehabilitation Center (KBSTRRC) (Figure 21). The fractures were not fresh and, as such, were not a result of the entanglement. After concluding that the turtle could not successfully recover from its injuries, and with authorization through the US Fish and Wildlife Service and NCWRC, the turtle was euthanized the next day under veterinary supervision. Subsequent necropsy confirmed the severe damage to the carapace, the underlying spine and the left lung (Matthew Godfrey, NCWRC, pers. comm.). Additionally, there were three fisherman self-reported sea turtle interactions in large-mesh gill nets; two were reported for Management Unit A and the other for Management Unit C (Table 11).

3.1.4 Changes in Fishing Effort

Overall fishing effort (measured by trips) during the 2019 ITP Year compared to the 2018 ITP Year was 11.8% lower for large-mesh (≥ 5 inch) gill-net trips and 17.1% lower for small-mesh (< 5 inch) gill-net trips. 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 D1 (Figure 22). 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. The closure of ≥ 4-inch mesh gill nets in Management Unit D1 (implemented during fall 2017) was apparent in the absence of reported large-mesh trips there during spring and summer. Outside of fall, small-mesh fishing effort among management units was more variable, not exhibiting specific trends.

3.2 Incidental Takes

Across seasons, most of the 22 observed sea turtle interactions in large-mesh gill nets were green sea turtles (n = 15) followed by Kemp's ridley sea turtles (n = 5) (Table 9, Figure 2) (McConnaughey 2018, 2019a, 2019b). The majority of observed takes were recovered alive (20 out of 22). However, as mentioned above, the one injured green turtle that was taken to the KBSTRRC was euthanized the following day. Although the carapace fractures were not due to the entanglement, the animal was included in the dead category for estimation of total observed takes. Green sea turtles (n = 15) ranged from 230 to 332 mm CCL (mean = 276.4, SD = 30.2) and 196 to 275 mm CCW (mean = 239.5, SD = 25.0) (Figures 23 and 24). Kemp's ridley sea turtles (n = 5) ranged from 228 to 343 mm CCL (mean = 282.6, SD = 41.8) and from 240 to 323 mm CCW (mean = 279.2, SD = 37.1) (Table 9, Figures 23 and 24). The single loggerhead sea turtle was 640 mm CCL and 650 mm CCW; the unidentified sea turtle could not be measured.

Observed interactions occurred primarily in Management Unit B (50%), followed by Management Unit D2 (23%), Management Unit E (23%), and Management Unit A (5%) (Table 9; Figure 2). Of the 22 observed interactions, the majority (64%) occurred during summer with fall and spring each contributing half of the remaining interactions. No interactions were documented in Management Unit C or in Management Unit D1, which was closed for the entire 2019 ITP Year. All three fisherman self-reported sea turtle interactions occurred in large-mesh gill nets during summer; two in Management Unit A and one in Management Unit C (Table 11).

Observed take levels during the 2019 ITP Year did not reach the thresholds of allowed takes for any species or management unit (Tables 1 – 5) (McConnaughey 2018, 2019a, 2019b). Of the thresholds expressed as counts of observed takes (not estimated), green sea turtle takes during the 2019 ITP Year reached only 16.7% of the threshold and loggerhead takes reached 4.2% of the threshold (Table 5). The one green sea turtle observed in Management Unit A was grouped with the authorized level of eight observed takes of "any species" in Management Units A & C,

equaling 12.5% of the threshold. Of the separate thresholds expressed as estimated totals of observed takes, green sea turtle takes during the 2019 ITP Year reached 41.4% of the live threshold and 6.6% of the dead threshold, and Kemp's ridley sea turtle takes reached 25.2% of the live threshold (no dead takes).

3.3 Compliance

There were 2,217 EGNPs issued during the 2019 ITP Year. Using the list of EGNPs, 4,305 phone calls or in-person contacts were made with 42.6% (n = 1,832) representing categories for which the observer was able to get speak with a fisherman (categories 2-10, and 15) (Figure 25). Of those 1,832 contacts, observers booked a trip 9.8% (n = 180) of the time. 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 made 1,431 gill-net checks and issued 74 citations during the 2019 ITP Year (Tables 12 – 13). The number of gill net checks were spread out across seasons. Of the 74 citations, half (50%) were issued during fall 2018. In addition to citations, officers issued 31 Notice of Violations (NOV) for fishermen found to be out of compliance with the EGNP (Table 14).

3.4 Marine Mammals

There was no observed marine mammal interaction during the 2019 ITP Year.

4 DISCUSSION

Incidental takes of sea turtles 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 sea turtles and Atlantic Sturgeon, management actions for other species, 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. The most notable differences were the large decrease in observed interactions during fall 2018 (n = 4) compared to fall 2017 (n = 37), and increase in observed interactions during summer 2018 (n = 14) compared to summer 2019 (n = 2) (McConnaughey et al. 2019). During the 2019 ITP Year, observed sea turtle interactions were primarily green sea turtles during summer in Management Unit B with fewer interactions in other combinations of seasons and management units. It was not possible to identify spatiotemporal patterns of Kemp's ridley takes given that only five were observed. All observed sea turtle takes occurred in large-mesh gill nets. Southern Flounder was the primary target species of large-mesh gill-net fishermen in all open management units. Other target species included American Shad (*Alosa sapidissima*) and the invasive Blue Catfish (*Ictalurus furcatus*), particularly in Management Unit A. During the 2019 ITP Year, the NCDMF issued eleven proclamations that allowed these fisheries to operate during certain times while monitoring and limiting incidental takes of protected sea turtle species using observer data in near real time (Table 10). The NCDMF successfully employed an adaptive management strategy for Management Unit D2 using proclamation M-12-2019 to close the area due to approaching allowable take numbers for Kemp's ridley sea turtles. Management unit D1 remained closed for

the entire 2019 ITP Year due to exceeding allowable green sea turtle take numbers in the fall of 2017 during the 2018 ITP Year.

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. Exceptions included combinations that had very little reported fishing effort where observer coverage was 0 percent: spring in D2 (only nine fishing trips reported) and summer in D1 (only four fishing trips reported). The most 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 scheduling a trip (9.8%) 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 percent coverage. In fact, 67.3% 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 (Kolkmeyer 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 sea turtle takes and an adaptive management approach to successfully control the number of interactions in the estuarine gill-net fisheries. Although it is not known what impacts Hurricane Florence had directly on adult and juvenile sea turtle 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 trips from the previous five years.

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6 TABLES

Table 1. For large-mesh (≥ 4 inch) gill nets, annual estimated authorized and actual takes of sea turtles by species and Management Units B, D1, D2, and E for the 2019 ITP Year. Estimated actual takes were calculated from observer data; 95% confidence intervals are provided in parentheses.

	B				D1				D2			
	Estimated Takes				Estimated Takes				Estimated Takes			
	Authorized		Actual		Authorized		Actual		Authorized		Actual	
Species	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Green	225	112	129.5 (32.1, 350.3)	0	9	5	0	0	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Kemp's ridley	53	26	7.2 (0, 21.5)	0	15	7	0	0	6	3	6.0 (0, 15.5)	0
Total	278	138	136.7	0	24	12	0	0	6	3	6.0	0

	E				Total			
	Estimated Takes				Estimated Takes			
	Authorized		Actual		Authorized		Actual	
Species	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Green	96	48	7.2 (0, 21.5)	10.9 (0, 32.8)	330	165	136.7	10.9
Kemp's ridley	24	13	11.5 (0-34.4)	0	98	49	24.7	0
Total	120	61	18.7	10.9	428	214	161.4	10.9

[1] Insufficient observer data existed to model an estimated annual take level for the permit application; therefore, for Management Unit D2, an annual observed take number was identified for green turtles (see Table 2).

Table 2. For large-mesh (≥ 4 inch) gill nets, annual authorized and actual observed (not estimated) takes of sea turtles by species and Management Units B, D1, D2, and E for the 2019 ITP Year.

	B		D1		D2		E		Total	
	Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)	
Species	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual
Green	n/a [1]	n/a [1]	n/a [1]	n/a [1]	6	3	n/a [1]	n/a [1]	6	3
Kemp's ridley	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Hawksbill	1	0	1	0	1	0	1	0	4	0
Leatherback	1	0	1	0	1	0	1	0	4	0
Loggerhead	3	1	3	0	3	0	3	0	12	1
Total	5	1	5	0	11	3	5	0	26	4

[1] Authorized levels of Kemp's ridley sea turtles in Management Units B, D1, D2, and E and green sea turtles in Management Units B, D1, and E are expressed as estimated takes for the fishery because sufficient observer data existed to model estimated annual take levels in the ITP application (See Table 1).

Table 3. For large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets combined, annual authorized and actual observed (not estimated) takes of sea turtles by Management Unit A and C for the 2019 ITP Year. Authorized levels per management unit are 4 sea turtles of any species.

	A		C		Total	
Species	Authorized (live/dead)	Actual (live/dead)	Authorized (live/dead)	Actual (live/dead)	Authorized (live/dead)	Actual (live/dead)
Green		1		0		1
Kemp's ridley		0		0		0
Hawksbill	4 (any species)	0	4 (any species)	0	8 (any species)	0
Leatherback		0		0		0
Loggerhead		0		0		0

Table 4. For small mesh (< 4 inch) gill nets, annual authorized and actual observed (not estimated) takes of sea turtles by species and Management Unit B, D1, D2, and E for the 2019 ITP Year.

	B		D1		D2		E		Total	
	Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)	
Species	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual
Green	3	0	3	0	3	0	3	0	12	0
Hawksbill	1	0	1	0	1	0	1	0	4	0
Kemp's ridley	3	0	3	0	3	0	3	0	12	0
Leatherback	1	0	1	0	1	0	1	0	4	0
Loggerhead	3	0	3	0	3	0	3	0	12	0
Total	11	0	11	0	11	0	11	0	44	0

Table 5. Total annual authorized and actual takes (observed and estimated) of sea turtles by species and for estimated takes by condition for the 2019 ITP Year. The incidental take of an unidentified sea turtle is not represented in the actual observed counts or estimated totals.

	Observed (live/dead)		Estimated			
	Authorized	Actual	Authorized		Actual	
Species	Live/Dead	Live/Dead	Alive	Dead	Alive	Dead
Green	18	3	330	165	137	11
Hawksbill	8	0	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Kemp's ridley	12	0	98	49	25	0
Leatherback	8	0	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Loggerhead	24	0	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Any Species	8	1 [2]	n/a [1]	n/a [1]	n/a [1]	n/a [1]
Total	78	5	428	214	162	11

[1] Insufficient observer data exist to model an estimated annual take level; therefore, takes are expressed as observed.
[2] Green sea turtle in Management Unit A (see Table 4)

Table 6. 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 7. For large-mesh gill nets, observer coverage calculated from observer data (≥ 4 inch) and reported trips from the Trip Ticket Program (≥ 5 inch) by season and management unit for the 2019 ITP Year. Trip Ticket Program data are considered finalized for 2018 (fall) and preliminary for 2019 (spring and summer). Management Unit D1 was closed to large-mesh (≥ 4 inch) gill nets for the entire ITP year; however, one trip was reported and observed during fall.

		Large Mesh		
Season	Management Unit	Reported trips	Observed Trips	Coverage
Fall 2018	A	1,812	131	7.2
	B	955	80	8.4
	C	485	37	7.6
	D1	1 (closed)	1 (closed)	100.0
	D2	374	26	7.0
	E	713	54	7.6
	State-wide	4,340	329	7.6
Spring 2019	A	1,699	100	5.9
	B	448	29	6.5
	C	45	20	44.4
	D1	closed	closed	closed
	D2	61	11	18.0
	E	247	30	12.1
	State-wide	2,500	190	7.6
Summer 2019	A	1,044	46	4.4
	B	974	34	3.5
	C	313	27	8.6
	D1	closed	closed	closed
	D2	124	10	8.1
	E	497	93	18.7
	State-wide	2,952	210	7.1
Overall		9,792	729	7.4

Table 8. For small-mesh gill nets, observer coverage calculated from observer trips (< 4 inch) and reported trips from the Trip Ticket Program (< 5 inch) by season and management unit for the 2019 ITP Year. Trip Ticket Program data are considered finalized for 2018 (fall) and preliminary for 2019 (spring and summer).

		Small Mesh		
Season	Management Unit	Reported trips	Observed Trips	Coverage
Fall 2018	A	239	5	2.1
	B	580	21	3.6
	C	81	9	11.1
	D1	34	4	11.8
	D2	67	9	13.4
	E	261	5	1.9
	State-wide	1,262	53	4.2
Spring 2019	A	727	13	1.8
	B	1,351	39	2.9
	C	97	16	16.5
	D1	39	6	15.4
	D2	9	0	0.0
	E	81	5	6.2
	State-wide	2,304	79	3.4
Summer 2019	A	118	2	1.7
	B	844	0	0.0
	C	45	1	2.2
	D1	4	0	0.0
	D2	19	5	26.3
	E	116	5	4.3
	State-wide	1,146	13	1.1
Overall		4,712	145	3.1

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Table 9. Summary of observed sea turtle interactions in large-mesh (≥ 4 inch, n = 22) and small-mesh (< 4 inch), n = 0) gill nets during the 2019 ITP Year. Tags were applied by observers. PIT = Passive Integrated Transponders [1] Turtle was transferred for rehabilitation based on severe carapace fractures, and was euthanized the next day.

							Applied Tags		Curved Carapace (mm)	
Date	Season	Management Unit	Latitude (N)	Longitude (W)	Species	Disposition	PIT	Inconel	Length	Width
10/3/2018	Fall	B	34.99438	76.28997	Kemp's	alive	n/a	n/a	228	241
10/4/2018	Fall	B	35.36187	75.55748	Green	alive	n/a	n/a	304	267
10/30/2018	Fall	B	35.25243	75.61018	Green	alive	n/a	n/a	290	260
11/8/2018	Fall	B	35.26151	75.62806	Green	alive	982.000362056415 3D6.0015948ADF	n/a	286	247
5/16/2019	Spring	E	33.9702	77.92483	Green	dead	n/a	n/a	332	256
5/16/2019	Spring	E	33.97090	77.92675	Kemp's	alive	982.000364048805 3D6.0015B2F1A5	n/a	274	300
5/16/2019	Spring	E	33.97146	77.92725	Kemp's	alive	982.000363950045 3D6.0015B16FDD	n/a	296	292
5/30/2019	Spring	D2	34.7526	76.69836	Green	alive	n/a	n/a	243	n/a
6/4/2019	Summer	D2	34.69337	76.98663	Kemp's	alive	n/a	n/a	343	323
6/7/2019	Summer	D2	34.68357	77.04107	Green	alive	982.000364297643 3D6.0015BCDAB	n/a	262	210
6/7/2019	Summer	D2	34.68368	77.04096	Green	dead	n/a	n/a	282	251
6/11/2019	Summer	D2	34.68367	76.99529	Kemp's	alive	n/a	n/a	272	240
7/3/2019	Summer	E	34.67980	77.13325	Green	alive	982.000362191618 3D6.0015969B023	n/a	268	244
7/17/2019	Summer	E	33.88800	78.47000	Green	alive [1]	n/a	n/a	n/a	n/a
7/18/2019	Summer	B	34.81551	76.38171	Loggerhead	alive	982.0004106 3D6.001879D717	MMG064/ MMG066	640	650
7/24/2019	Summer	B	34.99500	76.30190	Green	alive	n/a	n/a	303	255
7/29/2019	Summer	A	35.93329	75.78285	Green	alive	n/a	n/a	244	220
8/9/2019	Summer	B	34.90955	76.32888	Green	alive	n/a	n/a	230	196
8/9/2019	Summer	B	34.90952	76.32928	Green	alive	n/a	n/a	250	209
8/14/2019	Summer	B	34.99207	76.17590	Unidentified	alive	n/a	n/a	n/a	n/a
8/15/2019	Summer	B	35.11880	75.96291	Green	alive	n/a	n/a	261	224
8/22/2019	Summer	B	35.04076	76.11522	Green	alive	n/a	n/a	315	275

Table 10. Regulations for management units by date and regulation change for large-mesh (≥ 4 inch) and small-mesh (< 4 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)

Table 10 cont.

Year	Date(s)	Regulation Change
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)
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)

Table 10 cont.

Year	Date(s)	Regulation Change
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)
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)

Table 10 cont.

Year	Date(s)	Regulation Change
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)
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)

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Table 11. Summary of self-reported sea turtle interactions in large-mesh (≥ 4 inch) gill nets during the 2019 ITP Year. None were reported for small-mesh (< 4 inch) gill nets.

Date	Management Unit	Latitude (N)	Longitude (W)	Species	Disposition
7/12/2019	C	not reported	not reported	Green	alive
7/14/2019	A	not reported	not reported	Kemp's	unknown
7/28/2019	A	not reported	not reported	Green	alive

Table 12. Number of gill-net checks and citations issued by Marine Patrol for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets by season during the 2019 ITP Year. See Table 13 for details on individual citations.

Season	# Gill Net Checks	# Citations	Citation Percentage
Fall 2018	513	37	7.2
Spring 2019	487	18	3.7
Summer 2019	431	19	4.4
Total	1,431	74	5.2

Table 13. Citations written by Marine Patrol for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets by season and violation code during the 2019 ITP Year.

Season	Date	Violation code	Violation description
Fall	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
	9/6/2018	NETG60	Use gill nets with a mesh size of more than 6.5 inches (stretched mesh) in violation of proclamation M-7-12
	9/23/2018	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
	10/2/2018	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
	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

Table 13 cont.

Season	Date	Violation code	Violation description
Fall	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
	10/31/2018	NETG46	Set or retrieve large-mesh gill nets later than one hour after sunrise on Tuesday through Friday
	11/7/2018	NETG30	Leave RCGL gill net unattended
	11/7/2018	NETG29	RCGL gear without proper buoys
	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
Spring	3/9/2019	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
	4/6/2019	NETG39	Use large-mesh gill nets more than 15 meshes in height and w/out lead core or leaded bottomline
	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
	5/29/2019	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

Table 13 cont.

Season	Date	Violation code	Violation description
Summer	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 14. Notice of Violations issued by season, date and violation code for the Estuarine Gill Net Permit (EGNP) during the 2019 ITP Year.

Season	Date	Violation code	Violation description
Fall	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)
Spring	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	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)
	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
	5/15/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	5/31/2019	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	Failure to comply with gill net configurations outlined in proclamation
Summer	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)

7 FIGURES

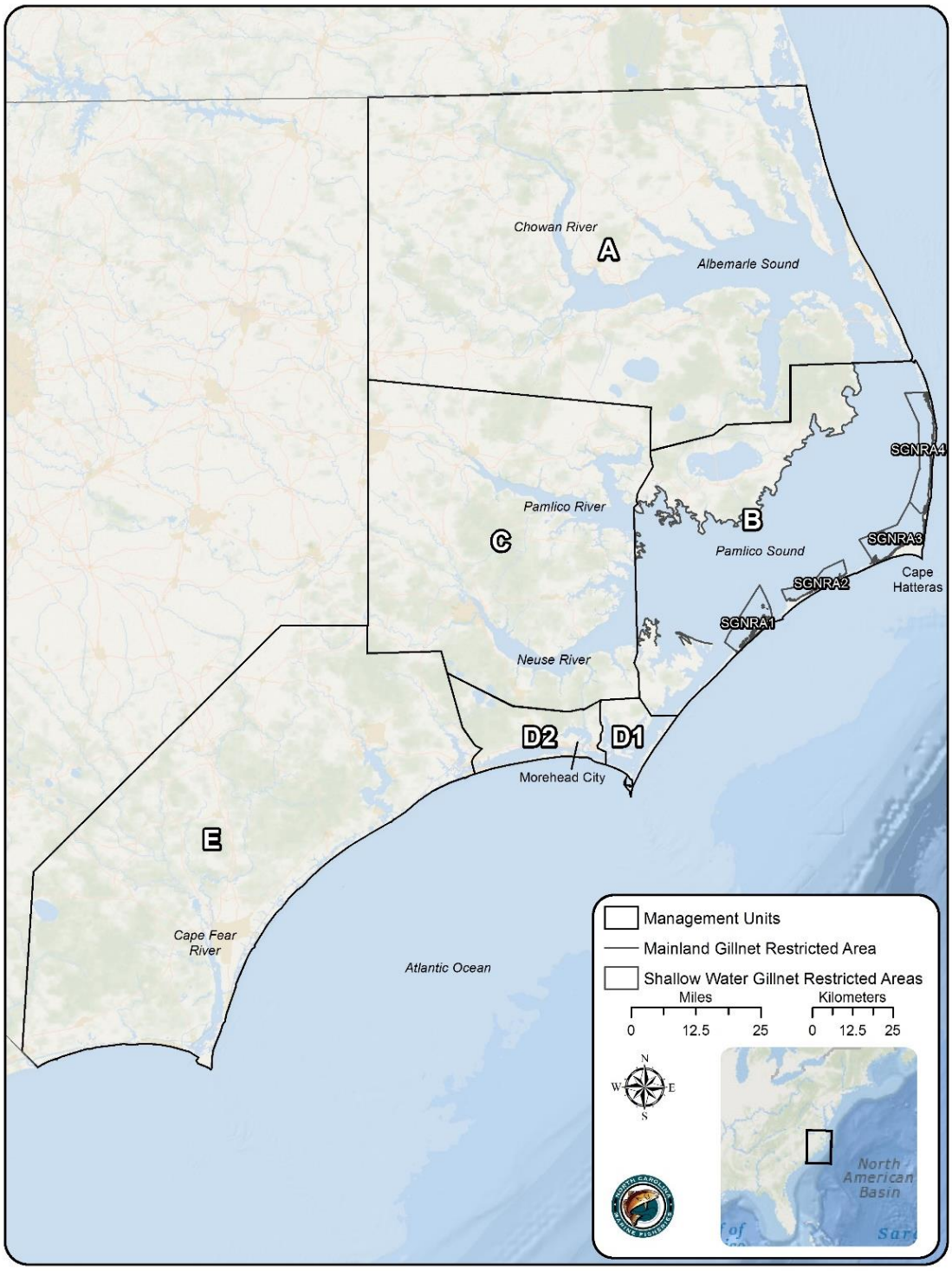

Figure 1. Management units (A, B, C, D1, D2, and E) as outlined in the Conservation Plan and used by the Observer Program for the 2019 ITP Year. In the Pamlico Sound Portion of B, large-mesh gill nets were confined to Shallow Water Gillnet Restricted Areas (SGNRA) 1-4 and the Mainland Gillnet Restricted Area (200 yards from shore).

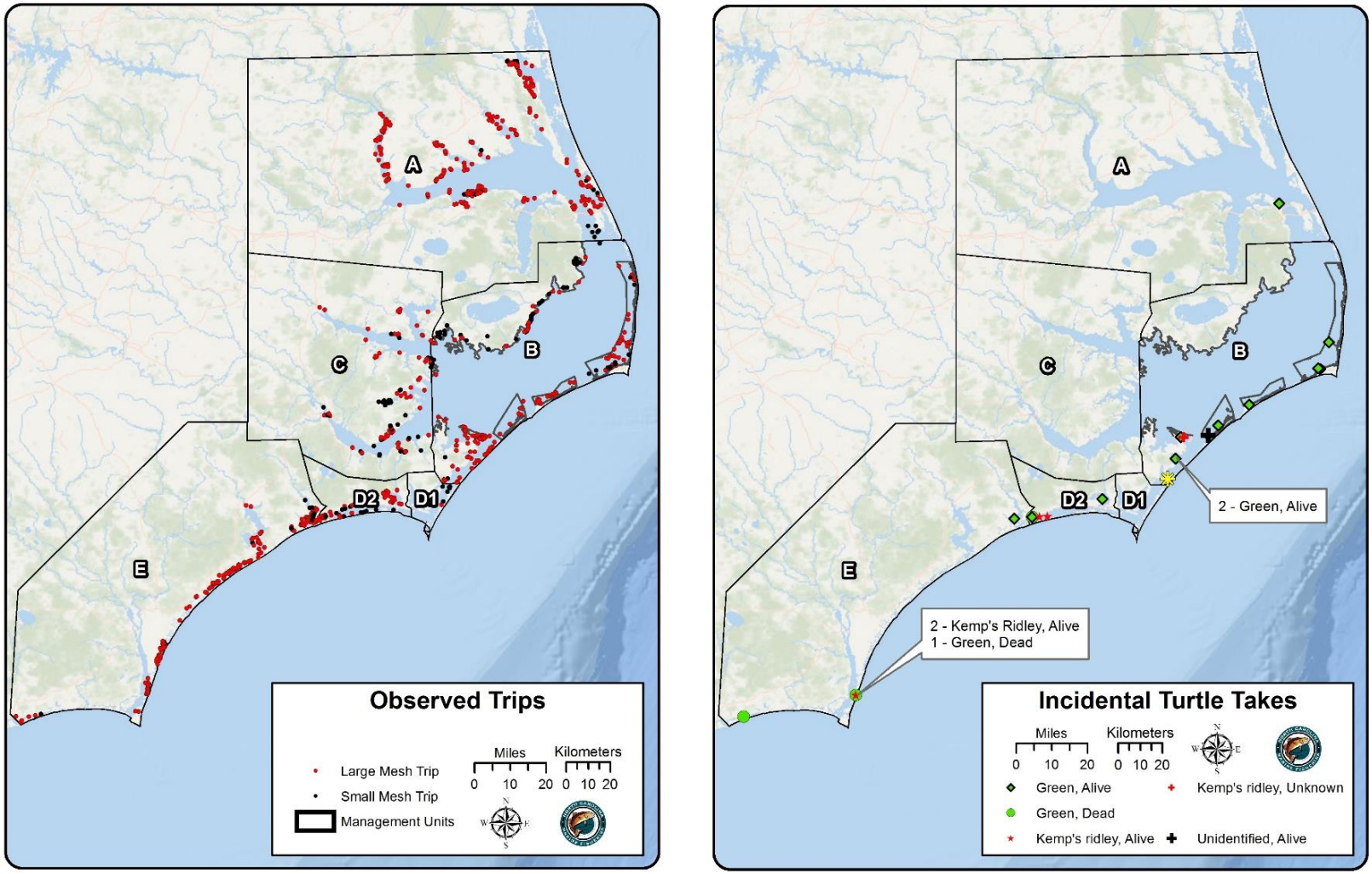

Figure 2. For the entire 2019 ITP Year, observed gill-net trips (left) by mesh-size category (729 large mesh = ≥ 4 inch; 145 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 19; dead, n = 3) across management units. One of the dead takes (green sea turtle) was recovered from the net alive, but was euthanized the next day due to extensive carapace factures not associated with the entanglement. See Figure 21.

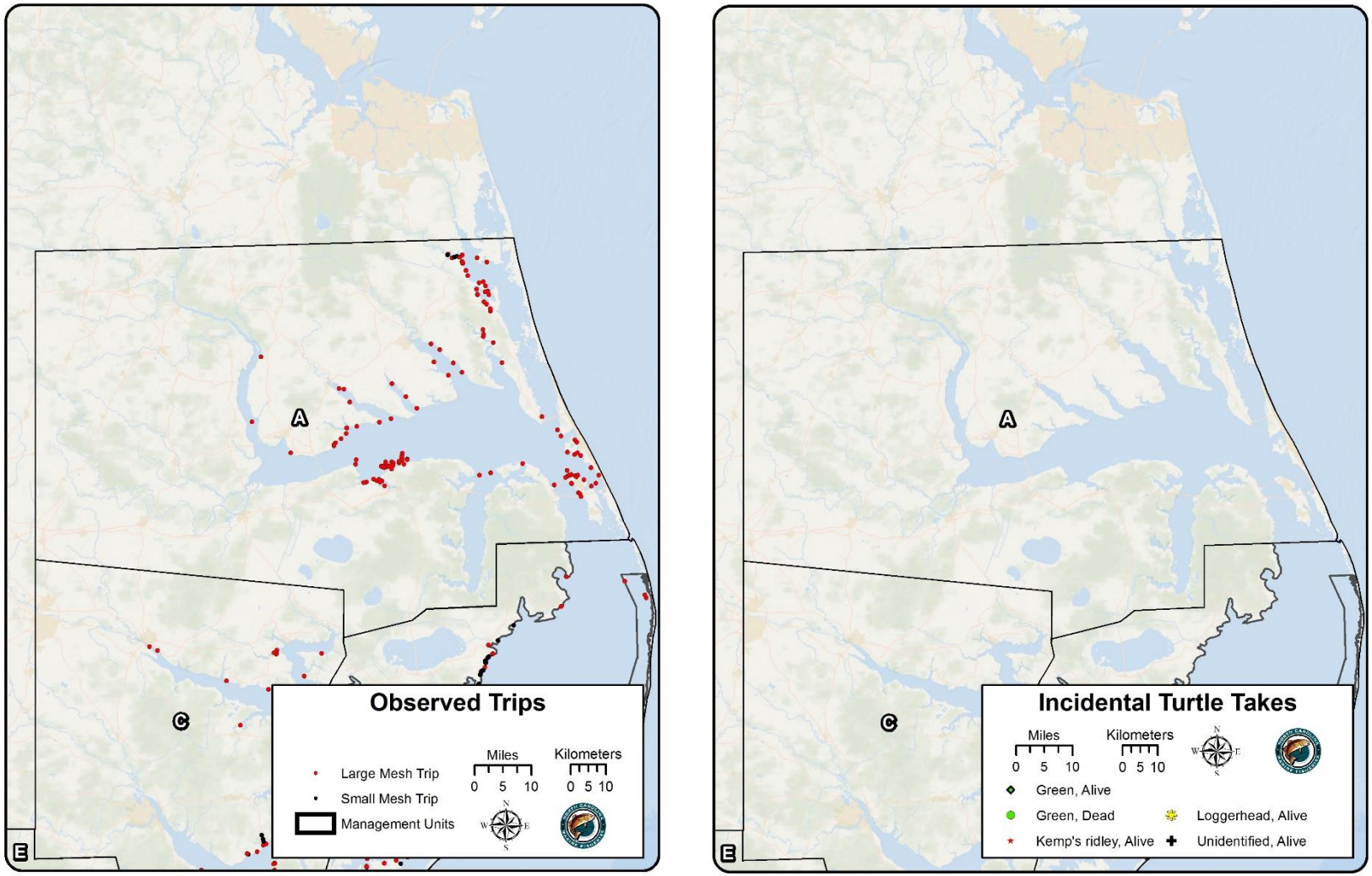

Figure 3. For fall 2018, observed gill-net trips (left) by mesh-size category (131 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit A.

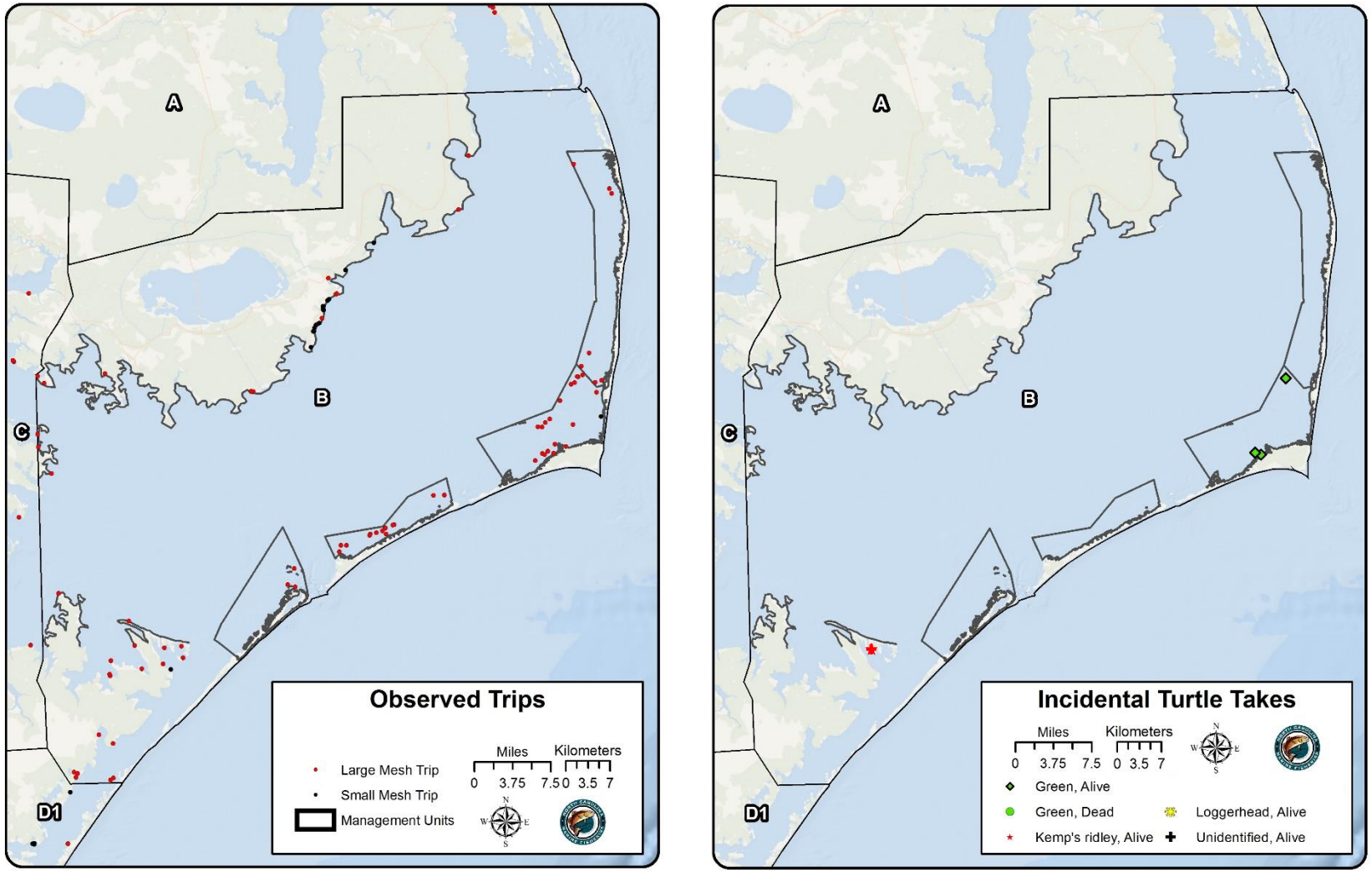

Figure 4. For fall 2018, observed gill-net trips (left) by mesh-size category (80 large mesh = ≥ 4 inch; 21 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 4; dead, n = 0) for Management Unit B.

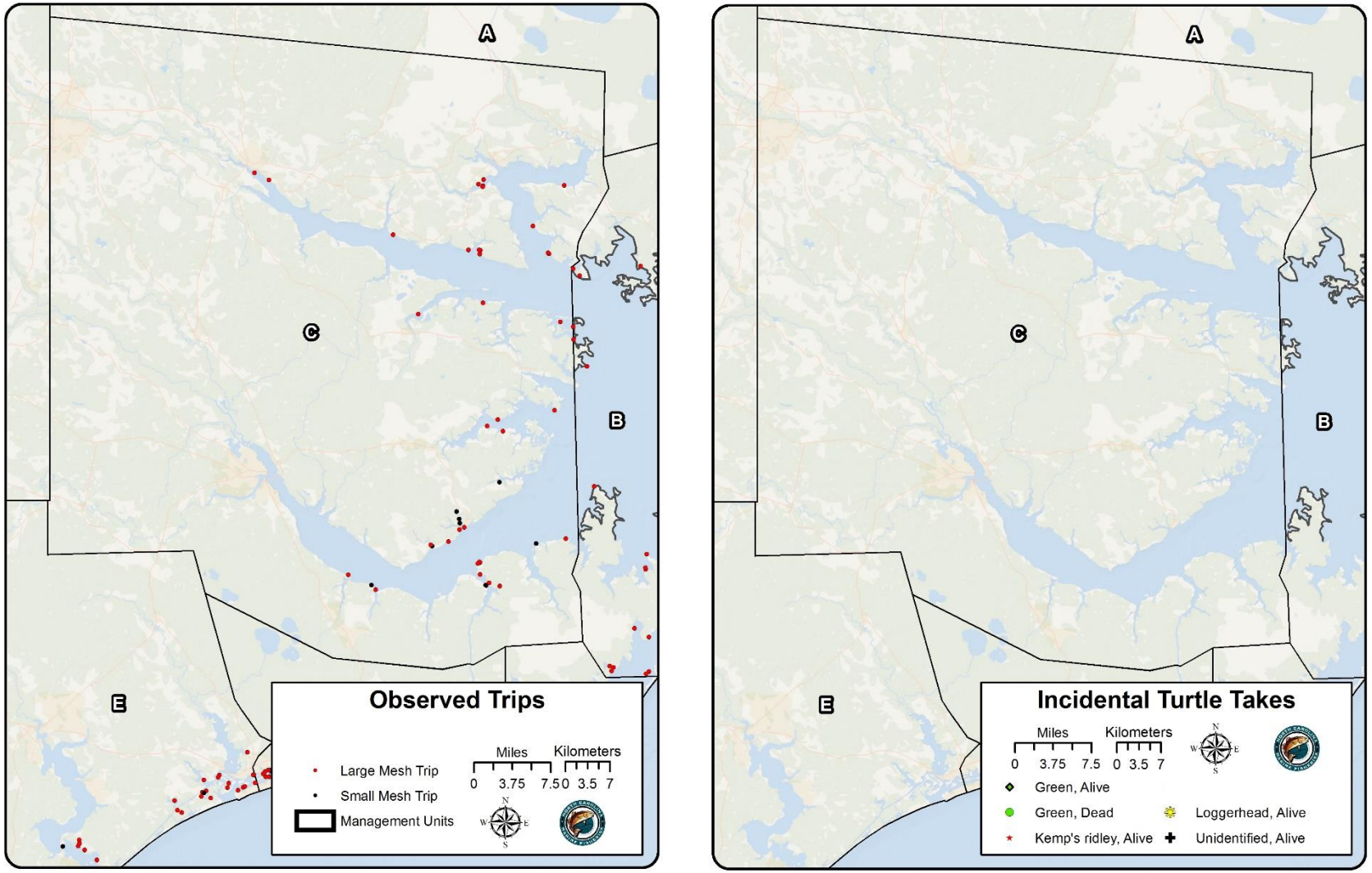

Figure 5. For fall 2018, observed gill-net trips (left) by mesh-size category (37 large mesh = ≥ 4 inch; 9 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit C.

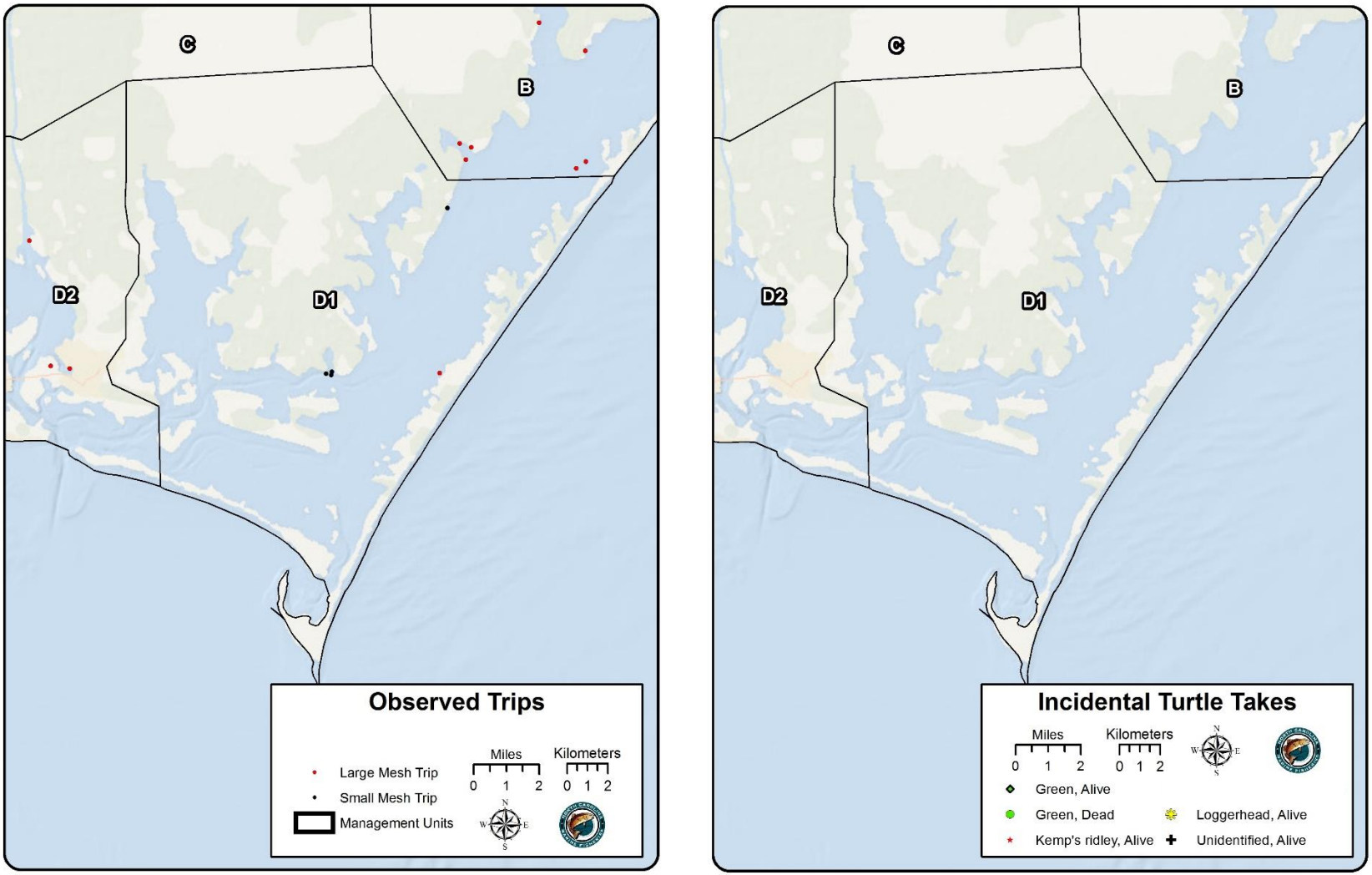

Figure 6. For fall 2018, observed gill-net trips (left) by mesh-size category (1 large mesh = ≥ 4 inch; 4 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit D1. D1 was closed to large-mesh gill nets for the entire 2019 ITP Year.

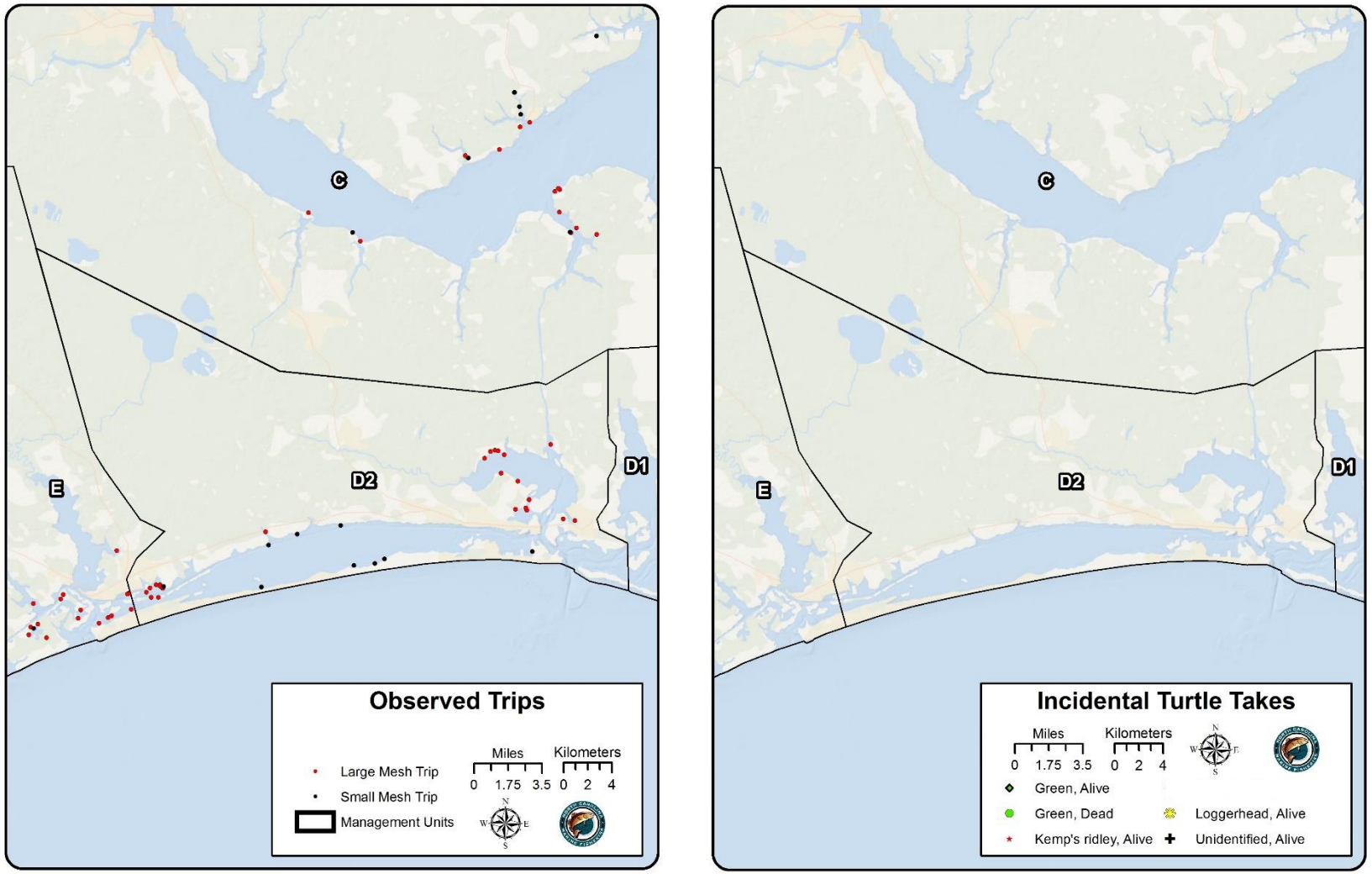

Figure 7. For fall 2018, observed gill-net trips (left) by mesh-size category (26 large mesh = ≥ 4 inch; 9 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit D2.

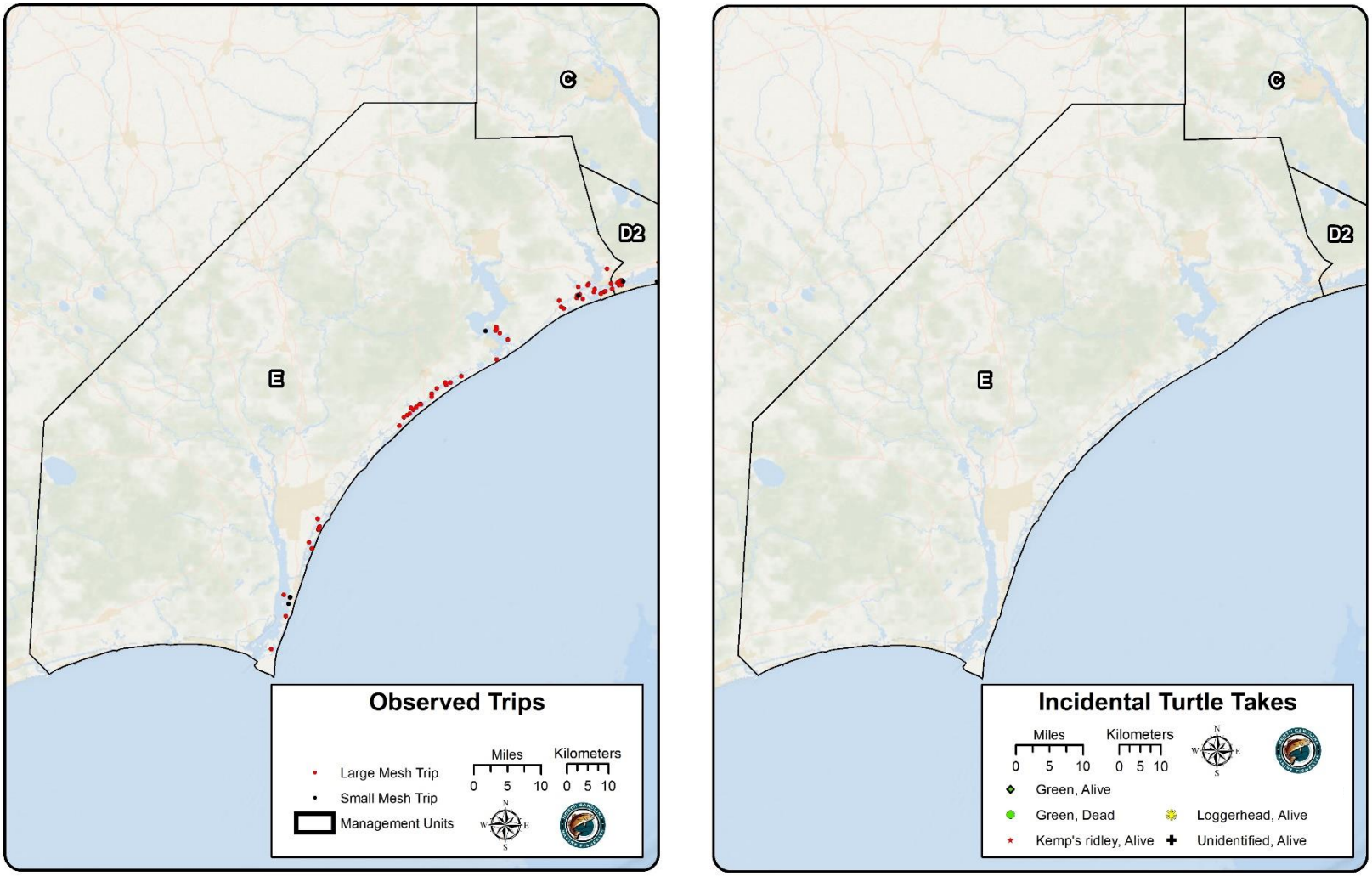

Figure 8. For fall 2018, observed gill-net trips (left) by mesh-size category (54 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit E.

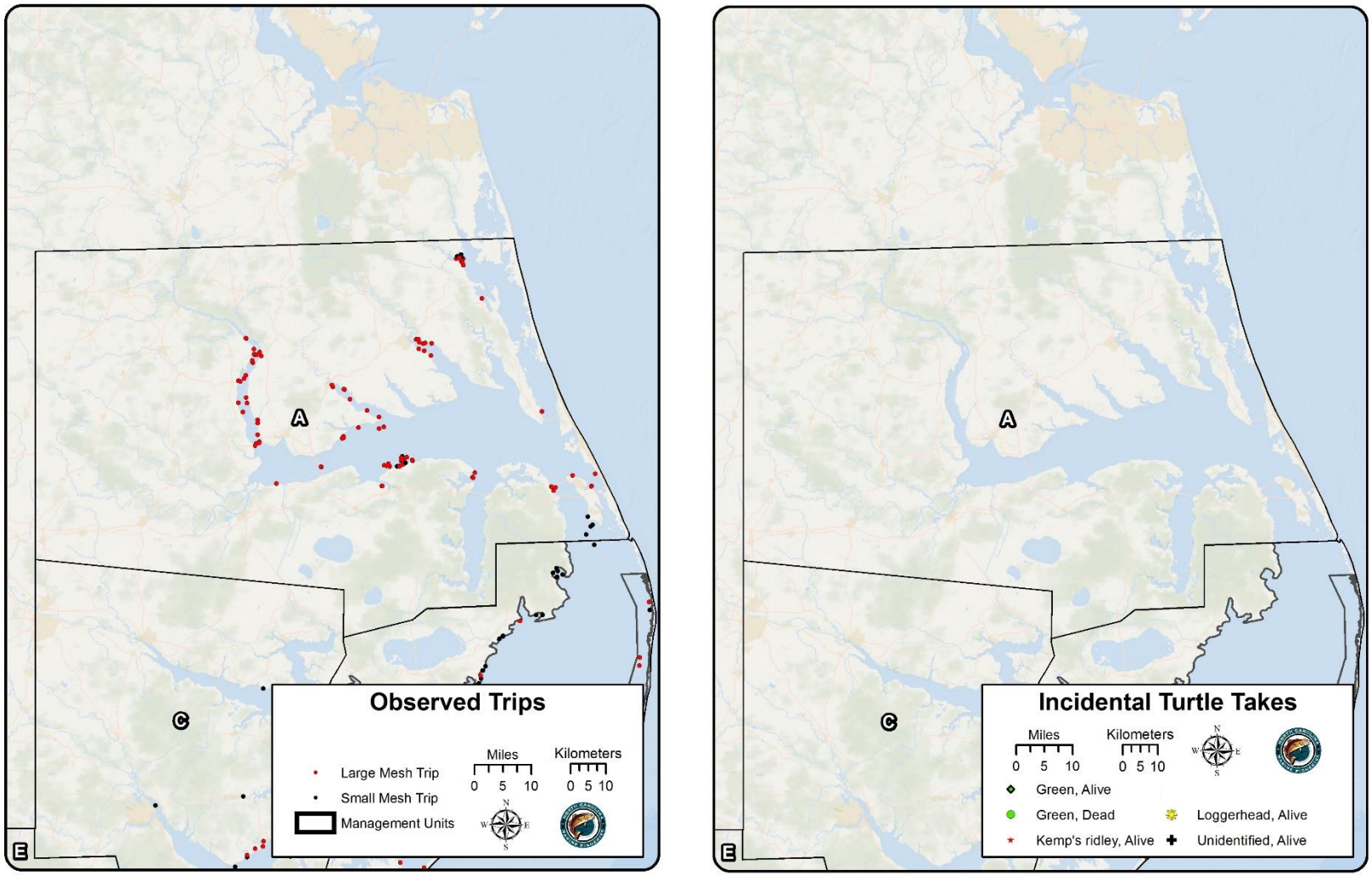

Figure 9. For spring 2019, observed gill-net trips (left) by mesh-size category (100 large mesh = ≥ 4 inch; 13 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit A.

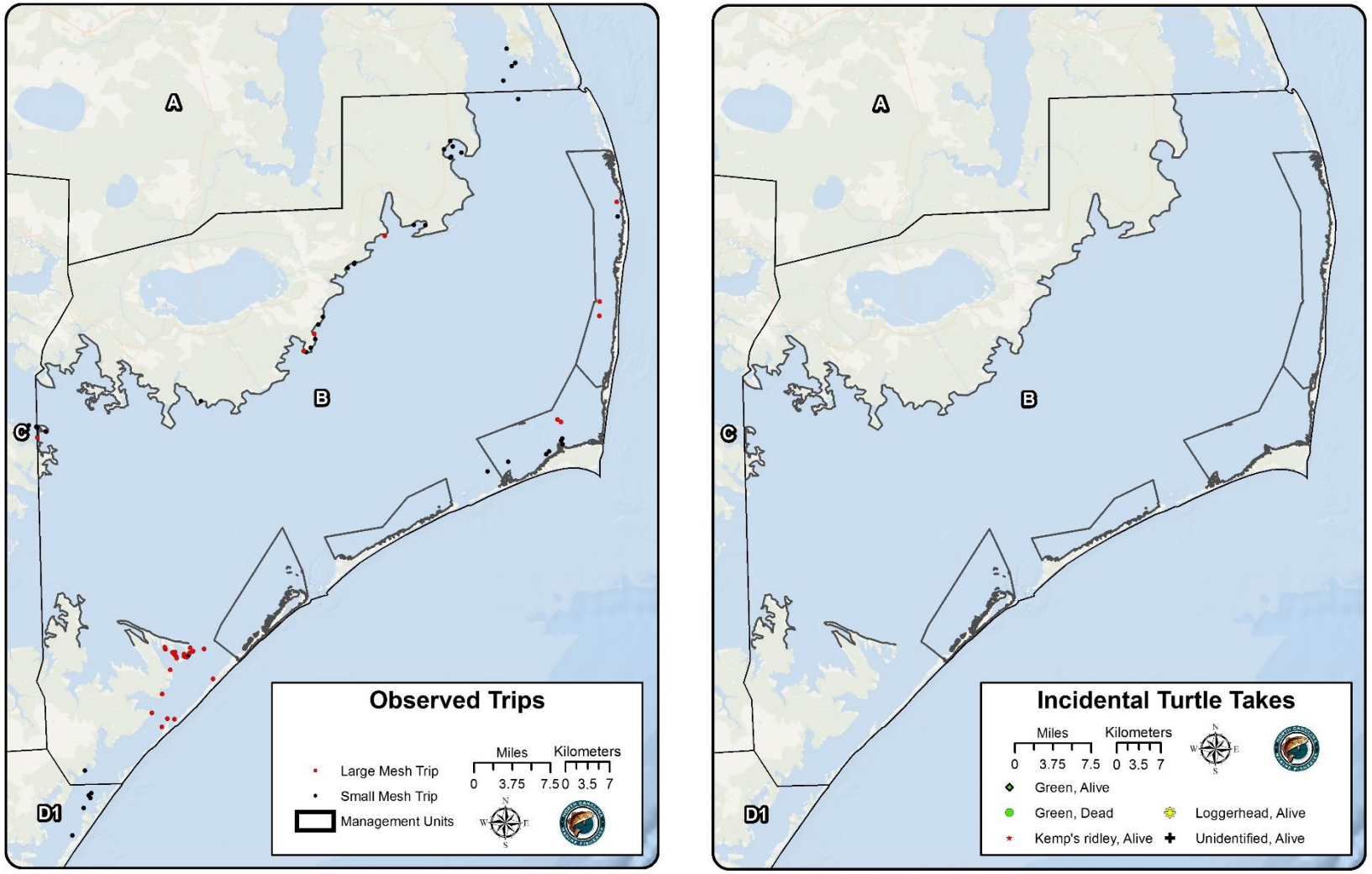

Figure 10. For spring 2019, observed gill-net trips (left) by mesh-size category (29 large mesh = ≥ 4 inch; 39 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit B.

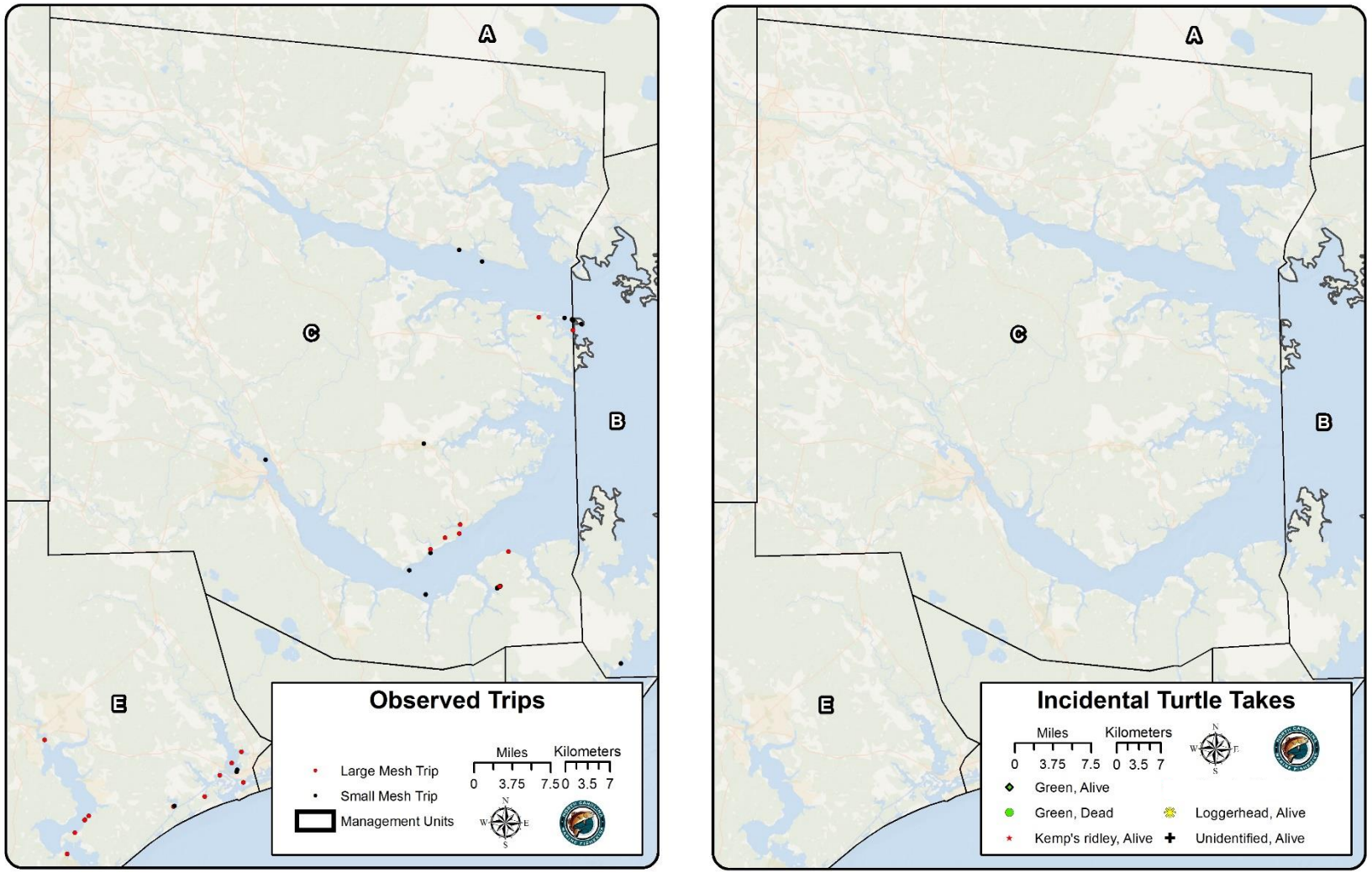

Figure 11. For spring 2019, observed gill-net trips (left) by mesh-size category (20 large mesh = ≥ 4 inch; 16 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit C.

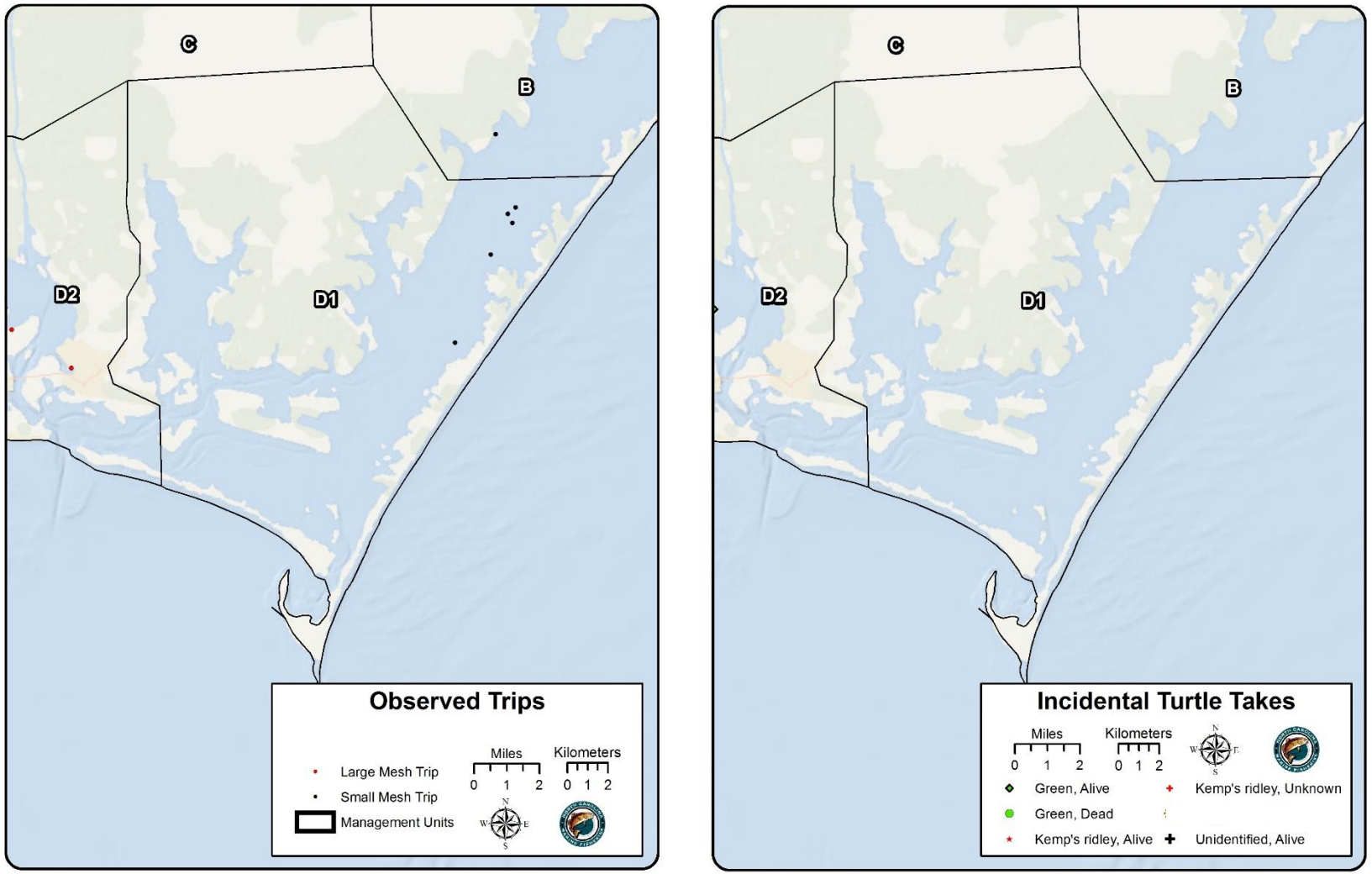

Figure 12. For spring 2019, observed gill-net trips (left) by mesh-size category (0 large mesh = ≥ 4 inch; 6 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit D1. D1 was closed to large-mesh gill nets for the entire 2019 ITP Year.

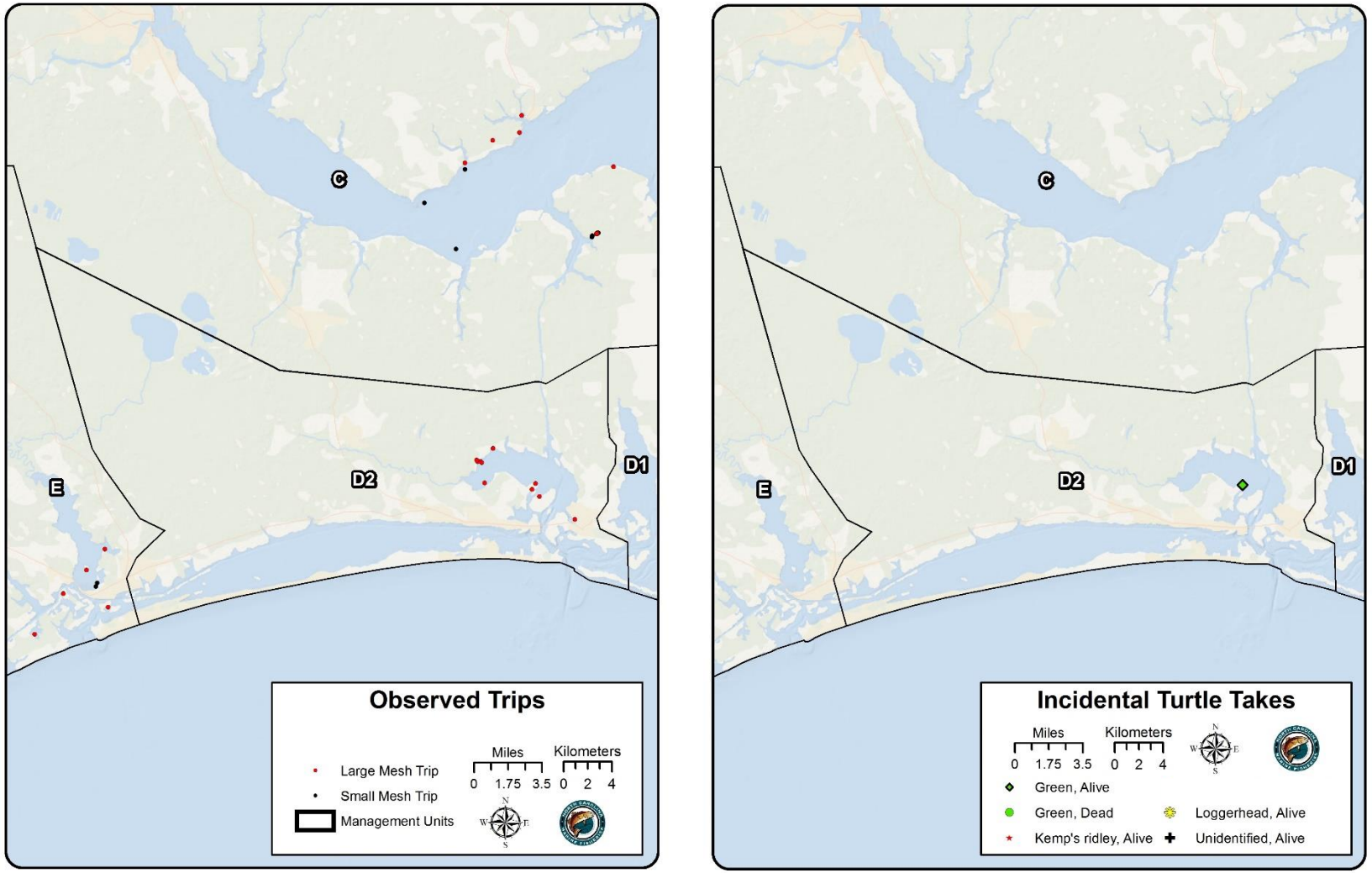

Figure 13. For spring 2019, observed gill-net trips (left) by mesh-size category (11 large mesh = ≥ 4 inch; 0 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 1; dead, n = 0) for Management Unit D2.

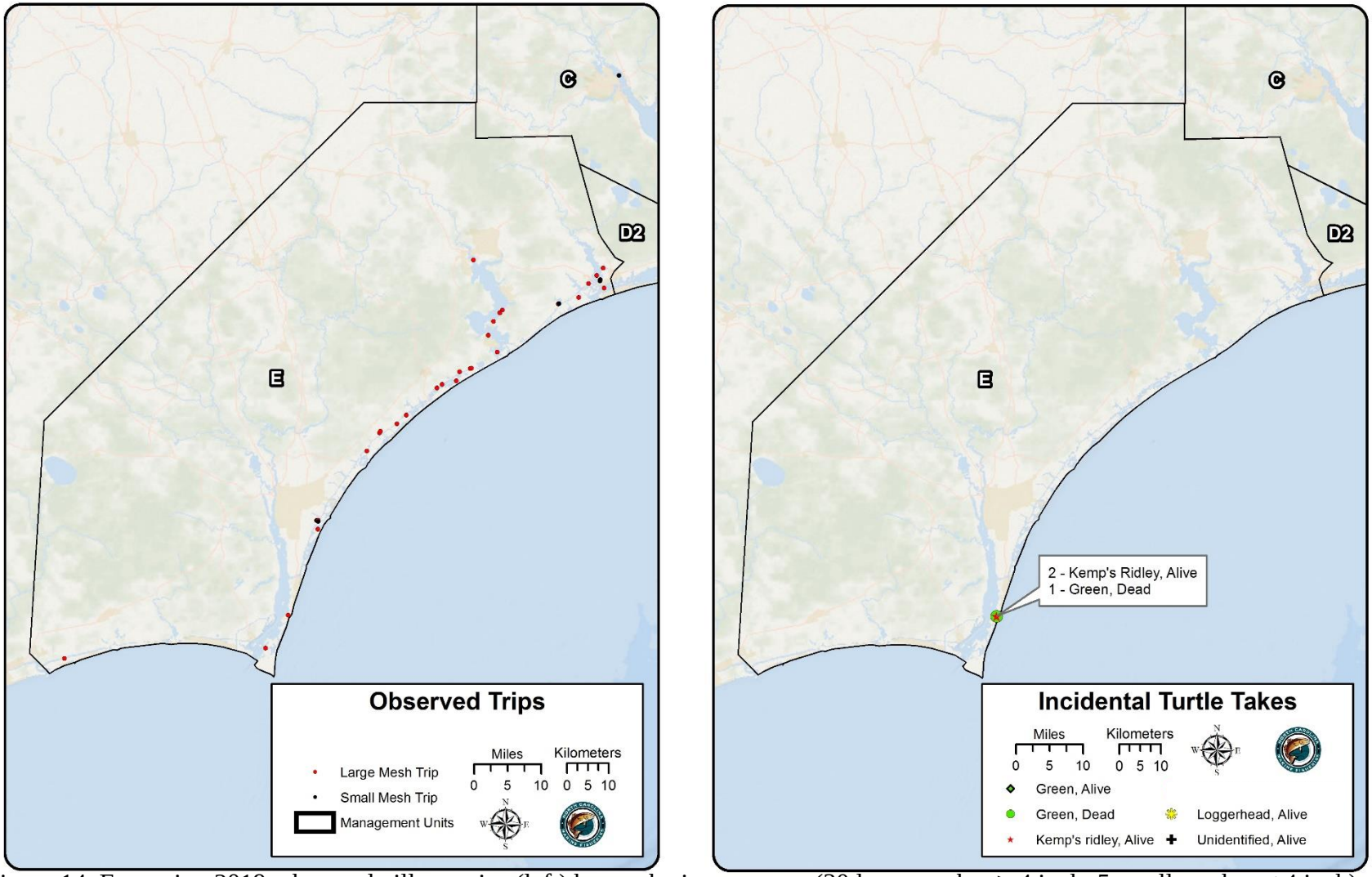

Figure 14. For spring 2019, observed gill-net trips (left) by mesh-size category (30 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 2; dead, n = 1) for Management Unit E.

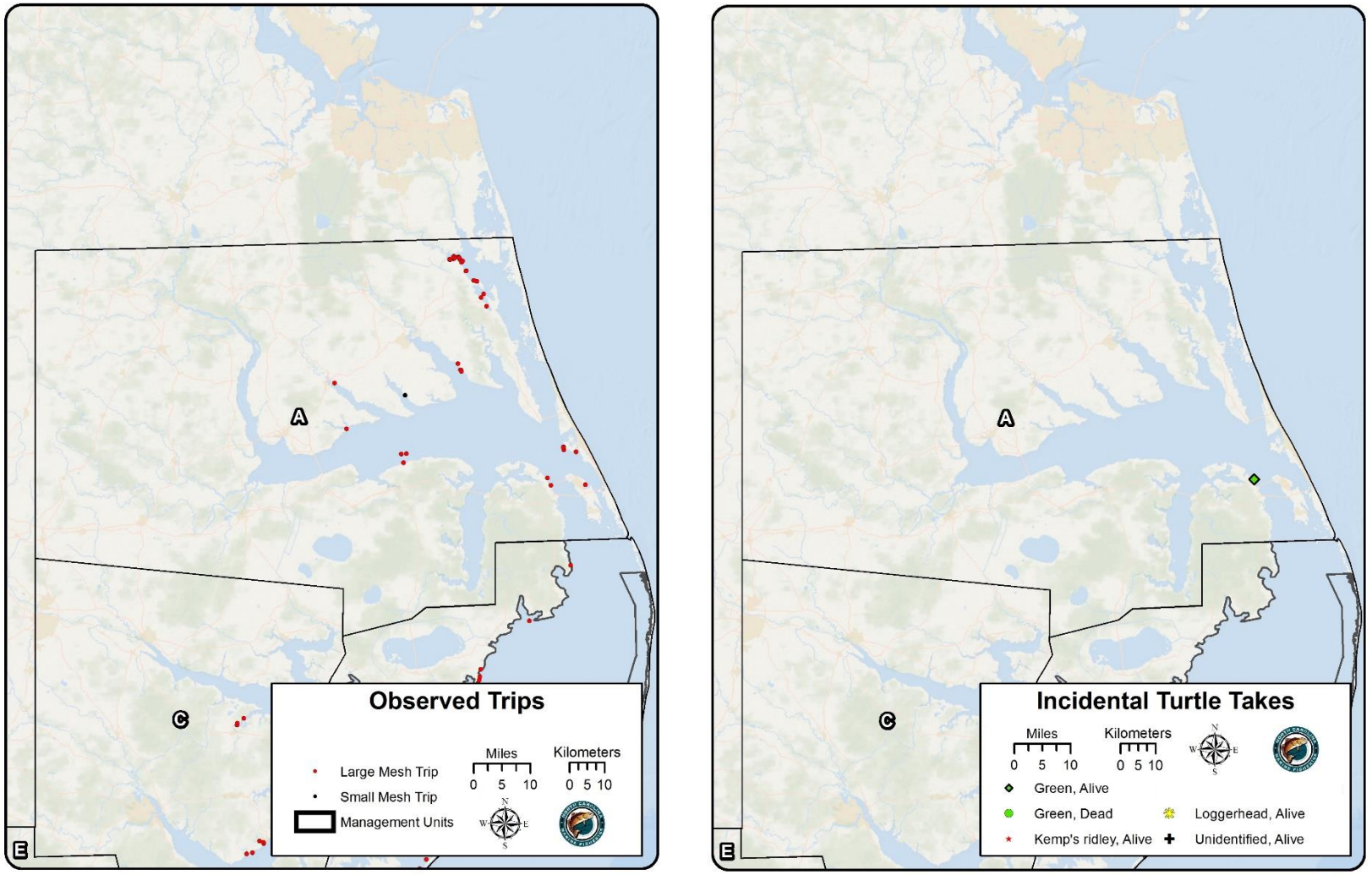

Figure 15. For summer 2019, observed gill-net trips (left) by mesh-size category (46 large mesh = ≥ 4 inch; 2 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 1; dead, n = 0) for Management Unit A.

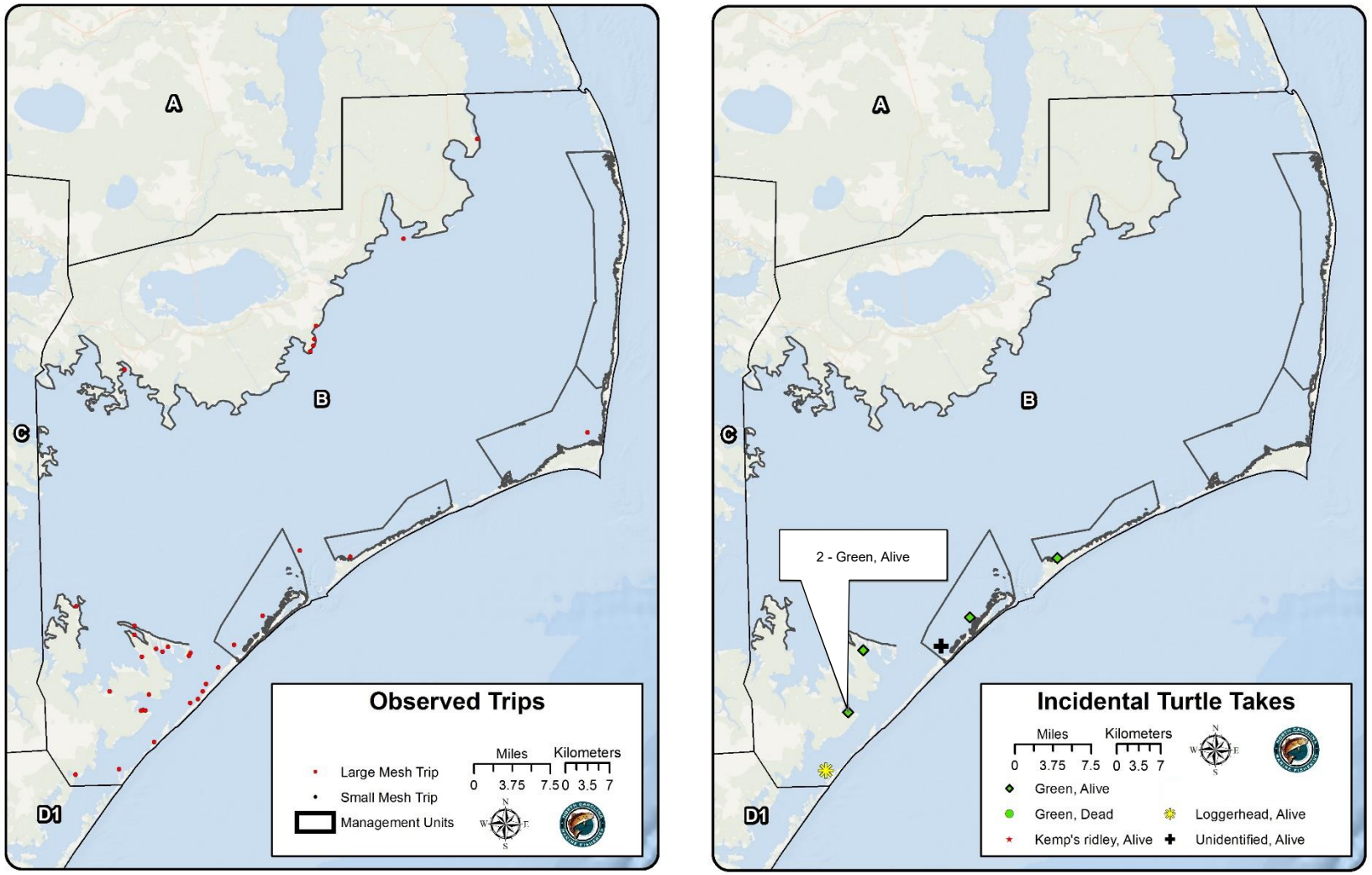

Figure 16. For summer 2019, observed gill-net trips (left) by mesh-size category (34 large mesh = ≥ 4 inch; 0 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 7; dead, n = 0) for Management Unit B.

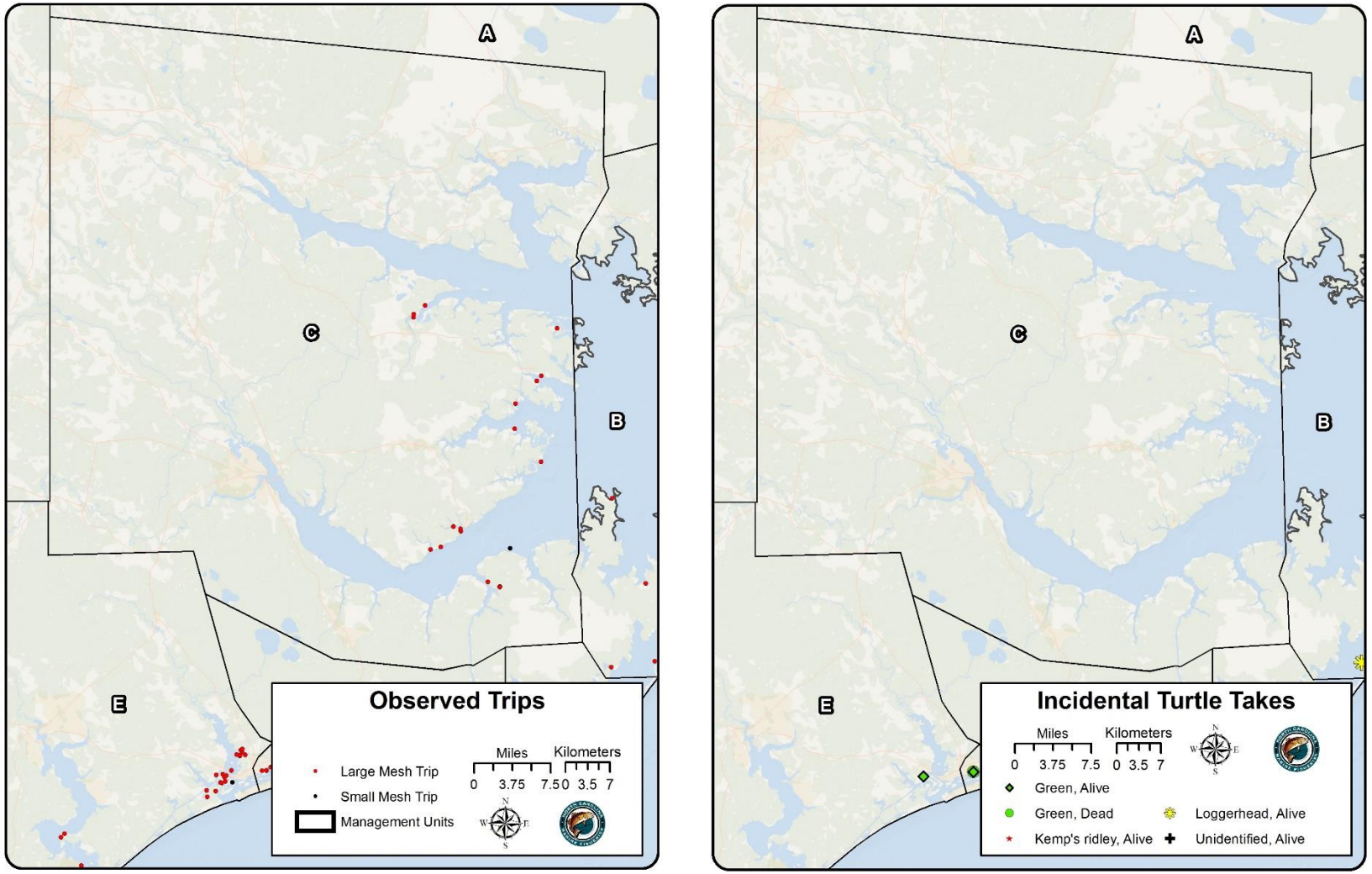

Figure 17. For summer 2019, observed gill-net trips (left) by mesh-size category (27 large mesh = ≥ 4 inch; 1 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit C.

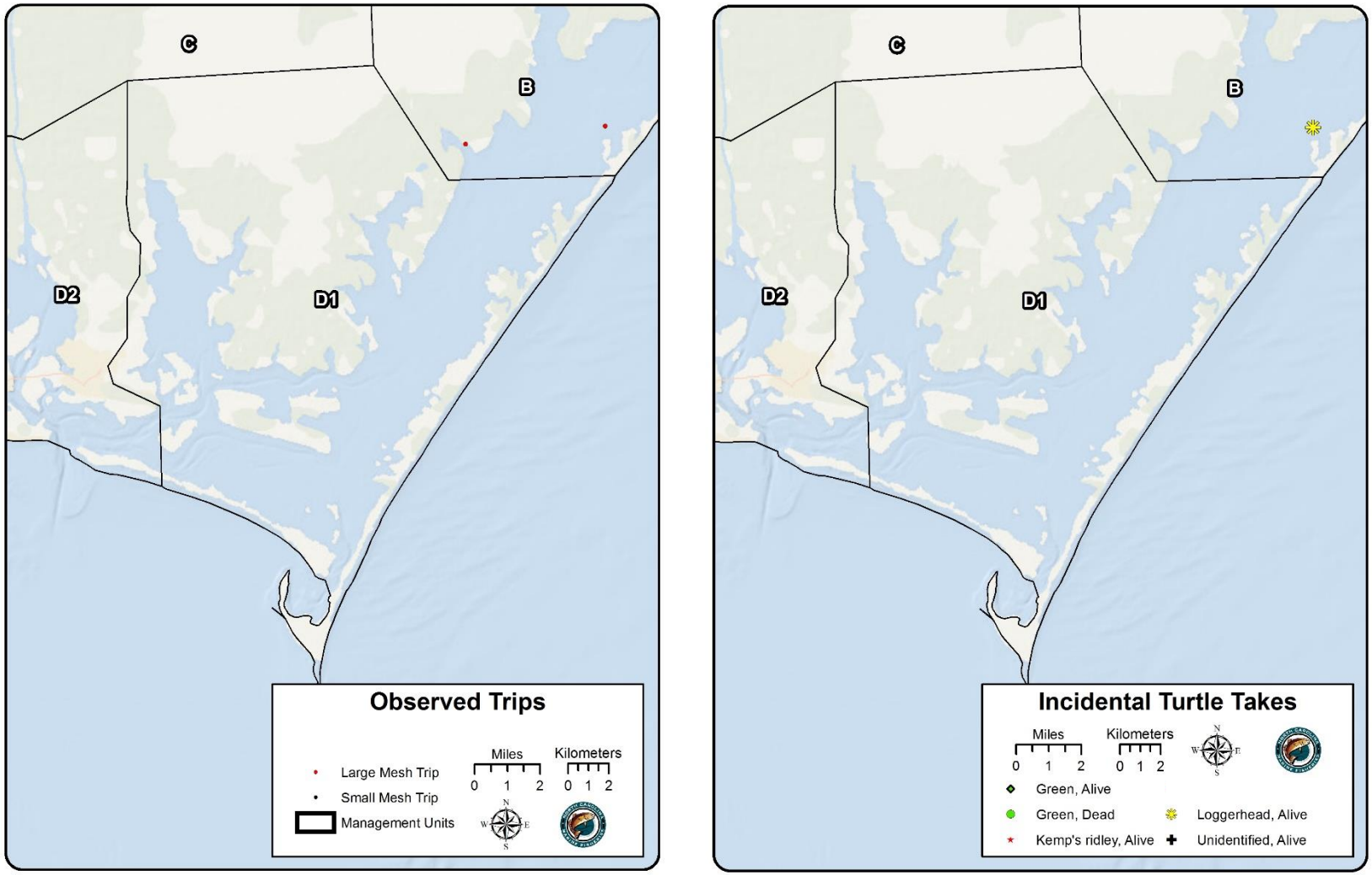

Figure 18. For summer 2019, observed gill-net trips (left) by mesh-size category (0 large mesh = ≥ 4 inch; 0 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 0; dead, n = 0) for Management Unit D1. D1 was closed to large-mesh gill nets for the entire 2019 ITP Year.

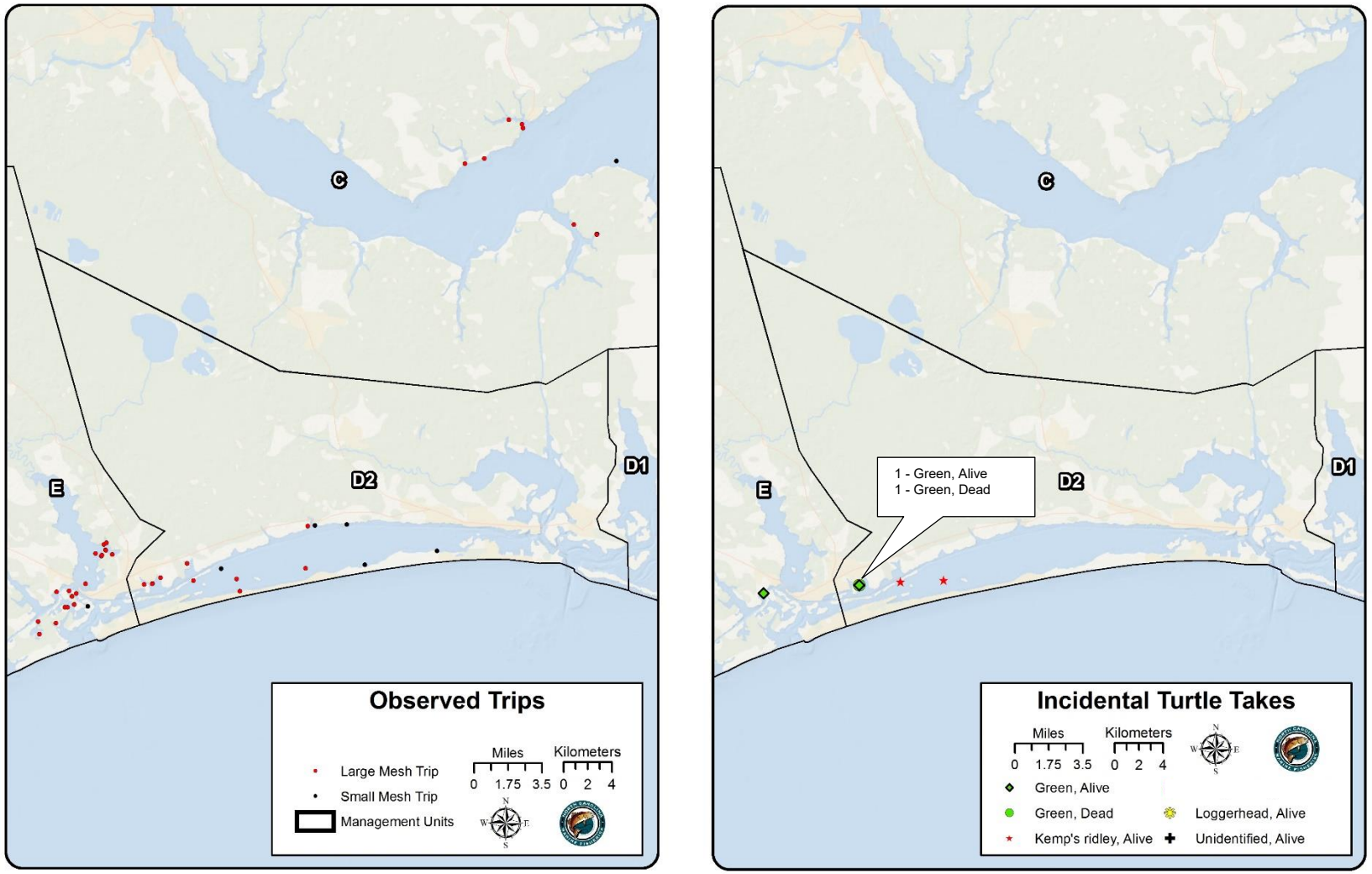

Figure 19. For summer 2019, observed gill-net trips (left) by mesh-size category (10 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 3; dead, n = 1) for Management Unit D2.

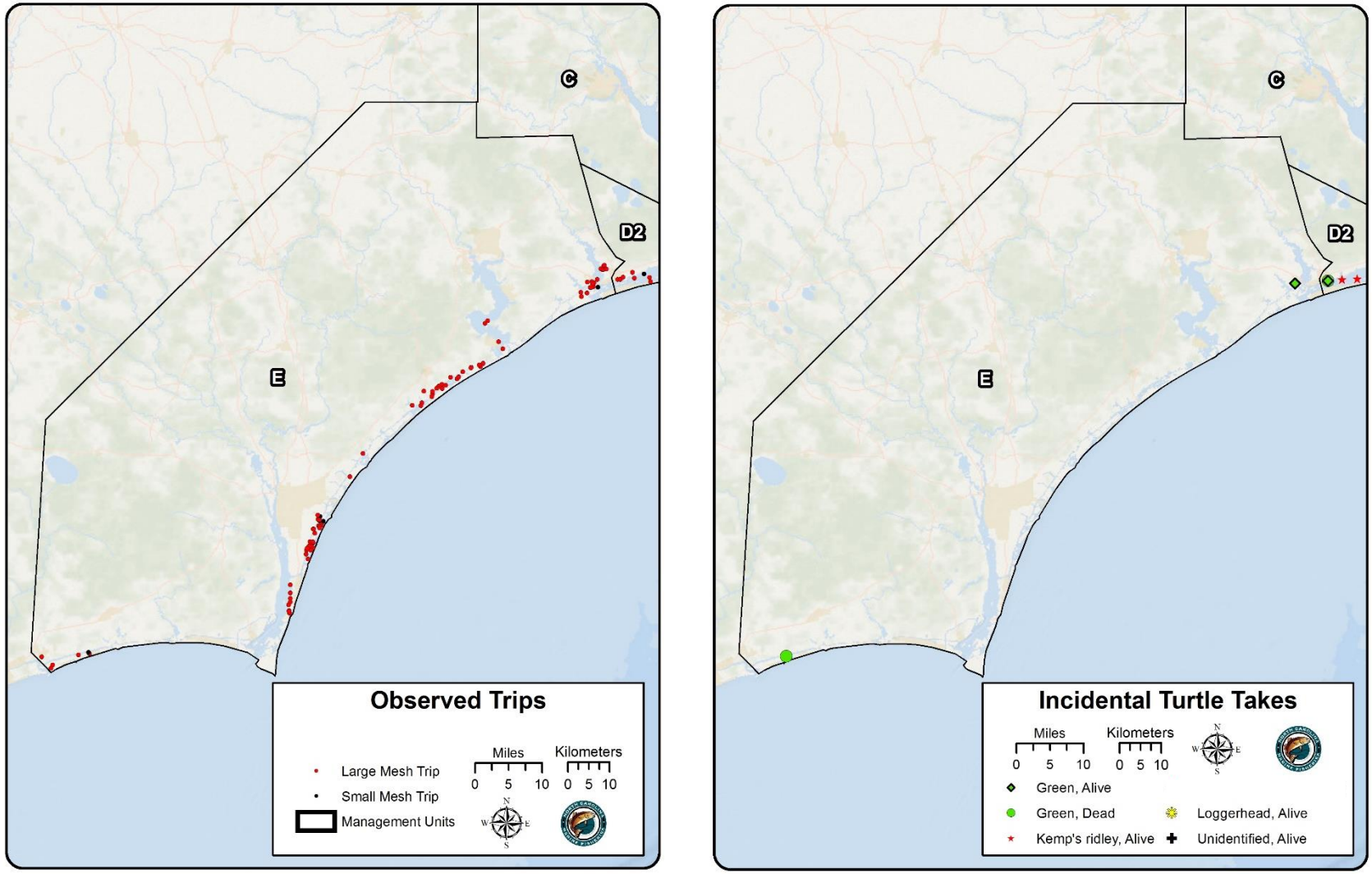

Figure 20. For summer 2019, observed gill-net trips (left) by mesh size category (93 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, n = 1; dead, n = 1) for Management Unit E. The dead green turtle was recovered from the net alive, but was euthanized the next day due to extensive carapace factures not associated with the entanglement. See Figure 21.

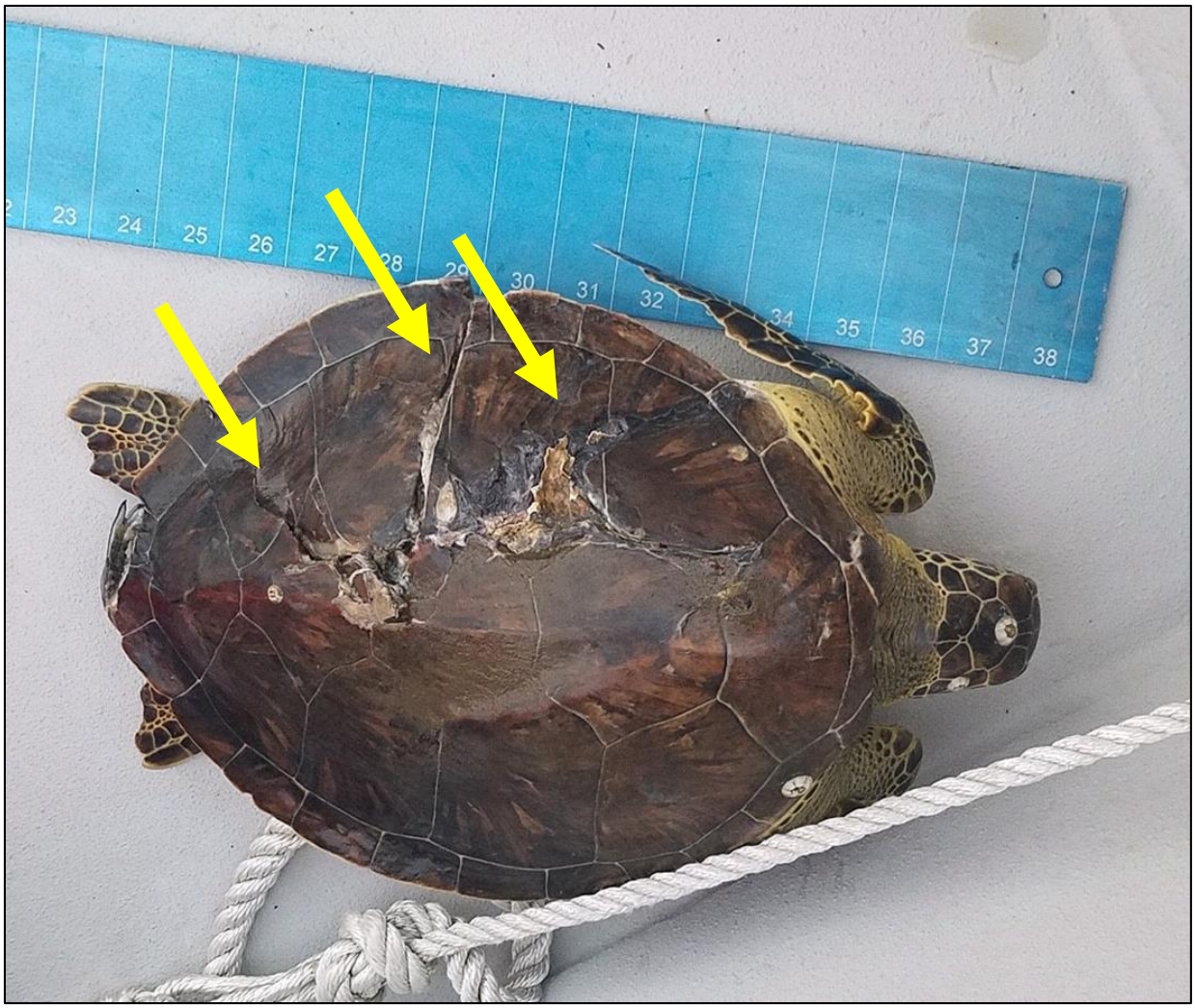

Figure 21. Green sea turtle recovered alive from a large-mesh (6 inch) gill net near Ocean Isle (Management Unit E) during an observed trip conducted by Marine Patrol on 17 July 2019. The turtle was transferred to the Karen Beasley Sea Turtle Rescue and Rehabilitation Center because of significant carapace fractures (yellow arrows). After assessment, the turtle was euthanized the next day because of the severity of the damage to the carapace and underlying spine and left lung. Photo credit: NCDMF.

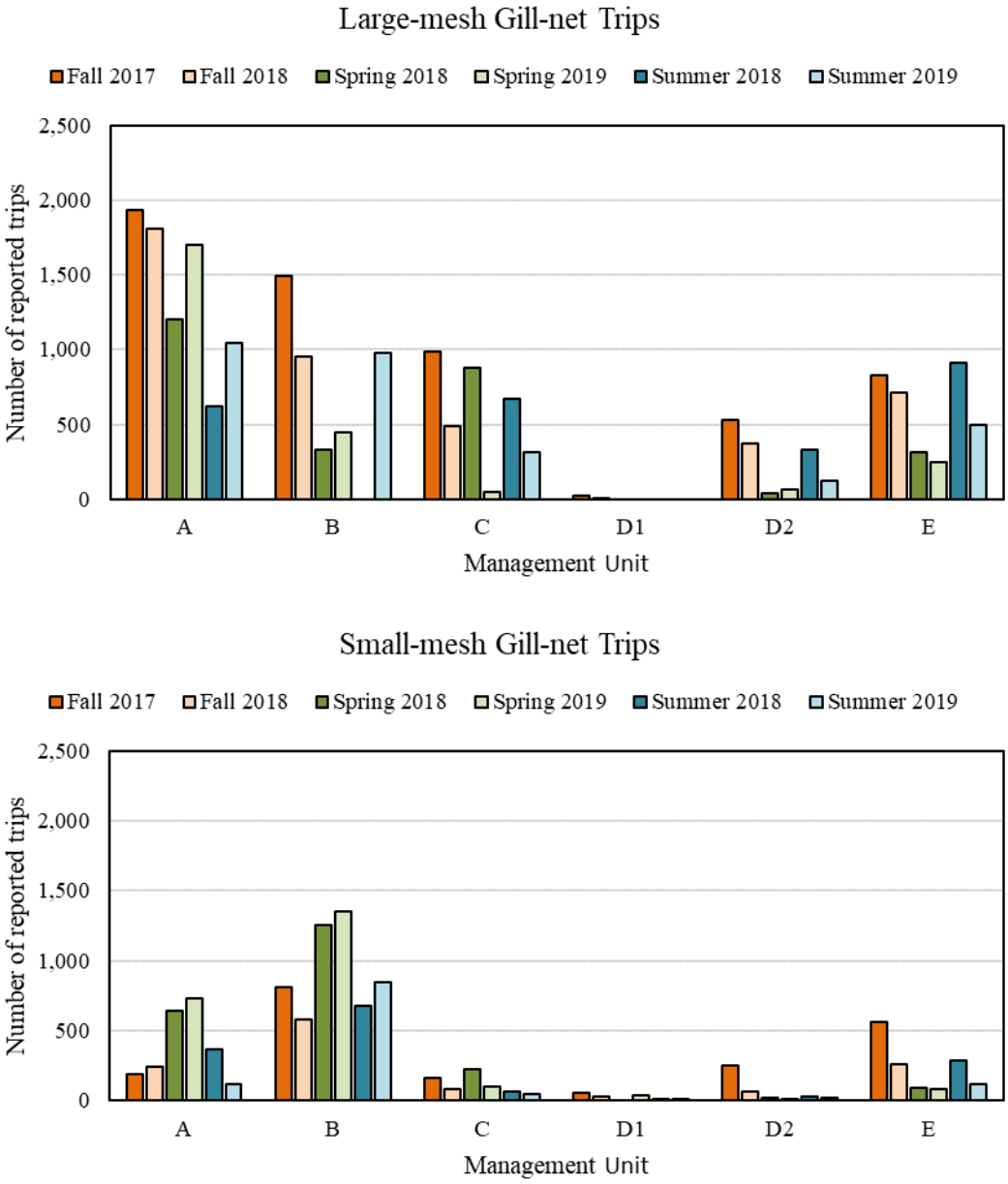

Figure 22. Number of fishing trips using large-mesh (≥ 5 inch, top) and small mesh (< 5 inch, bottom) gill nets reported to the Trip Ticket Program during the 2018 and 2019 ITP Years by season and management unit. Seasons for the 2018 ITP Year (fall 2017, spring 2018, summer 2018) are shown with darker shades that those for the 2019 ITP Year (fall 2018, spring 2019, summer 2019). Management Unit D1 was closed to large-mesh gill nets during fall 2017 and did not re-open during either ITP Year. Management Unit B was closed to large-mesh gill nets during late spring through summer 2018.

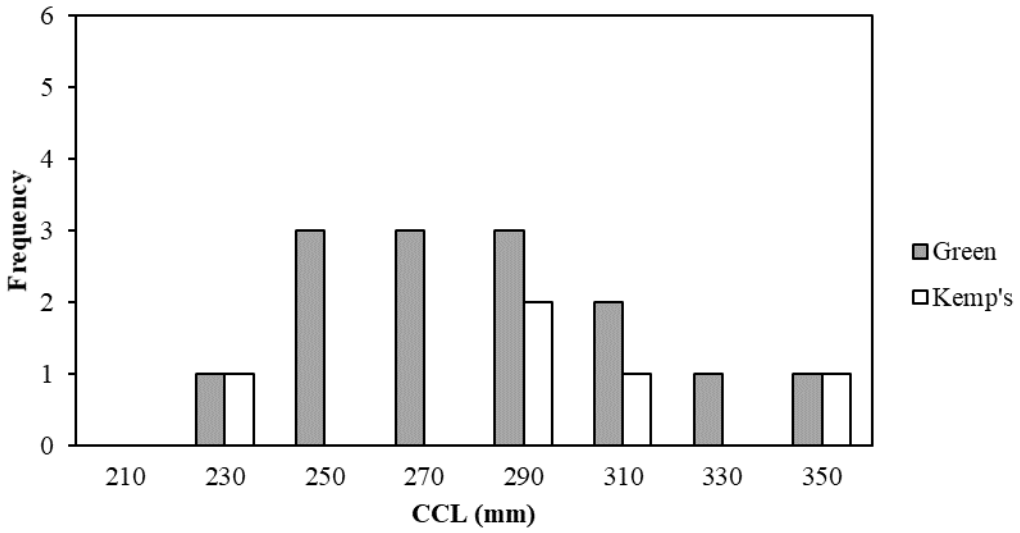

Figure 23. Length-frequency (curved carapace length [CCL], mm) of observed and measured incidental takes of green (n = 14 out of 15 observed) and Kemp's ridley (n = 5 out of 5 observed) sea turtles during the 2019 ITP Year. The measurement from the single observed loggerhead sea turtle (CCL = 640 mm) is not shown.

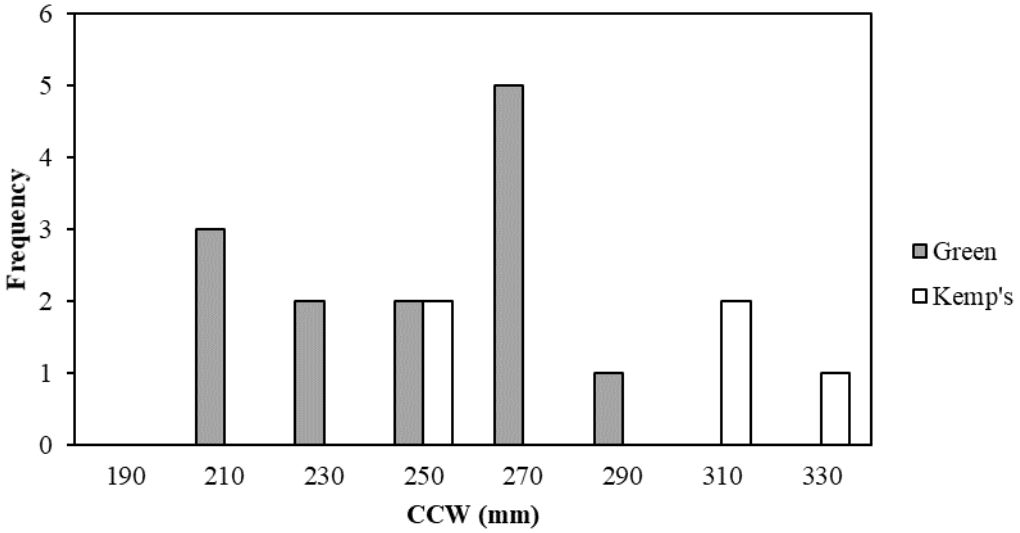

Figure 24. Length-frequency (curved carapace width, mm) of observed and measured incidental takes of green (n = 13 out of 15 observed) and Kemp's ridley (n = 5 out of 5 observed) sea turtles where measurements were obtained during the 2019 ITP Year. The measurement from the single observed loggerhead sea turtle (CCW = 650 mm) is not shown.

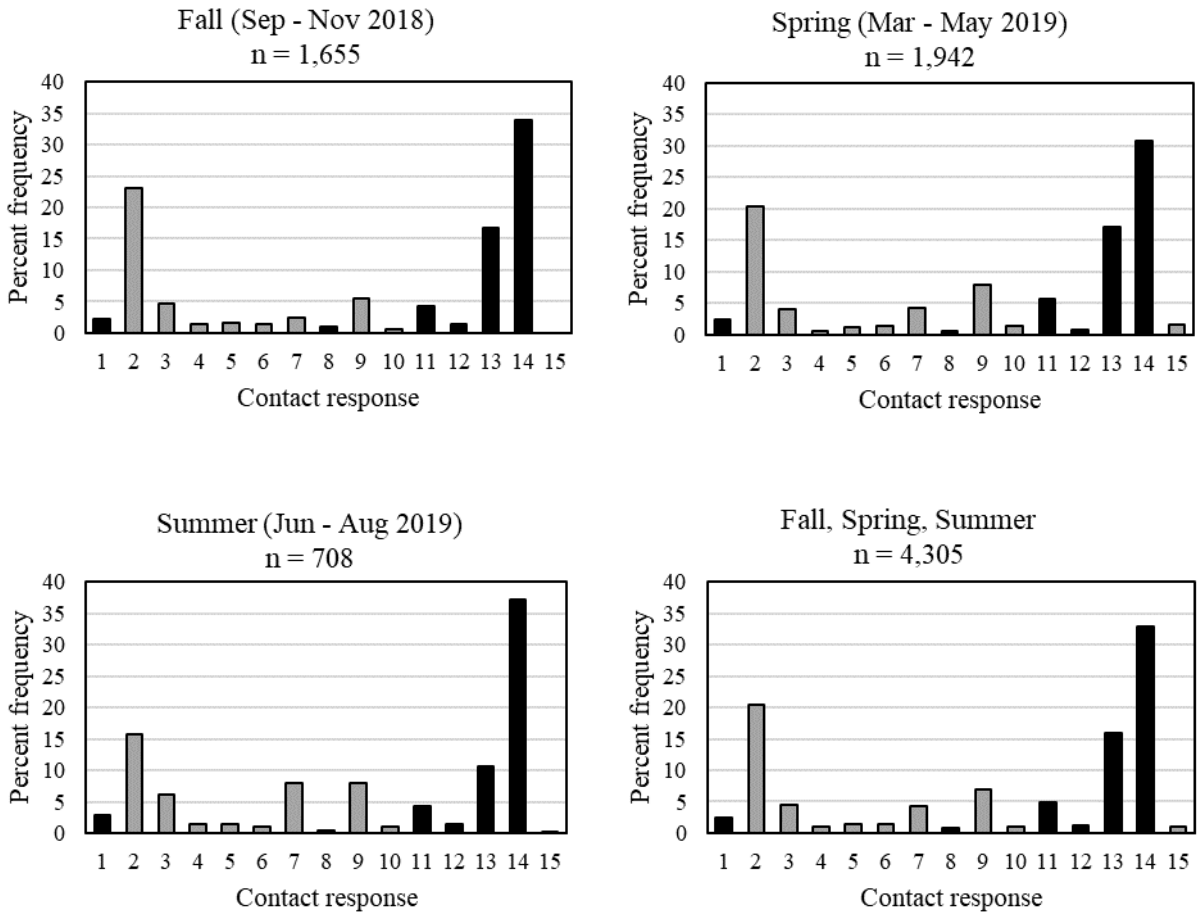

Figure 25. For the 2019 ITP Year, contacts attempted (n = 4,305) by observers to set up trips categorized by contact type (0-15) and presented as a percentage of the total for fall, spring, summer, and all three seasons combined. Contact type categories include the following: 1) Left message with someone 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).

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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April 2019

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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 ≥ 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 (Kolkmeyer 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.

		Total Interactions			
		Authorized (Mortality)		Actual All DPS	
Management Unit	Season	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.

		Total Interactions			
		Authorized (Mortality)		Actual All DPS	
Management Unit	Season	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.

		Large Mesh		
Season	Management Unit	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.

		Small Mesh		
Season	Management Unit	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.

						Length (mm)	
Date	Season	Management Unit	Latitude (N)	Longitude (W)	Disposition	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	Leave gill net in waters when could not be legally fished
	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	2/15/2019	NETG04	Leave gill net in waters when could not be legally fished
2018-2019	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
	2/22/2019	NETG22	Improperly set gill net
	2/22/2019	NETG61	Gill net tie down violation
Spring 2018	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
	5/15/2019	EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
		EGNP99	Failure to comply with statute(s), rule(s), and/or proclamation(s)
	5/31/2019	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	Failure to comply with gill net configurations outlined in proclamation
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

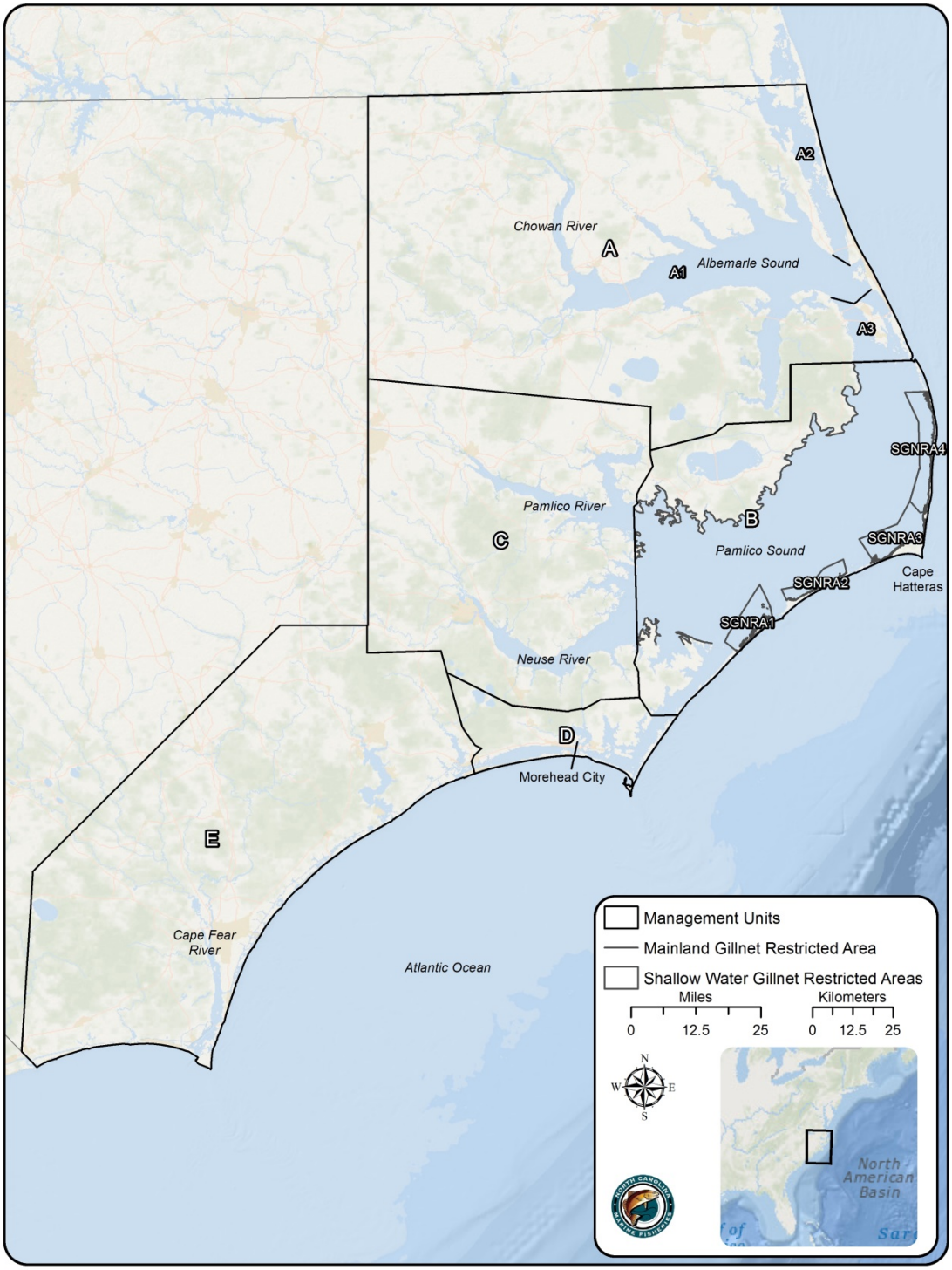

Figure 1. Management units (A1, A2, A3, B, C, D, and E) as outlined in the Incidental Take Permit (ITP) Conservation Plan and used by the Observer Program during the 2019 ITP Year. In the Pamlico Sound portion of B, gill nets with a mesh size of ≥ 4 inches were confined to Shallow Water Gillnet Restricted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

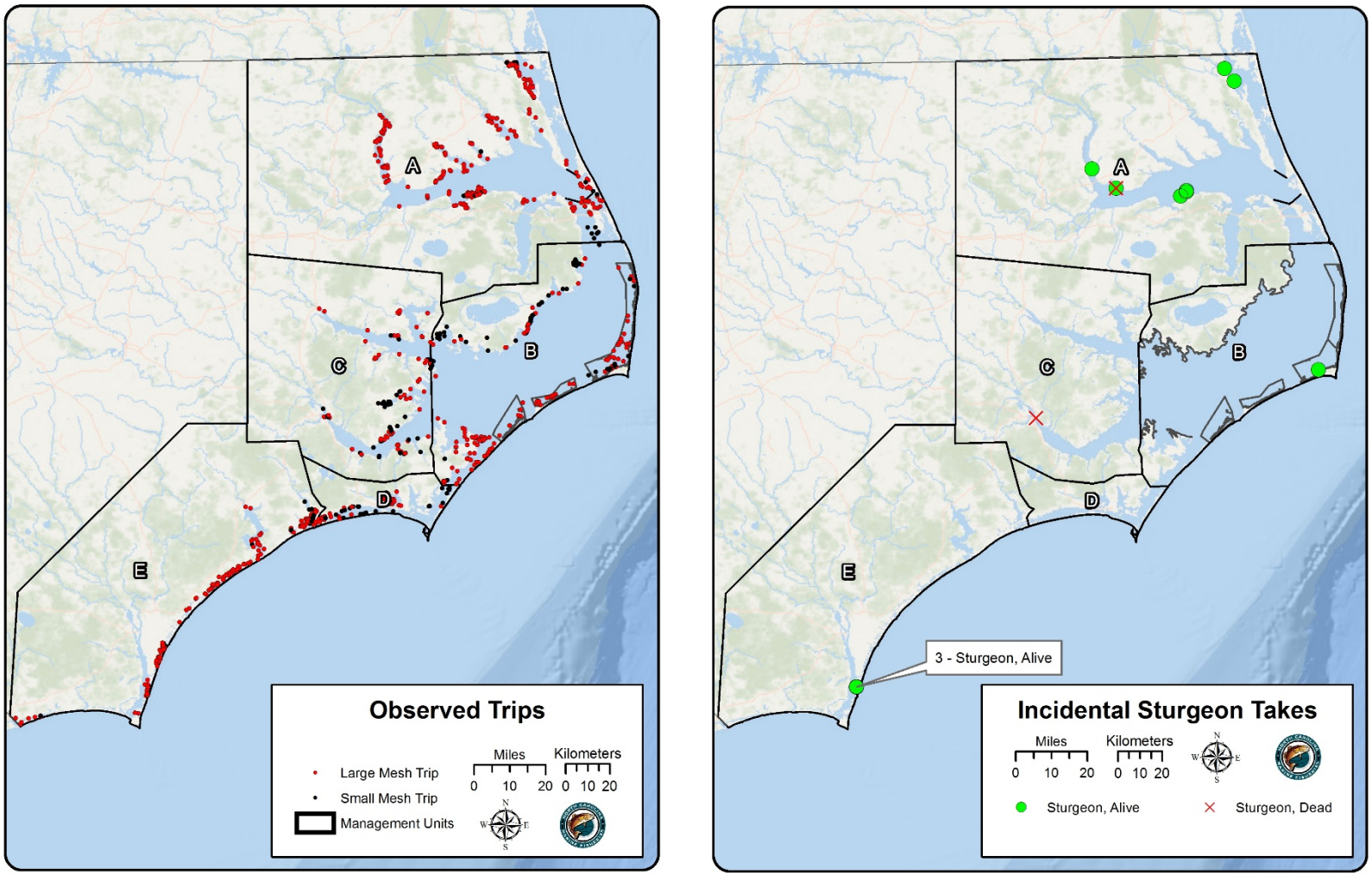

Figure 2. For the entire 2019 ITP Year, observed gill-net trips (left) by mesh-size category (774 large-mesh = ≥ 5 inch; 245 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, n = 11; dead, n = 2) across management units.

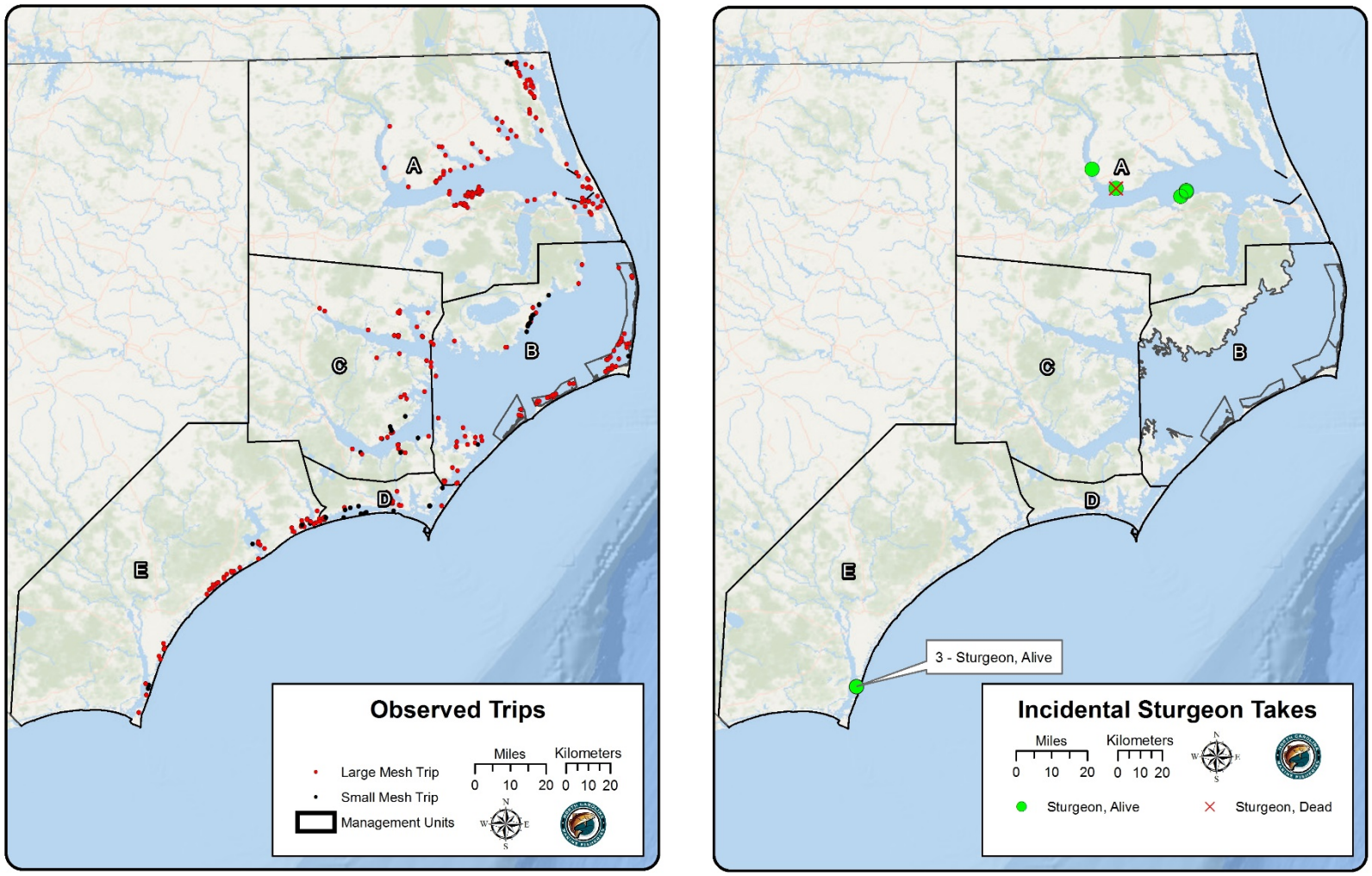

Figure 3. For fall 2018, observed gill-net trips (left) by mesh-size category (324 large-mesh = ≥ 5 inch; 58 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, n = 8; dead, n = 1) across management units.

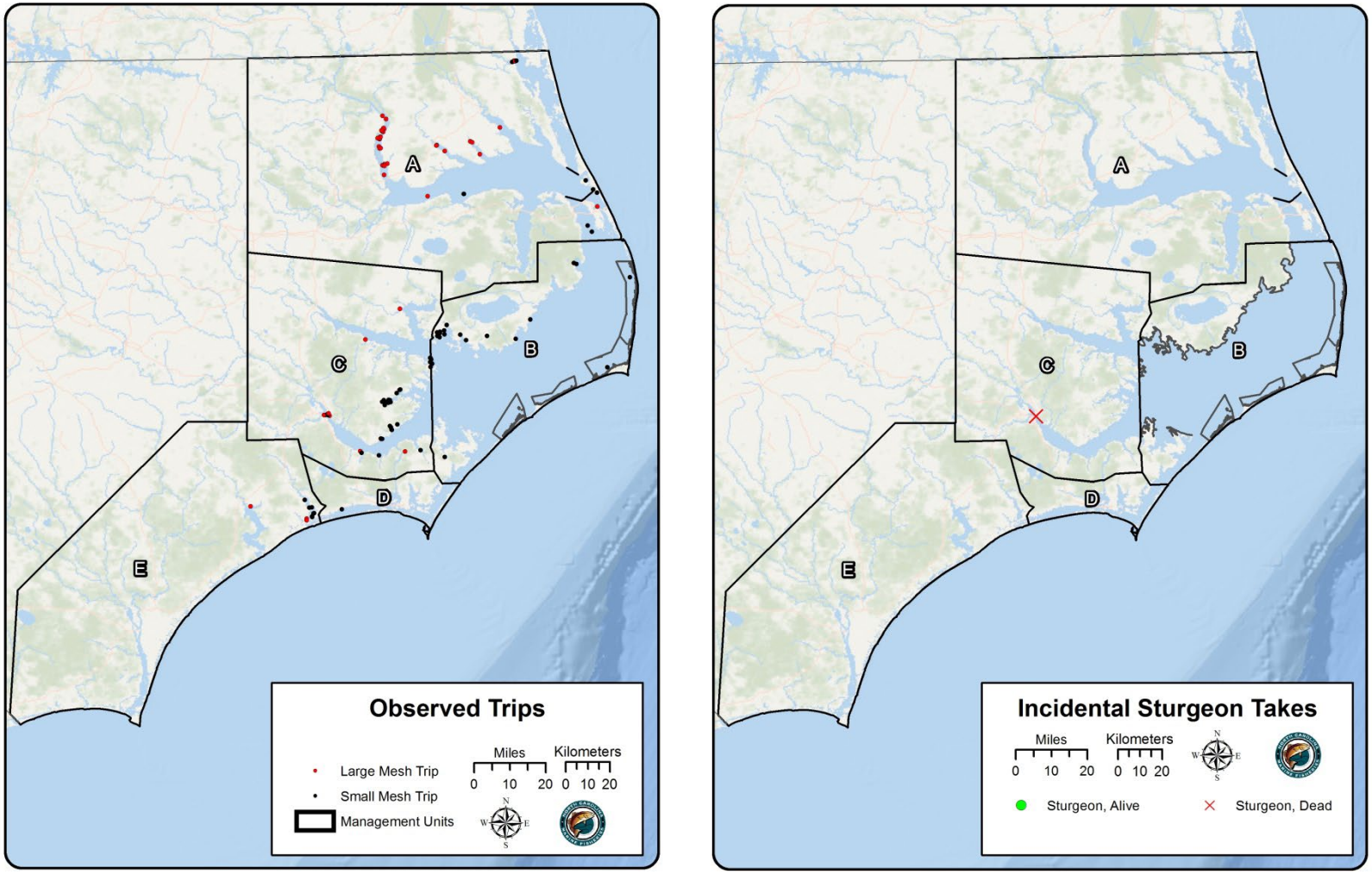

Figure 4. For winter 2018-2019, observed gill-net trips (left) by mesh-size category (50 large-mesh = ≥ 5 inch; 95 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, n = 0; dead, n = 1) across management units.

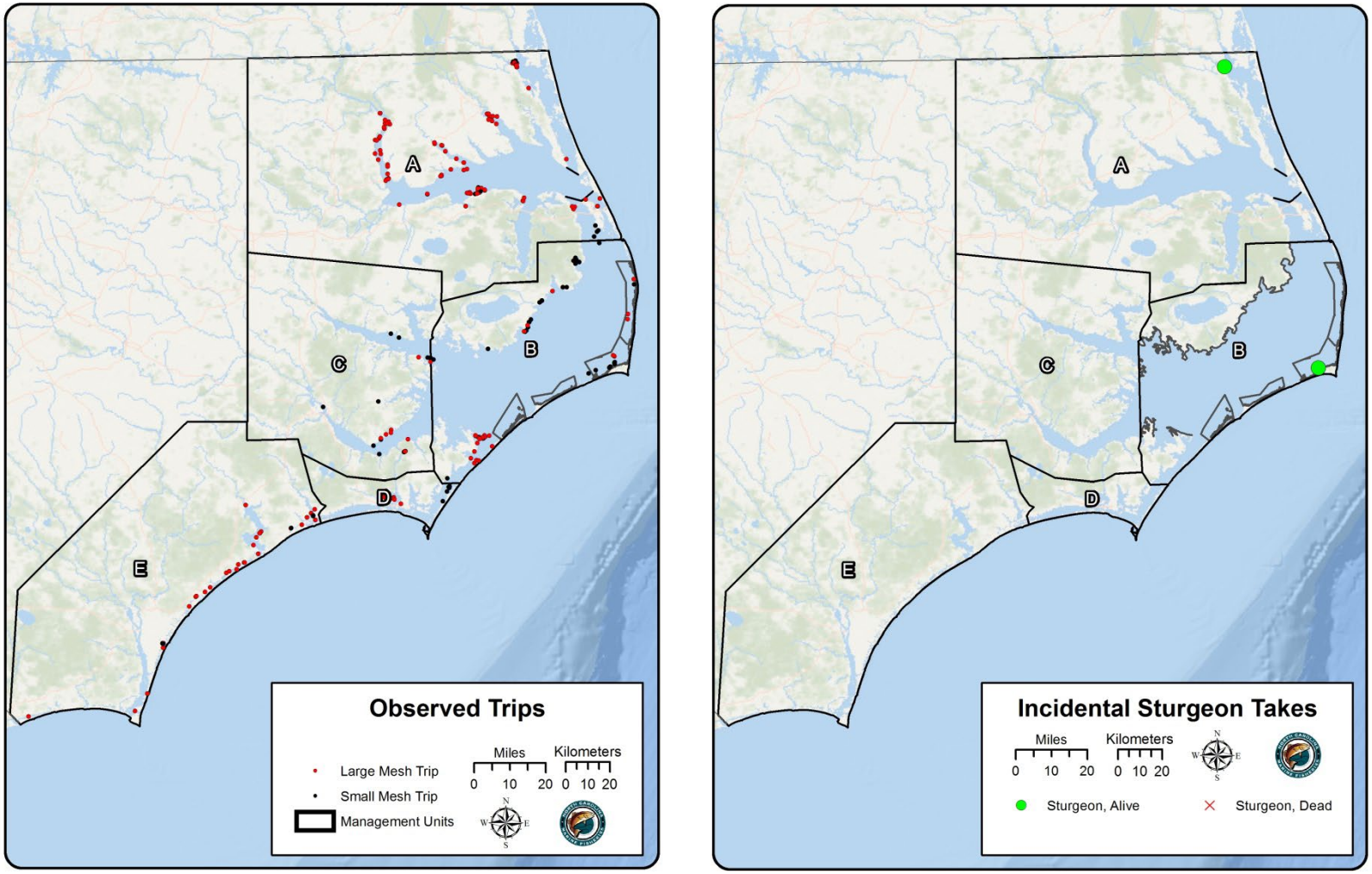

Figure 5. For spring 2019, observed gill-net trips (left) by mesh size-category (190 large-mesh = ≥ 5 inch; 79 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, n = 2; dead, n = 0) across management units.

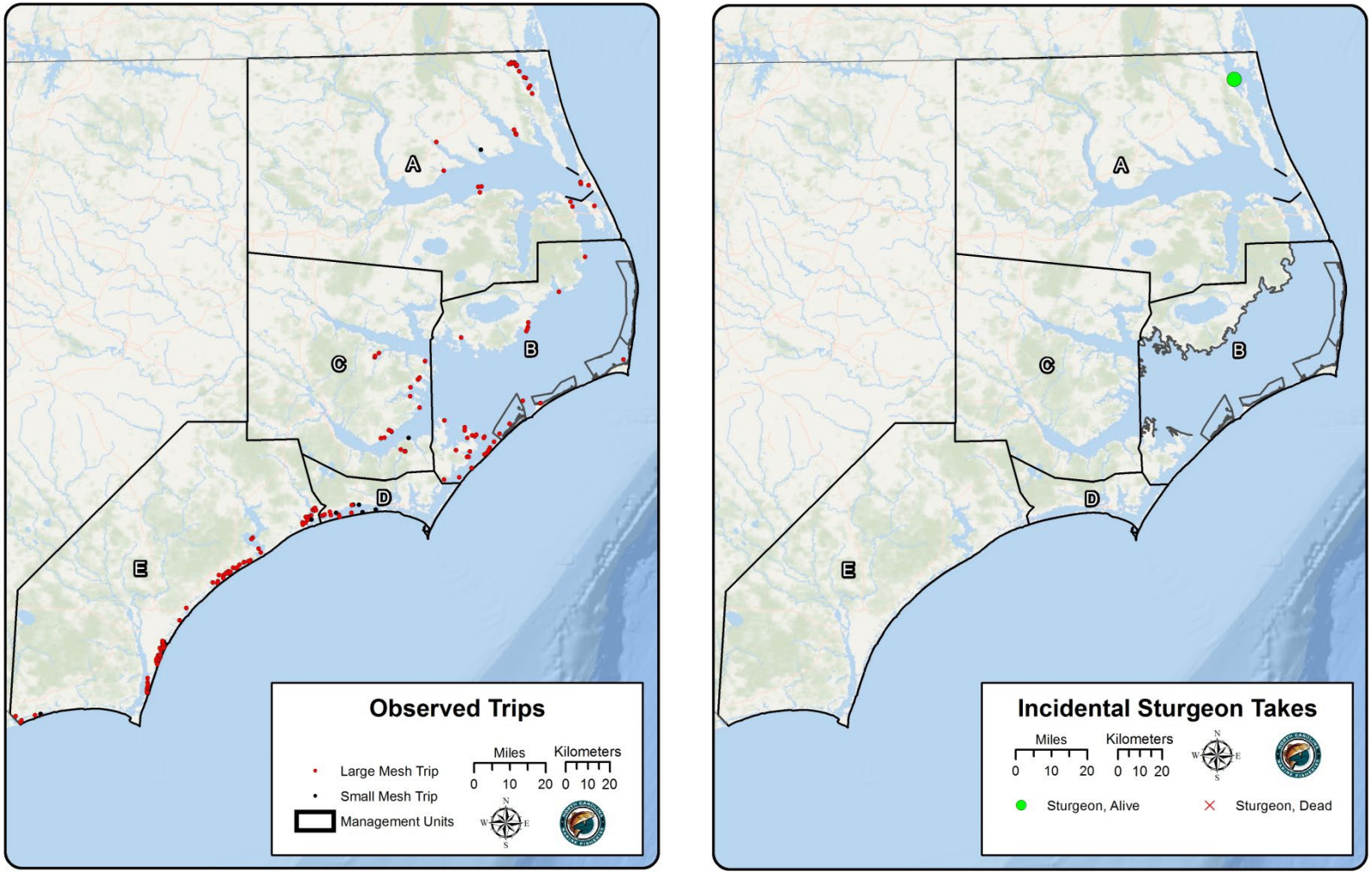

Figure 6. For summer 2019 observed gill-net trips (left) by mesh-size category (210 large-mesh = ≥ 5 inch; 13 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, n = 1; dead, n = 0) across management units.

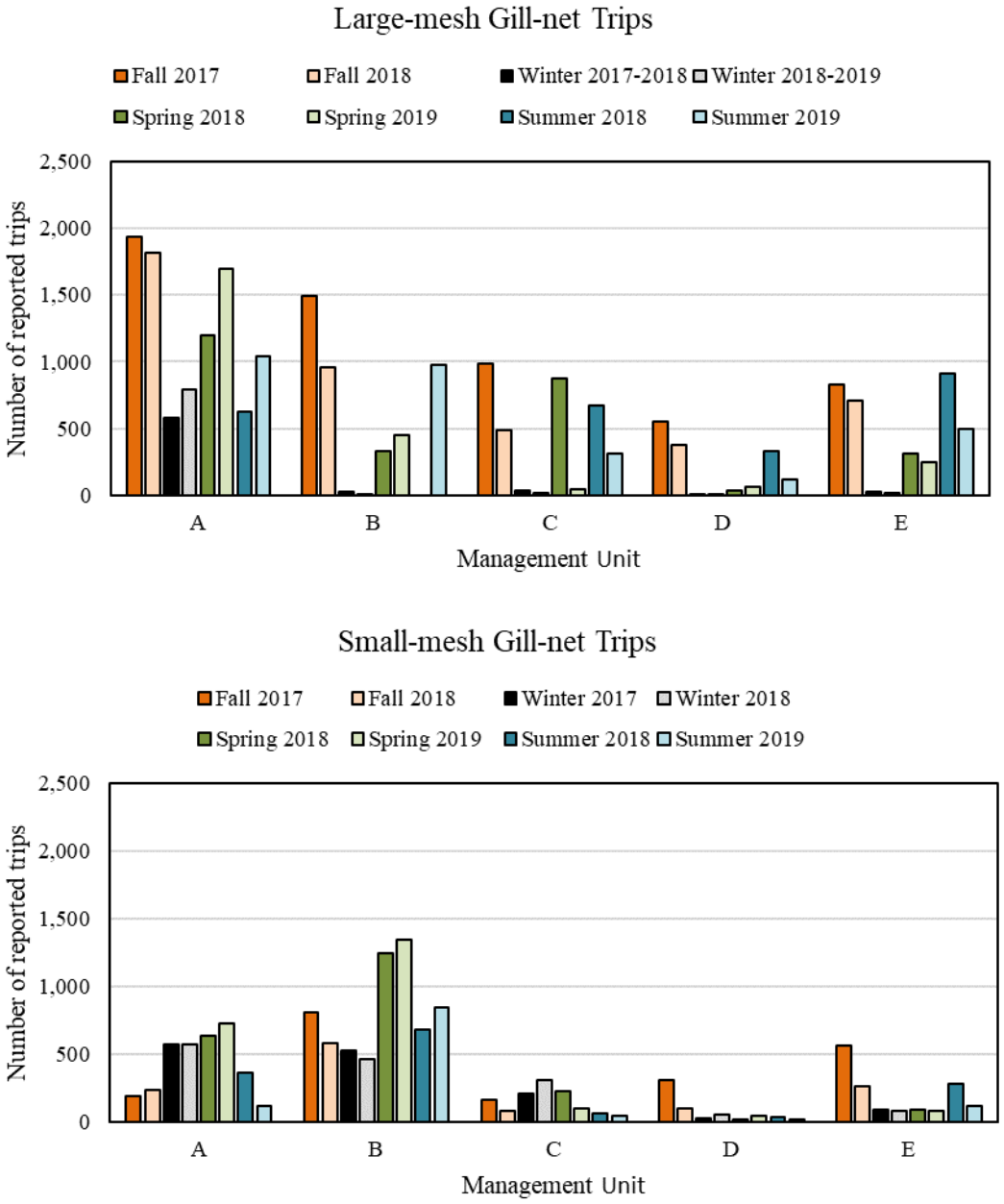

Figure 7. Number of fishing trips using large-mesh (≥ 5 inch, top) and small-mesh (< 5 inch, bottom) gill nets reported to the Trip Ticket Program during the 2018 and 2019 ITP Years by season and management unit. Seasons for the 2018 ITP Year (fall 2017, winter 2017-2018, spring 2018, summer 2018) are 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.

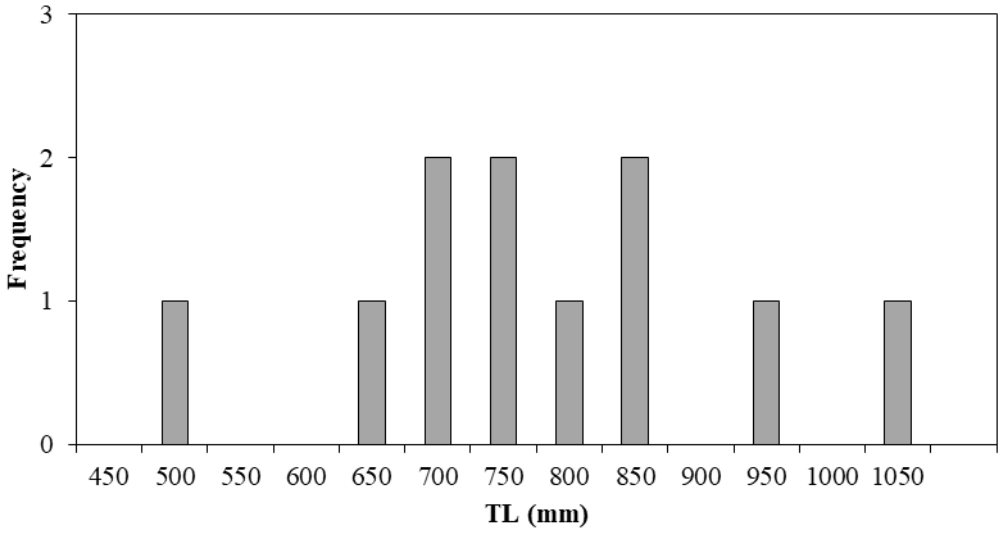

Figure 8. Length-frequency (total length [TL, mm]) of observed and measured incidental takes of Atlantic Sturgeon (n = 11 of 13 observed) during the 2019 ITP Year.

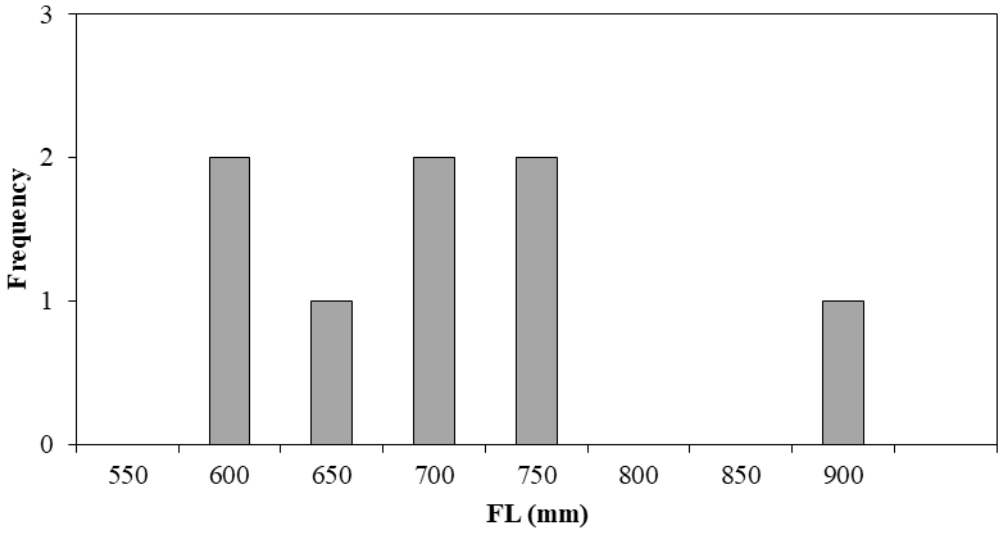

Figure 9. Length-frequency (fork length [FL], mm) of observed and measured incidental takes of Atlantic Sturgeon (n = 8 of 13 observed) during the 2019 ITP Year.

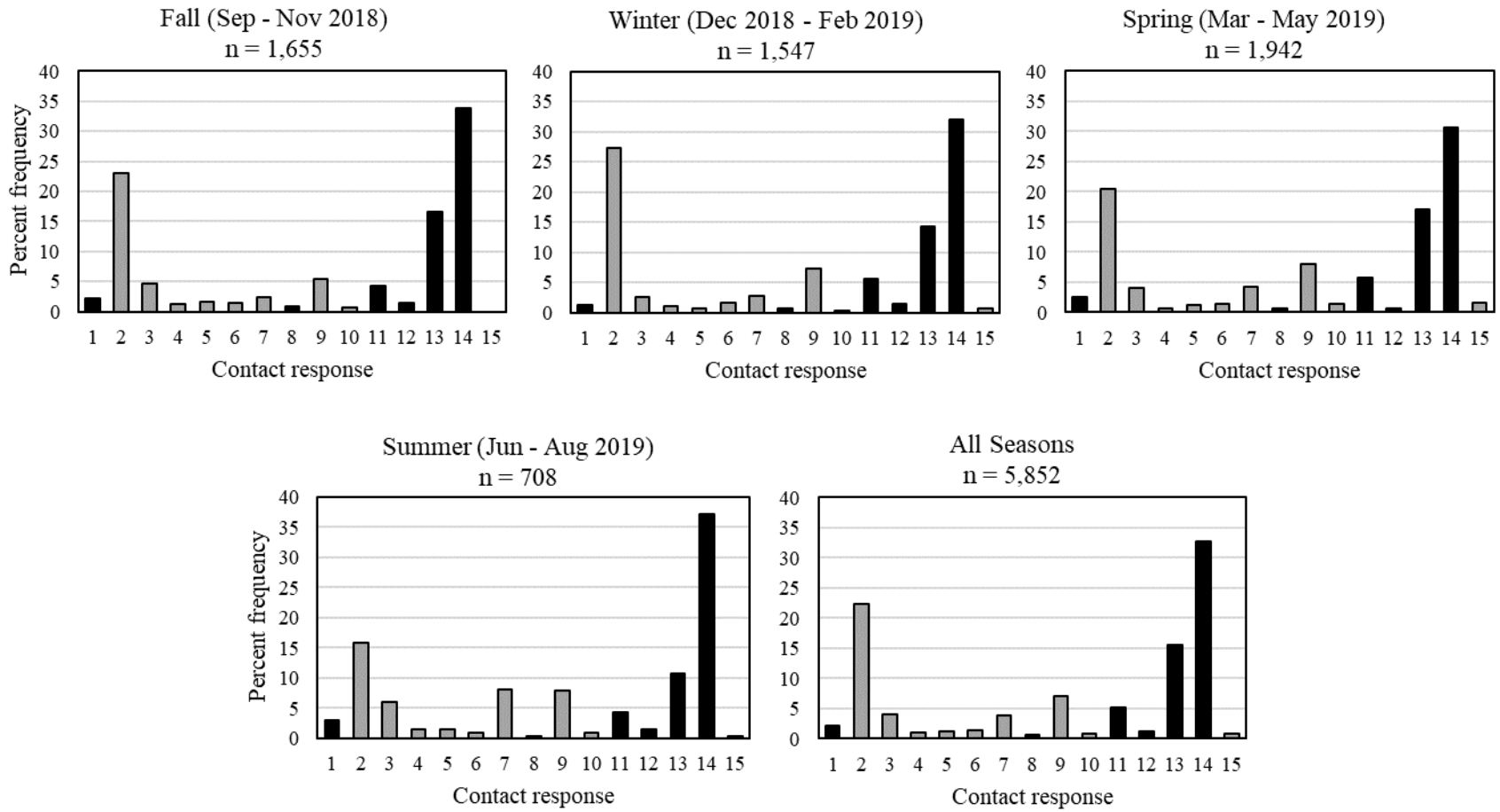

Figure 10. For the 2019 ITP Year, contacts attempted (n = 5,852) by observers to set up trips categorized by contact type (0-15) and presented as a percentage of the total for fall, winter, spring, summer, and all seasons combined. Contact type categories include the following: 1) Left message with someone 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,

for

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

Red Drum Landings 2018-2020

Landings are complete through January 31, 2020.
2018 landings are final. 2019 and 2020 landings are preliminary.

Year	Month	Species	Pounds	2009-2011 Average	2013-2015 Average	
2018	9	Red Drum	11,149	28,991	35,003	
2018	10	Red Drum	42,805	43,644	63,662	
2018	11	Red Drum	10,076	14,318	27,643	
2018	12	Red Drum	2,052	3,428	2,197	
2019	1	Red Drum	2,101	5,885	1,699	
2019	2	Red Drum	1,952	3,448	3,996	
2019	3	Red Drum	1,563	5,699	3,971	
2019	4	Red Drum	5,571	7,848	6,528	
2019	5	Red Drum	11,315	13,730	9,664	
2019	6	Red Drum	6,259	12,681	6,985	
2019	7	Red Drum	5,705	13,777	15,618	
2019	8	Red Drum	5,217	21,252	15,846	

Fishing Year (Sept 1, 2018 - Aug 31, 2019) Landings **105,764**

Year	Month	Species	Pounds	2009-2011 Average	2013-2015 Average	
2019	9	Red Drum	1,508	28,991	35,003	
2019	10	Red Drum	8,080	43,644	63,662	
2019	11	Red Drum	5,357	14,318	27,643	
2019	12	Red Drum	1,743	3,428	2,197	
2020	1	Red Drum	1,809	5,885	1,699	
2020	2	Red Drum	1,220	3,448	3,996	*
2020	3	Red Drum	813	5,699	3,971	*

Fishing Year (Sept 1, 2019 - Aug 31, 2020) Landings **20,529**

*partial trip ticket landings only
***landings are confidential

Year	Month	Species	Pounds	Dealers	Trips	Average (2007-2009)
2016	1	SOUTHERN FLOUNDER	2,625	33	264	7,713
2016	2	SOUTHERN FLOUNDER	1,643	31	291	4,617
2016	3	SOUTHERN FLOUNDER	9,260	58	915	23,512
2016	4	SOUTHERN FLOUNDER	10,558	72	628	68,389
2016	5	SOUTHERN FLOUNDER	24,522	90	821	122,514
2016	6	SOUTHERN FLOUNDER	44,952	100	1,242	154,090
2016	7	SOUTHERN FLOUNDER	43,574	102	1,132	170,387
2016	8	SOUTHERN FLOUNDER	53,057	106	1,409	201,862
2016	9	SOUTHERN FLOUNDER	246,269	131	3,011	396,301
2016	10	SOUTHERN FLOUNDER	280,689	117	2,181	781,717
2016	11	SOUTHERN FLOUNDER	182,768	102	1,479	392,150
2016	12	SOUTHERN FLOUNDER	14	5	5	37,303
2017	1	SOUTHERN FLOUNDER	1,677	38	122	7,713
2017	2	SOUTHERN FLOUNDER	2,758	55	215	4,617
2017	3	SOUTHERN FLOUNDER	8,254	67	874	23,512
2017	4	SOUTHERN FLOUNDER	9,591	83	787	68,389
2017	5	SOUTHERN FLOUNDER	33,105	105	1,121	122,514
2017	6	SOUTHERN FLOUNDER	74,785	115	1,904	154,090
2017	7	SOUTHERN FLOUNDER	74,879	108	1,755	170,387
2017	8	SOUTHERN FLOUNDER	102,751	116	2,364	201,862
2017	9	SOUTHERN FLOUNDER	235,915	128	2,849	396,301
2017	10	SOUTHERN FLOUNDER	548,740	142	3,971	781,717
2017	11	SOUTHERN FLOUNDER	302,286	123	2,003	392,150
2017	12	SOUTHERN FLOUNDER	166	7	8	37,303
2018	1	SOUTHERN FLOUNDER	610	14	43	7,713
2018	2	SOUTHERN FLOUNDER	1,833	34	154	4,617
2018	3	SOUTHERN FLOUNDER	2,815	43	387	23,512
2018	4	SOUTHERN FLOUNDER	8,142	74	769	68,389
2018	5	SOUTHERN FLOUNDER	18,342	90	951	122,514
2018	6	SOUTHERN FLOUNDER	42,501	105	1,407	154,090
2018	7	SOUTHERN FLOUNDER	57,273	117	1,495	170,387
2018	8	SOUTHERN FLOUNDER	72,495	121	1,916	201,862
2018	9	SOUTHERN FLOUNDER	109,125	114	1,776	396,301
2018	10	SOUTHERN FLOUNDER	363,339	109	3,062	781,717
2018	11	SOUTHERN FLOUNDER	226,832	89	1,352	392,150
2018	12	SOUTHERN FLOUNDER	471	5	5	37,303
2019	1	SOUTHERN FLOUNDER	524	25	74	7,713
2019	2	SOUTHERN FLOUNDER	558	23	69	4,617
2019	3	SOUTHERN FLOUNDER	1,412	44	216	23,512
2019	4	SOUTHERN FLOUNDER	5,966	66	448	68,389
2019	5	SOUTHERN FLOUNDER	36,666	92	1,038	122,514
2019	6	SOUTHERN FLOUNDER	61,035	109	1,437	154,090
2019	7	SOUTHERN FLOUNDER	59,251	108	1,551	170,387
2019	8	SOUTHERN FLOUNDER	95,588	109	1,778	201,862
2019	9	SOUTHERN FLOUNDER	51,734	59	551	396,301
2019	10	SOUTHERN FLOUNDER	326,946	118	2,329	781,717
2019	11	SOUTHERN FLOUNDER	158,954	57	533	392,150

*2019 and 2020 data are preliminary. Data are complete through January 2020.

***data are confidential

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

STEPHEN W. MURPHEY
Director

April 27, 2020

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Lara Klibansky, Marine Fisheries Commission Liaison

SUBJECT: Possible Tarpon Rule Exemption for Fishing Piers and Status of Current Tarpon Rule Amendment

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Issue

At the February MFC Business Meeting the commission heard comment during the public comment period, prior to voting on final approval of rule 15A NCAC 03M .0509, Tarpon, which raised concern over the impact of the tarpon rule on fishing piers. This comment led to a request from Commissioner Cross for the division to further examine the impact of the rule on ocean piers and to explore the possibility of further action to amend the rule to exempt piers. It is important to note that while the vote to approve the current amendment to the tarpon rule represented the final action of the commission, there are two additional steps in the rulemaking process that need to occur before the amended rule becomes effective, one of which is now complete and discussed below. What follows is a clarifying summary of the recreational data collected by and available from the division, as well as a short summary on the progress on the current tarpon rule amendment.

Findings

Division of Marine Fisheries Recreational Data Collection

The primary data collection program for recreational fisheries in North Carolina is the Marine Recreational Information Program (MRIP), which is a partnership with National Oceanic and Atmospheric Administration (NOAA) Fisheries. MRIP collects a large amount of recreational fishing data. Some of the information collected includes the following variables: target species, mode, species caught, if fish are harvested or released and if they are released alive or dead. The mode variable, listed above, is a way to identify how fishermen accessed fish, for example, by private/rented boat or from shore. For most states there are five modes. In North Carolina, however, there are six, because the shore mode is further divided into a beach/bank mode and a man made mode. In other states these two modes are combined into a single shore mode. Having them parsed out allows a more accurate representation of recreational fisheries relative to other states. The man made mode includes ocean piers, bridges, jetties, and breakwaters.

Recreational Tarpon Fishery in North Carolina

Tarpon are a rare event species, meaning they seldom occur in recreational catches. In North Carolina from 1982 to 2018 there have been 582,980 marine recreational angler intercepts out of which there have been 24 tarpon reported; this is across all modes of fishing. Due to their rare occurrence, the samplers are unable to intercept enough anglers with these species in their catch to produce precise estimates of catch.

Specific to piers, from 1982 to 2018 there have been 62,743 ocean fishing pier angler intercepts, of which 0.02% targeted tarpon. The species most targeted by ocean pier fishermen intercepted are spot, bluefish, Spanish mackerel, and kingfish. All available data for the recreational tarpon fishery in North Carolina, including the data for piers, were considered and incorporated in the materials provided to the MFC as part of the 2019-2020 rulemaking process to amend the tarpon rule.

Overview and Status of Current Tarpon Rule Amendment
The current rulemaking process amending the tarpon rule began in August 2019, with the MFC approval of the notice of text for rulemaking and the fiscal analysis. This was the culmination of the lengthy preparation to begin rulemaking, which began with an MFC motion in February 2018. During the public comment period for the proposed rule, which occurred from Oct. 15 to Dec. 2, 2019, the division received thirty-four public comments about the tarpon rule change: four oral comments in support; 23 emails in support, six not in support, and one with mixed comments. At its February 2020 meeting prior to final approval of the rule, the MFC received four additional oral comments about the tarpon rule change: two in support and two not in support. The amended tarpon rule was then discussed, in light of the public comment, and approved for readoption by the MFC at its February 2020 meeting.

As with all MFC approved rules, the tarpon rule was then submitted for review, and subsequently approved, by the Rules Review Commission (RRC). The RRC received at least 10 letters of objection to the rule, which is now, per G.S. 150B-21.3, subject to legislative review. In addition, the rule is also subject to legislative review per S.L. 2019-198 and G.S. 14-4.1. For this rule to become effective it must pass the legislative review process. This rule is not expected to be considered until the 2021 legislative session. Any action taken to amend this rule would begin an amendment to a rule that is still in the rulemaking process.

Action Needed
For informational purposes only, **no action is needed at this time.**

For more information, please refer to the following documents:

Proposed Tarpon Rule Change Issue Paper (Feb. 2019)

PROPOSED TARPON RULE CHANGE ISSUE PAPER

Jan. 29, 2019

I. ISSUE

Consider amending N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0509 to remove the daily harvest allowance and make it unlawful to spear or gaff tarpon in N.C. Coastal Fishing Waters.

II. ORIGINATION

N.C. Marine Fisheries Commission

III. BACKGROUND

Anecdotal reports from the public since 2017 expressed concern over the rule 15A NCAC 03M .0509 that allows for the recreational hook and line harvest of tarpon, and that tarpon were being used as cut bait to fish for sharks. An email and a phone conversation with two fishing guides to staff occurred since July 2017, and one public comment was received, on behalf of some recreational guides, during the Marine Fisheries Commission meeting on February 14, 2018, asking the Commission to consider tarpon a no kill species and include no gaffing and no spearing, to improve the survival of the fish. During the public comment it was indicated the recreational guides know that tarpon move into N.C. waters on their migratory run from the south to spawn and they see juveniles, but was unsure if these juveniles survive the winter. A letter was also given to the commission from the Bonefish and Tarpon Trust Foundation further supporting tarpon as a catch and release only species. A motion was introduced and passed by the commission the next day asking the Division of Marine Fisheries to draft rules to make tarpon a no spear, no gaff, and no possession fish. This paper responds to their motion and initiates the division process for considering rule changes.

Tarpon are prized by recreational anglers for their large size and strength in their fight. They are found in warmer waters on both sides of the Atlantic Ocean and in the Gulf of Mexico. Tarpon found in state waters are presumed to have migrated from points south, most likely Florida. They will enter the estuaries and have been found in the brackish or low salinity areas as well during the summer months. The population size of tarpon along the southeastern coast of the United States or in North Carolina is unknown. They are a bony fish and not desirable to eat, so most are released after they are caught. Only two tarpon were observed harvested in the 24 years of the division's recreational sampling program in 1987 and 2010, and although harvest is legal they are rarely encountered. Very little information is known about tarpon and there are no directed sampling programs for tarpon in North Carolina.

Reports on the harvest of tarpon for use as cut bait are undocumented. If used as cut bait, it is required that the angler, while engaged in fishing activities, must retain the carcass with head and tail intact per the Marine Fisheries Commission's mutilated finfish rule, NCAC 15A NCAC 03M .0101. The size of these fish would pose challenges to adhere to this rule. Recreational release mortality information on tarpon is limited to studies from Florida in the Boca Grande Pass and Tampa Bay areas. All release mortality studies are on tarpon caught from boats with fishing guides and not from shore or piers, with acoustic tagging following the fish for no more than 12 hours after release (Edwards 1992; Edwards 1998; Guindon 2011). These studies found low immediate post-release mortality of tarpon from catch and release. The most comprehensive and latest study estimated tarpon immediate post-release mortality at five percent, and factored the mortality to poor handling and irreparable physiological damage from the angling event (Guindon 2011). Use of a gaff or other puncturing tools to facilitate landing the tarpon increases damage to the fish and could decrease their chance of survival. Pier fishing, with their higher elevation from the water and distance from shore, makes it more likely that gaffs are used in order to land the fish. Therefore, the survival of tarpon from this mode may be less likely than from other modes of capture (i.e., boats, shore).

There is no interstate or federal fishery management plan in place for tarpon; management of this species rests solely with each coastal state. Rule 15A NCAC 03M .0509 for tarpon has been in effect since October 1, 1992 in North Carolina and has remained unchanged. The rule limits tarpon to be taken only with hook-and-line, and allows for the harvest of one fish per person per day, with no allowance to sell or offer to sell. South Carolina regulations for

tarpon are similar to regulations in North Carolina. Georgia also allows the taking of one tarpon per person per day at a minimum size of 68 inches fork length. Details on each state's regulations for tarpon and their website links are found below:

- Florida: http://myfwc.com/fishing/saltwater/recreational/tarpon/
  No minimum size limit, tarpon over 40 inches must remain in the water. It is a catch and release only fishery. One tarpon tag per person per year may be purchased when in pursuit of an International Game Fish Association record. Vessel, transport, and shipment limited to one fish.

- Georgia: http://www.eregulations.com/georgia/fishing/finfish-seasons-limits-sizes/
  Minimum size 68-inch fork length. Allowed one tarpon per person per day.

- South Carolina: http://dnr.sc.gov/marine/species/tarpon.html
  No minimum size limit. Allowed one tarpon per person per day, and may only be taken with rod and reel. Tarpon is designated as a State gamefish and therefore, cannot be sold.

- North Carolina: http://portal.ncdenr.org/web/mf/recreational-fishing-size-and-bag-limits
  No minimum size limit. Allowed one tarpon per person per day and may only be taken with hook and line. Cannot be sold.

- Virginia: https://webapps.mrc.virginia.gov/public/reports/vmrc_regulations_pdf.php
  Release only, with a minimum size release citation at 36 inches.

IV. AUTHORITY

N.C. General Statutes
§ 113-134 Rules
§ 113-182 Regulation of fishing and fisheries
§ 143B-289.52 Marine Fisheries Commission – power and duties

North Carolina Marine Fisheries Commission Rules (May 1, 2015)
15A NCAC 03M .0509 Tarpon

V. DISCUSSION

Rule 15A NCAC 03M .0509 limits tarpon harvest to only one fish per person per day by hook-and-line only with no allowance to sell. This rule has remained unchanged since it was adopted in 1992.

As a management option, the current rule for tarpon minimizes waste if the fish was not to survive a hook-and-line encounter by allowing the fishermen to harvest the fish instead of becoming a dead discard. On the other hand, the current rule may encourage recreational anglers to use puncturing tools to bring in a fish or to facilitate handling the fish during hook removal, which could impact its survival.

Another option as requested by the Marine Fisheries Commission is to make tarpon a no kill species, and specifically allow no gaffing, no spearing, and no puncturing, but still allow for catch-and-release with hook-and-line. The term "possess" is made unlawful in this option and equates to no harvest, but still allows the taking of fish with hook and line, but must be released. This option provides a better chance for the tarpon to survive a hook-and-line encounter when released, but there is the potential for waste if the fish was not to survive after release and would have to be discarded rather than harvested.

An intermediate option for consideration is to amend the rule to prohibit puncturing tarpon, but still allow the daily harvest limit to reduce the discarding of the fish that may not survive after release. Based on more communication available through social media, the pier fishery seems more popular than in the past for catching tarpon. Landing a fish from a pier is more challenging; sometimes the tarpon is pulled alongside the pier and landed on the beach, or the fish is lifted from the water onto the pier with the assistance of nets or puncturing tools to elevate the fish out of the

water. The fight time from a pier is more likely longer than from a vessel or shore, which will likely increase the post-release mortality on the tarpon.

VI. PROPOSED RULE(S)

Option 1: No change, just format updates.

15A NCAC 03M .0509 TARPON
It shall be unlawful to do any of the following:
~~(a) It is unlawful to~~(1) sell or offer for sale ~~tarpon.~~tarpon;
~~(b) It is unlawful to~~(2) possess more than one tarpon per person taken in any one ~~day.~~day; and
~~(c) It is unlawful to~~(3) take tarpon by any method other than hook-and-line.

History Note: *Authority G.S. 113-134; 113-182; ~~113-221;~~ 143B-289.4;*
Eff. October 1, 1992;
Readopted Eff. April 1, 2020.

Option 2: MFC recommendation: no kill, no spear, no gaff, no puncturing, no keeping any tarpon, but catch-and-release still allowed.

15A NCAC 03M .0509 TARPON
It shall be unlawful to do any of the following:
~~(a) It is unlawful to~~(1) possess, ~~sell~~ sell, or offer for sale ~~tarpon.~~tarpon;
~~(b) It is unlawful to possess more than one tarpon per person taken in any one day.~~
~~(c) It is unlawful to~~(2) take tarpon by any method other than ~~hook-and-line.~~hook and line; and
(3) spear, gaff, or puncture a tarpon.

History Note: *Authority G.S. 113-134; 113-182; ~~113-221;~~ 143B-289.4;*
Eff. October 1, 1992;
Readopted Eff. April 1, 2020.

Option 3: Intermediate recommendation, no spear, no gaff, no puncturing, but allow the daily harvest and catch-and-release still allowed.

15A NCAC 03M .0509 TARPON
It shall be unlawful to do any of the following:
~~(a) It is unlawful to~~(1) sell or offer for sale ~~tarpon.~~tarpon;
~~(b) It is unlawful to~~(2) possess more than one tarpon per person ~~taken in any one day.~~per day;
~~(c) It is unlawful to~~(3) take tarpon by any method other than ~~hook-and-line.~~hook and line; and
(4) spear, gaff, or puncture a tarpon.

History Note: *Authority G.S. 113-134; 113-182; ~~113-221;~~ 143B-289.4;*
Eff. October 1, 1992;
Readopted Eff. April 1, 2020.

VII. PROPOSED MANAGEMENT OPTIONS

1. Status Quo, maintain MFC Rule 15A NCAC 03M .0509 which continues to allow puncturing and limited harvest of tarpon.
   + Public familiar with rule that has remained unchanged since 1992.
   + Minimizes waste if the fish does not survive catch and release by it still being able to be harvested.
   − Does not comply with MFC motion
   − Higher potential for mortality.

– Allows puncturing and harvest of a species not common for human consumption.

2. Amend MFC Rule 15A NCAC 03M .0509 to make it unlawful to puncture or harvest tarpon, but catch-and-release still allowed.
   + Complies with MFC motion.
   + Increase chance for survival.
   – Public will need be educated on rule change.
   – May increase waste if the fish does not survive hook-and-line catch and release because it could no longer be harvested.

3. Amend MFC Rule 15A NCAC 03M .0509 to make it unlawful to puncture tarpon, but maintain the daily harvest limit.
   + Minimizes waste if the fish does not survive hook-and-line catch and release by it still being able to be harvested.
   + Improves survival by not allowing puncturing of the fish.
   – Does not comply with MFC motion.
   – Public will need be educated on rule change.
   – Higher potential for mortality.

VIII. RECOMMENDATION

No DMF recommendation is provided. This paper is to offer more information on tarpon and three options for further consideration to this rule.

Marine Fisheries Commission Rule 15A NCAC 03M .0509 is subject to re-adoption under the Periodic Review and Expiration of Existing Rules (G.S. 150B-21.3A) by June 30, 2022.

Prepared by: Tina Moore, Tina.Moore@ncdenr.gov, 252-808-8082
December 3, 2018

Revised: January 11, 2019
January 17, 2019
January 24, 2019
January 29, 2019

IX. LITERATURE CITED

Edwards, R. E. 1992. Tarpon release mortality assessment using acoustic tracking. Final Project Report 6634. Florida Department of Natural Resources. 45 pp. https://dspace.mote.org/bitstream/2075/1290/1/MTR%20259.pdf

Edwards, R. E. 1998. Survival and Movement Patterns of Released Tarpon (*Megalops atlanticus*). Gulf of Mexico Science 16 (1). Retrieved from https://aquila.usm.edu/goms/vol16/iss1/1

Guindon, K. Y. 2011. Evaluating lethal and sub-lethal effects of catch-and-release angling in Florida's Central Gulf Coast recreational Atlantic tarpon (*Megalops atlanticus*) fishery. Graduate Theses and Dissertations. http://scholarcommons.usf.edu/etd/313.

Notice of Text Attachment

15A NCAC 03M .0509 TARPON

Option 1: Proposed amendments make minor format corrections to the rule.

Option 2: Proposed amendments make minor format corrections, add no allowance to spear, gaff, or puncture a tarpon, no longer allows for the daily harvest of tarpon, but continues to allow catch-and-release of tarpon with hook and line.

Option 3: Proposed amendments make minor format corrections and add no allowance to spear, gaff, or puncture a tarpon to the rule.

MFC Rulebook Index Worksheet

Rule	Subject	Index Entry (**Bold** major headings)	Add/Delete/ No Change
03M .0509	tarpon	**species:** tarpon	No change

Ancillary Items:

- Update recreational guide.
- Provide further outreach on the no puncturing and no harvest of tarpon.
- Verify if complementary regulations are needed by the Wildlife Resources Commission in inland waters.
- Provide educational outreach to piers, guides, and tournaments.