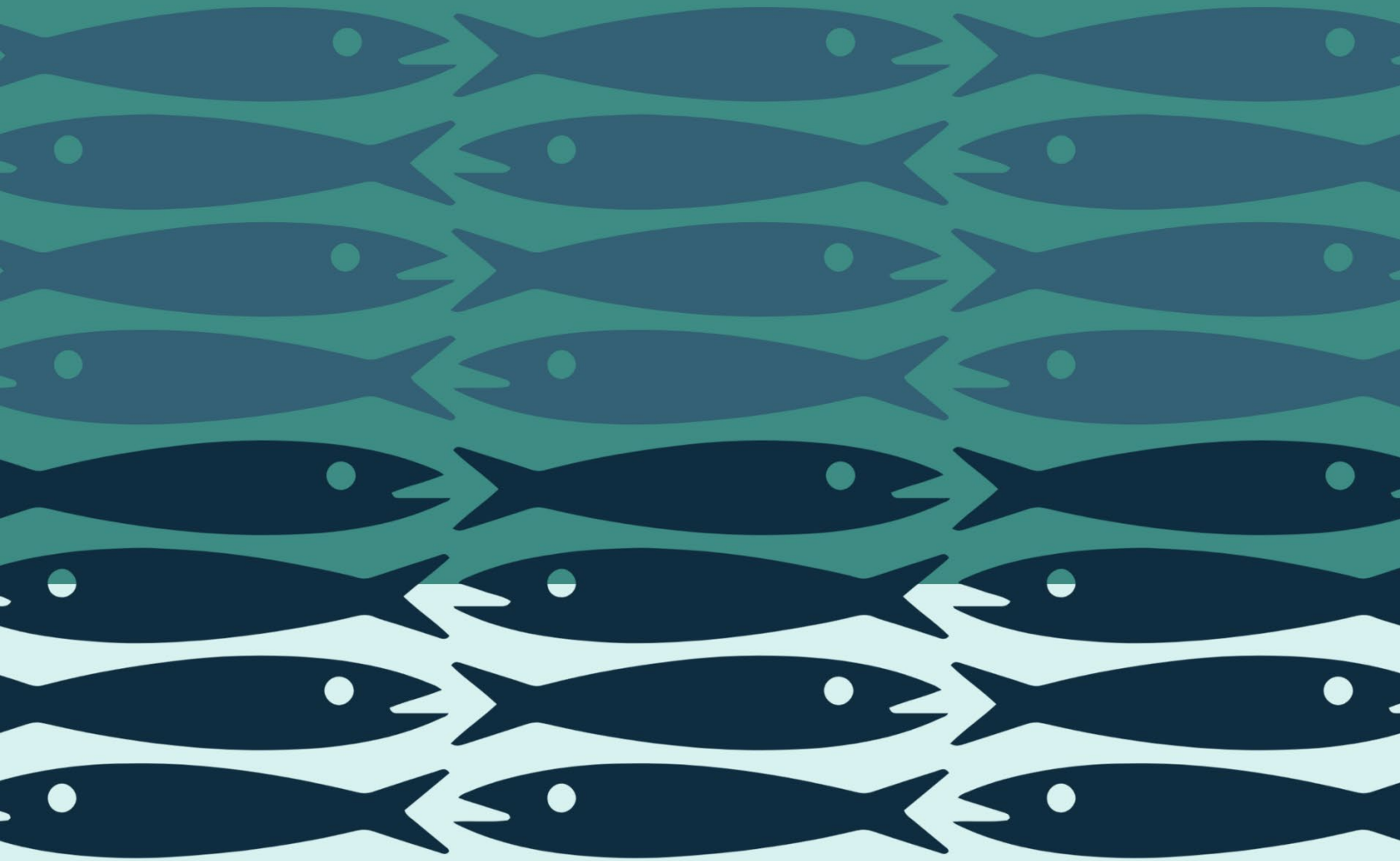


WEBINAR VIA WEBEX
MAY 20, 2021



NORTH CAROLINA MARINE FISHERIES COMMISSION

QUARTERLY BUSINESS MEETING

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Marine Fisheries Commission Business Meeting

AGENDA

Teleconference via WebEx
May 20, 2021

N.C.G.S. 138A-15(e) mandates at the beginning of any meeting of a board, the chair shall remind all members of their duty to avoid conflicts of interest under Chapter 138. The chair also shall inquire as to whether there is any known conflict of interest with respect to any matters coming before the board at that time.

N.C.G.S. 143B-289.54.(g)(2) states a member of the Marine Fisheries Commission shall not vote on any issue before the Commission that would have a "significant and predictable effect" on the member's financial interest. For purposes of this subdivision, "significant and predictable effect" means there is or may be a close causal link between the decision of the Commission and an expected disproportionate financial benefit to the member that is shared only by a minority of persons within the same industry sector or gear group. A member of the Commission shall also abstain from voting on any petition submitted by an advocacy group of which the member is an officer or sits as a member of the advocacy group's board of directors. A member of the Commission shall not use the member's official position as a member of the Commission to secure any special privilege or exemption of substantial value for any person. No member of the Commission shall, by the member's conduct, create an appearance that any person could improperly influence the member in the performance of the member's official duties.

Commissioners having questions about a conflict of interest or appearance of conflict should consult with counsel to the Marine Fisheries Commission or the secretary's ethics liaison. Upon discovering a conflict, the commissioner should inform the chair of the commission in accordance with N.C.G.S. 138A-15(e).

Thursday, May 20

9:00 a.m. Preliminary Matters

- Commission Call to Order* - Rob Bizzell, Chairman
- Conflict of Interest Reminder
- Roll Call
- **Approval of Agenda ****
- **Approval of Meeting Minutes****

9:15 a.m. Public Comment Period

9:45 a.m. Chairman's Report

- Letters and Online Comments
- Ethics Training and Statement of Economic Interest Reminder
- 2021 Meeting Schedule
- Commission Committee Assignments
- Committee Reports
 - Joint Meeting of the MFC Commercial Resources Fund Committee and the Funding Committee for the N. C. Commercial Fishing Resource Fund

*** Times indicated are merely for guidance. The commission will proceed through the agenda until completed.**

****Probable Action Items**

Thursday, May 20 Continued...

- 10:00 a.m. Director's Report – Kathy Rawls
Reports and updates on recent Division of Marine Fisheries activities
- CARES Act Update – Dee Lupton
 - South Atlantic Fishery Management Council Update
 - Dolphin Wahoo Amendment 10 Update - Steve Poland
 - Southern Flounder Fishery Management Plan
 - Amendment 2 Management Update
 - Amendment 3 Timeline Updates
 - Informational Materials:
 - Atlantic States Marine Fisheries Commission
 - Mid-Atlantic Fishery Management Council Update
 - Highly Migratory Species
 - Protected Resources Update
 - Observer Program
 - Incidental Take Permit Updates
 - Landings Updates
 - Rule Suspensions
- 11:30 a.m. Coastal Habitat Protection Plan
- Comments on CHPP Steering Committee Meeting– Commissioner Martin Posey
- 12:00 p.m. **Lunch**
- 1:00 p.m. Catch U Later: Citizen Science Mobile Application Update – Andrew Cathey
- 1:30 p.m. Fishery Management Plans
- Status of ongoing plans – Corrin Flora
 - Amendment 2 to the Shrimp FMP – Chris Stewart, Jason Rock, Dan Zapf
 - Presentation of Draft Amendment 2
 - **Vote to approve draft Amendment 2 to the Shrimp FMP for review by the public and advisory committees****
 - Interjurisdictional Fisheries FMP Update– Jason Rock
 - Amendment 2 of the Estuarine Striped Bass FMP Update – Charlton Godwin, Todd Mathes

** Times indicated are merely for guidance. The commission will proceed through the agenda until completed.*

***Probable Action Items*

Thursday, May 20 Continued...

- 3:45 p.m. Rulemaking – Catherine Blum
- 2019-2020 Rulemaking Cycle Update
 - 2020-2021 Rulemaking Cycle Update
 - 2021-2022 Rulemaking Cycle
 - “Package A”
 - **Vote on Notice of Text for readoption of rules per G.S. 150B-21.3A:**
 - **Rules with no changes in 15A NCAC 03I, 03J (11 rules) ****
15A NCAC 03I .0108, .0115, .0122,
03J .0103, .0104, .0106, .0111, .0202, .0208, .0401, 0402
 - **Interjurisdictional species (8 rules) ****
15A NCAC 03L .0207, .0301, .0302,
03M .0301, .0302, .0511, .0516, .0519
 - **Rules with minor changes relating to standards for handling, packing, and shipping crustacea meat (34 rules) ****
15A NCAC
18A .0134, .0137-.0139, .0144, .0145, .0147-.0149, .0151-.0153, .0156-.0158, .0161, .0162, .0164-.0166, .0168, .0174-.0178, .0181-.0187, .0191
 - **Potential vote on Notice of Text for readoption of 15A NCAC 18A .0136, .0173 per G.S. 150B-21.3A and adoption of 15A NCAC 03L .0210 (prohibit repacking of foreign crab meat in North Carolina) ****
 - “Package B” Update
- 4:45 p.m. Issues from Commissioners
- 5:00 p.m. Meeting Assignments and Preview of Agenda Items for Next Meeting – Lara Klibansky
- 5:15 p.m. **Adjourn**

** Times indicated are merely for guidance. The commission will proceed through the agenda until completed.*

***Probable Action Items*



FEBRUARY 2021 MEETING MINUTES

Marine Fisheries Commission Business Meeting Minutes
Virtual Meeting via WebEx
February 25-26, 2021

Due to COVID-19, the commission held a two-day business meeting via WebEx webinar on February 25-26. In addition to the public comment session, members of the public submitted public comment online or via U.S. mail. To view the public comment, go to: <https://files.nc.gov/ncdeq/February-2021-After-Mailout-Online-Public-Comment-and-Letters.pdf>

The briefing book, presentations and audio from this meeting can be found at: <https://deq.nc.gov/about/divisions/marine-fisheries/marine-fisheries-commission/marine-fisheries-commission-meetings#quarterly-business-meeting---february-25--26,-2021>

Actions and motions from the meeting are listed in **bolded** type.

BUSINESS MEETING - MOTIONS AND ACTIONS

On February 25 at 9 a.m. Chairman Rob Bizzell called the meeting to order and reminded commissioners of their conflict of interest and ethics requirements.

The following commission members were in attendance: Rob Bizzell-Chairman, Mike Blanton, Doug Cross, Tom Hendrickson, James Kornegay, Robert McNeill, Dr. Martin Posey Tom Roller and Sam Romano.

Motion by Tom Roller to approve the meeting agenda.
Second by Martin Posey.

Motion carries with no opposition.

Motion by Pete Kornegay to approve the minutes of the Nov. 19-20 meeting.
Second by Sam Romano

Motion carries with no opposition.

Public Comment Period

A public comment session was held beginning at 9:10 a.m. The following individuals registered to speak during the public comment session:

Stuart Creighton - I shared this email with you, because I'm sure it's going to run long. How can I convey with enough conviction that our fisheries are in serious trouble, principally because this commission and this division will not manage in a timely and proactive manner? During this meeting, perhaps more than others, all of the issues that I, and many others, have brought to your attention in the past are once again staring at you, still demanding action, the kind of action that you have been unwilling to take, but the kind of action that you must take, and take now in order to recover our dwindling stocks. First, our striped bass continue to decline. Evidence shows that in EVERY major river system, the fish are depleted and overfished, with overfishing continuing to occur. The reasons cited are numerous...physical factors such as locks and dams in the Cape Fear, incorrect flows on the Neuse, Tar-Pamlico, and Roanoke Rivers; and overfishing with excessive bycatch from both user groups. The news is especially troubling on the RR/ASMA because this has been the one area of the state where natural spawning occurs regularly. Now, five consecutive years of excessive flows during the spawn have resulted in little to no recruitment. Yet during that time, harvest continued with no action by the division. No adjustments were made to allowable landings; no changes were called for to recreational or commercial gears. The only thought seemed to be just keep harvesting, it'll be better next year. Now, once again, the angling community is forced to consider drastic choices if we are to recover the stock. Realistically, and unfortunately, another long-term closure is the best option. Recreational discard mortality could have been minimized by requiring the use of barbless or circle hooks much sooner. Yes, it is up for consideration now, but will it pass? Or will action be delayed again unnecessarily? Stripper bycatch in shad nets is high, as it is in large mesh flounder nets. When will these gears be removed? Stripers can easily be caught with hook and line (as can shad) and commercial fishermen would be very successful catching their daily limit if hook and line fishing replaced gill nets. According to the Division, adaptive management measures were built into the striper FMP. Why did it take four years for them to be proposed for the Roanoke River / Albemarle Sound?

New management measures are now up for consideration in the southern flounder fishery, another one that has been severely overfished for decades. You've got an unfair allotment between commercial recreational as proposed as 73 to 27 split is inevitable and it needs to go to 50, 50. Obviously guys, I've got a lot more, but out of time, so I'll complete there.

Dennis Cox - How are you doing this morning? I don't have a prepared speech but let me tell you how life is. I've been a commercial fisherman for 35 years. I don't know where y'all are coming up with this rock data, but I'm about to expose Marine Fisheries to how many fish are out there. I'm on Facebook now and I've got pound nets. This morning I dumped 500-1000 lbs of herring overboard. There's plenty of rock. I mean, I can call people and show them how to do a drop and yesterday, there was rock, ungodly. Data would not show what's out there. The computer will not tell you what's out there in that sound. These recreation or whatever wants to fight us about laws, I won't see a boat for 50 miles, yet we're overfishing it? I don't understand that. We need Marine Fisheries to step up and support commercial fishing, that's what we're here for. Marine Fisheries is supposed to support us. Not be against us and everything we do.

We're catching shad on trots, we're catching rock on trot, I'm catching so many fish right now I've never seen anything like it. Ever. And I keep hearing there's no rock, there's no rock. If Marine Fisheries would take advantage of the situation and go against the water quality people, a lot would get done. And also, all I want to know is how can I as a citizen of North Carolina remove the board for the State of North Carolina? What can I do to replace the nine people on the board? I'm asking that question. What can be done because you can not have nine people that disagree with everything about commercial fishing. We need somebody who has an open mind and listens to both sides instead of having a one-track mind. You cannot be one-track mind when you make decisions for commercial fishing or recreational fishing. Everyone needs to have an open mind and not. They got closed minded when they go in there. And there should be no CCA member on a commercial board, period. Can y'all hear me? I'm flabbergasted by how much money commercial fishing generates for the State of NC, yet.

(Chairman Bizzell gave the 30 second warning) I've got a lot of seconds – what can we do about y'all? What can we do about the board? (Chairman Bizzell answered that the commission is appointed by the Governor of NC). The Governor needs to be fired. The Governor needs to be fired then because you can not have anti-commercial people on the board. There is no way possible you can do that. That's like putting an atheist on a daggone Christian board.

David Sneed, Executive Director of CCA of NC, Good morning, Mr. Chairman. Thank you for this opportunity to offer comments on behalf of the CCA of NC. First, we support the effort to look at hook and line gear modifications to reduce recreational discard mortality. We are concerned that there is not a one size fits all approach that provides a universal solution, we encourage the commission instead to look at it on a case-by-case basis where the use of circle hooks or modified treble hook is appropriate for the target species. We were deeply concerned when the Roanoke River/Albemarle Sound striped bass stock assessment came out. It indicates she had another important stock is overfished and there have been calls for a moratorium, or at least a greatly reduced quota. However, there has been no discussion about how to address the other source of fishing mortality and that's not catching, which will greatly impede or prevent recovery. While by catch estimates are controversial, there is no doubt that as a stock recovers bycatch will increase.

Expanding the current gill net restrictions to include the following would be the most effective option, yet it is not on the table. This made me curious, so I looked at the numbers behind why we do not want to address this issue head on, to try to figure out what I might be missing. In 2019, there were 194 commercial participants in the ASMA striped bass fishery landing approximately 136,000 lbs which equates to roughly \$1900 per participant for the year. For 2021, the ASMA total allowable commercial landings will be capped at 25,608 lbs. With the same 194 participants, that would be roughly \$360 per participant for the year. I also pulled the landings data from the southern flounder allocation issue paper, another stock that has been overfished for decades, the average annual total landings by gill nets from 2008 to 2017 was roughly 898,000 lbs at an average price per pound at \$2.64. On average there were 808

participants. So they each made around \$2900 per year for that timeframe. With the current 2021 allocation for reduced 195,105 lbs, each of those 800 participants can expect to make \$638 for the year. In the meantime, hundreds of thousands of pounds of summer flounder continue to be landed in NC, providing millions of dollars of revenue to commercial fishermen. Public access to fresh caught flounder for the dinner table and the real money from the industry. So why are we profiting off of the part-time southern flounder and striped bass fisheries at the expense of our resources? I understand that people just want to make a living, but what if a resource can no longer support that way of making a living? I look forward to hearing what I'm missing during your discussion this week. Thank you for your service and for your consideration of the future of our public trust resources.

Kenneth Seigler – Thank you, Mr. Chairman, I have a few concerns... watching the internet and most social media pages and it show a lot of people out there recreational fishing who don't want to see a change in the allocation because they don't want to see their bag limit reduced. Unfortunately, that's what is going to have to occur if you approve the reallocation for southern flounder resources. I'd like to bring to your attention in your briefing book that you have it says changes in allocation may alter the rebuilding schedule that's on page 243. On page 246 says changing the allocation may alter the rebuilding schedule projections for rebuilding using a model that accounts for the rate of removal according to the size class of each sector harvested to estimate the changes of SSB. Allocation changes would impact the overall size limit of fish removed from the population and could therefore have some impact on model projections. My concern here is we reference rebuilding schedule and my question for the commission is basically in General Statute 143B-289.52: A supermajority of the Commission shall be six members. A supermajority shall be necessary to override recommendations from the Division of Marine Fisheries regarding measures needed to end overfishing or to rebuild overfished stocks. So we are talking about changing a rebuilding schedule on an overfished stock. I guess my question is, would that not require a super majority vote by commission to go into the Southern Founder Fishery Management Plan and change that allocation process? That concludes what I've got to say on the southern flounder. I'm not quite sure whether the gill net options are going to be discussed at this meeting. I didn't see them on the agenda. So I'm guessing they will be at the next advisory committee meeting.

Representative Bobby Hanig – Just a quick introduction and then a comment. I'm Representative Bobby Hanig, I represent Currituck, Dare and Pamlico counties. I'm in my second term. I wanted to make everyone out there aware that there's been a new committee formed here at the General Assembly it is called the Marine Resources and Aquaculture committee. The focus of this committee is to help grow our marine resources and aquaculture industry and to improve our water quality to ensure North Carolina seafood and recreational fishing and aquaculture continue to thrive for generations to come. I'm confident we can achieve these goals with good, honest discussion and reasonable solutions to challenges and opportunities we face. I encourage you to contact my office with any concerns or

recommendations. The phone number is 9197335906. Or you could email me at Bobby.Hanig@NCLeg.gov.

My comment is straightforward, I believe Mr. Corrigan, although well intended, has overstepped his bounds by preparing a 10-year management plan for the Albemarle, Roanoke striped bass stock. Statute 143-289.22 gives the embassy the power to adopt fishery management plans as provided to establish a priority list as determined in the order in which fishery management plans are developed. To establish a schedule for the development and adoption of each fishery management plan and to establish guidance criteria as to the contents of fishery management plans. It is not the duty of the MFC or an individual commissioner to prepare FMPs. G.S. 113-182.1 The department shall prepare FMPs for adoption by the MFC. This plan to permanently prohibit gill nets and to temporarily close recreational harvest is neither equitable or necessary. The stock has been depleted in the past and was successfully rebuilt by managing, not eliminating harvest and gears and it can be done again. Those are my comments and thank you so much.

Bert Owens – I did submit some comments online regarding flounder. Not sure if you've had a chance to read them, but please do if you get the opportunity. I'm just going to recap them here. When Southern Flounder Amendment 2 came along, it shut anglers out of the flounder fishery. Now no doubt some southern flounder are occasionally caught in the ocean, but they can also be returned to the water. In contrast, commercial vessels were not shut out of fishing, and in fact, recently had their season extended by two days with a 15000 lb landing limit. North Carolina has the largest quote of summer flounder in the nation and allows anglers zero fish except during the short southern flounder season. Virginia has the second largest quota and allows their anglers four fish at 16 1/2 inches all year long. New Jersey has the 3rd largest quota, and they allow their anglers 3 fish May through September. Now speaking of the Fisheries Reform Act, it also says that the duty of the Commission is to manage recreational and commercial groups fairly. (technical difficulties) continuing to unchanged the motion and anglers shut out, it's obvious that the fairness standard is not being met. Many small boat anglers and small charters can access these fish on the right days on near shore reefs and structure. You'd be fulfilling your duty, now talking about a duty, to open this fishery back up to anglers. One red drum, one gray trout, and now we got 3 blue fish. Surly need to give the small boat guys a reason to come to the coast, spend a little money and teach the kids how to fish. So, hope y'all have a good meeting. Thank you.

Chairman's Report

Chairman Bizzell stated that the letters and online comments are in the briefing book for review. Commissioners were reminded they are required to take ethics training within six months of their appointment and every two years thereafter. Commissioners were also reminded of the annual requirement to submit a Statement of Economic Interest form by April 15 to the State Board of Elections and Ethics Enforcement.

It was determined the 2021 meeting schedule would be:

Feb. 17-19

May 19-21

Aug. 25-27

Nov. 17-19

Chairman Bizzell pointed to the Commission Committee Assignments in the briefing book.

Committee Reports

Chairman Bizzell pointed to the Joint Meeting of the MFC Commercial Resources Fund Committee and the Funding Committee for the N. C. Commercial Fishing Resource Fund meeting minutes in the briefing book.

Director's Report

Acting Director John Batherson gave opening remarks to the MFC and the public. Acting Director Batherson then introduced Deputy Director Dee Lupton who gave an update on three economic assistance plans. The CARES Act provided 5.4 million dollars to North Carolina to provide financial relief to fishery related stakeholder groups impacted by the COVID-19 pandemic. Eligible stakeholders were required to submit applications by November 30, 2020. The division received a total of 290 applications, 198 have been approved. The applicants determined to be ineligible may appeal the Divisions determination. Once all appeals have been settled, the final funding decisions will be provided to the Atlantic States Marine Fisheries Commission, who are distributing the funds to member states. The funds are expected to be distributed to eligible stakeholders this spring. A second round of CARES Act fisheries assistance was approved by Congress in December 2020. The division is awaiting more guidance from NOAA Fisheries on this round of funding. Finally, Deputy Director Lupton provided an update on the Federal Fisheries Disaster Funds from Hurricane Florence. Following the issuance of the Federal disaster assessment in 2019 the DMF was notified that the state is eligible for 7.7 million dollars in federal fisheries assistance. The division developed and submitted a spending plan for these funds to NOAA Fisheries. According to NOAA Fisheries, this spending plan is still in review by the Office of Budget Management.

Acting Director Batherson then reviewed the informational materials and concluded his remarks.

Hook and Line Modifications Issue Paper

Steve Poland, the Division's Executive Assistant for Councils gave a presentation on the hook and line modifications issue paper.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Hook-Modifications-in-Coastal-Fishing-Waters.pdf>

Motion by Sam Romano to approve status quo. Mandatory circle hook requirement shall be considered on a species-by-species basis through the FMP process.

Second by Doug Cross

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion carries unanimously

Highly Efficient Gear Restrictions on Artificial Reefs in State Ocean Waters

Jason Peters, the Division’s Enhancement Program Supervisor, gave a presentation on High Efficiency Gear Restrictions on Artificial Reefs in State Ocean Waters Information Paper (SMZs).

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Artificial-Reef.pdf>

Motion by Martin Posey to select Option 2 and associated proposed language as the preferred management option, to proceed with rulemaking to protect all finfish species from highly efficient fishing gear on artificial reefs in state ocean waters, and to allow DMF staff the latitude to possibly place defined terms in 15A NCAC 03I .0101, Definitions.

Second by Tom Roller

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion carries unanimously.

Shellfish Lease Regulation in High Use Areas

Jacob Boyd, the Division’s Shellfish Habitat and Enhancement Section Chief gave a presentation on the Shellfish Lease Regulation in High Use Areas Issue Paper.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Shellfish-Lease-User-Conflict-Reduction-Update.pdf>

Motion by Martin Posey to not proceed with additional rulemaking at this time beyond that which staff is already pursuing.

Second by Sam Romano

Motion withdrawn

Motion by Doug Cross to direct DMF staff to study additional rulemaking for shellfish lease regulations in high use areas.

Motion withdrawn

Following the presentation by Jacob Boyd the commission discussed the merits of additional action to address user conflict current relative to the current efforts already underway to address

user conflict associated with shellfish leases in the state. The Commission then determined no additional action is needed, other than what is already being undertaken by the division, and in accordance with the User Conflict Study prepared by the Division and the MFC in response to Session Law 2019-37.

Coastal Habitat Protection Plan

Commissioner Posey, chair of the CHPP Steering Committee, provided comments from the January 21, 2021 CHPP Steering Committee meeting.

Anne Deaton, the Division's Habitat Program Supervisor, and Casey Knight, the Division's Coastal Habitat Biologist, gave a presentation on the 2021 Coastal Habitat Protection Plan Development. Their presentations provided background on two of the issue papers currently under development as part of the current CHPP Amendment. The full draft CHPP Amendment is expected to be reviewed by the MFC during the August business meeting.

To view the presentations, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/CHPP-1.pdf>

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/CHPP-2.pdf>

Rulemaking Update

Catherine Blum, the Division's Rulemaking Coordinator, presented information and updates on the 2020-2021 rulemaking cycle.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Rulemaking-Update.pdf>

Motion by Doug Cross that the N.C. Marine Fisheries Commission adopt as presented all rules, changes, or readoptions for Package B. Package B consists of 41 rules in 15A NCAC 03 and 18A as published in the *N.C. Register*, per G.S. 150B-21.3A, except for additional technical changes recommended to three rules in 15A NCAC 03O .0200:

- 15A NCAC 18A .0431, .0704, .0901-.0910, .0913, .0914; (growing waters)
- 15A NCAC 18A .0140-.0143, .0146, .0150, .0154, .0155, .0159, .0160, .0163, .0167, .0169-.0172, .0179, .0180, .0188-.0190; (crustacea meat)
- 15A NCAC 03O .0201, .0202, .0204; (shellfish leases)
- 15A NCAC 03R .0104, .0105; and (nursery areas)

- 15A NCAC 03R .0117. (oyster sanctuaries)

Second by Martin Posey

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion carries unanimously.

Commissioner Kornegay presented his document titled, “A Ten-Year Prescription for the Recovery of the Albemarle Sound/Roanoke River Striped Bass Stock”.

Fishery Management Plans

Corrin Flora, the Division’s Fishery Management Plan Coordinator provided a status update of ongoing FMPs which included southern flounder, estuarine striped bass, and shrimp.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/FMP-Update.pdf>

Southern Flounder Fishery Management Plan Amendment 3

Mike Loeffler and Anne Markwith, the Division’s Southern Flounder staff leads presented the Commercial and Recreational Sector Harvest Allocations Issue Paper requested by the commission during their Nov. 2020 business meeting. The issue paper included five allocation options as requested by the commission, which included consideration of commercial/recreational allocations of 70/30, 65/35, 60/30 with a 10% allotment for giggering, 60/40 and 50/50.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Southern-Flounder-FMP.pdf>

Motion by Pete Kornegay that the acting director of DMF direct staff to recalculate allowable southern flounder landings for Amendment 3 that will compensate for overages in landings during 2019 and 2020.

Second by Tom Roller

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion fails 3-6

Motion by Doug Cross to set the allocation for Amendment 3 at 70% commercial and 30% recreational.

Second by Sam Romano

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tom Roller	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion carries 5-4

Estuarine Striped Bass Fishery Management Plan Update

Charlton Godwin, the Division’s Striped Bass FMP co-lead, gave an update on Amendment 2 to the Estuarine Striped Bass FMP.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Estuarine-Striped-Bass-FMP.pdf>

Shrimp Fishery Management Plan Update

Chris Stewart, the Division’s Shrimp FMP co-lead, gave an update on Amendment 2 to the Shrimp FMP.

To view the presentation, go to:

<https://files.nc.gov/ncdeq/Marine-Fisheries/02-2021-mfc-meeting/powerpoints/Shrimp-FMP.pdf>

Issues from Commissioners

Commissioner Cross would like to see ocellated/gulf/summer flounder looked at so they can get some answers on potential access to these fish.

Commissioner Roller concurs with Commissioner Cross regarding gulf/summer flounder issue. He also stated that the Mid-Atlantic Fisheries Management Council is addressing summer flounder reallocation. He’s concerned North Carolina’s historical allocation could affect that outcome, low historical landings. Also, crab pot clean-up issue. He had made previous requests to look for mechanisms for crab pot clean up in closed seasons. Gear clean-up is a big issue.

Meeting Assignments and Preview of Agenda Items for Next Meeting

Lara Klibansky reviewed the meeting assignments and previewed the March MFC special meeting agenda.

The meeting adjourned at 11:53 a.m.



MARCH 2021 SPECIAL MEETING MINUTES

**Marine Fisheries Commission Special Meeting Minutes
Virtual Meeting via WebEx
March 31, 2021**

Due to COVID-19, the commission held a one-day special meeting via WebEx webinar on March 31. Members of the public submitted public comment online or via U.S. mail. To view the public comment, go to: <https://files.nc.gov/ncdeq/Marine-Fisheries/03-31-2021-mfc-special-meeting/March-31-MFC-Online-Comments-and-Letters.pdf>

The briefing book, presentations and audio from this meeting can be found at: <https://deq.nc.gov/about/divisions/marine-fisheries/marine-fisheries-commission/marine-fisheries-commission-meetings#special-meeting---march-31,-2021>

Actions and motions from the meeting are listed in **bolded** type.

SPECIAL MEETING - MOTIONS AND ACTIONS

On March 31 at 1 p.m. Chairman Rob Bizzell called the meeting to order and reminded commissioners of their conflict of interest and ethics requirements.

The following commission members were in attendance: Rob Bizzell-Chairman, Mike Blanton, Doug Cross, Tom Hendrickson, James Kornegay, Robert McNeill, Dr. Martin Posey Tom Roller and Sam Romano.

Motion by Tom Roller to approve the meeting agenda.

Second by Robert McNeill.

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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Motion carries 5-4

REVISITING THE SOUTHERN FLOUNDER SECTOR ALLOCATION ISSUE

Motion by Tom Roller to amend the previously adopted southern flounder allocation to adjust the allocation to 70/30 in 2021 and 2022 to 60% commercial and 40% recreational in 2023 and achieve a 50/50 parity in allocation in 2024

Second by Pete Kornegay

ROLL CALL VOTE				
Commissioner	Aye	Nay	Abstain	Absent
Doug Cross	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mike Blanton	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Hendrickson	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
James Kornegay	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Robert McNeill	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Dr. Martin Posey	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Tom Roller	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sam Romano	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chairman Rob Bizzell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Motion carries 5-4

Issues from Commissioners

Commissioner Hendrickson stated he would like to forward to public comment options of a 13-16” and a 13-17” slot for southern flounder as well as corresponding increase in the bag limit for the hook-and-line fishery.

Commissioner Kornegay stated he has some management options he would like explored in Amendment 3 to the Southern Flounder FMP:

- Phase out large mesh flounder gill nets at the end of current ITP
- Begin observer program for pound nets- currently no estimates on discards

- Account for flounder discards from the shrimp trawl fishery in the TAL
- Identify unreported flounder landings- \$100 permit for gill net and gig fishers
- Develop daily, real-time flounder landings reporting
- Develop reporting app for recreational flounder fishers
- Inlet Migration Corridors
 - No gill nets
 - No gigging
 - Season and distance from inlets to be determined in proclamations

Commissioner McNeill would like to look for the potential for summer and gulf flounder seasons with the recently approved allocations and how that could affect the southern flounder rebuilding process.

Commissioner Roller commented on Commissioner Kornegay's management options. He stated that we need to think big, we can do some additional things to be more progressive in our fisheries management. He agrees with Commissioner Kornegay's idea of phasing out large mesh flounder gill nets at the end of current ITP. He would like to add some items to the observer program for pound nets: Quantify discards in the fishery as they are currently an unknown. Acquire data for a more accurate flounder species composition in the fishery. As a means for additional quota monitoring, further catch composition, scientific information and as a means to determine when to implement inlet corridors by proclamation. Regarding concerns about underreported commercial landings, flounder are one of our most coveted species by anyone. We all know people who use SCFLs to be able to gig well past their recreational limit and to gig smaller fish as well. Most of those fish don't make it onto the trip tickets because they are being kept for personal consumption or their being donated. Same goes for hook-and-line. Regarding the estuarine gill net permit. There are 2400 permits issued, but only 1800 active commercial fishermen in the state and only 600 recording gill net landings. It would be beneficial to the protected resources division to weed out some of them by beginning to charge an administrative fee of \$100 for the permit. Look into creating a separate permit for other mobile gears and charge an administrative fee of \$100. Establishing a hail-in/hail-out program to better account for who is using SCGL licenses for reasons other than selling fish. We also need to make sure we have alternative management measures that allow the commission to make annual adjustments to the total allowable catch if the best available science says we need to. Need to avoid an ASMA striped bass situation like we have seen.

The meeting adjourned at 2:22 pm.

CHAIRMAN'S REPORT

LETTERS & ONLINE COMMENTS

ETHICS TRAINING & SEI REMINDER

2021 PROPOSED MEETING SCHEDULE

COMMISSION COMMITTEE ASSIGNMENTS

COMMITTEE REPORTS



LETTERS & ONLINE COMMENTS

NC CATCH

REAL LOCAL SEAFOOD

WWW.NCCATCH.ORG

PO Box 188 • 30 Oyster Creek Road, Swan Quarter, NC 27885 • info@nccatch.org

April 15, 2021

N.C. Marine Fisheries Commission
3441 Arendell Street
Morehead City, NC 28557

Dear North Carolina Marine Fisheries Commission members,

On behalf of NC Catch, a nonprofit working to educate the public about the benefits of eating local, North Carolina seafood, thank you for your efforts to manage for sustainable fisheries resources to benefit all North Carolina citizens, including seafood consumers.

The NC Catch board greatly appreciates your February 2021 decision to not further restrict shellfish aquaculture operations in high-use areas, opting instead to see how recently passed rules regarding shellfish lease activities affect potential social conflicts over water use. NC Catch believes it is important to have both wild harvest and aquaculture businesses in North Carolina to supply shellfish to consumers, protect water quality and provide marine habitat.

Our organization also appreciates the commission's efforts in fall of 2020 initiating rulemaking to make it illegal in North Carolina to repack imported crab meat and label it as a domestic product. It is very important for consumers in North Carolina to know that the seafood they purchase is the product as advertised, especially if it is conveyed as being a local product, caught by local fishermen and fisherwomen.

Thank you again for your efforts regarding these matters.

Best regards,



Barabara Garrity-Blake,
NC Catch Board President

From: [Klibansky, Lara](#)
To: [Gillikin, Dana](#)
Subject: FW: [External] Re: Atlantic Croaker
Date: Wednesday, March 31, 2021 7:00:03 AM

Lara K. J. Klibansky
Marine Fisheries Commission Liaison
Executive Assistant for Councils and Commissions
NC Division of Marine Fisheries
Department of Environmental Quality



252 515 6020 mobile (direct)
252 726 7021 main office
Lara.Klibansky@ncdenr.gov

P.O. Box 769
3441 Arendell Street
Morehead City, NC 28557

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties

From: Bizzell, Rob <r.bizzell.mfc@ncdenr.gov>
Sent: Tuesday, March 30, 2021 9:46 PM
To: Klibansky, Lara <Lara.Klibansky@ncdenr.gov>
Subject: Fwd: [External] Re: Atlantic Croaker

Get [Outlook for iOS](#)

From: Jack [REDACTED]
Sent: Tuesday, March 30, 2021 9:45 PM
To: Bizzell, Rob; Kornegay, K; Hendrickson, Tom; McNeill, Robert; Posey, Martin H; Cross, Doug; Blanton, Mike; Roller, Thomas N; Romano, Sam
Subject: [External] Re: Atlantic Croaker

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

I know you are all aware of the bycatch, but I wanted to take the time and share this video with you to refresh your memory. This is where our croaker are, and this is what needs to be addressed. <https://youtu.be/WLl4GSZLqGU>

Sent from my iPhone

On Mar 30, 2021, at 4:17 PM, Jack Jackson [REDACTED] wrote:

Good afternoon,

I see a proclamation has posted with recreational limits to Atlantic croaker. While 50 is a very liberal limit, I have to question what is being done about the commercial sector? Is there going to be a proclamation with commercial limits? Furthermore, what about all of the croakers that are dying as bycatch in the inshore shrimp trawl fishery? I think the writing is on the wall, if we are truly interested in preserving a fishery shrimp trawls need to be removed from our rivers and sounds.

Thank you for you time,
Anthony Jackson

From: [Klibansky, Lara](#)
To: [Gillikin, Dana](#)
Subject: FW: [External] Southern Flounder
Date: Thursday, April 1, 2021 10:21:21 AM

For May...

Lara K. J. Klibansky
Marine Fisheries Commission Liaison
Executive Assistant for Councils and Commissions
NC Division of Marine Fisheries
Department of Environmental Quality



252 515 6020 mobile (direct)
252 726 7021 main office
Lara.Klibansky@ncdenr.gov

P.O. Box 769
3441 Arendell Street
Morehead City, NC 28557

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties

From: Bizzell, Rob <r.bizzell.mfc@ncdenr.gov>
Sent: Thursday, April 1, 2021 10:21 AM
To: Klibansky, Lara <Lara.Klibansky@ncdenr.gov>
Subject: Fwd: [External] Southern Flounder

Get [Outlook for iOS](#)

From: Kim [REDACTED]
Sent: Thursday, April 1, 2021 9:02 AM
To: Bizzell, Rob
Subject: [External] Southern Flounder

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to Report Spam.<<mailto:report.spam@nc.gov>>

Dear Commissioner Bizzell,

The vote yesterday on the southern flounder allocation was very disappointing. This appears to be another delaying tactic that further supports the commercial sector. For too many years, the MFC has demonstrated an ongoing bias that favors the commercial fishery and ignores the recreational fisherman. Our marine fishery continues to suffer so that a handful of commercial fishermen make a few dollars.

Respectfully,

Kim Tavasso

Sent from my iPad



**NORTH CAROLINA MARINE FISHERIES COMMISSION
DEPARTMENT OF ENVIRONMENTAL QUALITY**

COMMISSIONERS

ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

ROB BIZZELL
Chairman

MIKE BLANTON
Elizabeth City
DOUG CROSS
Grantsboro
TOM HENDRICKSON
Zebulon
PETE KORNEGAY
Camden

DR. MARTIN POSEY
Wilmington
ROBERT McNEILL
Wilmington
TOM ROLLER
Beaufort
SAM ROMANO
Wilmington

March 11, 2021

Miriam Sutton
[REDACTED]

Dear Ms. Sutton:

On behalf of the commission and the division, we sincerely thank you for your service to the Shrimp Fishery Management Plan Advisory Committee. Thank you for sacrificing your time and providing your valuable input to help the Marine Fisheries Commission effectively manage the marine resources of our state.

We appreciate your continued involvement in the process as a member of the public by attending commission and advisory committee meetings and providing your thoughts on fisheries management.

Sincerely,

A handwritten signature in black ink, appearing to read "W. Robert Bizzell".

W. Robert Bizzell, Chairman
N.C. Marine Fisheries Commission

cc: Marine Fisheries Commission
John Batherson
Lara Klibansky
Corrin Flora
Jason Rock
Chris Stewart
Dan Zapf



EDUCATION REQUIREMENTS FOR PUBLIC SERVANTS

Public Servants must complete the Ethics and Lobbying Education program provided by the N.C. State Ethics Commission within **six months** of their election, appointment, or employment. We recommend that this be completed as soon as possible, but the training must be repeated every two years after the initial session.

Since Adobe Flash was terminated on December 31, 2020, our online program is not available. A new and shorter online program will be available in the near future. The new program will be compatible with portable devices such as phones and tablets.

Live webinar presentations are being offered monthly and registration information for the live presentations can be found [here](#). These presentations are about 90 minutes long and give you the opportunity to ask questions of the speaker.

For questions or additional information concerning the Ethics Education requirements, please contact Dottie Benz at (919) 389-1383.

2020 STATEMENT OF ECONOMIC INTEREST REMINDERS:

Completed SEIs must be filed on or before April 15, 2020. If you have already filed a 2020 SEI, do not refile. The forms and instructions can be found at <https://ethics.ncsbe.gov/sei/blankForm.aspx>.

If you filed a 2019 SEI **and** you have had **no changes** since your 2019 filing, you may file a 2020 SEI No Change Form, located on the website.

You must file a 2020 Long Form if any of the following apply to you:

- a. You filed a 2019 SEI **but** you have had changes since your 2019 filing;
- b. You did not file a 2019 SEI; or
- c. You are a first-time filer or have been appointed to a new or additional position/board.

This year, the State Board of Elections and Ethics Enforcement will roll out a new electronic process for filing SEIs. That electronic filing option will be available in **early February**.

You are encouraged to file your SEI electronically. However, if you want to file your SEIs before the updated electronic version is available, hard copies are available for filing now at the link above.

New commissioners will need to file a 2020 SEI; however, if you have not had any changes since you last filed, you can use the No Change Form, which is fairly easy to complete.

Please file by April 15th to avoid fines and other penalties.

SEI HELPFUL TIPS

1. PUBLIC RECORDS. The State Board of Elections and Ethics Enforcement (State Board) is required to collect and maintain disclosures from certain persons covered by the State Elections and Ethics Enforcement Act Government Ethics Act (Elections and Ethics Act). By law, the information requested is public record and available to the public upon request. As public records, Statements of Economic Interest (SEI) are available on the Commission's website. Personal contact information, however, is not.

2. CONTACT INFORMATION PAGE. The Contact Information page, which includes your personal contact information, will not be available on the Commission's website, but is a public record.

3. CHILDREN'S INITIALS. Only list minor children's INITIALS on the SEI. List each child's full legal name on the Confidential Unemancipated Children's Form. If you are filing electronically, the form will be generated at the end of the SEI from the information that you provided on your electronic SEI. The Confidential Form is not a public record, and the State Board will not make it available to the public.

4. READ EACH QUESTION CAREFULLY. Read each question carefully and pay close attention to the time periods in each question as they do vary.

5. ANSWER EACH QUESTION. It is important to answer each question, including all applicable subparts. Even if your answer is "no" or "not applicable," make certain you answer each question. Many of the questions have "yes" and "no" boxes to check for your convenience. Incomplete SEIs may cause delays and negatively impact your public service on a covered board or as an employee.

6. WHY ARE YOU FILING. You must list the complete name of the state board or state agency employer for which you are filing the SEI. Without this information, your SEI may be delayed and negatively impact your public service on a covered board or as an employee.

7. HOW TO FILE. The State Board strongly recommends electronic on-line filing as it is secure, allows easy information updates, and gives you access to your electronic SEIs previously filed. Filing your SEI on-line is easy, quick, convenient, and reduces the chance of reporting errors. Getting started is easy. Follow the simple steps to create your own account and get access today: <https://EFILE.ncsbe.gov/> To file a paper version of the SEI, you must provide the State Board with a signed, original SEI form. Each SEI includes an "affirmation" and is a legally binding document. Faxed or emailed copies of your SEI CANNOT be accepted.

SEI Helpful Tips, continued

8. INCOME. List each source of income as requested on the SEI. The actual dollar amount is not required. Be sure to list your employer as a source of income in Question # 6 of the SEI.

9. READ CAREFULLY. Read each question carefully, as the Elections and Ethics Act requires that you disclose your financial holdings and obligations, personal property, and real property and may also include your knowledge of the holdings of both your immediate family and your extended family. "Immediate family" and "extended family" are defined terms in the Elections and Ethics Act, and those definitions are included with this document.

10. REFLECT. Think carefully about WHY you are filing, and whether it has any relationship to your position. Does your board or commission license or regulate you? For many of the boards, a subject matter expert like a licensee is needed. Answering "yes" does not prohibit your service on the board, and your perspective is valued.

11. MAKE A COPY. Make a copy of the SEI for your own records, and make a note in your calendar when you submit it, whether on-line or by mail or hand delivery. When you successfully submit your SEI electronically on-line, the final screen will provide a confirmation number and will be proof that you have satisfied your filing obligation. Please print the **confirmation screen for your records.**

12. ETHICS LIAISON. Contact your Ethics Liaison to assist you in your obligations under the Elections and Ethics Act. Your Ethics Liaison is good source of information about how to fill out your SEI.

13. ON-LINE HELP. The State Board has on-line resources to answer questions you may have about your SEI. For more information, please visit the State Board website which has education offerings.

14. DEFINITIONS. As noted above, certain terms are defined in the Elections and Ethics Act (“immediate family”). These definitions may be helpful to you in completing your SEI. A complete list of all definitions used in the Elections and Ethics Act is available on the State Board’s website, under “Ethics”. Some of the more common ones are attached to this document.

15. YOUR INTERNET BROWSER. Consider using Internet Explorer or Chrome to submit your SEI. Some users have had trouble using other browsers. **16. WE ARE HERE TO HELP YOU.** In addition to on-line resources and written materials, the State Board has expert staff ready to answer any questions you might have and assist you in completing and filing your SEI. Do not hesitate to contact us at sei@ncsbee.gov (919) 814-3600.

2021 Meeting Planning Calendar

January						
Su	Mo	Tu	We	Th	Fr	Sa
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31						

February						
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28						

March						
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April						
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May						
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30	31					

June						
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July						
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August						
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29	30	31				

September						
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October						
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17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

November						
Su	Mo	Tu	We	Th	Fr	Sa
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

December						
Su	Mo	Tu	We	Th	Fr	Sa
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

- MFC
- ASMFC
- SAFMC
- MAFMC
- ASMFC/MAFMC Joint Meeting
- State Holiday

- Southern Regional AC
- Northern Regional AC
- Joint Regional AC
- Finfish AC
- Habitat and Water Quality AC
- Shellfish/Crustacean AC
- Finfish/Shellfish/Crustacean AC

2021 Committee Assignments for Marine Fisheries Commissioners

FINFISH ADVISORY COMMITTEE

Statutorily required standing committee comprised of commissioners and advisers that considers matters related to finfish.

Commissioners: Tom Roller – chair, Sam Romano – vice chair

DMF Staff Lead: Lee Paramore - lee.paramore@ncdenr.gov

Meeting Frequency: Can meet quarterly, depending on assignments from MFC

HABITAT AND WATER QUALITY ADVISORY COMMITTEE & COASTAL HABITAT PROTECTION PLAN STEERING COMMITTEE

Statutorily required standing committee comprised of commissioners and advisers that considers matters concerning habitat and water quality that may affect coastal fisheries resources.

Commissioners: Pete Kornegay – chair, Dr. Martin Posey – vice chair

DMF Staff Lead: Anne Deaton - anne.deaton@ncdenr.gov

Meeting Frequency: Committee can meet quarterly, depending on assignments from MFC. CHPP Steering Committee can meet a couple of times a year.

SHELLFISH/CRUSTACEAN ADVISORY COMMITTEE

Statutorily required standing committee comprised of commissioners and advisers that considers matters concerning oysters, clams, scallops and other molluscan shellfish, shrimp and crabs.

Commissioners: Sam Romano – chair, Pete Kornegay – co-vice chair, Dr. Martin Posey – co-vice chair

DMF Staff Lead: Tina Moore - tina.moore@ncdenr.gov

Meeting Frequency: Can meet quarterly, depending on assignments from MFC

CONSERVATION FUND COMMITTEE

Committee comprised of commissioners that makes recommendations to the MFC for administering funds to be used for marine and estuarine resources management, including education about the importance of conservation.

Commissioners: Sam Romano - chair, Tom Hendrickson and Robert McNeill

DMF Staff Lead: Randy Gregory - randy.gregory@ncdenr.gov

Meeting Frequency: Meets as needed

LAW ENFORCEMENT AND CIVIL PENALTY COMMITTEE

Statutorily required committee comprised of commissioners that makes final agency decisions on civil penalty remission requests.

Commissioners: Rob Bizzell - chair, Doug Cross and Tom Hendrickson

DMF Staff Lead: Col. Carter Witten – carter.witten@ncdenr.gov

Meeting Frequency: Meets as needed

COASTAL RECREATIONAL FISHING LICENSE ADVISORY COMMITTEE

Committee consisting of the three recreational seats and the science seat to provide the DMF advice on the projects and grants issued using Coastal Recreational Fishing License trust funds.

Commissioners: Pete Kornegay – chair, Rob Bizzell, Tom Roller, and Robert McNeill

DMF Staff Lead: Jamie Botinovch - jamie.botinovch@ncdenr.gov

Meeting Frequency: Meets as needed

NOMINATING COMMITTEE

Committee comprised of commissioners that makes recommendations to the MFC on at-large and obligatory nominees for the Mid- and South Atlantic Fishery Management Councils.

Commissioners: Robert McNeill – chair, Pete Kornegay, Tom Roller and Mike Blanton

DMF Staff Lead: Chris Batsavage - chris.batsavage@ncdenr.gov

Meeting Frequency: Typically meets once a year

STANDARD COMMERCIAL FISHING LICENSE ELIGIBILITY BOARD

Statutorily required three-person board consisting of DEQ, DMF and MFC designees who apply eligibility criteria to determine whether an applicant is eligible for a SCFL.

Commission Designee: Mike Blanton

DMF Staff Lead: Marine Patrol Capt. Garland Yopp – garland.yopp@ncdenr.gov

Meeting Frequency: Meets two to three times a year, could need to meet more often depending on volume of applications

N.C. COMMERCIAL FISHING RESOURCE FUND COMMITTEE

Committee comprised of commissioners that the commission has given authority to make funding decisions on projects to develop and support sustainable commercial fishing in the state.

Commissioners: Doug Cross – chair, Mike Blanton and Sam Romano

DMF Staff Lead: William Brantley – william.brantley@ncdenr.gov

Meeting Frequency: Meets two to three times a year

WRC/MFC JOINT COMMITTEE ON DELINEATION OF FISHING WATERS

Committee formed to help integrate the work of the two commissions as they fulfill their statutory responsibilities to jointly determine the boundaries that define North Carolina's Inland, Coastal and Joint Fishing Waters as the agencies go through a statutorily defined periodic review of existing rules.

MFC Commissioners: Rob Bizzell, Dr. Martin Posey and Pete Kornegay

DMF Staff Lead: Anne Deaton - anne.deaton@ncdenr.gov

Meeting Frequency: Meets as needed

SHELLFISH CULTIVATION LEASE REVIEW COMMITTEE

Three-member committee formed to hear appeals of decisions of the Secretary regarding shellfish cultivation leases issued under G.S. 113-202.

MFC Commissioners: Rob Bizzell

DMF Staff Lead: Jacob Boyd – jacob.boyd@ncdenr.gov

Meeting Frequency: Meets as needed

COASTAL HABITAT PROTECTION PLAN STEERING COMMITTEE

The CHPP Steering Committee, which consists of two commissioners from the Marine Fisheries, Coastal Management and Environmental Management commissions reviews and approves the plan, recommendations, and implementation actions.

MFC Commissioners: Dr. Martin Posey, Pete Kornegay

DMF Staff Lead: Anne Deaton – anne.deaton@ncdenr.gov

Meeting Frequency: Meets as needed



COMMITTEE REPORTS



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

February 23, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: William Brantley, Grants Program Manager, Administrative and Maintenance Services Section

SUBJECT: February 12, 2021 Commercial Fishing Resource Fund Committee Meeting

Issue

The N.C. Commercial Fishing Resource Funding Committee met jointly with the N.C. Marine Fisheries Commission Commercial Fishing Resource Fund Committee at 1:30 p.m. on Friday, February 12, 2021 on Webex to receive a presentation on the Committee funded Sea Grant Commercial Fishing Economic Impact Analysis study, as well as vote on recurring DMF projects funding by the Committees.

Findings

The joint committees reviewed and approved a third year of the DMF Commercial Fishery Statistics Project, as well as the third year of the DMF Disease and Pathology: Research and Monitoring Project.

[Meeting minutes](#) are located in the MFC Briefing Materials.

Action Needed.

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



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

MEMORANDUM

TO: N.C. Marine Fisheries Commission Commercial Resource Fund Committee and the Funding Committee for the N.C. Commercial Fishing Resource Fund

FROM: William Brantley, Grants Program Manager
Division of Marine Fisheries, NCDEQ

DATE: February 23, 2020

SUBJECT: MFC Commercial Resource Fund Committee and Funding Committee for the N.C. Commercial Fishing Resource Fund Meeting Minutes

The MFC Commercial Resource Fund Committee and the Funding Committee for the N.C. Commercial Fishing Resource Fund met at 1:30 p.m. on Friday, February 12, 2021 through Webex. The following attended:

MFC Commercial Resource Fund Committee: Chairman Doug Cross, Sam Romano, Mike Blanton

Funding Committee for the N.C. Commercial Fishing Resource Fund Members: Chairman Ernest Doshier, Glenn Skinner, Steve Weeks, Britton Shackelford, and Doug Todd.

Absent: Gilbert Baccus

Public Comment: Public comment was received through webpage and US mail

APPROVAL OF AGENDA AND MINUTES

Chairman Doug Cross called the meeting to order for the MFC Commercial Resource Fund Committee and inquired to any conflicts of interest. Chairman Ernest Doshier called the meeting to order for the Funding Committee for the N.C. Commercial Fishing Resource Fund. Chairmen Cross and Doshier asked Brantley to read the conflict of interest reminder, then they individually inquired to any conflicts of interest. None were noted. Brantley conducted a roll call for both Committees. All members were present from the MFC Commercial Resource Fund Committee. For the N.C. Commercial Fishing Resource Fund Committee, all members were present with the exception of Baccus.

The meeting agenda was then reviewed.

Motion by Weeks to approve the agenda. Second by Skinner. Motion passed unanimously through a roll call vote of present members.

Motion by Romano to approve the agenda. Second by Blanton. Motion passed unanimously.

Minutes from the October 27, 2020 MFC Commercial Resource Fund (CRF) Committee meeting and the Funding Committee for the N.C. Commercial Fishing Resource Fund were reviewed.

Motion by Romano to approve the minutes of the October 27, 2020 meeting. Second by Blanton. Motion passed unanimously through roll call vote.

Motion by Skinner to approve the minutes of the October 27, 2020 meeting. Second by Blanton. Motion passed unanimously through roll call vote.

Brantley briefed the committees on points from Session Law 2020-3 and gave a brief elaboration on the agenda items

Brantley also stated that public comment for the meeting had been accepted by mail and webpage, and comments received were included in the member's meeting packets.

DMF RECURRING PROJECTS

Commercial Fishery Statistics Program - \$56,459

Chairmen Cross and Doshier opened the floor to discussion on the DMF Commercial Fishery Statistics project that has been funded by the Commercial Fishing Resource Fund over the past two years. This project is to Maintain compliance with North Carolina General Statutes 113-169.3, 113-168.2, 113-169.2, 113-170.3 and N.C. Marine Fisheries Commission Rule 15A NCAC 03I .0114 by allocating funds to the North Carolina Division of Marine Fisheries Trip Ticket Program. Brantley noted that the budget had been reduced this year through alternative funding sources, due to discussion at previous meetings regarding the Fund covering staff positions.

Motion by Romano to approve the DMF CFRF Statistics project for year 3. Second by Blanton. Motion passed unanimously through roll call vote.

Motion by Skinner to approve the DMF CFRF Statistics project for year 3. Second by Todd. Motion passed unanimously through roll call vote of present members.

Disease and Pathology: Research and Monitoring - \$25,000

Chairmen Cross and Doshier opened the floor to discussion on the DMF Disease and Pathology: Research and Monitoring program that has been funded by the Commercial Fishing Resource Fund over the past two years. This program has not had any expenditures in the past, and works as a retainer to make funds available to the North Carolina Division of Marine Fisheries in order to collect, prepare, and send samples to a designated pathology facility, part for the facility's expert analysis and report of findings.

Motion by Blanton to approve funds for the DMF CFRF Pathology project. Second by Romano. Motion passed unanimously through roll call vote.

Motion by Skinner to approve funds for the DMF CFRF Pathology project. Second by Weeks. Motion passed unanimously through roll call vote of present members.

GRANT UPDATES

DMF Southern Flounder Satellite Tagging Project

Shelby White (DMF) and Mike Loeffler (DMF) gave a short update on the Southern Flounder Satellite Tagging Project. Satellite tagging occurred in three primary areas during Fall 2020: eastern Albemarle Sound, Frisco, and Harker's Island. All one hundred satellite tagged flounder were obtained from pound nets and had total lengths of 20 inches or greater. Each satellite tagged fish also received a high reward conventional spaghetti tag, so there's potential for additional recapture information if the high reward tag is reported. In addition to satellite tagging fish in 2020, DMF also released over 500 conventional spaghetti tags. In 2021, DMF plans to release an additional 100 satellite tags across the South Atlantic (from NC to NE Florida). After discussion, Brantley noted that he would reach out to Committee members for potential questions, and try to coordinate with White and Loeffler for another update at the next meeting.

GRANT FINAL REPORTING

NC Sea Grant Economic Impact of North Carolina's Wild-caught Commercial Fishing Industry Presentation

Led by North Carolina Sea Grant with partners at four universities, to include UNC-Wilmington, Appalachian State University, NC State University, and Duke University; the research team provided a presentation of the research funded by the NC Commercial Fishing Resource Fund. Principal investigators on the grant discussed individual sections of the research, and opened the floor to discussion and questions by the joint Committee members.

Dr. Harrison noted that information discussed during the meeting could also be found at this hyperlink: <https://go.ncsu.edu/ncseafooddemand>.

DISCUSSION ON PUBLIC RELATIONS PROJECT MATERIAL

Brantley noted that topic was requested as an agenda item at the October 2020 meeting, in lieu of continuing outside requests and public comment. Brantley noted that the Committees may want to consider a process for fair and equitable consideration for usage. Chairman Cross discussed legal issues that may occur with usage. Weeks cited copyright concerns, and stated that he agreed the information should be able to be disseminated, but had concerns about misuse of the material. DMF Deputy Director Lupton joined the call, and noted that the MFC's Committee had an attorney that Chairman Cross may want to consider requesting an opinion on a process to review requests for project material and usage. Chairman Cross asked for agreeance from Chairman Doshier that the MFC's attorney be brought in for a corridor to reviewing requests, which Chairman Doshier concurred. Weeks agreed that the joint Committees needed an opinion from the Attorney General's office on what they can do on letting other groups use the project material. Chairman Cross would ask for a stated opinion from the MFC attorney for moving forward.

ISSUES FROM COMMITTEE MEMBERS

Shackelford discussed constraints on commercial fishermen due to sea turtles, as well as predation of juvenile and commercially viable finfish. Another issue of potential concern for Committee involvement was sturgeon, which plays into effect of large mesh gillnets.

Doshier discussed cormorants, and a WRC study that was ongoing on the species. WRC does know future research opportunities, but the Committees may wish to reach out to WRC to assist with the research.

Blanton asked for an update on the projects approved from the RFP. Brantley stated that about half of the contracts had been fully executed.

Romano discussed diamondback terrapin, and asked for a conversation at the next meeting to discuss with the Committees, potentially bringing in the UNC-W staff that are on the grant funding in October 2020. He had questions about his design of the bycatch reduction gear, and if it may/may not already be a viable option under DMF criteria. Romano wanted to ensure the Committees and industry were forward-thinking in their actions that could affect diamondback terrapin.

Chairman Cross asked for continuous bycatch studies, and especially in the shrimp trawl industry. He cited the need to determine the actual percentage of Pamlico Sound and tributaries that are actually worked through trawling.

Skinner discussed the marketing proposal, and asked for thoughts on a wild-caught seafood conference. Brantley noted he would take this concept, and others, to compile into an RFP at a later date to present to the Committees. This would give the Committees an opportunity to make sure the projects met the Strategic Plan and legislative intent.

ADJOURNMENT

Motion by Blanton to adjourn. Second by Romano. Motion passed unanimously through roll call vote.

Motion by Skinner to adjourn. Second by Todd. Motion passed unanimously through roll call vote of present members.

Meeting adjourned.

WB

DIRECTOR'S REPORTS

SAFMC

SOUTHERN FLOUNDER FISHERY MANAGEMENT PLAN

ASMFC

MAFMC

HMS

PROTECTED RESOURCES UPDATE

LANDINGS UPDATE

RULE SUSPENSIONS



SAFMC



South Atlantic Fishery Management Council

News Release

FOR IMMEDIATE RELEASE
March 5, 2021

CONTACT: Kim Iverson
Public Information Officer
Toll Free: 866/SAFMC-10 or 843/571-4366
Kim.Iverson@safmc.net

Council Chooses Preferred Management Measures for Dolphin and Wahoo Fisheries

Proposed measures would reduce recreational vessel limits for Dolphin and bag limits for Wahoo

During its meeting this week, members of the South Atlantic Fishery Management Council chose preferred management alternatives affecting Dolphin and Wahoo harvested in federal waters along the entire Atlantic coast. The proposed measures, as outlined in Amendment 10 to the Dolphin Wahoo Fishery Management Plan, would reduce the current recreational vessel limit for Dolphin from 60 fish to 48 fish per vessel while maintaining the 10 fish per person/day bag limit and reduce the daily bag limit for Wahoo from 2 fish to 1 fish per person/day. Reductions in harvest are intended to help prevent seasonal closures that could be imposed should catch levels be exceeded.

Regional differences in the Dolphin and Wahoo fisheries became the focus of discussion as members of the Council reviewed concerns expressed during public hearings held in late January. Fishermen in South Florida and the Keys, including charter captains, have expressed concerns about catching fewer Dolphin and encountering smaller fish over the past few years and have requested the Council take action to reduce harvest. Further north, charter captains and other fishermen have raised objections to the proposed reductions, noting the importance of maintaining higher vessel limits for trips that require much farther runs offshore.

“We’ve heard from constituents and advisory panel members and believe their observations. Looking at the various management scenarios for both Dolphin and Wahoo, the Council compromised to reduce catches while addressing concerns of fishermen dependent on these valuable recreational fisheries,” explained Council Chair Mel Bell. “There are many variables affecting these migratory fisheries, including international harvest, environmental conditions, and other factors. We don’t have a clear sense of what the problem is and we’re being more preventative than curative at this point,” said Bell.

Amendment 10 also includes updates to annual catch limits, modifications to sector allocations, and changes to accountability measures designed to ensure the catch levels are not exceeded for both Dolphin and Wahoo. Proposed management measures would also allow properly permitted commercial fishing vessels with trap, pot or buoy gear onboard to retain up to 500 pounds (gutted weight) of Dolphin and remove the Operator Card requirement for for-hire and commercial fishermen in the Atlantic Dolphin Wahoo fishery. After considering recommendations from its advisory panels and public comment, the Council removed an action that would have allowed filleting Dolphin at sea on for-hire vessels in federal waters north of the NC/VA border. The Council is scheduled to approve Dolphin Wahoo Amendment 10 for review by the Secretary of Commerce during its June meeting.

(Continued)

Other Business:

Red Snapper

NOAA Fisheries provided an update on the recreational Red Snapper Season for 2021. Due to delays from COVID-19, some landings data from 2020 are not yet available. Those data are expected in May 2021. NOAA Fisheries intends to announce the 2021 season as soon as data are available and evaluated. If a season is allowed, the recreational season for Red Snapper begins on the second Friday in July. The number of fishing days is determined by NOAA Fisheries based on catch estimates from the previous season. The recreational season was open for four days in 2020 and five days in 2019.

A new stock assessment for Red Snapper will be reviewed by the Council's Scientific and Statistical Committee (SSC) during its meeting in late April. The Council will receive an overview of the assessment and the SSC's recommendations during its June meeting. The Council discussed management options for considering the stock assessment results in setting the 2021 catch levels and requested that staff determine if an abbreviated framework can be used to adjust catch levels and if so, prepare such an amendment for Council review at their June 2021 meeting. The Council will also move forward with a plan amendment to modify annual catch limits, allocations, and other management measures necessary as a result of the stock assessment.

King Mackerel, Red Porgy, Snowy Grouper and Rock Shrimp Fishery Access Area

The Council continued work on management measures addressing Atlantic migratory group King Mackerel to address the recent stock assessment update that found the stock is not overfished or undergoing overfishing. The measures, originally included in Framework Amendment 10 and now Amendment 34 to the Coastal Migratory Pelagics Fishery Management Plan, would modify annual catch limits and sector allocations, increase the recreational bag limit and possession limits off the coast of Florida, reduce the minimum size limits for both commercial and recreational sectors, and allow retention of "cut off" King and Spanish Mackerel by recreational fishermen as is allowed for the commercial sector. Public hearings on the amendment will be scheduled following the Council's June meeting.

Proposed management measures for Red Porgy to end overfishing and rebuild the stock continued to be reviewed in Amendment 50 to the Snapper Grouper Fishery Management Plan, with public hearings scheduled this summer. The Council reviewed recent stock assessment results for Snowy Grouper and recommendations from its SSC and will begin developing an amendment to address management measures. The Council also approved Coral Amendment 10 for public hearings to be held prior to the Council's June meeting. The amendment addresses a Shrimp Fishery Access Area for rock shrimp along the northern extension of the Oculina Bank Coral Habitat Area of Particular Concern off the east coast of Florida.

Additional information about this week's meeting, including a meeting [Story Map](#), committee reports, and briefing book materials is available from the Council's website at: <https://safmc.net/safmc-meetings/council-meetings/>. The next meeting of the South Atlantic Fishery Management Council is currently scheduled for June 14-18, 2021 in Ponte Vedra, 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 1-5, 2021

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.

Habitat Protection and Ecosystem-Based Management Committee

Coral Amendment:

MOTION 1: APPROVE CORAL AMENDMENT 10 FOR PUBLIC HEARINGS AS MODIFIED

APPROVED BY COUNCIL

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

1. Modify Coral Amendment 10 to address Committee recommendations: clarify that industry came forward before the previous amendment (Coral Amendment 8) was approved; describe and clarify SFAA designation; reword language for no action stating no SFAA exists in the OHAPC at this time and modify wording in the preferred alternative to clarify the allowable activity within the proposed SFAA. Schedule Coral Amendment 10 public hearings during the spring 2021.
2. Continue development of the Habitat Blueprint with the provided guidance.
3. Schedule and facilitate the Habitat and Ecosystem AP April meeting with agenda topics listed above.

APPROVED BY COUNCIL

Snapper Grouper Committee

MOTION 1: INSTRUCT STAFF TO INITIATE A FULL PLAN AMENDMENT FOR SNOWY GROUPE

APPROVED BY COUNCIL

MOTION 2: SELECT ALTERNATIVE 2 UNDER ACTION 1 AS PREFERRED

Action 1. Revise the Greater Amberjack annual catch limit and annual optimum yield.

Alternative 2. Revise the total annual catch limit and annual optimum yield for Greater Amberjack and set equal to the updated acceptable biological catch based on the results of the latest stock assessment (SEDAR 59 2020). The 2026-27 total annual catch limit would remain in place until modified.

Year	Total ACL (lbs ww)
2022-23	4,380,000
2023-2024	3,233,000
2024-2025	2,818,000
2025-2026	2,699,000
2026-2027+	2,669,000

APPROVED BY COUNCIL

MOTION 3: APPROVE AMENDMENT 49 FOR SCOPING

APPROVED BY COUNCIL

MOTION 4: REQUEST THE SSC PROVIDE SHORT-TERM MANAGEMENT (3 to 5 YEARS) ADVICE FOR RED SNAPPER ASSUMING RECENT HIGH RECRUITMENT

APPROVED BY COUNCIL

MOTION 5: REQUEST THAT STAFF DETERMINE WHETHER AN ABBREVIATED FRAMEWORK CAN BE USED TO ADJUST CATCH LEVELS OF RED SNAPPER AND, IF SO, PREPARE SUCH AN AMENDMENT FOR COUNCIL REVIEW IN JUNE 2021

APPROVED BY COUNCIL

MOTION 6: DIRECT STAFF TO DO THE FOLLOWING:

- Request a presentation from the SEFSC on pilot longline surveys in the region to be provided to the Committee at the June meeting, if time allows.
- Prepare Amendment 49 (Greater Amberjack) for scoping and conduct scoping hearings before the June meeting.
- Schedule and facilitate a meeting of the Snapper Grouper AP with approved agenda topics in April.
- Schedule wreckfish shareholders meeting after the June 2021 meeting.
- Request that the SSC explore ABC recommendations based on recent high recruitment for Red Snapper.
- Prepare an abbreviated framework to adjust catch levels for Red Snapper for review and approval in June 2021, if appropriate.

- Initiate amendment to address snowy grouper and direct staff to ensure appropriate timeline for development.

APPROVED BY COUNCIL

Dolphin Wahoo Committee

MOTION 1: ACCEPT THE IPT'S SUGGESTED EDITS TO THE REVISED GOALS AND OBJECTIVES OF THE DOLPHIN WAHOO FMP. DIRECT STAFF TO INCLUDE THE REVISED GOALS AND OBJECTIVES IN AMENDMENT 10 TO THE DOLPHIN WAHOO FMP.

APPROVED BY COUNCIL

MOTION 2: APPROVE THE IPT'S SUGGESTED EDITS TO THE PURPOSE AND NEED STATEMENTS IN AMENDMENT 10.

The *purpose* of Dolphin Wahoo Amendment 10 is to revise the catch levels [acceptable biological catch (ABC) and annual catch limits (ACL)], sector allocations, accountability measures, and management measures for dolphin and wahoo. Management measures address authorized gear, the operator card requirement, and recreational bag/vessel limits in the dolphin and wahoo fisheries, as well as allowing fillets at sea onboard for-hire vessels in the dolphin fishery.

The need for Dolphin Wahoo Amendment 10 is to base conservation and management measures on the best scientific information available and increase net benefits to the Nation, consistent with the Magnuson-Stevens Fishery Conservation and Management Act and its National Standards.

APPROVED BY COUNCIL

MOTION 3: REPLACE ALTERNATIVE 2 IN ACTION 5 WITH THE IPT PROPOSED ALTERNATIVE 2.

Action 5. Revise the trigger for the post-season recreational accountability measures for dolphin.

Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (*Sub-alternative 2a or 2b*) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those

two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.

Sub-alternative 2a. Use the arithmetic mean to calculate average landings.

Sub-alternative 2b. Use the geometric mean to calculate average landings.

APPROVED BY COUNCIL

MOTION 4: ACCEPT THE IPT PROPOSED ALTERNATIVE 5 TO REPLACE THE CURRENT ALTERNATIVE 5 IN ACTION 6.

Action 6. Revise the post-season recreational accountability measures for dolphin.

Alternative 5. In the following fishing year monitor landings, and if by September 1 of each year landings are projected to meet the sector ACL that fishing year, reduce the bag limit to prevent the annual catch limit from being exceeded (*Sub-alternatives 5a through 5e*). If reductions in the bag limit are projected to be insufficient to constrain harvest to the ACL, then also reduce the vessel limit to prevent the annual catch limit from being exceeded (*Sub-alternatives 5f through 5i*). If reductions in the bag limit and vessel limit are not implemented or are projected to be insufficient to constrain harvest to the ACL, then also reduce the length of the recreational fishing season to prevent the annual catch limit from being exceeded. However, the vessel limit, bag limit and/or recreational fishing season will not be reduced if the Regional Administrator determines, using the best available science, that it is not necessary.

Bag Limit Sub-Alternatives:

Sub-alternative 5a. Reduce the bag limit by the amount necessary but not below 2 fish per person per day.

Sub-alternative 5b. Reduce the bag limit by the amount necessary but not below 3 fish per person per day.

Sub-alternative 5c. Reduce the bag limit by the amount necessary but not below 4 fish per day.

Sub-alternative 5c. Reduce the bag limit by the amount necessary but not below 4 fish per person per day.

Sub-alternative 5d. Reduce the bag limit by the amount necessary but not below 5 fish per vessel per day.

Sub-alternative 5e. Do not reduce the bag limit.

Vessel Limit Sub-Alternatives:

Sub-alternative 5f. Reduce the vessel limit by the amount necessary but not below 10 fish per vessel per day.

Sub-alternative 5g. Reduce the vessel limit by the amount necessary but not below 20 fish per vessel per day.

Sub-alternative 5h. Reduce the vessel limit by the amount necessary but not below 30 fish per vessel per day.

Sub-alternative 5i. Do not reduce the vessel limit.

APPROVED BY COUNCIL

MOTION 5: SELECT ALTERNATIVE 2 IN ACTION 6 AS PREFERRED.

Action 6. Revise the post-season recreational accountability measures for dolphin.

Alternative 2. Reduce the length of the following recreational fishing season by the amount necessary to prevent the annual catch limit from being exceeded in the following year. However, the length of the recreational season will not be reduced if the Regional Administrator determines, using the

APPROVED BY COUNCIL

MOTION 6: ACCEPT THE IPT'S WORDING FOR ALTERNATIVE 2 IN ACTION 7.

Action 7. Revise the trigger for the post-season recreational accountability measures for wahoo.

IPT PROPOSED Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (Sub-alternative 2a or 2b) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.
Sub-alternative 2a. Use the arithmetic mean to calculate average landings.
Sub-alternative 2b. Use the geometric mean to calculate average landings.

APPROVED BY COUNCIL

MOTION 7: CHOOSE SUB-ALTERNATIVE 2B UNDER ACTION 7 AS PREFERRED.

Action 7. Revise the trigger for the post-season recreational accountability measures for wahoo.
Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (Sub-alternative 2a or 2b) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.

Sub-alternative 2b. Use the geometric mean to calculate average landings.

APPROVED BY COUNCIL

MOTION 8: ACCEPT THE IPT'S SUGGESTED EDITS IN ACTION 11.

Action 11. Reduce the recreational vessel limit for dolphin.

Alternative 1 (No Action). The recreational daily bag limit is 10 dolphin per person, not to exceed 60 dolphin per vessel, whichever is less:

Alternative 2. The recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 2a. 30 dolphin per vessel, whichever is less.

Sub-alternative 2b. 40 dolphin per vessel, whichever is less.

Sub-alternative 2c. 42 dolphin per vessel, whichever is less:

Sub-alternative 2d. 48 dolphin per vessel, whichever is less.

Sub-alternative 2e. 54 dolphin per vessel, whichever is less.

Alternative 3. In Florida only, the recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 3a. 30 dolphin per vessel, whichever is less.

Sub-alternative 3b. 40 dolphin per vessel, whichever is less.

Sub-alternative 3c. 42 dolphin per vessel, whichever is less.

Sub-alternative 3d. 48 dolphin per vessel, whichever is less.

Sub-alternative 3e. 54 dolphin per vessel, whichever is less.

Alternative 4. In South Carolina, Georgia, and Florida only, the recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 4a. 30 dolphin per vessel, whichever is less.

Sub-alternative 4b. 40 dolphin per vessel, whichever is less.

Sub-alternative 4c. 42 dolphin per vessel, whichever is less.

Sub-alternative 4d. 48 dolphin per vessel, whichever is less.

Sub-alternative 4e. 54 dolphin per vessel, whichever is less.

APPROVED BY COUNCIL

MOTION 9: SELECT SUB-ALTERNATIVE 2D AS PREFERRED IN ACTION 11.

Action 11. Reduce the recreational vessel limit for dolphin

Alternative 2. The recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 2d. 48 dolphin per vessel, whichever is less.

APPROVED BY COUNCIL

MOTION 10: ACCEPT ACTION 12 TO BE INCLUDED IN AMENDMENT 10.

Action 12. Reduce the recreational bag limit and establish a recreational vessel limit for wahoo
Alternative 1 (No Action). The recreational daily bag limit is 2 wahoo per person. There is no
Alternative 2. The recreational daily bag limit is 1 wahoo per person.

Alternative 3. The recreational vessel limit is:

- Sub-alternative 3a. 2 wahoo per vessel.
- Sub-alternative 3b. 3 wahoo per vessel.
- Sub-alternative 3c. 4 wahoo per vessel.
- Sub-alternative 3d. 5 wahoo per vessel.
- Sub-alternative 3e. 6 wahoo per vessel.
- Sub-alternative 3f. 7 wahoo per vessel.

APPROVED BY COUNCIL

MOTION 11: ACCEPT ALTERNATIVE 2 AS PREFERRED IN ACTION 12.

Action 12. Reduce the recreational bag limit and establish a recreational vessel limit for wahoo

Alternative 2. The recreational daily bag limit is 1 wahoo per person.

APPROVED BY COUNCIL

**MOTION 12: REMOVE ACTION 13 IN AMENDMENT 10 AND PUT IT IN THE
CONSIDERED BUT REJECTED SECTION.**

APPROVED BY COUNCIL

**MOTION 13: APPROVE ALL ACTIONS IN DOLPHIN WAHOO AMENDMENT 10, AS
MODIFIED, FOR REVIEW AT THE JUNE 2021 MEETING.**

APPROVED BY COUNCIL

DIRECTION TO STAFF:

- 1) Develop a framework action, or other appropriate action, to consider making the minimum size requirements currently in place for FL, GA, and SC apply throughout the management zone for dolphin.
- 2) Develop a framework or other appropriate action to consider exempting the charter fleet from the dolphin and wahoo vessel limits.

MOTION 14: APPROVE THE FOLLOWING TIMING AND TASKS:

- 1) Continue work on Amendment 10 and prepare the amendment for a vote of approval for secretarial review at the June 2021 meeting.

- 2) Prepare information on identified topics regarding the use of pelagic longline gear in the dolphin wahoo fishery, dolphin size limits, and exemptions to the dolphin and wahoo vessel limits onboard for-hire vessels. The council will review this information at the June 2021 meeting.

APPROVED BY COUNCIL

Mackerel Cobia Committee

MOTION 1: APPROVE THE PURPOSE AND NEED STATEMENT

The *purpose* of this amendment is to revise the annual catch limits for Atlantic migratory group king mackerel; to revise recreational and commercial allocations for Atlantic migratory group king mackerel; and to revise or establish management measures for Atlantic migratory group king and Spanish mackerel.

The need for this amendment is to ensure annual catch limits are based on the best scientific information available and to ensure overfishing does not occur in the Atlantic migratory group king and Spanish mackerel fisheries, while increasing social and economic benefits through sustainable and profitable harvest of Atlantic migratory group king and Spanish mackerel.

APPROVED BY COUNCIL

MOTION 2: APPROVE ACTION 1 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 1. Revise the total annual catch limit for Atlantic migratory group king mackerel to reflect the updated acceptable biological catch level.

Alternative 1 (No Action). The total annual catch limit for Atlantic migratory group king mackerel is set equal to the current acceptable biological catch level (12,700,000 pounds).

Alternative 2. The total annual catch limit for Atlantic migratory group king mackerel is equal to the updated acceptable biological catch level.

Alternative 3. The total annual catch limit for Atlantic migratory group king mackerel is equal to 95% of the updated acceptable biological catch level.

Alternative 4. The total annual catch limit for Atlantic migratory group king mackerel is equal to 90% of the updated acceptable biological catch level.

APPROVED BY COUNCIL

MOTION 3: APPROVE ACTION 3 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 3. Revise recreational annual catch target for Atlantic migratory group king mackerel.

Alternative 1 (No Action). Retain the current recreational annual catch target for Atlantic migratory group king mackerel [ACL[(1-PSE) or 0.5, whichever is greater] based on the previous acceptable biological catch (ACT = 7,400,000 pounds)

Alternative 2. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals sector ACL[(1-PSE) or 0.5, whichever is greater].

Alternative 3. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals 90% sector ACL.

Alternative 4. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals 85% sector ACL.

APPROVED BY COUNCIL

MOTION 4: APPROVE ACTION 4 AND ALTERNATIVES 1 THROUGH 2 FOR INCLUSION IN CMP AMENDMENT 34.

Action 4. Increase the recreational bag and possession limit for Atlantic migratory group king mackerel in the exclusive economic zone off Florida.

Alternative 1 (No Action). The daily bag limit for Atlantic migratory group king mackerel in the exclusive economic zone off Florida is two fish per person. Two fish per person is the daily bag limit specified by Florida for its waters.

Alternative 2. Increase the daily bag limit for Atlantic migratory group king mackerel to three fish per person. off Florida.

APPROVED BY COUNCIL

MOTION 5: APPROVE ACTION 5 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 5. Reduce the minimum size limit for recreational and commercial harvest of Atlantic migratory group king mackerel.

Alternative 1 (No Action). The minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel is 24-inches fork length.

Alternative 2. Reduce the minimum size limit for commercial and recreational harvest of Atlantic king migratory group mackerel to 22-inches fork length.

Alternative 3. Reduce the minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel to 20-inches fork length.

Alternative 4. Remove the minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel.

APPROVED BY COUNCIL

MOTION 6: APPROVE ACTION 6 AND ALTERNATIVES 1 THROUGH 2 FOR INCLUSION IN CMP AMENDMENT 34.

Action 6. Modify the recreational requirement for Coastal Migratory Pelagic species in the Atlantic region to be landed with heads and fins in intact.

Alternative 1 (No Action). Cut-off (damaged) Atlantic migratory group king mackerel or Atlantic migratory group Spanish mackerel caught under the recreational bag limit may not be possessed.

Alternative 2. Cut-off (damaged) fish caught under the recreational bag limit, that comply with the minimum size limits, may be possessed, and offloaded ashore.

Sub-alternative 2a. Atlantic migratory group king mackerel

Sub-alternative 2b. Atlantic migratory group Spanish mackerel

APPROVED BY COUNCIL

MOTION 7: SELECT ALTERNATIVE 2, UNDER ACTION 1, AS THE PREFERRED ALTERNATIVE

Action 1 – Modify the Gulf of Mexico (Gulf) Migratory Group Cobia (Gulf Cobia) Overfishing Limit (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limit (ACL).

Gulf Council Preferred Alternative 2: Modify the Gulf cobia stock OFL, ABC, and ACL based on recommendation of the Gulf Scientific and Statistical Committee (SSC) as presented in July 2020, for an increasing yield stream for 2021 to 2023, and then maintain the 2023 levels for subsequent fishing years or until changed by a management action. The stock ACL is set equal to the stock ABC.

	Gulf Cobia Stock		
Year	OFL	ABC	ACL
2021	3,030,000	2,340,000	2,340,000
2022	3,210,000	2,600,000	2,600,000
2023+	3,310,000	2,760,000	2,760,000

Note: Catch limits in pounds whole weight. The recreational portion of the OFL, ABC, and ACL are based on MRIP-FES data.

APPROVED BY COUNCIL

MOTION 8: CHOOSE ALTERNATIVE 3, UNDER ACTION 2, AS THE SOUTH ATLANTIC COUNCIL'S PREFERRED ALTERNATIVE

Action 2 – Modify the Gulf Cobia Apportionment Between the Gulf Zone and the Florida East Coast (FLEC) Zone and Update the Zones' ACLs Based on the ACL Selected in Action 1.

Alternative 3: Modify the Gulf cobia stock ACL apportionment to be 63% for the Gulf Zone and 37% for the FLEC Zone, based on the MRIP-FES average landings for Gulf cobia for the years 1998 – 2012, and use this apportionment to update the Zone ACLs based on the Gulf Cobia ACL(s) in Action 1.

APPROVED BY COUNCIL

MOTION 9: UNDER ACTION 4, CHOOSE ALTERNATIVE 2B AND ALTERNATIVE 3B-SUB-OPTION I AS PREFERRED.

Action 4 – Modify the Gulf Cobia Possession Limit and/or Establish a Trip Limit

Alternative 2: Reduce the recreational and commercial daily possession limit to 1 fish per person, regardless of the number or duration of trips.

Option 2b: in the FLEC Zone

Alternative 3: Create a recreational and commercial daily trip limit. Fishermen may not exceed the per person daily possession limit.

Option 3b: in the FLEC Zone

Sub-option i: The trip limit for cobia is two fish.

APPROVED BY COUNCIL

MOTION 10: APPROVE THE GULF COUNCIL PREFERRED FOR THE GULF ZONE UNDER ACTION 4

Action 4 – Modify the Gulf Cobia Possession Limit and/or Establish a Trip Limit

Gulf Council Preferred Alternative 2: Reduce the recreational and commercial daily possession limit to 1 fish per person, regardless of the number or duration of trips.

Gulf Council Preferred Option 2a: in the Gulf Zone

Gulf Council Preferred Alternative 3: Create a recreational and commercial daily trip limit. Fishermen may not exceed the per person daily possession limit.

Gulf Council Preferred Option 3a: in the Gulf Zone

Gulf Council Preferred Sub-option i: The trip limit for cobia is two fish.

APPROVED BY COUNCIL

MOTION 11: SELECT ALTERNATIVE 2, UNDER ACTION 5, AS THE SOUTH ATLANTIC COUNCIL'S PREFERRED

Action 5 – Modify the Gulf Cobia Minimum Size Limit

Alternative 2: Retain the current recreational and commercial minimum size limit of 36 inches FL in the Gulf Zone and increase the recreational and commercial minimum size limit to 36 inches FL in the FLEC Zone.

APPROVED BY COUNCIL

MOTION 12: ADOPT THE FOLLOWING TIMING AND TASKS:

1. Continue work on CMP Amendment 34 and prepare a draft for discussion and selection of preferred alternatives at the June 2021 meeting.
2. Work with Gulf Council staff to present information on CMP Amendment 32 to the Gulf Council and Gulf Mackerel Cobia Advisory Panel.
3. Work with Gulf Council staff to continue development CMP Amendment 32 for additional review at the June 2021 meeting.
4. White Paper Action – work with ASMFC staff on ad hoc AP structure
5. Convene a meeting of the Mackerel Cobia Advisory Panel to discuss topics listed above

APPROVED BY COUNCIL

SEDAR COMMITTEE

MOTION 1: APPROVE THE SEDAR 79 PARTICIPANT LIST TABLE AS MODIFIED

APPROVED BY COUNCIL

MOTION 2: APPROVE THE SEDAR 79 TERMS OF REFERENCE

APPROVED BY COUNCIL

EXECUTIVE COMMITTEE

MOTION 1: APPROVE THE AP POLICY AS REVISED

APPROVED BY COUNCIL

MOTION 2: APPROVE THE SAFMC SEMINAR SERIES

APPROVED BY COUNCIL

**SUMMARY REPORT
DOLPHIN WAHOO COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
Webinar
March 3-4, 2021**

The Committee approved amended minutes from the December 2020 meeting and the agenda.

Status of Amendments under Formal Review

The Committee was updated on the status of Dolphin Wahoo Amendment 12 that adds bullet mackerel and frigate mackerel to the Dolphin Wahoo Fishery Management Plan and designates them as Ecosystem Component species. This amendment was submitted to the NMFS Southeast Regional Office on December 3, 2020 and is undergoing rule making.

Review of the updated Dolphin Wahoo Fishery Management Plan Goals and Objectives

The Fisheries Allocation Review Policy (NMFS Policy Directive 01-119) issued in July 2016 encourages the use of adaptive management in respect to allocation revisions, which includes “periodic re-evaluation and updating of the management goals and objectives to ensure they are relevant to current conditions and needs.” As part of the Council’s process for creating an Allocation Review Trigger Policy, the goals and objectives of FMPs that include sector allocations will be reviewed and updated as appropriate.

The Dolphin Wahoo Committee reviewed the updated FMP goals and objectives and made the following motion:

Preamble: The original and ongoing intent of the Fishery Management Plan for the Dolphin Wahoo Fishery of the Atlantic is to sustainably manage the stocks of dolphin and wahoo for the long-term benefit of all participants. Owing to the substantial importance of the fisheries for dolphin and wahoo, particularly to the recreational sector, this fishery management plan seeks to manage these fisheries using a precautionary approach that maintains access, minimizes competition, preserves the social and economic importance of the fisheries, as well as promotes research and incorporation of ecosystem considerations where practicable.

Goal 1 (Precautionary Approach): Management of the dolphin and wahoo fisheries is precautionary, risk-averse, and maintains historic catch levels while preventing overfishing.	
<i>Objective 1</i>	Maintain catch levels that do not exceed catch level recommendations for dolphin or wahoo and do not directly change the balance of landings in comparison to the historic fishery to the extent that conflict is created between the recreational and commercial sectors.
<i>Objective 2</i>	Minimize bycatch of dolphin and wahoo in non-directed fisheries.
Goal 2 (Access): The recreational and commercial sectors retain access to the dolphin and wahoo resource.	

<i>Objective 1</i>	For the recreational sector, adopt management measures that ensure consistent and predictable access to dolphin and wahoo when they are regionally available as well as maintain abundant stock levels that lead to high encounter rates and elevated trip satisfaction.
<i>Objective 2</i>	For the commercial sector, adopt management measures that ensure consistent and predictable access to dolphin and wahoo when they are regionally available.
<i>Objective 3</i>	Address concerns as practicable over localized reduction in fish abundance and the resulting perceived decline in local availability of dolphin and wahoo.
Goal 3 (Minimize Competition Between User Groups): Competition between user groups is minimized.	
<i>Objective 1</i>	Ensure effort and catch levels of dolphin and wahoo by distinct user groups does not notably expand beyond their traditional share of the fishery.
<i>Objective 2</i>	Exercise caution in allowing development of new fisheries or expansion of existing fisheries that may increase competition between user groups.
Goal 4 (Economic and Social Importance): Management of the dolphin and wahoo fisheries recognizes and preserves their economic and social importance to both the recreational and commercial sectors.	
<i>Objective 1</i>	Manage the dolphin and wahoo resources to achieve optimum yield on a continuing basis in order to maximize the economic and social net benefits of the fishery.
<i>Objective 2</i>	Minimize market disruption. In the short-term, commercial markets (mainly local) may be disrupted if large quantities of dolphin are landed from intense commercial harvest or unregulated catch.
<i>Objective 3</i>	Encourage research that improves knowledge about the social and economic elements of the dolphin and wahoo fishery.
<i>Objective 4</i>	Improve awareness and understanding of how social and economic issues are linked to dolphin and wahoo fishery management measures.
Goal 5 (Ecosystem Based Management and Research Priorities): Management of the dolphin and wahoo fisheries recognizes the importance of biological information and incorporating ecosystem considerations.	
<i>Objective 1</i>	Support improved and expanded monitoring and reporting programs for the dolphin and wahoo fishery. Promote collection of quality data to support management plans and programs considered by the Council.
<i>Objective 2</i>	Support measures that incorporate ecosystem considerations for the management of dolphin and wahoo where practicable.
<i>Objective 3</i>	Promote research aimed at developing ecosystem based management of dolphin and wahoo.
<i>Objective 4</i>	Promote research that enhances collection of biological and habitat data on dolphin and wahoo stocks and fisheries.

MOTION 1: ACCEPT THE IPT'S SUGGESTED EDITS TO THE REVISED GOALS AND OBJECTIVES OF THE DOLPHIN WAHOO FMP. DIRECT STAFF TO INCLUDE THE REVISED GOALS AND OBJECTIVES IN AMENDMENT 10 TO THE DOLPHIN WAHOO FMP.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

Revise Dolphin and Wahoo Management Measures: Amendment 10

Amendment 10 includes actions that accommodate updated catch level recommendations and recreational data from the Marine Recreational Information Program and revise the annual catch limits and sector allocations for dolphin and wahoo accordingly. The amendment also contains actions that implement various other management changes in the fishery including revising recreational accountability measures; accommodating possession of dolphin and wahoo on vessels with trap, pot, or buoy gear onboard; removing the operator card requirement, reducing the recreational vessel limit for dolphin, reducing the recreational bag limit or implementing a recreational vessel limit for wahoo, and allowing filleting of dolphin at sea onboard for-hire vessels in the waters north of the Virginia/North Carolina border. Public Hearings for this amendment were held via webinar on January 26-28, 2021.

The Committee reviewed public hearing comments, discussed the amendment, and provided the following guidance as well as made the following motions:

MOTION 2: APPROVE THE IPT'S SUGGESTED EDITS TO THE PURPOSE AND NEED STATEMENTS IN AMENDMENT 10.

The *purpose* of Dolphin Wahoo Amendment 10 is to revise the catch levels [acceptable biological catch (ABC) and annual catch limits (ACL)], sector allocations, accountability measures, and management measures for dolphin and wahoo. Management measures address authorized gear, ~~and~~ the operator card requirement, ~~and recreational bag/vessel limits~~ in the dolphin and wahoo fisheries, as well as ~~recreational vessel limits and~~ allowing fillets at sea onboard for-hire vessels in the dolphin fishery.

The *need* for Dolphin Wahoo Amendment 10 is to base conservation and management measures on the best scientific information available and increase net benefits to the Nation, consistent with the Magnuson-Stevens Fishery Conservation and Management Act and its National Standards.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 3: REPLACE ALTERNATIVE 2 IN ACTION 5 WITH THE IPT PROPOSED ALTERNATIVE 2.

Action 5. Revise the trigger for the post-season recreational accountability measures for dolphin

~~**Alternative 2.** Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3 year geometric mean of landings~~

exceed the recreational sector annual catch limit. If in any year the recreational sector annual catch limit is changed, the moving multi-year geometric mean of landings will start over.

IPT PROPOSED Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (*Sub-alternative 2a or 2b*) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.

Sub-alternative 2a. Use the arithmetic mean to calculate average landings.¹

Sub-alternative 2b. Use the geometric mean to calculate average landings.²

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 4: ACCEPT THE IPT PROPOSED ALTERNATIVE 5 TO REPLACE THE CURRENT ALTERNATIVE 5 IN ACTION 6.

Action 6. Revise the post-season recreational accountability measures for dolphin

~~**Preferred Alternative 5.** In the following fishing year monitor landings and if landings are projected to meet the sector ACL, reduce the bag limit and/or the vessel limit (*Sub-alternatives 5a and/or 5b*) first and if needed reduce the length of the recreational fishing season by the amount necessary to prevent the annual catch limit from being exceeded. However, the vessel limit, bag limit, and/or recreational fishing season will not be reduced if the Regional Administrator determines, using the best available science, that it is not necessary.~~

~~**Sub-alternative 5a.** Reduce the bag limit by the amount necessary but not below X fish per person per day (*Council to fill in the number*).~~

~~**Sub-alternative 5b.** Reduce the vessel limit by the amount necessary but not below X fish per vessel per day (*Council to fill in the number*).~~

IPT PROPOSED Alternative 5. In the following fishing year monitor landings, and if by September 1 of each year landings are projected to meet the sector ACL that fishing year, reduce the bag limit to prevent the annual catch limit from being exceeded (*Sub-alternatives 5a through 5e*). If reductions in the bag limit are projected to be insufficient to constrain harvest to the ACL, then also reduce the vessel limit to prevent the annual catch limit from being exceeded (*Sub-alternatives 5f through 5i*). If reductions in the bag limit and vessel limit are not implemented or are projected to be insufficient to constrain harvest to the ACL, then also reduce the length of the recreational fishing season to prevent the annual catch limit from being exceeded.³ However, the vessel limit, bag limit, and/or recreational fishing season will not be reduced if the Regional Administrator determines, using the best available science, that it is not necessary.

Bag Limit Sub-Alternatives:

¹ The arithmetic mean is calculated by adding the values of a set of numbers and then dividing the sum by the number of values in the set.

² The geometric mean is calculated by multiplying the values of a set of numbers and then taking the nth root of the product, where n is equal to the number of values in the set.

³ The intent of this alternative is that NMFS would implement the reduction in bag limit, vessel limit, and/or season length through a single in-season action, but implementation via separate regulations would not be precluded.

Sub-alternative 5a. Reduce the bag limit by the amount necessary but not below 2 fish per person per day.

Sub-alternative 5b. Reduce the bag limit by the amount necessary but not below 3 fish per person per day.

Sub-alternative 5c. Reduce the bag limit by the amount necessary but not below 4 fish per person per day.

Sub-alternative 5d. Reduce the bag limit by the amount necessary but not below 5 fish per vessel per day.

Sub-alternative 5e. Do not reduce the bag limit.

Vessel Limit Sub-Alternatives:

Sub-alternative 5f. Reduce the vessel limit by the amount necessary but not below 10 fish per vessel per day.

Sub-alternative 5g. Reduce the vessel limit by the amount necessary but not below 20 fish per vessel per day.

Sub-alternative 5h. Reduce the vessel limit by the amount necessary but not below 30 fish per vessel per day.

Sub-alternative 5i. Do not reduce the vessel limit.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 5: SELECT ALTERNATIVE 2 IN ACTION 6 AS PREFERRED.

Action 6. Revise the post-season recreational accountability measures for dolphin

Alternative 2. Reduce the length of the following recreational fishing season by the amount necessary to prevent the annual catch limit from being exceeded in the following year. However, the length of the recreational season will not be reduced if the Regional Administrator determines, using the best available science, that it is not necessary.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 6: ACCEPT THE IPT'S WORDING FOR ALTERNATIVE 2 IN ACTION 7.

Action 7. Revise the trigger for the post-season recreational accountability measures for wahoo

~~**Preferred Alternative 2.** Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year geometric mean of landings exceed the recreational sector annual catch limit. If in any year the recreational sector annual catch limit is changed, the moving multi-year geometric mean of landings will start over.~~

IPT PROPOSED Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (*Sub-alternative 2a or 2b*) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.

Sub-alternative 2a. Use the arithmetic mean to calculate average landings.⁴

Sub-alternative 2b. Use the geometric mean to calculate average landings.⁵

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 7: CHOOSE SUB-ALTERNATIVE 2B UNDER ACTION 7 AS PREFERRED.

Action 7. Revise the trigger for the post-season recreational accountability measures for wahoo

IPT PROPOSED Alternative 2. Implement post season accountability measures in the following fishing year if the recreational annual catch limits are constant and the 3-year mean (*Sub-alternative 2a or 2b*) of landings exceeds the recreational sector annual catch limit. When the recreational sector annual catch limit is changed, use a single year of landings, beginning with the most recent available year of landings, then a two-year average of landings from that single year and the subsequent year, then a three-year average of landings from those two years and the subsequent year, and thereafter a progressive running three-year average to trigger the recreational accountability measure.

Sub-alternative 2b. Use the geometric mean to calculate average landings.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 8: ACCEPT THE IPT'S SUGGESTED EDITS IN ACTION 11.

Action 11. Reduce the recreational vessel limit for dolphin

Note: **Alternative 1 (No Action), Alternative 2 and Alternative 3** (including their respective sub-alternatives) do not apply to headboats. The current limit of 10 dolphin per paying passenger onboard a headboat will not change under this action and its alternatives.

Alternative 1 (No Action). The recreational daily bag limit is 10 dolphin per person, not to exceed 60 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Alternative 2. The recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 2a. 30 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Sub-alternative 2b. 40 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Sub-alternative 2c. 42 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Sub-alternative 2d. 48 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Sub-alternative 2e. 54 dolphin per vessel, whichever is less, ~~except on board a headboat where the limit is 10 dolphin per paying passenger.~~

Alternative 3. In Florida only, the recreational daily bag limit is 10 dolphin per person, not to exceed:

⁴ The arithmetic mean is calculated by adding the values of a set of numbers and then dividing the sum by the number of values in the set.

⁵ The geometric mean is calculated by multiplying the values of a set of numbers and then taking the nth root of the product, where n is equal to the number of values in the set.

Sub-alternative 3a. 30 dolphin per vessel, whichever is less, except on board a headboat where the limit is 10 dolphin per paying passenger.

Sub-alternative 3b. 40 dolphin per vessel, whichever is less, except on board a headboat where the limit is 10 dolphin per paying passenger.

Sub-alternative 3c. 42 dolphin per vessel, whichever is less, except on board a headboat where the limit is 10 dolphin per paying passenger.

Sub-alternative 3d. 48 dolphin per vessel, whichever is less, except on board a headboat where the limit is 10 dolphin per paying passenger.

Sub-alternative 3e. 54 dolphin per vessel, whichever is less, except on board a headboat where the limit is 10 dolphin per paying passenger.

Alternative 4. In South Carolina, Georgia, and Florida only, the recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 4a. 30 dolphin per vessel, whichever is less.

Sub-alternative 4b. 40 dolphin per vessel, whichever is less.

Sub-alternative 4c. 42 dolphin per vessel, whichever is less.

Sub-alternative 4d. 48 dolphin per vessel, whichever is less.

Sub-alternative 4e. 54 dolphin per vessel, whichever is less.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 9: SELECT SUB-ALTERNATIVE 2D AS PREFERRED IN ACTION 11.

Action 11. Reduce the recreational vessel limit for dolphin

Alternative 2. The recreational daily bag limit is 10 dolphin per person, not to exceed:

Sub-alternative 2d. 48 dolphin per vessel, whichever is less.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 10: ACCEPT ACTION 12 TO BE INCLUDED IN AMENDMENT 10.

Action 12. Reduce the recreational bag limit and establish a recreational vessel limit for wahoo

Alternative 1 (No Action). The recreational daily bag limit is 2 wahoo per person. There is no recreational vessel limit for wahoo.

Alternative 2. The recreational daily bag limit is 1 wahoo per person.

Alternative 3. The recreational vessel limit is:

Sub-alternative 3a. 2 wahoo per vessel.

Sub-alternative 3b. 3 wahoo per vessel.

Sub-alternative 3c. 4 wahoo per vessel.

Sub-alternative 3d. 5 wahoo per vessel.

Sub-alternative 3e. 6 wahoo per vessel.

Sub-alternative 3f. 7 wahoo per vessel.

Sub-alternative 3g. 8 wahoo per vessel.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 11: ACCEPT ALTERNATIVE 2 AS PREFERRED IN ACTION 12.

Action 12. Reduce the recreational bag limit and establish a recreational vessel limit for wahoo

Alternative 2. The recreational daily bag limit is 1 wahoo per person.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 12: REMOVE ACTION 13 IN AMENDMENT 10 AND PUT IT IN THE CONSIDERED BUT REJECTED SECTION.

Action 13. Allow filleting of dolphin at sea on board charter or headboat vessels in the Atlantic Exclusive Economic Zone north of the Virginia/North Carolina border.

Preferred Alternative 1 (No Action). Dolphin possessed in the Atlantic Exclusive Economic Zone must be maintained with head and fins intact, with specific exceptions for fish lawfully harvested in the Bahamas. Such fish harvested from the Atlantic Exclusive Economic Zone may be eviscerated, gilled, and scaled, but must otherwise be maintained in a whole condition.

Alternative 2. Exempt dolphin from regulations requiring head and fins be intact on board properly permitted charter and headboat vessels in the Atlantic Exclusive Economic Zone north of the Virginia/North Carolina border where dolphin may be filleted under the following requirement(s):

Sub-alternative 2a. Skin must remain intact on the entire fillet of any dolphin carcass.

Sub-alternative 2b. Two fillets of dolphin, regardless of the length of each fillet, is the equivalent to one dolphin.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 13: APPROVE ALL ACTIONS IN DOLPHIN WAHOO AMENDMENT 10, AS MODIFIED, FOR REVIEW AT THE JUNE 2021 MEETING.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

DIRECTION TO STAFF:

- 1) DEVELOP A FRAMEWORK ACTION OR OTHER APPROPRIATE ACTION TO CONSIDER MAKING THE MINIMUM SIZE REQUIREMENTS CURRENTLY IN PLACE FOR FL, GA, AND SC APPLY THROUGHOUT THE MANAGEMENT ZONE FOR DOLPHIN.
- 2) DEVELOP A FRAMEWORK OR OTHER APPROPRIATE ACTION TO CONSIDER EXEMPTING THE CHARTER FLEET FROM THE DOLPHIN AND WAHOO VESSEL LIMITS.

Timing for the next Dolphin Wahoo Advisory Panel meeting

The Committee discussed the timing of potential upcoming amendments to the Dolphin Wahoo FMP and were in generally agreement to tentatively schedule the next Dolphin Wahoo AP meeting in the Spring of 2022.

Other Business

There were no items discussed under other business.

Timing and Tasks

MOTION 14: APPROVE THE FOLLOWING TIMING AND TASKS:

- 1) CONTINUE WORK ON AMENDMENT 10 AND PREPARE THE AMENDMENT FOR A VOTE OF APPROVAL FOR SECRETARIAL REVIEW AT THE JUNE 2021 MEETING.
- 2) PREPARE INFORMATION ON IDENTIFIED TOPICS REGARDING THE USE OF PELAGIC LONGLINE GEAR IN THE DOLPHIN WAHOO FISHERY, DOLPHIN SIZE LIMITS, AND EXEMPTIONS TO THE DOLPHIN AND WAHOO VESSEL LIMITS ONBOARD FOR-HIRE VESSELS. THE COUNCIL WILL REVIEW THIS INFORMATION AT THE JUNE 2021 MEETING.

APPROVED BY COUNCIL

FINAL
SUMMARY REPORT
EXECUTIVE COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
MARCH 4, 2021

(MEETING HELD VIA WEBINAR)

The South Atlantic Council’s Executive Committee met via webinar on March 4, 2021. The Committee approved the meeting agenda and December 2020 minutes.

Advisory Panel Policy

The Committee reviewed and approved a revised draft of the Advisory Panel policy that addressed guidance provided in December 2020.

SAFMC Seminar Series Proposal

The Committee reviewed a proposal for a SAFMC Seminar Series intended to increase the timeliness and transparency of the Council considering research findings. The committee suggested several changes, including: discussing “next steps” following a seminar separately from the seminar; distributing a “call for topics” after the initial list of topics is addressed; clarifying that some questions will be considered “beyond the scope” of the seminar approach; and providing context when a topic is forwarded to the SSC for BSIA consideration. The Committee requested that boilerplate FRN language be provided to Monica Smit-Brunello for review. The Committee approved the proposal and discussed the initial topics.

Workplan Review

The Committee was provided an updated workplan that addressed direction and progress from this meeting. Priorities for June 2021 will be completing Dolphin Wahoo 10 for final approval and addressing the Red Snapper assessment findings. If necessary to achieve these goals, work may be delayed on the Greater Amberjack and ABC Control Rule Amendments. Final approval for Coral Amendment 10 and the ABC Control Rule amendment was delayed 1 meeting. There was also discussion on considering the commercial electronic logbook action sooner and the potential impact on developing Dolphin framework actions on scheduling of the proposed Dolphin longline amendment. The Committee directed staff to prepare, for consideration in June, proposals for completing the Dolphin Wahoo framework actions.

MOTIONS

MOTION 1: APPROVE THE AP POLICY AS REVISED

Approved by Committee
Approved by Council.

MOTION 2: APPROVE THE SAFMC SEMINAR SERIES

Approved by Committee
Approved by Council.

FINAL
SUMMARY REPORT
HABITAT PROTECTION AND ECOSYSTEM BASED MANAGEMENT COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
Via Webinar
March 1, 2021

The Committee approved a revised agenda and minutes from the December 2020 meeting.

Coral Amendment 10

Staff provided an overview of the Coral Amendment 10 Decision Document on possible establishment of a Shrimp Fishery Access Area (SFAA) along the eastern boundary of the northern extension of the *Oculina* Bank CHAPC to address a previous request from the rock shrimp fishery to provide access to historic fishing grounds. The IPT was given license to edit and revise the public hearing document based on recommendations provided by the Committee. The Committee approved the following motion and provided the following guidance:

MOTION 1: APPROVE CORAL AMENDMENT 10 FOR PUBLIC HEARINGS AS MODIFIED APPROVED BY COMMITTEE

Reword purpose to clarify the intent of the action is to allow rock shrimp fishing along the edge of the OHAPC.

The Committee reaffirmed selection of **Preferred Alternative 2:**

Preferred Alternative 2. Establish a rock shrimp fishery access area along the eastern edge of the northern extension of the *Oculina* Coral Habitat Area of Particular Concern. Allow a shrimp vessel with a valid commercial permit for rock shrimp to bottom trawl within the established area bounded by the following coordinates. No person may use a bottom longline, dredge, pot, or trap. If aboard a fishing vessel, no person may anchor, use an anchor and chain, or use a grapple and chain.

Point	Latitude	Longitude
1	29° 17.533' N	80° 10 ' 22" W
2	29° 10.983' N	80° 8 ' 39" W
3	29° 3.583' N	80° 7 ' 29" W
4	28° 54.417' N	80° 5 ' 23" W
5	28° 48.6' N	80° 4 ' 22" W
6	28° 30' N	80° 1 ' 1" W
7	28° 30' N	80° 0 ' 46" W
8	28° 46.017' N	80° 3 ' 29" W
9	28° 48.617' N	80° 3 ' 57" W
10	28° 53.3' N	80° 4 ' 49" W
11	29° 11.333' N	80° 8 ' 37" W
12	29° 17.567' N	80° 10 ' 7" W

FEP II Roadmap Update

Staff provided an overview of outcomes and highlights of the FEP II Roadmap Update developed by staff through Panel member deliberations and input. The Roadmap identified components of policies that could be turned into actions to be accomplished in 2 years. The Committee provided the following comments and guidance:

- As a vast resource, determine how can the FEP Roadmap be better used or operationalized.
- While policy statements were used in the past year as the basis for Council comments in the region there is a need to clarify how other policies get translated into actionable items.
- Policy statements are useful in supporting Council coordination with partners and other items such as providing material for the CCC document pertaining to MSA reauthorization.
- FEP roadmap is a good document housing all policies and region-wide policy statements and serves a good resource for states.
- The feedback loop connecting the FEP Roadmap to actionable items is going to be the Blueprint.

Habitat and Ecosystem Program Blueprint

Staff provided an overview of development of a Habitat and Ecosystem Blueprint and establishment of a Habitat and Ecosystem Blueprint Workgroup to discuss scope of and process to develop an overarching document.

The Committee provided the following guidance/comments:

- Composition of Habitat and Ecosystem Advisory Panel and possible modification.
- Broader goal is how to better integrate information that we have into the conversation for all of the Council's actions.
- Role and pathways for the SSC and APs to engage along this process while avoiding creating a mega-working group
- Vision to bring the Council's habitat program more into the conversations and be more focused on deliverables informing management decisions.
- Insight into how policies can be integrated across all the work the Council does.
- Highlight important Council policies e.g., affecting forage fish, climate change and prioritization of needs to document how other fisheries are affected
- Split habitat from ecosystem and climate activities. Committee members stated addressing all those overarching topics under the Blueprint would become unwieldy. Additionally, new Executive Orders pertaining to climate issues warrant addressing separately.

Habitat Protection and Ecosystem Based Management Advisory Panel

Staff reviewed a draft list of agenda items noted below to be covered during the spring Habitat and Ecosystem AP webinar. Committee modified and endorsed the list shown below.

List of Agenda Items for Spring Habitat Protection and Ecosystem Based Management AP (April 14-16, 2021)

- Briefing on Committee Action

- Status of Amendment Development
- NOAA Fisheries South Atlantic Climate Vulnerability Assessment
- Executive Order on Climate
- NOAA Fisheries South Atlantic Ecosystem Status Report
- FEP II Roadmap Activities
- Development of a SAFMC Habitat Blueprint
- Beach Dredge and Fill Policy Statement Revision
- ESA BiOp for beach, sand placement and dredging
- Habitat and Ecosystem Webpages/FEP II Dashboard
- Habitat and Ecosystem Web Services and Hub Development
- BOEM 2021 Activities
- Status Report on Kitty Hawk Wind and SC Call Areas
- Enhancing Collaboration with FSCs CCC Habitat WG
- SECAS and Regional Conservation Blueprint Update

The Committee discussed a recent Executive Order on Climate Change and 30-day comment period that was announced on March 1. Most Councils are interested in receiving a presentation from NMFS before CCC meets the 3rd week of May. The Council, has scheduled a meeting on March 29 to receive NMFS's presentation and provide comments. The EO was also added to the list of agenda items for the Habitat and Ecosystem AP meeting to obtain additional comment.

Timing and Task(s)

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

1. Modify Coral Amendment 10 to address Committee recommendations: clarify that industry came forward before the previous amendment (Coral Amendment 8) was approved; describe and clarify SFAA designation; reword language for no action stating no SFAA exists in the OHAPC at this time and modify wording in the preferred alternative to clarify the allowable activity within the proposed SFAA.
2. Schedule Coral Amendment 10 public hearings during the spring 2021.
3. Continue development of the Habitat Blueprint with the provided guidance (see above).
4. Schedule and facilitate the Habitat and Ecosystem AP April meeting with agenda topics listed above.

FINAL
SUMMARY REPORT
MACKEREL COBIA COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
Webinar
March 2, 2021

The Committee approved minutes from the December 2020 meeting and the agenda.

Coastal Migratory Pelagics Amendment 34 - Updates to king mackerel management based on SEDAR 38 Update 2020

At the June 2020 meeting the Council directed staff to begin work on an options paper that would include consideration of sector allocations and catch level adjustments based on SSC recommendations and the recent stock assessment update. Scoping for the amendment was held during the public comment period associated with this Council meeting. The Committee reviewed a draft options paper and considered potential topics to include in the amendment. Staff noted that because this amendment was considering revisions to sector allocations and the requirement to land fish with heads and fins intact it would need to be a full plan amendment. As such, these management actions will now be contained in Coastal Migratory Pelagics (CMP) Amendment 34 and will be a joint amendment with the Gulf of Mexico Fishery Management Council (Gulf Council). The Committee provided the following comments on the range of actions and alternatives:

- Consider a smaller range of buffers between the Atlantic king mackerel ABC and ACL (10% and 5%).
- Landings data from 1979-1983 is no longer supported and should not be used to set allocations.
- The Committee clarified that they would like to consider an allocation alternative that would hold the commercial sector poundage during the 2026/2027+ season equal to the commercial sector poundage in the 2020/2021 season.
- The CFR needs to be examined to determine if cut/damaged fish caught under the recreational bag limit can be possessed and landed if they comply with minimum size limits. NOAA GC will clarify at Full Council.

NOAA GC Clarification: language regarding cut up fish does not apply to recreational sector.

The following motions were approved:

MOTION 1: APPROVE THE PURPOSE AND NEED STATEMENT

The *purpose* of this amendment is to revise the annual catch limits for Atlantic migratory group king mackerel; to revise recreational and commercial allocations for Atlantic migratory group king mackerel; and to revise or establish management measures for Atlantic migratory group king and Spanish mackerel.

The *need* for this amendment is to ensure annual catch limits are based on the best scientific information available and to ensure overfishing does not occur in the Atlantic migratory group

king and Spanish mackerel fisheries, while increasing social and economic benefits through sustainable and profitable harvest of Atlantic migratory group king and Spanish mackerel.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 2: APPROVE ACTION 1 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 1. Revise the total annual catch limit for Atlantic migratory group king mackerel to reflect the updated acceptable biological catch level.

Alternative 1 (No Action). The total annual catch limit for Atlantic migratory group king mackerel is set equal to the current acceptable biological catch level (12,700,000 pounds).

Alternative 2. The total annual catch limit for Atlantic migratory group king mackerel is equal to the updated acceptable biological catch level.

Alternative 3. The total annual catch limit for Atlantic migratory group king mackerel is equal to 95% of the updated acceptable biological catch level.

Alternative 4. The total annual catch limit for Atlantic migratory group king mackerel is equal to 90% of the updated acceptable biological catch level.

APPROVED BY COUNCIL

MOTION 3: APPROVE ACTION 3 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 3. Revise recreational annual catch target for Atlantic migratory group king mackerel.

Alternative 1 (No Action). Retain the current recreational annual catch target for Atlantic migratory group king mackerel [$ACL[(1-PSE) \text{ or } 0.5]$, whichever is greater] based on the previous acceptable biological catch (ACT = 7,400,000 pounds)

Alternative 2. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals sector $ACL[(1-PSE) \text{ or } 0.5]$, whichever is greater].

Alternative 3. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals 90% sector ACL.

Alternative 4. Revise the recreational annual catch target to reflect updated acceptable biological catch level. The recreational annual catch target equals 85% sector ACL.

APPROVED BY COUNCIL

MOTION 4: APPROVE ACTION 4 AND ALTERNATIVES 1 THROUGH 2 FOR INCLUSION IN CMP AMENDMENT 34.

Action 4. Increase the recreational bag and possession limit for Atlantic migratory group king mackerel in the exclusive economic zone off Florida.

Alternative 1 (No Action). The daily bag limit for Atlantic migratory group king mackerel in the exclusive economic zone off Florida is two fish per person. Two fish per person is the daily bag limit specified by Florida for its waters.

Alternative 2. Increase the daily bag limit for Atlantic migratory group king mackerel to three fish per person. off Florida.

APPROVED BY COUNCIL

MOTION 5: APPROVE ACTION 5 AND ALTERNATIVES 1 THROUGH 4 FOR INCLUSION IN CMP AMENDMENT 34.

Action 5. Reduce the minimum size limit for recreational and commercial harvest of Atlantic migratory group king mackerel.

Alternative 1 (No Action). The minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel is 24-inches fork length.

Alternative 2. Reduce the minimum size limit for commercial and recreational harvest of Atlantic king migratory group mackerel to 22-inches fork length.

Alternative 3. Reduce the minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel to 20-inches fork length.

Alternative 4. Remove the minimum size limit for commercial and recreational harvest of Atlantic migratory group king mackerel.

APPROVED BY COUNCIL

MOTION 6: APPROVE ACTION 6 AND ALTERNATIVES 1 THROUGH 2 FOR INCLUSION IN CMP AMENDMENT 34.

Action 6. Modify the recreational requirement for Coastal Migratory Pelagic species in the Atlantic region to be landed with heads and fins in intact.

Alternative 1 (No Action). Cut-off (damaged) Atlantic migratory group king mackerel or Atlantic migratory group Spanish mackerel caught under the recreational bag limit may not be possessed.

Alternative 2. Cut-off (damaged) fish caught under the recreational bag limit, that comply with the minimum size limits, may be possessed, and offloaded ashore.

Sub-alternative 2a. Atlantic migratory group king mackerel

Sub-alternative 2b. Atlantic migratory group Spanish mackerel

APPROVED BY COUNCIL

The following direction to staff was provided:

DIRECTION TO STAFF TO MODIFY ALTERNATIVE 3 (ACTION 2- ALLOCATIONS) TO CONSIDER MULTIPLE TIME PERIODS (LONG TERM, SHORT TERM, BOTH) CONSIDERING WHEN TAC/ACL MAY HAVE BEEN RESTRICTIVE IN THE PAST.

Coastal Migratory Pelagics Amendment 32 - Updates to Gulf cobia management based on SEDAR 28 Update 2020 and the CMP Framework Procedure

An update to SEDAR 28 assessment for Gulf cobia was completed in July 2020. The results that Gulf cobia is undergoing overfishing, which puts the stock at risk of becoming overfished without management action. The Gulf SSC reviewed the results of the updated SEDAR 28 and provided recommendations for new ABCs for Gulf cobia. Council staff presented draft management measures to end overfishing of Gulf cobia and update the CMP framework procedures to clarify language about the responsibilities of the South Atlantic and Gulf Councils. Discussion had during the Gulf Council’s January 2021 meeting were also covered.

- Consider separating the action dealing with possession and vessel limits (Action 4) into two separate actions for clarity.
- Create a table and provide examples of actions that can be taken by each Council under the proposed revisions to the framework procedure (Action 6).

The following motions were approved:

MOTION 7: SELECT ALTERNATIVE 2, UNDER ACTION 1, AS THE PREFERRED ALTERNATIVE

Action 1 – Modify the Gulf of Mexico (Gulf) Migratory Group Cobia (Gulf Cobia) Overfishing Limit (OFL), Acceptable Biological Catch (ABC), and Annual Catch Limit (ACL).

Gulf Council Preferred Alternative 2: Modify the Gulf cobia stock OFL, ABC, and ACL based on recommendation of the Gulf Scientific and Statistical Committee (SSC) as presented in July 2020, for an increasing yield stream for 2021 to 2023, and then maintain the 2023 levels for subsequent fishing years or until changed by a management action. The stock ACL is set equal to the stock ABC.

	Gulf Cobia Stock		
Year	OFL	ABC	ACL
2021	3,030,000	2,340,000	2,340,000
2022	3,210,000	2,600,000	2,600,000
2023+	3,310,000	2,760,000	2,760,000

Note: Catch limits in pounds whole weight. The recreational portion of the OFL, ABC, and ACL are based on MRIP-FES data.

APPROVED BY COMMITTEE
APPROVED BY COUNCIL

MOTION 8: CHOOSE ALTERNATIVE 3, UNDER ACTION 2, AS THE SOUTH ATLANTIC COUNCIL'S PREFERRED ALTERNATIVE

Action 2 – Modify the Gulf Cobia Apportionment Between the Gulf Zone and the Florida East Coast (FLEC) Zone and Update the Zones' ACLs Based on the ACL Selected in Action 1.

Alternative 3: Modify the Gulf cobia stock ACL apportionment to be 63% for the Gulf Zone and 37% for the FLEC Zone, based on the MRIP-FES average landings for Gulf cobia for the years 1998 – 2012, and use this apportionment to update the Zone ACLs based on the Gulf Cobia ACL(s) in Action 1.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 9: UNDER ACTION 4, CHOOSE ALTERNATIVE 2B AND ALTERNATIVE 3B-SUB-OPTION I AS PREFERRED.

Action 4 – Modify the Gulf Cobia Possession Limit and/or Establish a Trip Limit

Alternative 2: Reduce the recreational and commercial daily possession limit to 1 fish per person, regardless of the number or duration of trips.

Option 2b: in the FLEC Zone

Alternative 3: Create a recreational and commercial daily trip limit. Fishermen may not exceed the per person daily possession limit.

Option 3b: in the FLEC Zone

Sub-option i: The trip limit for cobia is two fish.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 10: APPROVE THE GULF COUNCIL PREFERRED FOR THE GULF ZONE UNDER ACTION 4

Action 4 – Modify the Gulf Cobia Possession Limit and/or Establish a Trip Limit

Gulf Council Preferred Alternative 2: Reduce the recreational and commercial daily possession limit to 1 fish per person, regardless of the number or duration of trips.

Gulf Council Preferred Option 2a: in the Gulf Zone

Gulf Council Preferred Alternative 3: Create a recreational and commercial daily trip limit. Fishermen may not exceed the per person daily possession limit.

Gulf Council Preferred Option 3a: in the Gulf Zone

Gulf Council Preferred Sub-option i: The trip limit for cobia is two fish.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 11: SELECT ALTERNATIVE 2, UNDER ACTION 5, AS THE SOUTH ATLANTIC COUNCIL'S PREFERRED

Action 5 – Modify the Gulf Cobia Minimum Size Limit

Alternative 2: Retain the current recreational and commercial minimum size limit of 36 inches FL in the Gulf Zone and increase the recreational and commercial minimum size limit to 36 inches FL in the FLEC Zone.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

The following direction to staff was provided:

DIRECTION TO STAFF TO DEVELOP AN ALTERNATIVE TO ADDRESS FLEC ZONE SECTOR ALLOCATIONS (UPDATES CURRENT % BASED ON FES, OTHER TIME PERIODS, IPT TO DISCUSS)

Mackerel Cobia Advisory Panel Structure White Paper

During its September 2020 meeting the Council reviewed appointments to the Mackerel Cobia AP and decided to further discuss the structure of the advisory panel. In December, the Council directed staff to put together a white paper detailing how the Advisory Panel structure can be modified to better work with different regions and management organizations, such as other regional councils and the Atlantic States Marine Fisheries Commission. Staff presented a white paper with options to work with the Mid-Atlantic, Gulf, and New England Councils and the ASMFC.

- Do not support adding a member from the New England region because we do not manage CMP species in that region.
- Concern about adding a Gulf representative because the fisheries are so diverse that it would be hard to find one person to represent the entire CMP fishery.
 - Ensure that Gulf Council and South Atlantic Council APs have had a chance to discuss an issue in advance of either chair going to the other Council's AP meeting.
 - Joint AP meetings could be considered on a case-by-case basis.
- There is currently no need to add an additional representative for the Mid-Atlantic region, working with ASMFC should help.
- Support for **Option 3**: Joint-MC AP and ASMFC Spanish Mackerel AP meetings could be held to discuss Spanish mackerel issues as needed. Members of the MC AP that do not participate in the Spanish mackerel fishery would not be required to attend.
 - The Gulf Council could send representatives to these meetings as well.
 - Working with ASMFC would help improve representation throughout the Mid-Atlantic region and possibly the New England states (ASMFC is still working on populating APs under their new board structure).
 - Should be flexible enough to adjust to changing fisheries.

Mackerel Cobia Advisory Panel Agenda Items

The next Mackerel Cobia Advisory Panel will be held on April 6, 2021 via webinar. To optimize the level of input the Council desires from its advisory panels, the Committee was asked to provide guidance on items to include on the next Mackerel Cobia Advisory Panel agenda. The Committee has asked the AP to discuss:

- CMP Amendment 34 (Atlantic king mackerel)
- CMP Amendment 32 (Gulf cobia)
- Updated FPRs
- Impacts of COVID on mackerel fisheries
- Feedback on discussion at Council meeting regarding AP structure

Other Business

The commercial trip limit system for Atlantic Spanish mackerel in the Southern Zone (NC/SC line south to the Miami-Dade/Monroe line in Florida) uses an adjusted quota system with several step downs (3,500-pounds at the beginning of the season, dropping to 1,500-pounds when 75% of the adjusted quota has been met, 500-pounds when 100% of the adjusted quota has been met, closure once the full quota has been met). Rick DeVictor, SERO, explained to the Committee that due to late reporting and associated issues with projections from the Science Center there was a need to close the fishery to commercial harvest immediately, skipping usual the trip limit step downs. The Committee noted the intent to take a comprehensive look at the Spanish mackerel fishery once results from the upcoming stock assessment for Spanish mackerel are available and that this issue could be addressed at that time.

Note: Council staff drafts the timing and task motion based on Committee action. If points require clarification, they will be added to the draft motion. The Committee should review this wording carefully to be sure it accurately reflects their intent prior to making the motion.

Timing and Task(s)

MOTION 12: ADOPT THE FOLLOWING TIMING AND TASKS:

1. Continue work on CMP Amendment 34 and prepare a draft for discussion and selection of preferred alternatives at the June 2021 meeting.
2. Work with Gulf Council staff to present information on CMP Amendment 32 to the Gulf Council and Gulf Mackerel Cobia Advisory Panel.
3. Work with Gulf Council staff to continue development CMP Amendment 32 for additional review at the June 2021 meeting.
4. White Paper Action – work with ASMFC staff on ad hoc AP structure.
5. Convene a meeting of the Mackerel Cobia Advisory Panel to discuss topics listed above.

APPROVED BY COUNCIL

FINAL
SUMMARY REPORT
SEDAR COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
March 4, 2021

The Committee approved minutes from the September 2020 meeting and agenda.

SEDAR 79 (MUTTON SNAPPER) APPOINTMENTS

The Committee met during closed session to make appoints to SEDAR 79 (Mutton Snapper) Benchmark Assessment (see Table 1 below).

APPROVAL OF TERMS OF REFERENCE FOR SEDAR 79

The Committee was provided and approved the terms of reference for SEDAR 79.

SEDAR UPDATES

The Committee was provided an update on ongoing assessments and the schedules for SEDAR 79 (Mutton Snapper) and 76 (South Atlantic Black Sea Bass). Both assessments are scheduled to be delivered to the Council in June 2023.

Other Business:

No other business was brought before the committee.

The Committee approved the following motions:

MOTION 1: APPROVE THE SEDAR 79 PARTICIPANT LIST TABLE AS MODIFIED
APPROVED BY COMMITTEE
APPROVED BY COUNCIL

MOTION 2: APPROVE THE SEDAR 79 TERMS OF REFERENCE
APPROVED BY COMMITTEE
APPROVED BY COUNCIL

Timing and Tasks:

No timing and tasks motions were made during the meeting.

Table 1. SEDAR 79 MUTTON SNAPPER PANEL PARTICIPANTS AND OBSERVERS
P = Panelist, O=Observer, D = Data Provider

Name	Affiliation	DW	AW	RW
Technical Appointees (non-SSC)				
Mike Rinaldi	ACCSP	P		
Alejandro Acosta	FWC	P	P	
Chris Bradshaw	FWC	P	P	
Jessica Carrol	FWC	P	P	
Jeffery Renchen	FWC	P	P	
Alan Bianchi	NCDMF	D		
Amy Dukes	SCDNR	D		
Eric Hiltz	SCDNR	D		
SSC				
Scott Crosson	SSC	P		
Amy Schueller	SSC			P (C)
Eric Johnson	SSC	P	P	
Alexei Sharov	SSC			P
George Sedberry	SSC	P	P	
Jie Cao	SSC		P	
AP				
David Moss	S/G AP	P	O	O
Richie Gomez	S/G AP	P	(O)	
Other Constituent Candidates				
Greg Mercurio		P	O	O
Observers below are covered by SAFMC				
Council & Staff Observers				
Jessica McCawley, SAFMC	Council	O	O	O
Chester Brewer, SAFMC	Council	O	O	O
Mike Errigo, SAFMC	Staff	O	O	O
Mike Schmidtke, SAFMC	Staff	O	O	O

FINAL
SUMMARY REPORT
SNAPPER GROUPEE COMMITTEE
SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL
March 2-3, 2021

The Committee approved the minutes from the December 2020 meeting and the agenda for the March 2021 meeting noting two items to be discussed under Other Business.

Status of Amendments under Formal Review

SERO staff update the Committee on the status of Regulatory Amendment 34 (SMZs in NC and SC). A final rule for this amendment is awaiting publication.

Snowy Grouper Stock Assessment

The update to SEDAR 36 conducted in 2020, using data through 2018, showed the stock remains overfished and is experiencing overfishing. A lower natural mortality at age was likely the primary driver of any differences between SEDAR 36 and the 2020 update. SEFSC staff delivered a presentation on the assessment's results to the Committee and the SSC Chair delivered the SSC's recommendations. The SSC accepted the base run of the assessment model as Best Available Information Available and suitable for management and presented OFL and ABC recommendations ([SSC Report](#)). In addition, Council staff provided an overview of available Snowy Grouper landings and other pertinent data using an [online application](#). The Committee made the following motion:

**MOTION 1: INSTRUCT STAFF TO INITIATE A FULL PLAN AMENDMENT FOR
SNOWY GROUPEE
APPROVED BY COMMITTEE
APPROVED BY COUNCIL**

Note: The IPT will develop a suite of possible actions for the Council's consideration at a subsequent meeting in 2021 and Council staff will obtain input from the Snapper Grouper AP regarding potential modifications to management measures.

Wreckfish ITQ Modernization (Amendment 48)

Council staff reviewed modifications to actions and alternatives and IPT and relevant LE AP recommendations. Scoping for this amendment was held during the Public Comment session on March 3. No scoping comments were received.

Staff explained there will likely be additional actions needed as a significant overhaul of the regulations will be required to move from a paper-based reporting system to an electronic reporting system. Hence, the timeline of development will need adjustment. Final approval of this amendment is now tentatively expected in June 2022. The Committee provide the following guidance:

- Remove *de minimis* allocation alternative from Action 1.

- Explore allocations that would match expected recreational landings, it might be possible to allocate between 1-2% to the recreational sector.
 - Consider number of fish associated with allocated poundage.
- Separate actions to consider a fishing year change and modification of the spawning season closure and obtain feedback from shareholders on the spawning season closure.
- It was reiterated that a Snapper Grouper Unlimited permit (SG1) should be the one required to obtain a wreckfish permit.
- Move action to modify the fishing year to follow implementation of the electronic system since fishing year is tied to those modifications.
- Continue to develop actions and alternatives related to a VMS requirement. Include consideration of current requirements in the Gulf of Mexico IFQ fisheries.
- Hold a shareholders meeting after the June 2021 Council meeting.

Greater Amberjack (Amendment 49)

Staff presented available data on Greater Amberjack landings and other relevant information on the online application (link above). Subsequently, staff provided an overview of the decision document with modifications since the December 2020 meeting and IPT recommendations. Staff indicated that revised projections had been recently received from the SEFSC and presented revised total annual catch limit (ACL) alternatives based on those projections. It was clarified that the poundages under other actions in the amendment currently do not reflect those revisions. The Committee also discussed revising the recreational Annual Catch Target (ACT) for this species (Action 3) and supported the IPT’s to consider more general removal of recreational ACTs from the Snapper Grouper FMP, as these levels are not currently being used in management. The Committee made the following motions and provided the guidance below:

- Include language under Action 2 that notes an alternative that maintained the current commercial ACL poundage and only varied the recreational ACL according to any increase in the total ACL was previously considered and removed, due to the long-term allocations (2026-2027+) being very similar (within 1%) to allocation percentages from Alternative 2, which applies the current allocation formula to landings that include recreational catch estimates calibrated to the Marine Recreational Information Program Fishing Effort Survey (FES).
- For Action 3, remove Alternative 2 and revise the language to consider removing recreational ACTs for all species managed under the Snapper Grouper FMP.

MOTION 2: SELECT ALTERNATIVE 2 UNDER ACTION 1 AS PREFERRED

Action 1. Revise the Greater Amberjack annual catch limit and annual optimum yield

Alternative 2. Revise the total annual catch limit and annual optimum yield for Greater Amberjack and set equal to the updated acceptable biological catch based on the results of the latest stock assessment (SEDAR 59 2020). The 2026-27 total annual catch limit would remain in place until modified.

Year	Total ACL (lbs ww)
2022-23	4,380,000
2023-2024	3,233,000
2024-2025	2,818,000
2025-2026	2,699,000
2026-2027+	2,669,000

NOTE: Proposed annual catch limits are based on recreational data calibrated to the Marine Recreational Information Program Fishing Effort Survey (FES). Future recreational catches under these limits would be monitored by the FES.

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

MOTION 3: APPROVE AMENDMENT 49 FOR SCOPING

APPROVED BY COMMITTEE

APPROVED BY COUNCIL

Red Porgy (Amendment 50)

During the December meeting, the Council reviewed preliminary analyses and recommendations from the Snapper Grouper AP, requested specific analyses for review at this meeting, and approved the amendment for scoping. Scoping hearings were held on February 3 and 4, 2021 via webinar. Staff reviewed scoping comments, actions and alternatives with available analyses, and IPT recommendations. The Committee reviewed, modified, and approved actions and the range of alternatives under each action. The Committee provided the following guidance to the IPT:

- Request the IPT discuss possibly adding an alternative for catch level that reflects rebuilding at T_{min} (ACL = 0). Add discussion to the amendment to explain the apparent disconnect between the projected catch levels under rebuilding projections and the recommended ABC (similar situation noted for snowy grouper) and the role of recruitment.
- Incorporate reference to “annual” OY to Action 2 and its alternatives. It was noted the language for a similar action in Amendment 49 (Greater Amberjack) includes this language and the Committee suggested being consistent.
- Remove Action 4 (revision of the recreational ACT) for Red Porgy (since an action was included in Amendment 49 to consider removing the recreational ACT for all species for which it has been specified under the Snapper Grouper FMP).
- Modify alternatives for a recreational vessel (Action 6) limit to include 6, 12, and 18 fish per vessel.
- Include an alternative that explores options for different vessel limits for headboats for analysis and discussion.
- Remove action to consider modification to commercial accountability measures.
- Direct the IPT to develop an alternative to modify recreational accountability measures to incorporate multi-year (3 years or longer) running averages.
- Direct IPT to explore use of geometric mean vs arithmetic mean for triggering recreational accountability measures

Updates

Red Snapper and Greater Amberjack Research Projects:

In 2020, the NMFS Sea Grant Consortium received funding to administer programs to solicit research on Red Snapper (South Atlantic) and Greater Amberjack (South Atlantic and Gulf). The goal is to support research that would generate absolute estimates of abundance, with accompanying measures of uncertainty, for these stocks. The intent is for this information to be used as an “anchor point” for future stock assessments. These are sister projects to the much larger “Great Red Snapper Count” that was conducted in the Gulf of Mexico. Council staffs serve on the Steering Committees for each project and provided updates on progress to date for each project.

South Atlantic Preliminary Recreational Landings and 2021 Red Snapper Season

SERO staff presented preliminary 2020 recreational landings for Red Snapper and other information that will be used to determine the duration of the 2021 recreational season. The Committee discussed several issues related to Red Snapper:

- The SSC is scheduled to review the assessment at their April meeting (scheduled for April 27-29 and May 3, 2021) and provide their recommendations to the Council in June.
- The Red Snapper assessment will be presented to the Council at the June meeting.
- Adjusting catch levels, if allowed, could be done via an abbreviated framework. However, adjusting sector allocations would have to be done through a plan amendment (which takes much longer to develop).
- An approach where the Red Snapper ACL is adjusted through a framework amendment and allocations are addressed through a separate amendment was offered (the Gulf Council is pursuing such an approach). *Clarification – Gulf Council’s action to change red snapper ACLs is related to an interim analysis and does not consider changes in allocation because the assessment does not incorporate MRIP FES data.*
- NOAA GC will be providing further advice to the Council regarding the approach above.

MOTION 4: REQUEST THE SSC PROVIDE SHORT-TERM MANAGEMENT (3 to 5 YEARS) ADVICE FOR RED SNAPPER ASSUMING RECENT HIGH RECRUITMENT APPROVED BY COUNCIL

MOTION 5: REQUEST THAT STAFF DETERMINE WHETHER AN ABBREVIATED FRAMEWORK CAN BE USED TO ADJUST CATCH LEVELS OF RED SNAPPER AND, IF SO, PREPARE SUCH AN AMENDMENT FOR COUNCIL REVIEW IN JUNE 2021 APPROVED BY COUNCIL

Agenda topics for Spring 2021 Snapper Grouper AP Meeting

The Snapper Grouper AP is scheduled to convene via webinar on April 21-23, 2021. The Committee reviewed the list of topics below and approved it for staff to develop the AP’s agenda.

- Fishery overviews for Greater Amberjack, Yellowtail Snapper, and Snowy Grouper – recommendations on potential management measures
- Mutton Snapper FPR
- Amendment 49 (Greater Amberjack) – overview of proposed actions/alternatives and available analyses
- Amendment 50 (Red Porgy) – overview of proposed actions/alternatives and available analyses
- Amendment 48 (Wreckfish ITQ Modernization) – brief update and schedule shareholders meeting separately (include in T&T). Request input on recreational catch of wreckfish.
- SEDAR updates (Red Snapper, golden Tilefish, Gag, others)
- CitSci – the new ACCSP CitSci app (SciFish) combining Release and CatchULater. Demo of the app and short update on the general program
- Discussion on possible approaches to reduce recreational discards
- Feedback on Council’s research recommendations
- Request feedback on vermilion snapper trip limit

Other Business

The Committee discussed the two items below:

Golden Tilefish –

Projections indicate that the longline fishery for golden Tilefish may be reopened for an additional 11 days (this estimate subject to change). Fishermen indicated their preference for the fishery to be reopened in the days leading up to Easter (April 4), such as on or around March 20. NMFS staff stated that this can be done, and staff will prepare to announce the reopening as requested in late March.

Vermilion Snapper –

An emergency rule went into place in 2020 to increase the commercial trip limit for Vermilion Snapper to 1,500 pounds to help mitigate impacts of the pandemic on the commercial industry in the region. The emergency rule will expire on March 31, 2021. A Committee member requested discussion on whether the emergency rule could be extended. NOAA GC explained the emergency measures could not be extended without proper public notice and comment and without the Council actively working on an amendment to address the emergency. Neither of these criteria have been met. Additionally, the Council modified the commercial trip limit for Vermilion Snapper recently (in 2020)

The Committee made the motion below but did not vote on it.

MOTION: INCREASE THE VERMILION SNAPPER TRIP LIMIT TO 1,500 LBS

MOTION WITHDRAWN

The Council discussed looking for added flexibility to make adjustments to management measures as the need arises. The Council requested input from the Snapper Grouper AP on this topic.

Timing and Tasks:

MOTION 6: DIRECT STAFF TO DO THE FOLLOWING:

- Request a presentation from the SEFSC on pilot longline surveys in the region to be provided to the Committee at the June meeting, if time allows.
- Prepare Amendment 49 (Greater Amberjack) for scoping and conduct scoping hearings before the June meeting.
- Schedule and facilitate a meeting of the Snapper Grouper AP with approved agenda topics in April.
- Schedule wreckfish shareholders meeting after the June 2021 meeting.
- Request that the SSC explore ABC recommendations based on recent high recruitment for Red Snapper
- Prepare an abbreviated framework to adjust catch levels for Red Snapper for review and approval in June 2021, if appropriate
- Initiate amendment to address snowy grouper and direct staff to ensure appropriate timeline for development

APPROVED BY COUNCIL



SOUTHERN FLOUNDER FISHERY MANAGEMENT PLAN



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

JOHN G. BATHERSON
Acting Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Michael S. Loeffler and Anne L. Markwith Southern Flounder Fishery Management Plan co-leads

SUBJECT: Landings Update for Amendment 2 to the N.C. Southern Flounder Fishery Management Plan

Issue

The 2020 southern flounder fishery removals have been updated following the release of the recreational harvest data in April 2021. Below is an overview of the total removals of southern flounder since implementation of Amendment 2 and anticipated seasonal adjustments to reduce the likelihood of continued overages during the 2021 seasons.

Action Needed

No action needed at this time.

Overview

Southern flounder is a commercially and recreationally important fishery. The southern flounder found in North Carolina waters are part of a larger regional stock ranging from North Carolina to Florida. A multi-state stock assessment was conducted and found the southern flounder stock to be overfished and found overfishing was occurring. During their Aug. 2019 business meeting, the MFC took action to quickly address the stock status with the adoption of Amendment 2 and instructed the DMF to immediately begin development of Amendment 3 to include more precise management measures. Amendment 2 implemented commercial and recreational flounder seasons projected to achieve the 62% harvest reductions in 2019, and 72% harvest reductions in 2020. The original timeline for Amendment 3 estimated final adoption in August 2021.

The harvest reductions recommended by DMF and adopted by the MFC in Amendment 2 were more conservative than the statutorily required minimums of a 31% reduction to end overfishing in 2 years and a 52% reduction to rebuild the spawning stock biomass (SSB) in 10 years. Following the release of the 2020 recreational landings data in April 2021, it is now clear that while the statutorily required minimum reductions have been met to end overfishing and begin rebuilding the southern flounder stock, the reductions approved by the MFC have not been met. Please note, the stock assessment indicated successful rebuilding would be dependent on action by all states managing the southern flounder regional stock. In addition, the success of the seasonal approach to management has met with disparate success in the fishery sectors. Please note, the pounds of fish available for harvest by each sector is described as total allowable removals which includes the observed landings and the estimated dead discard values.

The commercial sector seasons were projected to result in total allowable removals of 531,629 pounds in 2019 and 391,726 pounds in 2020. The actual total removals were 804,117 pounds in 2019 and 482,832 pounds in 2020. While total removals were reduced from the 2017 removals by 42.5% and 65.5% in 2019 and 2020, respectively, removal overages occurred in both years. The commercial removal overages were 272, 488 pounds in 2019 and 91,106 pounds in 2020 (Table 1). As expected, the overages were greatly reduced in 2020, the first full year of seasonal management implementation.

The recreational sector seasons were projected to result in total allowable removals of 207,382 pounds in 2019 and 152,808 pounds in 2020. The actual total removals were 461,588 pounds in 2019 and 456,636 pounds in 2020. While actual removals were reduced from the 2017 removals by 15.4% and 16.3% in 2019 and 2020, respectively, removal overages occurred in both years. The recreational removal overages were 254, 206 pounds in 2019 and 303,828 pounds in 2020 (Table 1). While the removal overages in 2019 were anticipated, the significant overages in 2020 were not (Table 1).

Table 1. Allowable and actual total removals in pounds for the N.C. southern flounder fishery by sector and overall for 2019 and 2020. Removal overages are calculated by subtracting the allowable removals from the actual pounds of southern flounder removed. Percent reductions are the reductions in removals compared to the removals in 2017. The pounds of escapement provided in parentheses describe the pounds of flounder that escaped being harvested by the fishery.

	Total Removals (pounds)		Removal Overage (pounds)	Percent Reduction from 2017 (Pounds of Escapement)
	Allowable	Actual		
Commercial				
2019	531,629	804,117	272,488	42.5 (595,195)
*2020	391,726	482,832	91,106	65.5 (916,480)
Recreational				
2019	207,382	461,588	254,206	15.4 (84,152)
*2020	152,808	456,636	303,828	16.3 (89,104)
Overall				
2019	739,011	1,265,705	526,694	34.9 (679,347)
*2020	544,534	939,468	394,934	51.7 (1,005,584)

* 2020 data are preliminary at this time.

While the reductions achieved in 2019 and 2020 have met the minimum statutory requirements for the North Carolina portion of the southern flounder stock to end overfishing and begin rebuilding the stock, they have not met the reductions recommended by the division and approved by the MFC in August 2019. While the allowable removal overages were expected in 2019, the continuing overages in both sectors in 2020, and specifically the magnitude of the

overages observed in the recreational fishery in both years, indicate the current seasons are not achieving the 72% reductions. Based on the overages observed and because of the changes in the timeline for adoption of Amendment 3, further seasonal adjustment is necessary. In accordance with the seasonal flexibility provided to the DMF Director in the Aug. 2019 MFC motion approving the adoption of Amendment 2 to the Southern Flounder FMP the 2021 flounder seasons for both sectors are being evaluated and the division will implement adjusted seasons based on the 2019 and 2020 seasonal performance. The seasons will be adjusted to further reduce total removals in the southern flounder fishery to bring the actual removals more in line with the 72% reductions adopted under Amendment 2. Management will continue under Amendment 2 until Amendment 3 is implemented.



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Michael S. Loeffler and Anne L. Markwith Southern Flounder Fishery Management Plan co-leads

SUBJECT: Amendment 3 to the N.C. Southern Flounder Fishery Management Plan

Issue

Development of Amendment 3 to the N.C. Southern Flounder Fishery Management Plan (FMP) is continuing. Following the March MFC special meeting, the draft FMP is currently being revised to incorporate the MFC decision to amend the sector allocations to 70% commercial and 30% recreational in 2021 and 2022, 60% commercial and 40% recreational in 2023, and 50% commercial and 50% recreational in 2024. Updates are provided for the adjusted Amendment 3 timeline, impacts to the plan based on the amended allocation decision and a brief summary of additional management suggestions from the MFC.

Action Needed

No action needed at this time.

Overview

Southern flounder is a commercially and recreationally important fishery. The southern flounder found in North Carolina waters are part of a larger regional stock ranging from North Carolina to Florida. A multi-state stock assessment was conducted and found the southern flounder stock to be overfished and found overfishing was occurring. To implement management measures to address the stock status, the MFC moved quickly to adopt Amendment 2 to the Southern Flounder FMP. Amendment 2 implemented commercial and recreational flounder seasons that were projected to achieve the necessary harvest reductions. In addition, adoption of Amendment 2 authorized the continued development of Amendment 3 and more robust, long-term management strategies. As a reminder, management of the southern flounder stock will remain under Amendment 2 until the approval of Amendment 3.

Following the action by the commission in February establishing a 70% commercial and 30% recreational sector allocation, draft Amendment 3 was completed and ready for review. Based on that timeline Amendment 3 was scheduled for final approval by the MFC during the August 2021 business meeting. However, with the vote by the MFC at the March special meeting amending the allocation decision, staff are now revising draft Amendment 3 and anticipate presenting the completed draft during the November 2021 business meeting for review by the commission. At that time the commission may vote to send draft Amendment 3 out for public comment and AC review. This timeline adjustment is necessary for staff to evaluate how the different allocations will affect the management measures contained in the Sustainable Harvest, Increased Recreational Access, and Adaptive Management issue papers.

The changes to the sector allocations may alter the recommendations provided by the division and may alter options in their entirety. The new draft will include management options for the MFC to consider

based on the new sector allocations. Additionally, a southern flounder advisory committee workshop may need to be scheduled for input prior to the MFC's November 2021 business meeting.

At the March 2021 special meeting the MFC also provided a list of management suggestions for the division to consider for inclusion in the plan. Below the division has provided information gathered so far on some of these management suggestions. Additional updates will be provided during the August 2021 business meeting following further consideration of the issues.

- **Additional options for inlet corridors**

The current draft Inlet Corridors Issue paper is being updated with additional options for consideration by the MFC.

- **Recreational reporting app to track landings in real time**

The division is collaborating on a citizen science app that is trying to capture real-time data on the recreational fishery. Development of this citizen science app is in the very early stages of development and it will be several years before implementation and data collection begins.

- **Phase out large mesh gill nets**

The MFC has the authority to phase out the use of large mesh gill nets to harvest southern flounder through the Southern Flounder FMP. Exceptions may be allowed for commercial large mesh gill net fisheries that target American shad, hickory shad and catfish species if these fisheries are only allowed to operate during times of the year and locations where bycatch of southern flounder is unlikely. To phase out large mesh gill nets in all NC fisheries, action would be needed outside of the Southern Flounder FMP process.

- **Addressing unreported SCFL landings**

The current NCTTP forms have been updated to collect this information but no law currently exists to require this be completed.

- **Observer program for the pound net fishery**

Development of an observer program for the southern flounder pound net fishery is a research recommendation by the division and is currently included in draft Amendment 3.

- **Addressing shrimp trawl bycatch of southern flounder**

Shrimp trawl bycatch estimates are at the south Atlantic level and not as individual state estimates. The division does not have a monitoring program in place to obtain annual estimates of shrimp trawl bycatch for southern flounder.

The current projections assume the prior levels of shrimp trawl bycatch will continue throughout the rebuilding timeline. The current stock assessment and associate projections do not provide necessary reductions in F for each individual sector. Shrimp trawl bycatch management is addressed directly in the Shrimp Fishery Management Plan, which the MFC will review in May.

- **Considering slot limits that would decrease the minimum size to 12 or 13 inches**

Implementing a slot limit to include any length below the current minimum size of 15 inches while managing the stock to a significantly reduced harvest level for rebuilding purposes will increase uncertainty around the management measures implemented. In addition, access to the fishery may be reduced because of the subsequent changes in the in the weight of harvested and dead discard removals. A portion of the larger fish currently harvested will shift to dead discards. Because these fish weigh more, each dead discard will contribute more weight to the overall removals than the current dead discards. In addition, the increased harvest of smaller fish may be substantial, potentially increasing the likelihood of harvest overages. This change would require an issue paper to fully evaluate the impacts on management.



ASMFC

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



MAFMC



April 2021 Council Meeting Summary

The following summary highlights actions taken and issues considered at the Mid-Atlantic Fishery Management Council's meeting April 6-8, 2021. This meeting was conducted by webinar due to the ongoing COVID-19 pandemic. Presentations, briefing materials, and motions are available at <http://www.mafmc.org/briefing/april-2021>.

During this meeting, the Council:

- Postponed final action on the Summer Flounder, Scup, and Black Sea Bass Commercial/Recreational Allocation Amendment until the joint Council/Board meeting in December 2021 (joint with the ASMFC Summer Flounder, Scup, and Black Sea Bass Management Board)
- Adopted status quo specifications for the Mid-Atlantic blueline tilefish fishery for 2022-2024
- Reviewed a preliminary range of alternatives for the Tilefish Multi-Year Specifications Framework
- Provided comments on E.O 14008 on Tackling the Climate Crisis at Home and Abroad
- Received an update regarding several ongoing activities in support of advancing the Council's EAFM guidance document
- Reviewed the 2021 Mid-Atlantic State of the Ecosystem Report and EAFM Risk Assessment
- Received an update on the East Coast Climate Change Scenario Planning Initiative
- Received a presentation on Climate Change Science Efforts Underway at the Northeast Fisheries Science Center

Summer Flounder, Scup, and Black Sea Bass Commercial/Recreational Allocation Amendment

The Council met jointly with the Atlantic States Marine Fisheries Commission's (Commission) Summer Flounder, Scup, and Black Sea Bass Board (Board) to consider final action on the Summer Flounder, Scup, and Black Sea Bass Commercial/Recreational Allocation Amendment. This action considers possible changes to the commercial and recreational allocations of summer flounder, scup, and black sea bass. The amendment also considers options that would allow a portion of the allowable landings to be transferred between the commercial and recreational sectors each year, in either direction, based on the needs of each sector.

During the meeting, the Council and Board reviewed a summary of the 334 public comments submitted during five virtual public hearings and a written comment period earlier this year. In general, comments from the commercial sector favored maintaining status quo allocations, while comments from the recreational sector tended to support the alternatives that would increase allocations to the recreational sector. A more detailed summary of the public comments is available [here](#).

After several hours of discussion, the Council and Board voted to postpone final action until December. This is intended to allow for further development of the Recreational Reform Initiative—an approach that has been recommended by stakeholders from both sectors, as well as representatives from the NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO). The [Recreational Reform Initiative](#) focuses on management changes to more appropriately account for uncertainty and variability in the Marine Recreational Information Program data and provide stability in the recreational bag, size, and season limits. Proponents of postponing final action have argued that a better sense of potential management changes through the Recreational Reform Initiative may inform the allocation decisions that the Council and Board are considering through this action.

This decision is not expected to affect the timing of any allocation changes, as GARFO has advised that implementation of the amendment would be very unlikely to occur until January 1, 2023, regardless of whether

approval occurred at this meeting or in December. In the months ahead, staff may incorporate a small number of new alternatives proposed by Council and Board members that fall within the range of alternatives already analyzed within the amendment. The Council and Board are expected to discuss the need for any additional alternatives at their joint meeting in August. Additional information and updates are available on the amendment [action page](#).

Blueline Tilefish 2022-2024 Specifications

After reviewing recommendations from its Scientific and Statistical Committee, Tilefish Monitoring Committee, and Tilefish Advisory Panel, the Council adopted status quo specifications for the Mid-Atlantic blueline tilefish fishery for the 2022-2024 fishing years. These specifications are summarized in the table below.

Summary of Blueline Tilefish 2022-2024 Specifications	
Acceptable Biological Catch	100,520 pounds
Recreational Total Allowable Landings	71,912 pounds
Recreational Trip Limits	Private Boat: 3 fish USCG uninspected for-hire vessel: 5 fish USCG inspected for-hire vessel: 7 fish
Commercial Total Allowable Landings	26,869 pounds
Commercial Trip Limits	500 pounds (until 70% of quota is met, then reduced to 300 pounds)

The Council discussed several significant sources of uncertainty for this data poor stock. In particular, the SSC has voiced concerns about the data limited assessment approach for blueline tilefish as well as the methods used to estimate private/rental recreational catch. It was also noted that there is uncertainty about whether the spatial expansion of the fishery represents increased effort by harvesters or a shift northward in the range of the population as result of climate change.

Finally, the Council also discussed the status of private permitting and reporting for blueline and golden tilefish. In August 2020, NOAA Fisheries implemented a [final rule](#) requiring recreational vessels to obtain a private recreational tilefish permit and submit vessel trip reports for all trips where tilefish were targeted or retained. Because the recreational season runs from May 1 - October 31, the Council was only able to review 3 months of data. The Council anticipates a presentation from the regional office that will include a status update of private permitting and reporting at the October 2021 meeting. Learn more about tilefish permitting and reporting requirements [here](#).

Tilefish Multi-Year Specifications Framework

The first of two meetings was held to consider the Tilefish Multi-Year Specifications Framework to the Tilefish Fishery Management Plan. This framework was initiated to address minor process-related modifications to the golden tilefish management system and set specifications for 2023-2024. The Council reviewed a preliminary range of alternatives and selected preferred alternatives for the process related issues. The golden tilefish management track assessment update, which is scheduled to be completed in June, will be used to develop specifications for 2023-2024. Staff will continue development of the framework for further consideration at the August 2021 Council meeting.

Listening Session on President Biden's Executive Order on Tackling the Climate Crisis at Home and Abroad

Mr. Paul Doremus, Acting Administrator of the NOAA Fisheries, hosted a listening session on Section 216(c) of E.O 14008 on Tackling the Climate Crisis at Home and Abroad. This section of the EO requires the Secretary of

Commerce to collect input from the Councils on how to make fisheries and protected resources more resilient to climate change. The Council and members of the public offered comments and recommendations related to science and monitoring needs, governance concerns, fish habitat, aquaculture, offshore wind, and other topics. Council staff will summarize these comments for submission to NOAA Fisheries. A recording of the discussion is available [here](#).

Ecosystem Approach to Fisheries Management (EAFM) Updates

The Council received an update regarding several ongoing activities in support of advancing the Council's EAFM guidance document. First, staff reviewed progress made on the management strategy evaluation (MSE) that will evaluate the biological and economic performance and trade-offs of management alternatives to minimize discards in the recreational summer flounder fishery. Since the Council's last update on this project in October 2020, staff conducted considerable outreach to solicit input from a broad sector of stakeholders regarding the future management of summer flounder and ideas on how to reduce recreational discards. Initial results from a scoping survey were presented to the Council and will be used in future focused stakeholder workshops. This input will help the Council identify management objectives and strategies to be evaluated in the MSE. Over the next 8-10 months the project will focus on additional stakeholder workshops, biological and economic model development, and additional feedback and direction from management. It is anticipated that final results will be available for Council consideration in the spring of 2022.

Staff also provided an update on a collaborative research project between the Council and a research team from Rutgers University. The project will test new methods and models to predict short-term (over the next 1-10 years) climate-induced movements of diverse species that better align with management timescales. Summer flounder, spiny dogfish, *Illex* squid, and gray triggerfish have been selected as the focal species due to their diverse life histories, data availability, and interest in past and future distribution shifts. This project will test the utility of dynamic range models and their ability to forecast changes in species distributions. Observation models are currently being fitted to survey data and life history information and should be complete for all four focal species by the end of summer 2021. An update on model development and preliminary results will be presented to the Council's Ecosystem and Ocean Planning Committee and Advisory Panel, tentatively planned for early this fall. It is anticipated the project will be completed in late 2022.

2021 Mid-Atlantic State of the Ecosystem Report and EAFM Risk Assessment

Dr. Sarah Gaichas (NEFSC) presented the key results and findings of the 2021 Mid-Atlantic State of the Ecosystem report developed by scientists at the NEFSC, NOAA researchers, academia, and non-profit organizations. The report is provided to the Council each April and gives an overview of ecosystem-level indicators that evaluate the status and trends of ecological, environmental, economic, and social components of the Mid-Atlantic ecosystem. Addressing previous Council feedback and helping improve the utility to management, the 2021 report includes information detailing the linkages between ecosystem indicators and environmental variables and the potential risks they pose to meeting management goals and objectives. The 2021 report highlights how climate change, particularly ocean warming, is affecting the Mid-Atlantic ecosystem and its fisheries. In addition, the report provides new information on the potential management, biological, economic, and science risks associated with offshore wind development.

Dr. Gaichas also provided an update of the 2021 EAFM risk assessment, part of the Council's EAFM structured decision framework to incorporate ecosystem considerations into the management process. Risk assessment helps identify and prioritize ecosystem interactions and risks to help the Council decide where to focus limited resources to address priority ecosystem considerations. The report is an adaptive document and updated annually with new science, analysis, and information, including many of the indicators included in the 2021 State of the Ecosystem report. The updated risk assessment allows the Council to re-evaluate risk on an annual basis, track changes in risk across managed species and sectors, and identify possible management and science priorities.

East Coast Climate Change Scenario Planning Initiative

The Council received an update on the East Coast Climate Change Scenario Planning Initiative, which was initiated by the Northeast Region Coordinating Council (NRCC) in 2020. The NRCC, which consists of leadership from the Mid-Atlantic Fishery Management Council, New England Fishery Management Council, Atlantic States Marine Fisheries Commission, Greater Atlantic Regional Fisheries Office, and Northeast Fisheries Science Center, will serve as the primary decision-making body for this initiative, with the addition of South Atlantic Council representatives. The NRCC has appointed a Core Team of staff from each participating organization to serve as the technical team for this initiative, in conjunction with a contracted facilitator to be secured in the near future. The Council reviewed a tentative plan and timeline for this process, which will be reviewed by the NRCC at their May meeting. Pending NRCC approval, a public scoping process is expected to occur this summer. Additional information can be found at the [webpage for this initiative](#).

Climate Change Science Efforts Underway at the Northeast Fisheries Science Center

The Council received a presentation from Dr. Vincent Saba (NEFSC Ecosystem Dynamics and Assessment Branch) on climate science underway at the Northeast Fisheries Science Center. Dr. Saba provided an overview of observed change in the U.S. Northeast Shelf, discussed progress toward implementing the National Climate Science Strategy and Northeast Regional Action Plan (NERAP), and identified a number of steps that can be taken to help achieve climate ready fisheries. The presentation and discussion can be viewed [here](#).

Other Business

Northeast Trawl Advisory Panel

Staff provided an update on the ongoing revisions to the Northeast Trawl Advisory Panel (NTAP) charter, which the Council will review at a future meeting. The Council also reviewed the proposed use of available research funds in 2021 for a project titled “Quantifying the impacts of a restrictor rope on the composition, rate, and size-distribution of catch derived from a bottom trawl survey”. Since this document was only available as supplemental material in the briefing book, the Council decided to offer comments to staff the following week. Ultimately, no comments were received, and the document was approved by the MAFMC. The NEFMC approved the same document on April 14th leading to joint Council approval.

Research Steering Committee Report – RSA Workshops

The Council reviewed a summary of the Research Steering Committee's meeting on March 18 to discuss redevelopment of the RSA program and potential workshop options. The RSC recommended holding three workshop webinars during the summer and early fall focusing on research, funding, and enforcement, followed by an in-person 1-day workshop in the fall to report all findings and recommendations to the participants. The results of the entire workshop will be presented to the Council in December with a recommendation on whether/how to re-develop the RSA program.

Next Meeting

The next Council meeting will be conducted by conducted by webinar **June 8-10, 2021**.

A complete list of upcoming meetings can be found at <https://www.mafmc.org/council-events>.

Mid-Atlantic Fishery Management Council

April 6-8, 2021
Webinar Meeting

MOTIONS

Tuesday, April 6, 2021

Summer Flounder, Scup, Black Sea Bass Commercial/Recreational Allocation Amendment

In order to prioritize work on the Recreational Reform Initiative, I move to postpone final action on this amendment until the December 2021 joint Council/Commission meeting, with an understanding of a January 2023 implementation date.

Council: DiLernia/deFur 16/2/1

Board: Borden/Gilmore Motion passes with no objection and 2 abstentions (USFWS and NMFS)

Wednesday, April 7, 2021

Blueline Tilefish 2022-2024 Specifications

Move that the blueline tilefish ABC = 100,520 pounds for the 2022-2024 fishing years with status quo management measures. This results in status quo ACLs of 73,380 pounds and 27,140 pounds for the recreational and commercial sectors, respectively.

Council: Hemilright/Hughes

Motion carries by consent with no abstentions.

Golden Tilefish Framework

In section 5.1, move alternative 5.1.2 (alternative 2): specifications to be set for maximum number of years needed to be consistent with the Northeast Regional Coordinating Council (NRCC) approved stock assessment schedule as the preferred alternative.

Council: Farnham/DiLernia

Motion carries by consent with no abstentions

In section 5.2, move alternative 5.2.2 (alternative 2): the golden tilefish fishing year is the 12-month period beginning with January 1, annually, as the preferred alternative.

Council: Farnham/DiLernia

Motion carries by consent with no abstentions



HMS



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Steve Poland, Executive Assistant for Councils & Highly Migratory Species
Lead

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

Bluefin Tuna

NOAA Fisheries closed the General Category Atlantic Bluefin Tuna fishery on February 27th, 2021 after projecting the January through March sub-period quota of 75-metric tonnes would be reached on this date. The Southern area trophy fishery (measuring 73-inches or greater) was closed on March 1st, 2021 through December 31st, 2021. NOAA Fisheries projected that the 1.8 metric tonne quota for the trophy fishery had been exceeded, necessitating the closure for the remainder of the fishing year.

Upcoming events

The next meeting of the HMS Advisory Panel will be held [via webinar](#) May 25th – 28th, 2021. The AP will discuss many topics including bluefin tuna restricted fishing days, update on Bluefin tuna management measures action (Amendment 13), Endangered Species Act listing of shortfin mako, and conclude with a full day roundtable discussion on HMS recreational management.



PROTECTED RESOURCES UPDATE



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

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

SUBJECT: Protected Resources Program Update

Issue

Summary information is provided from the division's Protected Resources Program for the most recent annual reports for Atlantic Sturgeon and Sea Turtle Incidental Take Permits (ITPs). The reports were submitted in February to the National Marine Fisheries Service (NMFS) as required for the 2020 ITP Year (Sept. 1, 2019 - Aug. 31, 2020).

Action Needed

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

Overview

During the 2020 ITP year, take levels of 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 seven Atlantic Sturgeon and 25 green sea turtles in large-mesh gill nets and zero Atlantic Sturgeon and two green sea turtles in small-mesh gill nets. All seven observed Atlantic Sturgeon interactions were alive in large-mesh gill nets set in Management Unit A (Fall=2, Winter=1, Spring=4). Of the 27 observed sea turtle interactions, 26 occurred during fall (25 in large mesh, 1 in small mesh) and one occurred during winter (small mesh). All but six of the 27 sea turtles were released alive; 23 of 27 turtles were observed in Management Unit B.

Due to protective measures to help prevent the spread of COVID-19, the Protected Resources Program received a waiver from the NMFS on March 24, 2020 granting an exemption for maintaining observer coverage until further notice. Observers and Marine Patrol officers continued to conduct alternative platform observations in an attempt to meet required observer coverage levels while limiting potential COVID-19 exposure between fishermen and observers.

The Observer Program continues to have difficulty scheduling observed trips with fishermen. Out of 970 phone calls and in-person contacts across all seasons, observers spoke with a fisherman 30% of the time, but were only successful in scheduling a trip 2% of the time. Additionally, observers and Marine Patrol officers made 1,730 (98 and 1,632, respectively) unsuccessful attempts to find and observe a trip using alternative platform across all seasons.

The final documents can be found at the following links:

[2020 Annual Sea Turtle ITP Report 2020](#)
[Annual Atlantic Sturgeon ITP Report](#)



Annual Sea Turtle Interaction Monitoring of the Anchored Gill-Net Fisheries
in North Carolina for Incidental Take Permit Year 2020
(1 September 2019–31 August 2020)

Annual Completion Report for Activities under Endangered Species Act
Section 10 Incidental Take Permit No. 16230

Barbie L. Byrd, Meghan P. Gahm, 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

February 2021

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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 in portions of the state; limited days of fishing depending on location; restricted net height to no more than 15 meshes; restricted total net yardage to a maximum of 2,000 yards per vessel; 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 Unit D2 (Figure 1) 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 extrapolated when applicable across the fishery within a given season and area. Observer data also are used by the NCDMF in 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 May 2020, the NCDMF contacted the NMFS to request clarification of tagging protocols for sea turtles. Although the ITP requires that incidental sea turtles be tagged, the NMFS Southeast Fisheries Science Center (SEFSC, Beaufort, NC) staff communicated to the NCDMF that there had been recent changes to their tagging protocols. These changes affected the type of training that available SEFSC provided and resulted in having observers without the training necessary to fulfill the tagging requirement per the ITP. On 1 September 2020, the NMFS provided a notification letter to the NCDMF modifying ITP permit 16230 to remove the requirement for

observers to apply flipper and Passive Integrated Transponders (PIT) tags to incidentally captured sea turtles (Appendix A). This modification applies to the remainder of the current permit.

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 to estimate total incidental take where possible. Data from observed trips are used for both ITPs. 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.

Significant regulatory changes were enacted during fall 2019 for the Southern Flounder (*Paralichthys lethostigma*) fisheries. These regulations were included in Amendment 2 of the Southern Flounder Fishery Management Plan (FMP) adopted by the North Carolina Marine Fisheries Commission on 23 August 2019 (NCDMF 2019). This action was taken because the most recent Southern Flounder stock assessment indicated that the stock is overfished and overfishing is occurring. North Carolina state law requires management actions be taken to end overfishing within 2 years and to recover the stock from an overfished condition within 10 years. To meet these legal requirements, the Division determined that a 62% reduction in harvest was necessary for 2019 and a 72% reduction would be needed beginning in 2020.

To reduce harvest in the anchored large-mesh gill-net fishery, the state was divided into three flounder management areas, Northern, Central, and Southern. These flounder management areas generally aligned with the ITP management units except for the Core Sound portion of B, which was split into a different flounder management area than the rest of B (Figure 1). Each area had specific dates when fishing was allowed: the Northern area was open 15 September–13 October 2019, the Central area was open 1–26 October 2019, and the Southern area was open 1 October–15 November 2019. Yardage restrictions for large-mesh gill nets per the ITPs were further reduced by 25% in the Amendment 2 Flounder FMP (NCDMF 2019). Amendment 2 also reduced large-mesh gill net soak times to overnight soaks state-wide. Flounder management areas were still subject to conditions put forth by federally issued ITPs for sea turtle and sturgeon incidental takes and could be closed by proclamation should incidental take thresholds be approached or exceeded. After November 15, limited allowances for anchored large-mesh gill nets were made during winter and spring for the invasive Blue Catfish (*Ictalurus furcatus*) and American Shad (*Alosa sapidissima*) fisheries. For more information, see the Results section.

Another significant event that occurred during the 2020 ITP Year was the COVID-19 pandemic, which led to a state of emergency declaration by NC's Governor. On 20 March 2020, the NMFS waived the requirement for boats fishing in federally managed fisheries to carry observers or at sea monitors due to concerns about the transmission of COVID-19. The NMFS extended this waiver to the NCDMF Observer Program on 23 March 2020; the waiver was in place throughout the remainder of the 2020 ITP Year.

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 2019; McConnaughey 2020a), spring (March–May 2020; McConnaughey 2020b), and summer (June–August 2020; McConnaughey 2020c). 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. This annual report outlines observer activity, fishing activity, and total or estimated takes of sea turtles for the 2020 ITP Year, 1 September 2019–31 August 2020. Data for fishing activity, measured in number of trips, are finalized for fall 2019. After the preliminary data for spring and summer 2020 are finalized in May 2021, 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). 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 Gill-Net Restricted Area, SGNRA 1, SNGRA2, SNGRA3, SGNRA4, and Mainland Gill-Net 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. The exception was for management units and seasons where anchored large-mesh gill nets were prohibited whereby the projected fishing and observer trips were set to zero: Management Unit D2 for the entire 2020 ITP Year; Management Units B, D1, and E during spring and all management units during summer. 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.

At the beginning of the 2020 spring season (20 March 2020), the NCDMF temporarily halted observer effort because of the COVID-19 pandemic. Marine Patrol officers were still on the water and continued to include alternative platform trips (i.e., using a state-owned vessel to observe at a distance; see description below) as a part of their weekly duties when fishing effort could be found. In June 2020, the NCDMF outlined protocols for observer staff to resume limited field sampling while preventing the spread of COVID-19. These protocols included among other things, the use of alternative platform observations only and no overnight travel. Observers resumed effort under these guidelines on 6 June 2020. Because all observers were based out of the Morehead City office, coverage of areas too far for a day trip (e.g., Cape Fear River, Albemarle Sound) was dependent on Marine Patrol officers.

During fall, winter, and the first few weeks of spring, each observer attempted to obtain three to four trips per working week when fishing activity was occurring. This approach was used again when observers resumed activities in early June (beginning of summer). 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. Additionally, Marine Patrol officers attempted to obtain alternative platform trips as part of their regular duties. 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 given to observers assigned to specific management units so they could attempt to schedule an onboard trip. Other outreach efforts, such as visiting fish houses, were limited during the 2020 ITP Year. The Observer Program website (<http://portal.ncdenr.org/web/mf/observers-program>) was available, but fishermen were not necessarily directed to it during the 2020 ITP Year.

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, and when observations resumed in June during the ongoing COVID-19 pandemic. Coordination of onboard, alternative platform, and Marine Patrol alternative platform trips occurred 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 fishing 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, and resuscitate sea turtles by experienced NCDMF and NMFS SEFSC (Beaufort, NC) staff. Data collected on observed sea turtles included: date, time, location (latitude and longitude, when possible), condition (e.g., 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 (e.g., 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. Limited data such as date and waterbodies surveyed were also collected for unsuccessful alternative platform attempts (hereafter termed "No Contact" trips) by observers

and Marine Patrol. All data were coded onto NCDMF data sheets and uploaded to the NCDMF Biological Database for analysis. Observers were debriefed within 24 hours of each trip to obtain data on catch, set locations, gear parameters, and 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 (≥ 4 inch) and small-mesh (< 4 inch) category to the average number of trips from the previous five years' TTP data for (large-mesh = ≥ 5 inch, small-mesh = < 5 inch) by season and management unit. Reduced season dates in each management unit were accounted for 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. No Contact trips were not included in calculations of observer coverage.

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 2019 (fall) were finalized, but the data for 2020 (spring and summer) were preliminary. As a result, observer coverage calculated for spring and summer were considered estimates.

2.2 Changes in Fishing Effort

The number of reported fishing trips by mesh size category were compiled by season for the 2020 ITP Year and compared to the last two ITP Years (2018 ITP Year and 2019 ITP Year). This assessment was a general comparison to examine trends in fishing effort.

2.3 Incidental Takes

The ITP outlines authorized levels of incidental takes expressed as either estimated total takes based on observer data or counts of observed takes (Tables 1–5). Both types (estimated and counted) were necessary because there were insufficient data available for modeling predicted estimated takes in the ITP application for some combinations of species, management unit, and gear type (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 2020 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.

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

Throughout each season, this calculation was employed for each 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 2020, 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 2019). Bootstrap replicates were generated by sampling observer trips with replacement 5,000 times within strata (mesh/season/management unit).

2.4 Compliance

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). Observers also documented calls returned from fishermen, including the response category and notes. Data in the contact log was summarized by month and response category to determine what percentage of phone calls resulted in observer trips.

As part of their regular duties, Marine Patrol officers checked both gill nets for compliance. This effort, combined with the time spent conducting observations and searching for gill nets (No Contact trips), was logged as total “gill-net hours” by officers. Occasionally, citations and/or Notice of Violations (NOVs) were issued to fishermen when gear or fishing practices were out of compliance. A citation is an enforcement action taken by a Marine Patrol officer for person(s) found to be in violation of General Statutes, Rules, or Proclamations under the authority of the Marine Fisheries Commission and is considered a proceeding for District Court. A NOV is the Division’s administrative process to suspend a permit and is initiated by an Officer or Division employee when a permit holder is found to be in violation of general or specific permit conditions. A citation and a NOV may both be initiated by the same permit condition violation; however, they are two separate actions. For this report, NOVs or citations under the codes “EGNP” and “NETG” were compiled, as they are applicable to the estuarine gill-net permits and violations.

3 RESULTS

3.1 Observer Activity

Overall observer coverage during the three seasons covered for 2020 ITP Year was 7.8% of the large-mesh gill-net fishery and 1.7% of the small-mesh gill-net fishery (Tables 7 and 8; Figure 2). This level of coverage was based on 249 large-mesh gill-net trips (62 onboard and 187 alternative platform) and 103 small-mesh gill-net trips (5 onboard and 98 alternative platform) during fall, spring, and summer. Only one out of 354 (<0.3%) observed trips recorded a mesh size ≥ 4 and < 5 inch; the mesh size was exactly 4 inches. The COVID-19 pandemic and associated waiver from

the NMFS impacted observer coverage during spring and summer. Additionally, there were 1,345 No Contact trips (Table 9).

During the 352 observed trips, observers documented 25 sea turtles (24 green turtles and one unidentified) in large-mesh and two sea turtles (both green) in small-mesh gill nets (Table 10; Figures 2-14). One of the green sea turtles was documented during winter in a small-mesh gill net set in Management Unit B (Figure 8). The turtle fell out of the net and swam off as the fisherman was pulling in the net. No self-reported interactions were reported.

A series of proclamations was issued throughout the ITP year for management needs unrelated to protected species interactions (Table 11). A significant change in regulations for the Southern Flounder fishery during fall 2019 was noted above. After these regulations closed anchored large-mesh gill nets, portions of Management Unit A were re-opened to anchored large-mesh gill nets during late fall, winter, and spring (23 November–25 March) for harvesting Blue Catfish and American Shad, and portions of Management Unit C were re-opened to anchored large-mesh gill nets during winter and spring (February 15–April 15) for harvesting American Shad. Separately, Management Unit D1 was closed to anchored large-mesh gill nets for the entire 2020 ITP Year and closed to anchored small-mesh gill nets effective 20 April.

3.1.1 Fall 2019

During fall 2019 (September–November), the Observer Program achieved 10.0% state-wide coverage of large-mesh gill-net trips, and exceeded 7% in all management units except B (5.4%) and D2 (5.5%; Table 7; Figures 3–7). Based on the estimated ($n = 373$) large-mesh fishing trips for Management Unit B, the observer program would have attained 8% coverage (Table 7). However, the actual number of reported trips was greater than estimated by 180 trips. As such, the observer program needed 12 additional trips that were not obtained (nine in Management Unit B and three in D2). For small-mesh gill nets, the Observer Program achieved 2.5% state-wide coverage and exceeded 1% coverage in all management units (Table 8; Figures 3–7). There were 324 No Contact trips including 35 in Management Unit B and 52 in D2 (Table 9).

There were 25 observed sea turtle interactions in large-mesh gill nets and one observed in small-mesh gill nets during fall (Table 10; Figures 3–7). The interactions comprised 25 green sea turtles ($n = 19$ alive; $n = 6$ dead) and one identified sea turtles ($n = 1$ alive; $n = 0$ dead). The identified sea turtle fell out of the net and swam away before the observer was able to positively identify the species. The majority of interactions occurred in Management Unit B (22 out of 26) with three in D2 and one in E. No fisherman self-reported sea turtle interactions were reported.

3.1.2 Spring 2020

During spring 2020 (March–May), the Observer Program achieved an estimated 4.1% state-wide coverage of large-mesh gill nets (Table 7; Figures 9–11). Only Management Units A and C were open to large-mesh gill nets, and 41 observed trips occurred in A before observations were halted in response to the COVID-19 pandemic. There were 34 fishing trips reported across the three closed units. For small-mesh gill nets, the Observer Program achieved an estimated 1.1% state-wide coverage, and exceeded 1% in Management Units C, D1, and E (Table 8; Figures 9–11). The shortage represents an additional six trips that were not obtained (four in Management Unit A, one in B, and one in D2). There were 448 No Contact trips including 90 in Management Unit A, 40 in B, and 96 in D2 (Table 9).

No sea turtle interactions were observed during spring (Table 10; Figures 9–11). Additionally, no fisherman self-reported sea turtle interactions were reported.

3.1.3 Summer 2020

During summer 2020 (June–August), the Observer Program did not observe any large-mesh gill-net trips as the gear was prohibited state-wide (Table 7; Figures 12–14). The entire state was closed to large-mesh gill nets. Nevertheless, 90 large-mesh fishing trips were reported. For small-mesh gill nets, the Observer Program achieved an estimated 1.4% state-wide coverage and exceeded 1% in all management units except Management Unit B (0.9%) (Table 8; Figures 12–14). The shortage represents one additional trip that was not obtained in Management Unit B. There were 573 No Contact trips including 77 in Management Unit B (Table 9).

No sea turtle interactions were observed during summer (Table 10; Figures 12–14). Additionally, no fisherman self-reported sea turtle interactions were reported.

3.2 Changes in Fishing Effort

Overall large-mesh gill-net effort during the 2020 ITP Year (seasons fall, spring, and summer) was 67% lower than during the 2019 ITP Year and 71% lower than during the 2018 ITP Year (Figure 7). The decrease in large-mesh trips occurred during fall, spring, and summer in all management units. Overall small-mesh gill-net effort during the 2020 ITP Year was 30% higher than during the 2019 ITP Year and 8% higher than during the 2018 ITP Year (Figure 8). When comparing the 2020 and 2019 ITP Years, the increase in small-mesh gill-net trips was attributed primarily to fall when small-mesh gill-net trips nearly doubled from the previous ITP Year (1,262 trips during the 2019 ITP Year and 2,294 during the 2020 ITP Year). The greater number of small-mesh trips during fall occurred in all management units, but was particularly sharp in Management Unit B (97% increase) and D2 (255% increase).

3.3 Incidental Takes

Across the seasons covered by the sea turtle ITP, there were 26 observed sea turtle interactions (25 green and one unidentified sea turtle), all during fall (Table 10; Figures 2–14). An additional green sea turtle was documented during winter (see above). The observed takes occurred primarily in large-mesh gill nets (all but two sea turtles). The majority of observed takes were recovered alive (21 of 27). Measured green sea turtles ($n = 19$ of 26) ranged from 206 to 332 mm CCL (mean = 287.1, SD = 28.0) and 202 to 288 mm CCW (mean = 244.0, SD = 24.3; Figure 17). The single unidentified sea turtle could not be measured. Observed interactions occurred primarily in Management Unit B (85%), followed by Management Unit D2 (11%), Management Unit E (4%) (Figures 4, 6–7).

Observed take levels during the 2020 ITP Year did not reach the thresholds of allowed takes for any species or management unit (Tables 1–5). Of the thresholds expressed as counts of observed takes (not estimated), green sea turtle takes during the 2020 ITP Year reached only 17% of the threshold (Table 5). Of the separate thresholds expressed as estimated totals of observed takes, green sea turtle takes during the 2019 ITP Year reached 40% of the live threshold and 37% of the dead threshold.

3.4 Compliance

Estuarine Gill-Net Permits were issued to 2,629 fishermen during the 2020 ITP year; however, only 598 of them reported trips using anchored estuarine gill-net gear. Using the full list of EGNPs, 659 phone calls or in-person contacts were made with 5.6% (n = 37) representing occasions where a fishermen returned a phone call. Nevertheless, only 2.9% (n = 19) of the 659 contacts resulting in a booked trip (Figure 18). The greatest number of calls occurred during fall, and the least number of calls occurred in spring when observations temporarily stopped due to the COVID-19 pandemic.

During the 2020 ITP Year, Marine Patrol officers spent 1,584 hours investigating the proper and legal use of gill nets in estuarine waters, conducting and entering observations, and searching for gill nets to be observed (No Contact; Table 12). During these hours, they issued 27 citations (Tables 12–13). In addition to citations, officers issued eight Notice of Violations (NOVs) for fishermen found to be out of compliance with the EGNP (Table 14).

3.5 Marine Mammals

There was no observed marine mammal interaction during the 2020 ITP Year.

4 DISCUSSION

Incidental takes of sea turtles during the 2020 ITP Year, all green sea turtles, were below authorized levels. All 26 observed sea turtle interactions during the months covered by the sea turtle ITP were during the fall. The interactions were primarily in Management Unit B with only four interactions in other management units. Incidental takes continue to be primarily alive and in large-mesh gill nets. No new proclamations had to be imposed during the 2020 ITP Year to maintain take levels below thresholds. However, new regulations from Amendment 2 imposed on the state-wide Southern Flounder fishery greatly reduced large-mesh gill-net effort during fall and prevented the previous low levels of effort in this fishery during spring and summer. Limited allowance for anchored large-mesh gill nets occurred only during winter and spring for portions of Management Unit A and C, and for an additional seven days during late fall in portions of Management Unit A.

Compared to the previous 2019 ITP Year (n = 22; Byrd et al. 2020), the overall count of incidental takes was slightly higher during the 2020 ITP Year. The most notable differences were the large decrease in observed interactions during summer 2020 (n = 0) compared to summer 2019 (n = 14), and the increase in observed interactions during fall 2019 (n = 26) compared to fall 2018 (n = 4). The decrease in incidental takes in summer was likely due to the regulations associated with the Southern Flounder FMP Amendment 2, restricting the use of large-mesh gill nets during summer. Possible factors affecting the increase in takes during fall 2019 over fall 2018 were not identified. Increased takes were not coincident with increased large-mesh fishing effort. In fact, effort was greatly decreased in fall 2019 compared to fall 2018 because of the Southern Flounder regulations. Further investigation is needed to determine what factors may have affected the observed count of takes during fall 2019 compared to the previous year.

Overall minimum coverage levels were met or exceeded for large-mesh and small-mesh gill-net trips when combined across the ITP year and management units. Although coverage exceeded the overall 7% minimum of large-mesh gill-net trips for fall, minimum coverage levels were not reached for Management Unit B (5.4%) and D2 (5.5%). The shortage of 12 observed trips during

fall is despite the 35 No Contact trips (attempts to find trips) in Management Unit B and 52 No Contact trips in Management Unit D2. In contrast, coverage of small-mesh gill-net trips during fall exceeded the 1% minimum in all management units and exceeded 2% in three of six management units. Observers were active for only several weeks during spring prior the temporary halt of observer-led trips in March because of the COVID-19 pandemic. Marine Patrol officers contributed greatly to this continued coverage during spring when observers did not go in the field, and in summer when observers returned to the field at reduced capacity due to the NCDMF requirement of having two observers per alternative platform observation. Nevertheless, coverage of large-mesh gill-net trips during spring in open management units (A and C) did not meet the minimum 7%. Observer coverage of small-mesh gill-net trips met or exceeded the 1% minimum in three of six management units during spring and five of six management units during summer. It is surprising that there were reported fishing trips using anchored large-mesh gill nets during management units and seasons when this gear was prohibited. These reported trip data are being examined; it is likely that the dealers recorded fishing trips that used run-around/strike gill nets incorrectly as anchored gill nets during these months.

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 (3%) is low. This assessment of success rate and the assignment of call lists are being re-evaluated for the 2021 ITP Year given that only 23% of EGNP holders during the 2020 ITP Year reported trips with anchored gill-net gear. For the contacts that were made during the 2020 ITP Year, a sharp decrease in phone calls was made during the 2020 ITP Year (n = 659) compared to the previous year (n = 4,305), due in large part to effects of COVID-19 on observer activity.

Although onboard observations are the preferred method, alternative platform observations played a critical role to achieving the minimum percent coverage especially after the COVID-19 pandemic. In fact, 81.0% of observed trips during the 2020 ITP Year were alternative platform observations. Alternative platform observations have several advantages. Primarily, they do not rely on previous contact with fishermen to obtain an observable trip. Alternative platform observations also allow Marine Patrol to conduct observations as part of their daily patrols; their observed trips contribute a substantial portion of the total alternative platform observations. Even for fishermen who would willingly take an observer, many vessels used by gillnetters in estuarine waters are too small to easily accommodate an observer, making alternative platform observations ideal for capturing trips with this size class of vessel (Kolkmeier et al. 2007); however, the alternative platform method 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. These activities will resume when risks associated with COVID-19 are abated.

Significant staffing changes occurred during the 2020 ITP Year. The program supervisor left in September 2019 and the position was not filled until January 2020. The observer coordinator left in June 2019 and the position was not filled until March 2020. Additionally, a data analyst position was created in July 2019. These filled positions should increase efficiencies in the program. Changes in observer staffing also occurred during the 2020 ITP Year. Two long-term temporary observers left or significantly reduced their hours before March. Those positions were not refilled when observations resumed in June given the uncertainty of the effects of COVID-19 on the safety of continued, but limited, observation efforts.

The NCDMF 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 anchored gill-net fisheries. Specific actions to limit sea turtle takes were not necessary during the 2020 ITP Year; however, Management Unit D1 was kept closed to large-mesh gill nets based on historical sea turtle densities and take levels. The new management measures for Southern Flounder significantly reduced large-mesh gill-net effort throughout the year, especially during fall 2019 when effort was historically high. These management measures, along with challenges faced from the COVID-19 pandemic and its' associated field restrictions, presented additional and unique challenges in predicting fishing effort and obtaining coverage during the 2020 ITP Year. These ongoing changes require the Observer Program to incorporate new approaches to project observer coverage for the fishery in subsequent ITP years as the fishery is undergoing regulatory changes that impact fishermen strategy and effort.

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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 2020 ITP Year. Estimated actual takes were calculated from observer data; 95% confidence intervals are provided in parentheses. 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).

Species	B				D1				D2			
	Estimated Takes				Estimated Takes				Estimated Takes			
	Authorized		Actual		Authorized		Actual		Authorized		Actual	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Green	225	112	127.7 (62.1, 237.8)	61.3 (20.5, 129.5)	9	5	0	0	n/a ¹	n/a ¹	n/a ¹	n/a ¹
Kemp's ridley	53	26	0	0	15	7	0	0	6	3	0	0
Total	278	138	127.7	61.3	24	12	0	0	6	3	0	0

Species	E				Total			
	Estimated Takes				Estimated Takes			
	Authorized		Actual		Authorized		Actual	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
Green	96	48	5.7 (0, 17.2)	0	330	165	133.4	61.3
Kemp's ridley	24	13	0	0	98	49	0	0
Total	120	61	5.7	0	428	214	133.4	61.3

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 2020 ITP Year. 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).

Species	B		D1		D2		E		Total	
	Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)	
	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual
Green	n/a ¹	n/a ¹	n/a ¹	n/a ¹	6	2	n/a ¹	n/a ¹	6	2
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	0	3	0	3	0	3	0	12	0
Total	5	0	5	0	11	2	5	0	26	2

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 2020 ITP Year. Authorized levels per management unit are 4 sea turtles of any species.

Species	A		C		Total	
	Authorized (live/dead)	Actual (live/dead)	Authorized (live/dead)	Actual (live/dead)	Authorized (live/dead)	Actual (live/dead)
Green		0		0		0
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 2020 ITP Year.

Species	B		D1		D2		E		Total	
	Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)		Observed (live/dead)	
	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual	Authorized	Actual
Green	3	1	3	0	3	0	3	0	12	1
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	1	11	0	11	0	11	0	44	1

Table 5. Total annual authorized and actual takes (observed and estimated) of sea turtles by species and for estimated takes by condition for the 2020 ITP Year. The incidental take of an unidentified sea turtle in a large-mesh gill net is not represented in the actual observed counts or estimated totals. ¹ Insufficient observer data exist to model an estimated annual take level; therefore, takes are expressed as observed.

Species	Observed (live/dead)		Estimated			
	Authorized	Actual	Authorized		Actual	
	Live/Dead	Live/Dead	Alive	Dead	Alive	Dead
Green	18	3	330	165	133.4	61.3
Hawksbill	8	0	n/a ¹	n/a ¹	n/a ¹	n/a ¹
Kemp's ridley	12	0	98	49	0	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	0	n/a ¹	n/a ¹	n/a ¹	n/a ¹
Total	78	3	428	214	133.4	61.3

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 2020 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data for the previous five years and using actual reported trips from the program for the 2020 ITP Year. Estimated trips = “closed” when/where anchored large-mesh gill nets were prohibited, and any reported trips are *italicized*. Trip Ticket Program data are considered finalized for 2019 and preliminary for 2020.

Season	Management Unit	Large Mesh				
		Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2019	A	759	636	81	10.7	12.7
	B	373	553	30	8.1	5.4
	C	297	190	29	9.8	15.3
	D1	<i>closed</i>	<i>closed</i>	<i>closed</i>	<i>closed</i>	<i>closed</i>
	D2	195	217	12	6.2	5.5
	E	342	493	56	16.4	11.4
	Overall	1,966	2,089	208	10.6	10.0
Spring 2020	A	743	959	41	5.5	4.3
	B	<i>closed</i>	31	<i>closed</i>	<i>closed</i>	<i>closed</i>
	C	197	4	0	0.0	0.0
	D1	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	D2	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	E	<i>closed</i>	3	<i>closed</i>	<i>closed</i>	<i>closed</i>
	Overall	2,474	997	41	1.7	4.2
Summer 2020	A	<i>closed</i>	65	<i>closed</i>	<i>closed</i>	<i>closed</i>
	B	<i>closed</i>	18	<i>closed</i>	<i>closed</i>	<i>closed</i>
	C	<i>closed</i>	1	<i>closed</i>	<i>closed</i>	<i>closed</i>
	D1	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	D2	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	E	<i>closed</i>	6	<i>closed</i>	<i>closed</i>	<i>closed</i>
	Overall	<i>closed</i>	90	<i>closed</i>	<i>closed</i>	<i>closed</i>
Annual		2,906	3,176	249	8.6	7.8

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 2020 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data for the previous five years and using actual reported trips from the program for the 2020 ITP Year. Trip Ticket Program data are considered finalized for 2019 and preliminary for 2020. On April 4 2020, Management Unit D1 was closed to small-mesh gill nets.

Season	Management Unit	Small Mesh				
		Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2019	A	252	383	5	2.0	1.3
	B	729	1,140	12	1.6	1.1
	C	140	124	3	2.1	2.4
	D1	40	64	1	2.5	1.6
	D2	188	238	13	6.9	5.5
	E	447	345	23	5.1	6.7
	Overall	1,796	2,294	57	3.2	2.5
Spring 2020	A	743	612	2	0.3	0.3
	B	1,347	1,274	12	0.9	0.9
	C	197	315	4	2.0	1.3
	D1	32	14	0	0.0	0.0
	D2	29	39	0	0.0	0.0
	E	126	111	7	5.6	6.3
	Overall	2,474	2,365	25	1.1	1.1
Summer 2020	A	164	212	3	1.8	1.4
	B	836	959	9	1.1	0.9
	C	117	58	4	3.4	6.9
	D1	closed	closed	closed	closed	closed
	D2	45	11	1	2.2	9.1
	E	203	226	4	2.0	1.8
	Overall	1,363	1,466	21	1.5	1.4
Annual		5,633	6,125	103	1.8	1.7

Table 9. Number of "No Contact" trips by season and management unit completed by Marine Patrol and observers during the 2020 ITP Year. No Contact refers to unsuccessful attempts to find and observe anchored gill-net effort.

Season	Management Unit	Marine Patrol No Contact Trips	Observer No Contact Trips	Total No Contact Trips
Fall 2019	A	66	5	71
	B	28	8	35
	C	21	3	24
	D1	9	1	10
	D2	47	5	52
	E	130	1	131
	Overall	301	23	324
Spring 2020	A	89	1	90
	B	40	0	40
	C	34	2	36
	D1	14	0	14
	D2	96	0	96
	E	173	0	173
	Overall	445	3	448
Summer 2020	A	104	0	104
	B	51	26	77
	C	32	12	44
	D1	15	2	17.5
	D2	132	6	138
	E	191	2	193
	Overall	525	48	573
Annual		1,271	74	1,345

Table 10. Summary of observed sea turtle interactions in large-mesh (≥ 4 inch, $n = 25$) and small-mesh (< 4 inch, $n = 2$) gill nets during the 2020 ITP Year. One of the interactions was recorded during winter observations to monitor for Atlantic sturgeon interactions. PIT = Passive Integrated Transponders.

Date	Season	Management Unit	Mesh Size	Latitude (N)	Longitude (W)	Species	Disposition	Applied Tags		Curved Carapace (mm)	
								PIT	Inconel	Length	Width
10/3/2019	Fall	B	Large	35.30813	75.58702	Unknown	Alive	n/a	n/a	n/a	n/a
10/4/2019	Fall	B	Large	35.29235	76.49730	Green	Alive	n/a	n/a	272	255
10/4/2019	Fall	B	Large	35.30377	75.58100	Green	Dead	n/a	n/a	293	243
10/4/2019	Fall	B	Large	35.30486	75.57900	Green	Dead	n/a	n/a	246	212
10/8/2019	Fall	B	Large	35.31400	76.49846	Green	Alive	n/a	n/a	302	232
10/8/2019	Fall	B	Large	35.31400	76.49631	Green	Alive	n/a	n/a	274	229
10/11/2019	Fall	B	Large	34.88595	76.40133	Green	Alive	n/a	n/a	n/a	n/a
10/11/2019	Fall	B	Large	34.88773	76.40265	Green	Alive	n/a	n/a	n/a	n/a
10/11/2019	Fall	B	Large	34.88653	76.40430	Green	Alive	n/a	n/a	n/a	n/a
10/11/2019	Fall	B	Large	34.88643	76.40437	Green	Dead	n/a	n/a	n/a	n/a
10/15/2019	Fall	B	Large	34.86201	76.38114	Green	Alive	n/a	n/a	276	222
10/15/2019	Fall	B	Large	34.86162	76.38148	Green	Alive	n/a	n/a	299	234
10/15/2019	Fall	E	Large	34.67700	77.13400	Green	Alive	n/a	n/a	314	265
10/15/2019	Fall	B	Large	35.19303	75.79633	Green	Dead	n/a	n/a	276	251
10/15/2019	Fall	B	Large	35.18925	75.80685	Green	Dead	n/a	n/a	283	205
10/16/2019	Fall	B	Large	35.32789	75.59853	Green	Alive	n/a	n/a	298	261
10/18/2019	Fall	D2	Large	34.68332	76.99551	Green	Alive	n/a	n/a	332	288
10/29/2019	Fall	B	Large	34.99532	76.28635	Green	Alive	n/a	n/a	295	256
10/29/2019	Fall	B	Large	34.99582	76.28541	Green	Dead	n/a	n/a	295	252
10/31/2019	Fall	B	Small	34.96300	76.27880	Green	Alive	n/a	n/a	275	235
11/1/2019	Fall	D2	Large	34.68233	77.04841	Green	Alive	n/a	n/a	326	280
11/1/2019	Fall	D2	Large	34.68352	77.03974	Green	Alive	n/a	n/a	298	274
11/5/2019	Fall	B	Large	34.99495	76.28717	Green	Alive	n/a	n/a	n/a	n/a
11/5/2019	Fall	B	Large	34.99495	76.28717	Green	Alive	n/a	n/a	295	240
11/12/2019	Fall	B	Large	34.98670	76.24600	Green	Alive	n/a	n/a	206	202
11/12/2019	Fall	B	Large	34.98650	76.24610	Green	Alive	n/a	n/a	n/a	n/a
12/6/2019	Winter	B	Small	35.28000	75.54000	Green	Alive	n/a	n/a	n/a	n/a

Table 11. Regulations for management units by date and regulation change for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets for the 2020 ITP Year. Proclamations during winter months affected fishing effort in subsequent months.

Year	Date(s)	Regulation change
2019	Sep 4	This proclamation superseded Proclamation FF-3-2016, dated January 21, 2016 and FF-48-2018, dated November 27, 2018. It closed the commercial flounder fishery to all gears in Internal Coastal Waters and to all gears except trawls in the Atlantic Ocean Waters. The commercial fishery will re-open by proclamation later in 2019. This action was being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (FF-31-2019)
2019	Sep 4	This proclamation superseded Proclamation M-11-2019 dated April 26, 2019. This proclamation closed all of Management Unit A to the use of gill nets with a stretched mesh length of greater than $3 \frac{3}{4}$ inch stretched mesh (except as described in Section IV.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-13-2019)
2019	Sep 4	This proclamation superseded Proclamation M-12-2019 dated June 11, 2019. This proclamation closed all Management Units south of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches and greater (except as described in Section III.) in accordance Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-14-2019)
2019	Sep 15	This proclamation supersedes Proclamation M-13-2019 dated August 30, 2019. It opens the previously closed Management Unit A to the use of gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan and the Sea Turtle ITP. It maintains small mesh gill net attendance requirements in the entirety of Management Unit A. (M-15-2019)
2019	Sep 15	This proclamation superseded Proclamation FF-31-2019, dated August 28, 2019. It established commercial flounder season dates for Internal Coastal Waters, by Flounder Management Area. It maintained a 15-inch total length minimum size limit. It maintained the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It also made it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action was being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (FF-34-2019)
2019	Sep 30	This proclamation superseded Proclamation M-15-2019 dated September 12, 2019. It made it unlawful for Recreational Commercial Gear License holders to use gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches. It maintained the openings in Management Unit A to the use of gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan and the Sea Turtle ITP. It maintained small mesh gill net attendance requirements in the entirety of Management Unit A. (M-17-2019)

Table 11. (continued) Regulations for management units by date and regulation change for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets for the 2020 ITP Year. Proclamations during winter months affected fishing effort in subsequent months.

2019	Oct 1	This proclamation superseded Proclamation M-14-2019 dated August 30, 2019. This proclamation opened Management Units B (subunits only), C, D2 and E to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-16-2019)
2019	Oct 13	This proclamation superseded Proclamation M-17-2019 dated September 27, 2019. It closed all of Management Unit A to the use of gill nets with a stretched mesh length of greater than 3 ¾ inch stretched mesh (except as described in Section IV.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. It maintained small mesh gill net attendance in Management Unit A. (M-20-2019)
2019	Oct 26	This proclamation superseded Proclamation M-16-2019 dated September 27, 2019. This proclamation closed Management Units B (subunits SGNRA 1-4, MGNRA and portions of CGNRA) and Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.). It maintained openings in Management Units D2 and E. These actions were being taken in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-21-2019)
2019	Nov 15	This proclamation supersedes proclamation M-21-2019 dated October 23, 2019. This proclamation closes all Management Units South of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.). This action is being taken in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-22-2019)
2019	Nov 23	This proclamation superseded Proclamation M-20-2019 dated October 10, 2019. It opened portions of Management Unit A to the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in accordance with Amendment 2 to the N. C. Southern Flounder Fishery Management Plan. It maintained attendance on small mesh nets. (M-23-2019)
2019	Dec 1	This proclamation superseded Proclamation M-23-2019 dated November 21, 2019. In Management Unit A, it removed attendance requirements and implemented vertical height restrictions for anchored gill nets with a stretched mesh length of 3 inches through 3 ¾ inches. It continued to allow the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-24-2019)
2020	Jan 1	This proclamation superseded Proclamation M-24-2019 dated November 27, 2019. In Management Unit A, it was unlawful to use small mesh gill nets with a stretched mesh length other than 3 ¼ inches, except as described in Section II. C. and D. and Section IV. It continued to allow the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in certain portions of Management Unit A. (M-26-2019)
2020	Feb 15	This proclamation superseded Proclamation M-22-2019 dated November 12, 2019. This proclamation opened Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches and implemented gear exemptions for the shad fishery in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-2-2020)

Table 11. *(continued)* Regulations for management units by date and regulation change for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets for the 2020 ITP Year. Proclamations during winter months affected fishing effort in subsequent months.

2020	Mar 2	This proclamation opens a portion of Management Unit A to the use of floating gill nets configured for harvesting American shad by removing vertical height restrictions for all gill nets with stretched mesh lengths of 5 ¼ through 6 ½ inches. (M-3-2020)
2020	Mar 25	This proclamation supersedes Proclamation M-3-2020 dated February 28, 2020. In Management Unit A, it removes gill nets configured for harvesting American shad. It maintains restrictions on the use of fixed, stationary, or unattended gill nets and allows the use of run-around, strike, drop, and trammel gill nets and with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-5-2020)
2020	Apr 15	This proclamation maintains closures in all other management units south of Management Unit A and closes Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section II.; coincides with the commercial shad fishery closure) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-6-2020)
2020	Apr 20	This proclamation implements yardage and time setting restrictions for gill nets with a stretched mesh length less than 4 inches and attendance restrictions for gill nets with a stretched mesh length less than 5 inches in the Internal Coastal Waters of the state, south of Management Unit A. Yardage limit increases will be considered for the May-October Spanish mackerel drift gill net fishery. Those increases will be implemented by proclamation at a later time. This proclamation also closed D1 to anchored nets with a stretched mesh length less than 4 inches. (M-4-2020)
2020	May 1	This proclamation implements attendance requirements for gill nets with a stretched mesh length less than 4 inches in Subunit B.1. (M-9-2020)
2020	May 1	This proclamation implements small mesh gill net attendance requirements. It maintains restrictions on the use of run-around, strike, drop, and trammel gill nets and with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-10-2020)
2020	May 8	This proclamation increases yardage limits for the commercial Spanish mackerel drift gill net fishery in Management Unit B. (M-11-2020)

Table 11. (continued) Regulations for management units by date and regulation change for large-mesh (≥ 4 inch) and small-mesh (< 4 inch) gill nets for the 2020 ITP Year. Proclamations during winter months affected fishing effort in subsequent months.

2020	Jun 15	<p>This proclamation supersedes Proclamation FF-34-2019, dated September 12, 2019. It establishes commercial flounder season dates for Internal Coastal Waters by Flounder Management Area. It maintains a 15-inch total length minimum size limit. It also maintains the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It makes it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action is being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. The flounder harvest period for the Northern Management Area will open at 12:01 A.M., Tuesday, September 15, 2020 and close at 8:00 P.M., Tuesday, October 6, 2020.</p> <p>The flounder harvest period for the Central Management Area will open at 12:01 A.M., Thursday, October 1, 2020 and close at 8:00 P.M., Monday, October 19, 2020. The flounder harvest period for the Southern Management Area will open at 12:01 A.M., Thursday, October 1, 2020 and close at 8:00 P.M., Monday, November 2, 2020. (FF-25-2020)</p>
2020	Jul 22	<p>This proclamation reduced the yardage limit for gill nets with a stretched mess length less than 4 inches in Management Unit B. Yardage limit decrease in Management Unit B were being implemented to coincide with the 500 lb daily trip limit in the commercial Spanish mackerel fishery. (M-12-2020)</p>

Table 12. Number of gill-net hours logged and citations issued by Marine Patrol for anchored gill nets by season during the 2020 ITP Year. Gill-net hours represent time officers checked gill nets for compliance, conducted observations, or searched for trips to observe (No Contact trips). See Table 13 for details on individual citations.

Season	Gill-Net Hours	# Citations
Fall 2019	511	18
Spring 2020	542	6
Summer 2020	531	3
Total	1,584	27

Table 13. All EGNP and NETG Citations written by Marine Patrol for anchored gill nets by season and violation code during the 2020 ITP Year. Details for citations with a notice of violation (NOV) are described in Table 14.

Season	Date	Violation Code	Violation Description	NOV Notice Date	
Fall 2019	9/20/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a	
	9/20/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	9/23/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a	
	9/23/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a	
	9/23/2019	NETG03	Using gill net with improper buoys or identification	n/a	
	9/23/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	9/26/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	10/14/2019	NETG02	Using gill net without buoys or identification	10/21/2019	
	10/14/2019	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday. Proclamation M-8-2010	10/21/2019	
	10/14/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	10/23/2019	NETG29	RCGL gear without proper buoys 3J.0103(c)	n/a	
	10/24/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	10/25/2019	NETG03	Using gill net with improper buoys or identification	n/a	
	10/28/2019	NETG22	Improperly set gill net	n/a	
	10/31/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
	Spring 2020	11/2/2019	NETG37	Leave small mesh gill nets unattended 3J.0103	n/a
		11/2/2019	NETG02	Using gill net without buoys or identification	n/a
11/4/2019		EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
3/27/2020		EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)	3/30/2020	
4/11/2020		NETG30	Leave RCGL gill net unattended 3O.09302	n/a	
5/10/2020		NETG02	Using gill net without buoys or identification	n/a	
5/10/2020		NETG37	Leave small mesh gill nets unattended 3J.0103	n/a	
5/14/2020		NETG03	Using gill net with improper buoys or identification	n/a	
5/14/2020		NETG04	Leave gill net in waters when could not be legally fished	n/a	
5/25/2020		EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a	
Summer 2020	7/14/2020	NETG04	Leave gill net in waters when could not be legally fished	n/a	
	7/14/2020	NETG02	Using gill net without buoys or identification	n/a	

Table 14. Notice of Violations issued by season, date, and violation code for the Estuarine Gill Net Permit (EGNP) during the 2020 ITP Year. Details for NOV with an associated citation are described in Table 13.

Season	Notice Date	Serve Date	Violation code	Violation description
Fall 2019	9/18/2019	9/19/2019	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)
	10/21/2019	10/25/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/21/2019	10/28/2019	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)
	10/21/2019	10/28/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/23/2019	10/27/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	10/23/2019	10/27/2019	EGNP10	Set more than the legal length of gill net
	10/23/2019	10/27/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
Spring 2020	3/30/2020	4/27/2020	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)

7 FIGURES

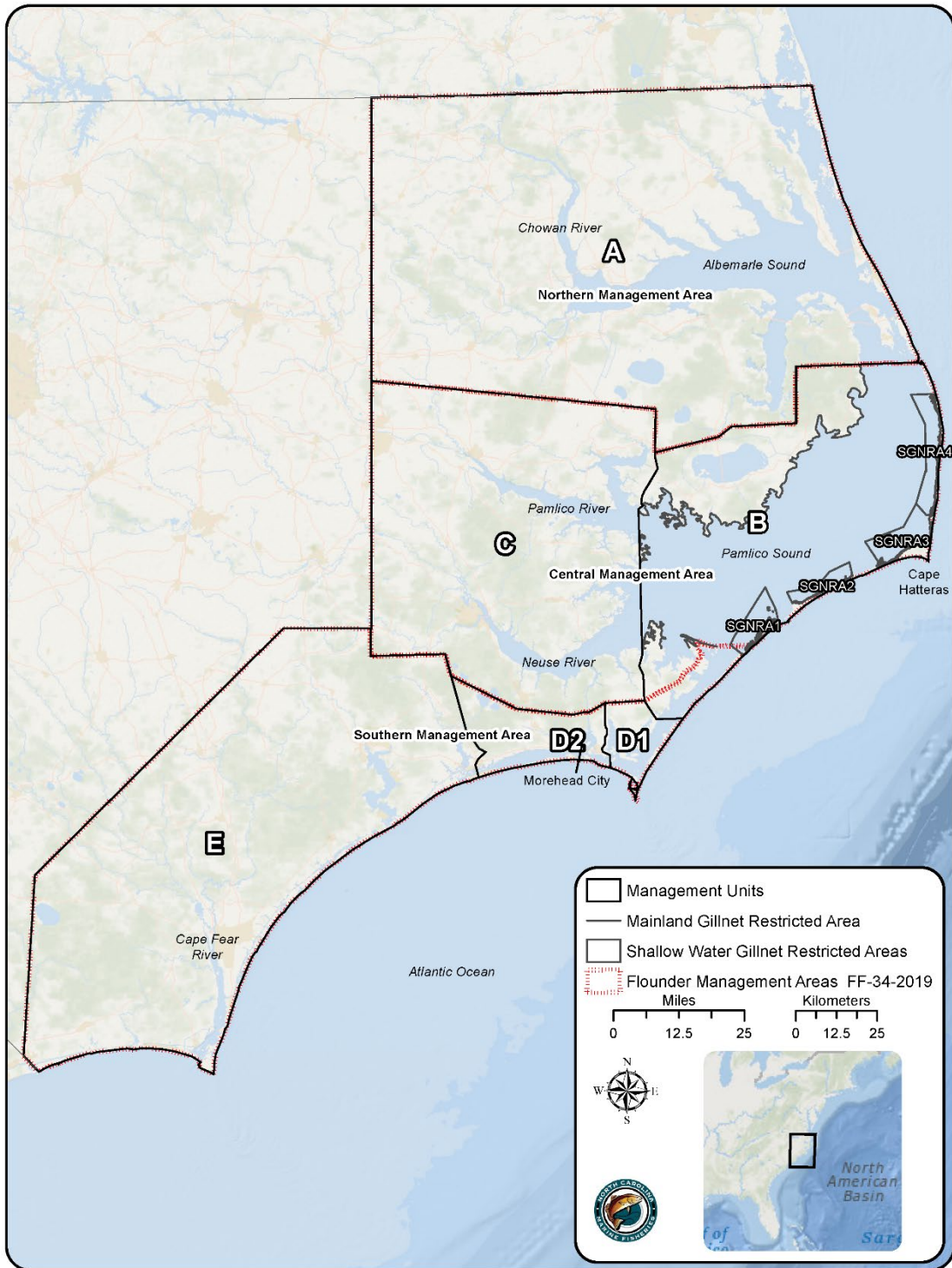


Figure 1. Management units (A, B, C, D1, D2, and E) as outlined in the Conservation Plan and used by the Observer Program for the 2020 ITP Year. In the Pamlico Sound Portion of B, large-mesh gill nets were confined to Shallow Water Gillnet Restricted Areas (SGNRA) 1-4 and the Mainland Gillnet Restricted Area (200 yards from shore).

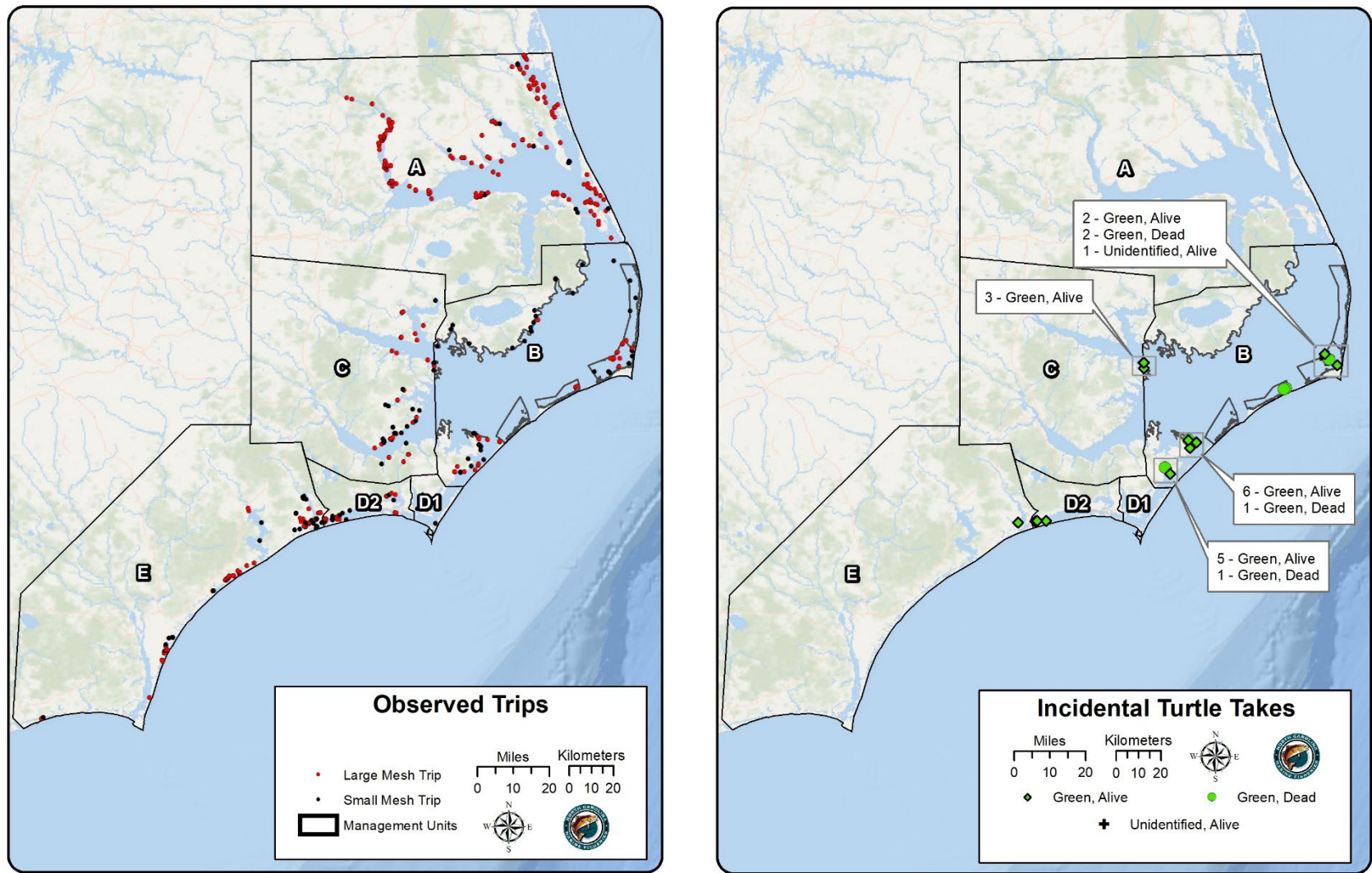


Figure 2. For the entire 2020 ITP Year, observed gill-net trips (left) by mesh-size category (249 large mesh = ≥ 4 inch; 103 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, = 21; dead, n = 6) across management units. One of the interactions was recorded during winter observations to monitor for Atlantic sturgeon interactions.

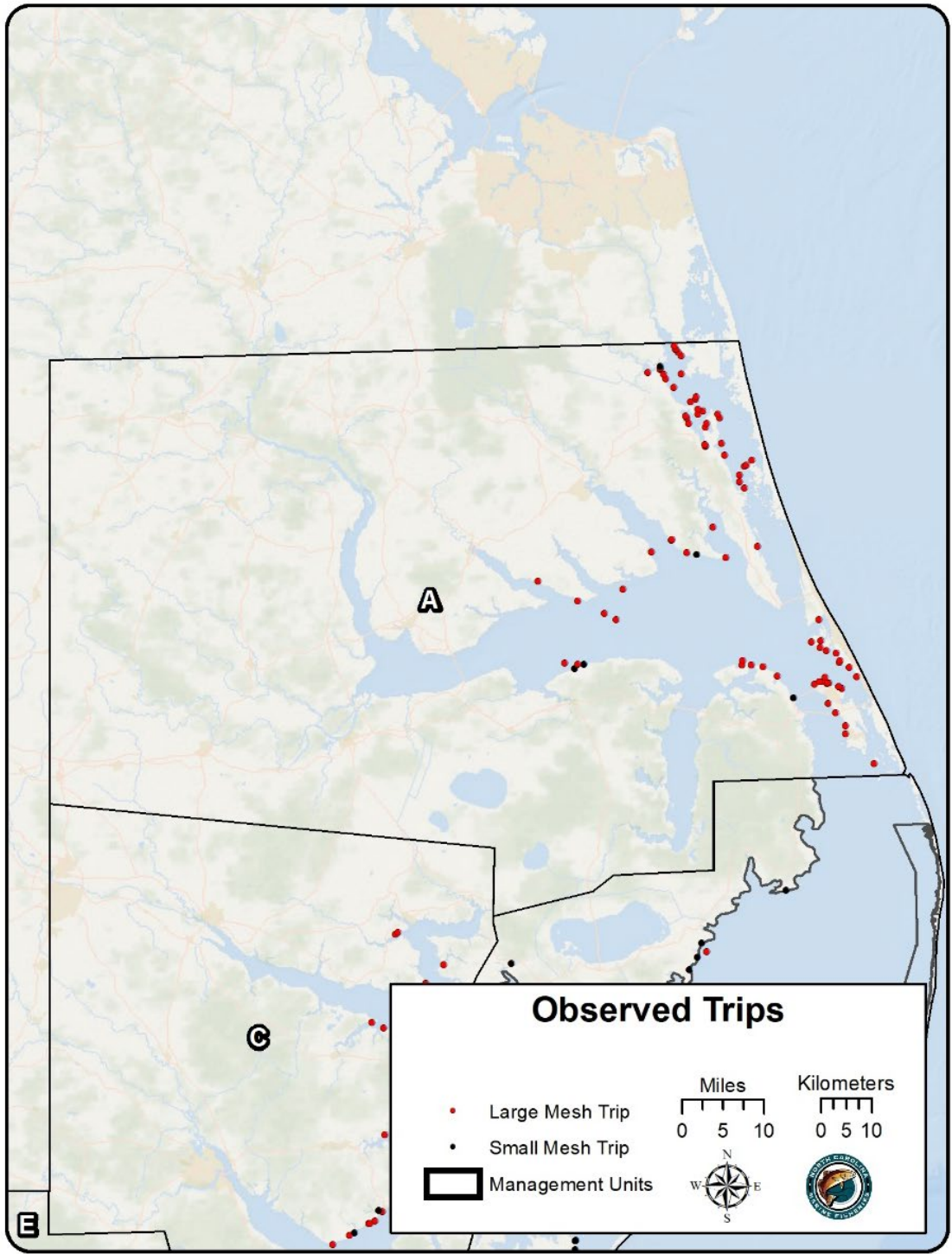


Figure 3. For fall 2019, observed gill-net trips by mesh-size category for Management Unit A (81 large mesh = ≥ 4 inch; 5 small mesh = < 4 inch). No sea turtle interactions were observed.

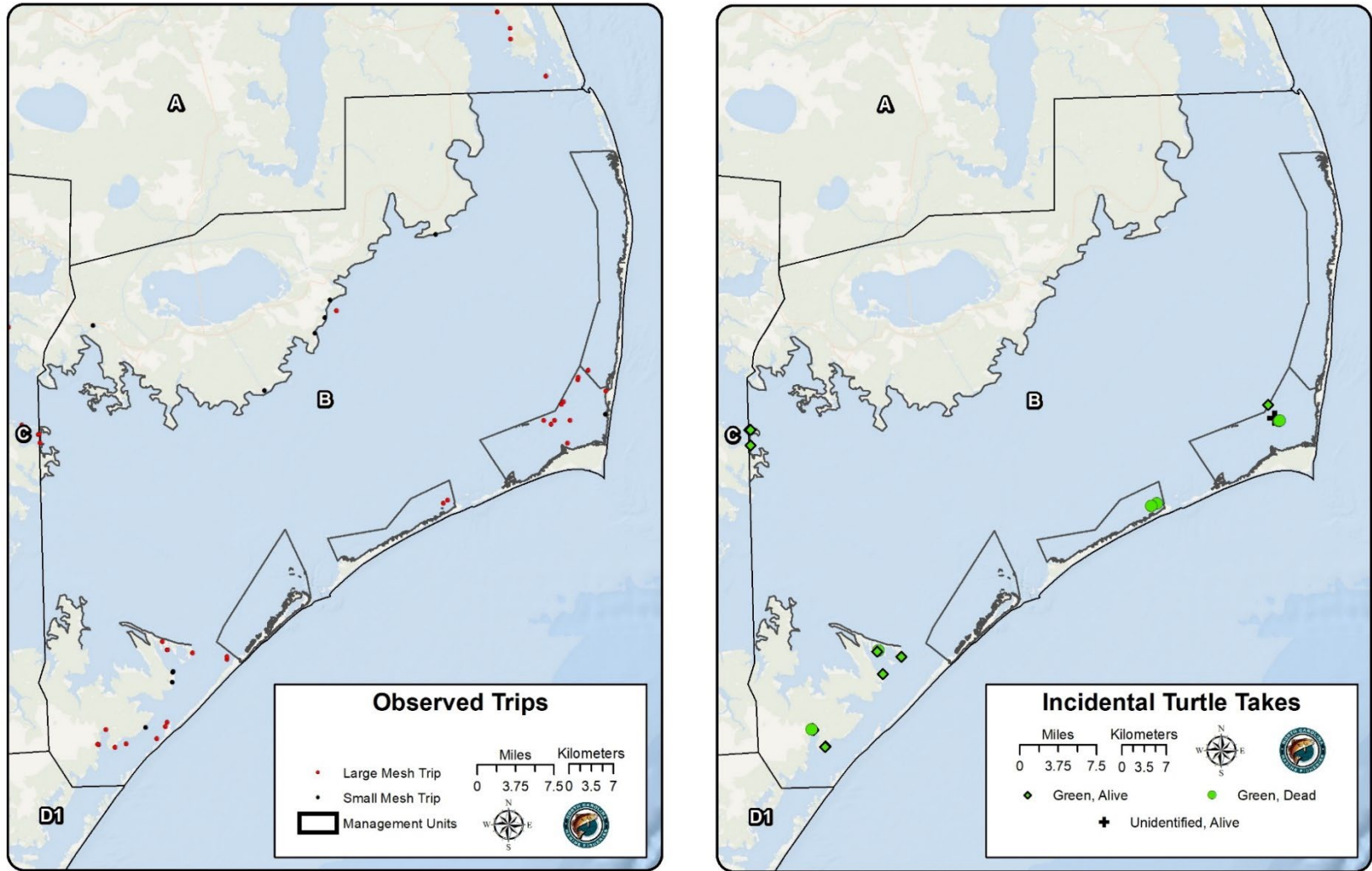


Figure 4. For fall 2019, observed gill-net trips (left) by mesh-size category (30 large mesh = ≥ 4 inch; 12 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, $n = 16$; dead, $n = 6$) for Management Unit B. Trips and turtle location at the border of Management Units B and C occurred in B.

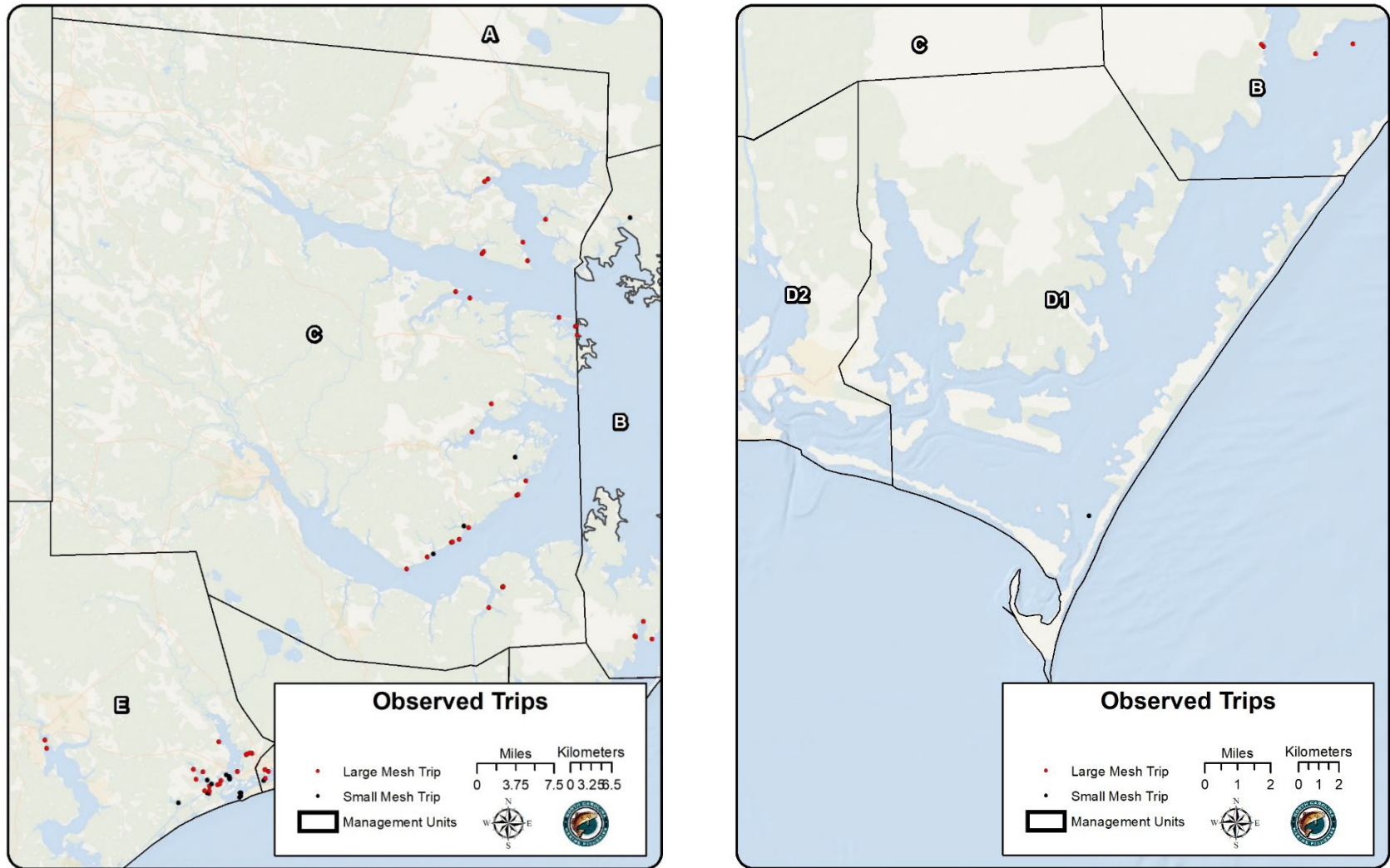


Figure 5. For fall 2019, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit C (left: 29 large mesh; 3 small mesh) and Management Unit D1 (right: 0 large mesh; 1 small mesh). D1 was closed to large-mesh gill nets the entire 2020 ITP Year. No sea turtle interactions were observed in Management Unit C or D1.

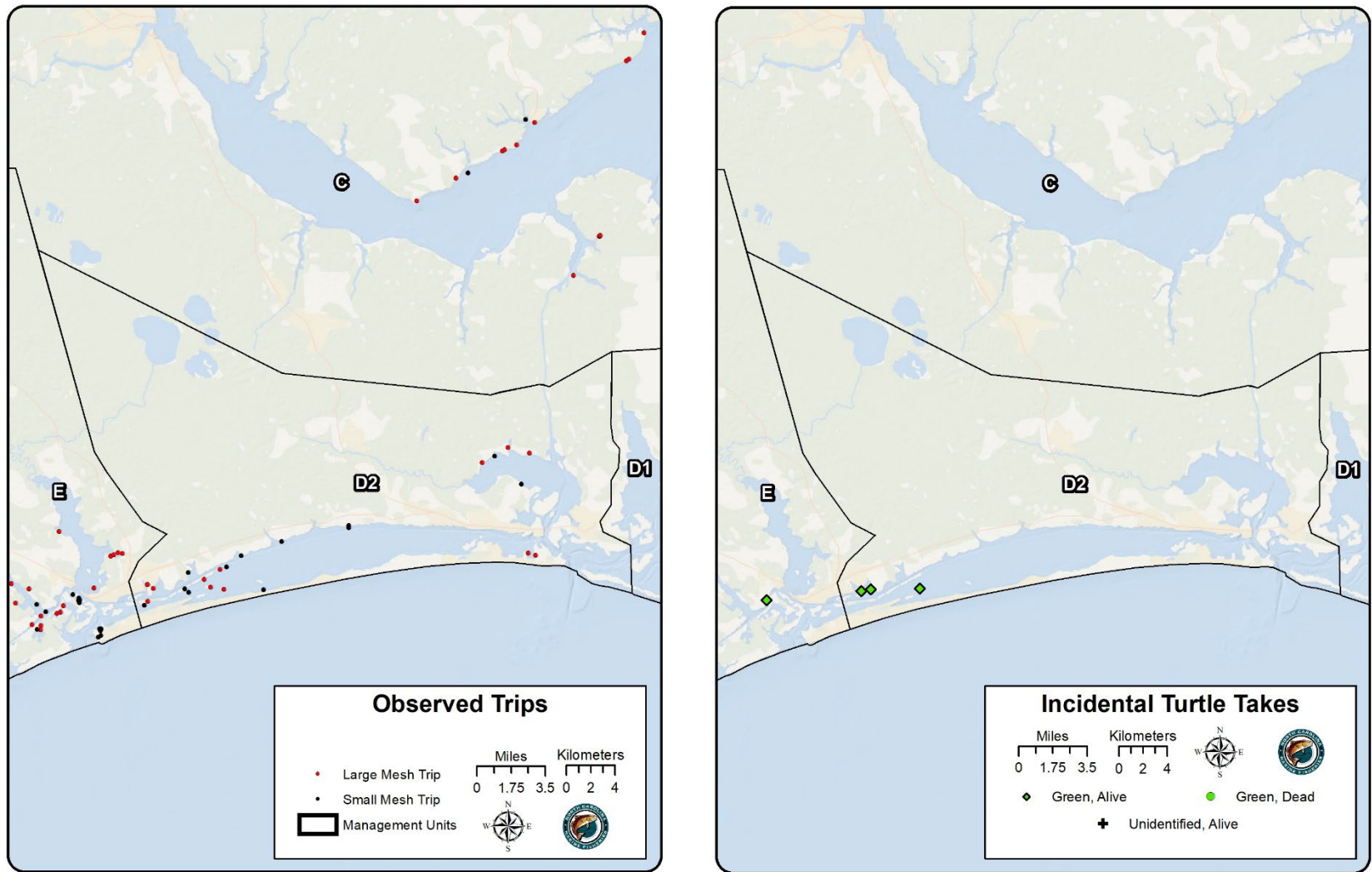


Figure 6. For fall 2019, observed gill-net trips (left) by mesh-size category (12 large mesh = ≥ 4 inch; 13 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, $n = 3$; dead, $n = 0$) for Management Unit D2.

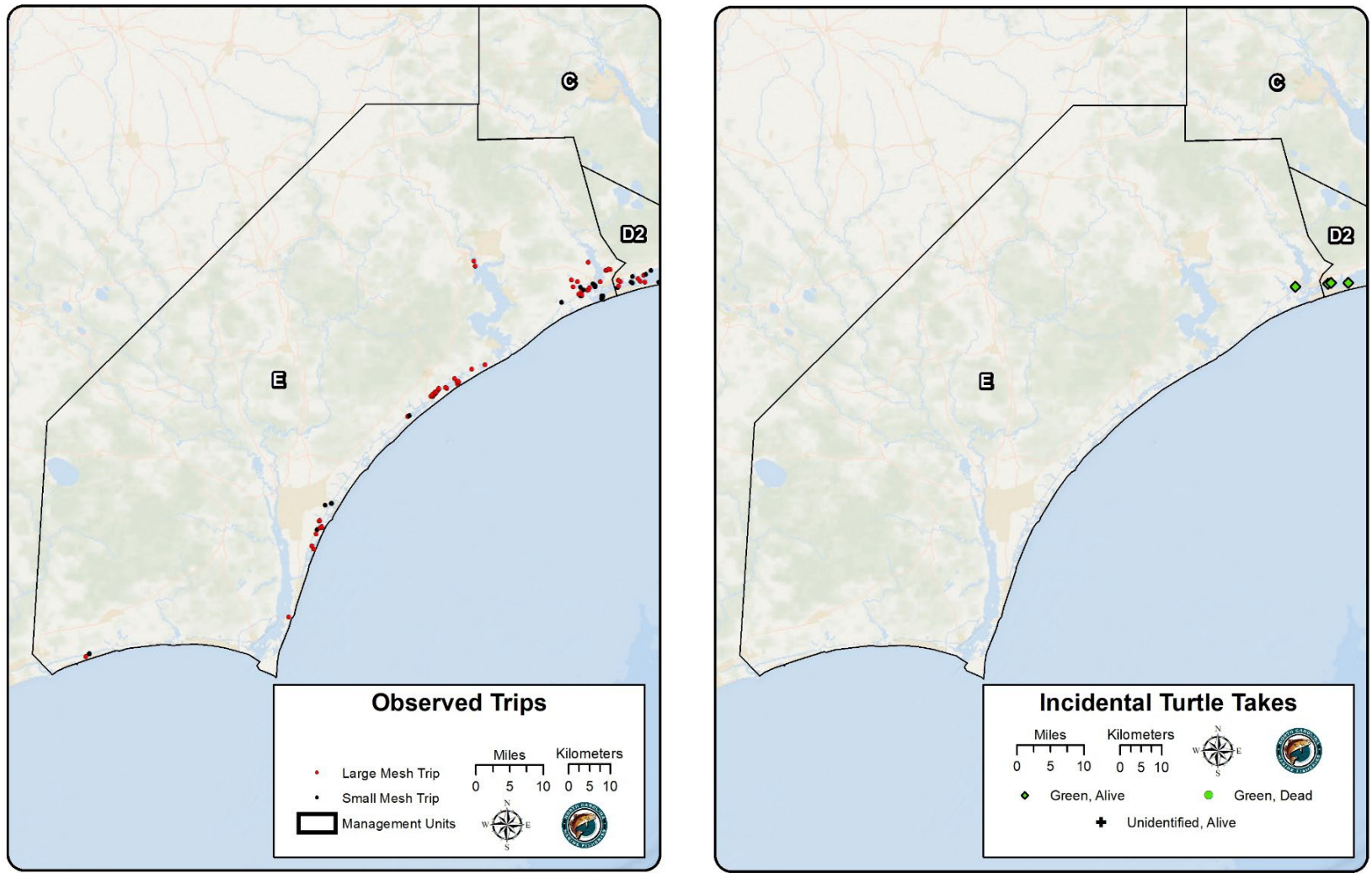


Figure 7. For fall 2019, observed gill-net trips (left) by mesh-size category (56 large mesh = ≥ 4 inch; 23 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, $n = 1$; dead, $n = 0$) for Management Unit E.

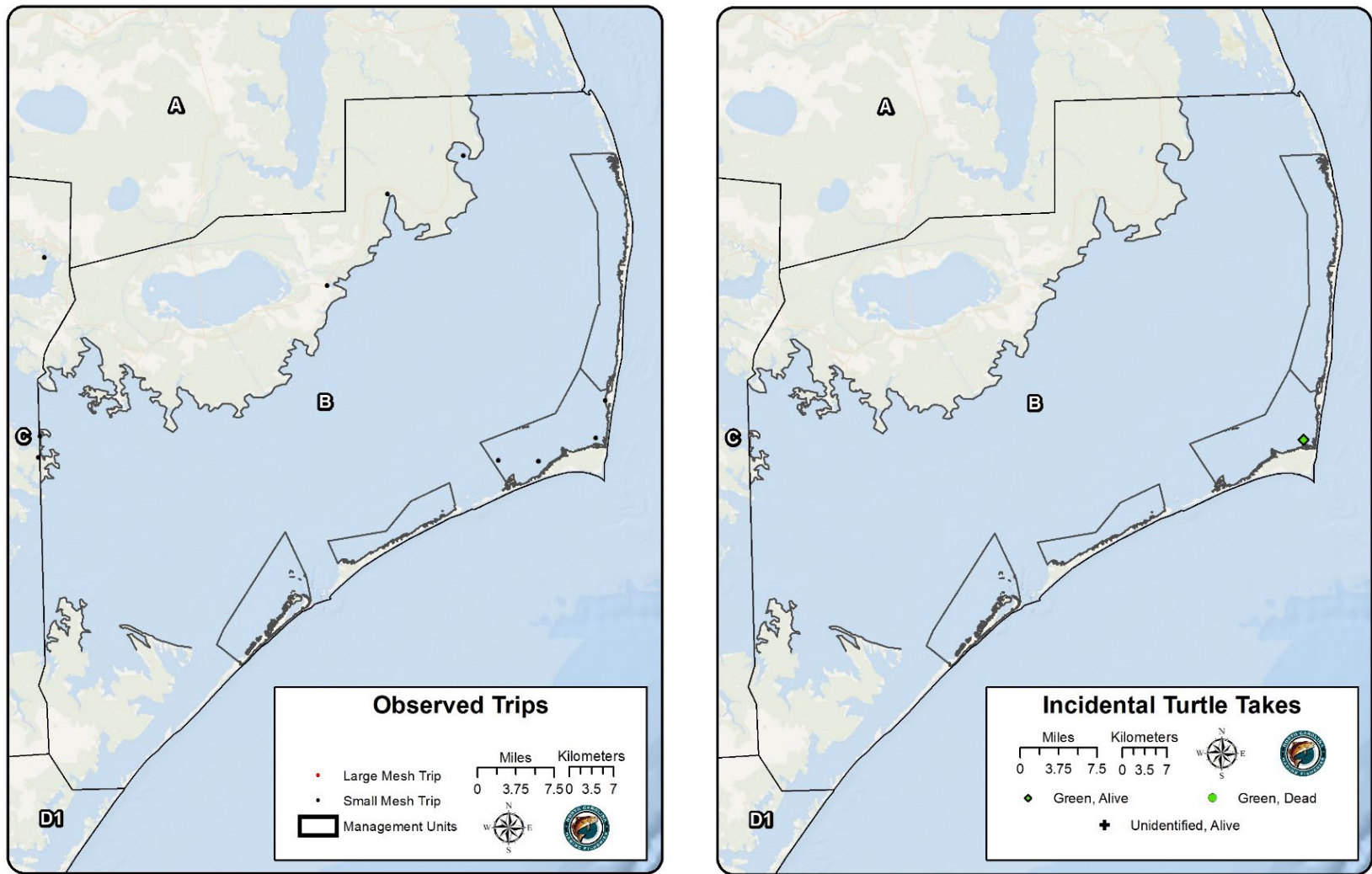


Figure 8. For winter 2019-2020, observed gill-net trips (left) by mesh-size category (0 large mesh = ≥ 4 inch; 10 small mesh = < 4 inch) and sea turtle interactions (right) by species and disposition (alive, $n = 1$; dead, $n = 0$) for Management Unit B. Management Unit B was closed to large-mesh gill-net effort for winter 2020. This interaction was recorded in a small-mesh gill net during winter observations to monitor for Atlantic Sturgeon interactions.

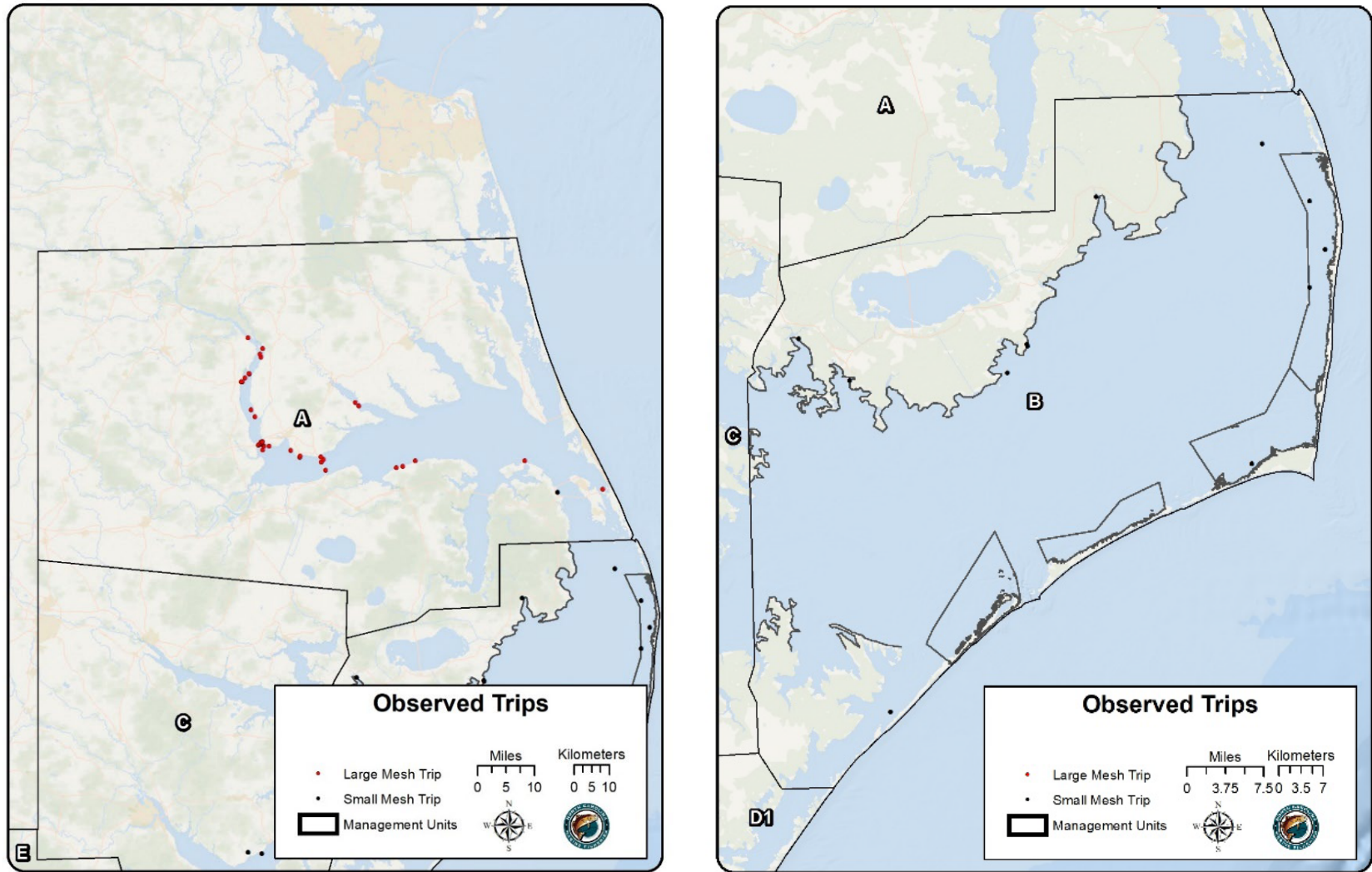


Figure 9. For spring 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit A (left: 41 large mesh; 2 small mesh) and Management Unit B (right: 0 large mesh; 12 small mesh). Management Unit B was closed to large-mesh gill nets during spring 2020. No sea turtle interactions were observed.

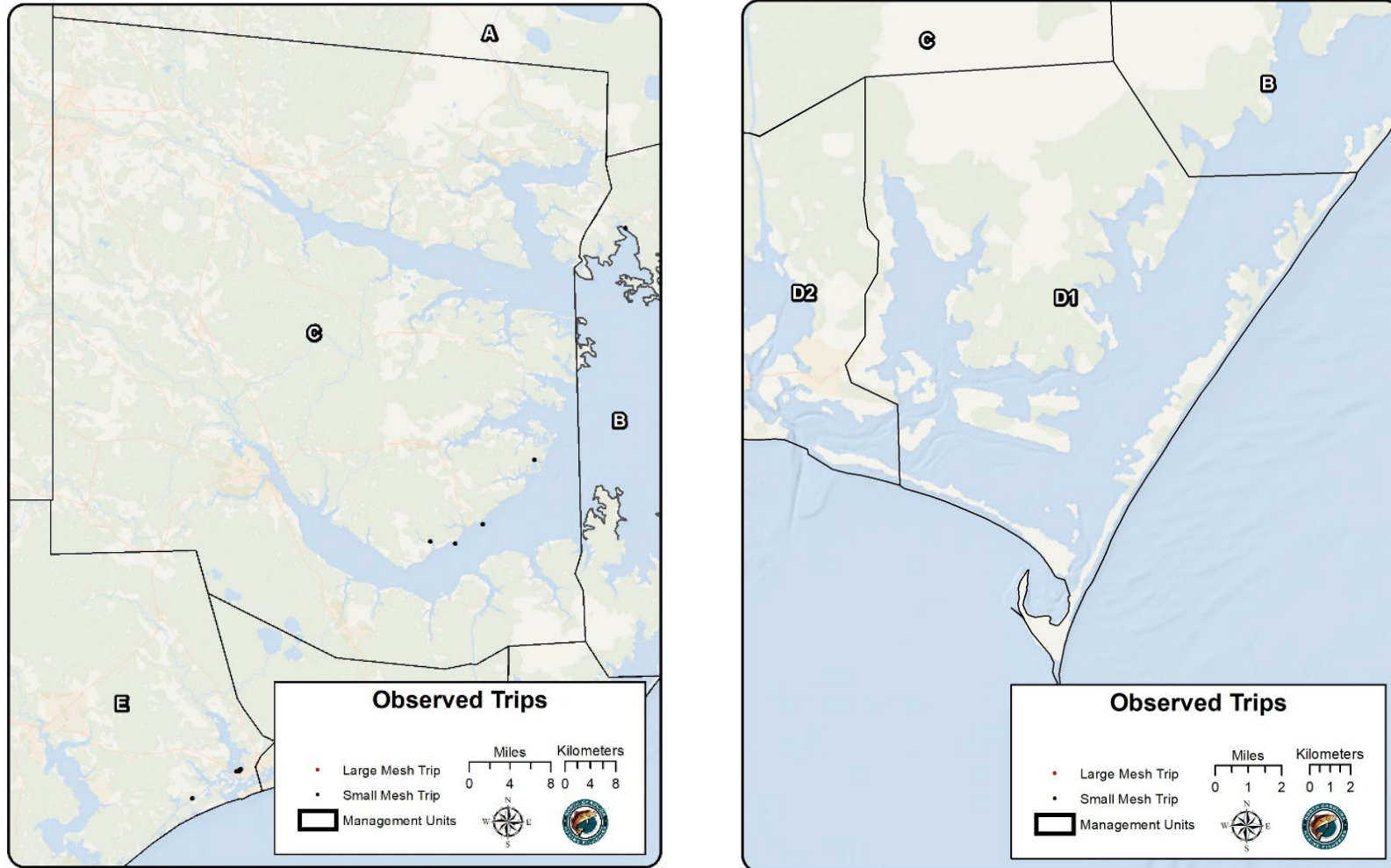


Figure 10. For spring 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit C (left: 0 large mesh; 4 small mesh) and Management Unit D1 (right: 0 large mesh; 0 small mesh). Management Unit D1 was closed to large-mesh gill nets for spring 2020. No sea turtle interactions were observed.

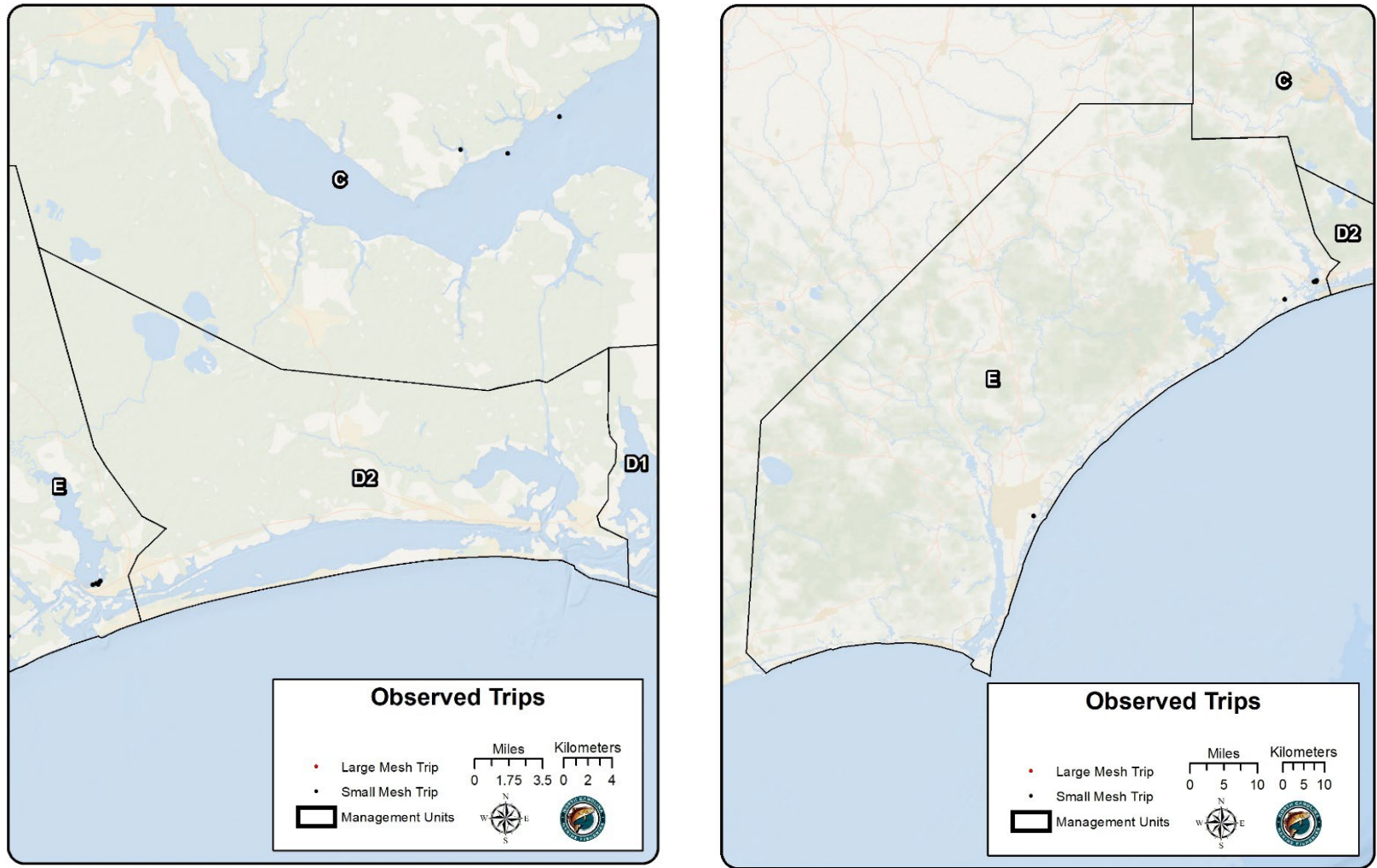


Figure 11. For spring 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit D2 (left: 0 large mesh; 0 small mesh) and Management Unit E (right: 0 large mesh; 7 small mesh). Management Units D2 and E were closed to large-mesh gill nets during spring 2020. No sea turtle interactions were observed.

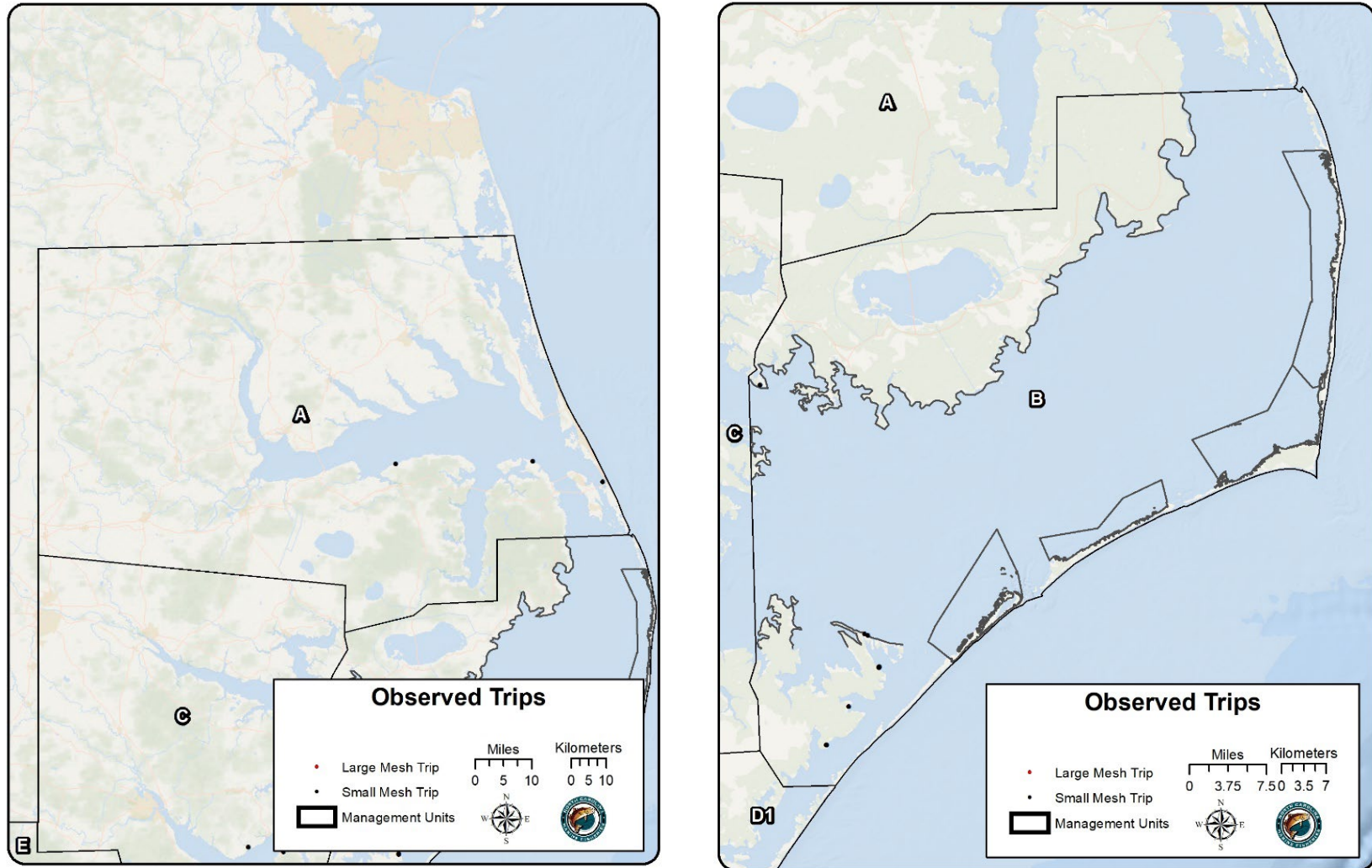


Figure 12. For summer 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit A (left: 0 large mesh; 3 small mesh) and Management Unit B (right: 0 large mesh; 9 small mesh). Management Units A and B were closed to large-mesh gill nets during summer 2020. No sea turtle interactions were observed.

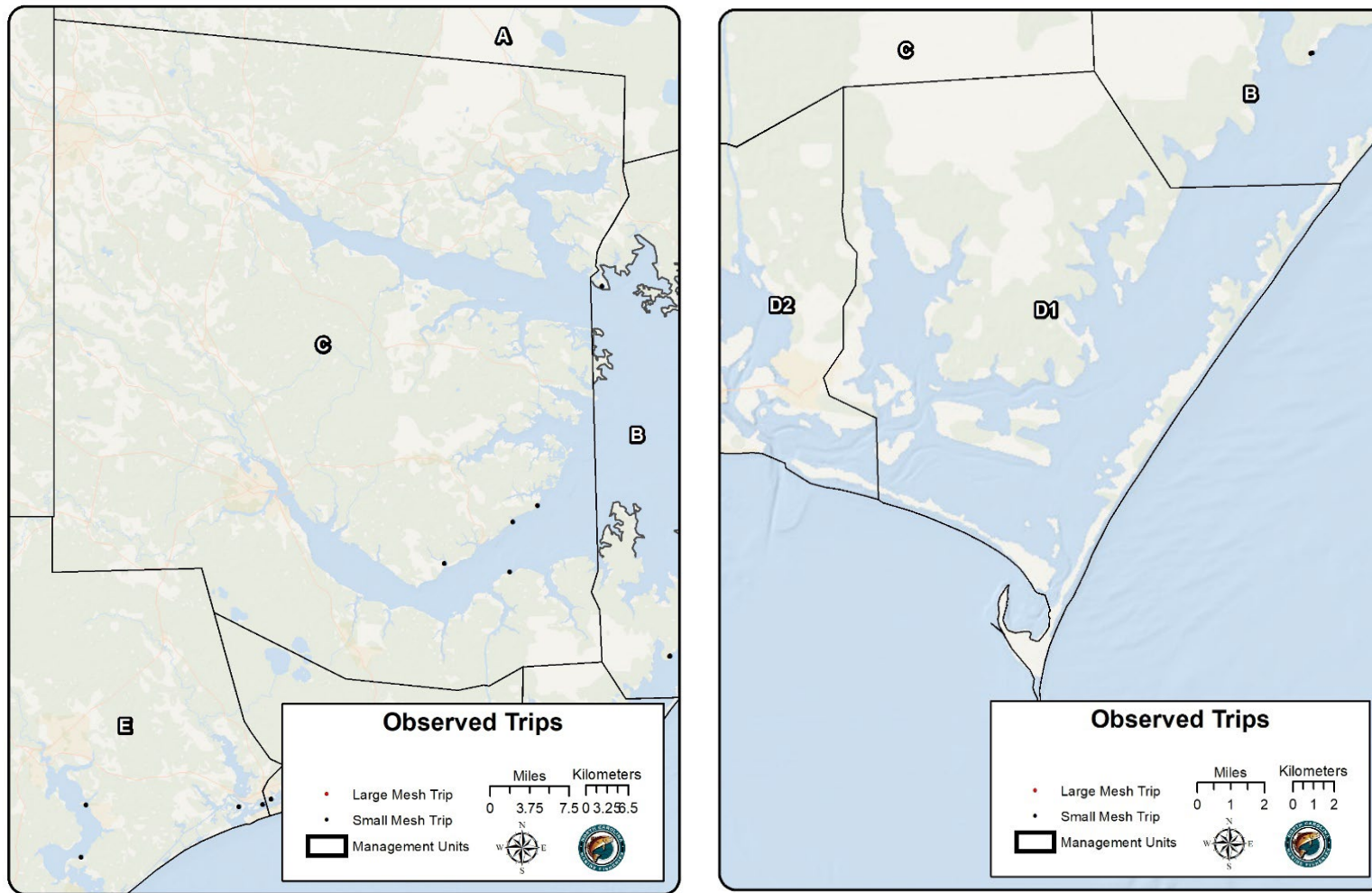


Figure 13. For summer 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit C (left: 0 large mesh; 4 small mesh) and Management Unit D1 (right: 0 large mesh; 0 small mesh). Management Units C and D1 were closed to large-mesh gill nets, and D1 was closed to small-mesh gill nets during summer 2020. No sea turtle interactions were observed.

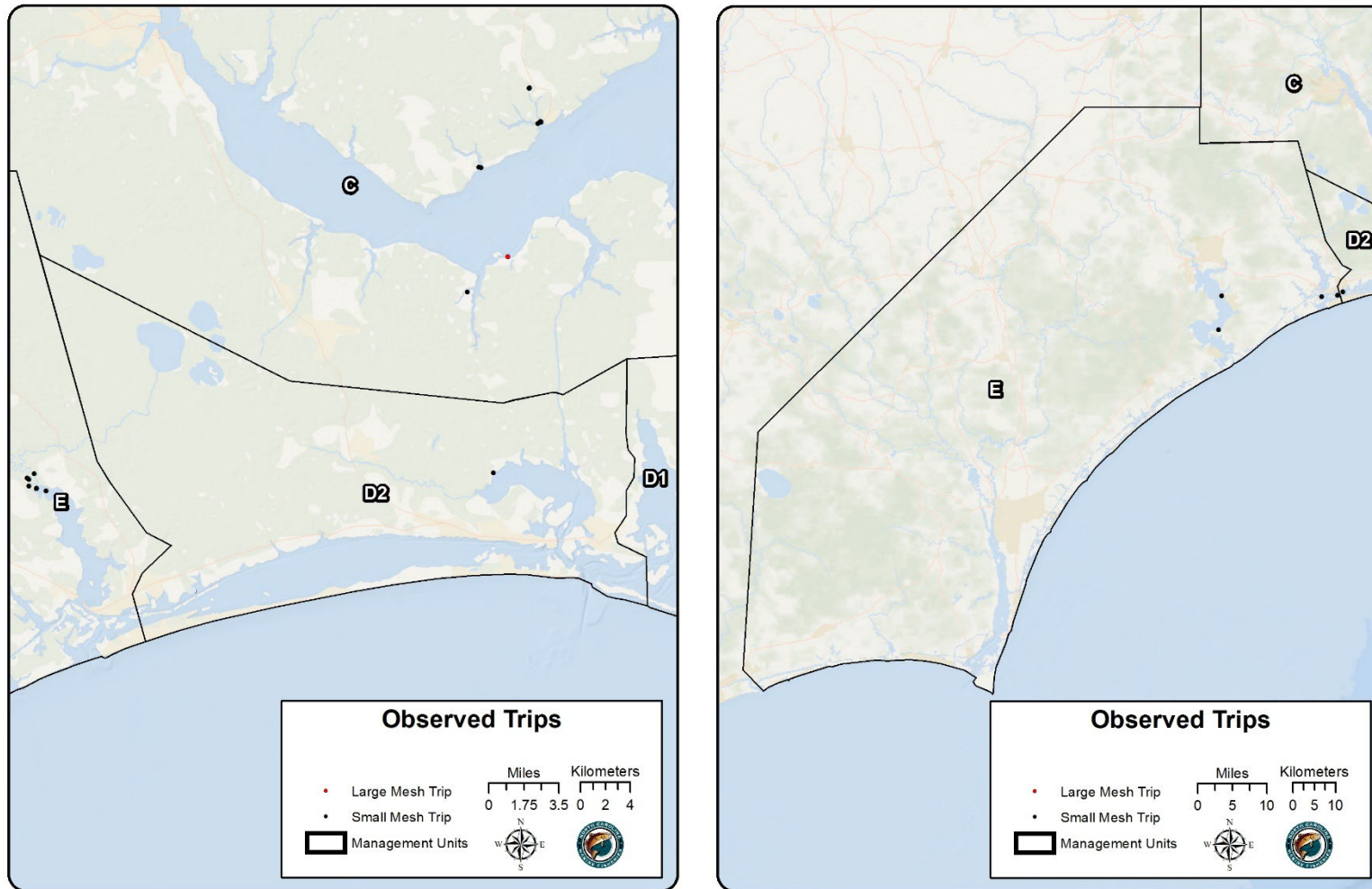


Figure 14. For summer 2020, observed gill-net trips by mesh-size category (large mesh = ≥ 4 inch; small mesh = < 4 inch) for Management Unit D2 (left: 0 large mesh; 1 small mesh) and Management Unit E (right: 0 large mesh; 4 small mesh). Management Units D2 and E were closed to large mesh during summer 2020. No sea turtle interactions were observed.

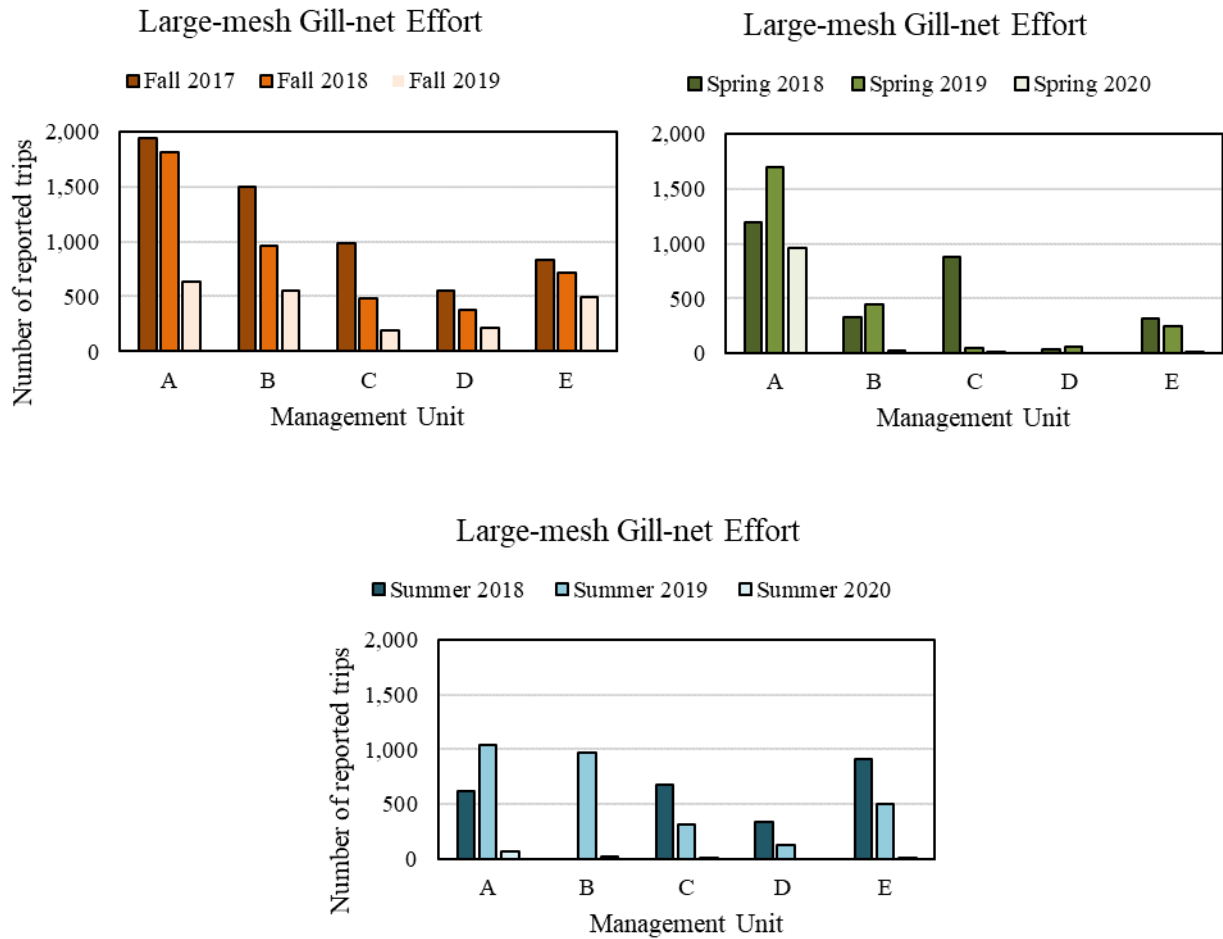


Figure 15. Number of fishing trips using large-mesh (≥ 5 inch) gill nets reported to the Trip Ticket Program during the 2018, 2019, and 2020 ITP Years by season and management unit.

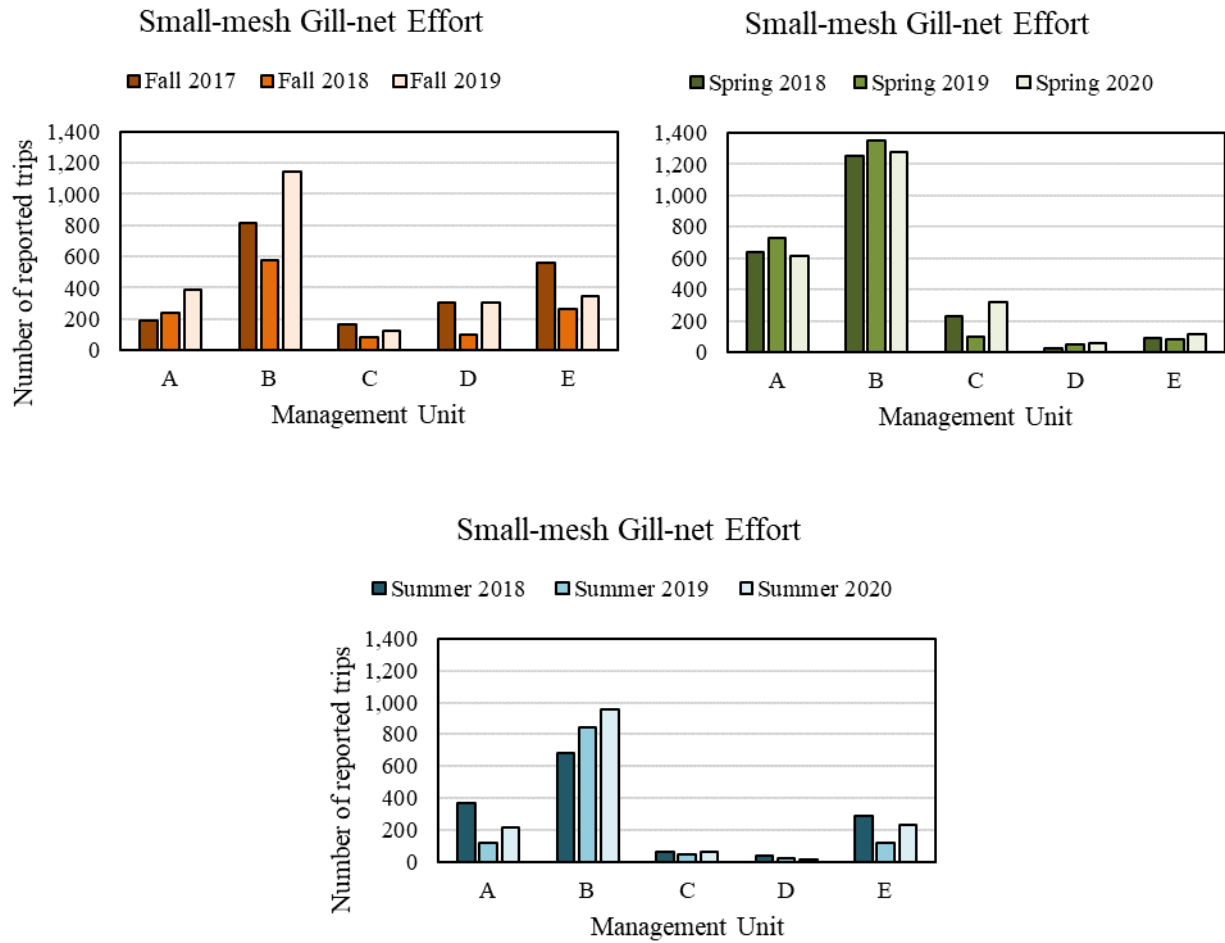


Figure 16. Number of fishing trips using small-mesh (<5 inch) gill nets reported to the Trip Ticket Program during the 2018, 2019, and 2020 ITP Years by season and management unit.

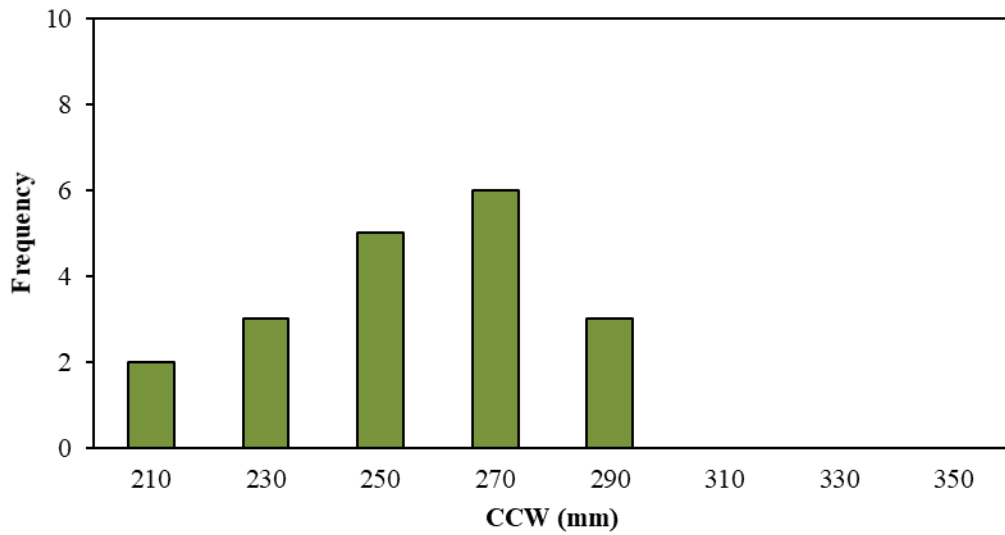
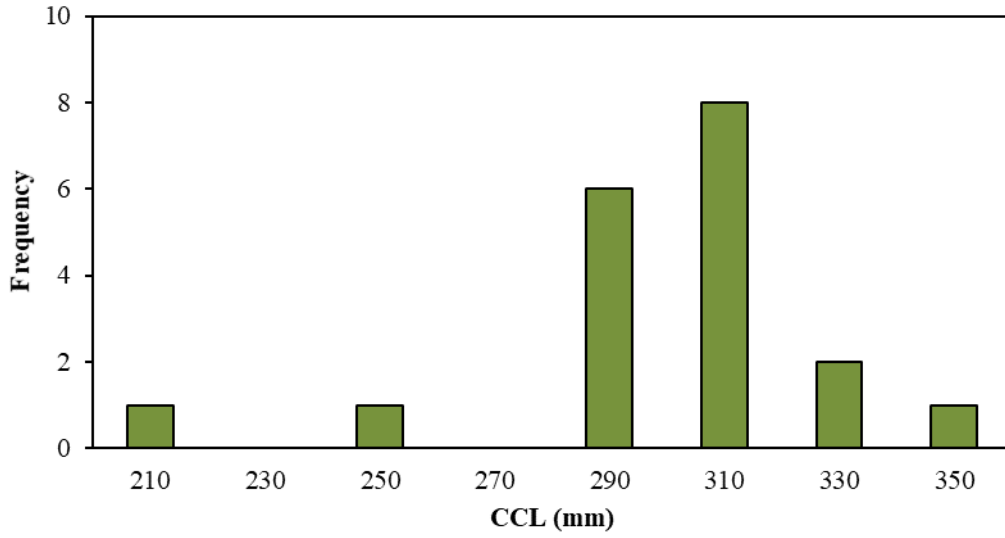


Figure 17. For observed and measured incidental takes of green sea turtles during the 2020 ITP Year (n = 19 of 27 included winter take), length-frequency of (top) curved carapace length (CCL, mm) and (bottom) curved carapace width (CCW, mm).

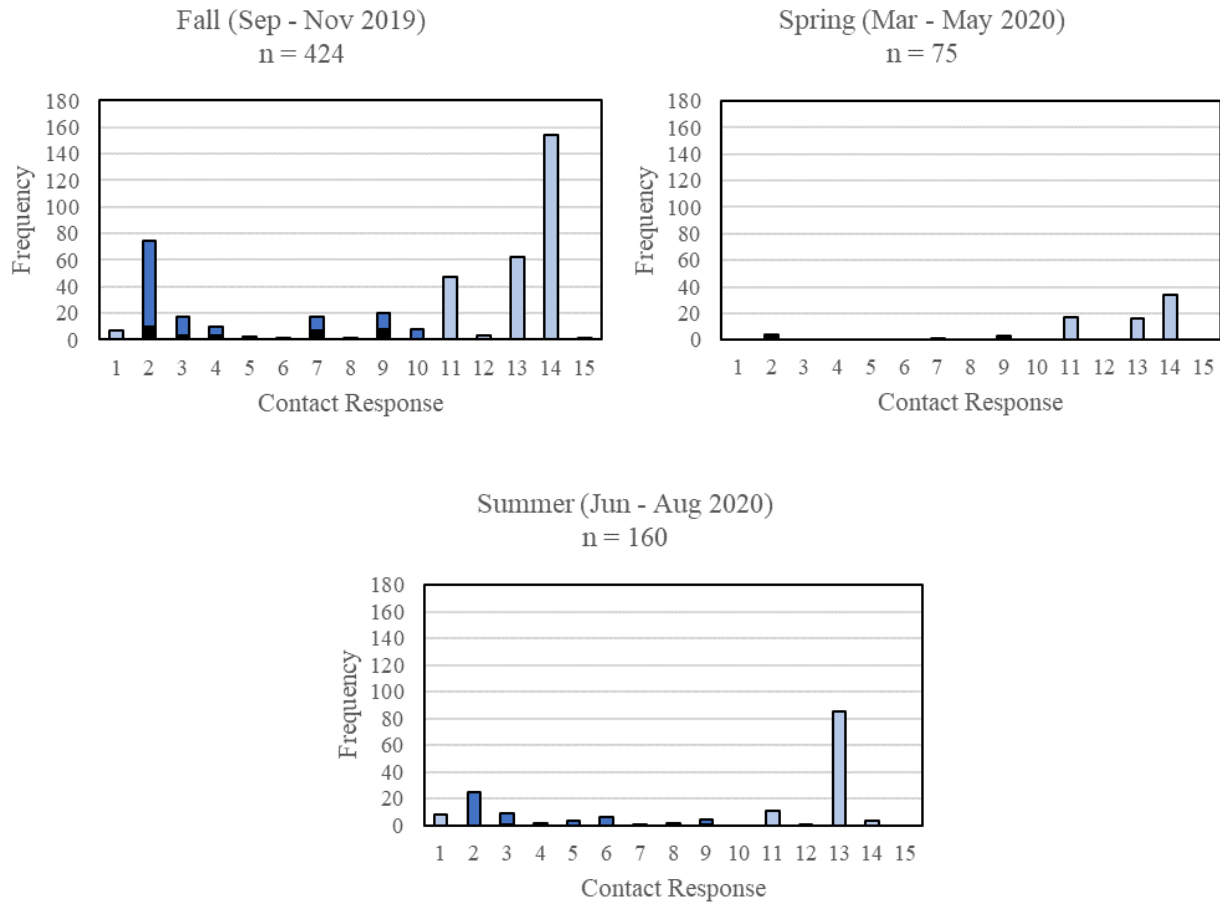


Figure 18. For the 2020 ITP Year, contacts attempted (n = 659) by observers to schedule trips categorized by contact type (0-15) and presented as a percentage of the total for fall, spring, and summer. Contact type categories include the following: 1) Left message with someone else; 2) Not fishing general; 3) Fishing other gear; 4) Not fishing because of weather; 5) Not fishing because of boat issues; 6) Not fishing because of medical issues; 7) Booked trip; 8) Hung up, got angry, trip refused; 9) Call back later time/date; 10) Saw in person; 11) Disconnected; 12) Wrong number; 13) No answer; 14) No answer, left voicemail; 15) Not fishing because of natural disaster (e.g., hurricane). Contact types are shown as those when the observer talked to a fisherman (dark blue bars), when the observer did not (light blue bars), and when the fisherman returned an observer’s call (black bars).



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

Stephen W. Murphey
Director, North Carolina Division of Marine Fisheries
3441 Arendell Street
P.O. Box 769
Morehead City, North Carolina 28557

Dear Mr. Murphey:

On May 26, 2020, North Carolina Department of Marine Fisheries (NCDMF) staff contacted NOAA's National Marine Fisheries Service (NOAA Fisheries) Office of Protected Resources requesting clarification of observed sea turtle tagging protocols as required by Permit No. 16230 issued under Section 10 (a)(1)(B) of the Endangered Species Act to incidentally take threatened and endangered sea turtles in gillnet fisheries operating in internal North Carolina (NC) waters. NCDMF staff requested clarification regarding updated flipper and Passive Integrated Transponder (PIT) tagging protocols required in the NOAA Fisheries Southeast Fisheries Science Center (SEFSC) Permit No. 21233-01 for research activities on sea turtles, and the availability of NOAA Fisheries SEFSC personnel to conduct tagging training for NC observers during the COVID-19 pandemic. In response to this request, we have consulted with SEFSC sea turtle staff at the NOAA Beaufort Laboratory, and collaborated with NCDMF staff and the NC Wildlife Resources Commission to conduct an analysis of available sea turtle tagging and recapture data under the current NCDMF incidental take permit.

Tagging of incidentally taken sea turtles is required under the incidental take permit as a mitigation activity to assist in determining the fate of incidentally captured individuals after release. Based on the available data, NCDMF observers (or rehabilitation facilities) have tagged 113 incidentally captured sea turtles (3 loggerhead, 18 Kemp's ridley, and 92 green sea turtles) as part of the current incidental take permit (September, 2013 to October, 2019). Data from the NC Sea Turtle Stranding and Salvage Network Database and the Archie Carr Center for Sea Turtle Research Cooperative Marine Turtle Tagging Program indicate that four of the tagged green sea turtles have been recaptured. Three of these green sea turtles stranded in NC due to cold stunning (one dead, two alive) at least two months after incidental capture, and one green sea turtle stranded in NC dead of undetermined causes approximately one month after incidental capture.

The updated flipper tagging protocols in the SEFSC permit require the use of smaller (1005 series) tags for turtles measuring 20-30 centimeters (cm) in straight carapace length, and standard (681 series) tags for turtles greater than 30 cm in straight carapace length. The updated PIT tagging protocols require researchers with specialized experience, use of a local anesthetic, and use of small needle gauge sizes for applying PIT tags in sea turtles measuring 16-30 cm in straight carapace length. Based on the approximately 200 sea turtles captured under the incidental take permit for which we have carapace measurements, more than 50 percent would require smaller flipper tags, requiring observers to have appropriate training and multiple size



8 Appendix A (continued)

tags available, at a minimum. Given the specialized experience required to apply the smaller tags to smaller turtles, we have determined that it would not be appropriate for observers to flipper or PIT tag these turtles.

Therefore, given the very low recapture rate (3.5 percent), the observer experience and training required to safely tag the size of sea turtles commonly incidentally captured, and the challenges with observers acquiring tagging training during the COVID-19 pandemic, we are modifying the permit to remove the requirement for observers to flipper and PIT tag incidentally captured sea turtles for the remainder of the current incidental take permit (No. 16230, expiring August, 2023). NOAA Fisheries and NCDMF will revisit the tagging requirement when developing any future incidental take permits for gillnet fisheries operating in NC waters as appropriate.

Please sign below to acknowledge that you will comply with this minor permit modification specified in this letter and send a copy of the signed letter to Wendy Piniak on my staff at your earliest convenience.

Please feel free to contact Wendy Piniak (wendy.piniak@noaa.gov) or Kristy Long (kristy.long@noaa.gov) with any questions about this minor modification.

We look forward to continuing to work with you on sea turtle conservation in North Carolina.

Sincerely,

WIETING.DONNA
A.S.1365710607
Donna S. Wieting
Director, Office of Protected Resources

Digitally signed by
WIETING.DONNA.S.1365710607
Date: 2020.08.24 16:00:30
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I acknowledge the minor modification specified above to Permit No. 16230 issued under Section 10 (a)(1)(B) of the Endangered Species Act to incidentally take threatened and endangered sea turtles in gillnet fisheries operating in inshore waters of North Carolina.

Stephen W. Murphey
Director
N.C. Division of Marine Fisheries

Date



Annual Atlantic Sturgeon Interaction Monitoring of Anchored Gill-Net Fisheries
in North Carolina for Incidental Take Permit Year 2020
(1 September 2019–31 August 2020)

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

Barbie L. Byrd, Meghan P. Gahm, John McConnaughey, and 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

February 2021

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1 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 from the NMFS 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 ITP authorizes 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 (16230) 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 in portions of the state, limited days of fishing depending on location, restricted net height to no more than 15 meshes, restricted total net yardage to a maximum of 2,000 yards per vessel; 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 were restricted to a maximum of 1,000 yards per fishing operation in the southern portion of the state (M-31-2014) (<http://portal.ncdenr.org/web/mf/proclamation-m-31-2014>). The reason 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 that allows for interactions to be counted and extrapolated when applicable across the fishery within a given season and area. Data from observed trips are used for both ITPs. These data are used by the NCDMF in 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 allocation of allowed takes in Management Units A and C to be listed as annual rather than

seasonal takes. The NCDMF explained that annual take thresholds would provide greater flexibility in managing the fishery while minimizing the frequency of full seasonal closures. Further, the NCDMF emphasized that they would actively monitor fisheries and take levels daily to limit takes, particularly dead takes. On 19 July 2017, the NMFS sent a letter to the NCDMF agreeing with the request for the minor modification, but encouraging staff to incorporate any further anticipated minor modifications into the application process for an updated ITP (McConnaughey et al. 2019).

Significant regulatory changes were enacted during fall 2019 for the Southern Flounder (*Paralichthys lethostigma*) fisheries. These regulations were included in Amendment 2 of the Southern Flounder Fishery Management Plan (FMP) adopted by the North Carolina Marine Fisheries Commission on 23 August 2019 (NCDMF 2019). This action was taken because the most recent Southern Flounder stock assessment indicated that the stock is overfished and overfishing is occurring. North Carolina state law requires management actions be taken to end overfishing within 2 years and to recover the stock from an overfished condition within 10 years. To meet these legal requirements, the Division determined that a 62% reduction in harvest was necessary for 2019 and a 72% reduction would be needed beginning in 2020.

To reduce harvest in the anchored large-mesh gill-net fishery, the state was divided into three flounder management areas, Northern, Central, and Southern. These flounder management areas generally aligned with the ITP management units except for the Core Sound portion of B, which was split into a different flounder management area than the rest of B (Figure 1). Each area had specific dates when fishing was allowed: the Northern area was open 15 September–13 October 2019, the Central area was open 1–26 October 2019, and the Southern area was open 1 October–15 November 2019. Yardage restrictions for large-mesh gill nets per the ITPs were further reduced by 25% in the Amendment 2 Flounder FMP (NCDMF 2019). Amendment 2 also reduced soak times of large-mesh gill nets to overnight soaks state-wide. Flounder management areas were still subject to conditions put forth by federally issued ITPs for sea turtle and sturgeon incidental takes and could be closed by proclamation should incidental take thresholds be approached or exceeded. After 15 November, limited allowances for anchored large-mesh gill nets were made during winter and spring for the invasive Blue Catfish (*Ictalurus furcatus*) and American Shad (*Alosa sapidissima*) fisheries. For more information, see the Results section.

Another significant event that occurred during the 2020 ITP Year was the COVID-19 pandemic, which led to a state of emergency declaration by NC's Governor. On 20 March 2020, the NMFS waived the requirement for boats fishing in federally managed fisheries to carry observers or at sea monitors due to concerns about the transmission of COVID-19. The NMFS extended this waiver to the NCDMF Observer Program on 23 March 2020; the waiver was in place throughout the remainder of the 2020 ITP Year.

This annual report outlines observer activity, fishing activity, and total or estimated takes of Atlantic Sturgeon for the previous ITP year, 1 September 2019–31 August 2020. 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). Data for fishing activity, measured in number of trips, are finalized for 2019 (fall and part of winter). After the preliminary data for 2020 are finalized in May 2021, observer coverage and authorized estimated Atlantic Sturgeon takes will be recalculated and finalized estimates will be provided to the NMFS in the form of an addendum.

2 METHODS

2.1 Observer Activity

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 Gill-Net Restricted Area, SGNRA 1, SNGRA2, SNGRA3, SGNRA4, and Mainland Gill-Net 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 2019), winter (December 2019–February 2020), spring (March–May 2020), and summer (June–August 2020). 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. 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. The exception was for management units and seasons where anchored large-mesh gill nets were prohibited whereby the projected fishing and observer trips were set to zero: Management Units B, D, and E during winter and spring, and all management units during summer.

At the beginning of the 2020 spring season (20 March 2020), the NCDMF temporarily halted observer effort because of the COVID-19 pandemic. Marine Patrol officers were still on the water and continued to include alternative platform trips (i.e., using a state-owned vessel to observe at a distance; see description below) as a part of their weekly duties when fishing effort could be found. In June 2020, the NCDMF outlined protocols for observer staff to resume limited field sampling while preventing the spread of COVID-19. These protocols included among other things, the use of alternative platform observations only and no overnight travel. Observers resumed effort under these guidelines on 6 June 2020. Because all observers were based out of the Morehead City office, coverage of areas too far for a day trip (e.g., Cape Fear River, Albemarle Sound) was dependent on Marine Patrol officers.

During fall, winter, and the first few weeks of spring, each observer attempted to obtain three to four trips per working week when fishing activity was occurring. This approach was used again when observers resumed activities in early June (beginning of summer). 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. Additionally, Marine Patrol officers attempted to obtain alternative platform trips as part of their regular duties. 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 given to observers assigned to specific management units so they could attempt to schedule an onboard trip. Other outreach efforts, such as visiting fish houses, were limited during the 2020 ITP Year. The Observer Program website (<http://portal.ncdenr.org/web/mf/observers-program>) was available, but fishermen were not necessarily directed to it during the 2020 ITP Year.

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, when observers were unable to set up onboard trips due to fisherman avoidance or non-compliance, and when observations resumed in June during the ongoing COVID-19 pandemic. Coordination of onboard, alternative platform, and Marine Patrol alternative platform trips occurred regularly to achieve the maximum efficiency, to 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, or PIT) Atlantic Sturgeon. Date, time, tag numbers, location (latitude and longitude, when possible), condition (e.g., no apparent harm, injury including a description of the nature of the injury, or mortality), total length (TL mm), and fork length (FL mm) were recorded for each Atlantic Sturgeon observed. Photographs, fin clips (for genetic analyses), and data on environmental parameters (e.g., salinity, water temperature) were also collected when feasible. Observers were instructed to retain any dead Atlantic Sturgeon when possible. Observers also collected data on location, 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 trip including species, quantities, weights, lengths, and disposition (alive or dead). Limited data such as date and waterbodies surveyed were also collected for unsuccessful alternative platform attempts (hereafter termed "No Contact" trips) by observers and Marine Patrol. All data were coded onto NCDMF data sheets and uploaded to the NCDMF Biological Database for analysis. Observers were debriefed within 24 hours of each trip to obtain data on catch, set locations, gear parameters, and Atlantic Sturgeon interactions to provide total counts and estimates of bycatch in near real time.

Ongoing estimates of observer coverage were calculated 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. No Contact trips were not included in calculations of observer coverage.

At the end of the 2020 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 2019 were finalized (fall and part of winter), but the data for 2020 were preliminary (part of winter, spring, and summer). As a result, observer coverage calculated for winter, spring, and summer were considered estimates.

2.2 Changes in Fishing Effort

The number of reported fishing trips by mesh size category were compiled by season for the 2020 ITP Year and compared to the last two ITP Years (2018 ITP Year and 2019 ITP Year). This assessment was a general comparison to examine trends in fishing effort, as measured by reported trips).

2.3 Incidental Takes

The ITP outlines authorized levels of incidental takes expressed as either estimated total takes based on observer data (Management Unit A) or counts of observed takes (Management Unit B, C, D, E) (Tables 1 and 2). Both types (estimated and counted) were necessary because there were insufficient data available for modeling predicted estimated takes in the ITP application for some combinations of management unit and gear type (Daniel 2014). To compare annual numbers of incidental takes of Atlantic Sturgeon during the 2020 ITP year to authorized levels, actual observed takes were counted for Management Units B, C, D, E and estimated for Management Unit A. The DPS of Atlantic Sturgeon could be determined because genetic results were not available. Incidental take estimates for Management Unit A were calculated using the stratified ratio method where the bycatch rate (Atlantic Sturgeon caught per observed trip) calculated from observer data was multiplied by the total reported fishing trips.

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

Throughout each season, this calculation was employed for each incidental take to determine the estimated number of interactions in Management Unit A by date of capture and disposition. For the real-time estimates, the average number of TTP reported trips from 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 ITP year, the estimated number of interactions for Management Unit A was recalculated using actual number of trips, albeit preliminary for 2020, 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 2019). Bootstrap

replicates were generated by sampling observer trips with replacement 5,000 times within strata (mesh/management unit).

2.4 Compliance

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). Observers also documented calls returned from fishermen, including the response category and notes. Data in the contact log were summarized by month and response category to determine what percentage of phone calls resulted in observer trips.

As part of their regular duties, Marine Patrol officers checked both gill nets for compliance. This effort, combined with the time spent conducting observations and searching for gill nets (No Contact trips), was logged as total “gill-net hours” by officers. Occasionally, citations and/or Notice of Violations (NOVs) were issued to fishermen when gear or fishing practices were out of compliance. A citation is an enforcement action taken by a Marine Patrol officer for person(s) found to be in violation of General Statutes, Rules, or Proclamations under the authority of the Marine Fisheries Commission and is considered a proceeding for District Court. A NOV is the Division’s administrative process to suspend a permit and is initiated by an Officer or Division employee when a permit holder is found to be in violation of general or specific permit conditions. A citation and a NOV may both be initiated by the same permit condition violation; however, they are two separate actions. For this report, NOVs or citations under the codes “EGNP” and “NETG” were compiled, as they are applicable to the estuarine gill-net permits and violations.

3 RESULTS

3.1 Observer Activity

Overall state-wide observer coverage during the 2020 ITP Year was 7.3% of the reported large-mesh gill-net fishery and 1.9% of the small-mesh gill-net fishery (Tables 4 and 5, Figure 2). This level of coverage was based on 297 observed large-mesh gill-net trips (76 onboard and 221 alternative platform) and 149 observed small-mesh gill-net trips (20 onboard and 129 alternative platform). The COVID-19 pandemic and associated waiver from the NMFS impacted observer coverage during spring and summer. Additionally, there were 1,730 No Contact trips (Table 6).

During the 446 total observed trips, observers documented seven Atlantic Sturgeon in large-mesh and none in small-mesh gill nets (Table 7, Figure 2). All interactions occurred in Management Unit A. No self-reported interactions were reported.

A series of proclamations was issued throughout the ITP year for management needs unrelated to protected species interactions (Table 8). A significant change in regulations for the Southern Flounder fishery during fall 2019 was noted above. After these regulations closed anchored large-mesh gill nets, portions of Management Unit A were re-opened to anchored large-mesh gill nets during late fall, winter, and spring (23 November–25 March) for harvesting Blue Catfish and American Shad, and portions of Management Unit C were re-opened to anchored large-mesh gill nets during winter and spring (15 February–15 April) for harvesting American Shad. Separately,

part of Management Unit D was closed to anchored large-mesh gill nets for the entire 2020 ITP Year and closed to anchored small-mesh gill nets effective 20 April 2020.

3.1.1 Fall 2019

During fall 2019 (September–November), the Observer Program achieved 9.9% state-wide coverage of large-mesh gill-net trips, with less than 7% coverage in Management Units B (5.2%) and D (5.1%; Table 4; Figure 3). For small-mesh gill nets, the Observer Program achieved 2.5% state-wide coverage, exceeding 1% observer coverage in all management units (Table 5; Figure 3). There were 324 No Contact trips (Table 6).

Two of the seven (29%) observed Atlantic Sturgeon interactions during the 2020 ITP Year occurred during fall 2019 (Table 7; Figure 3). Both Atlantic Sturgeon were live interactions in large-mesh gill nets set in Management Unit A.

3.1.2 Winter 2019-2020

During winter 2019–2020 (December 2019–February 2020), the Observer Program achieved an estimated 5.7% state-wide coverage of large-mesh gill-net trips, not meeting the minimum 7% coverage overall or in the open Management Units A (6.1%) and C (2.6%; Table 4; Figure 4). This shortage represents an additional 10 trips that were not obtained (eight in management unit A and two in C). Management Units B, D, and E were closed to anchored large-mesh gill nets; however, 35 fishing trips were reported across the three closed units. For small-mesh gill nets, the Observer Program achieved an estimated 3.0% state-wide coverage during winter 2019–2020, exceeding 1.0% in all management units (Table 5; Figure 4). There were 385 No Contact trips (Table 6).

There was one observed Atlantic Sturgeon interaction in a large-mesh gill net and none in small-mesh gill nets during winter 2019–2020. The single interaction was observed alive in Management Unit A (Table 7; Figure 4).

3.1.3 Spring 2020

During spring 2020 (March–May), the Observer Program achieved an estimated 4.1% state-wide coverage of large-mesh gill-net trips, not meeting the minimum 7% coverage overall (Table 4; Figure 5). Only Management Units A and C were open to large-mesh gill nets, and 41 observed trips occurred in A before observations were halted in response to the COVID-19 pandemic. There were 34 fishing trips reported across the three closed units. For small-mesh gill nets, the Observer Program achieved an estimated 1.1% state-wide coverage with the majority of reported and observed trips occurring in Management Unit B (Table 5; Figure 5). There were 448 No Contact trips (Table 6).

Four of seven (57%) observed Atlantic Sturgeon interactions during the 2020 ITP Year occurred during spring 2020. All were live interactions in large-mesh gill nets set in Management Unit A (Table 7; Figure 5). The monthly report for March activities included a single “reported” Atlantic Sturgeon that could be misinterpreted as a self-reported interaction. The sturgeon, in fact, was an interaction in illegal gear that was reported an officer.

3.1.4 Summer 2020

During summer 2020 (June–August), the Observer Program did not observe any large-mesh gill-net trips as the gear was prohibited state-wide (Table 4; Figure 6). Nevertheless, 90 large-mesh fishing trips were reported. For small-mesh gill-net trips, the Observer Program achieved an

estimated 1.4% state-wide coverage, and exceeded 1% in all management units except for B (0.9%; Table 5; Figure 6). There were 573 No Contact trips (Table 6).

There was no observed Atlantic Sturgeon interaction in gill nets during summer 2020 (Table 7; Figure 6).

3.2 Changes in Fishing Effort

Overall large-mesh gill-net effort during the 2020 ITP Year was 62% lower than during the 2019 ITP Year and 66% lower than during the 2018 ITP Year (Figure 7). The decrease in large-mesh trips occurred during fall, spring, and summer in all management units, but not winter. Overall small-mesh gill-net effort during the 2020 ITP Year was 23% higher than during the 2019 ITP Year and 7% higher than during the 2018 ITP Year (Figure 8). When comparing the 2020 and 2019 ITP Years, the increase in small-mesh trips was attributed primarily to fall when small-mesh trips nearly doubled from the previous ITP Year (1,262 trips during the 2019 ITP Year and 2,294 during the 2020 ITP Year). The greater number of small-mesh trips during fall occurred in all management units, but was particularly sharp in Management Unit B (97% increase) and D (199% increase).

3.3 Incidental Takes

All seven observed Atlantic Sturgeon interactions during the 2020 ITP Year were alive in large-mesh gill nets set in Management Unit A (Table 7; Figures 2–6). There were no observed interactions in small-mesh gill nets. Also, there were no self-reported Atlantic Sturgeon interactions. The size range of Atlantic Sturgeon measured by observers was 457–1,829 mm TL ($n = 7$, mean = 780.6, SD = 471.5) and 458 – 620 mm FL ($n = 5$, mean = 550.0, SD = 69.6; Table 7; Figure 9).

Observed take levels during the 2020 ITP year did not reach the thresholds of allowed takes for any management unit (Tables 1 and 2). The seven observed interactions resulted in an estimated 106.9 total interactions, all in large-mesh gill nets. This number represents 5% of the 2,139 allowable sturgeon takes in large-mesh gill nets.

3.4 Compliance

Estuarine Gill-Net Permits were issued to 2,629 fishermen during the 2020 ITP year; however, only 598 of them reported trips using anchored estuarine gill-net gear. Using the full list of EGNPs, 970 phone calls or in-person contacts were made with 5% ($n = 53$) representing occasions where a fishermen returned a phone call. Nevertheless, only 2% ($n = 24$) of the 970 contacts resulting in a booked trip (Figure 10). The greatest number of calls occurred during fall, and the least number of calls occurred in spring when observations temporarily stopped due to the COVID-19 pandemic.

During the 2020 ITP Year, Marine Patrol officers spent 1,992 hours investigating the proper and legal use of gill nets in estuarine waters, conducting and entering observations, and searching for gill nets to be observed (No Contact; Table 9). During these hours, they issued 31 citations (Tables 9–10). In addition to citations, officers issued nine Notice of Violations (NOVs) for fishermen found to be out of compliance with the EGNP (Table 11).

3.5 Marine Mammals

There was no observed marine mammal take during the 2020 ITP year.

4 DISCUSSION

Incidental takes of Atlantic Sturgeon during the 2020 ITP Year were below authorized levels. The combined number of estimated and counts of sturgeon was similar to the 2019 ITP Year, with the greatest difference being fewer interactions observed in fall and more in spring during the 2020 ITP Year. All interactions were alive, thereby limiting negative effects of these interactions on the DPS. Additionally, all interactions occurred in large-mesh gill nets during the 2020 ITP Year. New regulations from Amendment 2 imposed on the state-wide Southern Flounder fishery greatly reduced large-mesh gill-net effort during fall and prevented the previous low levels of effort in this fishery during spring and summer. Limited allowance for anchored large-mesh gill nets occurred only during winter and spring for portions of Management Unit A and C, and for an additional seven days during late fall in portions of Management Unit A.

Prior to the temporary halt of observer-led trips in March because of the COVID-19 pandemic, coverage of large-mesh gill nets exceeded the 7% minimum overall for fall, but not for winter. The shortage of observer trips during winter is despite the 385 No Contact trips reported by Marine Patrol and observers. During the same time, overall coverage of small-mesh gill nets exceeding the 1% minimum for fall and winter. Coverage of small-mesh gill nets during the spring and summer also met or exceeded the minimum 1% despite the limitations resulting from COVID-19. Even when observers returned to the field in June, capacity was halved because alternative platform observations require two observers. Marine Patrol officers contributed greatly to this continued coverage during spring when observers did not go in the field, and in summer when observer capacity was reduced. Nevertheless, coverage of large-mesh gill nets during spring in open management units (A and C) did not meet the minimum 7%. It is surprising that there were reported fishing trips using anchored large-mesh gill nets during management units and seasons when this gear was prohibited. These reported trip data are being examined; it is likely that the dealers recorded fishing trips that used run-around/strike gill nets incorrectly as anchored gill nets during these months.

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 success rate of observers even talking to a fisherman is low (<30%). This assessment of success rate and the assignment of call lists are being re-evaluated for the 2021 ITP Year given that only 23% of EGNP holders during the 2020 ITP Year reported trips with anchored gill-net gear. For the contacts that were made during the 2020 ITP Year, a sharp decrease in phone calls was made during the 2020 ITP Year (n = 970) compared to the previous year (n = 5,852), due in large part to effects of COVID-19 on observer activity.

Although onboard observations are the preferred method, alternative platform observations played a critical role to achieving the minimum percent coverage, especially after the COVID-19 pandemic. In fact, 78% of all observed trips during the 2020 ITP Year were alternative platform observations. Alternative platform observations have several advantages. Primarily, they do not rely on previous contact with fishermen to obtain an observable trip. Alternative platform observations also allow Marine Patrol to conduct observations as part of their daily patrols; their

observed trips contribute a substantial portion of the total alternative platform observations. Even for fishermen who would willingly take an observer, many vessels used by gillnetters in estuarine waters are too small to easily accommodate an observer, making alternative platform observations ideal for capturing trips with this size class of vessel (Kolkmeier et al. 2007; however, the alternative platform method 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. These activities will resume when risks associated with COVID-19 are abated.

Significant staffing changes occurred during the 2020 ITP Year. The program supervisor left in September 2019 and the position was not filled until January 2020. The observer coordinator left in June 2019 and the position was not filled until March 2020. Additionally, a data analyst position was created in July 2019. These filled positions should increase efficiencies in the program. Changes in observer staffing also occurred during the 2020 ITP Year. Two long-term temporary observers left or significantly reduced their hours before March. Those positions were not refilled when observations resumed in June given the uncertainty of the effects of COVID-19 on the safety of continued, but limited, observation efforts.

The NCDMF observer program uses a combination of real-time monitoring of Atlantic Sturgeon takes and an adaptive management approach to successfully control the number of interactions in estuarine gill-net fisheries. Specific actions to limit Sturgeon take were not necessary during the 2020 ITP Year. The new management measures for Southern Flounder significantly reduced large-mesh gill-net effort throughout the year, especially during fall 2019 when effort was historically high. These management measures, along with challenges faced from the COVID-19 pandemic and its' associated field restrictions, presented additional and unique challenges in predicting fishing effort and obtaining coverage during the 2020 ITP Year. These ongoing changes require the Observer Program to incorporate new approaches to project observer coverage for the fishery in subsequent ITP years as the fishery is undergoing regulatory changes that impact fishermen strategy and effort.

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6 TABLES

Table 1. For large-mesh (≥ 5 inch) gill nets, a comparison of actual ($n = 7$) annual incidental takes of Atlantic Sturgeon by management unit during the 2020 ITP Year to authorized thresholds expressed as either estimated total takes based on observed takes (Management Unit A) or counts of actual observed takes (Management Units B – E). 95% confidence intervals are provided in brackets. Genetic results were not available to determine Distinct Population Segment (DPS) of observed interactions.

Management Unit	Season	Authorized				Actual	
		Carolina DPS		Other DPS		All DPS	
		Alive	Dead	Alive	Dead	Alive	Dead
A	Annual	1,604	65	535	21	106.9 [40.5, 265.8]	0
B	Annual	24	6	9	0	0	0
C	Annual	11	5	4	0	0	0
D	Annual	8	2	n/a	n/a	0	0
E	Annual	8	2	n/a	n/a	0	0
Total	Annual	1,655	80	548	21	106.9	0

Table 2. For small-mesh (<5 inch) gill nets, a comparison of actual (n = 0) annual incidental takes of Atlantic Sturgeon by management unit during the 2020 ITP Year to authorized thresholds expressed as counts (not estimates) of actual observed takes.

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

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 inch) gill nets, observer coverage (observed trips/fishing trips) calculated by season and management unit for the 2020 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data for the previous five years and using actual reported trips from the program for the 2020 ITP Year. Estimated trips = “*closed*” when/where anchored large-mesh gill nets were prohibited, and any reported trips are *italicized*. Trip Ticket Program data are considered finalized for 2019 and preliminary for 2020.

Season	Management Unit	Large Mesh				
		Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2019	A	759	636	81	10.7	12.7
	B	373	553	30	8.0	5.4
	C	297	190	29	9.8	15.3
	D	195	217	11	5.6	5.1
	E	342	493	56	16.4	11.4
	Overall	1,966	2,089	207	10.5	9.9
Winter 2019-2020	A	835	793	48	5.7	6.1
	B	<i>closed</i>	20	<i>closed</i>	<i>closed</i>	<i>closed</i>
	C	46	39	1	2.2	2.6
	D	<i>closed</i>	3	<i>closed</i>	<i>closed</i>	<i>closed</i>
	E	<i>closed</i>	12	<i>closed</i>	<i>closed</i>	<i>closed</i>
	Overall	881	867	49	5.6	5.7
Spring 2020	A	743	959	41	5.5	4.3
	B	<i>closed</i>	31	<i>closed</i>	<i>closed</i>	<i>closed</i>
	C	197	4	0	0.0	0.0
	D	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	E	<i>closed</i>	3	<i>closed</i>	<i>closed</i>	<i>closed</i>
	Overall	940	997	41	4.4	4.1
Summer 2020	A	<i>closed</i>	65	<i>closed</i>	<i>closed</i>	<i>closed</i>
	B	<i>closed</i>	18	<i>closed</i>	<i>closed</i>	<i>closed</i>
	C	<i>closed</i>	1	<i>closed</i>	<i>closed</i>	<i>closed</i>
	D	<i>closed</i>	0	<i>closed</i>	<i>closed</i>	<i>closed</i>
	E	<i>closed</i>	6	<i>closed</i>	<i>closed</i>	<i>closed</i>
	Overall	<i>closed</i>	90	<i>closed</i>	<i>closed</i>	<i>closed</i>
Annual		3,787	4,043	297	7.8	7.3

Table 5. For small-mesh (<5 inch) gill nets, (observed trips/fishing trips) calculated by season and management unit for the 2020 ITP Year. Observer coverage was calculated using estimated fishing trips based on the Trip Ticket Program data for the previous five years and using actual reported trips from the program for the 2020 ITP Year. Trip Ticket Program data are considered finalized for 2019 and preliminary for 2020. On April 4, 2020, a portion of management Unit D was closed to small-mesh gill nets.

Season	Management Unit	Small Mesh				
		Estimated Fishing Trips	Reported Fishing Trips	Observed Trips	Coverage - Estimated Fishing Trips	Coverage - Reported Fishing Trips
Fall 2019	A	252	383	5	2.0	1.3
	B	729	1,140	12	1.6	1.1
	C	140	124	3	2.1	2.4
	D	228	302	15	6.6	5.0
	E	447	345	23	5.1	6.7
	Overall	1,796	2,294	58	3.2	2.5
Winter 2019-2020	A	859	589	9	1.0	1.5
	B	505	544	10	2.0	1.8
	C	255	216	14	5.5	6.5
	D	51	41	2	3.9	4.9
	E	95	129	10	10.6	7.8
	Overall	1,765	1,519	45	2.5	3.0
Spring 2020	A	743	612	2	0.3	0.3
	B	1,347	1,274	12	0.9	0.9
	C	197	315	4	2.0	1.3
	D	61	53	0	0.0	0.0
	E	126	111	7	5.6	6.3
	Overall	2,474	2,365	25	1.0	1.1
Summer 2020	A	164	212	3	1.8	1.4
	B	836	959	9	1.1	0.9
	C	117	58	4	3.4	6.9
	D	45	11	1	4.5	18.2
	E	203	226	4	2.0	1.8
	Overall	1,363	1,466	21	1.5	1.4
Annual		7,398	7,644	149	2.0	1.9

Table 6. Number of "No Contact" trips (n = 1,730) by season and management unit completed by Marine Patrol and observers during the 2020 ITP Year. No Contact refers to unsuccessful attempts to find and observe anchored gill-net effort.

Season	Management Unit	Marine Patrol No Contact Trips	Observer No Contact Trips	Total No Contact Trips
Fall 2019	A	66	5	71
	B	28	8	35
	C	21	3	24
	D	56	6	63
	E	130	1	131
	Overall	301	23	324
Winter 2019-2020	A	67	10	77
	B	22	3	25
	C	31	7	38
	D	90	2	92
	E	151	2	153
	Overall	361	24	385
Spring 2020	A	89	1	90
	B	40	0	40
	C	34	2	36
	D	110	0	110
	E	173	0	173
	Overall	445	3	448
Summer 2020	A	104	0	104
	B	51	26	77
	C	32	12	44
	D	147	8	156
	E	191	2	193
	Overall	525	48	573
Annual		1,632	98	1,730

Table 7. Summary of observed Atlantic Sturgeon interactions in large-mesh (≥ 5 inch, $n = 7$) gill nets during the 2020 ITP Year. No interactions were observed in small-mesh (< 5 inch) gill nets. PIT = Passive Integrated Transponders

Date	Season	Management Unit	Mesh Size Category	Latitude (N)	Longitude (W)	Disposition	PIT Number	Length (mm)	
								Total	Fork
9/19/2019	Fall	A	large	36.06291	76.15777	alive	982.000364358261	529	458
10/3/2019	Fall	A	large	35.98000	75.86000	alive	n/a	1829	n/a
1/6/2020	Winter	A	large	36.10956	76.71458	alive	982.000364301588	651	560
3/8/2020	Spring	A	large	36.02432	76.59752	alive	n/a	457	n/a
3/10/2020	Spring	A	large	36.20100	76.74590	alive	982.000410598963	582	502
3/12/2020	Spring	A	large	36.01796	76.68732	alive	989.001001951955	701	610
3/13/2020	Spring	A	large	36.04860	76.68840	alive	985.111000930597	715	620

Table 8. Regulations for Management Units by date and regulation change for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets for the 2020 ITP Year.

Year	Date(s)	Regulation change
2019	Sep 4	This proclamation superseded Proclamation FF-3-2016, dated January 21, 2016 and FF-48-2018, dated November 27, 2018. It closed the commercial flounder fishery to all gears in Internal Coastal Waters and to all gears except trawls in the Atlantic Ocean Waters. The commercial fishery will re-open by proclamation later in 2019. This action was being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (FF-31-2019)
2019	Sep 4	This proclamation superseded Proclamation M-11-2019 dated April 26, 2019. This proclamation closed all of Management Unit A to the use of gill nets with a stretched mesh length of greater than $3 \frac{3}{4}$ inch stretched mesh (except as described in Section IV.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-13-2019)
2019	Sep 4	This proclamation superseded Proclamation M-12-2019 dated June 11, 2019. This proclamation closed all Management Units south of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches and greater (except as described in Section III.) in accordance Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-14-2019)
2019	Sep 15	This proclamation supersedes Proclamation M-13-2019 dated August 30, 2019. It opens the previously closed Management Unit A to the use of gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan and the Sea Turtle ITP. It maintains small mesh gill net attendance requirements in the entirety of Management Unit A. (M-15-2019)
2019	Sep 15	This proclamation superseded Proclamation FF-31-2019, dated August 28, 2019. It established commercial flounder season dates for Internal Coastal Waters, by Flounder Management Area. It maintained a 15-inch total length minimum size limit. It maintained the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It also made it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action was being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (FF-34-2019)
2019	Sep 30	This proclamation superseded Proclamation M-15-2019 dated September 12, 2019. It made it unlawful for Recreational Commercial Gear License holders to use gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches. It maintained the openings in Management Unit A to the use of gill nets with stretched mesh lengths of $5 \frac{1}{2}$ inches through $6 \frac{1}{2}$ inches in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan and the Sea Turtle ITP. It maintained small mesh gill net attendance requirements in the entirety of Management Unit A. (M-17-2019)

Table 8. (continued) Regulations for Management Units by date and regulation change for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets for the 2020 ITP Year.

2019	Oct 1	This proclamation superseded Proclamation M-14-2019 dated August 30, 2019. This proclamation opened Management Units B (subunits only), C, D2 and E to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-16-2019)
2019	Oct 13	This proclamation superseded Proclamation M-17-2019 dated September 27, 2019. It closed all of Management Unit A to the use of gill nets with a stretched mesh length of greater than 3 ¾ inch stretched mesh (except as described in Section IV.) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. It maintained small mesh gill net attendance in Management Unit A. (M-20-2019)
2019	Oct 26	This proclamation superseded Proclamation M-16-2019 dated September 27, 2019. This proclamation closed Management Units B (subunits SGNRA 1-4, MGNRA and portions of CGNRA) and Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.). It maintained openings in Management Units D2 and E. These actions were being taken in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-21-2019)
2019	Nov 15	This proclamation supersedes proclamation M-21-2019 dated October 23, 2019. This proclamation closes all Management Units South of Management Unit A to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section III.). This action is being taken in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-22-2019)
2019	Nov 23	This proclamation superseded Proclamation M-20-2019 dated October 10, 2019. It opened portions of Management Unit A to the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in accordance with Amendment 2 to the N. C. Southern Flounder Fishery Management Plan. It maintained attendance on small mesh nets. (M-23-2019)
2019	Dec 1	This proclamation superseded Proclamation M-23-2019 dated November 21, 2019. In Management Unit A, it removed attendance requirements and implemented vertical height restrictions for anchored gill nets with a stretched mesh length of 3 inches through 3 ¾ inches. It continued to allow the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-24-2019)
2020	Jan 1	This proclamation superseded Proclamation M-24-2019 dated November 27, 2019. In Management Unit A, it was unlawful to use small mesh gill nets with a stretched mesh length other than 3 ¼ inches, except as described in Section II. C. and D. and Section IV. It continued to allow the use of gill nets with a stretched mesh length of 5 ½ inches through 6 ½ inches in certain portions of Management Unit A. (M-26-2019)
2020	Feb 15	This proclamation superseded Proclamation M-22-2019 dated November 12, 2019. This proclamation opened Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches and implemented gear exemptions for the shad fishery in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-2-2020)

Table 8. (continued) Regulations for Management Units by date and regulation change for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets for the 2020 ITP Year.

2020	Mar 2	This proclamation opens a portion of Management Unit A to the use of floating gill nets configured for harvesting American shad by removing vertical height restrictions for all gill nets with stretched mesh lengths of 5 ¼ through 6 ½ inches. (M-3-2020)
2020	Mar 25	This proclamation supersedes Proclamation M-3-2020 dated February 28, 2020. In Management Unit A, it removes gill nets configured for harvesting American shad. It maintains restrictions on the use of fixed, stationary, or unattended gill nets and allows the use of run-around, strike, drop, and trammel gill nets and with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-5-2020)
2020	Apr 15	This proclamation maintains closures in all other management units south of Management Unit A and closes Management Unit C to the use of gill nets with a stretched mesh length of 4 inches through 6 ½ inches (except as described in Section II.; coincides with the commercial shad fishery closure) in accordance with Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. (M-6-2020)
2020	Apr 20	This proclamation implements yardage and time setting restrictions for gill nets with a stretched mesh length less than 4 inches and attendance restrictions for gill nets with a stretched mesh length less than 5 inches in the Internal Coastal Waters of the state, south of Management Unit A. Yardage limit increases will be considered for the May-October Spanish mackerel drift gill net fishery. Those increases will be implemented by proclamation at a later time. This proclamation also closed D1 to anchored nets with a stretched mesh length less than 4 inches. (M-4-2020)
2020	May 1	This proclamation implements attendance requirements for gill nets with a stretched mesh length less than 4 inches in Subunit B.1. (M-9-2020)
2020	May 1	This proclamation implements small mesh gill net attendance requirements. It maintains restrictions on the use of run-around, strike, drop, and trammel gill nets and with a stretched mesh length of 5 ½ inches through 6 ½ inches in portions of Management Unit A. (M-10-2020)
2020	May 8	This proclamation increases yardage limits for the commercial Spanish mackerel drift gill net fishery in Management Unit B. (M-11-2020)

Table 8. *(continued)* Regulations for Management Units by date and regulation change for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets for the 2020 ITP Year.

2020	Jun 15	<p>This proclamation supersedes Proclamation FF-34-2019, dated September 12, 2019. It establishes commercial flounder season dates for Internal Coastal Waters by Flounder Management Area. It maintains a 15-inch total length minimum size limit. It also maintains the regulation making it unlawful to possess flounder taken from anchored large mesh gill nets with a stretched mesh length less than 6 inches. It makes it unlawful for a commercial fishing operation to possess flounder from the Atlantic Ocean Waters taken by any method other than trawls. This action is being taken to comply with the requirements of Amendment 2 to the N.C. Southern Flounder Fishery Management Plan. The flounder harvest period for the Northern Management Area will open at 12:01 A.M., Tuesday, September 15, 2020 and close at 8:00 P.M., Tuesday, October 6, 2020. The flounder harvest period for the Central Management Area will open at 12:01 A.M., Thursday, October 1, 2020 and close at 8:00 P.M., Monday, October 19, 2020. The flounder harvest period for the Southern Management Area will open at 12:01 A.M., Thursday, October 1, 2020 and close at 8:00 P.M., Monday, November 2, 2020. (FF-25-2020)</p>
2020	Jul 22	<p>This proclamation reduced the yardage limit for gill nets with a stretched mess length less than 4 inches in Management Unit B. Yardage limit decrease in Management Unit B were being implemented to coincide with the 500 lb daily trip limit in the commercial Spanish mackerel fishery. (M-12-2020)</p>

Table 9. Number of gill-net hours logged and citations issued by Marine Patrol officers by season during the 2020 ITP Year. Gill-net hours represent time officers checked gill nets for compliance, conducted observations, or searched for trips to observe (No Contact trips). See Table 10 for details on individual citations.

Season	Gill-Net Hours	# Citations
Fall 2019	511	18
Winter 2019-2020	408	4
Spring 2020	542	6
Summer 2020	531	3
Total	1,992	31

Table 10. Citations written by Marine Patrol for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets by season and violation code during the 2020 ITP Year. For violations with an associated Notice of Violation (NOV), the notice date is provided. All details for citations with a NOV are described in Table 11.

Season	Date	Violation Code	Violation Description	NOV Notice Date
Fall 2019	9/20/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a
	9/20/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	9/23/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a
	9/23/2019	NETG04	Leave gill net in waters when could not be legally fished	n/a
	9/23/2019	NETG03	Using gill net with improper buoys or identification	n/a
	9/23/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	9/26/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	10/14/2019	NETG02	Using gill net without buoys or identification	10/21/2019
	10/14/2019	NETG46	Set or retrieve large mesh gill nets later than one hour after sunrise on Tuesday through Friday. Proclamation M-8-2010	10/21/2019
	10/14/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	10/23/2019	NETG29	RCGL gear without proper buoys 3J.0103(c)	n/a
	10/24/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	10/25/2019	NETG03	Using gill net with improper buoys or identification	n/a
	10/28/2019	NETG22	Improperly set gill net	n/a
	10/31/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	11/2/2019	NETG37	Leave small mesh gill nets unattended 3J.0103	n/a
	11/2/2019	NETG02	Using gill net without buoys or identification	n/a
	11/4/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
	Winter 2020	12/6/2019	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit
12/6/2019		NETG16	Use an unattended gill net in a restricted area	n/a
12/20/2019		EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)	1/15/2020
	1/15/2020	NETG02	Using gill net without buoys or identification	n/a

Table 10. (continued) Citations written by Marine Patrol for large-mesh (≥ 5 inch) and small-mesh (< 5 inch) gill nets by season and violation code during the 2020 ITP Year. For violations with an associated Notice of Violation (NOV), the notice date is provided. All details for citations with a NOV are described in Table 11.

Season	Date	Violation Code	Violation Description	NOV Notice Date
Spring 2020	3/27/2020	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)	3/30/2020
	4/11/2020	NETG30	Leave RCGL gill net unattended 3O.09302	n/a
	5/10/2020	NETG02	Using gill net without buoys or identification	n/a
	5/10/2020	NETG37	Leave small mesh gill nets unattended 3J.0103	n/a
	5/14/2020	NETG03	Using gill net with improper buoys or identification	n/a
	5/14/2020	NETG04	Leave gill net in waters when could not be legally fished	n/a
	5/25/2020	EGNP01	Fishing gill net without a valid Estuarine Gill Net Permit	n/a
Summer 2020	7/14/2020	NETG04	Leave gill net in waters when could not be legally fished	n/a
	7/14/2020	NETG02	Using gill net without buoys or identification	n/a

Table 11. Notice of Violations (NOVs) issued by season, date, and violation code for the Estuarine Gill-Net Permit for ITP Year 2020. Details for NOV with an associated citation are described in Table 10.

Season	Notice Date	Serve Date	Violation code	Violation description
Fall 2019	9/18/2019	9/19/2019	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)
	10/21/2019	10/25/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/21/2019	10/28/2019	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)
	10/21/2019	10/28/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
	10/23/2019	10/27/2019	EGNP30	Failure to comply with gill net configurations outlined in proclamation
	10/23/2019	10/27/2019	EGNP10	Set more than the legal length of gill net
	10/23/2019	10/27/2019	EGNP09	Failure to set or retrieve nets in accordance with time restrictions.
Winter 2019-2020	1/15/2020	1/19/2020	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)
Spring 2020	3/30/2020	4/27/2020	EGNP99	Failure to comply with statutes(s), rules(s), and/or proclamation(s)

7 FIGURES

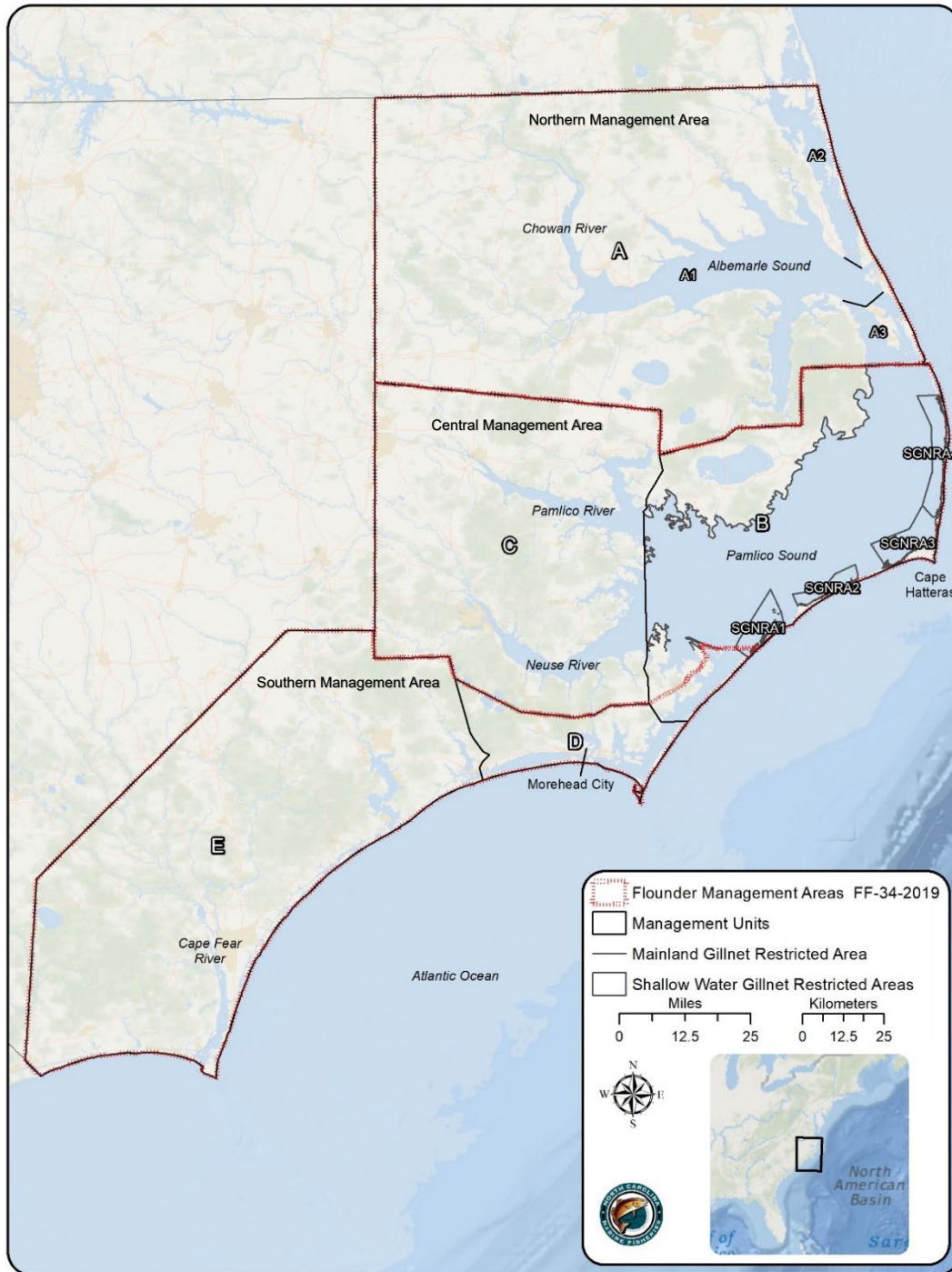


Figure 1. Management units (A1, A2, A3, B, C, D, and E) as outlined in the Incidental Take Permit (ITP) Conservation Plan and used by the Observer Program during the 2020 ITP Year. In the Pamlico Sound portion of B, gill nets with a mesh size of ≥ 4 inches were confined to Shallow Water Gill-Net Restricted Areas (SGNRA) 1–4 and the Mainland Gill-net Restricted Area (200 yards from shore). The three Southern Flounder Management Areas are shown with red hatched lines: northern, central, and southern.

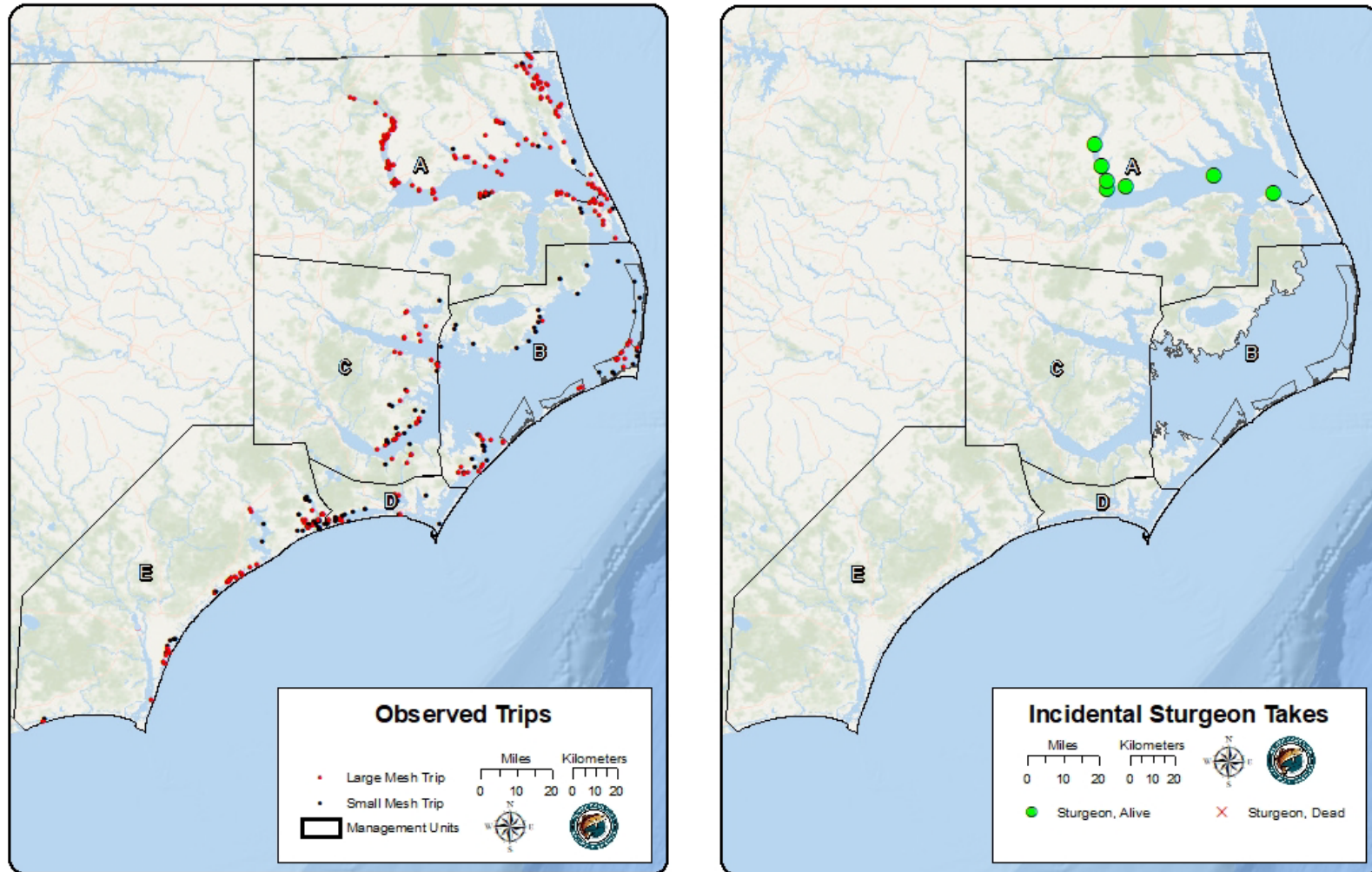


Figure 2. For the entire 2020 ITP Year, observed gill-net trips (left) by mesh-size category (297 large-mesh = ≥ 5 inch; 149 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 7$; dead, $n = 0$) across management units.

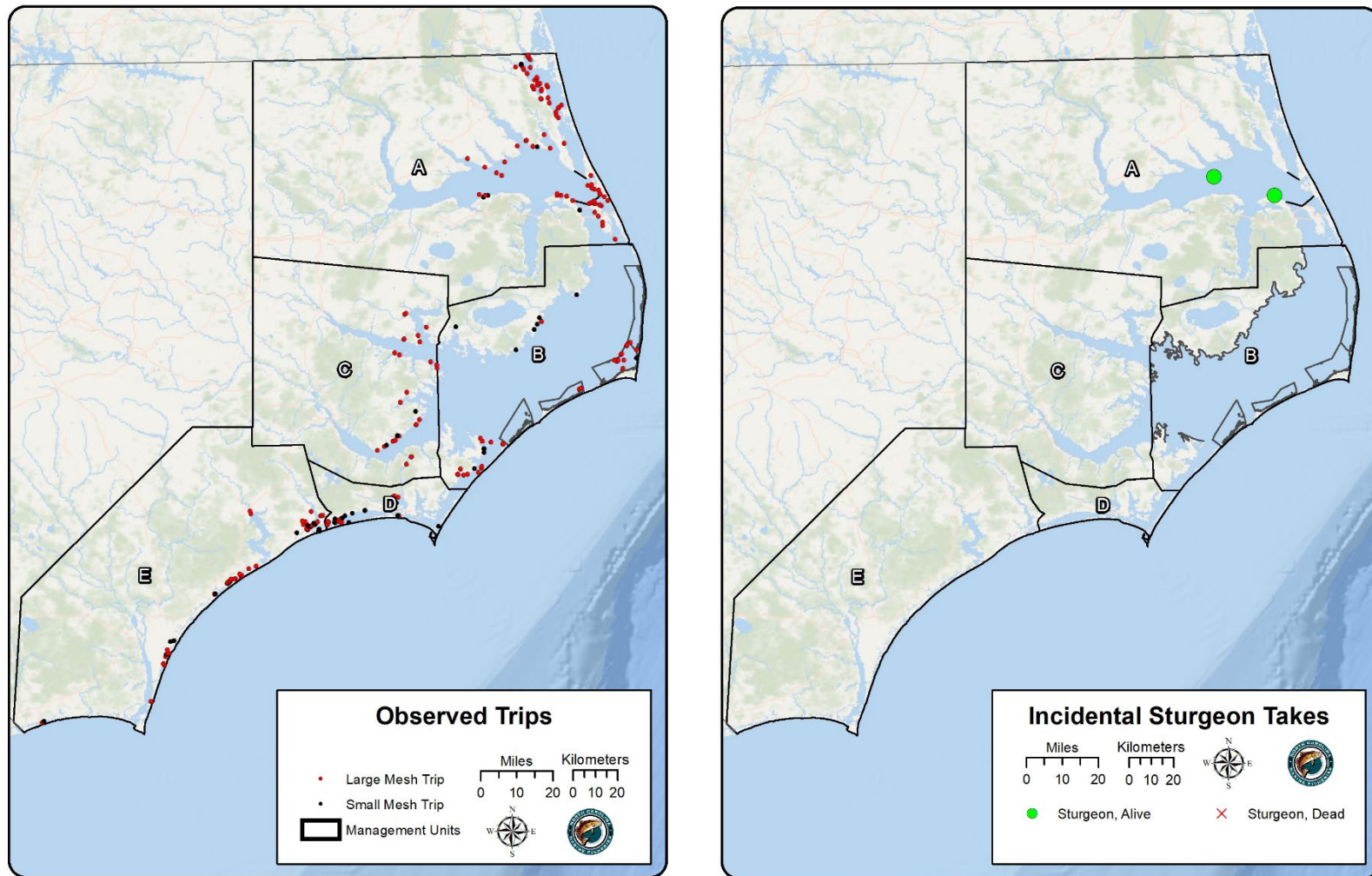


Figure 3. For fall 2019, observed gill-net trips (left) by mesh-size category (207 large-mesh = ≥ 5 inch; 58 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 2$; dead, $n = 0$) across management units.

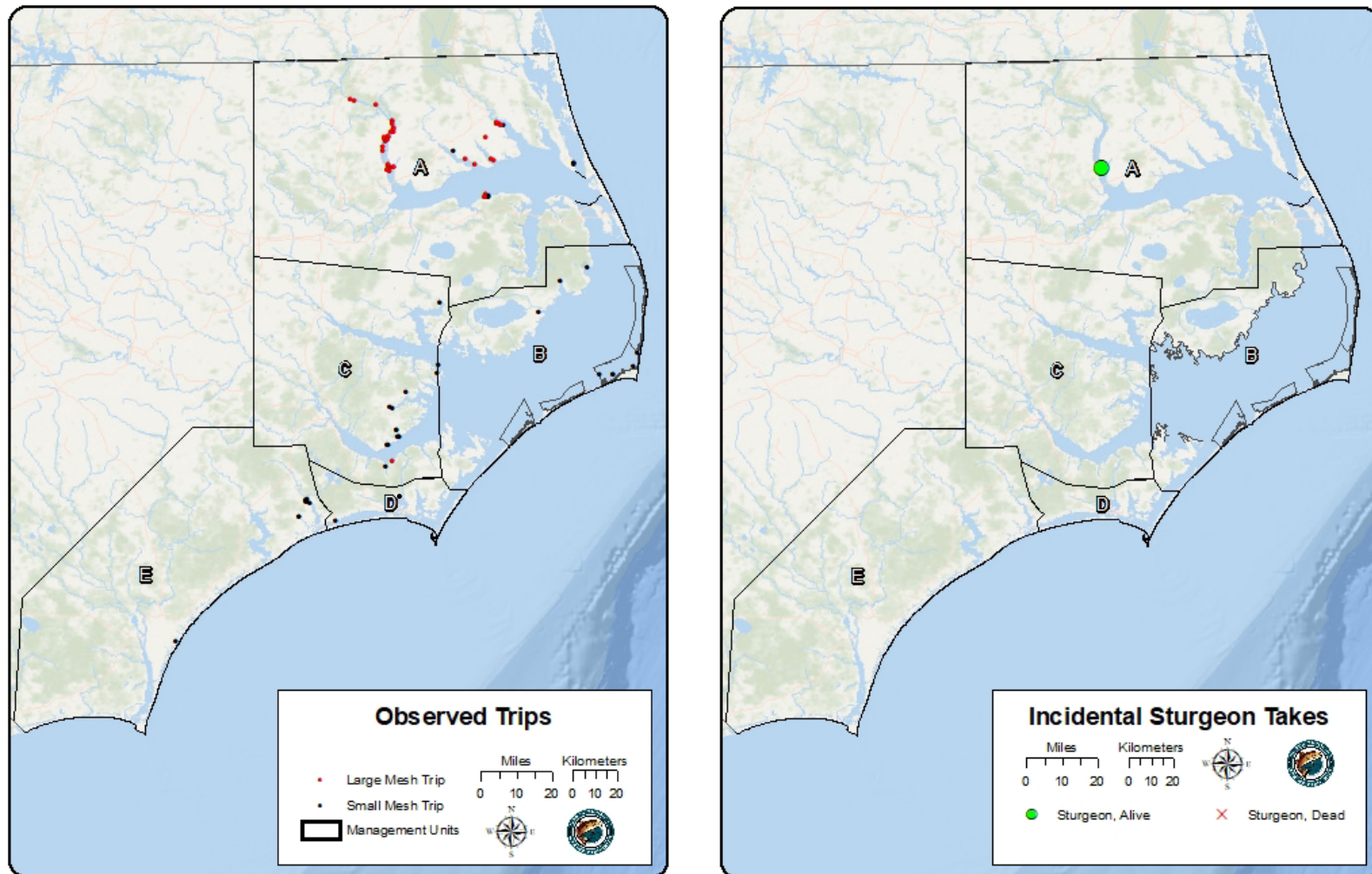


Figure 4. For winter 2019–2020, observed gill-net trips (left) by mesh-size category (49 large-mesh = ≥ 5 inch; 45 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 1$; dead, $n = 0$) across management units.

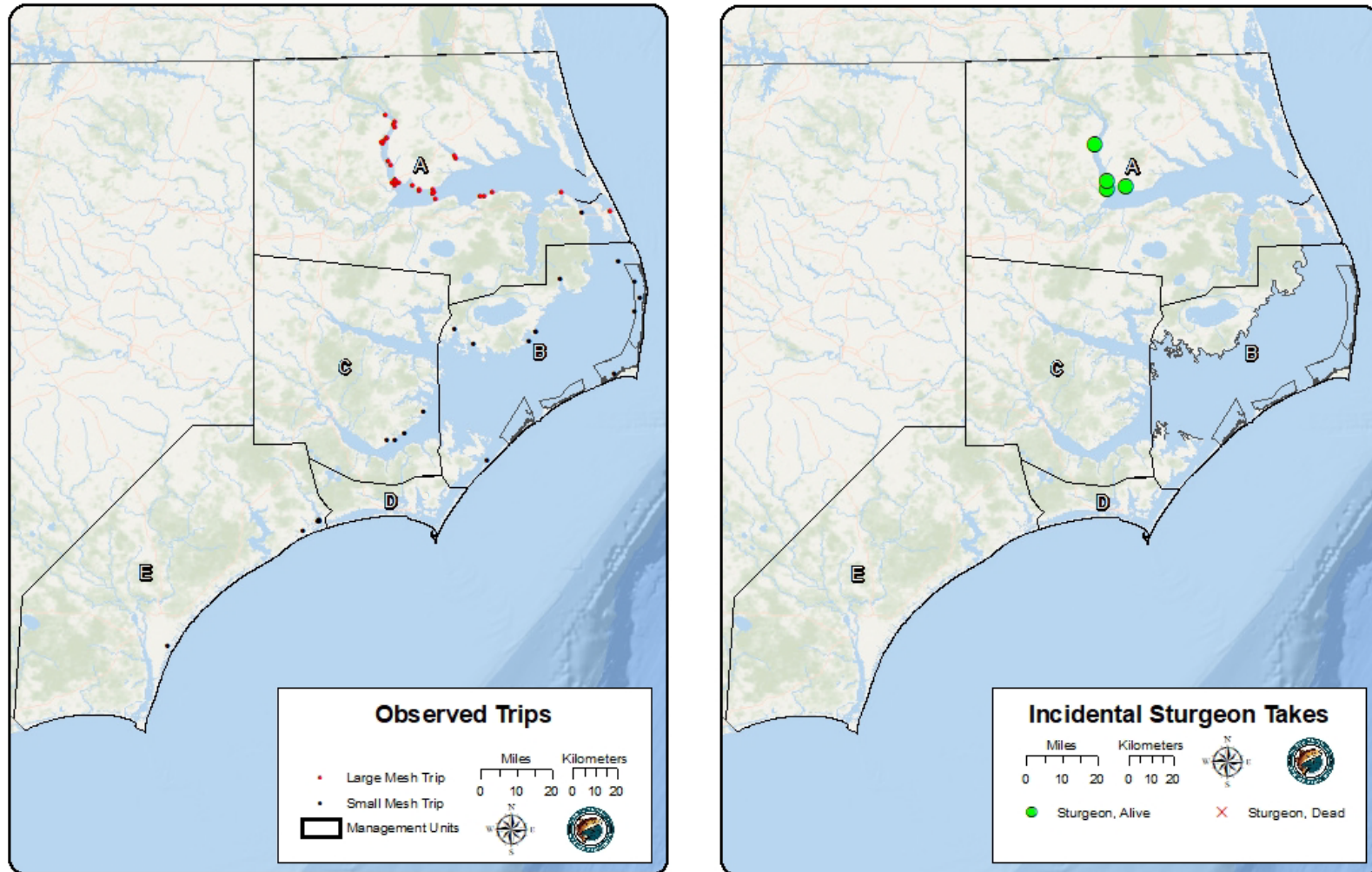


Figure 5. For spring 2020, observed gill-net trips (left) by mesh size-category (41 large-mesh = ≥ 5 inch; 25 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 4$; dead, $n = 0$) across management units.

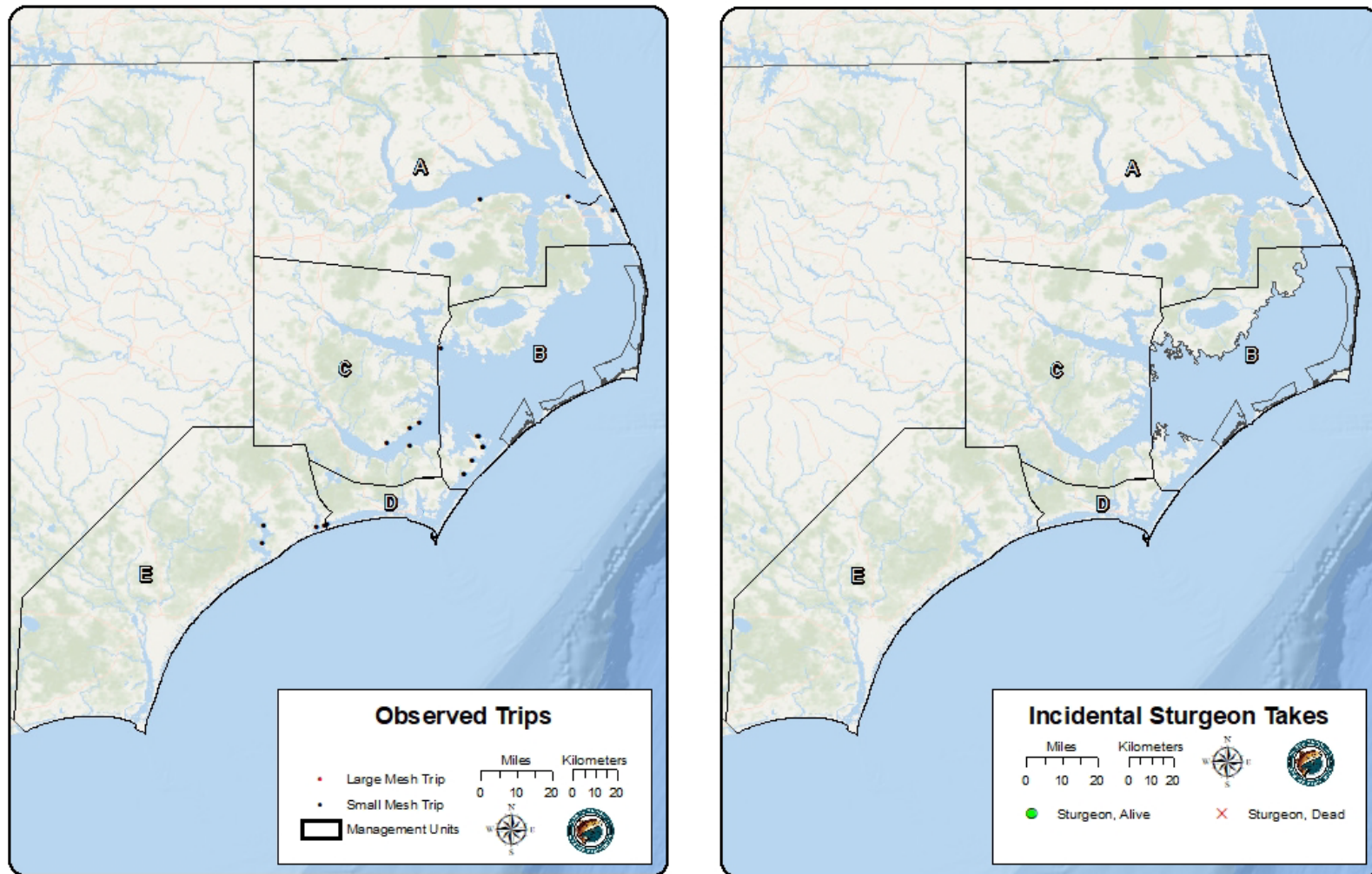


Figure 6. For summer 2020 observed gill-net trips (left) by mesh-size category (0 large-mesh = ≥ 5 inch; 21 small-mesh = < 5 inch) and Atlantic Sturgeon interactions (right) by disposition (alive, $n = 0$; dead, $n = 0$) across management units.

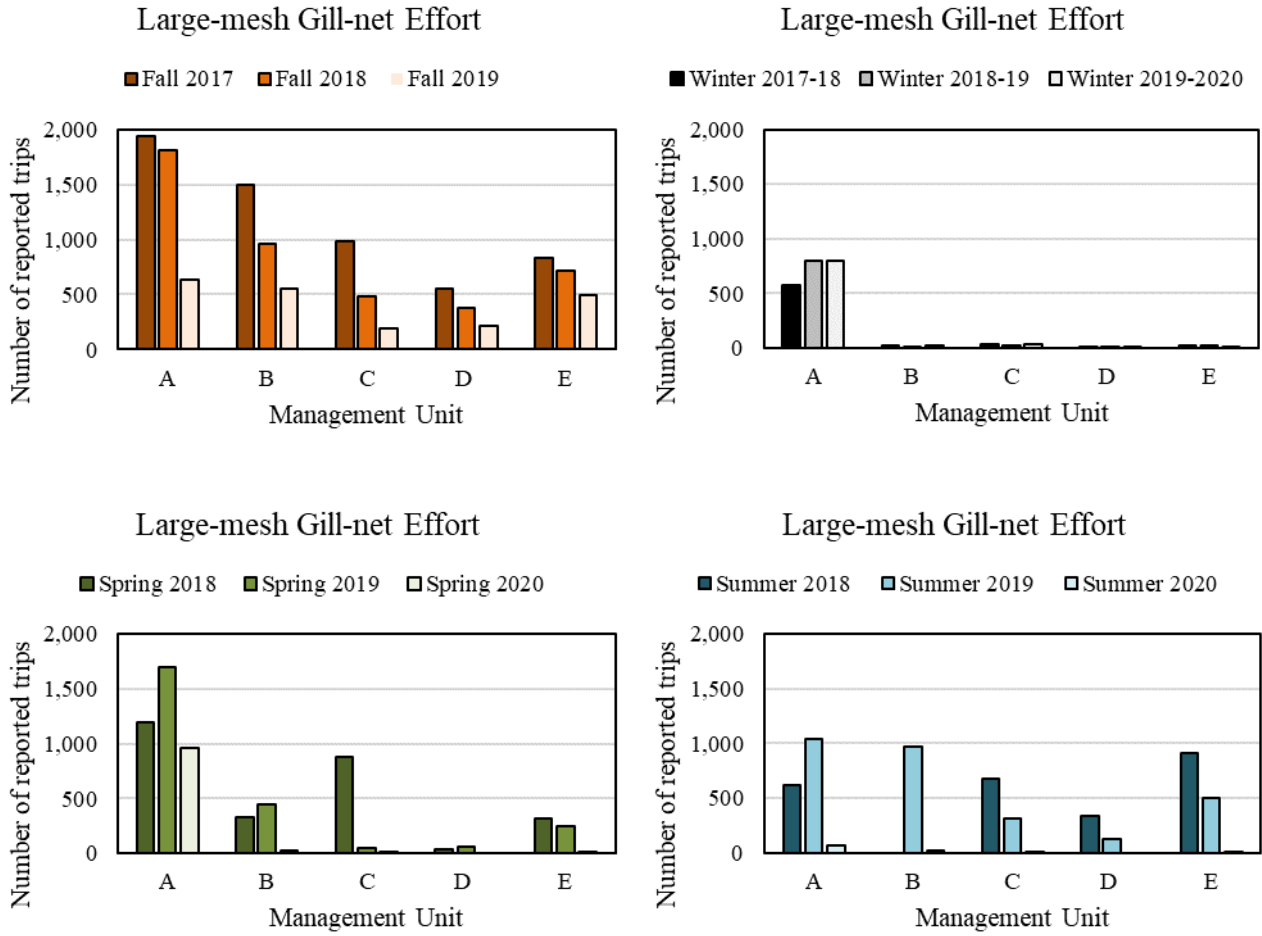


Figure 7. Number of fishing trips using large-mesh (≥ 5 inch) gill nets reported to the Trip Ticket Program during the 2018, 2019, and 2020 ITP Years by season and management unit.

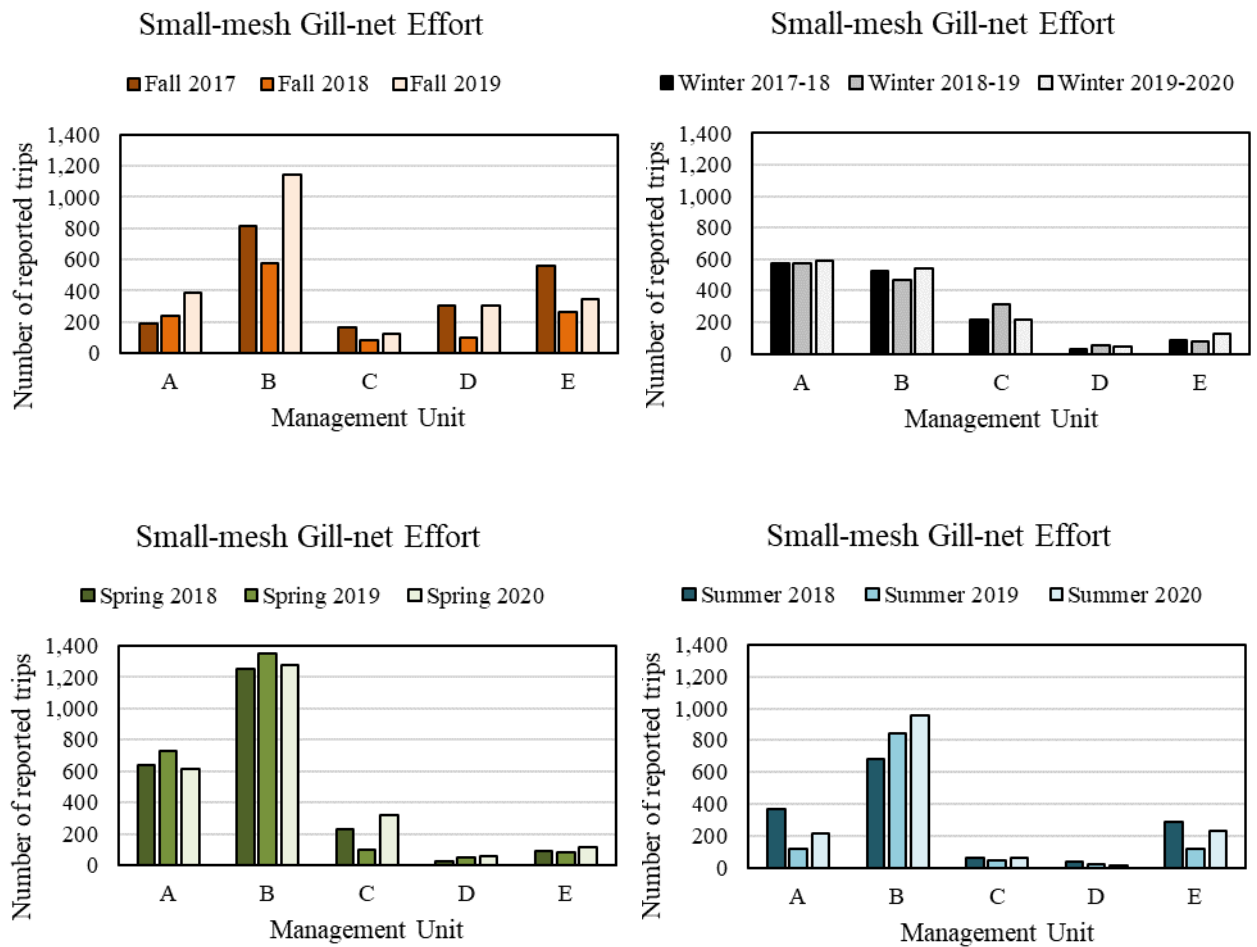


Figure 8. Number of fishing trips using small-mesh (<5 inch) gill nets reported to the Trip Ticket Program during the 2018, 2019, and 2020 ITP Years by season and management unit

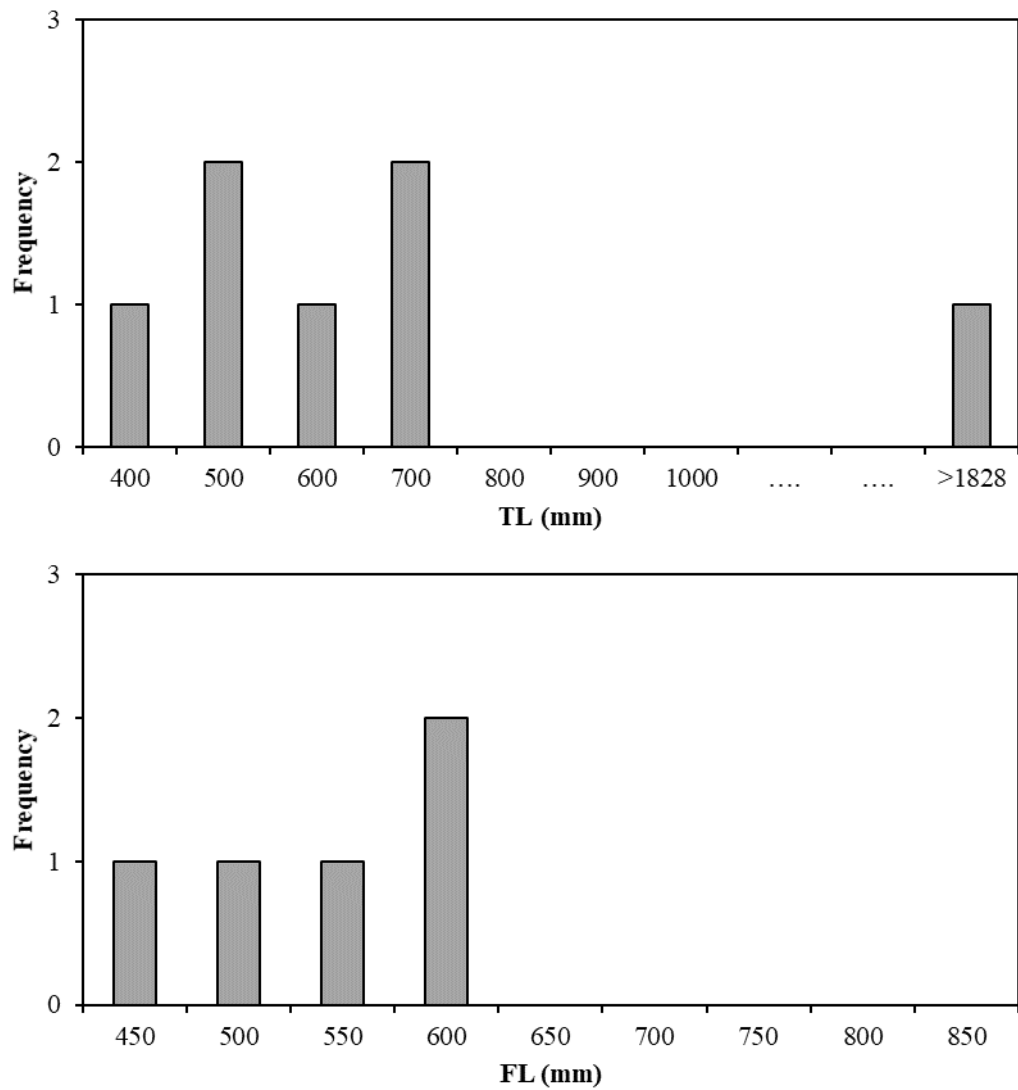


Figure 9. For observed and measured incidental takes of Atlantic Sturgeon during the 2020 ITP Year, length-frequency of (top) fork length (FL, mm; n = 5 of 7 observed) and (bottom) total length (TL, mm; n = 7 of 7 observed).

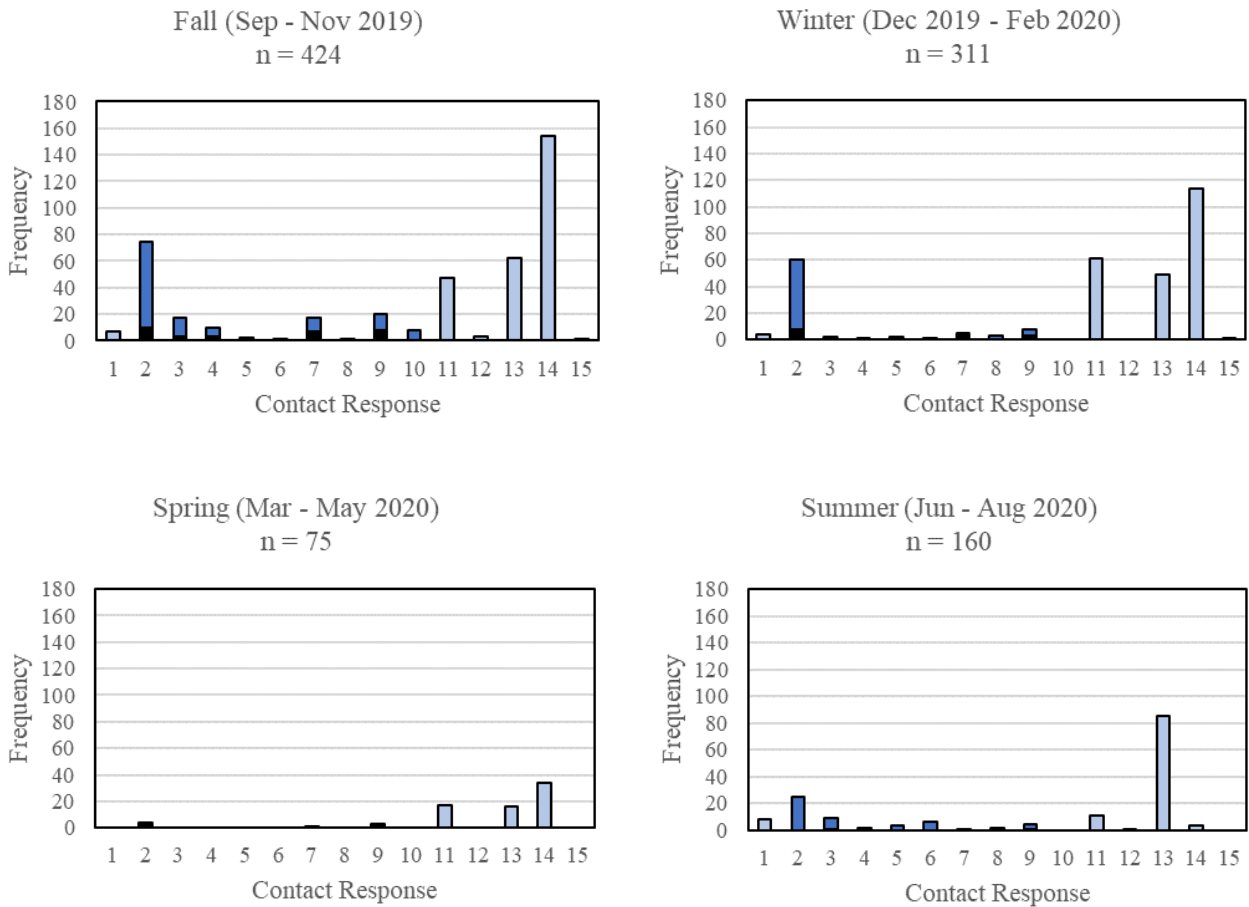


Figure 10. For the 2020 ITP Year, contacts attempted (n = 970) by observers to schedule trips categorized by contact type (0-15) and presented as a percentage of the total for fall, winter, spring, and summer. Contact type categories include the following: 1) Left message with someone else; 2) Not fishing general; 3) Fishing other gear; 4) Not fishing because of weather; 5) Not fishing because of boat issues; 6) Not fishing because of medical issues; 7) Booked trip; 8) Hung up, got angry, trip refused; 9) Call back later time/date; 10) Saw in person; 11) Disconnected; 12) Wrong number; 13) No answer; 14) No answer, left voicemail; 15) Not fishing because of natural disaster (e.g., hurricane). Contact types are shown as those when the observer talked to a fisherman (dark blue bars), when the observer did not (light blue bars), and when the fisherman returned an observer’s call (black bars).



LANDINGS UPDATE FOR RED DRUM & SOUTHERN FLOUNDER

Red Drum Landings 2019-2020

Landings are complete through April 20, 2021.

2019 landings are final. 2020 and 2021 landings are preliminary.

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	63,659
2019	11	Red Drum	5,357	14,318	27,646
2019	12	Red Drum	1,763	3,428	2,197
2020	1	Red Drum	1,853	5,885	1,700
2020	2	Red Drum	1,322	3,448	3,996
2020	3	Red Drum	1,040	5,699	3,971
2020	4	Red Drum	2,425	7,848	6,528
2020	5	Red Drum	4,473	13,730	9,661
2020	6	Red Drum	5,890	12,681	6,985
2020	7	Red Drum	6,839	13,777	15,618
2020	8	Red Drum	13,592	21,252	15,846

FY20 Fishing Year (Sept 1, 2019 - Aug 31, 2020) Landings 54,142

Year	Month	Species	Pounds	2009-2011 Average	2013-2015 Average
2020	9	Red Drum	32,104	28,991	35,003
2020	10	Red Drum	57,299	43,644	63,659
2020	11	Red Drum	26,704	14,318	27,646
2020	12	Red Drum	12,067	3,428	2,197
2021	1	Red Drum	11,512	5,885	1,700
2021	2	Red Drum	15,548	3,448	3,996
2021	3	Red Drum	2,409	5,699	3,971
2021	4	Red Drum			
2021	5	Red Drum			
2021	6	Red Drum			
2021	7	Red Drum			
2021	8	Red Drum			

FY21 Fishing Year (Sept 1, 2020 - Aug 31, 2021) Landings 157,643


*partial trip ticket landings only

***landings are confidential

Year	Month	Species	Pounds	Dealers	Trips	Average (2007-2009)
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	59,404	109	1,554	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	327,291	119	2,333	781,717
2019	11	SOUTHERN FLOUNDER	159,595	58	537	392,150
2020	3	SOUTHERN FLOUNDER	***	***	***	23,512
2020	4	SOUTHERN FLOUNDER	***	***	***	68,389
2020	8	SOUTHERN FLOUNDER	143	3	5	201,862
2020	9	SOUTHERN FLOUNDER	86,644	31	792	396,301
2020	10	SOUTHERN FLOUNDER	340,281	138	2,613	781,717
2020	11	SOUTHERN FLOUNDER	52,642	27	71	392,150
2021	3	SOUTHERN FLOUNDER	***	***	***	23,512

*2020 and 2021 data are preliminary. 2017-2019 data are complete.

***Data are confidential



RULE

SUSPENSIONS



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission
FROM: Kathy Rawls, DMF Director
SUBJECT: Temporary Rule Suspension

Issue

In accordance with the North Carolina Division of Marine Fisheries Resource Management Policy Number 2014-2, Temporary Rule Suspension, the North Carolina Marine Fisheries Commission will vote on any new rule suspensions that have occurred since the last meeting of the commission.

Findings

No new rule suspensions have occurred since the February 2020 meeting.

Action Needed

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

Overview

In accordance with policy, the division will report current rule suspensions previously approved by the commission as non-action, items. The current rule suspensions previously approved by the commission are as follows:

NCMFC RULE 15A NCAC 03M .0511 Bluefish

Suspension of this rule is for an indefinite period. Suspension of this rule allows the division to reduce bluefish creel limits in compliance with the requirements of the Mid-Atlantic Fishery Management Council/Atlantic States Marine Fisheries Commission Bluefish Fishery Management Plan to reduce recreational harvest of bluefish. This suspension was implemented in proclamation FF-1-2020.

NCMFC Rule 15A NCAC 03J .0103 (h) Gill Nets, Seines, Identification, Restrictions

Suspension of portion of this rule is for an indefinite period. Suspension of this rule allows the division to implement year around small mesh gill net attendance requirements in certain areas of the Tar, Pamlico, and Neuse River systems. This action was taken as part of a department initiative to review existing small mesh gill net rules to limit yardage and address attendance requirements in certain “hot spot” areas of the state. This suspension continues in proclamation M-8-2021.

NCMFC Rule 15A NCAC 03R .0110 (4)(5) Crab Spawning Sanctuaries

Suspension of portions of this rule is for an indefinite period. Suspension of this rule allows the division to revise the boundaries for the Drum Inlet and Barden Inlet crab spawning sanctuaries in accordance with Amendment 3 to the N.C. Blue Crab Fishery Management Plan. This suspension was implemented in proclamation M-7-2020.

NCMFC Rules 15A NCAC 03L .0201 (a)(b) Crab Harvest Restrictions, 03L .0203 (a) Crab Dredging and 03J .0301 (a)(1), (g)(h) Pots

Suspension of portions of these rules is for an indefinite period. Suspension of these rules allows the division to implement requirements for the blue crab fishery in accordance with Amendment 3 to the N.C. Blue Crab Fishery Management Plan. These suspensions were continued in proclamation M-1-2021.

NCMFC Rule 15A NCAC 03L .0103 (a)(1) Prohibited Nets, Mesh Lengths and Areas

Continued suspension of portions of this rule is for an indefinite period. This allows the division to adjust trawl net minimum mesh size requirements in accordance with the May 2018 Revision to Amendment 1 to the North Carolina Shrimp Fishery Management Plan. This suspension was implemented in proclamation SH-3-2019.

NCMFC 15A NCAC 03M .0516 Cobia

Continued suspension of this rule is for an indefinite period. This allows the division to manage the commercial and recreational cobia fisheries in accordance with management actions taken by the commission and in accordance with the Atlantic States Marine Fisheries Commission’s Interstate Cobia Fishery Management Plan. This suspension was continued in proclamation FF-25-2021.

NCMFC Rule 15A NCAC 03J .0501 Definitions and Standards for Pound Nets and Pound Net Sets

Continued suspension of portions of this rule is for an indefinite period. This allows the division to increase the minimum mesh size of escape panels for flounder pound nets in accordance with Amendment 2 of the North Carolina Southern Flounder Fishery Management Plan. This suspension was implemented in proclamation M-34-2015.

NCMFC Rule 15A NCAC 03M .0519 Shad & 03Q .0107 Special Regulations: Joint Waters

Continued suspension of portions of these rules is for an indefinite period. This allows the division to change the season and creel limit for American shad under the management framework of the North Carolina American Shad Sustainable Fishery Plan. These suspensions were continued in Proclamation FF-8-2021.



FISHERY MANAGEMENT PLANS

STATUS OF ONGOING PLANS

AMENDMENT 2 TO THE SHRIMP FMP

INTERJURISDICTIONAL FISHERIES FMP

AMENDMENT 2 TO THE ESTUARINE
STRIPED BASS FMP



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Corrin Flora, Fishery Management Plan Coordinator
Fisheries Management Section

SUBJECT: Fishery Management Plan Update

Issue

Update the Marine Fisheries Commission (MFC) on the status of ongoing North Carolina fishery management plans (FMPs).

Action Needed

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

Overview

This memo provides an overview on the status of six North Carolina FMPs for the May 2021 MFC business meeting.

Southern Flounder FMP

Staff continue to develop the Southern Flounder FMP Amendment 3, addressing comprehensive, long-term management strategies. At its Nov. 2020 business meeting, the MFC passed a motion requesting varying commercial and recreational harvest allocation scenarios. Lead staff provided a summary of harvest allocation scenarios analysis at the Feb. 2021 MFC business meeting. The MFC passed a motion to set the allocation for Amendment 3 at 70% commercial and 30% recreational and a special meeting was announced. Staff updated the draft FMP with the sector allocations for MFC review at the special meeting. During the special meeting, the MFC passed a motion to amend the previously adopted southern flounder allocation to adjust the allocation to 70/30 in 2021 to 60% commercial and 40% recreational in 2023 and achieve a 50/50 parity in allocation in 2024. Due to the complexity of this motion, the timeline for adoption of the Southern Flounder FMP Amendment 3 has changed. Management measures under Amendment 2 will continue until final adoption of Amendment 3.

Shrimp FMP

At its Feb. 2020 business meeting, the MFC adopted the goal and objectives to the Shrimp FMP Amendment 2. Staff continue to develop the draft plan. The division is examining management strategies to promote habitat protection, reduce bycatch in the shrimp trawl fishery, and potential changes to existing shrimp management strategies adopted in previous plans.

In March 2021, Shrimp FMP workshops were held between the Shrimp FMP Advisory Committee (AC) and division Plan Development Team (PDT). Staff have edited the draft plan incorporating FMP AC input. At the May 2021 MFC business meeting, lead staff will provide an overview of the draft Shrimp FMP Amendment 2 to obtain MFC approval for public and MFC AC review.

Estuarine Striped Bass FMP

Development of the Estuarine Striped Bass Amendment 2 began with a scoping period held in Nov. 2020. At its Feb. 2021 business meeting, the MFC adopted the goal and objectives to the plan. Additionally, the MFC gave input on management strategies to be considered in development of Amendment 2. The plan development team, comprised of division and Wildlife Resources Commission staff, is developing the draft plan. The FMP AC appointment process will begin this summer to further develop the draft plan with stakeholder input.

Spotted Seatrout FMP

A stock assessment for spotted seatrout is underway coinciding with the scheduled Spotted Seatrout FMP review. The prior stock assessment from 2014 indicated the stock is not overfished and is not experiencing overfishing. The stock assessment will be completed late 2021 or early 2022.

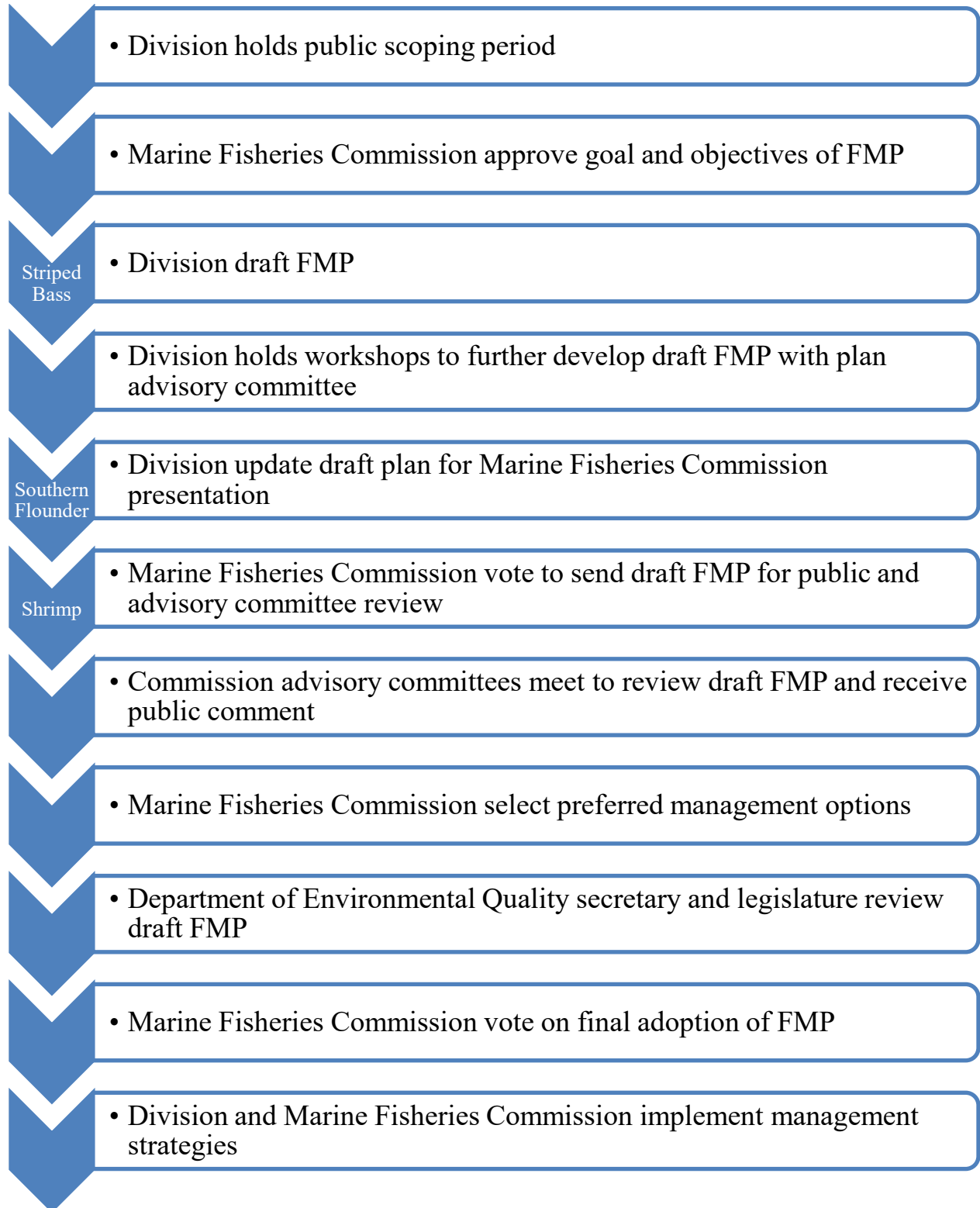
Striped Mullet FMP

A stock assessment for striped mullet is underway coinciding with the scheduled Striped Mullet FMP review. The previous stock assessment update, through terminal year 2017, indicated the stock is not experiencing overfishing. Due to a poor relationship between spawning stock biomass and juvenile abundance, overfished status was unable to be determined. The stock assessment will be completed in 2022.

Interjurisdictional FMP

The scheduled review of the Interjurisdictional (IJ) FMP is underway. The management strategy of this unique state FMP is to adopt management measures appropriate for North Carolina contained in existing finfish FMPs approved by the federal councils or the Atlantic States Marine Fisheries Commission (ASMFC), which North Carolina is subject to, by reference as minimum standard. This avoids duplication of effort in the development of North Carolina species' plans under the Fisheries Reform Act already subject to federal Council or ASMFC FMPs. When adopted by reference in the IJ FMP, the federal Councils and ASMFC FMPs are held to the standards established in G.S. 113-182.1 and most associated policies. The last IJ FMP update was completed in 2015. The PDT began the review of the plan in Jan. 2021. A process to be incorporated in the plan will address the best mechanism to retire a state plan covered by the IJ FMP.

NORTH CAROLINA FISHERY MANAGEMENT PLANS
Feb. 2021





AMENDMENT 2 TO THE SHRIMP FMP

AMENDMENT 2 TO THE SHRIMP FMP MEMO

DRAFT AMENDMENT 2 TO THE SHRIMP FMP



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Chris Stewart, Shrimp FMP Co-lead, Fisheries Management
Jason Rock, Shrimp FMP Co-lead, Fisheries Management
Daniel Zapf, Shrimp FMP Co-lead, Fisheries Management

SUBJECT: Shrimp Fishery Management Plan Amendment 2

Issue

During the May 2021 Marine Fisheries Commission (MFC) business meeting Division of Marine Fisheries (DMF) staff will present the draft N.C. Shrimp Fishery Management Plan (FMP) Amendment 2. Shrimp Advisory Committee (AC) input from the March 2021 FMP workshops was incorporated into the draft issue papers and FMP.

Action Needed

At its May 2021 meeting, the commission will be provided an overview of draft Amendment 2 and vote to take draft Amendment 2 out for public comment and MFC AC review.

Findings

- The focus of draft Amendment 2 is to further reduce bycatch in the shrimp trawl fishery and protect critical habitat.
- The total amount of bycatch in the N.C. shrimp trawl fishery and its population level impact on fish stocks is unknown.
- Quantifying the amount of bycatch in the N.C. shrimp trawl fishery requires detailed effort, gear, and catch composition information over a representative spatial and temporal scale.
- Quantifying the benefits of habitat protection and bycatch reductions of proposed management measures requires species specific estimates of removals, stock size, recruitment, fishing mortality, natural mortality, discard mortality, and other life history information.
- Quantifying the economic impacts of proposed management measures requires additional biological and economic data.
- Area closures, effort, and gear restrictions are effective measures to reduce bycatch in the shrimp trawl fishery.

- Issue papers are inter-related; management measures discussed in one issue paper must be considered in conjunction with one another.
- Status quo does not meet the goal and objectives of Amendment 2.

Overview

Shrimp is an important commercial and recreational fishery and is managed under Amendment 1 and its revisions. Management strategies in Amendment 1 and its revisions will remain in force until Amendment 2 is adopted.

Amendment 2 Goal and Objectives

Goal:

Manage the shrimp fishery to provide adequate resource protection, optimize long-term harvest, and minimize ecosystem impacts.

Objectives:

- Reduce bycatch of non-target species of finfish and crustaceans, as well as protected, threatened, and endangered species.
- Promote the restoration, enhancement, and protection of habitat and environmental quality in a manner consistent with the Coastal Habitat Protection Plan (CHPP).
- Develop a strategy through the CHPP to review current nursery areas and to identify and evaluate potential areas suitable for designation.
- Use biological, environmental, habitat, fishery, social, and economic data needed to effectively monitor and manage the shrimp fishery and its ecosystem impacts (i.e., bycatch, habitat degradation).
- Promote implementation of research and education programs designed to improve stakeholder and the general public's understanding of shrimp trawl bycatch impacts on fish population dynamics.

Amendment 2 Issue Papers

Management of Shrimp Trawling for Protection of Critical Habitats

- Examines location of known submerged aquatic vegetation and shell bottom habitats and how they overlap with areas open to shrimp trawling.
- Area specific shrimp trawl closures could be implemented to protect critical habitats; focuses on internal waters from Core Sound south to the NC-SC state line.

Shrimp Management in Special Secondary Nursery Areas

- Examine options to reduce bycatch in the 15 Special Secondary Nursery Areas (SSNA).
- Static seasons with delayed openings or early closures could be implemented to reduce bycatch or SSNAs could be reclassified as permanent secondary nursery areas eliminating all trawling in these areas.

Area Restrictions to Reduce Shrimp Trawl Bycatch in North Carolina

- Examines options to increase connectivity between protected areas to better encompass the life cycle and distribution of key species.

- Focuses on potential areas closures in Pamlico Sound and adjacent waterbodies.

Managing Effort and Gear Modifications in the Shrimp Fishery to Reduce Bycatch

- Examines options to reduce bycatch by further restricting effort via gear modifications (i.e., reducing headrope), allowable fishing times (i.e., reduce days of week fished, daily fishing times, and tow times), and harvest limits as well as increasing access for non-trawl gears.
- Data limitations are apparent and management measures chosen in this paper will likely depend on measures chosen in other issue papers.

Proposed Management Options

The list of proposed management options, including the positives and negatives for each option, can be found in the issue papers.

Timeline

June 2021

If the commission approves to send draft Amendment 2 out for public comment and MFC AC review, it will be presented to the Northern regional, Southern regional, Finfish, Shellfish/Crustacean, and Habitat advisory committees. Public comment will be taken during the MFC AC meetings and the public can also submit written comments during this period. Input received during the public comment period and MFC AC review will assist the commission in selecting its preferred management options.

August 2021

The division will detail MFC AC and public input. The commission will vote to select its preferred management options and to send the draft Amendment 2 to the Department of Environmental Quality secretary, the Joint Legislative Oversight Committee on Agriculture and Natural and Economic Resources, and the Fiscal Research Division for review and comment.

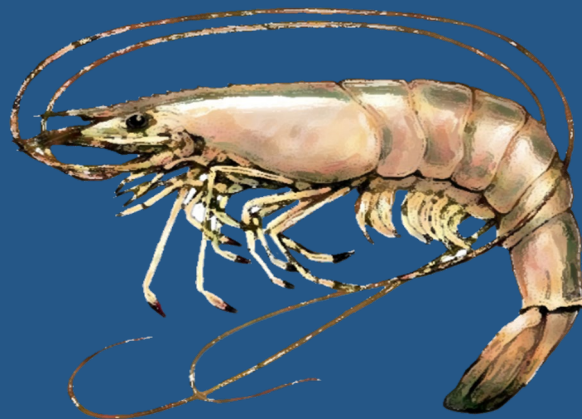
November 2021

The commission will consider departmental and legislative input and vote on final approval of Amendment 2. If approved, management measures will be implemented via the proclamation authority of the division Director.

DRAFT
North Carolina
Shrimp
Fishery Management Plan
Amendment 2

By

North Carolina Division of Marine Fisheries



North Carolina Department of Environmental Quality
North Carolina Division of Marine Fisheries
3441 Arendell Street
P. O. Box 769

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Disclaimer: Data in this Fishery Management Plan may have changed since publication based on updates to source documents.

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ACKNOWLEDGEMENTS

Amendment 2 to the North Carolina (NC) Shrimp Fishery Management Plan (FMP) was developed by the NC Department of Environmental Quality (NCDEQ), Division of Marine Fisheries (NCDMF) under the auspices of the NC Marine Fisheries Commission (NCMFC) with the advice of the Shrimp Advisory Committee (AC). Deserving special recognition are the members of the Shrimp AC and the NCDMF Plan Development Team (PDT) who contributed their time and knowledge to this effort.

Shrimp Advisory Committee

John Costner
Ward Ellis
Frederick Harris
Donald Ipock
Dr. Wilson Laney
Bruce MacLachlan
Gary Nowell
Clyde Phillips

Shrimp Plan Development Team

Alan Bianchi
Kevin Brown
Anne Deaton
David Dietz
Meghan Gahm
Kimberlee Harding
Daniel Ipock
Cameron Luck
Tina Moore (Mentor)
Trish Murphey (APNEP)
Jason Rock (Co-lead)
Ami Staples
Chris Stewart (Co-lead)
Jason Walker
Carter Witten
Daniel Zapf (Co-lead)

The following division staff were also invaluable in assisting with the development of this document: Kathy Rawls, Catherine Blum, Katy West, Corrin Flora, Thom Tears, and the many reviewers of the multiple drafts of this plan. Also grateful for the administrative support from Deborah Manley, Jennifer Lewis, Dana Gillikin, Mike Griffin, and Patricia Smith.

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EXECUTIVE SUMMARY

This section to be completed prior to final adoption of the plan.

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INTRODUCTION

This is Amendment 2 to the Shrimp Fishery Management Plan (FMP). By law, each FMP must be reviewed at least once every five years (G.S. 113-182.1). The N.C. Division of Marine Fisheries (NCDMF) reviews each FMP annually and a comprehensive review is undertaken about every five years. The last comprehensive review of the plan (Amendment 1) was approved by the N.C. Marine Fisheries Commission (NCMFC) in 2015. FMPs are the ultimate product that brings all information and management considerations into one document. The NCDMF prepares FMPs for adoption by the NCMFC for all commercially and recreationally significant species or fisheries that comprise state marine or estuarine resources. The goal of these plans is to ensure long-term viability of these fisheries. All management authority for the North Carolina shrimp fishery is vested in the State of North Carolina. The NCMFC adopts rules and policies and implements management measures for the shrimp fishery in Coastal Fishing Waters in accordance with 113-182.1. Until Amendment 2 is approved for management, shrimp are managed under Amendment 1 and the May 2018 Revision to Amendment 1 of the Shrimp FMP (NCDMF 2018).

FISHERY MANAGEMENT PLAN HISTORY

Original FMP Adoption:	April 2006
Amendments:	Amendment 1 – February 2015
Revisions:	May 2018 May 2021 (tentative based on rule adoption)
Supplements:	None
Information Updates:	None
Schedule Changes:	Timeline moved forward one year to start Amendment 2 in 2019 for the comprehensive review
Next Comprehensive Review:	Five years after adoption of Amendment 2

Past versions or revisions of the Shrimp FMP (NCDMF 2006, 2015, 2018, 2021) are available on the NCDMF website at: <http://portal.ncdenr.org/web/mf/fmps-under-development>

MANAGEMENT UNIT

The management unit includes the three major species of shrimp: brown (*Farfantepenaeus aztecus*), pink (*F. duorarum*), and white (*Litopenaeus setiferus*) and their fisheries in all coastal fishing waters of North Carolina, which includes the Atlantic Ocean offshore to three miles.

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GOAL AND OBJECTIVES

The goal of Amendment 2 to the N.C. Shrimp FMP is to manage the shrimp fishery to provide adequate resource protection, optimize long-term harvest, and minimize ecosystem impacts. The following objectives will be used to achieve this goal.

- Reduce bycatch of non-target species of finfish and crustaceans, as well as protected, threatened, and endangered species.
- Promote the restoration, enhancement, and protection of habitat and environmental quality in a manner consistent with the Coastal Habitat Protection Plan (CHPP).
- Develop a strategy through the CHPP to review current nursery areas and to identify and evaluate potential areas suitable for designation.
- Use biological, environmental, habitat, fishery, social, and economic data needed to effectively monitor and manage the shrimp fishery and its ecosystem impacts (i.e., bycatch, habitat degradation).
- Promote implementation of research and education programs designed to improve stakeholder and the general public's understanding of shrimp trawl bycatch impacts on fish population dynamics.

DESCRIPTION OF THE STOCK

BIOLOGICAL PROFILE

There are three species that make up the shrimp fishery in North Carolina. They are the brown shrimp, pink shrimp, and white shrimp. Brown shrimp occur from Massachusetts to the Florida Keys and into the Gulf of Mexico to northwestern Yucatan (Larson 1989; Williams 1984). High abundances of brown shrimp occur in the Gulf of Mexico supporting a major commercial fishery along the South Atlantic coast, primarily in North and South Carolina. Pink shrimp are found from southern Chesapeake Bay to the Florida Keys, and around the coast through the Gulf of Mexico to Yucatan (Bielsa et al. 1983). The largest population of pink shrimp is off southwestern Florida in the Tortugas and Sanibel as well as in the southeastern portion of Bay of Campeche. Significant quantities of pink shrimp have historically been reported off the North Carolina coast and the northeast Florida coast; however, since the late 1990s their abundance has declined in North Carolina. White shrimp occur along the Atlantic coast from New York to Florida and throughout the Gulf of Mexico (Muncy 1984; Steele 2002).

The lifecycle of these species are similar in that adults spawn offshore and eggs are hatched into free-swimming larvae. Larvae develop through several stages into post-larvae. Once post-larval shrimp enter estuaries, growth is rapid and is dependent on salinity and water temperature. As shrimp increase in size, they migrate from the upper reaches of small creeks to deeper saltier rivers and sounds. By late summer and fall, they return to the ocean to spawn. The maximum life span of shrimp can range from 16 to 24 months and may reach a size of 7 to 11 inches, depending on species (Eldred et al. 1961; Gunter 1961; McCoy 1968, 1972; McCoy and Brown 1967; Williams 1984).

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Significant weather events such as droughts, hurricanes, and changes in climate can influence the occurrence and distribution of marine organisms and habitat. While extreme weather events have always occurred, there is scientific consensus that climate change is occurring in North Carolina. Some of the expected weather related changes on the east coast resulting from climate change include increasing water temperatures, frequency of heavy rain events, severity of tropical storms, rate of sea level rise, and non-storm event nuisance flooding with more long-term effects on the estuarine system (Paerl et al. 2006; Melillo et al. 2014; Sweet et al. 2014; IPCC 2018; Kunkel et al. 2020). As the climate changes and waters warm, shrimp abundance and distribution shifts can occur. It has been predicted the ranges of hundreds of finfish and invertebrate species will shift or expand northward due to increasing temperatures caused by climate change (Morley et al. 2018).

In recent years, some monitoring programs are showing the expansion of white shrimp at the mouth of the Chesapeake Bay and off the coast of Cape Hatteras. Water temperatures have increased with milder winters and may be contributing to higher white shrimp abundance at the northern end of their range (Delancey et al. 2008; Kimbell et al. 2020; VIMS 2020). Warming winter temperatures may have the opposite effect on brown shrimp disrupting recruitment of post-larvae into the estuaries (David Whitaker, SCDNR (retired), personal communication). Post-larvae brown shrimp bury into bottom sediments as temperatures decline and then emerge as temperatures rise in late winter or early spring (Aldrich et al. 1968). If winter water temperatures do not decline enough to elicit this bottom-seeking behavior, then the post-larvae may recruit to the estuary throughout the winter, becoming exposed to periodic lethal low water temperature in the shallow tidal creeks.

Rising water temperatures associated with climate change have been linked to a rise in “black gill” infections in white shrimp which are thought to negatively impact penaeid shrimp fisheries in Georgia and South Carolina (Fowler et al. 2018; Frischer et al. 2018). Black gill is a parasitic infection caused by single-celled protozoans called ciliates that cause the shrimp’s immune system to produce an enzyme to fight the infection in a process known as melanization, giving the gills a black appearance (Johnson 1978; Burnett and Burnett 2015; Frischer et al. 2018). This process can impair respiratory function, growth, reproduction, and enhance the hosts susceptibility to environmental factors and predation (Gooding et al. 2020). Black gill has been observed in pink, brown, and white shrimp and is not harmful to humans (Johnson 1978).

Shrimp are preyed upon by numerous finfish, invertebrates, and a wide variety of coastal and wading birds (NCDMF 2015). Predation is cited as a major source of natural mortality for juvenile shrimp and decreases as they grow (Zimmerman et al. 2000; Ramirez-Rodriguez and Sanchez 2003; Baker and Minello 2010; Leo et al. 2016). Trends in natural mortality are thought to be the result of age specific predation rates, physiological requirements, and the physical environment acting on different life history stages of penaeid shrimp (Ramirez-Rodriguez and Sanchez 2003).

STOCK STATUS

Stock status is not available for all species of shrimp as they are considered an annual crop in North Carolina. Estimates of population size are not available but since shrimp are considered an annual crop and fished at near maximum levels, annual landings are probably a good indication of relative abundance. Population size is controlled by environmental conditions, and while fishing reduces the population size over the season, fishing is not believed to impact year class strength unless the

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spawning stock has been reduced below a minimum threshold level by environmental conditions. Annual variations in catch are presumed to be due to a combination of environmental conditions, fishing effort, and the effects of changes in the economics of the fishery. Because of high fecundity and migratory behavior, the three species are capable of rebounding from very low population sizes in one year to large populations the next, provided environmental conditions are favorable (MacArthur and Wilson 1967; McCoy and Brown 1967; McCoy 1968, 1972; Perez-Farfante 1969; Purvis and McCoy 1972; Whitaker 1981, 1983).

The division's Estuarine Trawl Survey (Program 120) is a fishery-independent multispecies monitoring program that has been ongoing since 1971 in the months of May and June. One of the key objectives of this program is to provide long-term indices of annual juvenile recruitment for multiple species. From this survey, annual trends in brown shrimp abundance measured as the number of brown shrimp per station (relative abundance) shows fluctuations from year to year. Estimates of year class strength can be inferred from the annual brown shrimp index of relative abundance and track brown shrimp landings in June and July, months where brown shrimp make up most of the landings (Figure 1). Currently, there are no juvenile indices for white and pink shrimp in North Carolina because sampling does not cover their recruitment time period. However, in recent years, higher abundances of white shrimp have been observed in the estuarine trawl survey in June and also track with peak white shrimp landings in October (Figure 2).

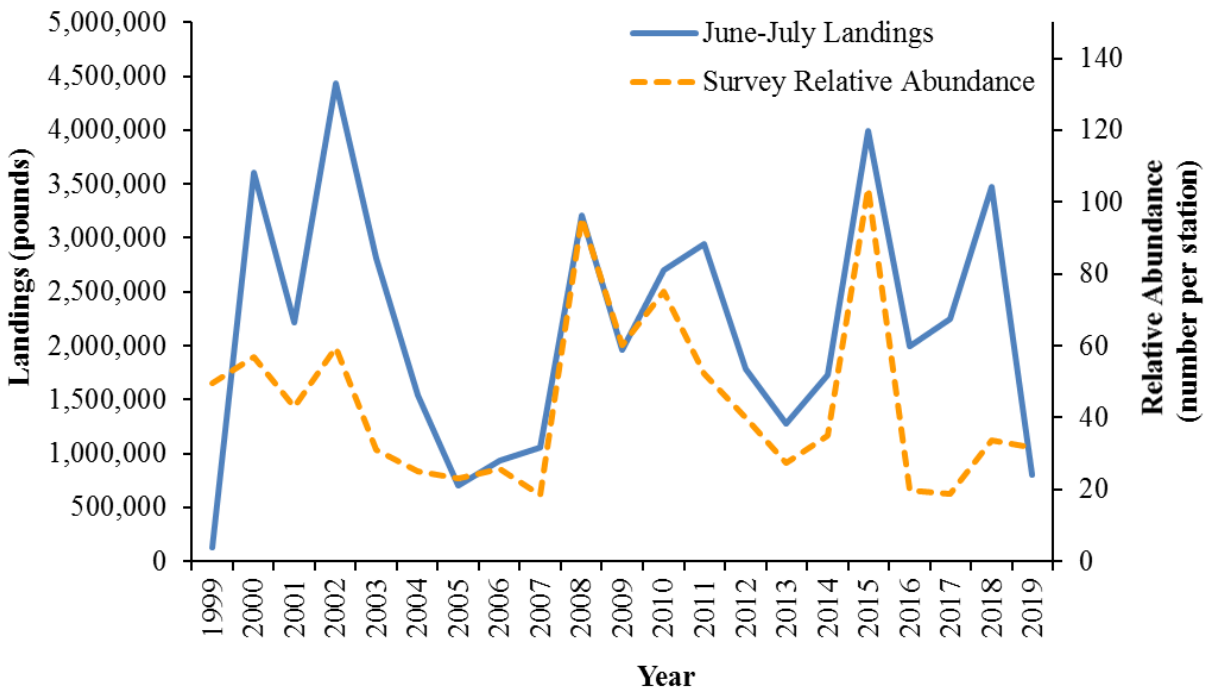


Figure 1. Comparison of brown shrimp commercial landings in the months of June and July to the brown shrimp Estuarine Trawl Survey index of relative abundance in May and June (number per station), 1999-2019.

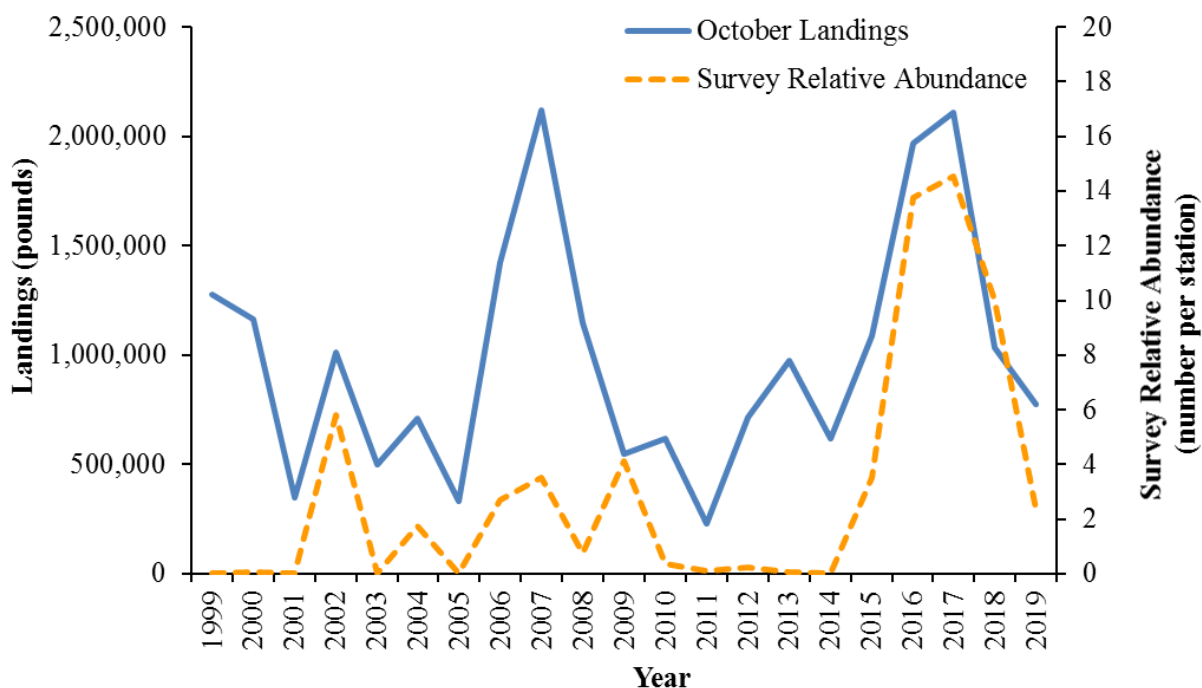


Figure 2. Comparison of white shrimp commercial landings in October to the relative abundance (number per station) of white shrimp in the Estuarine Trawl Survey in June, 1999-2019.

DESCRIPTION OF THE FISHERIES

Additional in-depth analyses and discussion of North Carolina’s commercial and recreational shrimp fisheries can be found in earlier versions of the Shrimp FMP (NCDMF 2006, 2015, 2018); all documents are available on the NCDMF website at: <http://portal.ncdenr.org/web/mf/fmps-under-development> and the License and Statistics Annual Report (NCDMF 2020) produced by the NCDMF which can be found at: <http://portal.ncdenr.org/web/mf/marine-fisheries-catch-statistics>.

COMMERCIAL FISHERIES

Historical landings statistics were collected on a voluntary basis and methodology varied through time until 1994 when the NCDMF implemented a mandatory Trip Ticket Program to monitor commercial landings and fishing effort (Lupton and Phalen 1996). While commercial shrimp fishery data exists for small geographic areas and short windows of time, commercial landings and associated effort from the Trip Ticket Program is the only statewide data source with a long time series. Commercial shrimp harvest for NC’s estuarine and state ocean waters requires a fisherman to hold a Standard Commercial Fishing License (SCFL) or a Retired Standard Commercial Fishing License (RSCFL). A Land or Sell License can be used to commercially harvest shrimp from ocean waters greater than three miles from shore and for a vessel that is registered in another state, as well as the SCFL and RSCFL.

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A variety of methods are used to catch shrimp including otter trawls, skimmer trawls, channel nets, shrimp pounds, and cast nets. Otter trawls derived their name from the two trawl doors (otter doors/boards) that attach to the bridle that are hydro-dynamically designed to hold the wings of the net open (Figure 3; Jennings et al. 2001). As the net is pulled along the bottom, the otter boards plane in opposite directions holding the net open. Otter trawls are used for all three species in both the estuary and the ocean with two-seam trawls used for brown and pink shrimp and four-seam and tongue trawls for white shrimp, which tend to swim higher in the water column and will jump to the surface when disturbed. Skimmer trawls consists of two rigid frames attached to each side of a vessel with nets attached along the two sides of the frame (Figure 4). Metal skids keep the frames off the bottom as the nets are pushed through the water column. Unlike otter trawls, the tailbags of skimmer trawls can be checked while fishing. Skimmer trawls are primarily used for white shrimp and are capable of fishing waters as shallow as two feet.

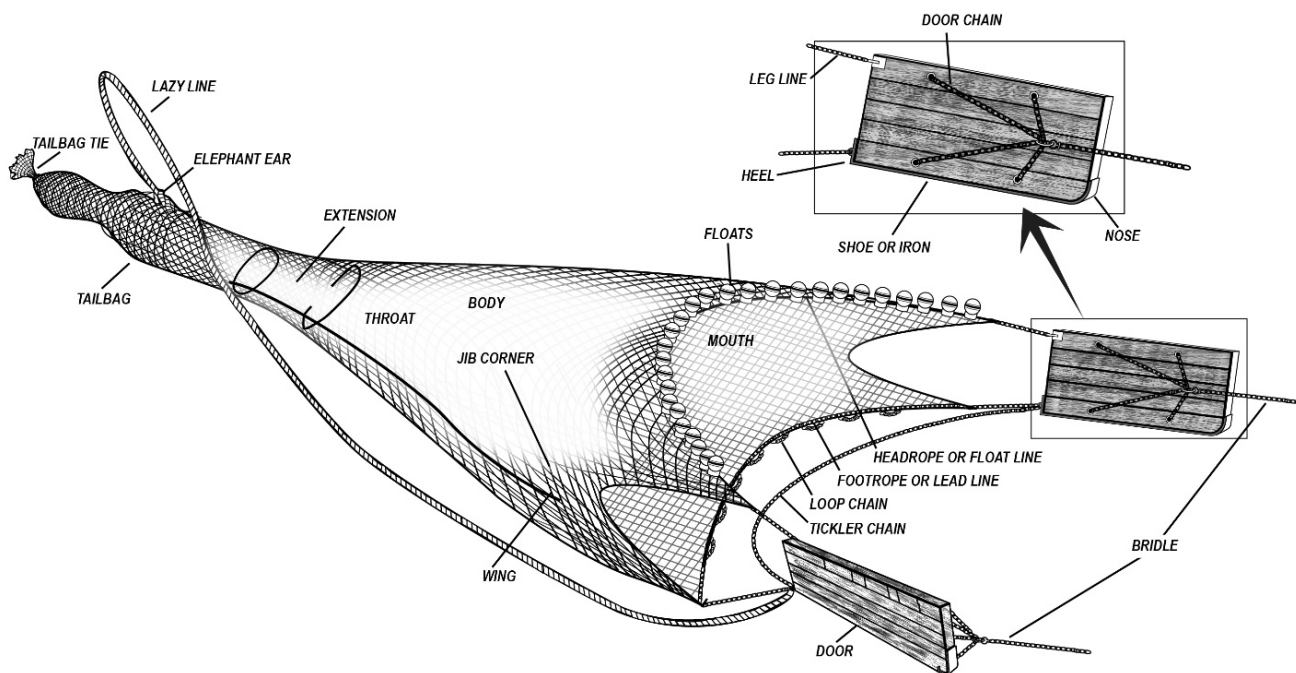


Figure 3. Schematic of otter trawl components.

Channel nets are stationary nets that use tidal currents to fish the surface and middle depths of the water column (Figure 5). The mouth of the nets is held open by upright wooden shafts attached to a buoy and anchor on one side and a small vessel on the other. Float and butterfly nets also make use of tidal currents to push shrimp into the nets and offer the advantages of less fuel consumption and less bycatch than traditional shrimp trawls. To shrimp with a “float net”, fishermen attach large floats to the doors and top lines of trawls to make the net fish up in the water column and are pulled slowly forward to harvest shrimp that are migrating to the inlets at night. Butterfly nets use this same harvest strategy but are attached to a metal frame and are held stationary in the water

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column to capture shrimp as the current carries them into the net. Trawls, cast nets and seines are used to harvest live shrimp for the commercial bait fishery. As of 2019, otter trawls account for most of the commercial shrimp harvest with skimmer trawls and channel nets ranking a distant second and third. From 2004 to 2019, approximately 93% of shrimp landings have been from otter trawls, 5% from skimmer trawls, and 2% from channel nets. Landings from other gears account for less than 1% of the total landings which include shrimp pots (Figure 6A), pound nets (Figure 6B), cast nets, and gill nets.

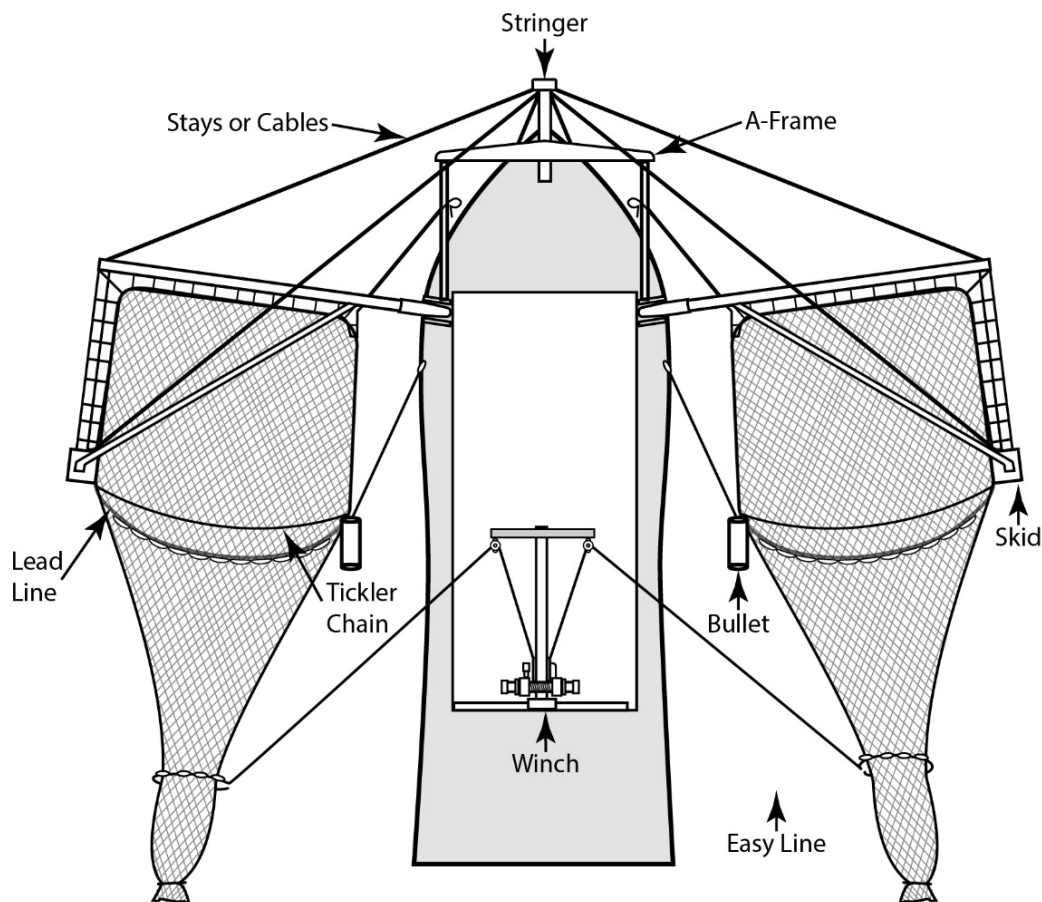


Figure 4. Schematic of skimmer trawler components.

North Carolina's shrimp fishery is unusual in the southeast U.S. because all three species are harvested and most of the effort occurs in internal waters. While South Carolina, Georgia, and Florida allow limited shrimping in internal waters, much of their fisheries are conducted in the Atlantic Ocean and white shrimp comprise most of their harvest (NCDMF 2015). Most of the vessels that operate in the NC commercial shrimp fishery are registered in NC. The number of NC registered vessels ranged from 394 in 2011 to 606 in 2004. The number of vessels registered in other states ranged from five in 2005 to 39 in 2017. In 2019, only 16 vessels registered in other states landed 4.4% of the total shrimp landings.

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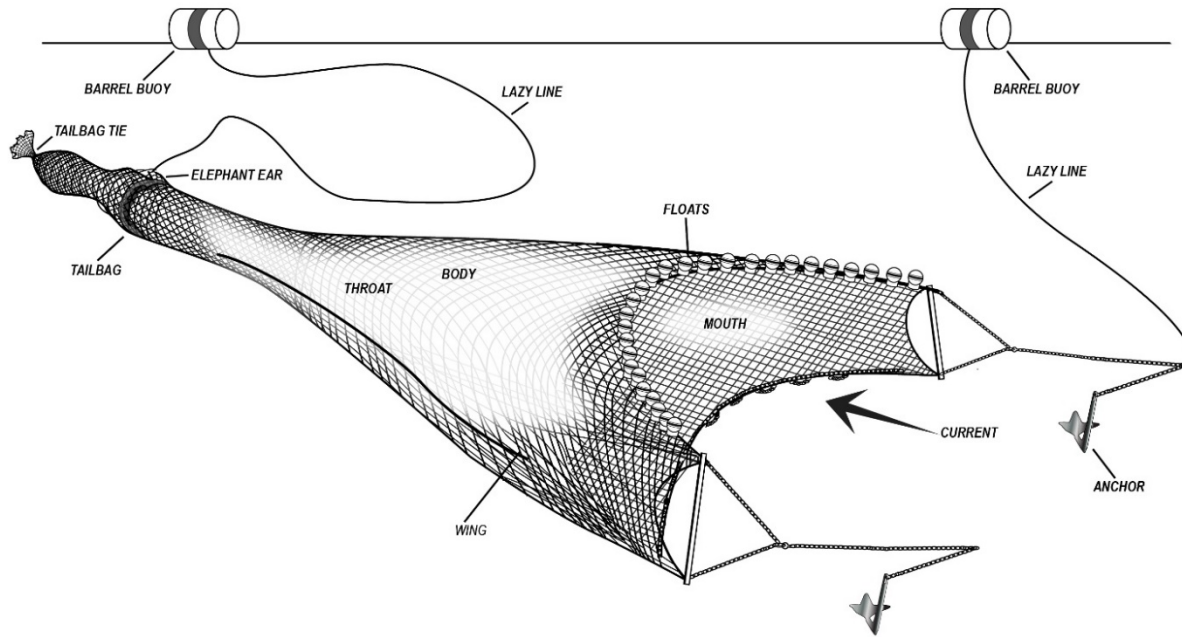


Figure 5. Schematic of channel net components.

Larger vessels are mostly used to trawl in the deeper waters in Pamlico Sound and the mouths of the Neuse, Pamlico, Pungo, and Bay rivers; and the ocean. Smaller vessels are more often used to trawl in the smaller sounds (Croatan, Roanoke, and Core sounds) and rivers (Newport, North, and White Oak rivers). Most trawling in the central portion of the state is conducted at night. Channel nets are popular around Harkers Island in the Straits and North River while skimmer trawling is very popular in Newport River and Bogue Sound. In the southern portion of the state, the fishery is mostly small boats fishing primarily the Intracoastal Waterway, New, and Cape Fear rivers and larger vessels fishing the Atlantic Ocean primarily off New River, Carolina Beach, and Brunswick County. Many of the small boats are fished by individuals who shrimp part-time or for personal consumption. Channel nets are fished extensively in the areas around New River and Topsail inlets. Skimmer trawls have become more popular around New River and Topsail Sound.

Historically, landings decline during the late fall and through the winter. However, in recent years, landings in December and January have increased substantially due to an abundance of white shrimp in near shore ocean waters north of Cape Hatteras from Oregon Inlet to the NC-VA state line. Landings of shrimp are lowest during the late winter and early spring months. Average monthly landings and dockside value are highest in the summer and early fall months from July through October.

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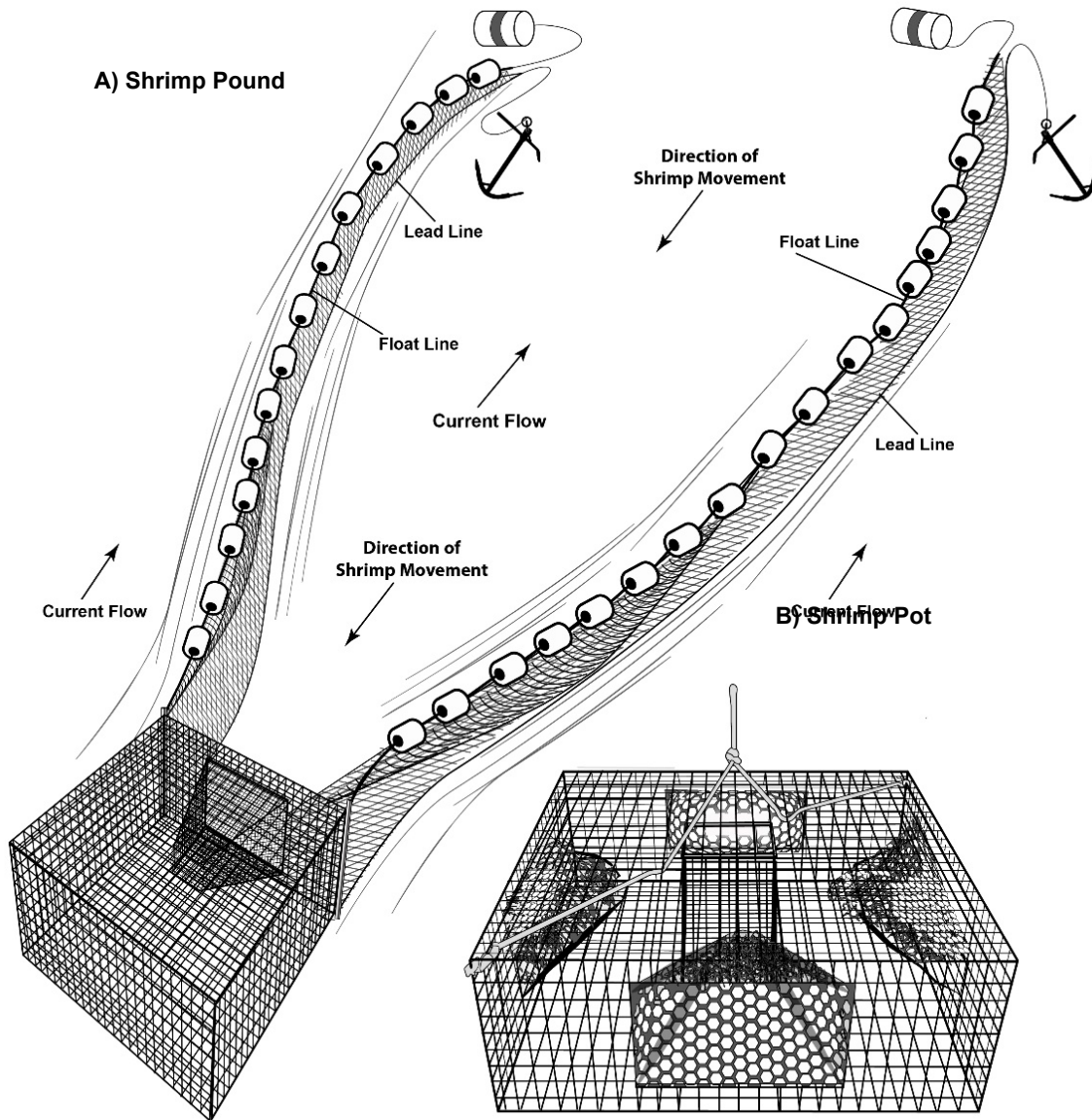


Figure 6. Schematic of shrimp pound (A) and shrimp pot (B) components.

Trends are shown for the dockside (ex-vessel) value and harvest volume presented as heads-on weight in pounds for shrimp. Total landings of all three shrimp species combined from 1994 to 2019 have averaged 7,430,164 pounds per year (Figure 7). The lowest landings during this period was 2.36 million pounds in 2005 and the highest was 13.91 million pounds in 2017. Shrimp landings have increased in recent years exceeding 9 million pounds since 2015. Annual dockside value of commercial shrimp landings averaged \$15.46 million from 2004 to 2019. Annual dockside value was lowest in 2005 at \$4.41 million and reached a high of over \$30.32 million in 2017.

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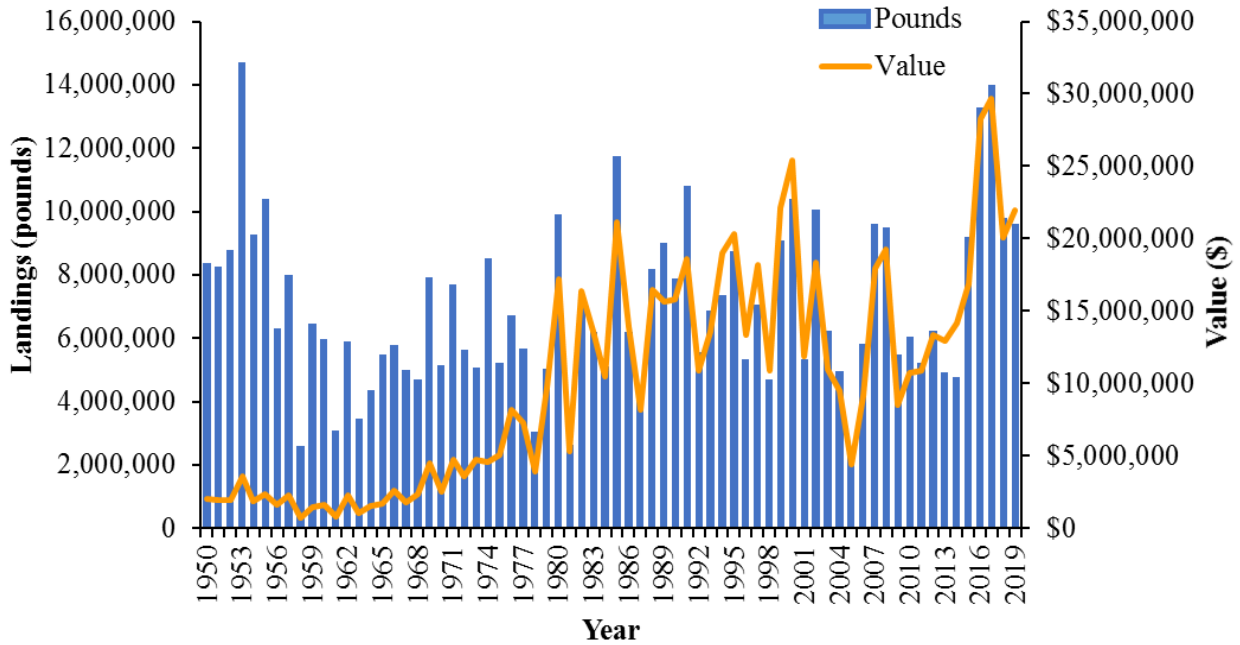


Figure 7. North Carolina annual shrimp commercial landings (pounds) and value (\$), 1950-2019.

Annual shrimping effort (number of trips) has fluctuated with shrimp abundance but has gradually declined since 1994 due to a number of factors including cheaper imported shrimp prices, increasing fuel prices, and fishermen retiring (NCDMF 2015; Figure 8). The number of trips decreased 2% from 2018 to 2019 (Figure 8). Landings in 2005 were lowest on record, likely because of several reasons including; many large trawlers remained scalloping instead of shrimping because prices were high and the days at sea were extended (NCDMF 2015), Hurricanes Katrina (Aug. 29, 2005) and Rita (Sept. 4, 2005) hit the Gulf coast, negatively affecting the fishing industry, shrimp breeding operations in the Gulf shut down with only one operational in September and some North Carolina shrimpers could not sell their product (NCDMF 2015). Hurricane Florence (Sept. 17, 2018) directly hit North Carolina, likely contributing to the decrease in landings in 2018.

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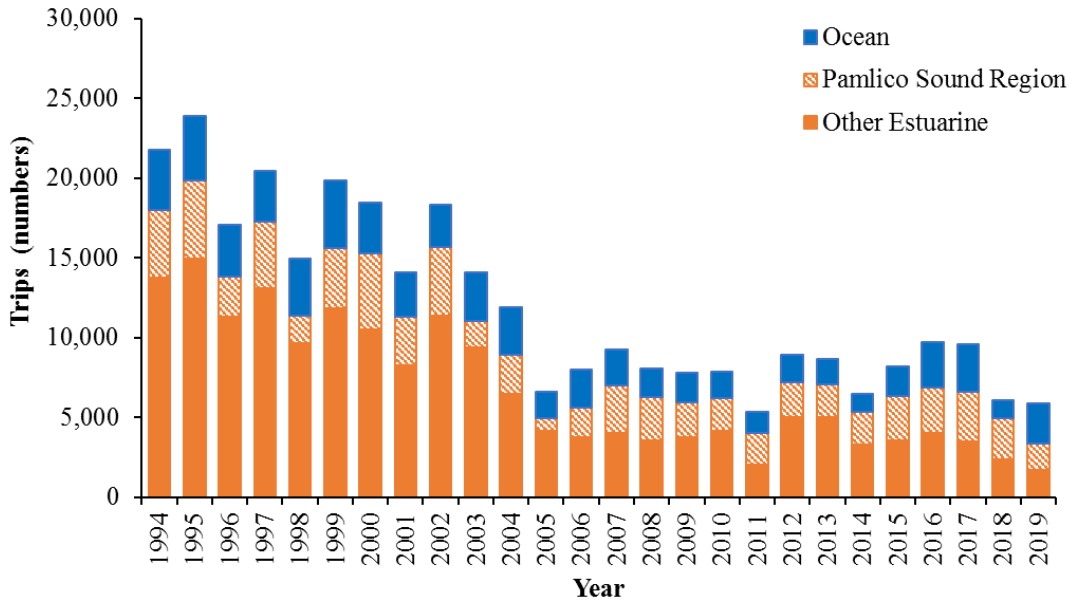


Figure 8. Annual number of commercial trips reported for all three species by area, 1994-2019. Data from the NCDMF Trip Ticket Program.

In 2018, most (82%) of the harvest occurred in estuarine waters (Pamlico Sound and estuarine other regions); however, only 36% occurred in estuarine waters in 2019 (Figure 9). Since 1994, the Pamlico Sound has accounted for roughly 56% of total commercial shrimp landings in North Carolina. Landings in the Atlantic Ocean (less than 3 miles from shore) increased 251% in 2019 and were well above the times series average.

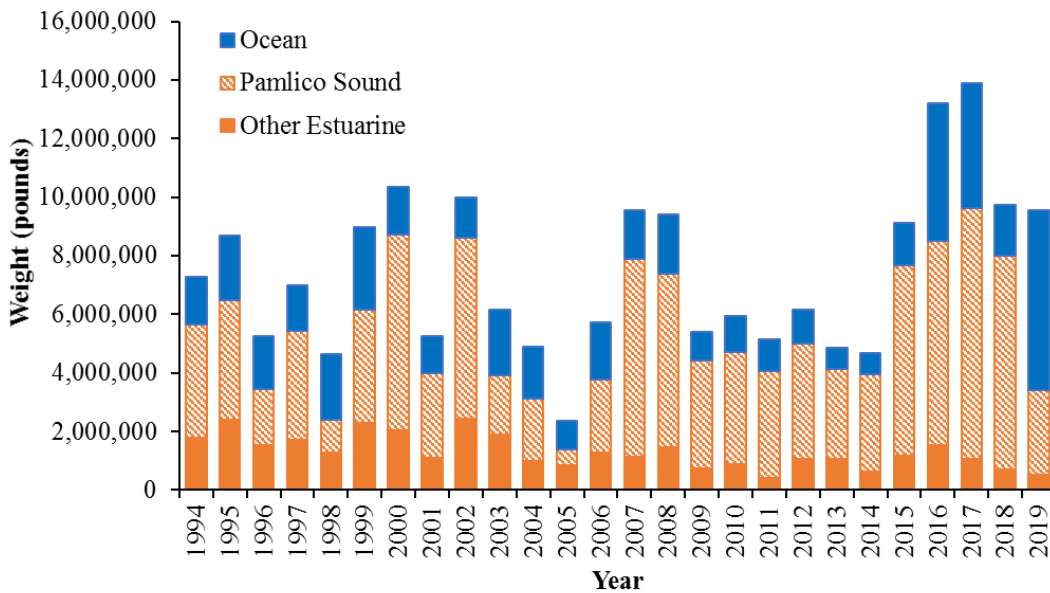


Figure 9. Annual commercial shrimp landings (pounds) by area for all three shrimp species combined in North Carolina, 1994-2019. Data from the NCDMF Trip Ticket Program.

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See *Appendix 2.4: Managing Effort and Gear Modifications in the Shrimp Fishery to Reduce Bycatch* and *Appendix 2.3: Area Restrictions to Reduce Shrimp Trawl Bycatch in North Carolina* for detailed commercial landings by gear and area.

Summary of Economic Impact of Commercial Shrimp Fishing

As one of the largest and most valuable commercial fisheries in the state, shrimp is a strong economic driver for the industry, supporting year-round seafood production, in-state consumption, and national exports. From 2004 to 2019, the value of the commercial shrimp harvest constituted roughly 20% of all commercial landings, with that proportion increasing to 25 to 30% in recent years. However, this valuable fishery is relatively concentrated, with fewer than 500 participants recording shrimp harvest most years. In fact, as the total value generated from commercial shrimp harvest increased from 2004 to 2019, the number of participants has decreased slightly, demonstrating an even greater concentration over time.

In addition to catch statistics and associated dockside values, the estimated total economic impact of this industry to the state of North Carolina can be modelled using IMPLAN statistical software. This method takes the direct contribution of the fishery (ex-vessel output and employment) along with federal fisheries data to model the total economic contribution to jobs, income, output, and value-added impacts. For a detailed explanation of the methodology used to estimate the economic impacts please refer to the NCDMF's License and Statistics Section Annual Report (NCDMF 2020).

To capture this total contribution, IMPLAN estimates three types of impacts: direct, indirect, and induced. For commercial shrimp fishing, direct effects are those felt at the fishery level, indirect effects occur from business-to-business spending related to the fishery, such as transport and processing, and induced effects are the state-level impacts of household spending from incomes gained through the commercial shrimp fishery. The values in Figure 10 represent the summed totals of direct, indirect, and induced impacts. While economic impacts can only be estimated starting in 2008, these data reflect the same landings trends of increasing value over time (Figure 10). Despite slight decreases in 2018 and 2019, the commercial shrimp industry helps promote a robust seafood economy, generating nearly \$100 million in state-wide sales impacts. While the number of licensed shrimp fishery participants is low, commercial shrimp harvest helps generate an estimated 1,000 to 2,000 additional jobs annually, underscoring the broader impact to the state's overall economy.

In addition to the economic influences of the global shrimp market, environmental concerns within North Carolina also act as a significant driver of this industry's value. Given the biology and life-histories of shrimp, fishing for this product requires methods that are generally deemed more environmentally destructive, such as trawling (MSC 1996; NCDEQ 2016). The environmental externalities that shrimp harvest incur can drive down demand for wild-caught shrimp, which, along with the need to price-adjust for environmental damages, can ultimately force North Carolina shrimp to sell at a prohibitively high price for many consumers. On top of this, shrimp are highly sensitive to environmental conditions, requiring additional concern for environmental protection when considering shrimp management. In all, these factors help demonstrate many of

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the hidden costs within the North Carolina shrimp harvest, and how that affects both the price and value of these products moving forward.

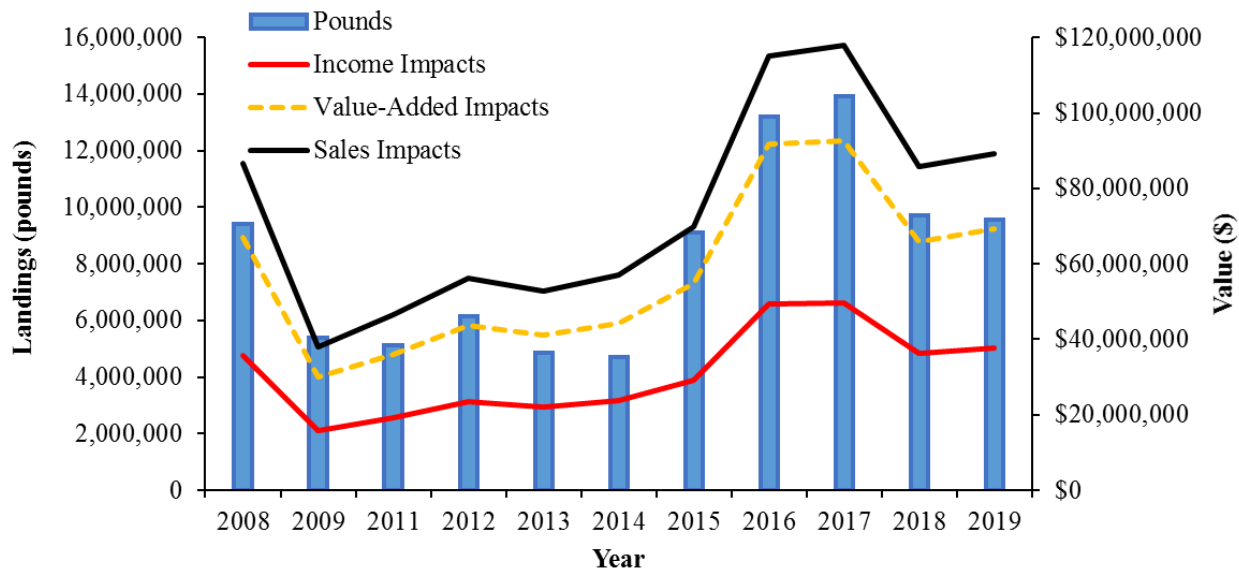


Figure 10. Economic impact estimates to the state of North Carolina from commercial shrimp harvest, 2008-2019. Estimates are generated using IMPLAN economic modelling software, data from NOAA’s Fisheries Economics of the U.S. Reports, and NCDMF Trip Ticket data. Income impacts represent the total additional income generated in NC by the commercial shrimp industry (includes wages, benefits, and proprietor income). Value-added impacts represent the total value of the commercial shrimp industry’s economic production to NC. Sales impacts represents the output value of the commercial shrimp industry and is the closest proxy of the industry’s contribution to NC’s annual gross domestic product (value added through the production of goods and services). These various impact estimates are not additive and should be considered independently. Note: expenditure data from NOAA’s “Fisheries Economics of the U.S.” is only available beginning in 2008.

Lastly, during the shrimp FMP advisory committee process, members discussed NCDMF’s ability to accurately quantify the economic impacts of management changes and questioned what steps would be needed to conduct this analysis. While this quantification may be possible with sufficient data, the Division lacks much of the required information to produce a reliable estimate spanning biological, economic, and social data gaps. In order to evaluate the economic impacts of management changes for the shrimp fishery, the Division would need highly accurate estimates of the stock status of each species related to the shrimp fishery, projections of how these stocks would react to various management changes, and the holistic value of each of these stocks are (including commercial, recreational, and non-use values). Beyond this, detailed participant-level data would need to be collected across a range of stakeholders, while the economic value of a variety of

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indirect components, such as improved water quality, enhanced broodstock habitat, reduced user conflict, or changes in market behavior, would also need to be accurately quantified to incorporate into the calculation. At this time the Division has a strong understanding of how specific management changes would impact the economics of the fishery at a functional level, but a holistic economic impact quantification would require enhanced data streams from a wide set of sources that is not feasible within the timeline of the current FMP.

RECREATIONAL FISHERY

Within the division's recreational fishery monitoring programs [Marine Recreational Information Program (MRIP), Giggling Mail Survey, Cast Net and Seine Mail Survey, and the Recreational Commercial Gear License (RCGL) Survey], the MRIP and Giggling Mail Survey do not collect data with respect to shrimp. Recreational shrimp harvest data are limited to the Cast Net and Seine Mail Survey and the RCGL Survey.

Recreational fishermen harvest shrimp for personal consumption and for use as bait. A RCGL is required to recreationally harvest shrimp using a limited amount of commercial gear. Commercial gear allowed under a RCGL license that target shrimp include otter and skimmer trawls with a headrope length up to 26-feet, a 100-foot seine, one shrimp pound net, and up to five shrimp, crab, and fish pots each. Seines measuring less than 30 feet long and cast nets are exempt from this license. Shrimp harvested under a RCGL license cannot be sold and is for personal consumption only. Recreational fishermen are limited to 48 quarts of head-on (30 quarts of head-off) shrimp per person, per day or if a vessel is used, per vessel per day (RCGL maximum limit is two per vessel). Cast nets are the only gear allowed in closed shrimping areas, and recreational fisherman can harvest four quarts of head-on or two-and-a-half quarts of head-off shrimp per person, per day. For additional information on RCGL guidelines and rules, visit:

<http://portal.ncdenr.org/web/mf/recreational-commercial-gear-license>.

Harvest data from RCGL gears are only available from 2004 to 2008 due to no funding of the RCGL survey. The number of licensed individuals participating in the RCGL fishery has steadily decreased from 6,356 in 2001 to 1,980 in 2019 (Figure 11). This is the best indicator currently available of effort in the RCGL fishery. For additional information on licenses see the License and Statistics Annual Report or for RCGL survey analysis see the 2009 License and Statistics Annual Report (NCDMF 2009).

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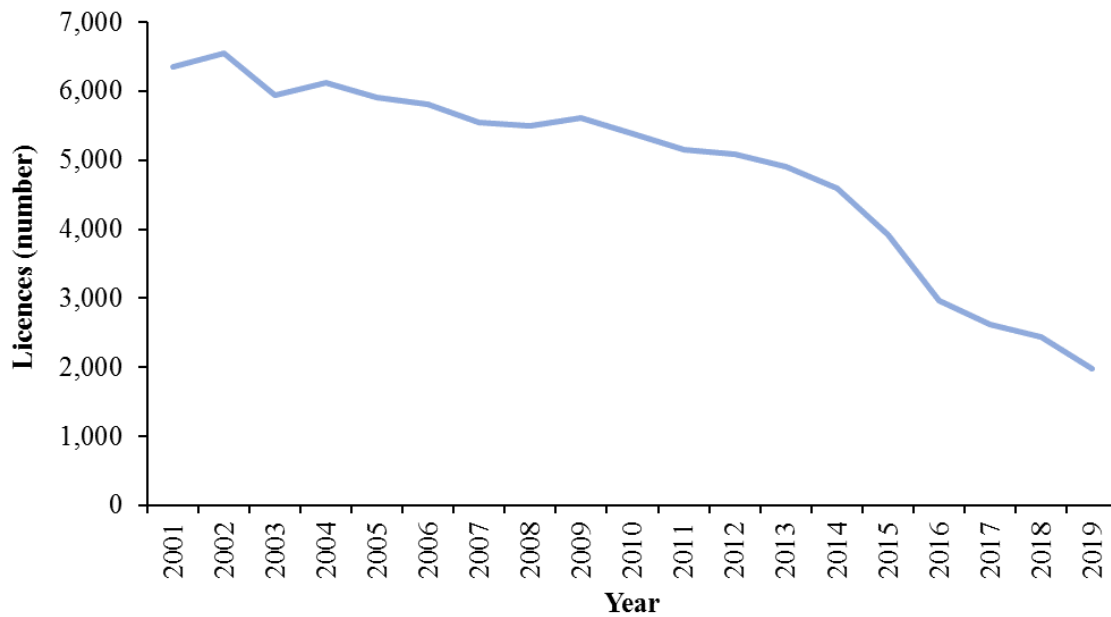


Figure 11. The number of Recreational Commercial Gear License (RCGLs) issued 2001-2019.

From 2012 to 2019, the estimated total number of shrimp caught (harvest and released) using a cast net and/or seine ranged from 90,651 in 2018 to 296,692 in 2016, with an estimated annual average of 189,022 shrimp. Total shrimp harvest ranged from 83,266 in 2019 to 237,433 in 2016 (Figure 7). The estimated average of shrimp harvested annually over this eight-year period was 161,235. The months of July/August had the greatest number of shrimp harvested, closely followed by September/October and May/June. Annual trips ranged from 95,784 in 2018 to 217,484 in 2015 (Figure 12).

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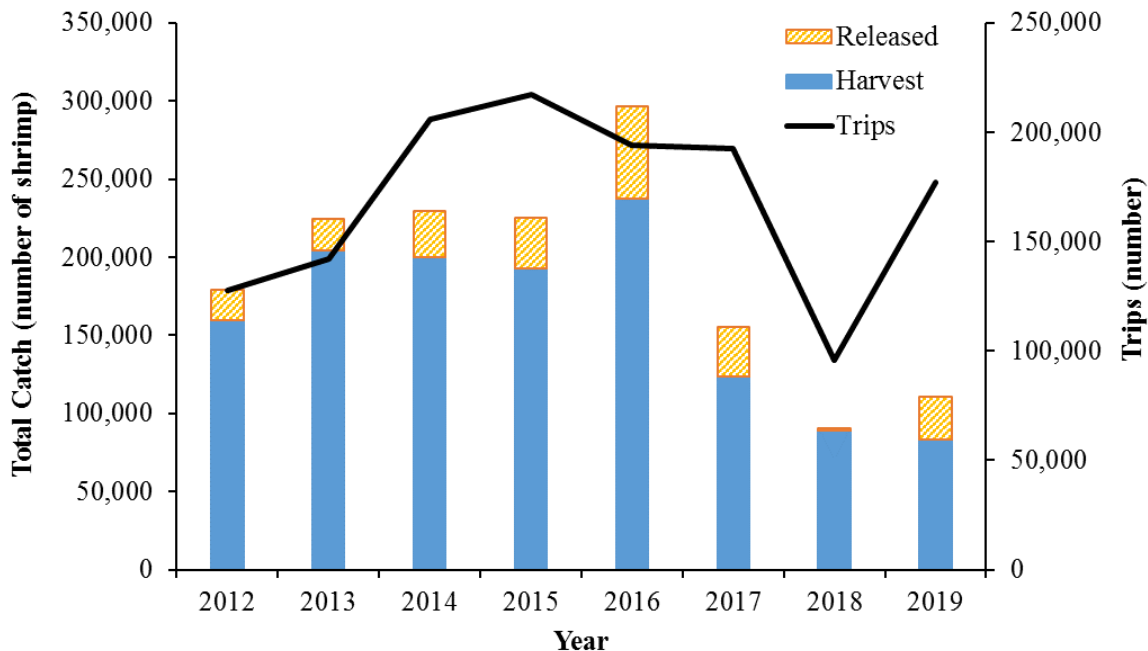


Figure 12. Annual number of shrimp harvested and trips taken from cast nets and seines for recreational purposes, 2012-2019.

Summary of Economic Impact of Recreational Shrimp Fishing

Overall, recreational effort and harvest for shrimp in North Carolina is very difficult to track and quantify. However, shrimp play a significant role in the recreational fishing industry overall in North Carolina, and it is important to note this species' role and how it affects the recreational fishing economy at-large. Specifically, shrimp serve as one of the primary bait species for recreational anglers in the state, and bait shrimp are sold in tackle shops, gas stations, big-box stores, and a variety of other locations. Depending on target species, anglers allocate a significant portion of their bait and tackle spending to shrimp each season, which contributes strongly to the sales of many tackle shops. Additionally, the need to purchase bait shrimp can also lead to spillover spending, these goods bring anglers into tackle shops and related stores, leading to additional spending. On top of this, some anglers choose to catch their own bait shrimp via cast nets and seines, which also drives gear purchases throughout the state. In short, shrimp are an important component of recreational angling, and contribute greatly to recreational bait, tackle, and gear spending, which generates significant economic impacts to the state of North Carolina.

BYCATCH

Bycatch is the portion of a catch taken incidentally to the targeted catch because of non-selectivity of the fishing gear to either species or size differences (ASMFC 1994). In North Carolina, numerous studies have been conducted to characterize bycatch in the commercial shrimp trawl fishery (Roelof 1950; Pearce et al. 1988; McKenna et al. 1993, 1996; Diamond-Tissue 1999; Johnson 2003, 2006; Logothetis and McCuiston 2004; Brown 2009, 2010, 2015, 2016; Brown et al. 2017, 2018). While many species of finfish are caught as bycatch in the shrimp trawl fishery,

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the bycatch of Atlantic croaker (*Micropogonias undulatus*), southern flounder (*Paralichthys lethostigma*), summer flounder (*P. dentatus*), spot (*Leiostomus xanthurus*), and weakfish (*Cynoscion regalis*) are of particular concern due to their value as economically important recreational and commercial fisheries as well as concerns about their stock status.

In 1990, NCDMF began testing the use of Bycatch Reduction Devices (BRDs) in shrimp trawls to reduce finfish bycatch. Results from this work led to North Carolina becoming the first state to mandate the use of BRDs in all shrimp trawls in 1992. The use of BRDs installed in shrimp trawls can reduce total bycatch by 30 to 70% (McHugh et al. 2016). North Carolina has continued testing and working with the industry to modify trawl gears to reduce bycatch.

Of federally protected species found in North Carolina, sea turtles, sturgeon, and the common bottlenose dolphin (*Tursiops truncatus*) are known or suspected to be incidentally taken in the shrimp fishery. Turtle Excluder Devices (TEDs) in trawls are estimated to have a 97% exclusion rate of sea turtles with minimal shrimp loss (Watson 1981; Federal Register 1987, 1992; NOAA 2020). The use of TEDs has also shown to reduce finfish bycatch (Brewer et al. 2006; Broome et al. 2011; Price and Gearhart 2011).

While bottlenose dolphins are commonly seen feeding behind shrimp trawlers in North Carolina (Fleming 2004; Johnson 2006; Brown 2009), very few takes have been observed in the shrimp trawl fishery. Bycatch of Atlantic sturgeon (*Acipenser oxyrinchus*) is thought to be the primary source of mortality and biggest threat to the species recovery (ASMFC 2017). Results from the 2017 Atlantic Sturgeon Stock Assessment Report indicate the total and dead bycatch of Atlantic sturgeon from otter trawls has declined since 2002 and the stock is showing signs of recovery (ASMFC 2017). In an evaluation of TED designs used in the Mid-Atlantic croaker flynet fishery, Atlantic sturgeon were observed escaping through TED openings (Gearhart 2010) and may further be excluded from shrimp trawls outfitted with TEDs.

Bycatch in the recreational shrimp fisheries is likely minimal, and effort in this sector has been difficult to quantify. While recreational fishermen holding a RCGL may use trawls up to 26 feet in length, creel limits, and area restrictions further limit their effort and bycatch. The use of non-trawl gears such as cast nets, seines, shrimp pots, and shrimp pounds are popular among recreational fishermen and have been shown to have minimal bycatch (Whitaker et al. 1991; McKenna and Clark 1993; Brown 2006; Sessions and Thorpe 2006).

See *Appendix 1: Shrimp Trawl Bycatch Assessment*, *Appendix 2.4: Managing Effort and Gear Modifications in the Shrimp Fishery to Reduce Bycatch* and *Appendix 2.3: Area Restrictions to Reduce Shrimp Trawl Bycatch in North Carolina* for more information on bycatch and discards of non-target species.

ECOSYSTEM PROTECTION AND IMPACTS

The growth and survival of shrimp within the habitats used are maximized when water quality parameters, such as temperature, salinity, and dissolved oxygen, are within optimal ranges. Additional information on these habitats including threats, water quality degradation and how these relate to the shrimp fishery are discussed below. Additional information can be found in the

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North Carolina Coastal Habitat Protection Plan (CHPP), previous shrimp FMPs, various Division of Water Resources publications (NCDWQ 2000, 2008; NCDEQ 2016), and in the representation shown in Figure 13.

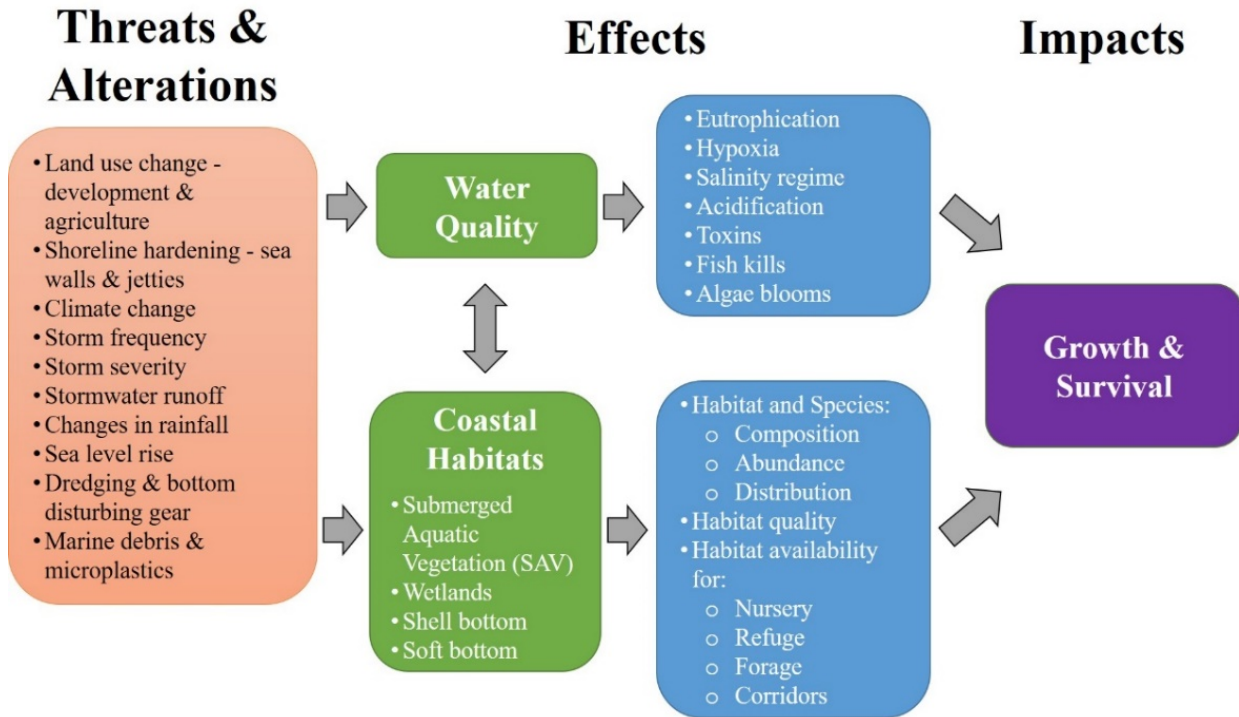


Figure 13. Effects of threats and alterations on water quality and coastal habitats and their ultimate impact on the growth and survival of various species.

FISHERY MANAGEMENT PLANS

State-managed species plans focus on current priority habitat issues specific to their species and target fisheries. The protection of habitat is reviewed in this plan's issue papers in relation to the shrimp fishery and how harvest areas may be adjusted to minimize fishery impacts to SAV, shell bottom, and Special Secondary Nursery Areas (SSNAs).

See *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* and *Appendix 2.1 Management of Shrimp Trawling for Protection of Critical Habitats* for more nursery area and habitat information.

Coastal Habitat Protection Plan

The Fisheries Reform Act statutes require that a Coastal Habitat Protection Plan be drafted by the NCDEQ and reviewed every five years (G.S. 143B 279.8). The CHPP is intended as a resource and guide compiled by NCDEQ staff to assist the department, Marine Fisheries, Environmental

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Management (EMC), and Coastal Resources (CRC) commissions in the development of goals and recommendations for the continued protection and enhancement of fishery habitats of North Carolina. The CHPP helps to ensure consistent actions among these commissions as well as their supporting NCDEQ divisions. The three commissions shall adopt rules to implement the Coastal Habitat Protection Plan in accordance with Chapter 150B of the General Statutes. Habitat recommendations related to fishery management can be addressed directly by the MFC. Habitat recommendations not under MFC authority (e.g., water quality management, shoreline development) can be addressed by the EMC and the CRC through the CHPP process.

The CHPP Source Document summarizes the economic and ecological value of coastal habitats to North Carolina, their status, and the potential threats to their sustainability (NCDEQ 2016). The Coastal Habitat Protection Plans and Source Document can be viewed and downloaded from: <http://portal.ncdenr.org/web/mf/habitat/chpp/07-2020-chpp>.

The CHPP is undergoing a mandated five-year review, with adoption planned in 2021. The priority issue, “Submerged Aquatic Vegetation (SAV) Protection and Restoration, with Focus on Water Quality Improvements” has implications for shrimp stocks. SAV is especially sensitive to water quality impairment from nutrient and sediment pollution and has been considered a “coastal canary”, serving as a valuable bio-indicator of the overall health of coastal ecosystems. The primary mechanism to restore and sustain SAV is by improving water quality. The CHPP strategy for SAV involves modifying water quality criteria, such as chlorophyll-a levels and nutrient standards to reduce nutrient loading, to allow increased light penetration that is critical for SAV. This will not only benefit SAV but address other poor water quality impacts to marine resources. Another priority issue in the CHPP, “Wetland Protection and Restoration with a Focus on Nature-based Methods”, also has direct implications for shrimp. Turner (1977) found a significant positive relationship between the size of wetlands and shrimp production. The positive relationship between wetlands and shrimp production was later shown to be affected by the extent of marsh edge and flooding duration (Minello et al. 2012). To protect and restore SAV and wetlands, which would benefit shrimp, mapping and monitoring of these habitats is critical to determine and provide direction on necessary protection or restoration actions. The priority issue “Habitat Monitoring to Assess Status and Regulatory Effectiveness” addresses more specifics regarding needed habitat monitoring.

One of the goals of the CHPP is to identify, designate, and protect Strategic Habitat Areas (SHAs). SHAs are specific locations of individual fish habitats or systems of fish habitats that have been identified to provide exceptional habitat functions or that are particularly at risk due to imminent threats, vulnerability or rarity. Division habitat staff have instituted additional sampling to validate the identified SHAs by employing the creation of a multi-metric index to further evaluate/validate the SHAs. Through this process habitat metrics will be analyzed and refined. A similar process will be used to evaluate the ecological condition of existing nursery areas and non-nursery areas.

In recent years, scientific literature has refined the concept of nursery areas. In earlier days, an entire estuary was initially considered a nursery area because of the occurrence of juveniles. But as ecosystem sciences advance, it has been found that in addition to density, other factors such as growth, predator protection, and movement out of the nursery into the adult habitat influence determination of nursery areas. Based on Beck et al. (2001), Dahlgren et al. (2006), and Peterson

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(2003), nursery areas are a subset of juvenile habitat that contributes disproportionately more to the production of juveniles that recruit into a population than another area of similar size. Shallow habitats with structure, such as wetlands, SAV, and oyster reefs, provide more predator protection and food than soft bottom habitat, enhancing growth and survival (Lehnert and Allen 2002; Ross 2003; Grabowski et al. 2005). However, juvenile species require specific, optimal abiotic conditions, such as salinity and temperature, to maximize growth. Productive or optimal nursery areas occur where ideal abiotic factors, structured habitat, and landscape position overlap (Figure 14). While all waterbodies may have juvenile fish present at any given time, the combination of the above noted factors may not align, resulting in low nursery value (Beck et al. 2001; Peterson 2003). Shrimp trawling is restricted in the majority of these optimal nursery areas through habitat designations and area and gear restrictions.

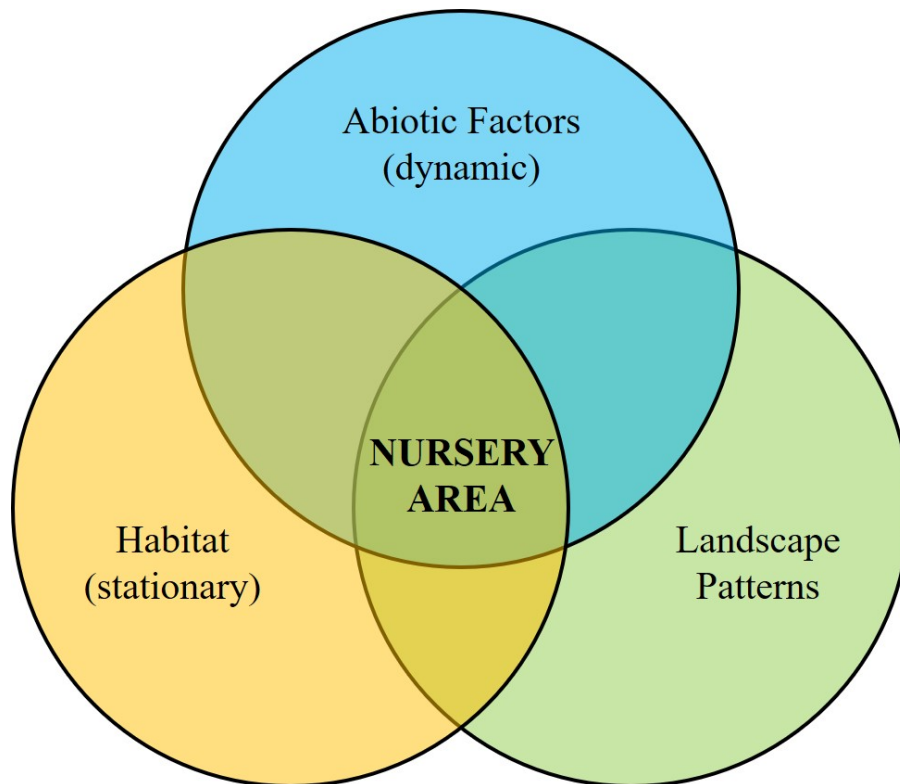


Figure 14. Depiction of the nursery area concept – the location where abiotic and habitat conditions, as well as the landscape setting are optimal for productivity. Abiotic factors – salinity, temperature, depth, currents; Habitat factors – wetlands, shell bottom, SAV, substrate; Landscape setting – geomorphology of the waterbody, proximity to inlets or adult habitat, habitat connectivity (adapted from Peterson 2003 and Beck et al. 2001).

Protecting existing coastal wetlands and SAV and taking steps to address losses is critical to maintaining production of shrimp. It is imperative the fishing community actively participate in the ongoing CHPP initiatives and add their voice to support the actions outlined in the CHPP.

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Two objectives in this amendment relate directly to habitat protection of the CHPP:

- Promote the restoration, enhancement, and protection of habitat and environmental quality in a manner consistent with the CHPP.
- Develop a strategy through the CHPP to review current nursery areas and to identify and evaluate potential areas suitable for designation.

THREATS AND ALTERATIONS

Shrimp use a variety of estuarine and coastal ocean habitats and are found in most habitats identified by the CHPP (NCDEQ 2016). Adequate water quality is necessary to maintain the chemical properties of the water column required by shrimp, and the various habitats that support them (wetlands, submerged aquatic vegetation, shell bottom, and soft bottom). Human activities that degrade water quality or alter water flow can negatively impact shrimp growth or survival. Human activities and land use that increases nutrient loading can lead to prolonged periods of oxygen depletion in large areas of habitat (Jordan et al. 2018). Tidal creeks are considered critical nursery habitat for shrimp and can be particularly sensitive to land use and urban development (Sanger et al. 2015). As land modification occurs and impervious surfaces increase in areas adjacent to natural ecosystems, sedimentation, channelization, and toxin runoff events occur with greater frequency and severity. These events often become compounded since tidal creeks function as hydrological links to our estuaries (Sanger et al. 2015). As a result, low dissolved oxygen events, toxin contamination of sediments, and tidal creek channelization are probably the greatest water quality concerns for shrimp. For more information on other sources of water quality degradation, please refer to the CHHP (NCDEQ 2016).

Submerged aquatic vegetation (SAV), wetlands, shell bottom, and soft-bottom, including inlets and the ocean floor, are habitats of particular importance as nursery, refuge, foraging grounds, and movement corridors for shrimp (Williams 1955; Williams 1958; Weinstein 1979; Rulifson 1981; Bielsa et al. 1983; Murphey and Fonseca 1995; Steele 2002). Portions of these habitats have been degraded or lost over time by a variety of anthropogenic activities. Although it is difficult to quantify how, and to what extent, habitat degradation may alter annual shrimp populations, it remains important for management to understand the impacts of habitat degradation on other estuarine species that rely on similar habitat for survival.

The primary gear used in the shrimp fishery is shrimp trawls. Bottom disturbing fishing gear can impact ecosystem function through habitat degradation and is well documented (NCDMF 1999; NCDMF 2015; NCDEQ 2016). Extensive damage to SAV can occur from trawl doors that dig into the sediment and uproot plants. The dragged chain can cut or damage the above-ground leaves, but this does not always result in complete mortality (ASMFC 2000). Shrimp trawls can elevate turbidity, reducing water clarity needed for SAV growth and survival. Loss and damage to SAV is detrimental to the estuarine system due to the large diversity of fish and invertebrates that are dependent on it as a nursery and foraging area (NCDEQ 2016). Shrimp trawling can cause structural damage to oyster reefs (Berrigan et al. 1991). Similarly, shrimp trawling can cause structural damage to ocean hard bottom. This habitat, consisting of exposed limestone rock encrusted with live organisms such as coral, sponges, and other invertebrates, is critical for supporting reef fish communities.

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RESEARCH NEEDS

The research recommendations listed below (in no particular order) are offered by the division to improve future management strategies of the shrimp fishery. They are considered high priority as they will help us to better understand the extent of bycatch from shrimp trawls, better manage the shrimp fishery, and meet the goal and objectives of the FMP. A more comprehensive list of research recommendations is provided in the FMP Update and Research Priorities documents reviewed annually and can be found at:

http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=33789156&name=DLFE-143144.pdf

- Conduct bycatch characterization work across all strata (for example: dominant species, season, areas, gear type, vessel type, number of nets/rigs, headrope length, TED position, etc.).
- Improve accuracy of self-reported license gear survey data or investigate other means of accurately obtaining shrimp fleet characteristics.
- Collect improved effort data (e.g., headrope length, number of nets, tow time, number of tows) to provide bycatch estimates based on actual time fished (or number of tows), rather than number of trips.
- Create and validate juvenile abundance indices for white and pink shrimp.
- Determine the cumulative impacts of shrimp trawl bycatch on individual species population dynamics and the ecosystem.

To gain a better understanding of the current magnitude and composition of discards in the shrimp trawl fishery, at sea observations are needed across all seasons, areas, and gears. Expanded characterization data across all segments of the fishery provides insight on gear selectivity and can aid in the development of new gear configurations to reduce bycatch. Due to the high variability of shrimp trawl bycatch data, additional information on tow duration and number of tows made during a trip is needed to expand discard estimates. Improved data on fleet characteristics and effort further allows fisheries managers to estimate total removals of bycatch species and produce more accurate stock assessments. Better estimates of shrimp trawl bycatch also allow managers to better understand how these removals alter the community structure of ecosystems. Fishery-independent monitoring programs need to be expanded to create juvenile abundance indices for white and pink shrimp to help managers estimate year class strength of all penaeid shrimp and further evaluate nursery areas.

SHRIMP AMENDMENT 2 MANAGEMENT STRATEGY

This section to be completed when the MFC selects their preferred management strategies that are taken out to review by the DEQ secretary, Gov Ops, AgNEER, and fiscal research division.

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APPENDICES

APPENDIX 1. SHRIMP TRAWL BYCATCH ASSESSMENT

The focus of this appendix is to discuss: 1) methods and data needed to estimate the amount of bycatch in the shrimp trawl fishery and 2) methods for estimating bycatch reduction and the impacts to common bycatch species.

Calculating Bycatch Estimates

Though the need is widely recognized, characterizing the nature, composition, and magnitude of bycatch in the shrimp trawl fishery has proven difficult (Diamond et al. 2000; Davies 2009; Wang et al. 2019). These difficulties are generally attributed to inadequate monitoring of many pertinent fishery characteristics including actual bycatch levels, effort of the directed fishery, variable fishing behavior, distribution and abundance of bycatch species, and the mortality rate of discarded species. The problem is exacerbated by the patchy distribution of fishing effort and juvenile finfish in both time and space. The amount of bycatch generally varies from tow to tow (and depends on many factors), with many tows having some bycatch and fewer tows with high bycatch (Diamond 2003; Fernandes et al. 2015).

Two methods are typically used to estimate shrimp trawl bycatch. One common method of estimating bycatch is the ratio method (fish:shrimp). While there are numerous ways to calculate the ratio, all forms of this method use some information about the ratio of kept and/or discarded bycatch to the target catch, usually at the tow, day, or trip level (i.e., per sample) caught by a gear or fishery and uses the reported landings of the target species multiplied by the ratio to estimate the total amount of bycatch (Diamond 2003; SEDAR 2014a). The main assumption with the ratio method is there is a direct linear relationship between the bycatch species and the target species, which often is not the case. For example, from division observer studies conducted from 2012 through 2017 (Brown 2015, 2016, 2017, and 2018), a linear regression was used to model the relationship between the observed weakfish and shrimp catch (Figure 1.1). The results showed a weak, positive linear relationship with a r^2 of 0.23. This means that only 23% of the variability in the catch data is explained by the linear relationship between weakfish and shrimp in the catch. Additionally, as more effective bycatch reduction devices (BRDs) are developed the relationship between the retained catch and the discarded catch will change (Wang et al. 2019). Another method used to estimate bycatch is the catch-per-unit-effort (CPUE) also called the bycatch-per-unit-effort (BCPUE) method. This method relies on fishery effort data and observer data or fishery independent proxy. Fishery independent data used as a proxy may help characterize bycatch, but it is important to determine gear type/comparability caveats of any fishery independent data used versus fishery dependent data (SEDAR 2014a).

A comparison among several ratio methods and a CPUE method found the four ratio methods tested were more biased than the CPUE method. Additionally, the four ratio methods were more influenced by the mean or variance of the catch, observer coverage, and correlation between the bycatch and target catch (Diamond 2003). Similarly, Edwards et al. (2015) found that model-based bycatch estimates were preferred because they showed less bias than ratio estimators. Carbonell et al. (2017) furthered the use of CPUE based estimates by incorporating environmental variables

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into their model to determine what environmental characteristics were related to higher rates of bycatch. However, in most cases the data needed to calculate reliable CPUE estimates for bycatch species is lacking. During the SEDAR (2014a) Procedural Workshop to evaluate shrimp data for assessment purposes and for bycatch estimation, several data requirements were identified based on methods used and can be found in Table 1.1.

The SEDAR (2014a) workgroup panel determined the ratio method was not the preferred method for bycatch estimation and noted it should be phased out as fishery effort time series become more reliable. The following issues were identified as potential problems with the ratio method:

- Difficult to separate fishing trends from fish population trends.
- Shrimp and fish populations are often on different trends. Unless there is a correlation between shrimp and the species of interest, should not use the ratio method.
- Should only use the ratio method when you have fishery-independent indices for shrimp and the fish species of interest so the ratio can be scaled.

The use of fishery-independent surveys to develop BCPUE estimates are not proxies alone for commercial BCPUE effort estimates but may be useful when combined with observer data. Fishery-independent surveys that use shrimping vessels and nets (e.g., SEAMAP) show much higher rates of BCPUE than observer programs, most likely due to differences in gear configuration, timing of sampling (day vs. night), and areas fished (randomly selected). However, fishery-independent indices may be correlated with commercial BCPUE, since both may reflect the abundance and availability of non-shrimp species. The Shrimp SEDAR Workgroup (2014a) recommended exploring the use of fishery-independent indices to tune BCPUE estimates where observer sample size is not adequate to produce year-specific BCPUE estimates.

Commercial shrimp trawl effort data currently collected through the division's Trip Ticket Program include the number of trips and trip duration (not days fished) and may be insufficient to calculate reliable bycatch estimates depending on the desired effort metric for the fishery. The division and most other agencies do not typically collect more detailed effort data (e.g., number of fishing days, number of tows made during a trip or per day); although a few fisheries use logbooks to record effort metrics like tow time (Broadhurst et al. 2006; A. Bianchi, NCDMF, personal communication). Many of these more specific effort characteristics can be significant factors when estimating bycatch losses (e.g., mortality). Gear characteristics [i.e., number of nets, headrope length, BRD and turtle excluder device (TED) type and position, etc.] and strata (e.g., depth, season, area) are also important in calculating fishing effort (SEDAR 2014a).

While using the number of tows to represent effort rather than the number of trips or fishing days may be preferred it could present statistical problems. The variance in bycatch among tows in single day trips is likely less than for multi-day trips where tows are spread out over several days and likely over a broader spatial range. If the tows are not truly independent samples, then pseudoreplication would be a concern and result in imprecise variance estimates (Cochran 1977; Hurlbert 1984; Diamond 2003). Pseudoreplication occurs when samples are heavily dependent on each other. Since most trips in the North Carolina shrimp trawl fishery are single day trips (approximately 74% for otter trawls and 97% for skimmer trawls from 2012 through 2017; see Figure 2.4.5 in Appendix 2.4), there may be a high degree of covariance among tows in a trip. For example, if several tows are made in the same general area on the same day due to high catch rates

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of shrimp, the tows, and therefore the amount of bycatch caught, would not be considered independent samples, and the resulting bycatch estimates may be biased as the variance in bycatch would be underestimated (Diamond 2003). In this instance, using the number of trips or number of fishing days rather than the number tows may be preferred. Additionally, assuming there is less than 100% observer coverage, there would need to be an independent estimate of the average number of tows per trip available to use as an expansion factor for unobserved trips (Diamond 2003).

Data Collection Methods

There are several methods for collecting the data needed to estimate discards including onboard observers, logbooks, fishery-independent surveys, and fisher interviews. The best method for collecting data on bycatch species is through an onboard observer program (Kennelly 1995; Babcock et al. 2003; Suuronen and Gilman 2020; Curtis and Carretta 2020). Other methods, like the ratio method, have been shown to produce unreliable discard estimates (Suuronen and Gilman 2019). Several studies give general guidance concerning the percentage of observer coverage needed to produce reliable bycatch estimates or methods for determining the percent coverage needed for the fishery or species of interest (Babcock et al. 2003; Borges et al. 2004; Curtis and Carretta 2020). SEDAR (2014a) recommended that observer coverage be increased with special attention to temporal and spatial factors such as seasons, day vs. night, and coverage of various fleets without compromising statistical design.

Although onboard observers are considered the gold standard for collecting reliable discard data, there are potential biases. Babcock et al. (2003) identified potential sources of bias such as non-random sampling (many programs are opportunistic and vessels volunteer to carry an observer) as well as changes in fishermen behavior in the presence of observers, among others. One way to check the latter is to compare catches of observed and unobserved trips. If the samples are unbiased, Babcock et al. (2003) suggests observer coverage levels of at least 20% for common species and 50% for rare species in fisheries with more than a few thousand trips per year (the NC shrimp trawl fishery averaged 7,248 trips per year from 2012 through 2017). Although, the actual level of coverage needed may be higher or lower depending on the size of the fishery, distribution of the catch and bycatch, and spatial stratification of the fishery.

Borges et al. (2004) evaluated optimum sampling levels in an observer program that considered both cost and precision objectives simultaneously and explored the dependence of sampling levels on both variables. They found that small budget reductions would result in marginal decreases in precision. However, increasing the precision by 50% would require unrealistic increases in sampling and associated program costs.

Due to the challenges of documenting rare-event bycatch, Curtis and Carretta (2020) developed a software package to help assess how much observer coverage is needed to estimate bycatch of these rare-event species. In the North Carolina shrimp trawl fishery these may include species such as sheepshead, black drum, Spanish mackerel, and sea turtles. The package predicts observer coverage performance based on three metrics: 1) the conditional probability of observing any bycatch given that bycatch occurred in the fishery and the probability of any bycatch in the total fishery effort, 2) the upper confidence limit for total bycatch when none is observed, and 3)

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precision of the bycatch estimate. The tool allows the user to explore how observer coverage targets may vary with total effort, bycatch per unit effort (BCPUE), and dispersion index.

The division does have limited shrimp trawl observer data that could be analyzed to help determine optimum observer coverage for the shrimp trawl fleet (Brown 2015, 2016, 2017, and 2018). Likely stratifications for an observer program would include gear, season, and area to ensure estimates are unbiased and representative of the fleet. Vessel size is also a factor that could be considered when determining how to allocate observer coverage. One decision point that would need to be made is which species or suite of species should be used to determine the optimum percent observer coverage for the shrimp trawl fishery. Some potential species to use for determining the appropriate amount of observer coverage include Atlantic croaker, spot, and weakfish. Another decision to be made would be the minimum level of precision desired for bycatch estimates as more precise estimates will require more observer coverage and therefore make the program more expensive to operate.

Observer Program Logistics

Starting an observer program specifically for the shrimp trawl fleet would be similar to the one currently in place for estuarine gill nets. Past observer studies of the shrimp trawl fleet were done on a voluntary basis but to produce reliable estimates of bycatch participation in the program would need to be mandatory for fishermen/vessel operators. From past observer studies (Brown 2015, 2016, 2017, and 2018), 2014 was the year with highest percent observer coverage at 1.7% where 149 out of 8,531 trip days were observed (Table 1.2). The cost for this study was approximately \$150,000. To reach the 20% coverage recommended by Babcock et al. (2003), approximately 1,684 trip days would need to have been observed in 2014. The following paragraph outlines what would have been needed to achieve 20% observer coverage based on effort (trip days) from 2014.

The high number of trip days in the shrimp trawl fishery necessitates the need for additional staff (14 permanent and 14 temporary) due to the number of observed trip days that would be needed annually. Additional staff would likely consist of 13 permanent technicians, 14 6-month temporary technicians, and one permanent biologist. In addition to funds for new staff, operating funds would also be needed to purchase and maintain field and office equipment, cover travel costs for sampling operations, and other expenses. The total estimated cost is approximately \$1.4 million (Table 1.3). Table 1.4 shows a breakdown of how many trip days per month on average each new staff member would need to observe to meet 20% observer coverage based on the number of trip days in 2014. The estimated number of trip days that would be observed annually is 1,728 and would have resulted in 20.3% observer coverage in 2014 (Table 1.5). Since 2014 had the lowest amount of trip days in the shrimp trawl fishery from 2012-2017, anywhere from 419 (2013) to 1,125 (2016) additional trip days would have to be observed to attain 20% observer coverage in those years. This increase in the number of observed trip days would likely further increase the cost of the observer program.

Logbook Program Logistics

A logbook program could be instituted in the commercial shrimp trawl fishery to gather additional effort information such as the number of tows per day or per trip, the total amount of headrope

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fished, and tow times for each tow. Implementing a commercial shrimp trawl fishery logbook program would be similar to the current North Carolina Trip Ticket Program (TTP). The TTP has two primary methods for reporting: paper forms and electronic submissions. It would make sense to also allow these two platforms for any potential logbook program (for example it would seem unfair to make all logbooks be reported electronically while trip tickets could still be reported via paper). The trip ticket templates for paper forms are specifically designed by fishery (shrimp, crab, finfish, etc.). Logbook templates may need to be designed for specific sectors of the shrimp trawl fishery and might need to be more specific than the trip ticket templates. For instance, it might be wise to have a specific logbook template for the shrimp otter trawl fishery and one for the skimmer trawl fishery, depending on the variables being collected. To report logbooks electronically, the software should be designed to allow for fishermen who might be federally permitted to use that same platform to report to the state and the National Marine Fisheries Service (like what is in place for seafood dealers who are federally permitted).

The reporting frequency for any logbook program would also need to be considered. The TTP has a requirement for data to be turned in by the 10th of the following month. For a logbook program, a similar requirement would need to be put in place to track compliance (making sure logbooks are coming in when they are supposed to). Having logbooks submitted by the 10th of the following month would also work well because the industry and staff are already used to that schedule.

For the NCDMF Commercial Statistics Program to successfully implement a commercial shrimp trawl fishery logbook program more resources and staff would be needed. In license year 2020, there were 672 seafood dealer licenses issued (NCDMF 2020). Although not all seafood dealers reported trip tickets, all dealers were tracked for compliance purposes (seafood dealers who did not have any business still have to report to the TTP that they do not have any activity by the 10th of the month). In comparison, there were 350 to 450 fishing licenses with commercial shrimp trawl (otter and skimmer) landings in 2018 and 2019 (NCDMF 2020). Although the number of commercial fishing licenses is about 60% of the number of seafood dealers, compliance tracking would be more labor intensive because of the mobile nature of commercial fishermen compared to seafood dealers.

The data collected through a logbook program would be entered into the NCDMF Fisheries Information Network. For this to happen, new data tables would need to be developed as well as a new set of interface screens for division staff to enter the data. A process for submitting logbooks electronically would need to be developed as would a means to link logbook entries to their associated trip ticket.

The estimated cost to launch a commercial shrimp trawl fishery logbook program in North Carolina would be steep. The TTP spends about \$15,000 a year to print trip tickets and another \$10,000 a year for a maintenance contract to support the software program used by our seafood dealers. Assuming a logbook would be a three-part form (as opposed to a four-part form used for trip tickets) and about two-thirds of commercial shrimp trawl fishermen would report by paper (similar to what we see with seafood dealers), it is estimated that logbook printing would be roughly \$11,250 a year. It is also reasonable to assume the software maintenance contract would increase because it would increase the number of users by 1.5 times (~\$5,000). There would also be additional cost to configure the current software for a logbook program which is estimated to

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cost about \$60,000. The operational costs of the program would also need to be considered (postage, supplies, computers, etc.) and are estimated at \$46,500. The additional staff needed to administer the program would include one data entry clerk (\$25,000), one data control clerk (\$31,000), two port agents (\$64,000), and one biologist/analyst (\$41,000). The total estimated cost for a commercial fisheries logbook program for North Carolina is \$283,250 (Table 1.6). There is also the additional burden to fishermen to consider as they would have to spend additional time recording, verifying, and submitting logbook entries. In some states where logbooks have already been implemented, fisheries managers are scaling back these efforts and relying more on dealer reporting due to the cost of their logbook program (D. Lupton, NCDMF, personal communication).

Quantifying Bycatch Reductions

The division does not have the minimum data necessary to produce reliable absolute estimates of shrimp trawl bycatch and hence cannot quantify potential reductions in bycatch from various management actions. However, proxies may be examined to give a reasonable estimates of the potential reduction in bycatch for some management measures under consideration. To serve as a proxy for potential bycatch reductions for some area closures under consideration in Amendment 2, the division could look at data from one or more fishery-independent surveys as these provide useful information on the species composition and abundance on the fishing grounds (Kennelly 1995). For example, one method for potentially evaluating proposed closed areas in Pamlico Sound would be to use data from the division's Pamlico Sound Survey to come up with a proxy estimate for potential bycatch reductions due to a proposed area closure in Pamlico Sound. This could be done by determining the percent abundance of a particular species typically caught within the proposed closed area compared to the entire area sampled by the survey. While this is not a true estimate of bycatch reduction it would give managers some idea about the potential effectiveness of management measures in achieving some level of bycatch reduction. This would have to be done once a potential closed area was identified and a recent year or group of years would need to be chosen to estimate past abundance and distribution, which can be highly variable. This also assumes the species of interest makes up approximately the same percentage of the catch in the Pamlico Sound Survey as it does in the commercial fishery which may not be the case due to differences in gear (e.g., mesh size, BRDs, TEDs), area fished (depth), time of day fished, and time of year fished (Pamlico Sound Survey only samples in June and September). A similar approach was used by Gücü (2012) to model potential reductions in bycatch based on depth and season closures in the Mediterranean Sea. The study found higher amounts of discards would be expected to occur in shallower depths during certain times of year and that limiting effort in those areas and times discard losses could be mitigated.

Quantifying Impacts of Reducing Bycatch on Bycatch Species

Quantifying the impacts of reducing bycatch has proven to be a difficult task. Regardless of how large or small the bycatch estimate is for a species the number is meaningless in the absence of a population estimate from a stock assessment (Kennelly 1995). While large populations may be able to withstand large amounts of bycatch losses, a small population may be unable to withstand even small losses (Diamond 2003). Further the life history strategy of a species may also affect its ability to withstand varying levels of bycatch losses. Species that mature quickly and produce large numbers of young (r-selected species), such as spot, may be able to accommodate higher levels of

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discards than a species that matures slowly and produces few young (k-selected species), such as Atlantic sturgeon. Even when a stock assessment is available and bycatch estimates are incorporated, reducing mortality from bycatch alone may not have the expected outcome if the bycatch species/life stage is subject to high rates of natural mortality (Kennelly 1995), as was the case with Gulf of Mexico red snapper (see below; Galloway et al. 2017; Galloway et al. 2020; Cowan 2010). To properly estimate the impact of bycatch losses for any species, estimates of natural mortality, biomass, length at age, and estimates of discard mortality are needed (Kennelly 1995). Accounting for discard losses is vital for fisheries managers to set accurate harvest limits. In fisheries where discard losses are a large portion of the catch, including or excluding discard losses can impact the yield, effort, and biomass at Maximum Sustainable Yield (MSY) as does the survival rate of the discarded catch (Guillen et al. 2014). Additionally, to gauge any potential positive population impacts of reducing bycatch, a stock assessment is needed that produces estimates of stock size through time to monitor population size prior to and after management action was taken. Given the life history and coast-wide distribution of many bycatch species (e.g., Atlantic croaker, spot, weakfish) any benefits to inshore fisheries may not be realized even with reductions in bycatch.

Weakfish in the Atlantic

Weakfish is managed as a single coast-wide stock with all states from Massachusetts through Florida having a declared interest in weakfish. The first stock assessment for weakfish occurred in 1991 and found the stock was overfished and overfishing was occurring (Vaughn et al. 1991). Management responded by requiring all states to 1) reduce exploitation (mortality) of weakfish by 15 to 25% in 1992, 2) implement minimum size limits of 10 inches in 1992, 11 inches in 1993, and 12 inches in 1994, 3) further reduce exploitation by 25% in 1993 and 1994, 4) South Atlantic states reduce shrimp trawl by catch of weakfish by 50% by 1994, and 5) implement mesh size restrictions for gill nets and finfish trawls to achieve a 75% escapement rate of undersized weakfish (Seagraves 1991). To comply with Amendment 1, North Carolina 1) required the use of BRDs beginning in 1992, 2) closed the ocean flynet fishery south of Cape Hatteras in 1994, 3) implemented minimum size limits for weakfish in 1992, and 4) implemented minimum mesh size requirements for gill nets and flynets in 1992. However, due to poor compliance from most states, Amendment 2 was adopted in 1994 (ASMFC 1994). The purpose of Amendment 2 was to allow full implementation of the management strategy in Amendment 1 under the newly passed Atlantic Coastal Fisheries Cooperative Management Act. The weakfish stock was assessed again in 1994 and found the stock was still overfished and overfishing was occurring (Gibson 1995). Amendment 3, adopted in 1996, required states to implement a 12-inch minimum size limit, set minimum mesh size requirements for gill nets and fish trawls that retained less than 25% of weakfish under 12 inches, and to strengthen BRD certification requirements. These measures were meant to reduce fishing mortality to $F=0.50$ by 2000 (Lockhart et al. 1996).

A new stock assessment for weakfish was completed in 2002 (Kahn 2002). The assessment showed that fishing mortality in 2000 was below the target of $F=0.50$ and that stock biomass had increased above the $SSB_{\text{threshold}}$ of 14,400 metric tons. The stock assessment was updated in 2006 (ASMFC 2006) and while the stock assessment was not formally accepted key points from the assessment were accepted for management use, they were 1) the stock is declining, 2) total mortality is increasing, 3) there was not much evidence for overfishing, 4) something other than fishing

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mortality was causing the decline in the stock, and 5) there is a strong chance that regulating the fishery would not, in itself, reverse stock decline.

In 2009 the stock was again assessed, and the results of the assessment indicated weakfish abundance had declined markedly, total mortality was high, non-fishing mortality had increased, and the stock was in a depleted state (NEFSC 2009). The weakfish stock was depleted and at an all-time low of 10.8 million pounds (4,899 metric tons). At that stock size, fishery removals (landings and dead discards combined) represented a significant proportion of the remaining biomass. While the decline in the stock primarily resulted from a change in the natural mortality of weakfish, it was further exacerbated by continued removals by the commercial and recreational fisheries. Natural mortality had risen substantially since 1995, with factors such as predation, competition, and changes in the environment having a stronger influence on recent weakfish stock dynamics than fishing mortality. Given the high natural mortality levels, stock projections indicated the stock was unlikely to recover rapidly, even under a harvest moratorium (NEFSC 2009).

A new stock assessment model was used in 2016 to assess the weakfish stock and found the stock was still depleted although there were some positive signs in SSB in the last few years of the assessment and that natural mortality had risen to levels that were preventing the stock from recovering (ASMFC 2016). With the advent of revised recreational landings estimates, the assessment was updated in 2019 (ASMFC 2019). The results differed little from the 2016 assessment, showing the stock was still depleted though there was a slight increase in SSB in the last few years.

Atlantic Croaker in the Gulf of Mexico and South and Mid-Atlantic Bights

Diamond et al. (2000) used matrix models to explore the population-level impacts of shrimp trawl bycatch on Atlantic croaker populations in the Gulf of Mexico and the South and Mid-Atlantic bights and explored tradeoffs between the directed adult fisheries and bycatch mortality in shrimp trawls. Based on a previous study (Diamond et al. 1999) their a priori assumptions were 1) both stocks were declining in abundance, 2) both populations were more sensitive to first-year survival than any adult year, 3) mortality in the late juvenile stage, which is primarily bycatch mortality, had a greater effect on population growth rates than mortality during any other first-year stage, and 4) Atlantic croaker in the Gulf were more affected by bycatch mortality than in the Atlantic because of higher bycatch levels in the Gulf.

Their analysis showed both populations were more sensitive to adult survival than first-year survival. Bycatch mortality of late juveniles was not the most important factor affecting either population. Both populations were most sensitive to ocean larva mortality. In the Atlantic, this was followed by early juvenile and adult mortality. Although, bycatch mortality did have a negative impact on population growth rates and they estimated that reducing late juvenile or adult mortality by 5% in the Atlantic would reverse the modest population decline seen in their model. They speculated that the BRDs currently being used in the fishery would achieve the 5% reduction in mortality.

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South Carolina Trawl Net Closure

The inside waters of South Carolina's sounds and bays were consistently opened to trawling beginning in 1952. However, through time, conflict between large shrimping vessels and small shrimping vessels on whether the sounds and bays should remain open continued through the 1960s and 1970s. Small vessels preferred the sounds and bays remain open while the large vessels preferred them closed. Mid-sized vessels were evenly divided on the issue. By the 1980s, recreational fishermen and environmentalists became involved and asked for permanent closure of the sounds and bays to protect recreationally important finfish such as spotted sea trout and red drum (Whitaker 1989). Bearden et al. (1985) examined all available information and provided a report concluding the policy of opening the sounds and bays had not increased or decreased the overall physical or economic yield of shrimp. It also indicated there was negligible impact of trawling on habitat, crabs, and fish in the sounds and bays.

However, at the request of shrimpers, recreational fishermen, and environmentalists, the SC General Assembly closed the three sounds and one bay to commercial trawling for 1986 and 1987. The Crustacean Management section of the South Carolina Wildlife and Marine Resource Department (now the South Carolina Department of Natural Resources) set out to assess the closure through a fall trawl survey in the sounds and bays and a shrimp tagging program. Although it was pointed out that a two-year closure was too short to properly assess, it was concluded that:

1. Very few spotted seatrout and red drum were caught by trawling in the sounds and bays of SC.
2. No evidence trawling in the sounds or along the ocean beaches caused any long-term decreases in finfish populations.
3. Loss of forage species was more difficult to assess but believe that serious impacts would have been realized long ago.
4. Shrimp were consistently larger in areas outside of the sounds compared to shrimp size inside the sounds. This may represent a greater economic yield but if there are greater losses from natural mortality before moving into the ocean, economic yield could decrease despite the increase in size.
5. It was concluded that shrimp and fish stocks had not been negatively affected from a biological standpoint by commercial shrimp trawling.

Gulf of Mexico Red Snapper

In the initial stock assessment (1995) for Gulf of Mexico red snapper, natural mortality of juveniles was thought to be low, and the assessment concluded approximately 80% of total juvenile mortality was from bycatch in the shrimp trawl fishery and was the reason for the stock decline (Goodyear 1995; Galloway et al. 2017). Management responded by requiring shrimp trawl bycatch mortality be reduced by 50% with no corresponding reductions from the directed fisheries (recreational and commercial). The reduction in shrimp trawl bycatch mortality was to be achieved by requiring the use of BRDs.

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A new stock assessment conducted in 2005 determined the stock was still overfished because the BRDs did not meet the target reduction and harvest in the directed fisheries remained unchanged under the false assumption the bycatch reduction target was being met (SEDAR 2005; Galloway et al. 2017). The 2005 stock assessment also produced new estimates of juvenile mortality, attributing 33% of total juvenile mortality to shrimp trawls (much less than the initial stock assessment estimate of 80%) and natural mortality accounted for 67% of total juvenile mortality. Management again responded by not reducing harvest in the directed fisheries and instead opted to update BRD certification procedures (GMFMC 2006). A year later effort controls were established in the shrimp trawl fishery to reduce shrimp trawl effort in the western Gulf of Mexico by 74% in depths of 10-30 fathoms from 2001 to 2003 levels. In concert with this step, the quota for directed fisheries was reduced from 9.12 million pounds to 6.5 million pounds (GMFMC 2007) and was further reduced to 5 million pounds in 2008 and 2009. Only once harvest in directed fisheries was reduced did the stock begin to recover (Galloway et al. 2017). This should not be interpreted to mean that reducing bycatch mortality from shrimp trawls is unnecessary; however, it is likely not the only remedy needed to recover a depressed stock and, in some cases, reducing bycatch mortality may increase mortality from another source (natural mortality in the case of Gulf of Mexico red snapper).

Summary

Below are few summary points to consider:

- The CPUE method is preferred for calculating bycatch estimates as the ratio method is unreliable and prone to bias because it assumes a proportional relationship between the bycatch species and the target species.
- The level of observer coverage needed to attain reliable long-term estimates of shrimp trawl discards is likely high, as is the cost.
- In some instances, fishery-independent survey data may be used to provide guidance on potential bycatch reductions.
- Quantifying the impact of shrimp trawl bycatch on a species is difficult without an approved stock assessment for the species of interest.
- Reducing shrimp trawl bycatch alone is often not enough to recover an overfished stock.

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Tables

Table 1.1. Commercial shrimp bycatch estimation methods and corresponding data requirements (X) identified by the SEDAR Shrimp Workshop Panel (SEDAR 2014a).

	BYCATCH ESTIMATION METHODS		
Data Type	CPUE Method (King Mackerel; SEDAR 2014b)	CPUE Method (Sharks; SEDAR 2015)	Ratio Method (Atlantic Croaker Stock Assessment; ASMFC 2010)
Fishery Effort (Depth x Season x Strata x Gear Characteristics)	X	X	
Shrimp Catch	X (used to estimate effort)	X	X
Kept Bycatch/Fish			X (if available)
Discarded Bycatch/Fish	X (mortality estimate)	X	X
Fish age/length	X (Age 0 assumed)	X	X (Age 0 check assumption)
Fish BCPUE (observer CPUE)	X	X	
Fishery Independent CPUE)	X	X	
Minimum Data Requirement	Should be defined	Should be defined	Should be defined
BRD/TED-Type & Impact	X (need paired research)	X	X

X=Required

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Table 1.2. Summary of observer coverage percentages using trip days for the North Carolina shrimp trawl fishery from NCDMF bycatch characterization studies (Brown 2015, 2016, 2017, 2018). Fleet trip days data from the NCDMF Trip Ticket Program.
*Trip days includes shrimp trawl trips with durations of 1-6 days. Longer trips were excluded from the analysis and constituted 1.1% of the trips for 2012-2017.

Study Year	Study Months	Area	Gear	Observed Fishing Days	Total Trip Days (Sample Period)	Total Annual Trip Days	Percent Coverage (Sample Period)	Annual Percent Coverage
2012	Aug-Dec	Pamlico Sound	Otter Trawl	29	2,602	4,851	1.1	0.6
		Other Inshore	Otter Trawl	20	1,234	2,819	1.6	0.7
		Ocean	Otter Trawl	28	1,557	2,209	1.8	1.3
		<i>All</i>	<i>Otter Trawl</i>	77	5,393	9,879	1.4	0.8
	None	Pamlico Sound	Skimmer Trawl	0	3	6	0.0	0.0
		Other Inshore	Skimmer Trawl	0	957	1,092	0.0	0.0
		Ocean	Skimmer Trawl	0	0	0	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	0	960	1,098	0.0	0.0
		Total	All Trawls	77	6,353	10,977	1.2	0.7
	2013	Jan-Dec	Pamlico Sound	Otter Trawl	39	4,856	4,856	0.8
Other Inshore			Otter Trawl	14	2,577	2,577	0.5	0.5
Ocean			Otter Trawl	43	2,091	2,091	2.1	2.1
<i>All</i>			<i>Otter Trawl</i>	96	9,524	9,524	1.0	1.0
None		Pamlico Sound	Skimmer Trawl	0	35	35	0.0	0.0
		Other Inshore	Skimmer Trawl	0	1,177	1,177	0.0	0.0
		Ocean	Skimmer Trawl	0	0	0	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	0	1,212	1,212	0.0	0.0
		Total	All Trawls	96	10,736	10,736	0.9	0.9
2014		Jan-Dec	Pamlico Sound	Otter Trawl	69	4,362	4,362	1.6
	Other Inshore		Otter Trawl	13	1,947	1,947	0.7	0.7
	Ocean		Otter Trawl	67	1,494	1,494	4.5	4.5
	<i>All</i>		<i>Otter Trawl</i>	149	7,803	7,803	1.9	1.9
	None	Pamlico Sound	Skimmer Trawl	0	23	23	0.0	0.0
		Other Inshore	Skimmer Trawl	0	705	705	0.0	0.0
		Ocean	Skimmer Trawl	0	0	0	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	0	728	728	0.0	0.0
		Total	All Trawls	149	8,531	8,531	1.7	1.7
	2015	Jan-Aug	Pamlico Sound	Otter Trawl	23	3,520	5,794	0.7
Other Inshore			Otter Trawl	15	1,627	2,308	0.9	0.6
Ocean			Otter Trawl	28	621	2,358	4.5	1.2
<i>All</i>			<i>Otter Trawl</i>	66	5,768	10,460	1.1	0.6
Jan-Dec		Pamlico Sound	Skimmer Trawl	5	39	39	12.8	12.8
		Other Inshore	Skimmer Trawl	57	960	960	5.9	5.9
		Ocean	Skimmer Trawl	0	0	0	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	62	999	999	6.2	6.2
		Total	All Trawls	128	6,767	11,459	1.9	1.1
2016		Jan-Dec	Pamlico Sound	Otter Trawl	9	5,783	5,783	0.2
	Other Inshore		Otter Trawl	16	2,729	2,729	0.6	0.6
	Ocean		Otter Trawl	27	3,853	3,853	0.7	0.7
	<i>All</i>		<i>Otter Trawl</i>	52	12,365	12,365	0.4	0.4
	Jan-Dec	Pamlico Sound	Skimmer Trawl	0	119	119	0.0	0.0
		Other Inshore	Skimmer Trawl	20	1,217	1,217	1.6	1.6
		Ocean	Skimmer Trawl	0	0	0	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	20	1,336	1,336	1.5	1.5
		Total	All Trawls	72	13,701	13,701	0.5	0.5
	2017	July-Dec	Pamlico Sound	Otter Trawl	8	6,259	6,440	0.1
Other Inshore			Otter Trawl	10	1,983	2,685	0.5	0.4
Ocean			Otter Trawl	2	2,576	4,353	0.1	0.0
<i>All</i>			<i>Otter Trawl</i>	20	10,818	13,478	0.2	0.1
July-Dec		Pamlico Sound	Skimmer Trawl	0	275	287	0.0	0.0
		Other Inshore	Skimmer Trawl	15	473	494	3.2	3.0
		Ocean	Skimmer Trawl	0	5	5	0.0	0.0
		<i>All</i>	<i>Skimmer Trawl</i>	15	753	786	2.0	1.9
		Total	All Trawls	35	11,571	14,264	0.3	0.2

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Table 1.3. Estimated cost for implementing a commercial shrimp trawl observer program for the NC shrimp trawl fishery.

Category	Number of Staff	Unit Cost	Estimated Cost
Observer Field Supplies	28	\$2,000	\$56,000
Travel (Food, Lodging, Mileage)	28	\$17,808	\$498,624
Other	28	\$1,500	\$42,000
Staff			
Permanent Technician	13	\$36,000	\$468,000
6-month Temporary Technician	14	\$20,000	\$280,000
Biologist	1	\$45,000	\$45,000
Total			\$1,389,624

Table 1.4. Estimated number of trip days observed by position per month and year, number of trip days observed per year by position type, and total number of trip days observed per year for the NC shrimp trawl fishery.

Position Type	Number of Trip Days Observed / Person / Month	Total Number of Trip Days Observed / Person / Year	Total Number of Staff	Total Number of Trip Days Observed / Year / Position Type
Permanent Technician	7	84	13	1,092
6-month Temporary Technician	7	42	14	588
Permanent Biologist	4	48	1	48
Total Number of Trip Days Observed/Year				1,728

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Table 1.5. Estimated observer coverage for proposed level of observed trip days and number of trip day observations needed to attain 20% observer coverage for the NC shrimp trawl fishery, 2012-2017.

Year	Number of Trip Days	Proposed Observed Trip Days	Percent Observer Coverage	Observed Trip Days Needed for 20% Observer Coverage
2012	10,977	1,728	15.7	2,195
2013	10,736	1,728	16.1	2,147
2014	8,531	1,728	20.3	1,706
2015	11,459	1,728	15.1	2,292
2016	13,701	1,728	12.6	2,740
2017	14,264	1,728	12.1	2,853

Table 1.6. Estimated cost for implementing a commercial logbook program for the NC shrimp trawl fishery.

Category	Number of Staff	Unit Cost	Estimated Cost
Logbook Printing	-	-	\$11,250
Software Maintenance Contract	-	-	\$5,000
Software Configuration	-	-	\$60,000
Operational Cost	-	-	\$46,000
Staff			
Data Entry Clerk	1	\$25,000	\$25,000
Data Control Clerk	1	\$31,000	\$31,000
Port Agent	2	\$32,000	\$64,000
Biologist	1	\$41,000	\$41,000
Total			\$283,250

Figures

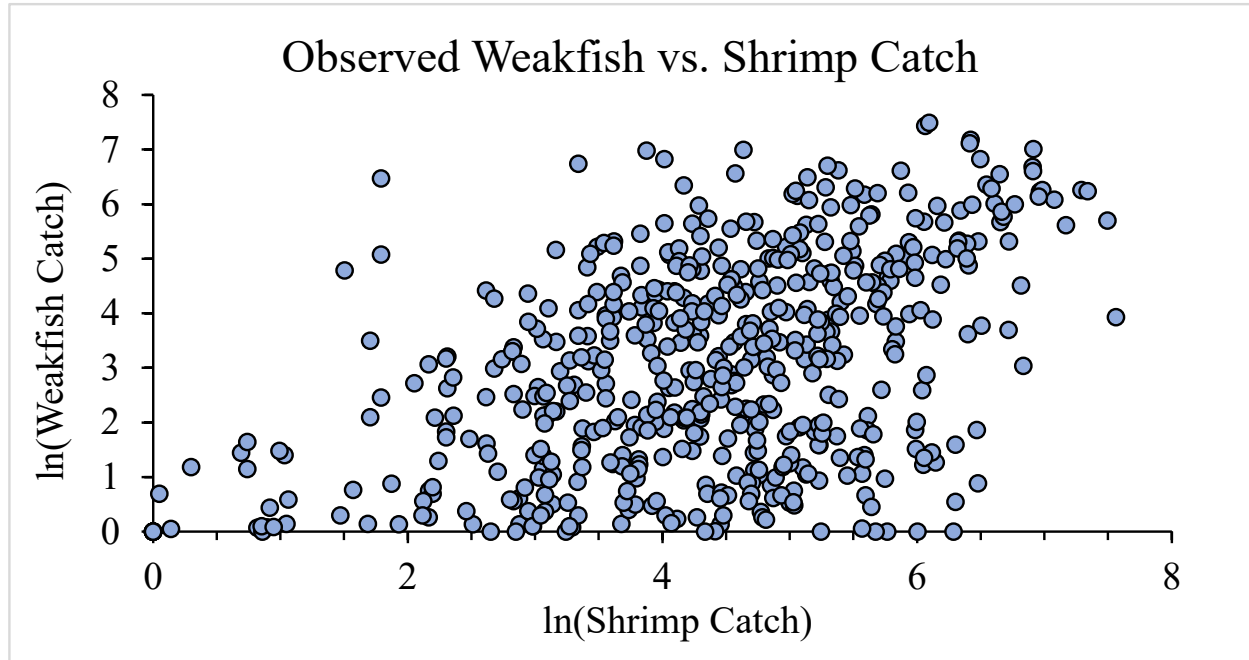


Figure 1.1. Plot of the natural log (ln) of weakfish (kg) versus the ln of shrimp (kg) in observed shrimp trawl catches, 2012-2017.

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APPENDIX 2. ISSUE PAPERS

APPENDIX 2.1. MANAGEMENT OF SHRIMP TRAWLING FOR PROTECTION OF CRITICAL SEA GRASS AND SHELL BOTTOM HABITATS

I. ISSUE

Providing additional protections for critical sea grass and shell bottom habitats through shrimp trawl area closures.

II. ORIGINATION

The North Carolina Division of Marine Fisheries (NCDMF) Shrimp Plan Development Team (PDT) and the public.

III. BACKGROUND

North Carolina's estuarine system is the largest of any coastal state along the eastern Atlantic seaboard and encompasses a diverse aquatic system of estuarine rivers, creeks, large sounds, and inlets totaling over 2.2 million acres (Deaton et al. 2010; NCDMF unpublished data). Framed by a chain of low-lying barrier islands from Virginia to the Cape Fear River, these habitats include intertidal and subtidal oyster reefs and extensive submerged aquatic vegetation (SAV) beds which provide a litany of ecosystem services, including shoreline stabilization, storm water filtration, and critical habitat for a variety of juvenile finfish and shellfish species. Furthermore, this estuarine system provides North Carolina access to a variety of commercially and recreationally important fisheries, including shrimp, blue crab (*Callinectes sapidus*), oysters (*Crassostrea virginica*), southern flounder (*Paralichthys lethostigma*), spotted seatrout (*Cynoscion nebulosus*), and red drum (*Sciaenops ocellatus*). In addition, the estuarine waters of North Carolina provide important habitat for many interjurisdictional managed species including Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), and weakfish (*C. regalis*). Given these characteristics, it is clear the habitats which make up North Carolina's estuarine system hold tremendous ecological, economic, and social value for the citizens of North Carolina and warrant management measures that guarantee their persistence.

While there are several major threats to the overall health of these habitats (i.e., pollution, coastal development, climate change, etc.), one of particular concern in North Carolina is the use of bottom disturbing fishing gears (i.e., trawls and dredges). Bottom trawls are conical nets pulled behind vessels along the benthos and are the primary fishing gear used to harvest shrimp (see *Description of the Fisheries* section of Amendment 2 for full description of gear). The potential environmental impact of using this gear has been extensively studied in a variety of habitat types ranging from flat sand and mud bottoms to structured habitats, including piled boulders, live bottom, seagrass, kelp beds, and coral reefs (Dorsey and Pederson 1998; Auster 1998; Hiddink et al. 2017; Sciberras et al. 2018). Findings from these studies suggest mobile fishing gear can significantly reduce habitat complexity by smoothing the bottom and removing structures that provide essential refuge and resources to a variety of benthic predator and prey species (Dorsey and Pederson 1998). Trawling also increases turbidity in many areas which can slow the growth of primary (algae and

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plants) and secondary producers (organisms that consume other organisms), limit nutrient regeneration, and disrupt the feeding relationships of all organisms within the ecosystem (the food web).

The magnitude of trawling disturbance is highly variable, ranging from no apparent effect to the complete elimination of some species, and can introduce long-term changes within the benthic community. The ecological effect of trawling depends upon site-specific characteristics of the ecosystem such as bottom type (sand, mud, shell, grass, reef, etc.), water depth, type of animal community (small vs. large sized species, short-lived vs. long-lived species, mobile vs. immobile species), type of trawl employed, and the intensity and duration of trawling and natural disturbances. The rate of recovery for benthic communities following bottom fishing disturbance events is also highly dependent on the habitat type. In other words, communities typically inhabited by sessile organisms with slow growth rates tend to also exhibit slow recovery rates (i.e., coral reefs, oyster reefs, etc.) following a disturbance. Conversely, habitats that experience consistent disturbance from storm events, wave action, and high tidal flow are commonly inhabited by fast growing, short-lived species which are generally capable of rapid recovery (NRC 2002).

Trawling Effects on Shell Bottom

For a complete review of habitat requirements, distribution, ecological role and functions, fish use, biological functions and status of shell bottom see the North Carolina Coastal Habitat Protection Plan Source Document (NCDEQ 2016).

Shell bottom is estuarine intertidal or subtidal bottom composed of surface shell concentrations including living or dead oysters (*Crassostrea virginica*), hard clams (*Mercenaria mercenaria*), or other shellfish (Street et al. 2005; NCDEQ 2016). Oyster rocks form a complex three-dimensional structure of accumulating shells and oysters over the course of many years and provide critical habitat for the settlement of larval oysters, sessile filter feeding organisms, and refuge for small fish and invertebrates. Shell bottom is widely recognized as essential fish habitat (EFH) for oysters and other reef-forming mollusks (ASMFC 2007). Shell bottom also provides ecosystem resilience by improving water quality through filtration (ASMFC 2007; Wall et al. 2008).

The more complex the habitat structure, the more susceptible the habitat is to disturbance by mobile bottom fishing gear (Auster 1998). Shell bottom is a complex habitat that is affected by both oyster dredges and otter trawls. Trawling over oyster reefs negatively impacts live shell bottom habitat by disturbing the structure of the reefs, reducing and scattering the upper layers of shell with the movement of trawl doors or chain as the gear is fished over the structure (NCDMF 2001; Street et al. 2005). In addition, trawling can significantly reduce epifaunal organisms in shell beds and recovery can take an extended period (Cook et al. 2013).

Shellfish rehabilitation and cultch planting has continuously occurred in North Carolina since the early 1900s. To date, millions of bushels of shell and fossil rock have been deposited into coastal estuaries from Dare to Brunswick counties. In most cases, cultch planting sites are not re-enhanced, rather new sites in new areas are built every year; resulting in thousands of sites in almost every suitable water body along the coast with reliable records for cultch planting dating back to 1981, detailing 1,648 reef sites (J. Peters, NCDMF; personal communication). For a complete review of

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the history of shellfish rehabilitation and cultch planting in North Carolina, see the North Carolina Oyster Fishery Management Plan (NCDMF 2001) and Amendment 4 of the North Carolina Oyster Fishery Management Plan (NCDMF 2017).

Oyster sanctuaries are protected under Rule 15A NCAC 03K .0209 and delineated in 15A NCAC 03R .0117, which prohibits oyster harvest and use of trawls, long haul seines, and swipe nets therefore promoting growth and enhancing survivability of large oysters within the sanctuaries (Table 2.1.1). Oyster sanctuaries under construction but not yet incorporated into 15A NCAC 03R .0117 can be protected under Rule 15A NCAC 03H .0103 and 15A NCAC 03K .0103 through proclamation authority.

Ongoing efforts to identify suitable areas for oyster restoration may include cultch planting and other oyster protections in areas where trawling currently occurs. State posted oyster plantings are protected from any type of trawling or seining when designated as shellfish management areas under rule 15A NCAC 03K .0103. Rule 15A NCAC 03K .0103 gives the Fisheries Director proclamation authority to designate shellfish management areas in areas with suitable environmental conditions necessary for shellfish growth or areas that have shellfish populations or shellfish enhancement projects. Within shellfish management areas, it is unlawful to use trawl nets, long haul seines or swipe nets. These areas must be marked with signs or buoys.

Posting of natural oyster beds has never been attempted because of the large number of areas and lack of sufficient resources for enforcement. Some areas where enhancement activities are conducted, and shell fishing activities are restricted or prohibited, except by proclamation, are designated as shellfish management areas.

Seed oyster management areas are open harvest areas that, by reason of poor growth characteristics, predation rates, overcrowding or other factors, experience poor use of oyster populations for direct harvest and sale to licensed dealers and are designated by the Marine Fisheries Commission as a source of seed for public and private oyster culture. Seed oyster management areas are designated in Rule 15A NCAC 03R .0116 and trawl nets, long haul seines, and swipe nets are unlawful to use in designated seed oyster management areas.

Trawl Effects on Submerged Aquatic Vegetation (SAV)

For a complete review of habitat requirements, distribution, ecological role and functions, fish use, biological functions and status of SAV habitat see the North Carolina Coastal Habitat Protection Plan Source Document (NCDEQ 2016).

SAV is fish habitat dominated by one or more species of underwater vascular plants. The North Carolina Marine Fisheries Commission defines SAV habitat as submerged lands that (Rule 15A NCAC 03I .0101 (4)(i); NCDEQ 2016):

- i. Are vegetated with one or more species of submerged aquatic vegetation including bushy pondweed or southern naiad (*Najas guadalupensis*), coontail (*Ceratophyllum demersum*), eelgrass (*Zostera marina*), horned pondweed (*Zannichellia palustris*), naiads (*Najas* spp.), redhead grass (*Potamogeton perfoliatus*), sago pondweed

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(*Stuckenia pectinata*, formerly *Potamogeton pectinatus*), shoalgrass (*Halodule wrightii*), slender pondweed (*Potamogeton pusillus*), water stargrass (*Heteranthera dubia*), water starwort (*Callitriche heterophylla*), waterweeds (*Elodea* spp.), widgeon grass (*Ruppia maritima*) and wild celery (*Vallisneria americana*). These areas may be identified by the presence of above-ground leaves, below-ground rhizomes, or reproductive structures associated with one or more SAV species and include the sediment within these areas;

Or

- ii. have been vegetated by one or more of the species identified in Sub-item (4)(i)(i) of this rule within the past 10 annual growing seasons and that meet the average physical requirements of water depth (six feet or less), average light availability (Secchi depth of one foot or more), and limited wave exposure that characterize the environment suitable for growth of SAV. The past presence of SAV may be demonstrated by aerial photography, SAV survey, map, or other documentation. An extension of the past 10 annual growing season's criteria may be considered when average environmental conditions are altered by drought, rainfall, or storm force winds.

SAV is included as fish habitat under MFC rules defined above, modified to include low salinity species and to address difficulties in identification of SAV habitat in 2009. The previous definition required the presence of leaves, shoots, or rhizomes. However, because the presence of SAV varies seasonally and inter-annually, a single inspection could result in improper habitat determination. The modified rule defines habitat to include areas where SAV is present, or areas where there is documentation of professional knowledge of its presence within the past ten growing seasons.

SAVs occur in subtidal and intertidal zones and provide refuge, forage, spawning and nursery areas for many organisms including red drum, spotted seatrout, snapper/grouper, bay scallops (*Argopecten irradians*), and penaeid shrimp. SAVs provide important ecosystem functions such as structural complexity, sediment and shoreline stabilization, primary productivity, and nutrient cycling.

There are two distinct groups of SAV ecosystems in NC distributed according to estuarine salinity. One group, referred to as low salinity SAV, thrives in fresh and low salinity riverine waters (<10 ppt). The second group, referred to as high salinity SAV or seagrass, occurs in moderate to high (>10 ppt) salinity estuarine waters of the bays, sounds, and tidal creeks. These groups are distinguished by different species composition and living requirements, and have characteristics similar to SAV communities found in many other estuaries in the U.S. While most SAV is found in water depths less than six feet, Costa (1988) noted in Buzzards Bay Massachusetts in poorly flushed areas where water transparency is poor, eelgrass was only present in shallower depths (2.0-5.9 feet) while in well flushed offshore waters eelgrass was found in deeper depths (9.8-19.7 feet). It is difficult to gauge the historic extent of SAV distribution in North Carolina because of inadequate records. However, journal accounts from fishermen describe SAV beds in coves along mainland Pamlico Sound during the 1800s where it was absent in the late 1990s (NCDEQ 2016). In addition, historic accounts have documented the presence of SAV in the upper portions of the Neuse and Pamlico rivers and in areas of Albemarle Sound.

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Natural events, human activities, and climate change influence the distribution and quality of SAV habitat. Natural events include shifts in salinity due to drought and excessive rainfall, animal foraging, storm events, temperature, and disease. SAV is vulnerable to water quality degradation, in particular suspended sediment and pollutant runoff (NCDEQ 2016). The majority of SAV loss can be attributed to large-scale eutrophication (nutrient enrichment) and sedimentation, which reduces light penetration to the plants (Costello and Kenworthy 2011). It should be noted in North Carolina, even in areas where shrimp trawling is prohibited, like Albemarle Sound, Currituck Sound, upper Neuse River, upper Pamlico River, Pungo River, and most primary and secondary nursery areas (Figures 2.1.1a), SAV is either absent or limited to depths less than six feet suggesting factors other than shrimp trawling limit the extent of SAV distribution.

Bottom disturbing fishing gears can damage SAV by shearing blades, seeds and/or flowers, uprooting or burying entire areas of habitat, or increasing turbidity causing a reduction in light required for critical metabolic processes like photosynthesis. Impacts from trawling over SAV may occur from the sweep of the net or the digging of the trawl doors into the sediment (ASMFC 2000). Estimates of maximum cutting depth for otter trawl doors range from an inch to a foot (2.54-30.48 cm) when used in depths over 100 feet (30.48 m; ASMFC 2000), although such deep water does not occur in North Carolina's estuaries. Variation in cutting depth is the result of differences in gear weight, bottom hardness and towing warp to depth ratios (a measure of the force of the gear). Little information exists on the direct impact of trawling over SAV; however, impacts can be intuitively applied based on knowledge of trawl design and mechanics and the effects of trawling in other habitats.

SAV beds on the eastern side of Pamlico, Core and Back sounds are directly protected from the impacts of trawl nets via a trawl net prohibited area (Rule 15A NCAC 03R .0106) and SAV beds north of the Intracoastal Waterway (IWW) and on the western end of Bogue Sound and in New River are protected via proclamation (NCDMF 2007). Additionally, mechanical clam harvest areas (MCHA) in Core Sound and North River have been modified and the MCHA in Bogue Sound was eliminated by proclamation to avoid overlap with SAV habitat (Proclamation SF-7-2020). SAV beds are indirectly protected from trawls via designation of primary, secondary, and special secondary nursery areas.

Trawl Effects on Soft Bottom

Most bottom trawling in North Carolina occurs over soft bottom habitat. For a comprehensive review of the impact of trawling on sediment and productivity in North Carolina waters see NCDMF (1999), NCDMF (2014a), and NCDEQ (2016).

Soft bottom covers approximately 1.9 million acres, or 90% of the 2.1 million acres of estuaries and coastal rivers in North Carolina (Riggs 2001). Soft bottom is unconsolidated, unvegetated sediment that occurs in freshwater, estuarine, and marine systems. It is found in both subtidal and intertidal zones and can be characterized by geomorphology (the shape and size of the system), sediment type, water depth, hydrography, and salinity (Street et al. 2005). As with other habitats, damage from bottom-disturbing fishing gear varies with gear type and habitat complexity. Because of a lack of structure and complexity, soft bottom habitats are considered the habitat which may be most resilient to damage by bottom-disturbing gear.

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Trawling in sandy and muddy areas causes resuspension of bottom sediments resulting in increased turbidity and alteration of grain sizes. Besides the resulting turbidity, grain size of the sediment as it settles back to the bottom can be altered. Tidal transport of fine-grained sediments can alter the sediment composition by increasing average grain size of the trawled bottom (NCDMF 1999). Sandy substrate located in shallow high energy areas are regularly disturbed by natural physical processes and recover quickly (Posey et al. 1996; Kaiser 1998). Deeper (greater than 40 feet), high energy areas may also experience significant sediment disturbance from storm events, wave action and currents (Posey et al. 1996; van Denderen et al. 2015; Lambert et al. 2017). These areas would be expected to recover quickly from trawling disturbances, while areas that are deep and muddy with little natural disturbances are slow to recover from physical processes or trawling disturbances (DeAlteris et al. 1999).

Multiple studies have examined the effect of trawling on sediment in estuaries (Barnette 2001). Generally, resuspension of sediment is caused by trawl doors penetrating the sediment with depth of penetration being influenced by sediment composition and type of trawl (Delapenna et al. 2006). However, the depth of penetration by any part of the gear is always greater in muddy substrate compared to sandy substrate (NCDMF 1999). In a meta-analysis of global bottom trawl studies otter trawl doors (2.44 cm on average) were found to penetrate the sediment less than other trawl types including beam trawls (2.72 cm), towed scallop dredges (5.47 cm), and hydraulic dredges (16.11 cm; Hiddink et al. 2017).

In South Creek, a tributary of the Pamlico River in NC, bottom trawling increased total suspended solid (TSS) concentrations one to three times more than pre-trawl levels, with concentrations returning to pre-trawl levels by the next day (Corbett et al. 2004). Under high wind and current conditions TSS dispersed throughout the water column but redeposited relatively quickly when wind and current were low. In Hillsborough Bay, a shallow microtidal estuary on the Gulf coast of Florida, suspended sediment concentrations had similar increases from trawling and large vessel wakes with plumes persisting for eight hours and sediment transport dependent on currents and sediment type (Schoellhamer 1996). Generally, in shallow waters, like Pamlico Sound with an average depth of 16 feet, wind has been shown to cause as much resuspension of sediment as trawling (Cahoon et al. 2002; Corbett et al. 2004). Recovery from bottom trawl disturbance is dependent on sediment type, depth, currents and bioturbation (Barnette 2001).

Globally, marine sediments are an important carbon sink (Atwood et al. 2020), and shallow coastal waters, like North Carolina estuaries, can serve as carbon sinks (Crosswell et al. 2014). Under certain conditions, bottom disturbance, including bottom trawling, can re-mineralize sedimentary carbon to CO₂. At a global scale, estimates of the amount of aqueous CO₂ emissions from disturbed marine sediments are comparable to estimates of carbon loss from soil during terrestrial farming, though global estimates of CO₂ released from bottom trawling are preliminary and represent a best estimate based on available data that require further research to verify (Sala et al. 2021). Carbon stocks in marine sediments vary across depths and regions with almost four times as much carbon in deep sea sediment (>1,000 meters; >3,281 feet) than in shallow seas (Atwood et al. 2020), though this largely due to the extreme difference in total area. While generally functioning as carbon sinks, shallow estuarine areas, like Pamlico Sound, can also become carbon sources during periods of high winds (Crosswell et al. 2014). The extent to which disturbance from bottom

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trawling releases carbon from sediments in Pamlico Sound compared to carbon released from natural events is unknown and requires further work.

Bottom disturbance can also resuspend pollutants like heavy metals, polycyclic hydrocarbons (PAHs), petroleum hydrocarbons, polychlorinated biphenyls (PCBs), and pesticides bound to sediment particles. Toxins can affect benthic invertebrates by inhibiting or altering reproduction or growth, and in some cases causing mortality (Weis and Weis 1989). Because low concentrations of heavy metals in the water column can be easily incorporated into fine grained sediment, particularly organic rich muds which is a common bottom type in North Carolina estuaries, chemicals can accumulate in the sediment to toxic levels and be resuspended into the water column (Riggs et al. 1991). In Hancock and Slocum creeks, Corbett et al. (2009) found higher rates of sedimentation and contamination in sediment than in the higher energy Neuse River mainstem. Resuspension of sediments where heavy metals and other contaminants are found could have serious consequences with more significant effects where contaminants are found in higher concentrations (i.e., near areas affected by major industrialization; Barnette 2001), though the extent to which contaminants may be resuspended by natural processes compared bottom disturbance by trawls is unknown.

General Impacts of Trawling

For a comprehensive review of the impact of trawling on sediment and productivity in North Carolina waters, see NCDMF (1999), NCDMF (2014a), and NCDEQ (2016).

The effects of trawling on benthic habitat have been well documented (NCDMF 1999; Barnette 2001; NCDEQ 2016; Hiddink et al. 2017; Sciberras et al. 2018). Impacts from mobile bottom-disturbing fishing gear, like shrimp trawls, range from changes in community composition from removal of species to physical disruption of the habitat (Barnette 2001).

Bottom trawling is generally more damaging when occurring over structurally complex biotic habitat like oyster reefs, or SAV (Althaus et al. 2009; Cook et al. 2013) when compared to effects on sandy shallow soft bottom that is lacking structure but can also be damaging to these habitats depending on composition of sediment and type of trawl (Brown 1989; Engel and Kvitek 1998; Collie et al. 2000; Hiddink et al. 2017; Sciberras et al. 2018). However, in many areas, including deep sea habitats, bottom disturbance from natural processes is similar to bottom disturbance from trawls depending on many factors including depth and sediment type (Diesing et al. 2013; van Denderen et al. 2015; Lambert et al. 2017). In areas of high natural disturbance, the benthic community is more resilient to bottom trawl impacts and recovers quickly from disturbance (van Denderen et al. 2015). Bottom trawling can reduce small scale habitat complexity (Auster and Langton 1999) and reduce epifauna abundance and diversity (Kaiser and Spencer 1996; Hinz et al. 2008). Primary productivity can be reduced due to increased turbidity, disruption of the benthic microalgae, and secondary effects on the food chain (West et al. 1994). Increased turbidity reduces light penetration and consequently, the primary productivity of benthic microflora on the seafloor, as well as phytoplankton in the water column (Auster and Langton 1999). The sediment composition of the bottom can also change with frequent trawling. Given the close relationship between sediment size and benthic community structure, this sediment shift will alter the benthic community (Thrush and Dayton 2002).

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Shrimp trawling can reduce or degrade structure and habitat complexity by disturbing epifauna, smoothing bedforms, and removing organisms but the magnitude of trawling disturbance is highly variable depending on habitat type, gear type, intensity, and duration of trawling and natural disturbances (Barnette 2001).

Critical Habitat Areas

The 1996 amendment to the federal Magnuson-Stevens Act recognized the loss of marine and estuarine habitat as a long-term threat to the viability of U.S. fisheries and emphasized habitat conservation as an important component of fisheries conservation and management. The amendment defined essential fish habitat (EFH) as “those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity.” (Magnuson-Stevens Act 16 U.S.C. 1802 §3(10)) and designated habitat areas of particular concern (HAPC) as a subset of EFH. Designations do not confer any specific habitat protections but can focus habitat conservation efforts. The federal councils have taken a range of approaches to designating HAPCs. The South Atlantic Fishery Management Council (SAFMC) designates specific habitat types (i.e., submerged aquatic vegetation) and discrete sites with known boundaries (e.g., the “Point” and “Ten Fathom Ledge”) as HAPCs while the Gulf and Caribbean Councils designate discrete areas (MAFMC 2016). The Mid-Atlantic Fishery Management Council (MAFMC) and the Atlantic States Marine Fisheries Commission (ASMFC) use the more general and broad application of the HAPC terminology by designating habitat types and not discrete sites. The National Marine Fisheries Service (NMFS) has encouraged the councils to shift HAPC designations from broad habitat types to discrete, geographically defined sites for more effective management (SAFMC 2016).

Shallow habitats with structure, such as SAV and oyster reefs, provide more predator protection and food than soft bottom habitat, enhancing growth and survival of juvenile fish (Lehnert and Allen 2002; Ross 2003; Grabowski et al. 2005). Multiple studies have documented that abundance of penaeid shrimp, sciaenids (fish in the drum family including Atlantic croaker, spot, red drum, spotted seatrout, etc.), and other estuarine dependent species is significantly greater in SAV, and oyster reef habitat than in soft bottom habitat (NCDEQ 2016). Shell bottom is widely recognized as EFH for oysters and other reef-forming mollusks (ASMFC 2007). In addition to its role as EFH for oysters, shell bottom provides critical fisheries habitat for ecologically and economically important finfish, mollusks, and crustaceans. The SAFMC considers shell bottom to be EFH for black drum (*Pogonias cromis*), striped bass (*Morone saxatilis*), weakfish, spotted seatrout, summer flounder (*P. dentatus*), and southern flounder and SAV is considered EFH for shrimp, red drum, snapper and grouper species, and spiny lobster (*Palinuridae* spp.).

IV. AUTHORITY

North Carolina General Statutes

§ 113-134 RULES

§ 113-173 RECREATIONAL COMMERCIAL GEAR LICENSE

§ 113-182 REGULATION OF FISHING AND FISHERIES

§ 113-182.1 FISHERY MANAGEMENT PLANS

§ 113-221.1 PROCLAMATIONS; EMERGENCY REVIEW

§ 143B-289.52 MARINE FISHERIES COMMISSION – POWERS AND DUTIES

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North Carolina Marine Fisheries Commission Rules

15A NCAC 03H .0103 Proclamations, General

15A NCAC 03J .0104 Trawl Nets

15A NCAC 03K .0103 Shellfish Management Areas

15A NCAC 03K .0208 Seed Oyster Management Areas

15A NCAC 03K .0209 Oyster Sanctuaries

15A NCAC 03L .0101 Shrimp Harvest Restrictions

15A NCAC 03L .0103 Prohibited Nets, Mesh Lengths and Areas

V. DISCUSSION

- Section focuses on habitat protections in areas from Core Sound and South
- Management options in *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* and *Appendix 2.3: Reducing Shrimp Trawl Bycatch Through Area Closures that Increase Connectivity Between Closed Areas* may also provide additional habitat protections and should be considered in conjunction with this issue paper
- Goal of this paper is protecting SAV and shell bottom habitat from damage by shrimp trawls

The focus of this issue paper is areas from Core Sound and South because of the higher frequency of critical shell bottom and SAV habitat. However, depending on the management approach taken in the *Shrimp Management in Special Secondary Nursery Areas* and *Reducing Shrimp Trawl Bycatch Through Area Closures that Increase Connectivity Between Closed Areas* issue papers additional critical habitat protections in other areas may need to be considered. Examples of where and how those protections could occur are discussed in this paper.

There are approximately 2.2 million acres of coastal estuarine waters (excluding the ocean) in North Carolina, of which 242,642 acres are joint waters. The NCMFC has designated 161,830 acres as either Primary Nursery Areas (PNAs), Permanent Secondary Nursery Areas (SNAs), or Special Secondary Nursery Areas (SSNAs), which represent 7% of the total estuarine waters (Table 2.1.1, Appendix 3 Maps 3.1-3.12). Additionally, the North Carolina Wildlife Resources Commission (NCWRC) has designated 30,384 acres of inland waters under its jurisdiction as inland nursery areas. PNAs and SNAs are permanently closed to certain fishing gears, while SSNAs are conditionally opened to certain fishing gears (see *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas*).

In the 1980s, the NCDMF formed an internal Critical Habitat Committee to work with the North Carolina Marine Fisheries Commission (NCMFC) Habitat Advisory Committee to discuss the concept of expanding habitat protections. The committee recommended expanding fish sampling to identify anadromous spawning and nursery areas, estuarine areas important to juvenile reef fish like gag grouper (*Mycteroperca microlepis*), black sea bass (*Centropristis striata*), and sheepshead (*Archosargus probatocephalus*), and mapping of shellfish and SAV resources due to their importance as nursery area (Noble and Monroe 1991). The Estuarine Benthic Mapping Program was implemented in 1990 and Critical habitat definitions were put into rule in 1994 (15A NCAC 03I .0101 (4)).

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The Coastal Habitat Protection Plan (CHPP) initiated a process to identify strategic habitat areas (SHAs) for key species (NCDEQ 2016). The CHPP recommended identification, nomination, and designation of SHAs as a tool to focus habitat and water quality protection efforts. However, before SHAs can influence regulatory management strategies, sampling of indicators is needed to verify ecosystem function and identify site-specific management needs (NCDEQ 2016). While the SHA verification process is underway, it may be years before statewide verification of SHA nominations are complete. Because the historic extent of SAV habitat since 1981 and known shell bottom areas have been mapped (Figure 2.1.1a-g), additional habitat protections should be considered prior to SHA verification.

Specific critical habitat protections, including protections for SAV and shell bottom have been implemented as part of Fishery Management Plans for shrimp (NCDMF 2006; 2015), oysters (NCDMF 2001), bay scallop (NCDMF 2007), and blue crab (NCDMF 1998; 2020). In addition, the 2006 Shrimp Fishery Management Plan included consideration of a strategy to expand areas where dredging and trawling is prohibited to allow some recovery of SAV and shell bottom where those habitats historically occurred (NCDMF 2006). Trawling and dredging is prohibited in SAV beds on the eastern side of Pamlico, Core and Back sounds through a no trawl area designation (Rule 15A NCAC 03R .0106). SAV beds north of the Intracoastal Waterway (IWW) and on the western end of Bogue Sound are protected via proclamation (NCDMF 2007). SAVs in New River are also protected within no trawl areas. Trawling was prohibited in Albemarle and Currituck sounds due to user conflicts, but the prohibition also provided ancillary protections for habitat (Rule 15A NCAC 03J .0104). Trawl nets, long haul seines, and swipe nets are prohibited in any designated oyster sanctuary (355.80 acres); shellfish (25.57 acres) or seed management areas (2,590.26 acres; Rule 15A NCAC 03K .0103). Crab spawning sanctuaries (Rule 15A NCAC 03L .0205) and inlet trawling restrictions (Rule 15A NCAC 03J .0401) provide a “no trawl corridor” around inlets that protect crabs and allows migration of sub-adult fish to the ocean.

The NCDMF Director, through proclamation authority, may designate cultch planting sites as shellfish management areas thereby protecting them from bottom disturbing gears. Currently, 2,971.63 acres have been designated as oyster sanctuary, shellfish or seed management areas which are required, by rule, to be marked with signs or buoys (Table 2.1.2; Figure 2.1.1a-g). While cultch planting has occurred at thousands of sites throughout the state, very few have been designated as shellfish management areas primarily because they have been managed as open harvest areas. In addition, marking sites can be difficult and prior to 2002, cultch planting locations are uncertain because of Loran to GPS coordinate conversion errors (J. Peters, NCDMF, personal communication). When adequately marked, smaller trawlers will usually avoid cultch planting sites due to the damage cultch material causes to nets. Public meetings are held prior to the annual cultch planting season to solicit input from the public on locations for cultch planting sites. While input from shrimp trawlers would be useful in reducing impact of cultch locations to the shrimp trawl fishery, the meetings are generally poorly attended with minimal input on locations and no feedback from shrimp trawlers (C. Luck and C. Stewart, NCDMF, personal communication). Generally, there seems to be little overlap or conflict between cultch planting locations and the shrimp trawl fishery because cultch planting sites are in shallow water where minimal shrimp trawling occurs. Cultch material has been planted on 634.44 acres in North Carolina’s estuarine waters, of which, 64.4% (408.36 acres) occurs in areas already closed to trawling.

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Beds of SAV occur in North Carolina in subtidal, and occasionally intertidal, areas of sheltered estuarine and riverine waters where there is suitable sediment, adequate light reaching the bottom, and moderate to negligible current velocities of turbulence (Ferguson and Wood 1994; Thayer et al. 1984). SAV habitat is primarily located in shallow water (< 6 feet) where minimal trawling occurs. Of the 191,155 acres of historical SAV distribution in North Carolina’s estuarine waters, 77.2% (222,769.68 acres) occurs in areas closed to shrimp trawling (Figure 2.1.1a-g).

Because most SAV and shell bottom habitat occurs in shallow water one method for protecting these habitats could be to prohibit trawling within certain depth contours. A similar strategy is used to define designated pot areas where shrimp trawling is prohibited in the Pamlico, Bay and Neuse rivers from June 1 to November 30 in less than six feet of water. Prohibiting shrimp trawling in less than six feet of water, or in less than 12 feet of water in specific areas or statewide would provide protection for a majority, or all shell bottom and SAV habitat. However, this type of restriction is difficult to enforce and could be difficult to comply with depending on the capability of individual shrimp trawl boats. Depending on the depth contour used, areas where critical habitat does not occur might be closed to shrimp trawling which could be detrimental to the shrimp trawl fishery.

Additional protections for some or all SAV and shell bottom habitat occurring outside of currently closed areas should be considered and may be necessary as SAV and shell bottom habitat naturally expands, or new cultch planting locations are added. The management framework by which shrimp trawling can be restricted in SAV and shell bottom habitats already exists. Existing no shrimp trawl areas could be expanded, or new no shrimp trawl areas could be designated to create more extensive areas of habitat protection. No shrimp trawl areas are used to protect SAV habitat in New River, Bogue, eastern Pamlico, and Core sounds and these areas could be expanded to encompass additional SAV habitat. Including cultch planting locations in no shrimp trawl areas would eliminate the need to designate and mark individual sites as shellfish management areas and creating more clearly identified no shrimp trawl lines may be more effective than marking several smaller areas individually.

In the New River, shrimp trawl areas occur in the same area as the MCHA, which were adjusted to protect SAV in 2017 (Figure 2.1.2). Additionally, MCHAs in Core Sound and North River have been modified and the MCHA in Bogue Sound was eliminated by proclamation to avoid overlap with SAV habitat (Proclamation SF-7-2020). Where possible, in areas south of Pamlico Sound, allowing shrimp trawling to only occur within MCHAs would accomplish the objective of protecting SAV habitat and create common boundaries for enforcement. Applying this strategy in Core Sound (Figure 2.1.3) and North River (Figure 2.1.4) would provide protection for SAV habitat in these waterbodies, streamline enforcement, and minimally impact shrimp trawling because most of the closed area would be locations that are not trawled because of shallow water or other obstructions. Adjacent to Core Sound, consideration could also be given to allowing shrimp trawling to continue in the marked navigable channel in the Straits area (Figure 2.1.5). This channel is an area where shrimp trawling occurs and SAV is not present.

Historic SAV mapping indicates the presence of SAV habitat near the southern shore of Bogue Sound, though SAV may not be present in these locations every year (Figure 2.1.6). While this area is open to shrimp trawling, shallow water, and the presence of SAV minimizes effort in this

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area, though some shrimp trawling occurs in the IWW and deeper water areas near Salter Path. The MCHA in Bogue Sound was eliminated in 2020 (Proclamation SF-7-2020) so matching the shrimp trawl area with the MCHA is not possible. Because of the patchy distribution of SAV south of the IWW in Bogue Sound, a no shrimp trawl area would need to be large enough to encompass the entire SAV area. Bogue Sound could be closed to shrimp trawling except for in the IWW and within 100 yards on the south side of the IWW and in Banks Channel from Wood Island to around Dog Island. The IWW and Banks Channel represent areas where shrimp trawling currently occurs where no SAV is present so this option would protect SAV habitat while continuing to allow shrimp trawling (Figure 2.1.7).

MCHA's are designated in Newport River, and White Oak River and shrimp trawling does occur in these rivers, though effort is generally low. However, SAV is less extensive in these waterbodies (Figure 2.1.1e-f) and likely does not require additional shrimp trawl protections. Most shrimp trawling in Newport River occurs along the Penn Point shrimp line which protects shell bottom habitat, leases, and cultch planting sites above the line. Shrimp trawling also occurs around Core Creek. Similarly, the MCHA in White Oak River does not encompass the extent of trawlable area in the river which occurs around Cahoon's slough, the Turnstake, Hills Bay, and the mouth of Pettiford Creek.

In locations with no MCHA, shrimp trawl lines could be adjusted to encompass additional SAV and shell bottom habitat. Because current understanding of SAV distribution is based on historic mapping efforts (1981-2015), maps may not represent the actual extent of SAV in any given year but does represent potential SAV habitat. Therefore, any shrimp trawl closures implemented to protect SAV must be broad enough to capture potential SAV habitat distribution and could limit the use of shrimp trawls in potentially productive areas with no SAV present. However, shrimp trawl closures that are broader provide buffer between open areas and SAV and should be considered when delineating closure areas. Shrimp trawl closures to protect shell bottom habitat, particularly cultch planting areas, could be implemented to protect these areas from damage by shrimp trawls. In addition, defining areas of shell bottom as no shrimp trawl areas may prevent damage to shrimp trawl gear. However, since oyster dredges are allowed in cultch planting areas in the north, the ecological benefit of restricting shrimp trawls in these areas would be limited.

Modification of no shrimp trawl lines could be accomplished via revision of existing proclamations or suspending rules via proclamation. This method of implementation may be most effective in locations where no trawl areas already exist and are near SAV and shell bottom habitat. Creating no shrimp trawl areas around SAV and shell bottom habitat would be effective in areas where existing closures do not exist or where modification of existing no shrimp trawl areas is not realistic. For example, West Bay is closed to trawling early in the season but can be opened to shrimp trawling (Figure 2.1.8). There are no existing no shrimp trawl areas near West Bay, so creating a no shrimp trawl area in West Bay encompassing SAV and shell bottom habitat would define an area as open to trawling (Figure 2.1.9). For either implementation method, creating lines that use existing landmarks and are clear would be important for promoting compliance and simplifying enforcement. Another option would be to prohibit shrimp trawling within a certain depth contour within West Bay that would encompass critical habitat areas. Similar options could be considered in Croatan and Roanoke sounds where critical habitats are present but no specific management options were discussed in this issue paper. Management options in *Appendix 2.2*:

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Shrimp Management in Special Secondary Nursery Areas and Appendix 2.3: Reducing Shrimp Trawl Bycatch Through Area Closures that Increase Connectivity Between Closed Areas may also provide additional habitat protections and should be considered in conjunction with this issue paper.

The management options discussed in this issue paper represent immediate, direct action that can be taken through review of the shrimp FMP to protect critical shell bottom and SAV habitat. Direct protections of SAV and shell bottom habitat aligns with the strategy from the 2006 Shrimp FMP to expand areas where dredging and trawling is prohibited to allow some recovery of SAV and shell bottom where those habitats historically occurred (NCDMF 2006) and the priority that has been put on SAV in the current CHPP review. A long-term, more effective strategy to protect critical habitat, including SAV and shell bottom, is needed to focus future protections in areas designated as SHAs. SHA nominations have been completed for areas throughout the state (NCDMF 2009; 2011; 2014; 2018), but cannot influence regulatory management strategies until designation, based on verification of ecosystem function and identification of site-specific management needs (NCDEQ 2016). SHAs identified in the CHPP represent a subset of priority habitat areas for protection due to their exceptional condition or imminent threat to their ecological functions supporting finfish and shellfish species (Deaton et al. 2006). The SHAs have been nominated on scientific understanding of relationships between habitats, connectivity, and fish production. Because of the rigorous scientific process in which SHAs are identified and designated, additional habitat protections or modification of existing habitat protections should be considered upon completion of SHA designations.

While closing areas of critical SAV and shell bottom habitat allows for calculation of how much additional habitat will be protected, additional benefits are difficult to quantify because physical disturbance by shrimp trawls is not the primary threat to these habitats, particularly SAV. In the absence of shrimp trawls, shell bottom habitat may still be covered by sediment and SAV growth may be impaired by poor water quality, climate change, disease or other natural disturbances.

VI. PROPOSED RULE(S)

This action will result in no immediate rulemaking, rather existing proclamation authority pertaining to use of trawls may be used.

VII. MANAGEMENT OPTIONS AND IMPACTS

(+ Potential positive impact of action)

(- Potential negative impact of action)

1. *Status Quo* – Maintain the areas open to shrimp trawling as identified in current rules and proclamation.
 - + Continued access to resources by shrimpers
 - + Will not create shifts in effort to other areas
 - + Area closures to address bycatch considered in Amendment II may provide additional habitat protections

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- + Most cultch planting areas are open to oyster harvest so prohibiting shrimp trawling has limited ecological benefit
 - + Most SAV and shell bottom habitat already occurs in areas closed to shrimp trawling
 - SAV and shell bottom habitat may be damaged by continued trawling
 - Could have negative impacts on important fish stocks
 - Could negatively affect historic and future cultch planting efforts
 - Lack of clear boundaries could lead to damages to trawl gear
2. Modify existing or create new shrimp trawl closure lines to protect additional SAV habitat.
- + Decrease damage to SAV from shrimp trawls
 - + Minimal impact to fishermen since areas are not used extensively
 - + Modification of closure lines would occur by proclamation allowing for flexibility
 - + Identifying clear boundaries could prevent damage to gear and habitat
 - + Bycatch reduction
 - May decrease some traditional shrimp trawling areas
 - Could shift effort to other areas
 - SAV mapping reflects historic distribution, so creation of broad no shrimp trawl areas may prevent shrimp trawling in productive areas with no SAV
 - Modification of existing closure lines could cause confusion
3. Modify existing or create new shrimp trawl closure lines to protect additional shell bottom habitat.
- + Decrease damage to shell bottom habitat from shrimp trawls
 - + Minimal impact to fishermen since areas are not used extensively
 - + Closure lines would occur by proclamation allowing for flexibility
 - + Identifying clear boundaries could prevent damage to gear and habitat
 - + Bycatch reduction
 - May decrease some traditional shrimp trawling areas
 - Could shift effort to other areas
 - Shellfish management areas are already closed to trawling
 - Most cultch planting areas are open to mechanical oyster harvest so prohibiting shrimp trawling has limited ecological benefit
 - Modification of existing closure lines could cause confusion

VIII. SHRIMP FMP WORKSHOPS

Shrimp FMP Workshops were held in March 2021 between the division plan development team and the Shrimp FMP Advisory Committee (AC). The goal of these workshops is for the AC to assist the division in drafting the plan. The division presented discussion points to guide conversation and inform specific areas where stakeholder input was needed in addition to other AC feedback. The guidance received during workshops on the protection of critical shell bottom and SAV habitat was incorporated into the draft plan. Overall, AC members expressed supported protections of critical shell bottom and SAV habitat through area closures. The commercial AC members suggested additional areas that could be left open to shrimp trawling that do not overlap with existing SAV habitat adjacent to Core Sound and in Bogue Sound. Other AC members suggested building in closed area buffers between open shrimp trawl areas and existing shell

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bottom and SAV habitat but largely deferred to commercial AC members for recommendations of specific area closures.

IX. RECOMMENDATION

The division will make recommendations after receiving input from the public and the MFC Advisory Committees.

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Tables

Table 2.1.1. Existing areas closed to the use of trawls in coastal and estuarine waters of North Carolina.

Type of Closure	Location	Restriction	Purpose	Reference
Primary Nursery Area	Statewide/Internal Coastal Waters	Unlawful to use trawl nets or other bottom disturbing gear	Protect habitat for juvenile fish and shrimp	15A NCAC 03N .0104 15A NCAC 03R .0103
Secondary Nursery Area	Statewide/Internal Coastal Waters	Unlawful to use trawl nets	Protect habitat for juvenile fish and shrimp	15A NCAC 03N .0105(a) 15A NCAC 03R .0104
Special Secondary Nursery Area	Statewide/Internal Coastal Waters	Can be opened to the use of trawl nets by proclamation from August 16 to May 14	Protect habitat for juvenile fish and shrimp while allowing taking of shrimp after they have grown or when juvenile fish have left area	15A NCAC 03N .0105 15A NCAC 03R .0105
Trawl Net Prohibited Areas	Statewide/Coastal and Internal Coastal Waters	Unlawful to use trawl nets; parts of Pamlico, Core and Back sounds can be opened to peeler crab trawling by proclamation	Protect sensitive habitat or reduce bycatch	15A NCAC 03J .0104(b)(3)(4) 15A NCAC 03R .0106
Military Danger Zones	Statewide/Coastal and Internal Coastal Waters	No public access	Public safety	15A NCAC 03R .0102
Crab Spawning Sanctuaries	All coastal inlets	From Barden Inlet north unlawful to use trawls in spawning sanctuaries from March 1 to August 31; From Beaufort inlet south unlawful to use trawls in spawning	Provide protection for spawning blue crabs	15A NCAC 03L .0205 15A NCAC 03R .0110 Proclamation M-7-2020

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Type of Closure	Location	Restriction	Purpose	Reference
		sanctuaries from March 1 to October 31		
Designated Pot Areas	Pamlico, Bay, Neuse rivers and their tributaries	Unlawful to use trawl nets in designated pot areas from June 1 to November 30	Reduce gear conflicts between trawls and crab pots	NCAC 03J .0104(b)(6) 15A NCAC 03J .0301(a)(2) 15A NCAC 03R .0107 Proclamation (i.e., SH-1-2020)
Seed Oyster Management Areas	Statewide/Internal Coastal Waters	Unlawful to use trawl nets in seed oyster management areas	Protect oyster habitat	15A NCAC 03K .0208 15A NCAC 03R .0116
Oyster Sanctuaries	Croatan Sound, Pamlico Sound, Neuse River	Unlawful to use trawl nets in oyster sanctuaries	Protect oyster habitat	15A NCAC 03k .0209 15A NCAC 03R .0117
Shrimp Trawl Prohibited Areas	Pungo, Pamlico, Neuse, Shalotte, Calabash rivers; Eastern Channel; Sunset Beach	Unlawful to use shrimp trawls	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03L .0103(e) 15A NCAC 03R .0114
Other Trawl Closures				
Miscellaneous	Atlantic Ocean	Unlawful to use trawls in specified areas during specified times	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03J .0202 (1)(2) 15A NCAC 03J .0202 (8)
Miscellaneous	Albemarle Sound and Tributaries	Unlawful to use trawls	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03J .0104 (b) (3)
Miscellaneous	Southport Boat Harbor	Unlawful to use any commercial fishing gear	Reduce user group conflict, public safety	15A NCAC 03J .0206
Miscellaneous	Duke Energy Progress Brunswick Nuclear Plant Intake Canal Closure	Unlawful to use any commercial fishing gear	Public safety	15A NCAC 03J .0207

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Type of Closure	Location	Restriction	Purpose	Reference
Miscellaneous	Dare County	Unlawful to use commercial fishing gear within 750 feet of licensed fishing piers when open to the public	Reduce user group conflict	15A NCAC 03J .0402(a)(1)(ii)
Miscellaneous	Onslow and Pender counties	Unlawful to use commercial fishing gear during specified times and distances from fishing piers	Reduce user group conflict	15A NCAC 03J .0402(a)(2)(A)(B)(i)(ii)
Miscellaneous	New Hanover County	Unlawful to use commercial fishing gear during specified times and distances from fishing piers	Reduce user group conflict	15A NCAC 03J 0402(a)(3)(A)(B)(i)(iii)

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Table 2.1.2. Total acreage of shellfish management areas, oyster sanctuary, designated seed oyster management area, cultch planting sites and SAV habitat (1981-2015) and total acreage of estuarine waters closed to trawling.

Designation	Total Acreage
Shellfish Management Area*	26
Oyster Sanctuary*	395
Designated Seed Oyster Management Area*	2,590
SAV	191,155
Cultch Planting Sites ⁺	634
Closed Estuarine Waters	1,003,634

* Closed to trawling

⁺ Estimated acreage

Figures

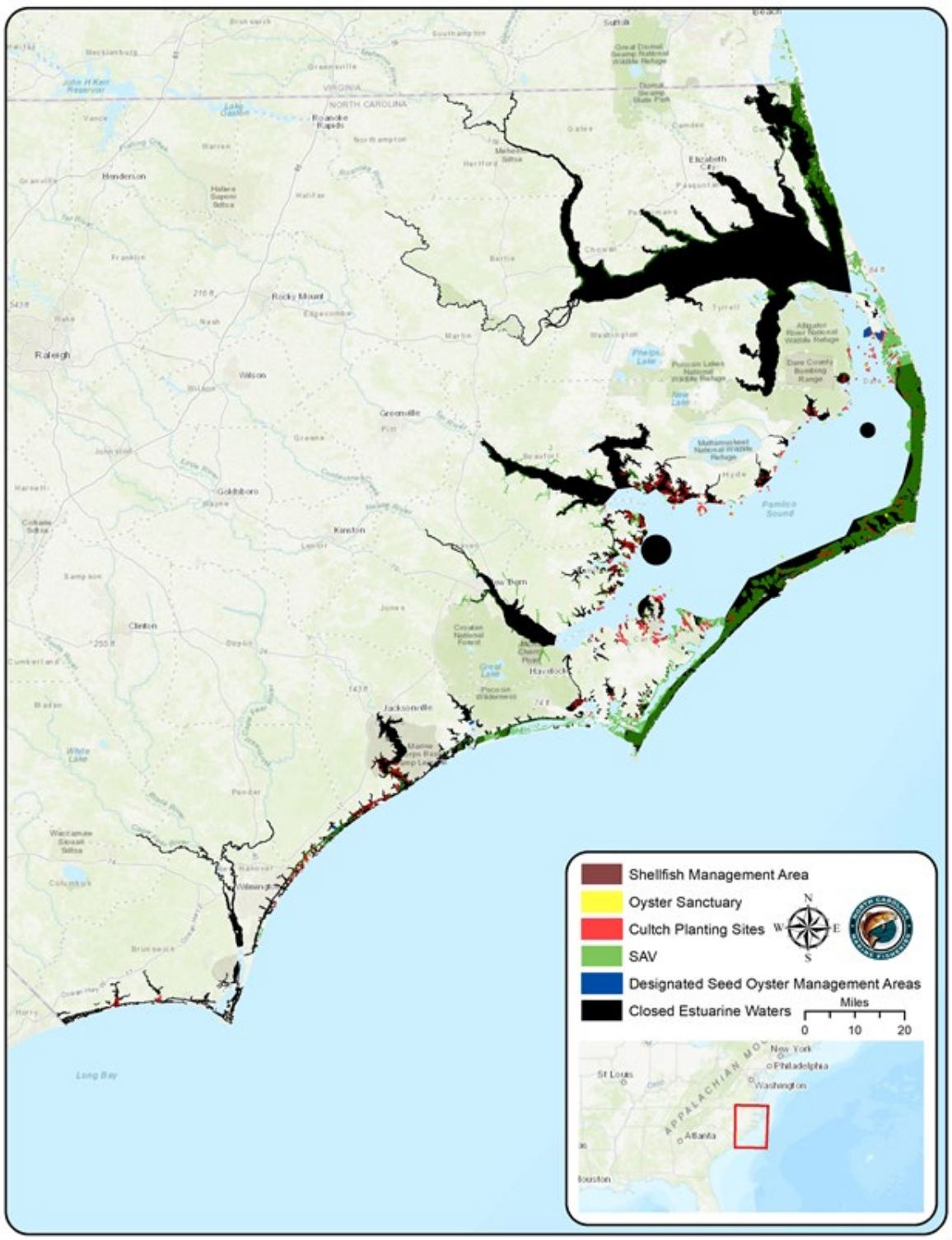


Figure 2.1.1a. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in North Carolina Estuarine waters.

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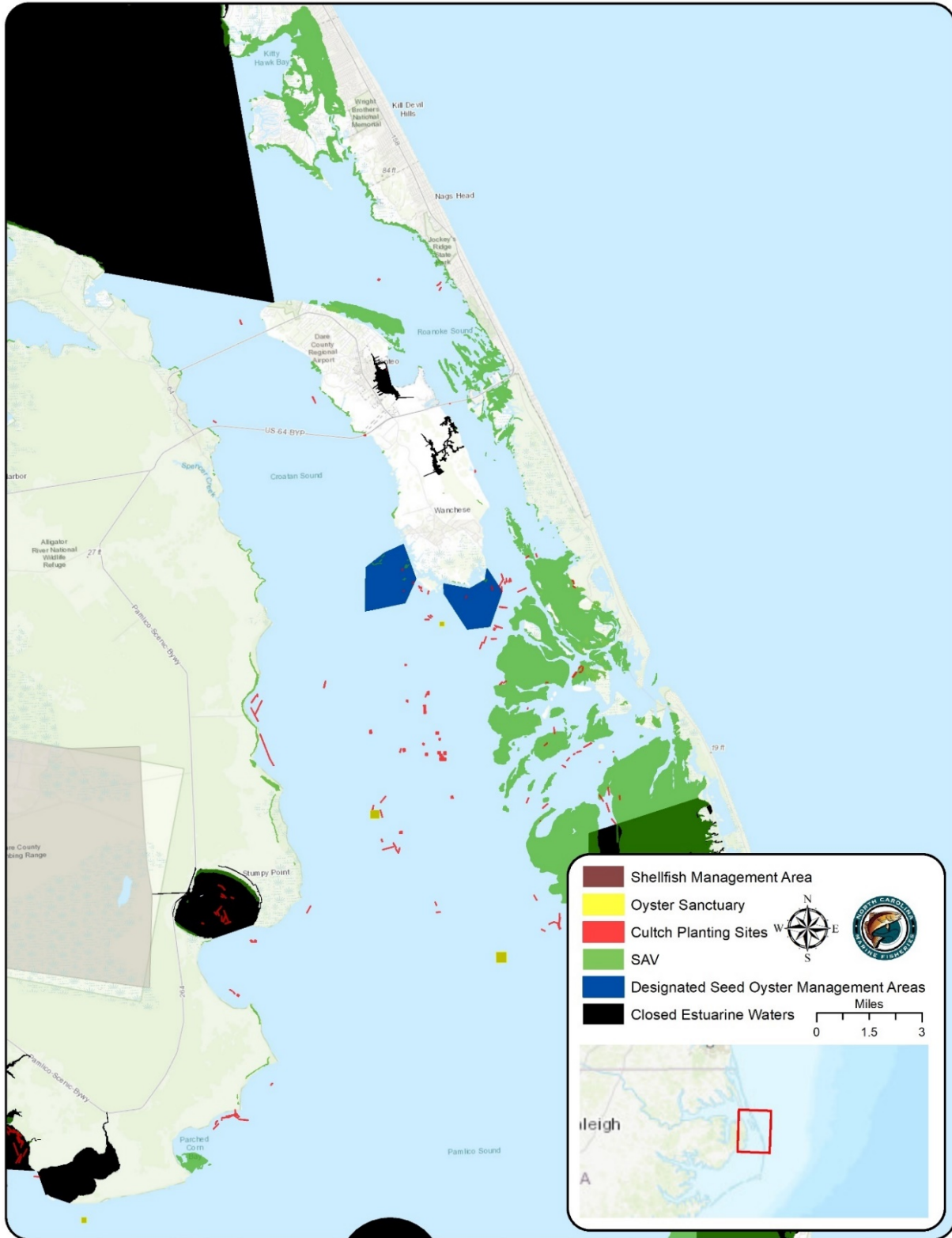


Figure 2.1.1b. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in Croatan and Roanoke sounds.

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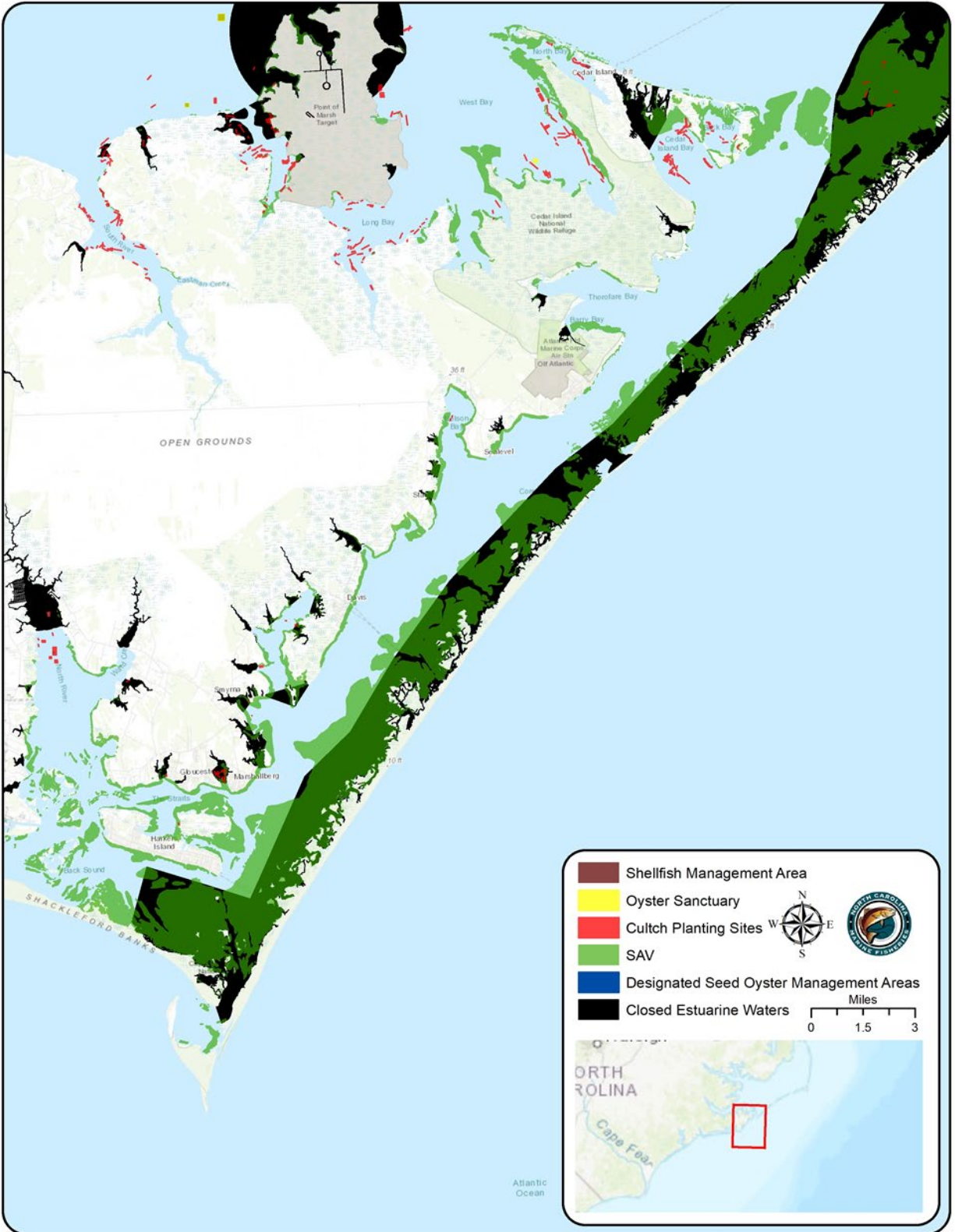


Figure 2.1.1c. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in Core Sound.

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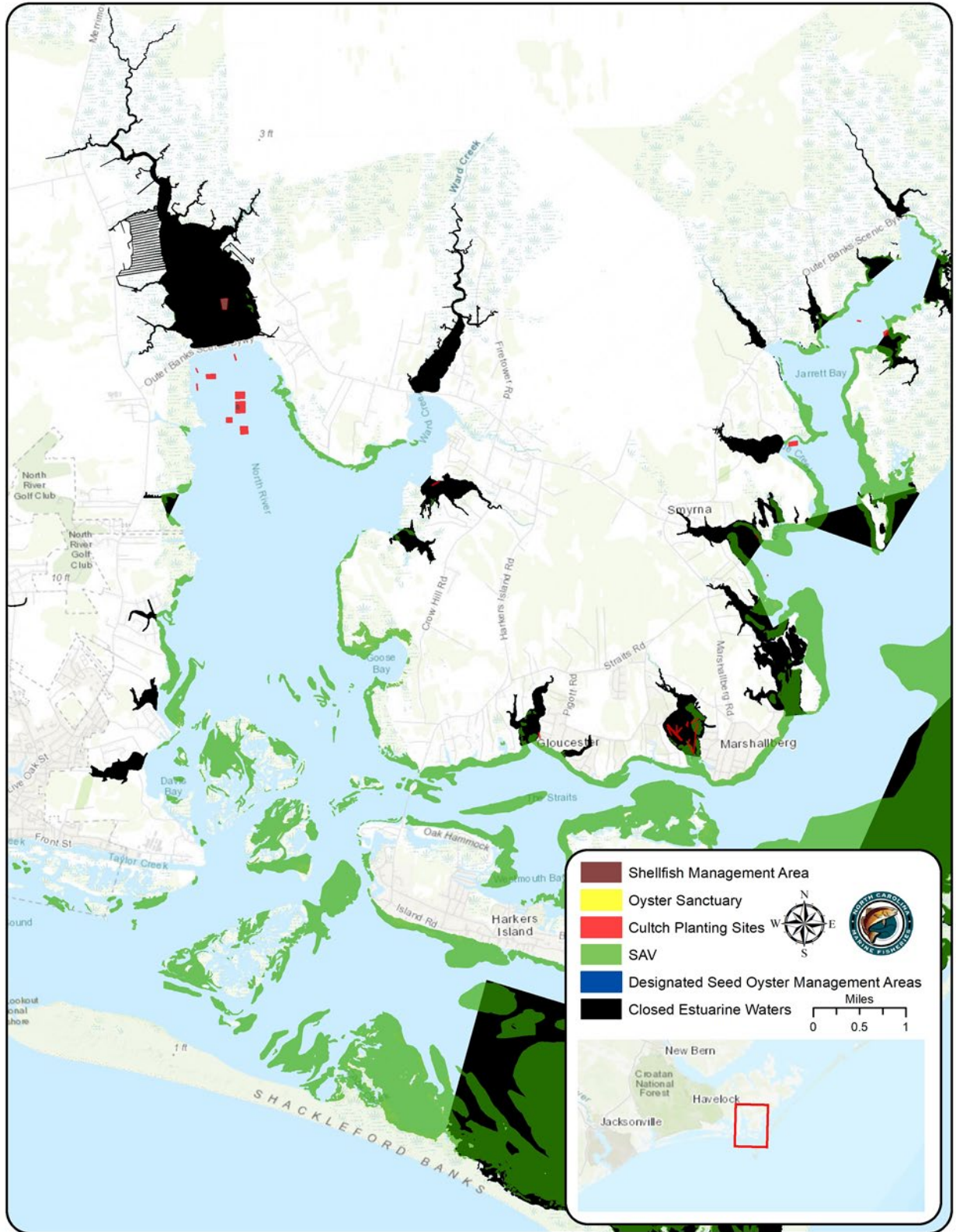


Figure 2.1.1d. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in North River.

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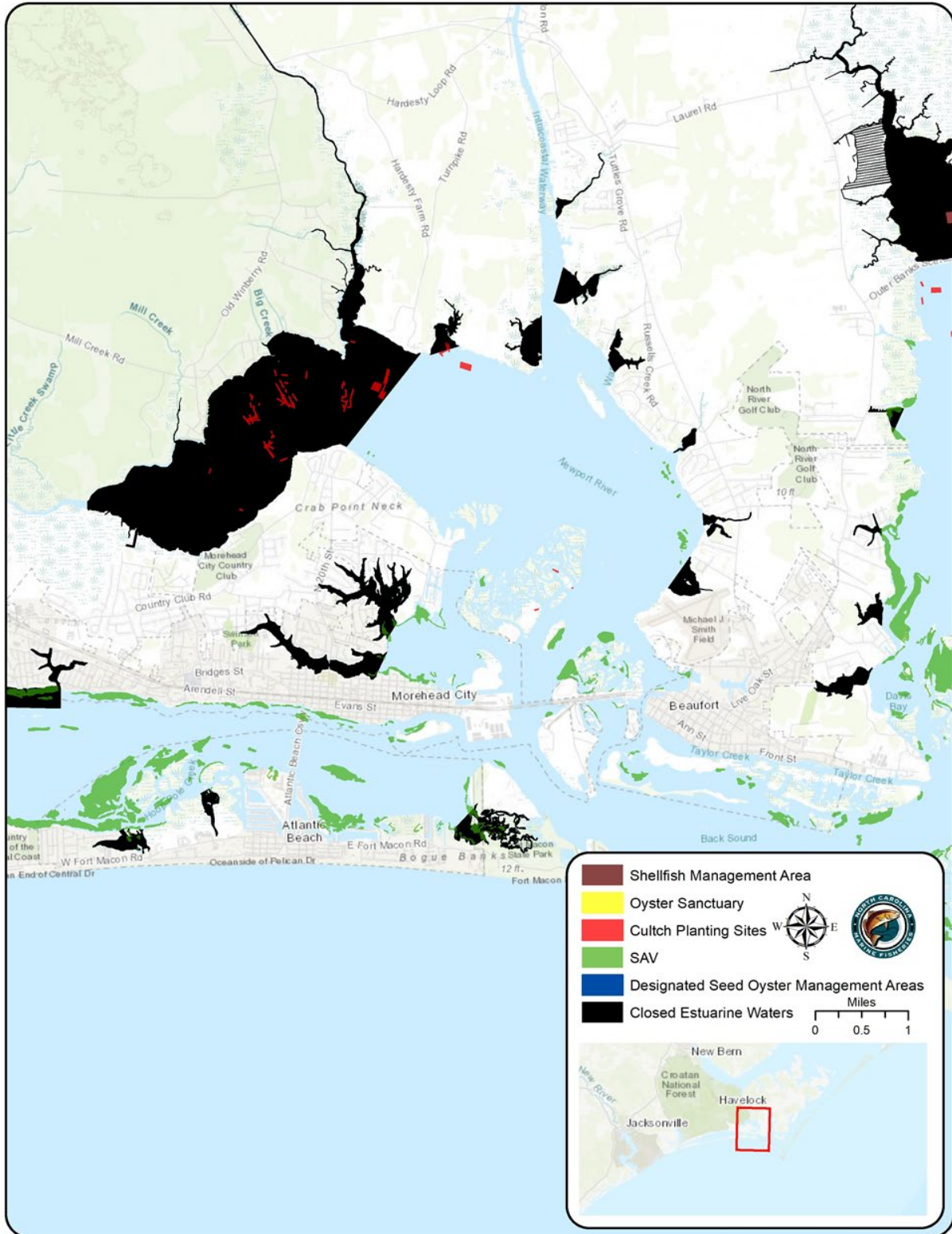


Figure 2.1.1e. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in Newport River.

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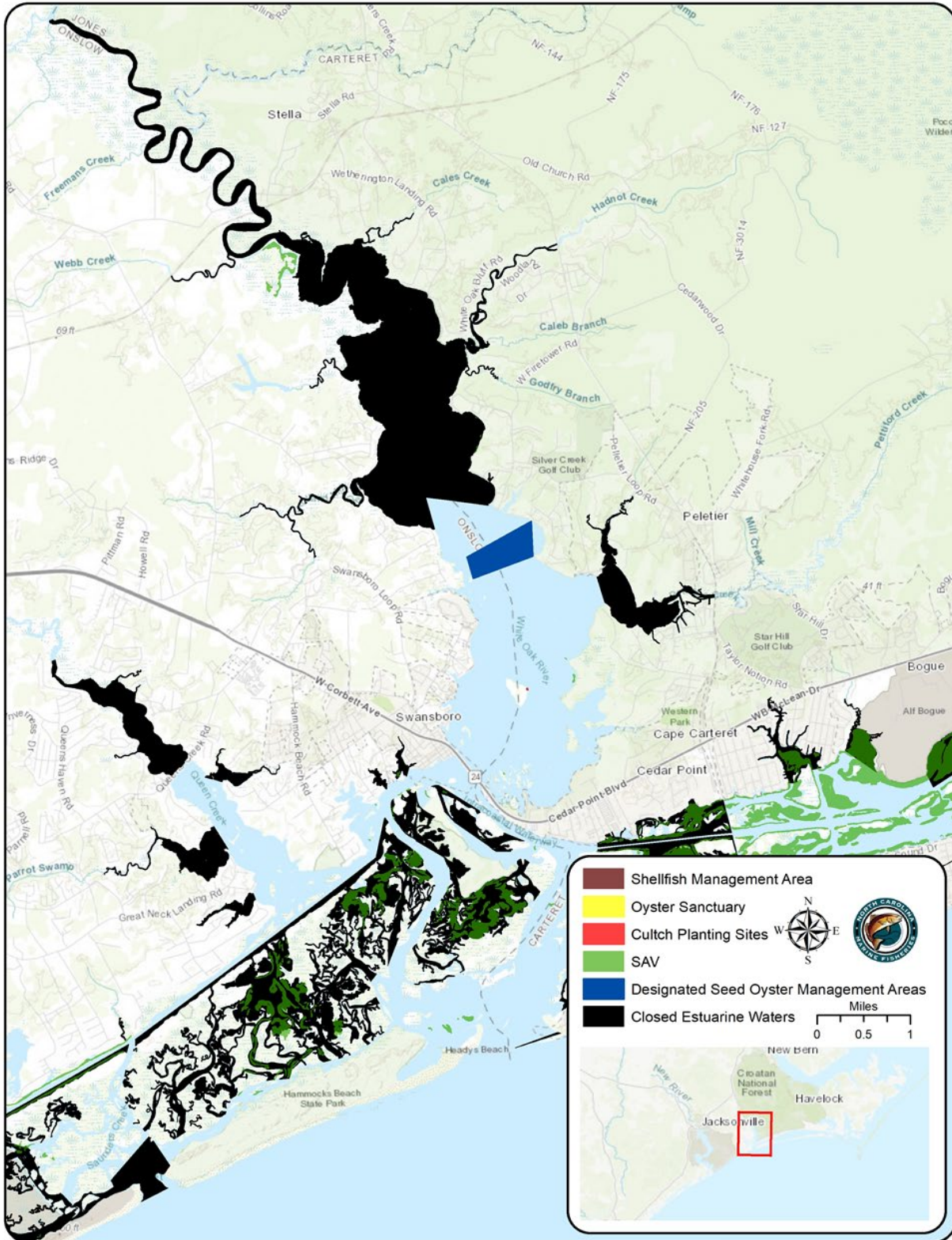


Figure 2.1.1f. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in White Oak River.

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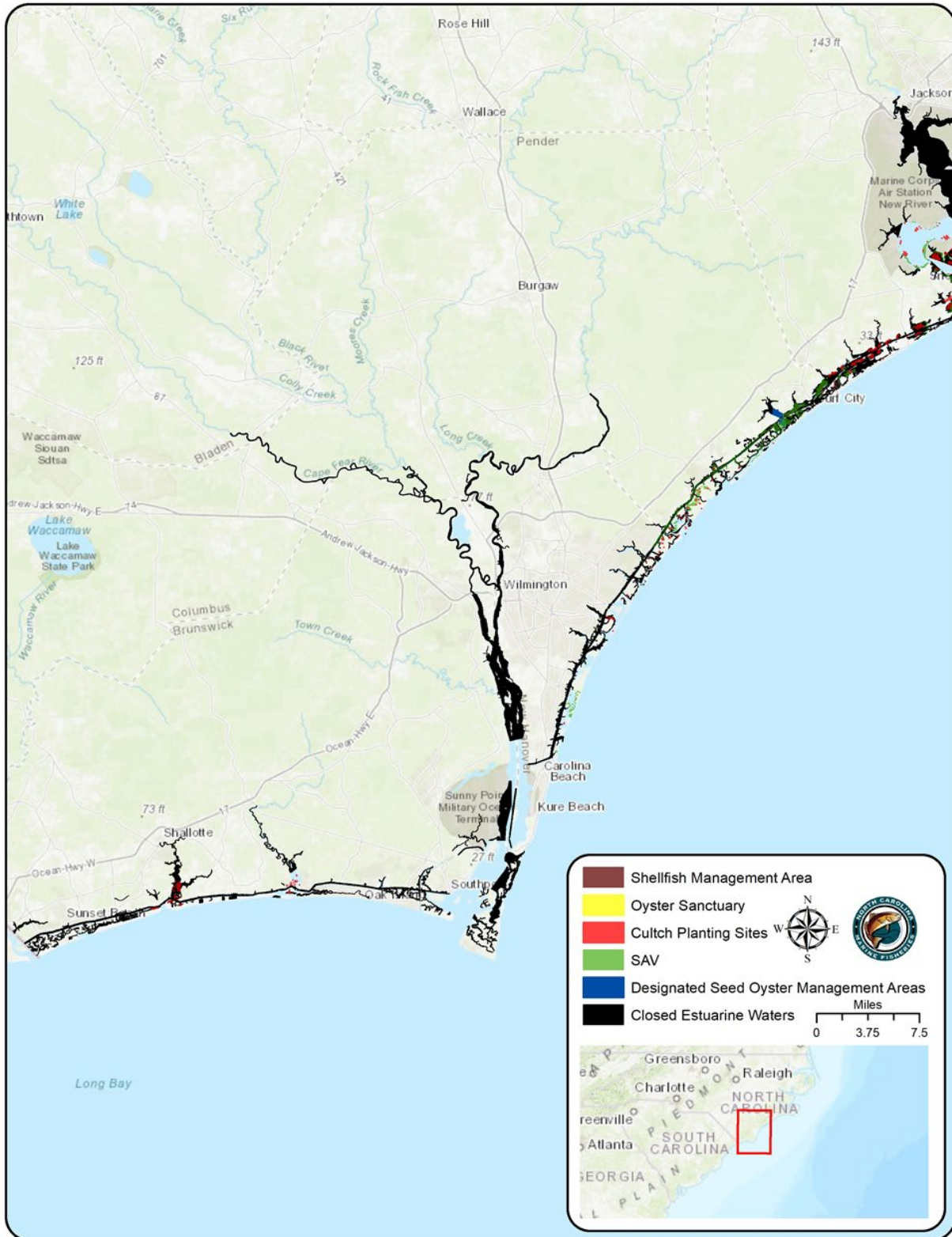


Figure 2.1.1g. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations south of New River.

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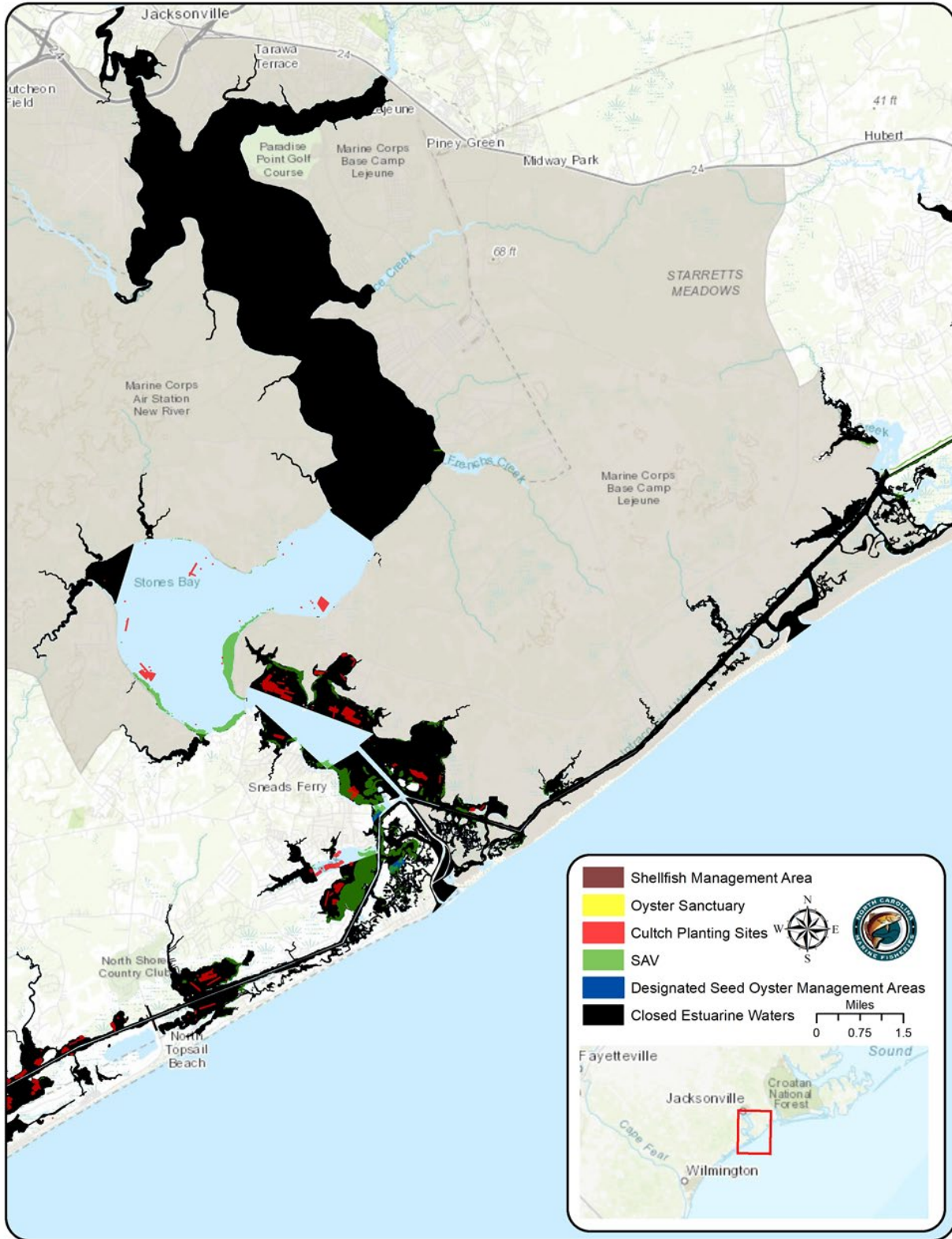


Figure 2.1.2. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in New River.

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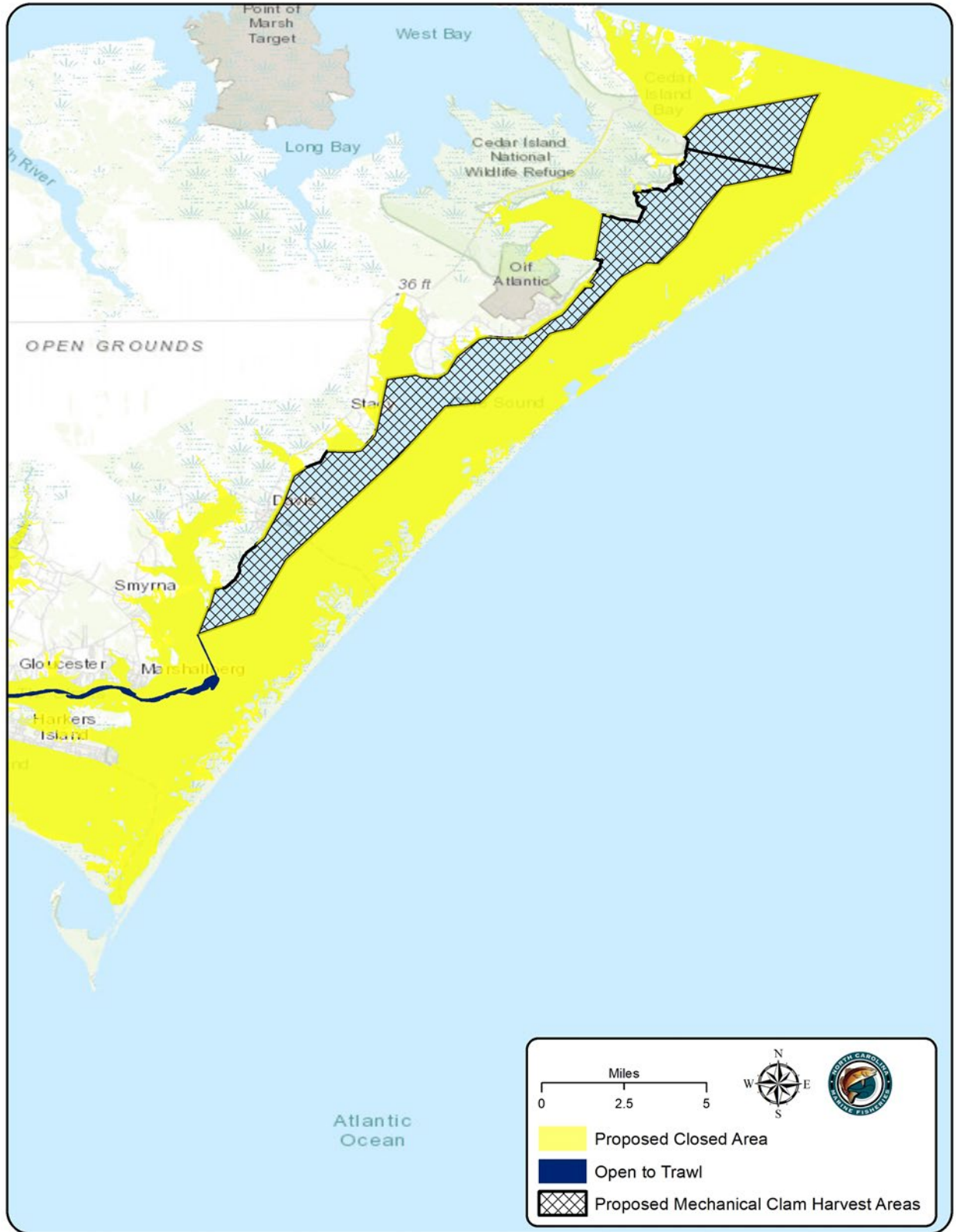


Figure 2.1.3. Location of mechanical clam harvest area in Core Sound.

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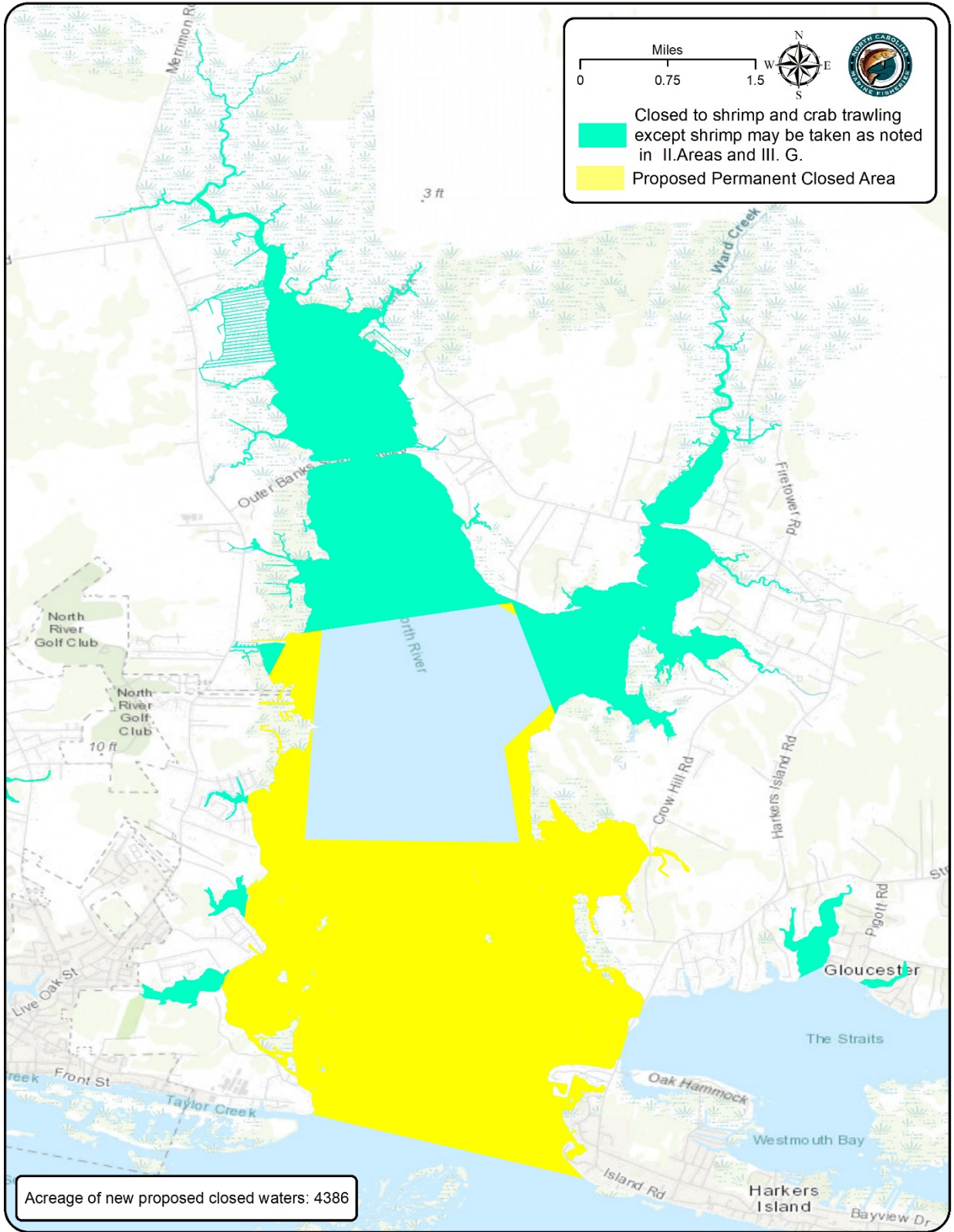


Figure 2.1.4. Location of mechanical clam harvest area in North River.

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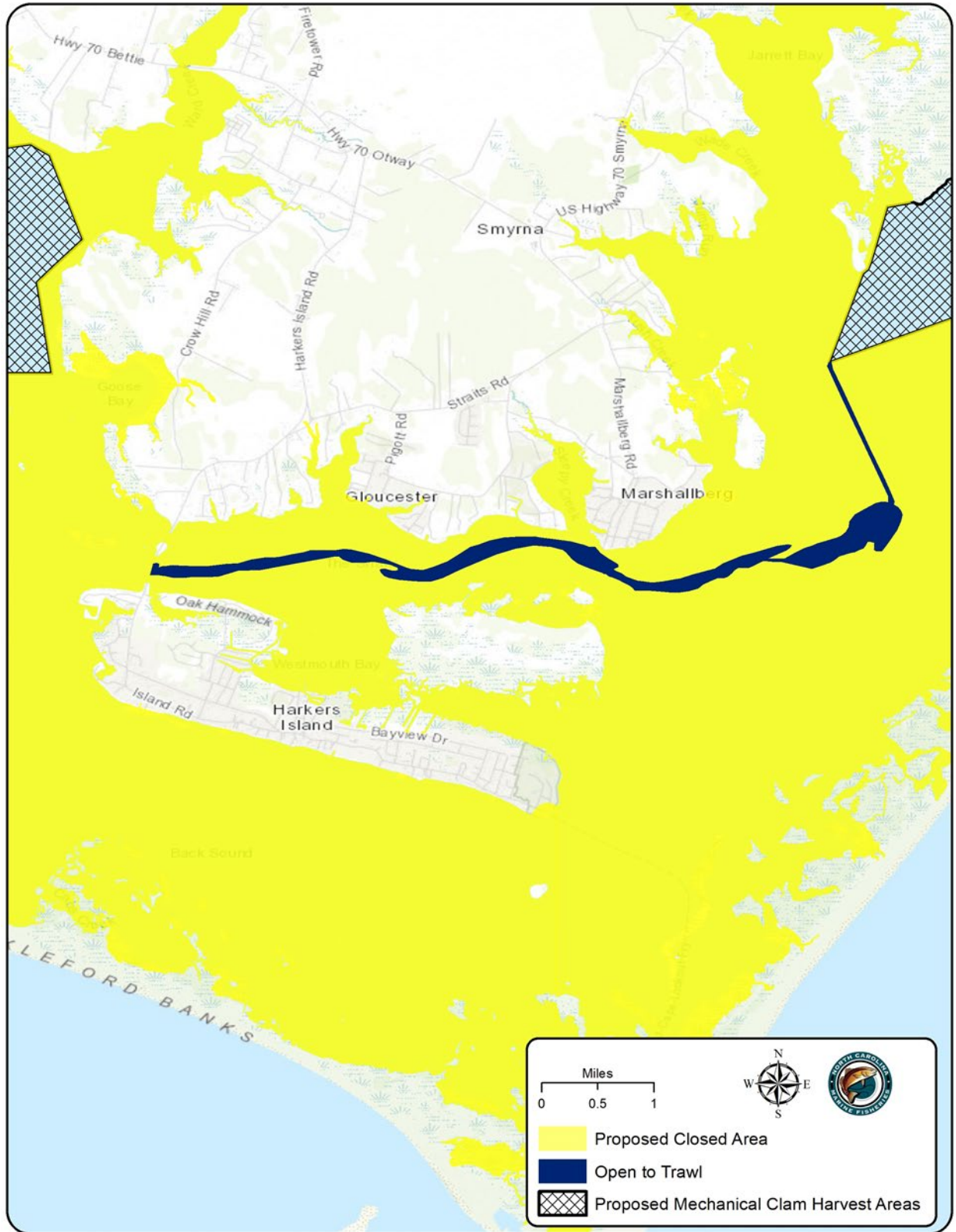


Figure 2.1.5. Location of marked channel in the “Straits”.

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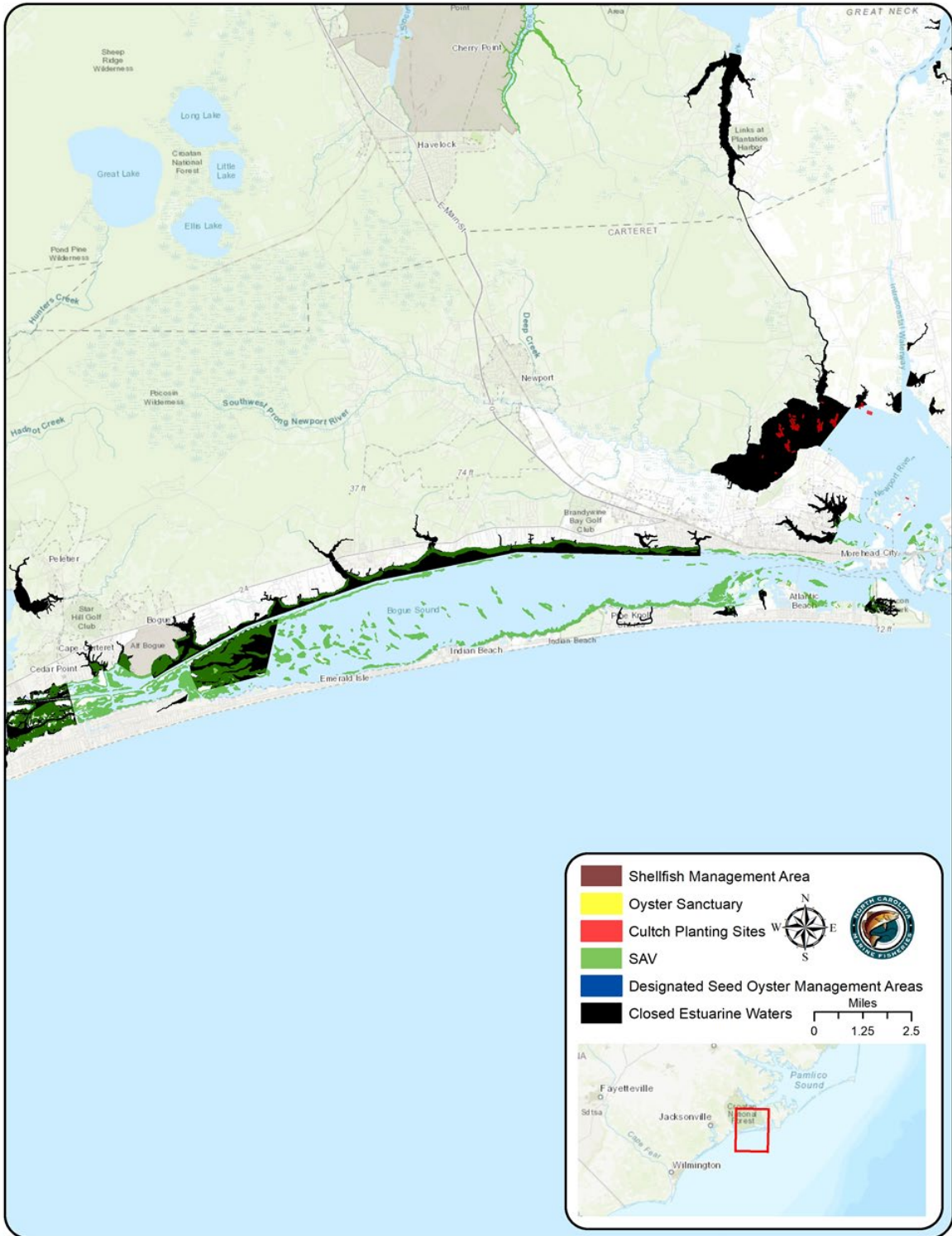


Figure 2.1.6. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in Bogue Sound, NC.

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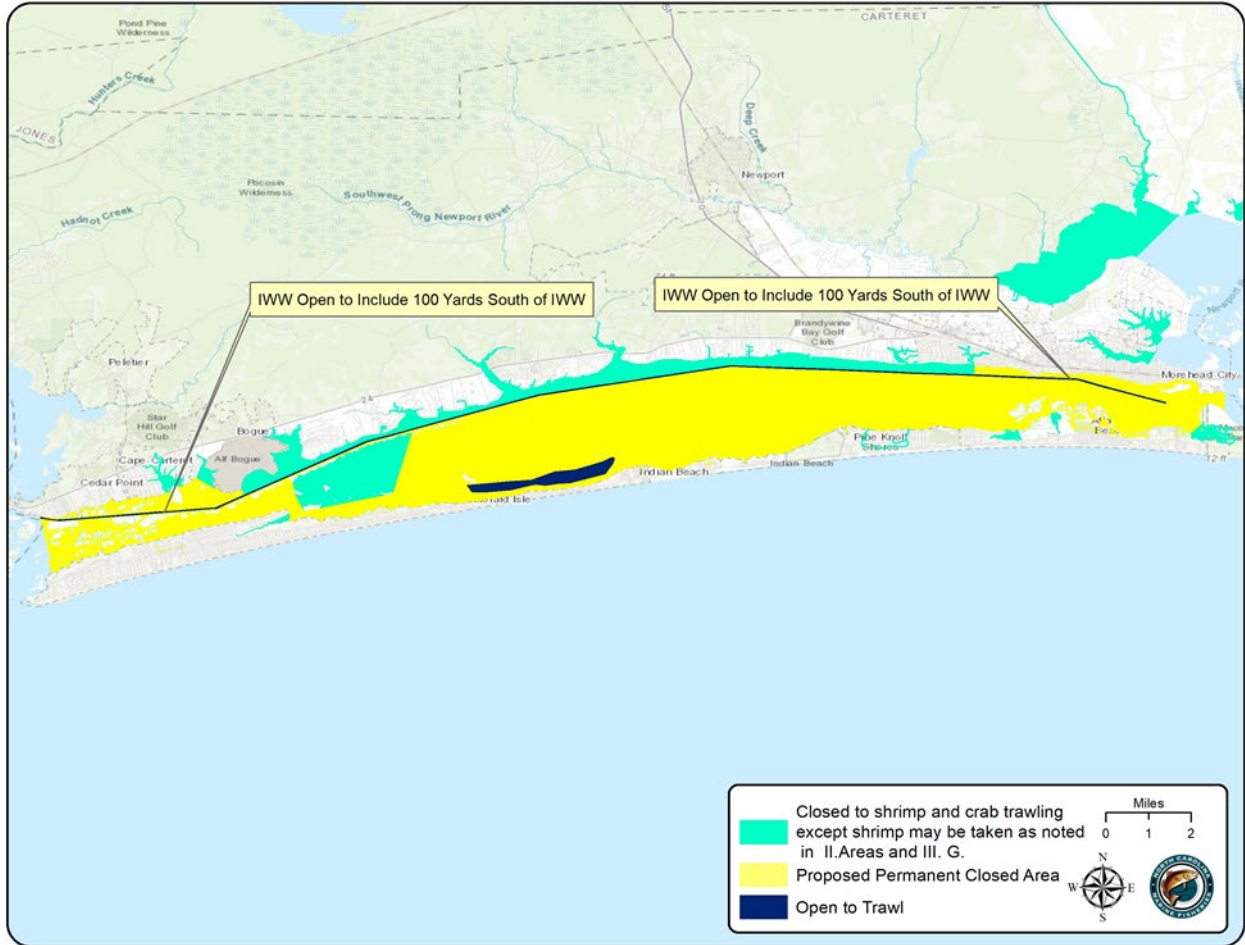


Figure 2.1.7. Proposed shrimp trawl area in Bogue Sound, allowing trawling in the IWW and within 100 yards on the south side of the IWW and in Banks Channel.

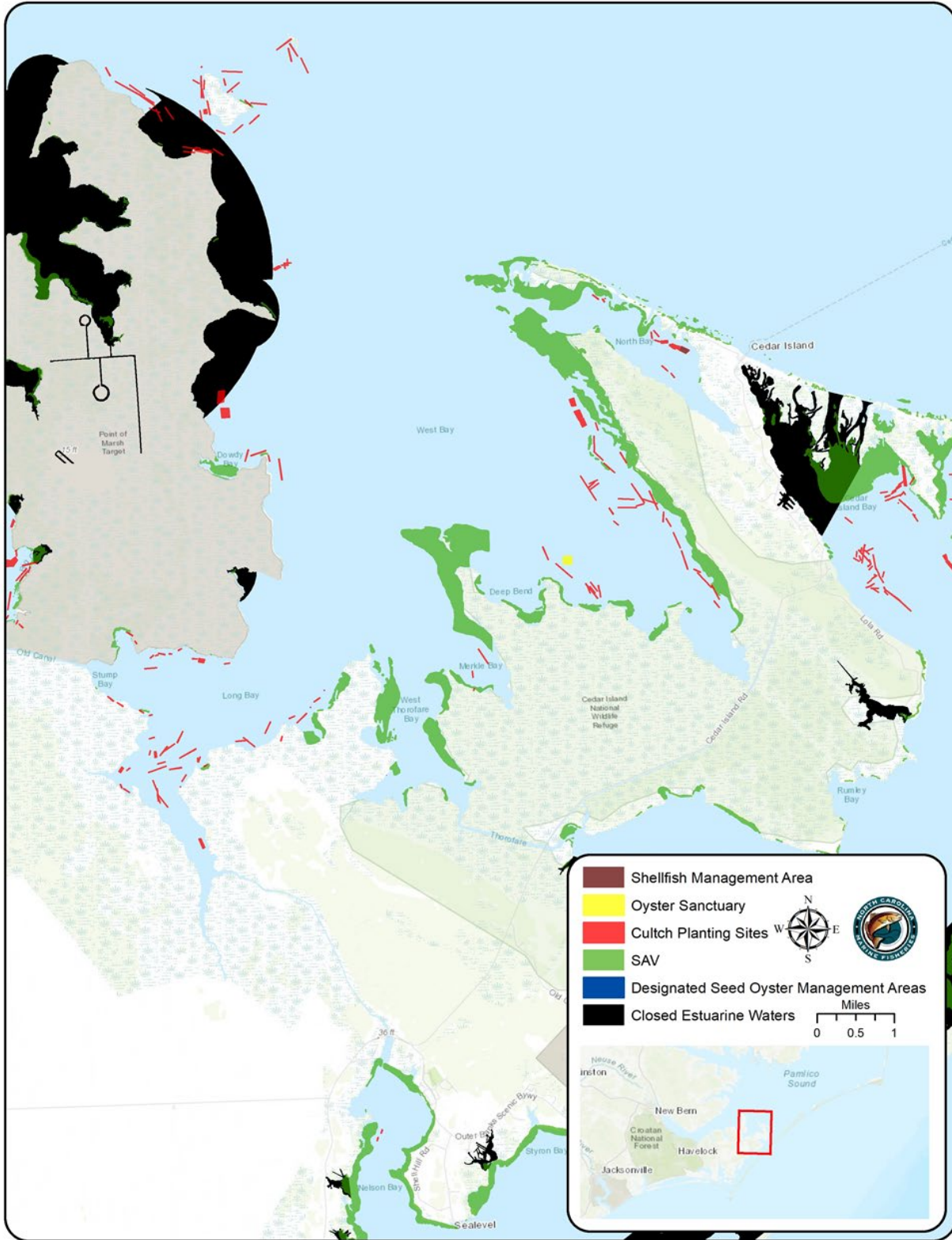


Figure 2.1.8. Designated oyster sanctuary, shellfish and seed oyster management areas and historical SAV locations (since 1981) and cultch planting locations in West Bay, NC.

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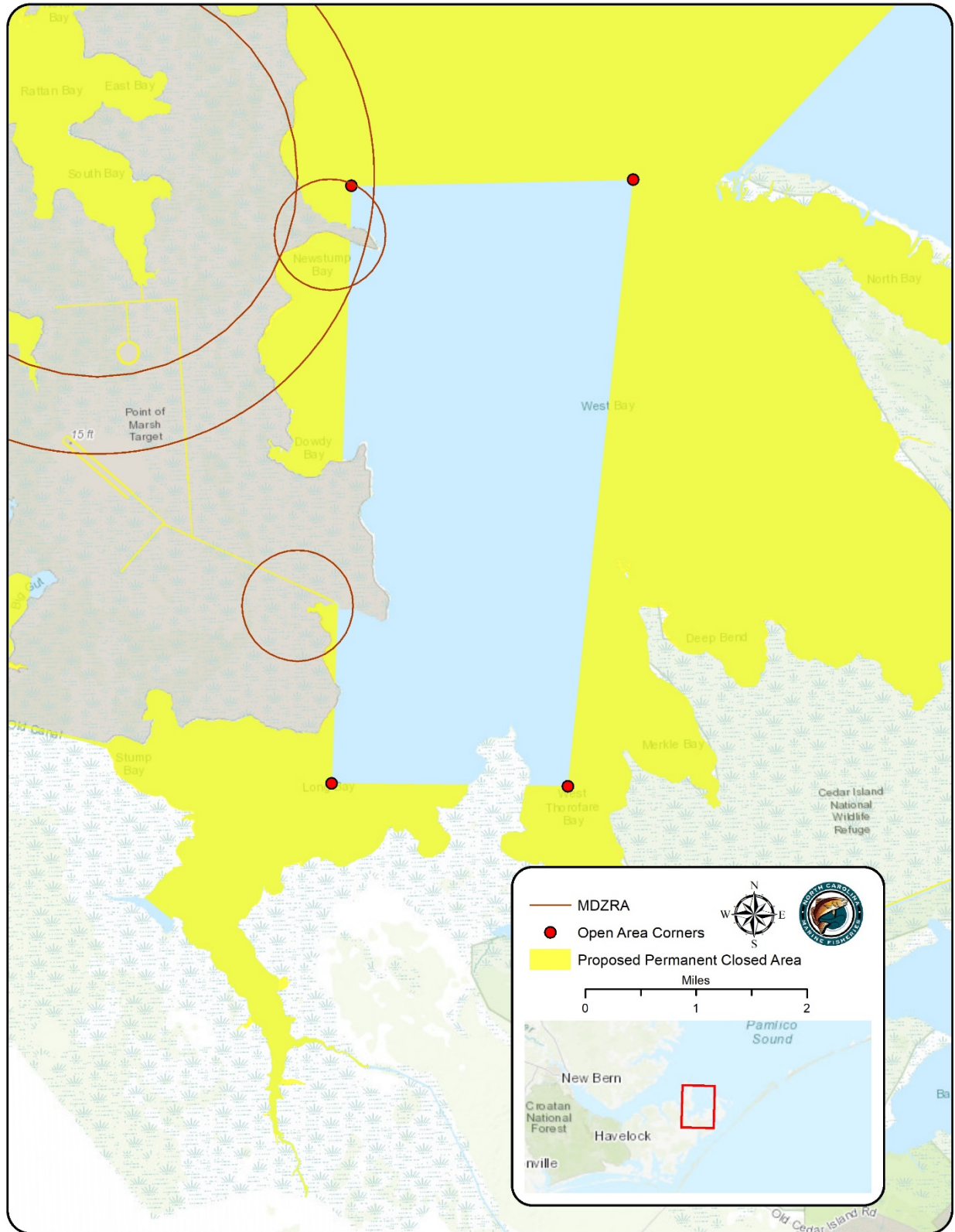


Figure 2.1.9. Example area closure in West Bay to protect SAV and shell bottom habitat.

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APPENDIX 2.2. SHRIMP MANGEMENT IN SPECIAL SECONDARY NURSERY AREAS

I. ISSUE

Evaluate current shrimp management in Special Secondary Nursery Areas (SSNA)

II. ORIGINATION

The North Carolina Division of Marine Fisheries (NCDMF) Shrimp Plan Development Team (PDT)

III. BACKGROUND

Primary nursery areas (PNAs), Secondary Nursery Areas (SNAs) and Special Secondary Nursery Areas (SSNAs) are defined in MFC Rule 15A NCAC 03I .0101 and designated in 15A NCAC 03R .0103, .0104, and .0105. It is unlawful to use any trawl net, long haul seine, swipe net, dredge, or mechanical method for clams or oysters for the purpose of taking any marine fishes in PNAs. In SNAs, it is unlawful to use trawl nets for any purpose. However, in SSNAs the Fisheries Director, may, by proclamation, open any or all SSNAs, or any portion thereof to shrimp or crab trawling from August 16 through May 14.

The SNA and SSNA designations are based primarily on the life histories of the same suite of species used in the PNA designations. As these species grow, they begin to move out of PNAs and toward the middle portion of the estuarine bays and sounds (secondary), then into the lower portions of the system (originally called temporary nursery or transport areas), and eventually the ocean (NCDMF 1978; Ross and Epperly 1985). SSNAs were designated to allow shrimping to occur once substantial out-migration of fish had occurred, so as to provide access to the marketable shrimp resource that might otherwise be lost due to out-migration (NCDMF 1978). Areas considered for SSNA designation were those where the shrimp populations would empty into unfishable bottom and where no substantial oyster habitats would be damaged by trawling.

At their February 2020 business meeting the North Carolina Marine Fisheries Commission (NCMFC) changed the designation of 10 SSNAs that had not been opened to trawling in many years to permanent SNAs. Upon final approval, the 2021 Revision to Amendment 1 to the N.C. Shrimp Fishery Management Plan (FMP) will document the rationale and provides supporting data for changing the designations of these SSNAs (unpublished). These rule changes are scheduled to be effective in May 2021. Pending these rule changes, a total of 28,741 acres of SSNAs remain (Table 2.2.1, Figures 2.2.1-2.2.3). This issue paper for Amendment 2 of the shrimp FMP further evaluates the opening of SSNAs to shrimp trawling.

Prior to the 2006 Shrimp FMP, shrimp management strategies focused on maximizing the economic value of the shrimp fishery. With implementation of the 2006 Shrimp FMP, shrimp management by size was developed to address economic conditions in the shrimp fishery and other strategies were implemented to minimize waste though gear modifications [trawl mesh size, bycatch reduction devices (BRD), area closures], culling practices, and harvest restrictions (NCDMF 2006). While size management was carried forward in Amendment 1, the emphasis of

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the amendment was to address bycatch in the commercial and recreational shrimp fisheries and development of a live bait shrimp fishery (NCDMF 2015).

The criteria for managing opening and closing of SSNAs also shifted with the adoption of Amendment 1, concentrating on minimizing bycatch while also meeting target shrimp sizes (count of shrimp per pound heads-on). Thus, SSNA openings based on division sampling have occurred later in the season (mid-September and October) to address bycatch concerns, particularly in Core and Stump sounds as well as the New River (Table 2.2.2, Figure 2.2.4). While determining openings and closures through the use of count size may be an appropriate management strategy in terms of economics – maximizing the number and size of shrimp caught, is not necessarily an appropriate measure to reduce bycatch because this measure may not reduce the length of a shrimping season. The intent of the rule which established the August 16 through May 14 SSNA opening window was to allow for the migration of juvenile finfish out of the area balanced against shrimp availability and size. Under existing procedures, a warm winter with favorable environmental conditions may lead to an early season opening, while harsh environmental conditions may lead to a later season opening or no opening at all.

Overall, larger shrimp (lower count size) are landed in the northern and central regions of the state (Roanoke, Croatan, Pamlico and Core sounds) with minimal loss of shrimp due to out-migration. However, in the southern region south of New River, shrimp tend to be smaller in size due to the lack of extensive bays and sounds and out-migration can occur over a shorter period of time. Shrimp size also fluctuates more in the southern region in response to environmental conditions. Large volumes of juvenile shrimp are often pushed out of PNAs following excessive rainfall. When this occurs, the event is often over before a closure in an open SSNA can take effect. In other instances, the size of shrimp brought to market may be notably smaller than those observed during NCDMF sampling, prompting requests from fishermen and dealers to close an area shortly after it has opened. In the southern portion of the state, some dealers have reported that smaller shrimp can at times demand a higher price earlier in the season than larger shrimp due to availability. Live shrimp sold for bait, are often smaller, and have higher value than shrimp harvested for consumption (Figure 2.2.5). While delayed openings may allow larger shrimp to be caught later in the season, supply and demand largely determines shrimp prices; therefore, shrimp management by size is not an effective tool for enhancing the value of the shrimp fishery, nor reducing bycatch.

In order to evaluate current shrimp management in SSNAs, it is important to understand that SSNAs are ecologically equivalent to permanent SNAs with similar habitat characteristics and patterns of species diversity and seasonality; only being differentiated by SSNA allowance to be opened seasonally to trawling. Both SSNAs and permanent SNAs are typically located in the middle portion of the estuarine system and are primarily composed of developing sub-adults of similar size that have migrated from an upstream PNA. Ross and Epperly (1985) noted monthly abundances of winter-spawned species such as spot (*Leiostomus xanthurus*), Atlantic croaker (*Micropogonias undulatus*), southern flounder (*Paralichthys lethostigma*), and blue crab (*Callinectes sapidus*) were similar among trawl stations in the shallow creeks and bays adjacent to Pamlico Sound (Stumpy Point Bay to northern Core Sound), many of which are classified as SSNA and permanent SNAs. Overall, species diversity and seasonality were also found to be similar across all stations. Using cluster analysis to examine the classification of nursery areas in Pamlico

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and Core sounds as well as portions of the Albemarle Sound, Noble and Monroe (1991) also found that relative species abundance and diversity overlapped at stations with similar abiotic profiles and habitat characteristics (bottom composition, sediment size, depth).

Data from NCDMF Estuarine Trawl Survey (Program 120) was paired into two categories (SSNA and PNA) based on their proximity (< 1 mile) to the SSNAs listed in Table 2.2.1 to evaluate the community structure of finfish and invertebrates at eight stations (4 SSNAs and 4 PNAs) in Core Sound from 1978 to 1981 and Roanoke Sound from 2006 to 2019. Community indices were calculated using methods described by Kwak and Peterson (2007). Data were limited to time periods where sampling was conducted both before and after August 16th. Prior to 1989, sampling was conducted year-around, but was later limited to 104 core stations with sampling only occurring in May and June. However, in the Roanoke Sound temporal coverage was expanded beyond May and June to provide more information on within-year changes in growth, mortality, and abundance of blue crab. A paired t-test was also used to compare the relative abundance (number per sample) and mean lengths of penaeid shrimp (brown, pink, white), Atlantic croaker, southern flounder, spot, summer flounder, and weakfish between nursery types.

A total of 95 species of finfish and crustaceans were collected in SSNAs and 65 species in PNAs. The Margalef Index, a weighted measure of species richness (number of different species) that compensates for differences in sample size (Margalef 1958; Kwak and Peterson 2007), was also higher for SSNAs, indicating a greater species richness (Table 2.2.3). Species diversity (Shannon Diversity Index H'), which accounts for species richness and abundance (Hamilton 2005; Kwak and Peterson 2007) was also higher in SSNAs. Species evenness (Shannon's Index J'), an expression of how evenly individuals are distributed among different species (Kwak and Peterson 2007) was higher in SSNAs. Overall, the species composition of both nursery types was similar; however, more unique species were observed in SSNAs. These findings are similar to those of Ross and Epperly (1985) which found that species richness, diversity, and evenness were lower in the uppermost portions of the estuary (i.e., PNAs). The nursery-role of a habitat can vary for species with different life history strategies, degree of estuarine dependency, and use on varying geographic, ontogenetic (physical and psychological), annual and cohort-specific scales (Able 2005). Therefore, SSNAs may not only serve as important migration corridors for winter spawned species, but also as nursery areas for spring and summer spawned species.

Based on the results of the paired t-tests, the relative abundance of Atlantic croaker, southern flounder, summer flounder, and weakfish was not significantly different between SSNAs and PNAs (Table 2.2.4). In SSNAs, relative abundance of southern flounder, spot, summer flounder, and weakfish peaked in May and June; however, Atlantic croaker peaked in October (Figure 2.2.6). The relative abundance of brown and white shrimp in SSNAs peaked in June and July, respectively, declining rapidly after August and September. The mean length of southern flounder as well as brown, pink, and white shrimp was not significantly different between nursery types (Table 2.2.4). Length frequency distribution of target species was similar for target species in both nursery types (Figure 2.2.7). These results further support the ecological similarity between SSNAs and PNAs and demonstrates the importance of both habitats as essential habitat for many developing sub-adult finfish and invertebrates at their various life stages throughout the year.

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The presence of juvenile fish is not the only factor that is considered when identifying nursery areas. In addition to species abundance, size composition, and species diversity, several abiotic factors (bottom type, sediment size, salinity, temperature, and depth) must be evaluated for an area to be designated a PNA. As ecosystem science advances, it has been found that in addition to these factors, other things such as growth, predator protection, and movement out of the nursery into the adult habitat influence determination of nursery areas. Based on Beck et al. (2001), Dahlgren et al. (2006), and Peterson (2003), nursery areas are a subset of juvenile habitat that contributes disproportionately more to the production of juveniles that recruit into a population than another area of similar size. Once a waterbody has been identified by NCDMF as a potential nursery area, a sampling station is established and is sampled a minimum of three years prior to designation to account for annual variability. This process also includes comparisons to other nursery areas to ensure consistent application of the methodology (NCDMF 2013). Since SSNAs are a subset of SNAs, no further sampling or analysis is needed to change the remaining SSNAs to permanent SNAs. Additionally, SNAs do not have additional protections from other agencies' rules, except for a North Carolina Coastal Resources Commission (CRC) rule that restricts impacts to secondary nursery areas (among several other natural resources areas) in the siting of energy facilities [7M .0403 (f)(10)(A)].

Changing the designation of SSNAs to PNAs or expanding nursery area designations is outside of the scope of the Shrimp FMP. The Coastal Habitat Protection Plan (CHPP) provides the proper framework to assist the Marine Fisheries, Environmental Management, and Coastal Resources commissions in managing fish habitat for continued protection and restoration. In addition, an objective of this amendment is to develop a strategy through the CHPP to review current nursery areas and to identify and evaluate potential areas suitable for designation. Efforts are currently underway to create a multi-metric index that will describe the ecological condition of Strategic Habitat Areas (SHAs). SHAs are a subset of high quality or rare, relatively unaltered habitats or systems of habitats that support estuarine and coastal fish and shellfish species. The multi-metric index will evaluate several variables including community diversity, species richness, and feeding guilds (species that share similar niches or ecological roles). A similar process will also be used describe the ecological condition of PNAs, SNAs, and non-nursery areas. Additional work will focus on evaluating current nursery area designations and better aligning the current approach of designating nursery areas in North Carolina with the most current science.

See the CHPP for additional information on protection of critical habitats as well as the identification of SHAs. The Coastal Habitat Protection Plans and Source Document can be viewed and downloaded from: <http://portal.ncdenr.org/web/mf/habitat/chpp/downloads>.

IV. AUTHORITY

North Carolina General Statutes

§ 113-134 RULES

§ 113-173 RECREATIONAL COMMERCIAL GEAR LICENSE

§ 113-182 REGULATION OF FISHING AND FISHERIES

§ 113-182.1 FISHERY MANAGEMENT PLANS

§ 113-221.1 PROCLAMATIONS; EMERGENCY REVIEW

§ 143B-289.52 MARINE FISHERIES COMMISSION – POWERS AND DUTIES

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North Carolina Marine Fisheries Commission Rules

15A NCAC 03H .0103 PROCLAMATIONS, GENERAL

15A NCAC 03L .0101 SHRIMP HARVET RESTRICTIONS

15A NCAC 03J .0103 GILL NETS, SEINES, IDENTIFICATION, RESTRICTIONS

15A NCAC 03N .0105 PROHIBITED GEAR, SECONDARY NURSERY AREAS

V. DISCUSSION

- Section discusses potential management measures to reduce bycatch in SSNAs
- Establishing static seasons with delayed openings could reduce bycatch and allow access to larger more marketable shrimp later in the season
- Changing the designation of all SSNAs to permanent SNAs would eliminate bycatch by making it unlawful to use any trawl (beam, crab, skimmer, otter, etc.)
- The amount of bycatch reduction is non-quantifiable (see *Appendix 1: Shrimp Trawl Bycatch Assessment*)
- Changing the designation of all SSNAs to permanent SNAs would require gill net attendance in all waters from May 1 through November 30

By allowing limited trawling in SSNAs, fishermen may catch shrimp late in the season that have not migrated out into the larger estuaries. The division conducts regular sampling in the central and southern regions of the state to monitor abundance of bycatch and shrimp size and abundance if the area is being considered for opening. Target sizes (count of shrimp per pound heads-on) differ by waterbody within the state to account for variability in size preference of user groups, geographic differences in shrimp size at migration, weather events, vessel sizes, and socioeconomic conditions (NCDMF 2006). Timing of SSNA openings can be highly influenced by environmental conditions, proximity to major inlets and rivers, and input from stakeholders, and vary by area. In smaller waterbodies of the state, shrimp tend to migrate earlier due to lack of extensive bays and sounds. Management by target size has been controversial because of bycatch, variability in shrimp abundance and size from year to year, timing of opening, user conflicts, and pressure from fishermen to access the resource.

Using the NCTTP landings data, the monthly percentage of shrimp harvested in all estuarine waters that were a 31/35 count or lower (average target opening size for SSNAs listed in Table 2.2.1) was calculated from 1994 to 2019 (Table 2.2.5). While landings data for each SSNA could not be identified, count sizes were used as a proxy for shrimp sizes in SSNAs. On average, 69% of the shrimp landed from August 1 to May 31 were a 31/35 count or lower (Table 2.2.5). If a September 1 to November 30 season was in place, approximately 81% of the shrimp landed would be a 31/35 count or lower. Approximately 85% of the shrimp landed would be a 31/35 count or lower if the season was delayed to October 1 to December 31. In the southern portion of the state, marketable shrimp typically migrate out of the estuaries earlier in the year; thus, seasons could be established regionally to account for differences in migration timing.

While many SSNAs have periodically opened from 2000 to 2019, several have not opened to shrimp trawling in many years (Tables 2.2.1 and 2.2.2). The North River and Ward Creek SSNAs

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have only opened once since 2000. The Chadwick Bay SSNA has only opened twice since being designated a SSNA in 2011; last opening in 2012. The Kitty Hawk/Buzzards Bay SSNA has never opened since being designated as nursery area in 2004. In the Stump Sound SSNA, the area from the Highway 210 Bridge to Marker #49 has only opened twice in the last five years; opening in 2018 to allow access to shrimp prior to Hurricane Florence. The presence of small shrimp and high levels of bycatch, as well as limited stakeholder demand have minimized the need to open most SSNAs. Changing these particular SSNA designations to permanent SNAs would have little to no impact on commercial shrimp and crab trawling since these areas have not been opened to trawling in many years. Not allowing trawling in these areas would also provide further protection to critical habitats used by numerous economically important species of fish and invertebrates as well as other prey species. Furthermore, eliminating bottom disturbing gear such as crab and shrimp trawling in these areas would provide additional protection to significant portions of MFC nominated SHAs.

Re-designating all SSNAs to permanent SNAs, making it unlawful to use all trawl nets for any purpose, would further reduce bycatch and protect developing sub-adult finfish and invertebrates that have migrated from PNAs and critical fish habitats. Re-designating all SSNAs to permanent SNAs would also provide further protection to species such as Atlantic Croaker that migrate through SSNAs into PNAs in September (Figure 2.2.6). However, changing the designation of all SSNAs to permanent SNAs would impact commercial shrimp trawling; most notably in SSNAs located in Core and Stump sounds, and the New River. Overall, SSNAs make up a small percentage of the total acreage of North Carolina's estuarine waters open to trawling (Table 2.2.1). Closing these areas to trawling leaves a considerable amount of water open to trawling and potentially allows more marketable shrimp to be harvested downstream of the current SSNA boundaries. Currently, only skimmer trawls are allowed in the New River SSNA; prohibiting the use of all trawls could elevate conflicts between otter and skimmer trawlers downstream.

Changing the designation of all SSNAs to permanent SNAs would eliminate crab trawling in some areas. However, effort in the crab trawl fishery has been low in recent years with most effort occurring in the central region of the state (Core and Bogue sounds; Table 2.2.6). Statewide, blue crab landings from crab and shrimp trawls account for 0.05% and 0.1%, respectively of the total blue crab harvest in recent years (NCDMF 2020). Since 2009, there have been no landings from crab trawling in the New River, Chadwick Bay, and Stump Sound, though it is allowed. With the adoption of Amendment 3 to the Blue Crab FMP in 2020, the use of crab trawls was prohibited north of the shrimp trawl lines in the Pamlico, Pungo, and Neuse rivers (NCDMF 2020). This action was taken to improve habitat conditions for blue crabs as well as other economically important species and provide additional protection of SHAs. Trawling has also been further limited to November through February in fourteen inlets from Beaufort Inlet south to the NC/SC line with the inception of new crab spawning sanctuaries on May 1, 2020.

Attendance requirements for gill nets would also change if SSNAs were reclassified to permanent SNAs (Table 2.2.7). Current gill net attendance requirements for each SSNA are shown in Figures 2.2.8-2.2.10. MFC Rules 15A NCAC 03J .0103 and 03R .0112 require attendance of small mesh gill nets in all permanent SNAs. The 2001 Red Drum FMP implemented small mesh gill net attendance from May 1 through October 31 (later extended through November) in areas where juvenile red drum (*Sciaenops ocellatus*) typically occur, in shallow bays and creeks, shorelines,

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and over shallow submerged aquatic vegetation (NCDMF 2001). Additionally, the South Atlantic Fishery Management Council (SAFMC) designated specific inshore areas in the south Atlantic region as Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPC) in their Habitat Plan for red drum (SAFMC 1998). In North Carolina, these federal areas included all state-designated nursery habitats of particular importance for red drum (i.e., all PNAs and all SNAs). When the gill net attendance rule language was adopted, it covered areas listed as PNAs and SNAs, but not SSNAs. The stated rationale for red drum bycatch reduction would apply to any SNA (past or future).

VI. PROPOSED RULE(S)

Completed after recommendations are brought forward.

VII. MANAGEMENT OPTIONS AND IMPACTS

(+ Potential positive impact of action)

(- Potential negative impact of action)

1. *Status quo* - Continue to manage special secondary nursery concentrating on minimizing bycatch while also meeting target shrimp sizes with sampling.
 - + No rule changes are needed
 - + No impact to commercial fishermen
 - + Flexibility in dealing with dynamic conditions
 - Does not minimize bycatch from shrimp trawls in SSNAs
 - Does not address the needs of all user groups (bait vs. consumption)
 - Does not protect habitat from bottom disturbing gear
 - Labor intensive and expensive sampling
 - Shrimp abundance and size vary widely in the same geographic area
 - Bycatch abundance variable due to environmental conditions and locations in the estuary
2. Establish static seasons for shrimp trawling in all or some special secondary nursery areas.
 - + Potential to reduce bycatch from shrimp trawls in SSNAs
 - + Potential to increase harvest size and economic value of shrimp
 - + Opening and closing dates predetermined
 - + Satisfy fishermen who disagree with flexible openings.
 - + Minimizes confusion of openings
 - Does not protect habitat from bottom disturbing gear
 - No flexibility in dealing with dynamic conditions
 - Potential for excessive harvest of small shrimp or shrimp gone when opened
 - May adversely impact some fishermen more than others
3. Change the designation of all or some special secondary nursery areas to permanent secondary nursery areas which would prohibit all trawling. Under MFC Rule 03R .0112(b)(1), gill net attendance is required in all waters of permanent secondary nursery areas from May 1 through November 30.

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- + Eliminate bycatch from shrimp trawls in all SSNAs
- + Protects habitat from bottom disturbing gear
- +/- Gill net attendance required in all waters from May 1 through November 30
- + Nursery rule changes are needed
- Eliminates crab trawling when the areas are open
- Loss of income to commercial fishermen and dealers
- Cannot assess benefit of bycatch reduction on fish stocks with current data
- Loss of recreational shrimp source
- May concentrate participants into open areas and result in greater effort impacts overall
- May adversely impact some fishermen more than others

VIII. SHRIMP FMP WORKSHOPS

Shrimp FMP Workshops were held in March 2021 between the division plan development team and the Shrimp FMP Advisory Committee (AC). The goal of these workshops is for the AC to assist the division in drafting the plan. The division had distinct discussion points to lead conversation to inform individual issue papers where stakeholder input was needed. The guidance received during workshops on the management of SSNAs were incorporated into the draft plan. Overall, AC members expressed the need for additional biological and economic data for SSNAs. There was mixed support between redesignating SSNAs to SNAs and using static seasons. Clarification between what is appropriate in this plan and the CHPP were noted. Commercial AC members indicated that while they would like to see SSNAs openings occur earlier and more frequently, changes to current strategies used to manage SSNAs is not needed. Commercial AC members also noted that the use of skimmer trawls in SSNAs may reduce bycatch in SSNAs.

IX. RECOMMENDATION

The division will make recommendations after receiving input from the public and the MFC Advisory Committees.

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Tables

Table 2.2.1. Total acreage, year designated, percent (%) acreage of estuarine waters open to trawling, year designated, last year opened, and target opening sizes (count of shrimp per pound heads-on) of special secondary nursery areas.

Current Rule ID 03R .0105	Description	Acreage	Percent Acreage of Estuarine Waters Open to Trawling	Year Designated (reclassified)	Latest Year Opened	Proclamation Reference	Target Count size
1 (a)	Shallowbag Bay	468	0.04	2004	2017	SH-5-2017	27-35
1 (b)	Kitty Hawk Bay-Buzzard Bay	1,996	0.18	2004			27-35
3 (a)	West Thorofare Bay	776	0.07	1986	2018	SH-6-2018	27-35
3 (b)	Long Bay-Ditch Bay	1,140	0.10	1986	2018	SH-6-2018	27-35
3 (c)	Turnagain Bay	963	0.09	1995	2018	SH-6-2018	27-35
4 (a)	Cedar Island Bay	1,794	0.16	1986	2018	SH-6-2018	27-35
4 (b)	Thorofare Bay-Barry Bay	2,156	0.19	1986	2018	SH-6-2018	27-35
4 (c)	Nelson Bay	1,077	0.10	1986	2018	SH-6-2018	27-35
4 (d)	Brett Bay	251	0.02	1986	2018	SH-6-2018	27-35
4 (e)	Jarrett Bay	1,431	0.13	1986	2018	SH-6-2018	27-35
5 (a)	North River	978	0.09	1986	2000	SH-4-2000	27-35
5 (b)	Ward Creek	625	0.06	1986	2000	SH-4-2000	27-35
7	New River (above HWY 172 Bridge)**	14,669	1.31	1995	2019	SH-7-2019	20-30
8	Chadwick Bay	167	0.01	2011	2012	SH-8-2012	30-40
9	Intracoastal Waterway (Stump Sound)	252	0.02	1995	2019	SH-7-2019	20-30

* Not opened after SSNA designation

**Only 5,406 acres is open to trawling or 0.48% of estuarine waters open to trawling

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Table 2.2.2. Special secondary nursery (SSNA) openings by waterbody, 2000-2019. Re-openings are bolded.

	Total Openings	Not Opened	Opened Aug. 16	Openings							
				Aug. 1-16	Aug. 17-31	Sept. 1-16	Sept. 17-30	Oct. 1-16	Oct. 17-31	Nov. 1-16	Nov. 17-30
<u>Roanoke Sound Area</u>											
Shallowbag Bay	13	2	8	8	5						
Kitty Hawk Bay-Buzzard Bay	0	20	0								
<u>Core Sound Area</u>											
West Thorofare Bay ⁴	17	3	0				2	6	7	1	
Long Bay-Ditch Bay ⁴	17	3	0				2	6	7	1	
Turnagain Bay ⁴	17	3	0				2	6	7	1	
Cedar Island Bay ⁴	17	3	0				2	6	7	1	
Thorofare Bay-Barry Bay ⁴	17	3	0				2	6	7	1	
Nelson Bay ⁴	17	4	0				2	6	7	1	
Brett Bay ⁴	17	3	0				2	6	7	1	
Jarrett Bay ⁴	17	3	0				2	6	7	1	
<u>North River Area</u>											
North River	1	19	1	1							
Ward Creek	1	19	1	1							
<u>New River Area</u>											
New River (above HWY 172 Bridge) ¹	21	0	0		10	5	2	2(1)	1		
New River (Hine to Lowe Point) ²	1	19	0			1					
Chadwick Bay	2	7	0		2						
<u>Stump Sound (IWW)</u>											
Marker 17 to HWY 50 Bridge (total)	3	17	0		3						
Marker 17 to HWY 50 Bridge (total in parts)	8	12	0			1		1		1	2
Marker 17 to Marker 49 (upper, middle) ³	1	19	0			1					3
Marker 17 to HWY 210 Bridge (upper)	20	0	2	2	9	5	1	1	2		
HWY 210 Bridge to Marker 45 (middle) ¹	13	9	0		3	1		1		1(1)	2(1)
HWY 210 Bridge to Marker 49 (middle)	11	9	0		3	1		1		1	2
Marker 45 to HWY 50 Bridge (lower) ¹	16	5	1	1	7	3		1	1		2(1)
Marker 49 to HWY 50 Bridge (lower)	15	5	1	1	6	3		1		1	2

¹ Closed and reopened within year due to small shrimp and bycatch concerns

² Partial opening of SSNA on 9/3/2004, full opening on 9/14/2004

³ Opened on 9/5/18 for Hurricane Florence

⁴ Opened on 9/12/18 for Hurricane Florence

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Table 2.2.3. Total number of samples collected, total species abundances, species richness, species diversity, and species evenness of Special Secondary Nursery Areas (SSNA) and Primary Nursery Areas (PNA) located in Core (1978-1981) and Roanoke sounds (2006-2019).

	SSNA	PNA
Total Samples	251	250
<u>Abundance</u>		
Total Number of Individuals	31,013	18,410
<u>Species Richness</u>		
Total Species	95	65
Margalef Index	9.09	6.52
<u>Species Diversity</u>		
Shannon Diversity Index (H')	2.83	1.77
<u>Species Evenness</u>		
Shannon's Index (J')	0.62	0.42

Table 2.2.4. Relative abundance (number per sample), standard error (SE), percent standard error (PSE), total number collected (N), number measured, modal length (mm), mean length (mm), size range (mm) for economically important species collected in NCDMF Program 120 in Core (1978-1981) and Roanoke sounds (2006-2019). Bolded relative abundance and mean length values are statistically significant ($p < 0.05$).

Common Name	Relative Abundance	SE	PSE	Number Collected	Sample Size	Number Measured	Mode (mm)	Mean Length (mm)	Size Range (mm)
SSNA									
Brown Shrimp	7.2	1.2	16	1,813	251	1,574	25	66.8	5-138
Pink Shrimp	1.0	0.2	17	245	251	244	35	57.9	15-145
White Shrimp	1.9	0.6	33	470	251	366	24	50.7	15-162
Atlantic Croaker	7.3	1.3	18	1,833	251	1,302	25	60.3	10-265
Southern Flounder	0.4	0.1	26	99	251	99	59	83.8	37-380
Spot	17.0	2.7	16	4,259	251	2,381	55	63.6	12-215
Summer Flounder	0.1	0.0	37	17	251	17	43	91.1	53-197
Weakfish	0.2	0.1	50	50	251	50	45	54.1	25-209
PNA									
Brown Shrimp	4.6	0.6	14	1,152	250	1,150	65	67.3	13-155
Pink Shrimp	0.3	0.1	23	77	250	77	35	56.1	25-168
White Shrimp	0.4	0.1	26	107	250	35	37	53.1	24-99
Atlantic Croaker	6.6	1.0	16	1,639	250	1,379	22	70.3	7-245
Southern Flounder	0.1	0.0	17	35	250	107	75	86.1	29-453
Spot	26.7	3.9	15	6,666	250	3,673	55	69.4	16-200
Summer Flounder	0.1	0.0	35	13	250	13	66	68.8	38-116
Weakfish	0.1	0.0	33	20	250	20	45	89.7	22-188

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Table 2.2.5. Total estuarine shrimp landings and count size (number of shrimp per pound, heads-on), 1994-2019. NUM/DOZ=dozens of shrimp sold as live bait converted to pounds.

Size	Month											
	1		2		3		4		5		6	
	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%
0/15	47,154	19.1	10,449	32.8	12,066	7.7	38,009	6.4	26,575	1.4	101,545	1.3
16/20	102,216	41.5	7,053	22.1	18,122	11.6	50,517	8.5	79,783	4.2	322,792	4.2
21/25	55,956	22.7	6,733	21.1	10,708	6.8	25,072	4.2	106,788	5.7	638,028	8.3
26/30	4,344	1.8	1,380	4.3	8,175	5.2	18,739	3.1	176,800	9.4	1,043,711	13.5
31/35	21,563	8.8	1,152	3.6	4,937	3.2	36,465	6.1	251,733	13.4	961,695	12.5
36/40	4,639	1.9	636	2.0	12,625	8.1	89,913	15.0	345,570	18.4	1,050,185	13.6
41/45	4,954	2.0	514	1.6	19,586	12.5	94,863	15.9	299,495	16.0	839,595	10.9
46/50	1,986	0.8	489	1.5	17,906	11.4	129,512	21.7	327,509	17.4	975,897	12.6
51/55	916	0.4	1,913	6.0	17,891	11.4	25,754	4.3	57,731	3.1	336,663	4.4
56/60	90	0.0	711	2.2	11,585	7.4	21,059	3.5	34,873	1.9	562,452	7.3
60/70	101	0.0	281	0.9	3,773	2.4	2,854	0.5	17,307	0.9	397,094	5.1
70/80		0.0	4	0.0	230	0.1	197	0.0	5,483	0.3	136,455	1.8
80+		0.0		0.0	147	0.1	2,466	0.4	3,623	0.2	45,663	0.6
MIXED	1,962	0.8	475	1.5	18,675	11.9	61,568	10.3	142,888	7.6	304,045	3.9
NUM/DOZ	409	0.2	63	0.2	224	0.1	604	0.1	1,224	0.1	4,051	0.1
Total	246,289	100	31,852	100	156,648	100	597,592	100	1,877,381	100	7,719,869	100
Size < 31/35	231,231	93.9	26,767	84.0	54,008	34.5	168,802	28.2	641,678	34.2	3,067,770	39.7

Size	Month											
	7		8		9		10		11		12	
	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%	lbs.	%
0/15	3,637,516	8.7	8,771,235	24.1	4,999,151	21.7	7,869,400	39.6	4,118,059	48.3	451,226	31.3
16/20	9,708,484	23.2	11,291,889	31.0	4,927,747	21.4	3,634,021	18.3	1,162,558	13.6	360,609	25.0
21/25	11,433,320	27.3	6,191,082	17.0	3,906,628	16.9	2,633,966	13.2	923,615	10.8	308,675	21.4
26/30	8,233,091	19.7	3,216,202	8.8	2,030,047	8.8	974,281	4.9	292,217	3.4	44,749	3.1
31/35	2,700,684	6.4	1,118,548	3.1	1,677,016	7.3	1,486,633	7.5	643,622	7.6	76,541	5.3
36/40	2,444,248	5.8	1,234,049	3.4	1,467,136	6.4	1,174,098	5.9	431,511	5.1	57,786	4.0
41/45	653,750	1.6	642,456	1.8	892,771	3.9	577,994	2.9	244,930	2.9	33,582	2.3
46/50	885,838	2.1	779,181	2.1	730,163	3.2	426,681	2.1	128,316	1.5	20,138	1.4
51/55	183,318	0.4	360,530	1.0	387,263	1.7	138,488	0.7	90,234	1.1	20,223	1.4
56/60	341,249	0.8	519,438	1.4	420,795	1.8	215,100	1.1	106,857	1.3	19,317	1.3
60/70	174,122	0.4	475,245	1.3	467,507	2.0	182,927	0.9	95,971	1.1	15,087	1.0
70/80	49,647	0.1	228,867	0.6	234,544	1.0	56,322	0.3	53,564	0.6	2,891	0.2
80+	41,897	0.1	173,485	0.5	235,186	1.0	38,224	0.2	38,691	0.5	2,236	0.2
MIXED	1,385,882	3.3	1,403,106	3.9	672,985	2.9	475,262	2.4	181,996	2.1	24,372	1.7
NUM/DOZ	3,543	0.0	3,063	0.0	2,534	0.0	5,478	0.0	9,050	0.1	3,096	0.2
Total	41,876,591	100	36,408,376	100	23,051,472	100	19,888,875	100	8,521,190	100	1,440,528	100
Size < 31/35	35,713,095	85.3	30,588,955	84.0	17,540,588	76.1	16,598,302	83.5	7,140,071	83.8	1,241,800	86.2

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Table 2.2.6. Annual crab and peeler trawl landings by region, 2009-2019.

Year	ASMA ¹		Pamlico Sound Region ²		Core/Bogue Sound to New River ³		New River to SC State line ⁴	
	Participants	Trips	Participants	Trips	Participants	Trips	Participants	Trips
2009	4	17	57	430	3	37	0	0
2010	3	11	29	143	25	150	0	0
2011	2	3	20	123	20	143	0	0
2012	3	3	9	17	5	25	0	0
2013	1	2	12	42	9	70	0	0
2014	0	0	23	58	17	165	0	0
2015	1	1	28	109	25	380	0	0
2016	2	2	20	84	23	391	0	0
2017	0	0	19	71	21	297	0	0
2018	1	1	8	10	20	168	0	0
2019	6	27	17	74	19	222	0	0

¹ All the waters north of Pamlico Sound

² Pamlico Sound, Pamlico River, Pungo River, Neuse River, and Bay River

³ Core Sound, Bogue Sound, Newport River, North River, White Oak River, New River, Inland Waterway-Onslow

⁴ Masonboro Sound, Topsail Sound, Cape Fear River, Shallotte River, Lockwood’s Folly River, Stump Sound (IWW), and Brunswick County (IWW)

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Table 2.2.7. Current and potential gill net attendance requirement changes (<5 inch stretched mesh) for each special secondary nursery area under consideration for reclassification by management option.

Management Options	Shallowbag Bay	Kitty Hawk Bay-Buzzard Bay	West Thorofare Bay	Long Bay-Ditch Bay	Turnagain Bay	Cedar Island Bay	Thorofare Bay-Barry Bay	Nelson Bay
Current gill net attendance requirements	Attendance not required	Attendance not required	Attendance within 50 yards of shore from May 1 - November 30	Attendance within 50 yards of shore from May 1 - November 30	Attendance within 200 yards from shore in all waters year round	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30
Options 1 & 2: Remain as SSNAs*	No change	No change	No change	No change	No change	No change	No change	No change
Option 3: Reclassify as SNAs† with gill net attendance	Gill net attendance period in all waters from May 1 - November 30	Gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	No change	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30

Management Options	Brett Bay	Jarrett Bay	North River	Ward Creek	New River (above HWY 172 Bridge)	Chadwick Bay	Intracoastal Waterway (Stump Sound)
Current gill net attendance requirements	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30	Attendance within 50 yards of shore from May 1 - September 30
Options 1 & 2: Remain as SSNAs*	No change	No change	No change	No change	No change	No change	No change
Option 3: Reclassify as SNAs† with gill net attendance	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30	Extends gill net attendance period in all waters from May 1 - November 30

* Special Secondary Nursery Area

† Secondary Nursery Area

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Figures

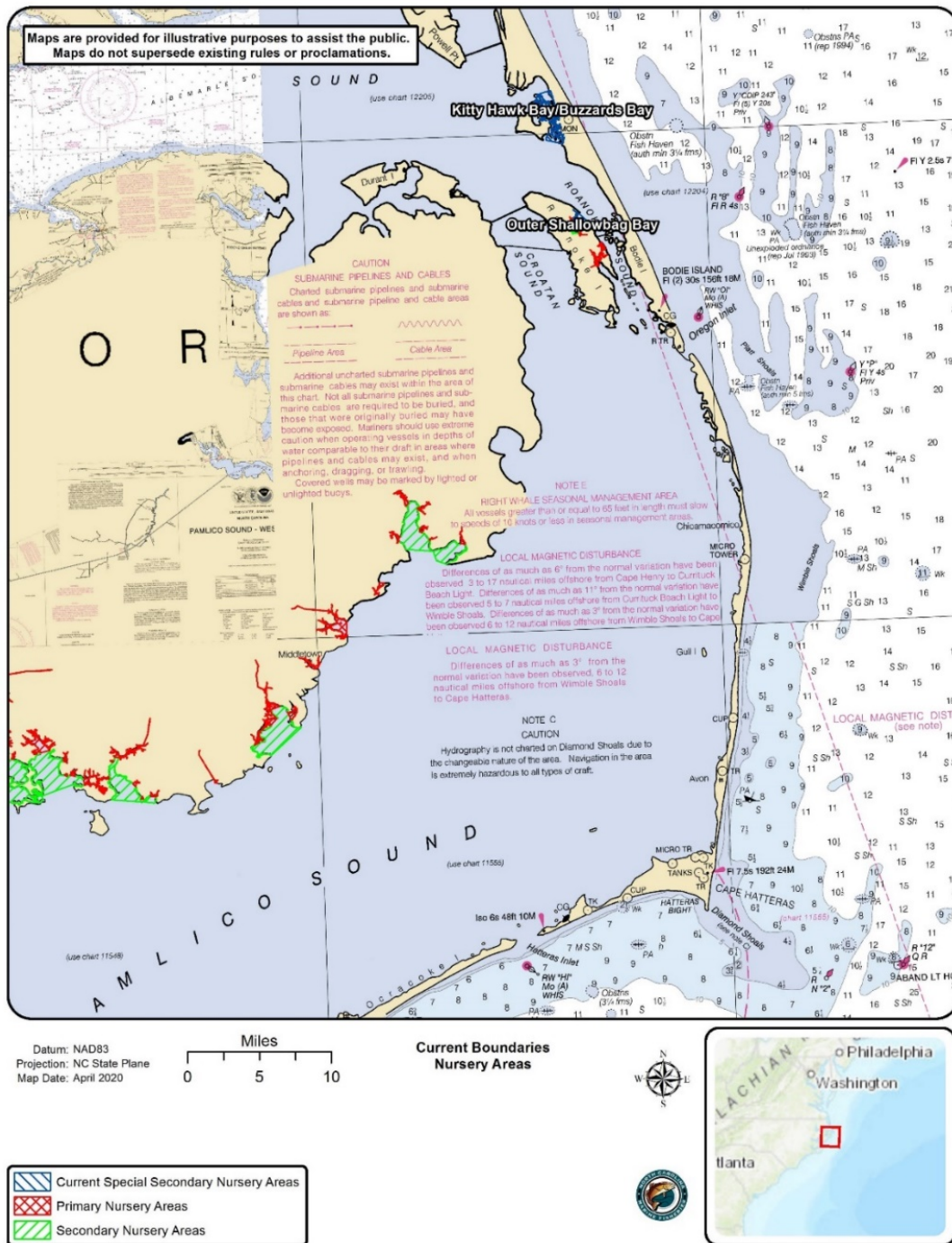


Figure 2.2.1. Map of the shrimp management and nursery areas in the Roanoke Sound that are subject to gill net attendance rules (<5 inch stretched mesh). Gill net attendance will be required in all areas marked as special secondary nursery areas (SSNAs) from May 1 through November 30 if their designation is changed to permanent secondary nursery areas (SNAs). Year-round attendance (<5 inch stretched mesh) is already required in Scranton Creek.

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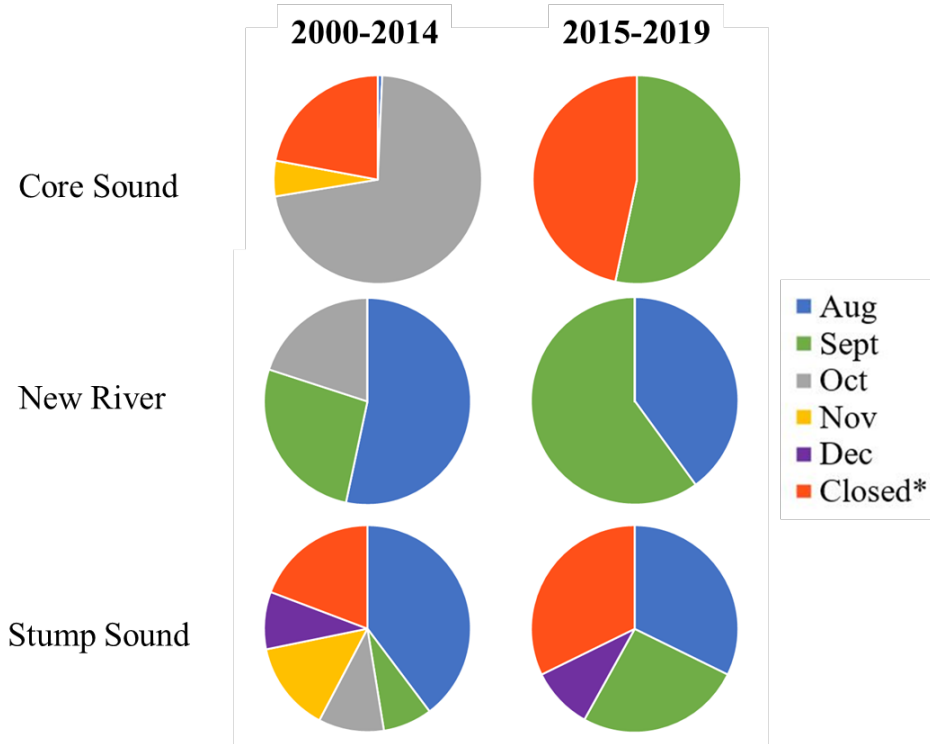


Figure 2.2.4. Special secondary nursery (SSNA) openings (percent of total) in Core Sound, New River, and Stump Sound shown by month and waterbody from 2000-2014 and 2015-2019. *Closures in Stump Sound may be partial closures.

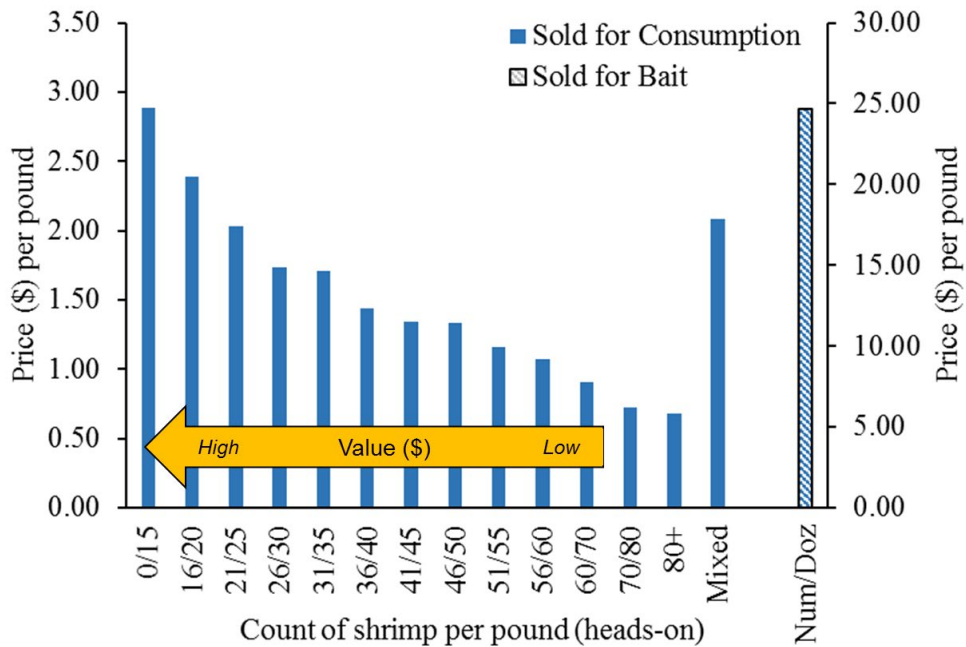


Figure 2.2.5. Value of estuarine shrimp by count size (heads-on), 1994-2019.

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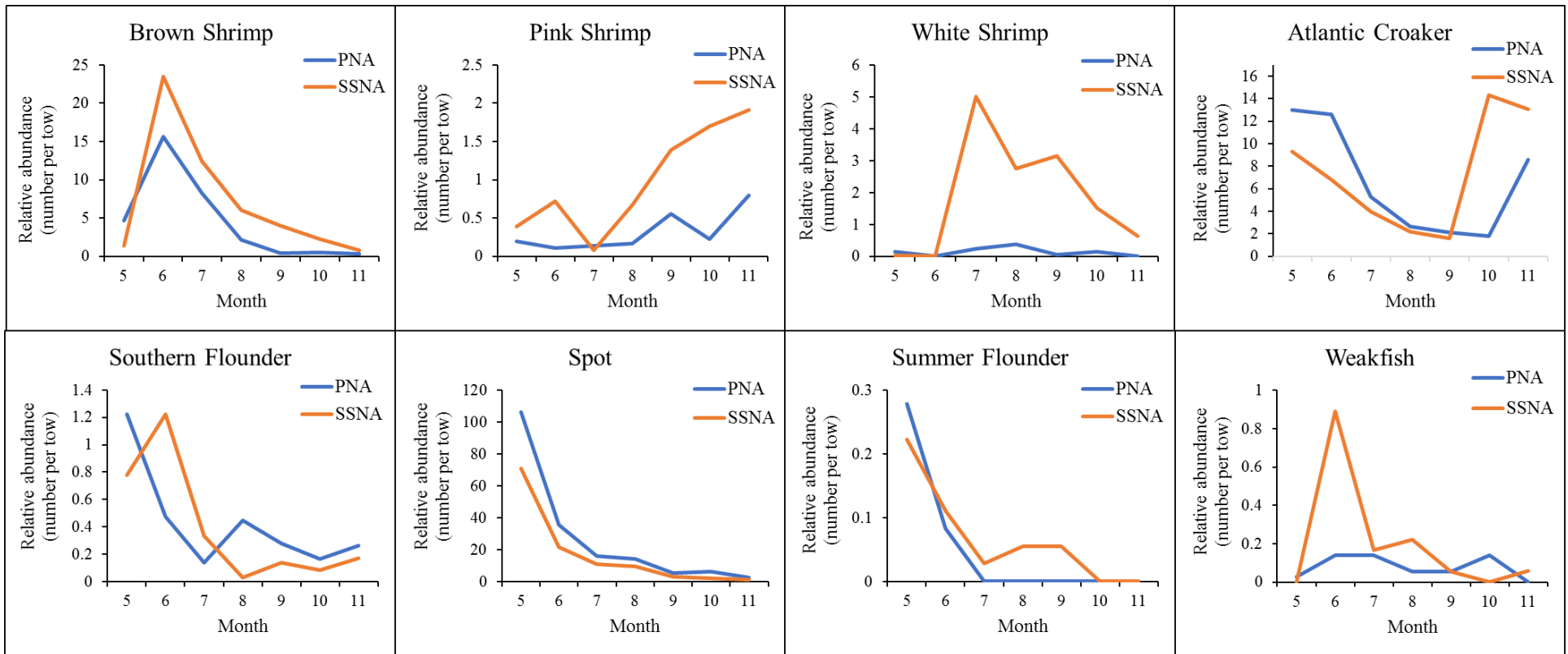


Figure 2.2.6. Relative abundance (number per sample) of target species collected in NCDMF Program 120 in Core (1978-1981) and Roanoke sounds (2006-2019) by nursery type (primary nursery - PNA, special secondary nursery - SSNA).

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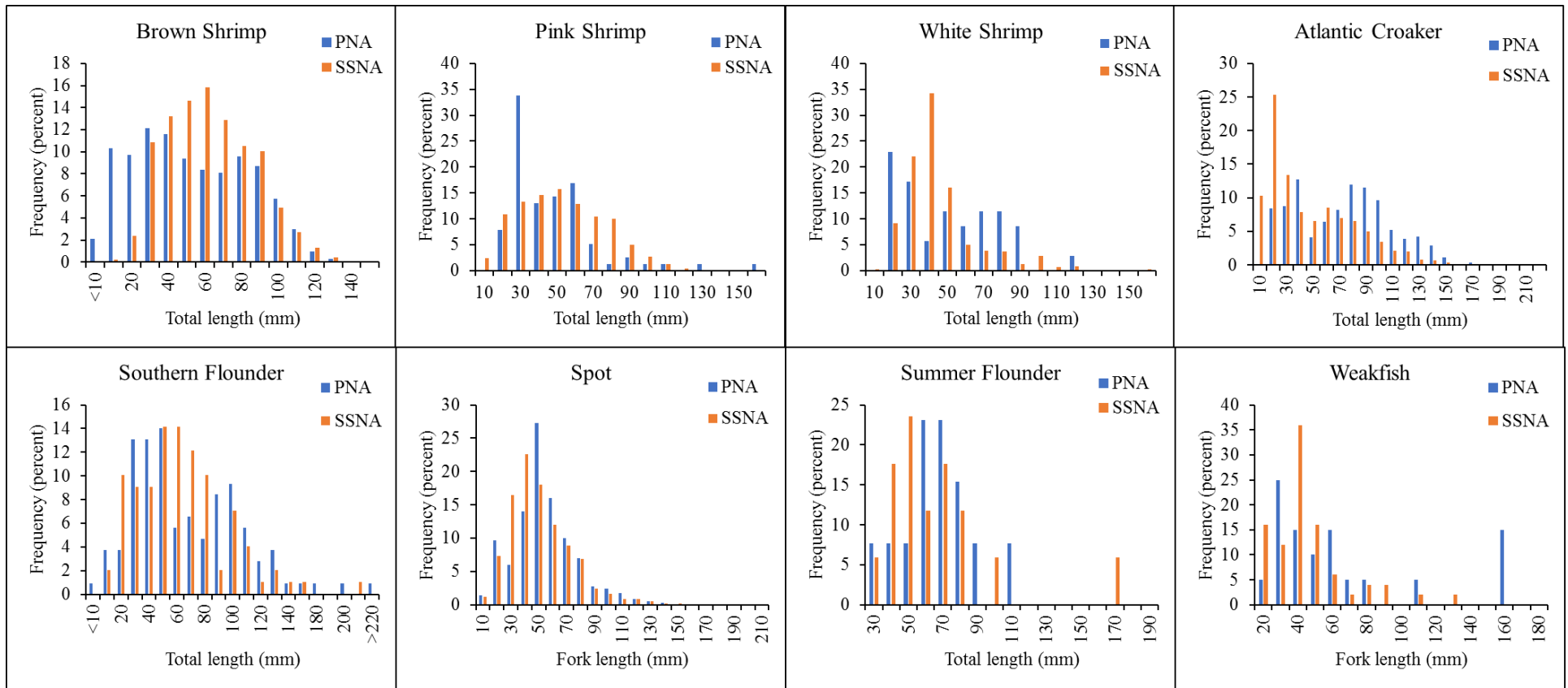


Figure 2.2.7. Expanded length frequency distribution of target species collected in NCDMF Program 120 in Core (1978-1981) and Roanoke sounds (2006-2019).

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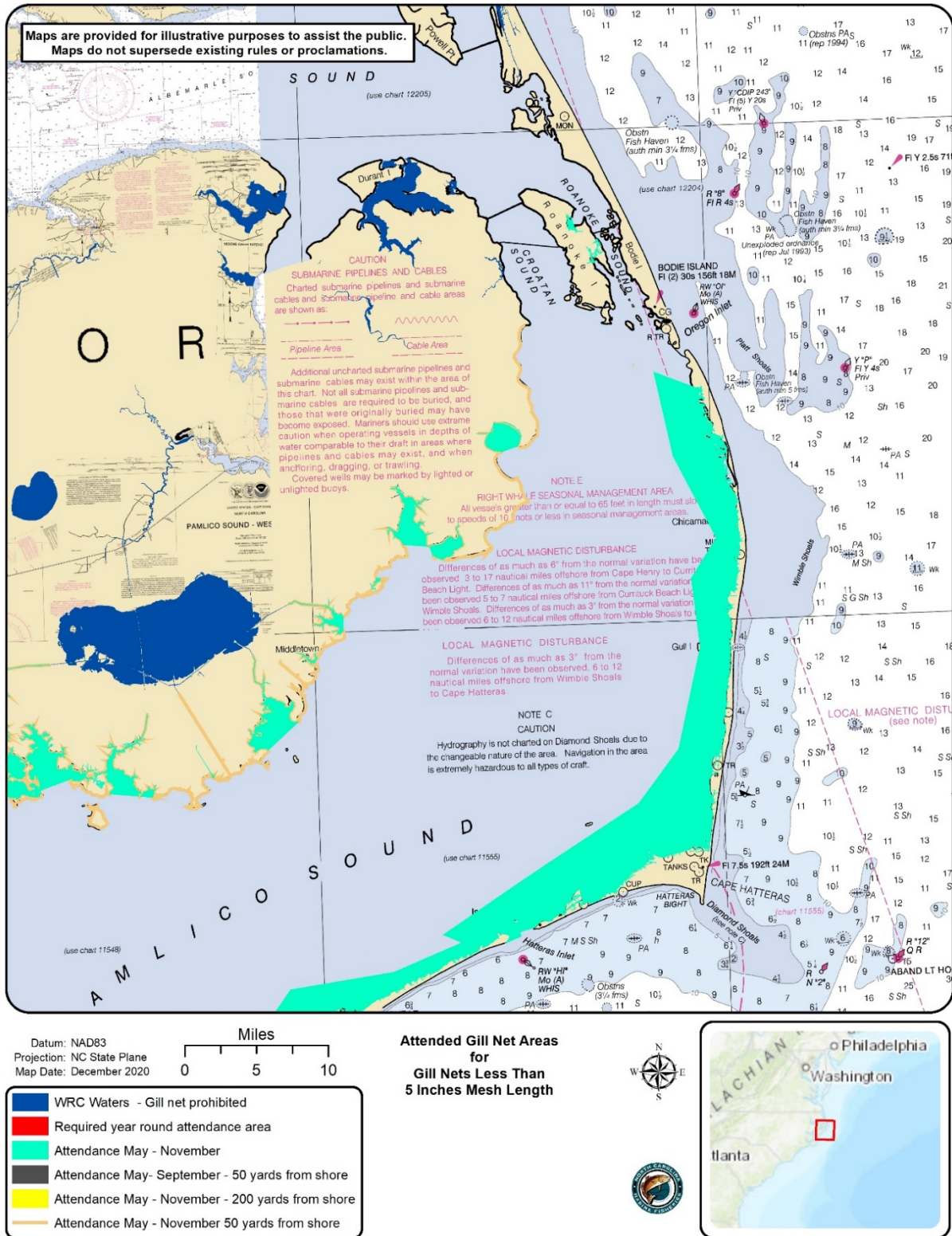


Figure 2.2.8. Map of current gill net attendance (<5 inch stretched mesh) and primary and permanent secondary nursery areas in Shallowbag, Kitty Hawk, and Buzzard bays.

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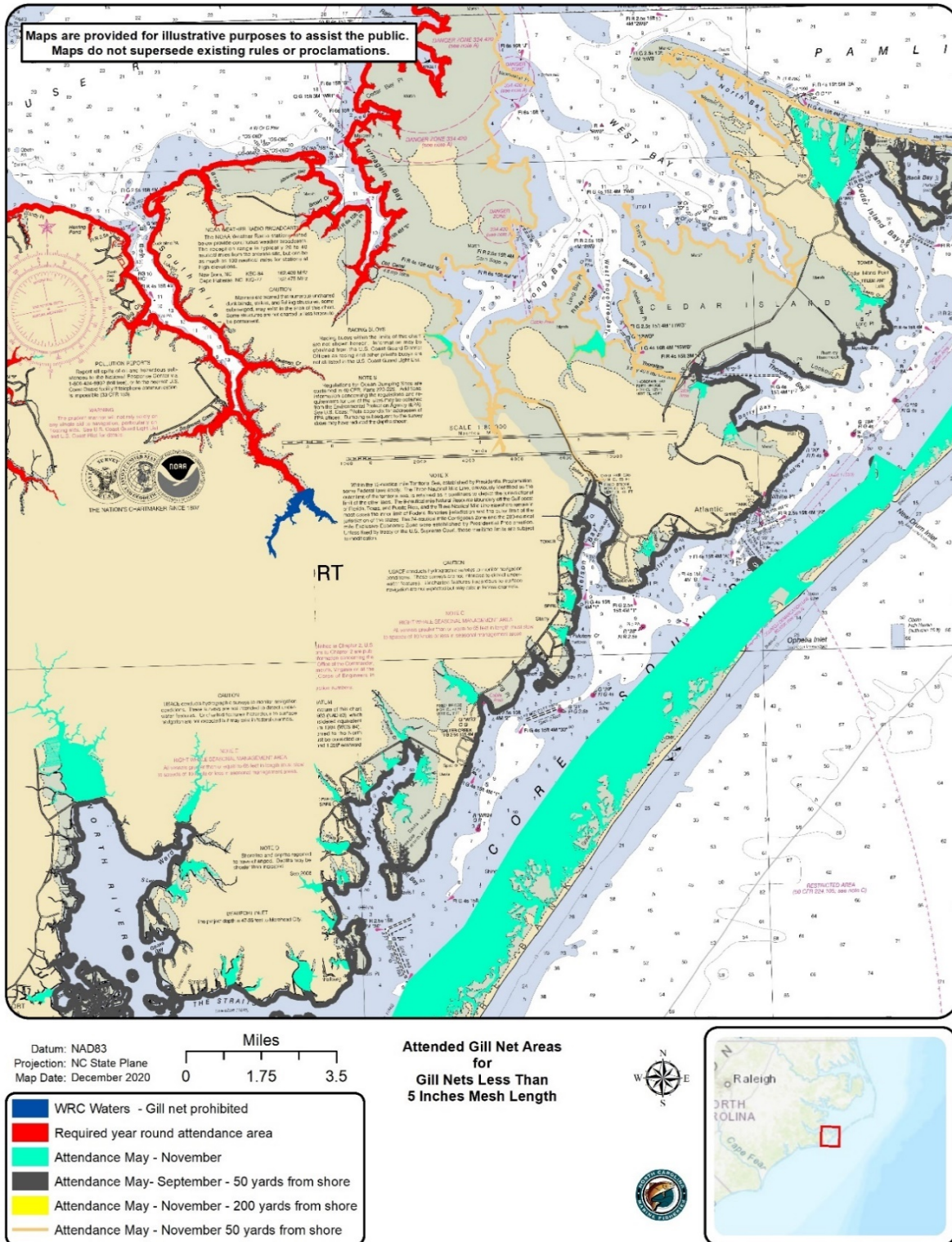


Figure 2.2.9. Map of current gill net attendance (<5 inch stretched mesh) and primary and permanent secondary nursery areas in West Thorofare, Long Bay-Ditch, Turnagain, Cedar Island, Thorofare-Barry, Nelson, Brett, Jarrett bays as well as North River and Ward Creek.

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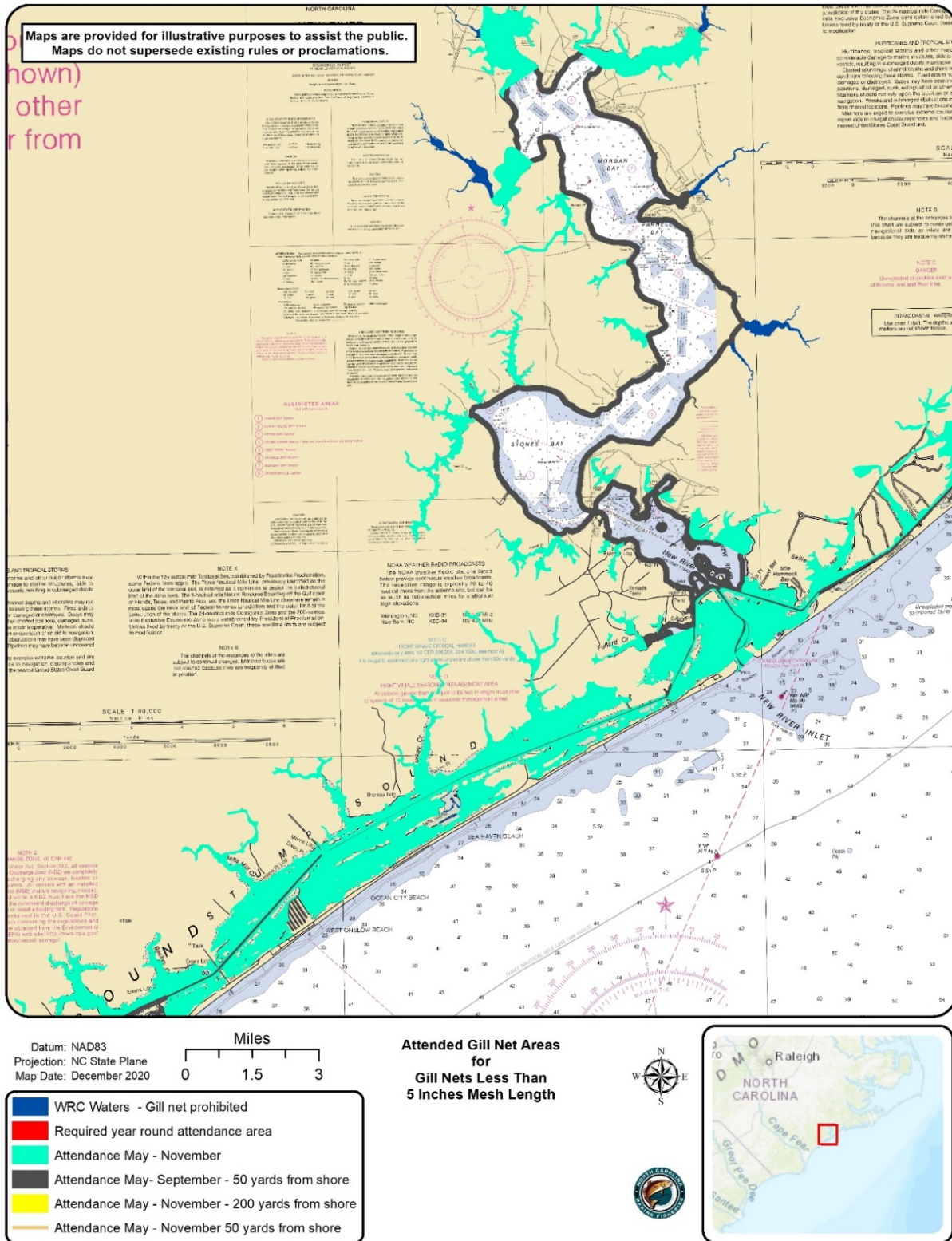
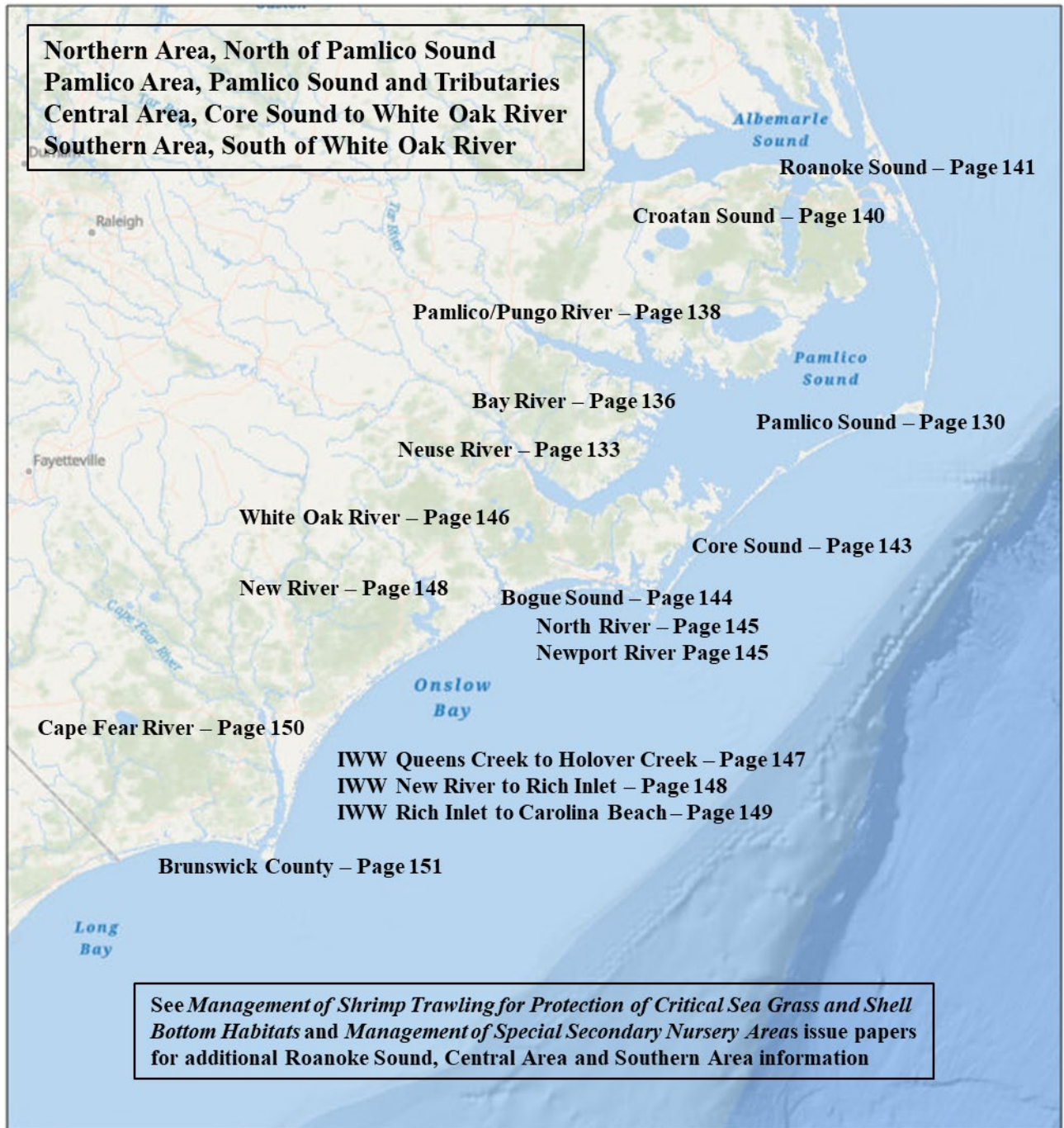


Figure 2.2.10. Map of current gill net attendance (<5 inch stretched mesh) and primary and permanent secondary nursery areas in New River, Chadwick Bay, Stump Sound (IWW).

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APPENDIX 2.3. REDUCING SHRIMP TRAWL BYCATCH THROUGH AREA CLOSURES THAT INCREASE CONNECTIVITY BETWEEN CLOSED AREAS



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I. ISSUE

Implementation of area closures in estuarine waters to increase connectivity between currently closed areas to further reduce shrimp trawl bycatch in North Carolina’s Internal Coastal Waters.

II. ORIGINATION

The North Carolina Division of Marine Fisheries (NCDMF) Shrimp Plan Development Team (PDT).

III. BACKGROUND

The shrimp trawl fishery is one of the most economically valuable commercial fisheries in North Carolina and primarily targets brown (*Farfantepenaeus aztecus*), pink (*Farfantepenaeus duorarum*), and white (*Litopenaeus setiferus*) shrimp using otter trawls, skimmer trawls, channel nets, and other minor gears. From 1994 to 2019, commercial shrimp landings averaged 7,430,164 pounds and are highly variable for year to year (Table 2.3.1). While commercial landings are variable, the number of commercial trips and participants landing shrimp has generally declined since 2004. From 1994 to 2004, an average of 17,955 commercial trips landed shrimp and from 2005 to 2019, an average of 8,201 commercial trips landed shrimp. From 1994 to 2004 the average number of participants in the commercial shrimp fishery was 1,420, and from 2005 to 2019 the average number of participants was 746. From 1994 to 2004 an average of 7,130,582 pounds of shrimp were landed and from 2005 to 2019 an average of 7,649,028 pounds of shrimp were landed. Static, or increased, average shrimp landings during periods of declining commercial shrimp trips and participants suggests increased efficiency of the shrimp fishery and/or increased abundance of shrimp. For further analysis of effort and shrimp trawl fleet characteristics, including trip days, see *Appendix 2.4: Managing Effort and Gear in the North Carolina Shrimp Fishery to Reduce Bycatch*.

The shrimp fishery is characterized as either estuarine (internal waters) or ocean. The estuarine fishery has accounted for 73% of the total commercial catch (Figure 2.3.1), 79% of the total commercial trips (Figure 2.3.2), and 81% of the participants (Figure 2.3.3) from 1994 to 2019 and generally accounts for over 50% of total landings each year. The Pamlico Region (Pamlico Sound, Pamlico/Pungo and Neuse rivers) has contributed over half of landings with minimal contributions coming from other regions from 1994 to 2019 (Figure 2.3.4). Despite minimal landings, the largest percentage of commercial trips landing shrimp occur in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Figure 2.3.4). The largest percentage of participants in the commercial fishery are in the Pamlico and Central regions.

From 1994 to 2019, the fishery has an average annual value of \$16,071,856 with the Pamlico Region accounting for 59% of the value followed by the Atlantic Ocean at 28% (Figure 2.3.4). Since 1994, average annual value is \$46,411 in the Northern Region, \$9,572,987 in the Pamlico Region, \$1,233,769 in the Central Region, \$672,603 in the Southern Region, and \$4,546,084 in the Atlantic Ocean.

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Bycatch in the shrimp trawl fishery is a primary source of controversy due to concerns about the effects on populations of non-target species. For a review of trawl impacts on habitat see *Appendix: 2.1 Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats*. Though the impact of discarding bycatch, or incidentally captured non-target species, on fish populations is not well understood, the amount of dead discards in the shrimp trawl fishery is perceived by many stakeholders to influence the amount of resources available to recreational and other commercial fisheries. Economically valuable finfish species like Atlantic croaker (*Micropogonias undulatus*), southern flounder (*Paralichthys lethostigma*), summer flounder (*P. dentatus*), spot (*Leiostomus xanthurus*), and weakfish (*Cynoscion regalis*) are commonly caught as bycatch in the shrimp trawl fishery (Brown 2010) and are of particular interest in North Carolina because of their popularity and value as target species in recreational and commercial fisheries (NCDMF 2019).

Removals of these species as bycatch in the shrimp trawl fishery has been estimated and used in stock assessments for Atlantic croaker (ASMFC 2017a), spot (ASMFC 2017b), and southern flounder (Flowers et al. 2019). However, speculation persists that bycatch from shrimp trawls may be a strong contributing factor to poor stock status (e.g., weakfish and southern flounder) and perceived low abundance (e.g., Atlantic croaker and spot). Southern flounder is overfished and overfishing is occurring, though the southern flounder stock assessment found discards from shrimp trawls contribute minimally to fishing mortality (Flowers et al. 2019). Weakfish is depleted but the stock assessment found natural mortality accounts for a large portion of total mortality (ASMFC 2019). Subsequent work has found weakfish natural mortality consistently and substantially exceeds fishing mortality and high natural mortality occurs from fall to spring, coinciding with periods of emigration from estuaries and overwintering on the continental shelf (Krause et al. 2020a, 2020b). Stock status for Atlantic croaker and spot is unknown because neither stock assessment was approved for management use (ASMFC 2017a, 2017b). A Traffic Light Analysis (TLA), used to monitor the Atlantic croaker and spot stocks between stock assessments, indicates moderate concern for both species primarily because of coastwide declines in commercial and recreational landings and abundance declines in mid-Atlantic (New Jersey-Virginia) fishery-independent surveys (ASMFC 2020a; 2020b). The Atlantic States Marine Fisheries Commission (ASMFC) Sciaenid Management Board met in March 2021 to approve state implementation plans for Atlantic croaker and spot Addendum III management measures triggered by the TLA (50 fish recreational bag limit, 1% reduction in commercial landings; ASMFC 2020a, 2020b).

Existing management strategies have substantially reduced bycatch in the shrimp trawl fishery since the early 1990s, but shrimp trawls continue to capture sizeable numbers of non-target species (Brown 2010; see *Appendix 2.4: Managing Effort in the North Carolina Shrimp Trawl Fishery to Reduce Bycatch* for review of shrimp trawl bycatch studies). Throughout the entire southeast (North Carolina to Florida), billions of Atlantic croaker (ASMFC 2020a) and millions of spot (ASMFC 2020b) are discarded in the shrimp trawl fishery despite large declines in shrimp trawl effort (net hours fished) and overall bycatch since the early 1990s. Similarity of life history characteristics, size of individuals captured, and habitat use by shrimp and other common estuarine species increases the difficulty of achieving bycatch reductions in shrimp trawl fisheries. In addition, high abundance and pervasiveness of juvenile Atlantic croaker and spot (Table 2.3.2 and 2.3.3; NCDMF 2020a see sections for Atlantic croaker and spot; Paris et al. 2020a, 2020b), among

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other species, in North Carolina estuaries makes their capture as bycatch in shrimp trawls unavoidable in areas where shrimp trawling occurs. Though, use of turtle excluder devices (TEDs) and bycatch reduction devices (BRDs) has reduced bycatch in individual shrimp trawl tows (Brown et al. 2019).

Brown shrimp, pink shrimp, white shrimp, Atlantic croaker, southern flounder, summer flounder and spot spawn in the ocean during the fall and winter (Table 2.3.4). After hatching, larvae enter estuaries and settle into the upper portions of rivers, creeks, and bays. Weakfish spawn in estuaries and nearshore ocean habitats over an extended period from March through September and upon hatching, larvae disperse throughout the estuary. These species grow rapidly, moving out of shallow nearshore habitats into deeper open water habitats of lower estuaries as they grow.

This movement is evident when examining abundance and length-frequency data from the NCDMF Estuarine Trawl Survey (Program 120) and the Pamlico Sound Trawl Survey (Program 195; NCDMF 2020b, 2020c). Program 120 is conducted in nearshore creeks and bays during May and June while Program 195 occurs in Pamlico Sound and its major tributaries during June and September. For most species, abundance between the two surveys is positively correlated and length-frequency distributions show larger individuals are captured in Pamlico Sound than in adjacent smaller tributaries, suggesting movement.

While some species, like Atlantic croaker and spot are ubiquitous and can be found in diverse habitats, others like summer flounder and weakfish use a narrower range of habitat and are found primarily in higher salinity, deeper water areas (Paris et al. 2020a, 2020b). Just as shrimp become available to harvest by trawls as they grow and move from protected to open areas, non-target finfish species may become bycatch as they too grow and move.

Area restrictions are an effective management measure to meet sustainability objectives, reduce bycatch and protect vulnerable habitat (Fujioka 2006; O’Keefe et al. 2014; McConnaughey et al. 2019; Hilborn et al. 2020). In North Carolina, area restrictions have been implemented in coastal estuarine waters to protect important habitats, reduce bycatch, or reduce user group conflicts (Table 2.3.5; Appendix 3, Maps 3.1-3.12). For example, 161,831 acres of North Carolina’s estuarine waters have been designated as Primary Nursery Area (PNA) or Secondary Nursery Area (SNA), primarily in the upper portions of estuarine rivers, creeks, and bays. Since the use of trawl nets is prohibited in nursery areas, these designations provide protection for juvenile shrimp and finfish during the early part of their life. Other areas where shrimp trawls are prohibited provide similar protections to bycatch species or important habitats.

IV. AUTHORITY

North Carolina General Statutes

§ 113-134 RULES

§ 113-173 RECREATIONAL COMMERCIAL GEAR LICENSE

§ 113-182 REGULATION OF FISHING AND FISHERIES

§ 113-182.1 FISHERY MANAGEMENT PLANS

§ 113-221.1 PROCLAMATIONS; EMERGENCY REVIEW

§ 143B-289.52 MARINE FISHERIES COMMISSION – POWERS AND DUTIES

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North Carolina Marine Fisheries Commission Rules

15A NCAC 03H .0103 Proclamations, General

15A NCAC 03J .0104 Trawl Nets

15A NCAC 03L .0101 Shrimp Harvest Restrictions

15A NCAC 03L .0103 Prohibited Nets, Mesh Lengths and Areas

V. DISCUSSION

- Section discusses estuarine areas where shrimp trawling occurs, characteristics of those areas and current shrimp trawl closures
- Management options are a starting point for discussion and are not recommendations
- Options are meant to illustrate concepts to increase connectivity between currently closed areas with the goal of reducing bycatch
- Options from adjacent areas must be considered in conjunction to accomplish increased connectivity
- The focus of this paper is area closures in Pamlico Sound and adjacent water bodies
- *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitat* and *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* should be referenced for area closure options from Core Sound and south
- Amount of bycatch reduction from area closures is non-quantifiable (see *Appendix 1: Shrimp Trawl Bycatch Assessment*)
- Current and potential closures in the Atlantic Ocean are not discussed or considered

The acreage of area permanently or seasonally closed to trawling in North Carolina is extensive (approximately 1,216,163 acres; Table 2.3.5). Current closures represent a patchwork that in conjunction with other management measures (i.e., gear modifications, TEDs, BRDs), are likely effective in reducing bycatch at a local level. However, because shrimp and fish move throughout their life cycle and distributions in abundance change seasonally, daily, or even hourly, localized, fragmented area closures alone may be ineffective at reducing total bycatch (see *Appendix 2.4: Managing Effort and Gear Modifications in the North Carolina Shrimp Fishery to Reduce Bycatch* for further discussion of area and bycatch). If the goal of implementing additional area restrictions is to reduce bycatch, the objective should be increasing connectivity between currently closed areas to better encompass the life cycle and distribution of common bycatch species.

Seasonal Closures

Time and area closures are an effective management tool for achieving sustainability goals and reducing bycatch (O’Keefe et al. 2014; Hoos et al. 2019; Hilborn et al. 2020) and have been implemented in the North Carolina shrimp trawl fishery to reduce bycatch, delay harvest of shrimp (see *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* issue paper), and reduce conflict between fishing sectors. For example, Special Secondary Nursery Areas (SSNA) can only be opened to shrimp trawling by proclamation from August 16 to May 14 and timing of openings corresponds to periods when shrimp are larger and the abundance of bycatch species is reduced. Seasonal area closures may be effective in reducing bycatch, while continuing to allow access to the shrimp resource and could be considered as a component of any area closure considered for implementation.

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Under existing regulations in Pamlico Sound shrimp trawlers can choose when to fish except in areas with existing restrictions (i.e., PNAs, SNAs, shrimp trawl net prohibited areas, etc.). An option that has been suggested is to open the sound when shrimp count (number of shrimp per pound heads-on) reaches a desired size, similar to how SSNAs are managed (see *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas*) which could delay shrimp harvest and reduce bycatch. However, because of variable openings this strategy may not delay shrimp harvest or reduce bycatch. For example, analysis of Trip Ticket data indicates that a 60-count opening target size for Pamlico Sound (as proposed in a 2016 petition for rulemaking) may not provide a predictable outcome in delaying the opening of shrimp season (NCDEQ 2019). Shrimp landings (by count size) in Pamlico Sound indicate that the shrimping season may not close if a 60-count opening target size is established and shrimp species is not accounted for. Roughly 90% or greater of all shrimp (brown, white, pink) harvested in Pamlico Sound are 60 count or lower (larger shrimp have lower count sizes). A minimal delay in the opening date would occur if a 60-count opening target size were to include species-specific openings. By May, 52% of all brown shrimp landed in Pamlico Sound from 1994 to 2015 were 56/60 count or lower, and by June, 95 percent were 56/60 count or lower. The same count size of white shrimp landed ranged from a low of 87% in June to a high of 100% in January. By April, 95% of the pink shrimp landed from Pamlico Sound were 56/60 count or lower.

Enacting a closure until shrimp count size reaches 60 shrimp per pound in Pamlico Sound could also result in “grand openings,” where many vessels operate in an area following a closure. Reductions in bycatch may be negated by recoupage from the increased effort once an area is opened. Previous fishing seasons observed by NCDMF have shown that delayed openings in SSNAs, like those in New River and Stump Sound, have resulted in many vessels in a small area trying to recoup harvest and effort once the areas are opened. Additionally, early season openings could occur if environmental conditions are favorable; thus, count sizes may not be an effective means of reducing bycatch. Setting a static season, with set opening and closing dates may be a more appropriate strategy to achieve bycatch reductions.

Gear Exemptions

Allowing continued use of gears with less bycatch concern could be considered for any areas closed to shrimp trawling (see NCDMF 2015 for review of gear types including, characteristics, limitations, and bycatch concerns). For example, since 2010 it has been unlawful to use trawl nets, except skimmer trawls, upstream of the Highway 172 Bridge in New River (NCDMF 2006; Rule 15A NCAC 03J .0208). The benefits of skimmer trawls include reduction of finfish bycatch, less bottom disturbance, less fuel consumption, more effective fishing time, and less culling time (Coale et al. 1994; Ruderhausen and Weeks 1999; Scott-Denton et al. 2006). In addition, skimmer trawl tailbags can be hauled back more frequently allowing for increased survival of bycatch. However, skimmer trawls are less effective for brown or pink shrimp (Coale et al. 1994) and can only be used over bottom that is free from obstructions and perform best in shallow water. If additional areas are closed to shrimp trawling, use of other gear types whose use has less bycatch concerns, like skimmer trawls, could be allowed to continue harvesting shrimp.

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Fishery Impacts

Any additional shrimp trawl area closures would reduce access to the shrimp resource by the commercial and recreational sectors resulting in economic impacts to the shrimp fishery and those operating and working on shrimp trawlers. Reduced effort resulting from area closures will likely reduce the efficiency of the shrimp trawl fishery and consequently reduce the amount of shrimp harvested and likewise profitability of each trip. This may also lead to reduced employment in the shrimp trawl fishery as operators have to deal with tighter profit margins. However, there is also the possibility for economic gains in other portions of the shrimp fishery as well as other fisheries. Additional opportunities for recreational and commercial fishermen using non-trawl gears may lead to some economic gains for commercial fishermen using these gears and recreational fishery suppliers as fishermen purchase additional gear. Another potential benefit of reduced shrimp trawl effort in closed areas may be improved habitat and reduced bycatch mortality (hence increased survival) of bycatch and other species and thus have more available for harvest as recruits grow into other fisheries (both commercially and recreationally). Additionally, improved habitat may improve other economic niches like eco-tourism. Although, these types of economic benefits are more abstract, uncertain, and dependent on other external factors.

Closures in nearshore waters or smaller waterbodies would be particularly detrimental to smaller commercial boats and the recreational sector. Though brown shrimp and white shrimp can be caught throughout the summer, brown shrimp are generally available to the fishery earlier and the white shrimp fishery primarily occurs in the late summer and fall (NCDMF 2015). As the brown shrimp fishery has declined in some areas of the state, brown shrimp landings in others, like Pamlico Sound and Neuse River, have remained consistent or increased allowing the fishery to meet market demands for shrimp throughout the summer. Many areas that might be considered for closure are important to the early season brown shrimp fishery and may disproportionately impact participants in this fishery.

If additional area closures occur in locations with high shrimp abundance, shrimp trawling efficiency may be affected, leading to increased effort and higher bycatch. For example, nearshore creeks and bays can act as a bottleneck, concentrating shrimp as they move out of these areas making them easier to capture in high volumes with less effort. Closing these areas creates additional area for shrimp to disperse and spread out into larger waterbodies. Increased dispersal may make shrimp more difficult to capture which could increase effort in open areas and consequently increase bycatch. If additional areas are closed, shrimp trawl effort may shift to open areas where bycatch would still occur. Concentrating effort in small areas could lead to localized depletion of shrimp and bycatch species and may have negative impacts to habitat (see *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom*). In addition, if remaining open areas are unproductive for shrimp, the shrimp trawling industry would experience additional negative impacts.

Quantifying Benefits

The expected amount of bycatch reduction from any additional area closures is unquantifiable and the population level benefits to species like Atlantic croaker, spot, southern flounder, summer flounder, and weakfish are impossible to predict due to confounding factors like natural mortality

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and offshore migration. The objective of additional area closures would be to create connectivity between closed areas to better encompass the life cycle of common bycatch species more completely because once they enter open estuarine waters or the ocean they become less susceptible to shrimp trawls because of the increased area for dispersal.

Measuring the success of area closures implemented to reduce bycatch is difficult. At the population level, the method for gauging success is a stock assessment. Atlantic croaker, spot, southern flounder, summer flounder and weakfish are interjurisdictional stocks managed and assessed by regional commissions and councils. For example, Atlantic croaker is managed and assessed as a single population from the Atlantic coast of Florida through New Jersey (ASMFC 2011). Atlantic croaker spawn in the ocean, larvae are transported inshore, and juveniles settle in coastal nurseries. Upon emigrating from North Carolina waters, Atlantic croaker contribute to the coastwide stock. The objective of reducing bycatch of juvenile Atlantic croaker in North Carolina waters would be to increase the coastwide population. However, population level benefits may not be realized if significant mortality (fishing or natural) occurs elsewhere along the coast or at different life stages (e.g., larval or adult). If bycatch is reduced through shrimp trawl area closures in North Carolina waters and stock assessments do not indicate increases in population size, that does not mean management measures have failed, rather it suggests these are dynamic stocks whose population is influenced by complex natural and anthropogenic factors. In contrast, if stock assessments indicate increases in population size it would be difficult to credit management measures in North Carolina because of the other influences on these stocks. For management measures in North Carolina waters to significantly increase the coastwide population of any of these species, juveniles residing in North Carolina would need to contribute a significantly larger portion to the stock than other areas. Data needed to evaluate the contribution of North Carolina waters to coastwide stocks does not exist and would be difficult to obtain.

One method that could be used to gauge success of management measures is fishery independent surveys. The Pamlico Sound Survey (Program 195; NCDMF 2020b) and the Independent Gill Net Survey (P915; NCDMF 2020d, 2020e) provide indices of relative abundance for important commercial recreational finfish species including Atlantic croaker, spot, southern flounder, and weakfish. While the Pamlico Sound Survey primarily samples juveniles, the survey provides an annual index of abundance for age-1 and older spot (ASMFC 2020b). The independent gill net survey provides indices of adult abundance that are evaluated annually for many North Carolina species (NCDMF 2020a). Evaluating long term trends in adult abundance, length frequency, and age structure from these surveys is the most direct and immediate method for inferring success of any area closures.

Fishery independent surveys are not equivalent to stock assessments and increasing or decreasing trends in abundance cannot be extrapolated to the population level for interjurisdictional species. Fishery independent surveys do provide invaluable information about species abundance in North Carolina waters and what might be available to recreational and commercial fisheries. Increasing abundance and expanding age structure of adult fish could indicate management measures to reduce bycatch are successful in allowing increased survival of juvenile fish to older ages making them available to fisheries in North Carolina waters. However, decreasing, or neutral trends in abundance are not necessarily indicative of a failure to reduce bycatch. As noted, these species have complex life cycles with many confounding factors influencing recruitment and abundance.

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Since all of these species spend at least part of their life in the Atlantic Ocean, inshore fishery independent surveys may not detect increases in abundance and the expected benefits of reducing bycatch to North Carolina inshore fisheries may never be realized.

Area Closure Examples

Bycatch in the North Carolina shrimp trawl fishery has been reduced but still occurs at a high level. However, the degree to which shrimp trawl bycatch impacts fish stocks at the population level is either unknown or thought to be minimal. Given inconclusive information about the adverse effects of shrimp trawl bycatch on fish populations, a balanced approach to area closures considering areas where shrimp trawling occurs, distribution and life history of common bycatch species and economic impact should be considered. Similar approaches have been proposed for habitat protection. Fujioka (2006) recommended a balanced approach to area closures and suggested closing large amounts or lightly fished areas and small amounts of heavily fished areas to protect habitat and maintain catch. While this specific example may not effectively reduce bycatch, similar balanced approaches may work.

The following issue paper sections discuss estuarine areas where shrimp trawling occurs, characteristics of those areas, and existing closed areas. The management options presented in this paper are a starting point for discussion of shrimp trawl area closures to limit or reduce bycatch. The options illustrate concepts for area closures that could be implemented **to increase connectivity between closed areas with the goal of reducing overall bycatch**. Public input could provide additional options.

Because of the disparity in shrimp landings and fishing effort between estuarine waters and the ocean (Figures 2.3.1; 2.3.2; 2.3.3), available data and the ecological concepts being considered, the focus of this issue paper is estuarine waters. North Carolina's coastline on the Atlantic Ocean is comprised of barrier islands that stretch approximately 300 miles. Shoals extending perpendicular from shore accompany capes and inlets along the coastal ocean. Nearshore hard bottom areas, dense concentrations of marine algae, artificial reefs and shipwrecks limit the amount of trawlable bottom available. Of North Carolina's 726,007 acres of Atlantic Ocean waters 138,561 acres are closed to shrimp trawling, 4,752 acres are managed, and 582,694 acres are open. In the Atlantic Ocean off Brunswick County, it is unlawful to use shrimp trawls from 9:00 pm to 5:00 am each day, because studies have shown bycatch in this area is higher at night than during the day (Ingraham 2003).

The division does not conduct any fishery independent sampling in the Atlantic Ocean that could be used to determine the distribution of fish and inform management options. The South Carolina Department of Natural Resources conducts the SEAMAP-SA Coastal Survey which occurs in the coastal zone of the South Atlantic Bight from Cape Hatteras, North Carolina to Cape Canaveral Florida. The Virginia Institute of Marine Science conducts the NEAMAP Mid Atlantic survey which occurs from Cape Cod Massachusetts to Cape Hatteras North Carolina. The distribution of sampling effort in the coastal ocean surveys may not be sufficient to adequately represent species distribution at a scale fine enough to inform area closures in North Carolina coastal waters. In addition, because North Carolina only has jurisdiction within three miles of shore, which

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represents a small portion of most species Atlantic Ocean range, any closures are likely to be minimally effective in reducing bycatch.

Pamlico Area (Pamlico Sound, Neuse River, Bay River, Pamlico/Pungo River)

PAMLICO SOUND

The sound is divided into two basins east and west of Bluff Shoal. Most feeder creeks and bays are classified as PNA, SNA, SSNA, or no trawl areas. Along the Hyde County shoreline all bays and tributaries are closed to trawling except for West Bluff Bay, East Bluff Bay, Parched Corn Bay, and Sandy Bay (Appendix 3, Maps 3.1-3.3). There are no other area restrictions related to shrimp trawling along the Hyde County shoreline of Pamlico Sound.

Along the eastern side of Pamlico Sound, no trawling is allowed in an area described in rule 15A NCAC 03R .0106 (1) to protect sea grass beds (Appendix 3, Maps 3.1-3.3), though the Fisheries Director may, by proclamation, open this area to peeler crab trawling (Rule 15A NCAC 03J .0104 (4)). In crab spawning sanctuaries designated at Oregon, Hatteras, Ocracoke, and Drum inlets, it is unlawful to use trawls from March 1 to August 31. Trawling is also prohibited in three Military Danger Zone and Restricted areas located southeast of the mouth of Long Shoal River, east of the mouth of Bay River, and near Piney Island including Point of Marsh and Newstump Point. Along the southern shore, parts of West Bay can be opened to trawling by proclamation.

Since 1994, the Pamlico Sound has accounted for 56% of total commercial shrimp landings in North Carolina and within the Pamlico Region (Pamlico Sound, Bay River, Pamlico/Pungo River), the sound has accounted for 96.1% of shrimp landings (Table 2.3.6), 81.6% of the trips and 73.9% of the participants from 1994 to 2019 (Table 2.3.7). Within the Pamlico Region, the Pamlico Sound has accounted for 96.5% of the value (Figure 2.3.5). Shrimp landings and trips have fluctuated since 1994 and after declining from 1994 to 2005, have generally increased or remained consistent. Shrimp landings from 2015 to 2018 were amongst the highest recorded and landings in 2017 were the highest in the time series. High landings during these years occurred without substantial increases in trips. Historically, brown shrimp have been the primary species caught in the Pamlico Sound with lesser numbers of white and pink shrimp landed. However, since 2011 white shrimp landings have increased and in 2017 white shrimp comprised most of the landings.

Management Considerations for Pamlico Sound

The Pamlico Sound is an important habitat for many fish species and is used extensively as juvenile habitat for estuarine dependent species like Atlantic croaker, spot, southern flounder, summer flounder and weakfish. Atlantic croaker and spot are amongst the most abundant finfish species and are generally ubiquitous throughout the sound (Table 2.3.3; Paris et al. 2020a, 2020b). While trawl closures are designated in most bays and tributaries of the sound and along the eastern shore, most of the sound is open to trawling. Because of the extent to which some species use the sound, additional isolated closures would be unlikely to substantially reduce bycatch. Any additional area closures should aspire to create linkages between habitats currently closed to trawling. Achieving this objective would create a network of areas where juvenile fish and crustaceans could move between nursery areas, open sound habitats, and adult habitat in the ocean. While most of the sound

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has soft, muddy, or sandy bottom that is more resilient to damage from shrimp trawls (see *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* for review of trawl impacts on habitat), additional closures could help minimize bottom disturbance and decrease periods of turbidity further aiding survival and growth of estuarine dependent species.

Closing the entire Pamlico Sound to shrimp trawling would be a severe management measure, essentially eliminating half of the multi-million-dollar shrimp fishing industry in North Carolina. While a complete closure would reduce bycatch, the goal and benefits would be uncertain given current abundance, stock status, and life history characteristics of most species of concern (i.e., Atlantic croaker, spot, weakfish). More refined area closures implemented with the objective of linking areas already closed to trawling may be effective in reducing bycatch without severe impacts to the shrimp fishing industry that would occur with a complete closure.

Despite high abundance and non-specific habitat use by some estuarine dependent species, shrimp and juvenile fish are not uniformly distributed throughout the sound. Some areas exhibit consistently higher abundance and are termed clusters or “hot spots”. Identification of abundance hot spots in Pamlico Sound, in combination with life history information can inform designations of more refined area closures that could achieve bycatch reductions.

The Pamlico Sound Trawl Survey (Program 195) is conducted by NCDMF in Pamlico Sound and its tributaries during June and September and has run continuously since 1987. The primary objective of Program 195 is to produce fishery independent indices of abundance for important recreational and commercial fish species. The survey uses a stratified random design with strata designated by geographic location and water depth. Stations (one minute by one-minute grid system equivalent to one square nautical mile) are randomly selected, with 54 stations sampled in June and 54 stations sampled in September (108 total annually; see NCDMF 2019b; Paris et al. 2020a, 2020b for detailed survey methodology).

To identify hot spots, abundance at survey sites falling within a predetermined distance are compared to each other. When abundance is high at a site, and the site is surrounded by other sites with high abundance they are labeled high-high clusters, indicating that area is likely a hot spot for a species. Sites with low abundance that are surrounded by other low abundance sites are labeled low-low clusters, indicating the area is likely not a hot spot for a species. Sites with low abundance surrounded by sites with high abundance are labeled low-high clusters indicating that the overall area may be a hot spot, but the individual site had lower catch abundance compared to the surrounding sites. Sites with high abundance surrounded by sites with low abundance are labeled high-low clusters indicating that while the overall area may not be a hot spot, the individual site had higher catch abundance compared to the surrounding sites. See *Appendix 2.3.A: Hot Spot Analysis* for further description of hot spot analysis methodology.

Hot spots of abundance in Pamlico Sound during June and September were identified for Atlantic croaker, spot, weakfish, southern flounder, summer flounder, brown shrimp, white shrimp, and pink shrimp (Figures 2.3.6-2.3.13; Appendix 2.3.B, Maps 2.3.B.1-2.3.B.16); for aggregate finfish (Atlantic croaker, spot, southern flounder, summer flounder, and weakfish; Figure 2.3.14); and shrimp (white shrimp, brown shrimp, and pink shrimp; Figure 2.3.15).

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Distribution of hot spots varies by species and season. Atlantic croaker hot spots are distributed throughout the sound but are clustered closer to the Hyde County shoreline in September compared to June (Figure 2.3.6). Spot hot spots show a distinct seasonal shift from the center of the sound in June to near the mouth of the Pamlico and Neuse rivers in September (Figure 2.3.7). Southern flounder hot spots are distributed throughout the western Pamlico Sound with hot spots in June clustered near the mouth of the Neuse River and hot spots in September clustered near the mouth of the Pamlico River (Figure 2.3.8). Summer flounder hot spots are concentrated in the northern Pamlico Sound and Croatan Sound in June and September (Figure 2.3.9). Weakfish hot spots are concentrated in the center of Pamlico Sound and are more widespread in June compared to September (Figure 2.3.10).

White shrimp hot spots are more prevalent in September than in June and are concentrated in the center of the sound in June and closer to shore in September (Figure 2.3.11). Brown shrimp hot spots are located close to shore in June and more toward the center of the sound in September (Figure 2.3.12). Pink shrimp hot spots are more prevalent in September than June and are concentrated in the center of the sound (Figure 2.3.13).

Because of the disparity in hot spot distribution between species and seasons (Figures 2.3.14-2.3.15), no single area closure encompasses the range of all species, except for a complete closure. However, because of patterns in hot spot distribution and known life history characteristics, certain area closure configurations could be implemented to create linkages between closed areas, encompass hot spots, and allow for movement of fish species, while continuing to allow access to shrimp. Creating an area closure linking the bays and tributaries with other closed areas and coastal inlets may be an effective measure to reduce bycatch.

Most common bycatch species (i.e., Atlantic croaker, spot) use nursery areas located in estuarine bays and creeks before moving into the open sound and eventually through coastal inlets into the ocean. Creating a no shrimp trawling buffer area along the northern/western shore of Pamlico Sound would create a link between nursery areas and coastal inlets, with larger area closures encompassing the distribution of more species and creating greater linkages (Figure 2.3.16; Table 2.3.8). Essentially, this strategy provides greater area for fish and shrimp to disperse as they leave nursery areas along the northern/western shore of Pamlico Sound which lessens the likelihood of being caught in shrimp trawls. In addition, this type of closure protects habitats near the mouths of the Neuse, Bay and Pamlico river and in Croatan and Roanoke sounds.

Because distribution of fish and shrimp shifts seasonally this option could be implemented seasonally, or a seasonal extension could be added to incorporate additional important habitats (Figure 2.3.17). Early season closures may not effectively reduce bycatch because shrimp and fish have not started to move from nursery areas, and shrimp trawl effort is low. Later season area closures, like August 1 through November 30, may be effective in reducing bycatch because shrimp and fish have moved into open water habitats and shrimp trawl effort is higher. For example, weakfish hot spots have been identified in the area east of Bluff Shoal in central Pamlico Sound (Figure 2.3.10; Appendix 2.3.B, Maps 2.3.B.9-2.3.B.10). Incorporating this area as a seasonal closure would reduce bycatch of weakfish locally, while accommodating movement throughout the season.

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Example Options for Pamlico Sound

(+ Potential positive impact of action)

(- Potential negative impact of action)

1. *Status Quo* – No additional area or seasonal closures
 - + Continues to allow access to the shrimp resource in Pamlico Sound
 - + No impact to shrimp trawling industry
 - + Bycatch reductions may still be achieved through other strategies (i.e., gear modifications)
 - No additional bycatch reductions from area closures
 - Continued conflict between trawlers and other sectors

2. Create no shrimp trawl buffer with seasonal extension (Figure 2.3.17)
 - + Continues to allow access to the shrimp resource in most of Pamlico Sound
 - + Buffer closures in combination with other strategies (i.e., gear modifications) may reduce bycatch
 - + Reduces some conflict between trawlers and other sectors
 - + Creates connectivity between other closed areas
 - + Habitat protections
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - May not reduce bycatch if size of closed area is not sufficient to account for movement of fish

3. Complete closure
 - + Reduces bycatch
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - + Habitat protections
 - Eliminates access to shrimp resource in areas that are very productive for shrimp harvest
 - May increase trawl effort in open areas
 - Would create economic hardship

NEUSE RIVER

Within the Neuse River shrimp are generally only found as far upstream as Slocum Creek. From 1994 to 2019, the Neuse River accounted for 3.2% of shrimp landings in the Pamlico area (Pamlico Sound, Bay River, Pamlico/Pungo River; Table 2.3.6), 15.8% of the trips, and 18.2% of participants (Table 2.3.7). Within the Pamlico Region, the Neuse River has accounted for 2.8% of the value (Figure 2.3.5). There has been little trend in landings or trips since 1994. Brown shrimp are the primary species caught in the Neuse River with lesser numbers of white shrimp and very few pink shrimp landed.

Shrimp trawling is prohibited upstream of a line from the Minnesott Beach Ferry running south to a point at the Cherry Branch Ferry (Appendix 3, Map 3.3). This closure was implemented through

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the 2006 shrimp FMP based on management recommendations from the 2005 Southern Flounder FMP to address the issue of sublegal southern flounder discards in the shrimp trawl fishery (NCDMF 2006). Most Neuse River tributaries are designated as nursery area, but trawling is allowed in parts of Clubfoot Creek, Adams Creek, South River and Turnagain Bay. Only small portions of Clubfoot Creek are open to trawling and most effort is by smaller commercial boats. Trawling activity in Adams Creek is from a mix of small to mid-size commercial and recreational trawlers. South River and Turnagain Bay receive mostly commercial trawling activity but effort in South River has declined recently and Turnagain Bay is not a significant area to the shrimp trawl fishery. Within areas of the Neuse River and its tributaries that are open to trawling, there is a prohibition on trawling in water depths less than six feet from June 1 through November 30 to reduce conflict with the crab pot fishery.

Management Considerations for Neuse River

If a complete closure or an option that closes areas in the northern and western portion of Pamlico Sound is chosen, a complete closure of Neuse River should be strongly considered. If status quo or other smaller scale options are chosen for Pamlico Sound, additional options could be considered for Neuse River.

Because large portions of the Neuse River are already permanently or seasonally closed to trawling, additional small-scale closures may not significantly reduce bycatch. In addition, the existing six-foot contour closure creates connectivity between nursery areas and the Pamlico Sound allowing for a degree of unobstructed movement of shrimp and fish. However, areas near the mouths of Dawson, Green (Oriental), and Lower Broad Creek are excluded from the shallow water closure, allowing shrimp trawlers to harvest shrimp as they leave these creeks. Filling these gaps with additional closures at the mouths of these creeks would create a continuous closure between nursery area habitat and Pamlico Sound. The area around the mouth of Dawson Creek is not a popular area for shrimp trawling but the area around the mouth of Greens Creek is very popular for commercial and recreational trawlers and the mouth of Lower Broad Creek is a popular area for commercial trawlers. In 1999 and 2000, a shoreline buffer closed to shrimp trawling running along the channel markers from Dawson Creek to the mouth of Neuse River was implemented by proclamation to address protection of small shrimp while allowing for shrimp trawling in the main stem of the river (NCDMF 2006). However, this buffer was difficult to enforce and often resulted in the same size shrimp being found on the open side of the line as on the closed side.

Parts of Clubfoot Creek, Adams Creek, South River, and Turnagain Bay are open to shrimp trawling to allow access to the shrimp resource but are located adjacent to PNA and SNA designations. Prohibiting shrimp trawling in these creeks would create a broader linkage between PNA's and SNA's and habitats used as the species grow and move. Restricting trawling in smaller tributaries could allow juvenile fish and crustaceans to disperse into larger water bodies where the probability of interacting with trawls is decreased, potentially reducing bycatch.

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Example Options for Neuse River (Dependent on selected options for Pamlico Sound)

If all of Pamlico Sound or large areas in northern and western Pamlico Sound are closed, a complete closure of Neuse River should be the only option considered.

4. Prohibit shrimp trawling in Neuse River and its tributaries in combination with Pamlico Sound closures.
 - + Reduces bycatch
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - + Creates a complete closure link between Neuse River and Pamlico Sound
 - + Habitat protections
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

If status quo or smaller scale options are chosen for Pamlico Sound, additional options could be considered for Neuse River.

5. *Status Quo* – No additional area or seasonal closures for Neuse River and its tributaries
 - + Continues to allow access to the shrimp resource in Neuse River and open tributaries
 - + No impact to shrimp trawling industry
 - + Bycatch reductions may still be achieved through other strategies (i.e., gear modifications)
 - No additional bycatch reductions from area closures
 - Continued conflict between trawlers and other sectors
6. Close open areas in Clubfoot Creek, Adams Creek, South River, Turnagain Bay and the mouths of Dawson, Greens and Lower Broad Creek
 - + Continues to allow access to the shrimp resource in most of Neuse River
 - + Impact to the shrimp trawling industry is minimized
 - + Additional closures in combination with other strategies (i.e., gear modifications) may reduce bycatch
 - + Reduces some conflict between trawlers and other sectors
 - + Allows juvenile fish more area to disperse before becoming susceptible to trawls
 - + Creates continuous connectivity of closed area between Neuse River and Pamlico Sound
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - May not reduce bycatch
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

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7. Prohibit shrimp trawling in Neuse River and its tributaries
 - + Closure in combination with other strategies (i.e., gear modifications) may reduce bycatch
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - + Creates a complete closure link between Neuse River and Pamlico Sound
 - + Habitat protections
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

BAY RIVER

Bay River is a tributary of Pamlico Sound, located in Pamlico County, between the Pamlico and Neuse rivers. From 1994 to 2019, Bay River accounted for 0.2% of shrimp landings in the Pamlico area (Pamlico Sound, Bay River, Pamlico/Pungo River; Table 2.3.6), 1.3% of the trips, and 2.8% of participants (Table 2.3.7). Within the Pamlico Region, the Bay River has accounted for 0.2% of the value (Figure 2.3.5). The disparity between landings and trips suggests most of the shrimp trawl effort in the river is by smaller boats. Landings and trips have declined substantially since the late 1990s and early 2000s but have little trend since. Brown shrimp are the primary species caught in Bay River accounting for nearly all landings.

Shrimp trawling is only allowed in the main stem of the river because all tributary creeks and bays are classified as PNA, SNA, or no trawl areas (Appendix 3, Map 3.3). The area of the river, open to trawling, bound by the shoreline to the depth of six feet is closed to trawling from June 1 through November 30. Despite its smaller size, Bay River is a major area for small and larger commercial shrimp trawlers.

Management Considerations for Bay River

If a complete closure or an option that closes areas in the northern and western portion of Pamlico Sound is chosen, a complete closure of Bay River should be strongly considered. If status quo or other smaller scale options are chosen for Pamlico Sound additional options could be considered for Bay River.

Because large portions of Bay River are already permanently or seasonally closed to trawling, additional small-scale closures may not significantly reduce bycatch. In addition, the existing six-foot contour closure creates connectivity between Bay River nursery areas and the Pamlico Sound allowing for a degree of unobstructed movement of shrimp and fish between these areas. However, areas near the mouths of Vandemere Creek and along the eastern shore of Moore Bay are not included in this closure. Filling these gaps with additional closures would create a continuous closed area between nursery habitat and the Pamlico Sound.

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Example Options for Bay River (Dependent on selected options for Pamlico Sound)

If all of Pamlico Sound or large areas in northern and western Pamlico Sound are closed, a complete closure of Bay River should be the only option considered.

8. Prohibit shrimp trawling in Bay River and its tributaries
 - + Reduces bycatch
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - + Creates a complete closure link between Bay River and Pamlico Sound
 - + Habitat protections
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

If status quo or smaller scale options are chosen for Pamlico Sound, additional options could be considered for Bay River.

9. *Status Quo* - No additional area or seasonal closures in Bay River
 - + Continues to allow access to the shrimp resource in Bay River
 - + No impact to shrimp trawling industry
 - + Bycatch reductions may still be achieved through other strategies (i.e., gear modifications)
 - No additional bycatch reductions from area closures
 - Continued conflict between trawlers and other sectors
10. Prohibit shrimp trawling at the mouth of Vandemere Creek and the shoreline area of Moore Bay
 - + Continues to allow access to the shrimp resource in most of Bay River
 - + Impact to the shrimp trawling industry is minimized
 - + Additional closures in combination with other strategies (i.e., gear modifications) may reduce bycatch
 - + Reduces some conflict between trawlers and other sectors
 - + Allows juvenile fish more area to disperse before becoming susceptible to trawls
 - + Creates continuous connectivity of closed area between Bay River and Pamlico Sound
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - May not reduce bycatch
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

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11. Prohibit shrimp trawling in Bay River

- + Closure in combination with other strategies (i.e., gear modifications) may reduce bycatch
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- + Creates a complete closure link between Bay River and Pamlico Sound
- + Habitat protections
- Limits access to shrimp resource in areas that might be very productive for shrimp harvest
- May increase trawl effort in open areas
- May not reduce bycatch
- Particularly limiting to smaller commercial and recreational shrimpers
- Would limit brown shrimp fishery

PAMLICO/PUNGO RIVER

From 1994 to 2019, the Pamlico/Pungo River accounted for 0.5% of shrimp landings in the Pamlico area (Pamlico Sound, Bay River, Pamlico/Pungo River; Table 2.3.6), 1.4% of the trips, and 5.0% of participants (Table 2.3.7). Within the Pamlico Region, the Pamlico/Pungo River has accounted for 0.5% of the value (Figure 2.3.5). Landings and trips have both declined substantially since the late 1990s and early 2000s. In 2014 no landings or trips were attributed to the Pamlico/Pungo River and in 2019, 194 pounds were attributed to the Pamlico/Pungo River. Brown shrimp are the primary species caught in the Pamlico/Pungo River accounting for nearly all shrimp landings.

Trawling is prohibited in the Pungo River and upstream of a line running from Pamlico Beach southwest to a point at Reed Hammock (Appendix 3, Map 3.3). These closures were implemented through the 2006 Shrimp FMP based on management recommendations from the 2005 Southern Flounder FMP to address the issue of sublegal southern flounder discards in the shrimp trawl fishery (NCDMF 2006). Trawling is allowed in lower Goose Creek north of a line running from the north shore of Snode Creek easterly to Store Point though tributaries of the creek are designated as PNA or SNA and are closed to trawling. The open area of Pamlico River bound by the shoreline to the depth of six feet is closed to trawling from June 1 through November 30. This includes the open portion of lower Goose Creek.

Management Considerations for Pamlico/Pungo River

If a complete closure or an option that closes areas in the northern and western portion of Pamlico Sound is chosen, a complete closure of Pamlico/Pungo River should be strongly considered. If status quo or other smaller scale options are chosen for Pamlico Sound additional options could be considered for Pamlico/Pungo River.

Because nearly all of Pamlico River is permanently or seasonally closed to trawling, additional small-scale closures may not significantly reduce bycatch. In addition, the existing six-foot contour closure creates connectivity between nursery areas and the Pamlico Sound allowing for a degree of unobstructed movement of shrimp and fish. The only gap in this closure occurs near the mouth

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of the Pungo River because water depth is greater than six feet. Filling this gap with a trawl closure would create a continuous closed area between nursery habitats and the Pamlico Sound.

The area of lower Goose Creek that is open to trawling is adjacent to PNA and SNA designations. Prohibiting trawling in lower Goose Creek would create a broader linkage between PNA and SNA habitats and habitats used as the species grow and move. Restricting trawling in smaller tributaries could allow juvenile fish to disperse into larger water bodies where the probability of interacting with trawls is decreased potentially reducing bycatch. However, lower Goose Creek is an important area to recreational shrimpers because of easy access and high productivity of shrimp.

Example Options for Pamlico/Pungo River (Dependent on selected options for Pamlico Sound)

If all of Pamlico Sound or large areas in northern and western Pamlico Sound are closed, a complete closure of Pamlico/Pungo River should be the only option considered.

12. Prohibit shrimp trawling in Pamlico/Pungo River and its tributaries
 - + Reduces bycatch
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - + Creates a complete closure link between Pamlico/Pungo River and Pamlico Sound
 - + Habitat protections
 - Limits access to shrimp resource in areas that might be very productive for shrimp harvest
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers
 - Would limit brown shrimp fishery

If status quo or smaller scale options are chosen for Pamlico Sound, additional options could be considered for Pamlico/Pungo River.

13. *Status Quo* - No additional area or seasonal closures in Pamlico/Pungo River and its tributaries
 - + Continues to allow access to the shrimp resource in Pamlico River
 - + No impact to shrimp trawling industry
 - + Bycatch reductions may still be achieved through other strategies (i.e., gear modifications)
 - No additional bycatch reductions from area closures
 - Continued conflict between trawlers and other sectors

14. Prohibit shrimp trawling in lower Goose Creek and at the mouth of Pungo River
 - + Continues to allow access to the shrimp resource in most of Pamlico River
 - + Impact to the shrimp trawling industry is minimized
 - + Additional closures in combination with other strategies (i.e., gear modifications) may reduce bycatch
 - + Reduces some conflict between trawlers and other sectors
 - + Allows juvenile fish more area to disperse before becoming susceptible to trawls

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- + Creates increased area for juvenile fish to disperse into larger water bodies
- + Creates continuous connectivity of closed area between Pamlico River and Pamlico Sound
- Limits access to shrimp resource in areas that might be very productive for shrimp harvest
- May increase trawl effort in open areas
- May not reduce bycatch
- Particularly limiting to recreational shrimpers
- Would limit brown shrimp fishery

15. Prohibit shrimp trawling in Pamlico River

- + Closure in combination with other strategies (i.e., gear modifications) may reduce bycatch
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- + Creates a complete closure link between Pamlico River and Pamlico Sound
- + Habitat protections
- Limits access to shrimp resource in areas that might be very productive for shrimp harvest
- May increase trawl effort in open areas
- May not reduce bycatch
- Particularly limiting to smaller commercial and recreational shrimpers
- Would limit brown shrimp fishery

Northern Area

Discussion of commercial shrimp landings and trips for the Northern Region do not include areas north of Croatan and Roanoke sounds (i.e., Albemarle and Currituck sounds). Since 1987, it has been unlawful to use trawl nets in Albemarle Sound and its tributaries (15A NCAC 03J .0104(b)(3); Appendix 3, Map 3.4). This action was implemented to protect the flounder gill net fishery in this area (NCDMF 2006) and because of conflicts between trawlers and crab potters (NCDMF 2015). Because of high freshwater inputs, shrimp abundance is not high in Albemarle Sound, but minimal shrimp landings have occurred from non-trawl gear (i.e., crab pots, cast nets, pound nets, etc.) since 1994 (i.e., Albemarle Sound, Alligator River, Pasquotank River, Currituck Sound).

CROATAN SOUND

Croatan Sound is bound by Pamlico Sound to the south, extends along the west side of Roanoke Island, to Albemarle Sound to the north. From 1994 to 2019, Croatan Sound accounted for 67.9% of shrimp landings in the Northern Region (Croatan and Roanoke sounds), 51.1% of the trips, and 51.7% of participants (Table 2.3.9). Within the Northern Region, Croatan Sound has accounted for 69.0% of the value (Figure 2.3.18). Landings and trips have both increased substantially since around 2014, because of increased white shrimp landings. Historically, brown shrimp were the primary species landed from Croatan Sound, but landings of white shrimp began increasing in 2016.

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There is no trawling permitted north of a line running northwesterly from the north end of Roanoke Island to Caroon Point (Appendix 3, Map 3.4). Except for feeder creeks and two oyster seed management areas along the southern part of Roanoke Island being closed to trawling there are no other trawling restrictions in Croatan Sound.

ROANOKE SOUND

Roanoke Sound extends north from Oregon Inlet along the east side of Roanoke Island to Albemarle Sound. From 1994 to 2019, Roanoke Sound accounted for 32.1% of shrimp landings in the Northern Region (Croatan and Roanoke sounds), 48.9% of the trips, and 48.3% of participants (Table 2.3.9). Within the Northern Region, Roanoke Sound has accounted for 30.3% of the value (Figure 2.3.18). Landings and trips have both increased substantially since around 2015 because of increased white shrimp landings. Historically, brown shrimp have accounted for most of the landings from Roanoke Sound. While Roanoke Sound accounts for nearly half of the trips in the Northern Region, landings are much lower than in Croatan Sound suggesting this area is trawled by smaller boats or is less productive for shrimp.

Shrimp trawling is allowed in most of Roanoke Sound but shallow water and other impediments limit the amount of area that can be trawled (Appendix 3, Map 3.4). Except for Outer Broad Creek, all feeder creeks and bays are designated as PNA, SNA, or no trawl areas. SSNAs are designated in Shallowbag Bay and the Kitty Hawk and Buzzards Bay area between the east side of Colington Island and the west side of Kill Devil Hills (see *Appendix 2.2: Management of Special Secondary Nursery Areas* for further information).

Management Considerations for Croatan Sound and Roanoke Sound

Because of proximity and connection, Croatan and Roanoke sounds should be combined when considering management options. If a complete closure or an option that closes areas in the northern and western portions of Pamlico Sound is chosen, a complete closure of Croatan and Roanoke sounds should be strongly considered. If status quo or other smaller scale options are chosen for Pamlico Sound additional options could be considered for Croatan Sound.

Because Roanoke Sound is a smaller waterbody with limited areas where shrimp trawling can occur, comprehensive potential area closures are not discussed. In addition, because of the SSNAs adjacent to Roanoke Sound and the presence of extensive critical habitat (i.e., SAV and shell bottom), options relating to additional area closures in Roanoke Sound are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas*.

Croatan and Roanoke sounds are small, shallow waterbodies with some areas of deeper water that contribute minimally to the shrimp fishery in North Carolina. This area acts as a major corridor for the movement of fish, particularly Atlantic croaker (Figure 2.3.6) and summer flounder (Figure 2.3.9), and invertebrates (i.e., blue crab; NCDMF 2020f) between Albemarle Sound and the ocean. Because of migration timing, habitat use, and other life history characteristics anadromous species like striped bass (*Morone saxatilis*), alewife (*Alosa pseudoharengus*), blueback herring (*A.*

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aestivalis), and American shad (*A. sapidissima*) that use this area as a migration pathway between coastal rivers and the ocean are not a concern as bycatch in the estuarine shrimp trawl fishery. Consideration of Croatan and Roanoke Sound area closures should consider decisions regarding Pamlico Sound area closures. The objective of area closures in Croatan and Roanoke sounds should be creating connectivity between the closed area in the Albemarle Sound, Pamlico Sound, and the ocean.

Example Options for Croatan Sound and Roanoke Sound (Dependent on selected options for Pamlico Sound)

If all of Pamlico Sound or large areas in northern and western Pamlico Sound are closed, a complete closure of Croatan and Roanoke sounds should be the only option considered.

16. Prohibit shrimp trawling in Croatan and Roanoke sounds

- + Reduces bycatch
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger waterbodies
- + Creates a complete closure link between Croatan Sound and Pamlico Sound
- + Habitat protections
- Limits access to shrimp resource in areas that might be very productive for shrimp harvest
- May increase trawl effort in open areas
- May not reduce bycatch
- Particularly limiting to smaller commercial and recreational shrimpers
- Would limit brown shrimp fishery

If status quo or smaller scale options are chosen for Pamlico Sound, it would be difficult to consider additional small-scale options for Croatan Sound. Note that area closures may be considered for Roanoke Sound in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2 Management of Special Secondary Nursery Areas*.

17. *Status Quo* - No additional area or seasonal closures in Croatan and Roanoke sounds

- + Continues to allow access to the shrimp resource in Croatan and Roanoke sounds
- + No impact to shrimp trawling industry
- + Bycatch reductions may still be achieved through other strategies (i.e., gear modifications)
- No additional bycatch reductions from area closures
- Continued conflict between trawlers and other sectors

18. Prohibit shrimp trawling in Croatan and Roanoke sounds

- + Closure in combination with other strategies (i.e., gear modifications) may reduce bycatch
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- + Creates a complete closure link between Croatan Sound and Pamlico Sound

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- + Habitat protections
- Limits access to shrimp resource in areas that might be very productive for shrimp harvest
- May increase trawl effort in open areas
- May not reduce bycatch
- Particularly limiting to smaller commercial and recreational shrimpers
- Would limit brown shrimp fishery

Central Area

This section discusses areas where shrimp trawling occurs, characteristics of those areas and existing closed areas in the Central Area. Because of the smaller waterbodies in the Central Area and the limited areas where shrimp trawling can occur, comprehensive potential area closures are not discussed. Because of the numerous SSNAs in the Central Area and the presence of extensive critical habitat (i.e., SAV and shell bottom), options relating to additional area closures in the Central area are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas*.

CORE SOUND

Core Sound is a relatively small and shallow body of water that has maximum depths around ten feet with shrimp trawling occurring in the sound and its bays. From 1994 to 2019, Core Sound accounted for 56.0% of shrimp landings in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Table 2.3.10), 61.5% of the trips, and 46.6% of participants (Table 2.3.11). Within the Central Region, Core Sound has accounted for 64.0% of the value (Figure 2.3.19). Landings and trips have both generally declined since the early 2000s. Historically brown shrimp accounted for most of the shrimp landings from Core Sound followed by pink shrimp, but since 2010 white shrimp have made up a larger portion of the landings while pink shrimp landings have declined.

The area on the eastern side of Core Sound is designated as a no trawl area by Rule 15A NCAC 03R .0106 (1) and is in place to protect SAV but can be opened to peeler crab trawling by proclamation (Rule 15A NCAC 03J .0104 (4); Appendix 3, Map 3.5). The bays on the mainland side of Core Sound including Jarrett Bay, Brett Bay, Nelson Bay, Thorofare Bay-Barry Bay and Cedar Island Bay are designated as SSNAs which can be opened to trawling by proclamation from August 16th to May 14th. All other tributaries and bays to Core Sound are designated as PNAs. The only other shrimp trawling restriction in the area is the crab spawning sanctuary at Ophelia and Drum inlets which is closed to the use of bottom disturbing gear from March 1 to August 31. Refer to the *Appendix 2.2: Management of Special Secondary Nursery Areas* issue paper for detailed description of opening and closing dates of SSNAs in the Core Sound Area.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Management of Special Secondary Nursery Areas*.

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19. Complete Closure of Core Sound

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in the most important area in the Central Area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

BOGUE SOUND

Bogue Sound is a relatively small and shallow body of water located in Carteret County between the State Port in Morehead City to the east and the town of Emerald Isle to the west and has maximum depths around five feet. From 1994 to 2019, Bogue Sound has accounted for 4.8% of shrimp landings in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Table 2.3.10), 5.4% of the trips, and 11.0% of participants (Table 2.3.11). Within the Central Region, Bogue Sound has accounted for 4.4% of the value (Figure 2.3.19). There has been little trend in landings or trips since 1994. White shrimp have generally accounted for most landings from Bogue Sound.

Tributaries including Pettiford, Goose, Sanders, Broad, Gales, and Archer creeks are designated as PNAs and the sound is closed to trawling north of the Intracoastal Water Way (IWW) on the mainland side (Appendix 3, Map 3.5-3.6). The closure of the mainland side of the IWW serves as a buffer zone to the PNAs and SAV habitat. There is also a rectangular section of Bogue Sound in the western portion that is closed to trawling to protect seagrass beds and bay scallop habitat (NCDMF 2007). Some nearshore areas on the south side of Bogue Sound, including Tar Landing Bay, Coral Bay and Hoop Pole Creek are also closed to trawling. Crab spawning sanctuaries, where trawling is prohibited from March 1 to October 31, have been designated at Beaufort and Bogue inlets. Shrimp are harvested from the IWW as they migrate toward the inlets (Beaufort and Bogue).

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

20. Complete Closure of Bogue Sound

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

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NORTH RIVER

North River is a relatively small and shallow body of water that has maximum depths around five feet. From 1994 to 2019, North River accounted for 14.0% of shrimp landings in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Table 2.3.10), 11.3% of the trips, and 18.0% of participants (Table 2.3.11). Within the Central Region, North River has accounted for 12.4% of the value (Figure 2.3.19). There has been little trend in landings, though annual fluctuations can be large while trips have generally declined since the early 2000s. White shrimp have generally accounted for most landings from North River with some large peaks in brown shrimp landings.

Most of the upper portion of North River is designated as PNA or SSNA. Ward Creek and its tributaries are also designated as either PNA or SSNA (Appendix 3, Map 3.5-3.6). Turner Creek, a small tributary near the mouth of North River, is designated as PNA and other tributaries of the river are closed to trawling. Refer to the *Management of Special Secondary Nursery Areas* issue paper for detailed description of opening and closing dates of SSNAs in the Core Sound Area. The entire North River was closed to shrimp trawling once in 2003 (Proclamation SH-7-2003).

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

21. Complete Closure of North River

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

NEWPORT RIVER

Newport River is generally deeper than Bogue Sound and North River and has more area that can be trawled. From 1994 to 2019, Newport River has accounted for 20.5% of shrimp landings in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Table 2.3.10), 17.2% of the trips, and 18.2% of participants (Table 2.3.11). Within the Central Region, Newport River has accounted for 16.0% of the value (Figure 2.3.19). Landings and trips have generally been declining since the early 2000's, though annual fluctuations are large. White shrimp have generally accounted for most landings from Newport River with lesser, but consistent, landings of brown shrimp.

The upper portion of the Newport River is permanently closed to trawling through the 2006 FMP and encompasses PNA and SSNA (NCDMF 2006; Appendix 3, Map 3.5-3.6). Through management recommendations in Amendment 1, the Newport River SSNA was re-designated as an SNA (NCDMF 2015). Except for Core Creek, most tributaries and bays of the Newport River

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including Calico Creek, Crab Point Bay, Harlow Creek, Oyster Creek, Eastman Creek, Bell Creek, Ware Creek, and Russel Creek are designated as PNAs. There are no other trawling restrictions in the Newport River.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

22. Complete Closure of Newport River

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

WHITE OAK RIVER

White Oak River is located on the Onslow/Carteret County line and has the town of Swansboro at its mouth. Due to the presence of oyster rocks and shoals, there are only a few places that are trawled in the river. From 1994 to 2019, White Oak River accounted for 4.7% of shrimp landings in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River; Table 2.3.10), 4.5% of the trips, and 6.1% of participants (Table 2.3.11). Within the Central Region, White Oak River has accounted for 3.1% of the value (Figure 2.3.19). Landings and trips have generally declined since the early 2000's, though annual fluctuations are large. White shrimp account for most landings from White Oak River.

The middle portion of the White Oak River above Cahoon's Slough across to Hancock Point was closed to trawling through the 2006 FMP (NCDMF 2006; Appendix 3, Map 3.5-3.6). The upper portion of the river and tributaries including Pettiford Creek, Holland Mill Creek, Hawkins Creek, and parts of Queens Creek are designated as PNAs. There are no other trawling restrictions in the White Oak River.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.1: Management of Special Secondary Nursery Areas*.

23. Complete Closure of White Oak River

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

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Southern Area

This section discusses areas where shrimp trawling occurs, characteristics of those areas and existing closed areas in the Southern Area. Because of the smaller waterbodies in the Southern Area and the limited areas where shrimp trawling can occur, comprehensive potential area closures are not discussed. Because of the numerous SSNAs in the Southern Area and the extensive presence of critical habitat (i.e., SAV and shell bottom), options relating to additional area closures in the Southern Area are discussed in *Appendix 2: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas*.

INTRACOASTAL WATERWAY AND SOUNDS FROM QUEENS CREEK TO HOLOVER CREEK

Queens and Bear creeks are usually opened to shrimp trawling in conjunction with White Oak River (NCDMF 2006). Queens Creek is located southeast of the White Oak River in Onslow County. The waters upstream of the NC 1509 Bridge and the tributary creeks below the bridge (Halls, Parrot Swamp, and Dicks creeks) are designated as PNAs and are closed to trawling. Limited trawling occurs below the bridge by skimmer trawlers and RCGL holders. Bear Creek is a shallow water creek located south of Queens Creek. In Bear Creek, the waters upstream of the closure line at Willis Landing are designated as PNA and are closed to trawling and very limited trawling occurs below Willis Landing due to the presence of shoals. Browns, Freeman, Gillets, and Holover creeks as well as Salliers Bay are designated as PNAs and are closed to trawling. The bays and tributaries that surround the IWW from Queens Creek to Holover Creek are designated as PNAs and are closed to trawling; however, trawling is allowed in the main channel of the IWW. Trawling is allowed in channels that connect the IWW to the ocean (West and Suanders/Sander creeks). From March 1 to October 31 trawling is prohibited in the designated crab spawning sanctuary at Bear and Browns inlets.

In 2002, the NCTTP waterbody code for the “Inland Waterway” was split into two waterbody codes [Inland Waterway (Onslow), Inland Waterway (Brunswick)]; however, some dealers using older trip tickets continued to use the code up until 2007. Thus, landings from 2003-2019 do not reflect total landings, trips, and participants from this waterbody and are not shown.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

24. Complete Closure of IWW and Sounds from Queens Creek to Holover Creek
 - + Reduces bycatch
 - + Protects critical habitat
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - Eliminates shrimp trawling in a potentially productive area
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers

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NEW RIVER

The New River is approximately 50 miles long and is in Onslow County (Appendix 3, Map 3.7-3.8). The lower portion of the river adjoins portions of Bogue and Topsail sounds via the IWW. The Chadwick Bay SSNA also borders the lower portion of the New River (see *Appendix 2.2: Management of Special Secondary Nursery Areas*). In 1995, the waters upstream of the Highway 172 bridge were designated as SSNA. The use of otter trawls in the SSNA was phased out in 2010 as part of the 2006 Shrimp FMP. Trawling is prohibited in all tributary creeks downstream of the closure line at Grey and Wards Point and in the military restricted zone that extends from the western shoreline of the river below Grey Point to the northeastern shoreline of Stones Bay. NCDMF actively manages eight Shellfish Management Areas (SMAs) that are closed to trawling in the area. Below the Highway 172 Bridge, trawling is prohibited in all bays and tributary creeks and additional areas were closed to match the mechanical clam harvest line to protect SAV. From March 1 to October 31 trawling is prohibited in the designated crab spawning sanctuary at New River Inlet.

Landings from New River (above and below Highway 172 Bridge) accounted for 49.8% of shrimp landings in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway (Brunswick), Inland Waterway (Onslow), Lockwood’s Folly, Masonboro Sound, New River, Shallotte River, Stump Sound, Topsail Sound; Table 2.3.12), 41.8% of the trips and 37.5% of participants from 1994 to 2019 (Table 2.3.13 and 2.3.14). Within the Southern Region, New River has accounted for 53.8% of the value (Figure 2.3.20). While landings and trips have declined since the 1990s, landings from the New River made up 72.4% of the total landings from the Southern Region in 2019. Historically, brown shrimp made up roughly a quarter of the landings; however, over the last decade white shrimp have comprised approximately 70% of the landings.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

25. Complete Closure of New River

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

INTRACOASTAL WATERWAY AND SOUNDS FROM NEW RIVER TO RICH INLET

The estuarine waters of the IWW as well as the adjacent sounds and bays between the New River Inlet and Rich Inlet are managed as a single waterbody. Stump Sound lies between Marker #17 to the site of the “old” Highway 50 Bridge at Surf City and includes the waters of Alligator, Everett, Spicer, and Waters bays. Topsail Sound includes all waters south of the Highway 50 Bridge to Old Topsail Inlet. Landings from Stump and Topsail sounds accounted for 12.1% of shrimp landings

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in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway (Brunswick), Inland Waterway (Onslow), Lockwood’s Folly, Masonboro Sound, New River, Shallotte River, Stump Sound, Topsail Sound; Table 2.3.12), 16.4% of the trips, and 20.6% of participants from 1994 to 2019 (Table 2.3.13 and 2.3.14). Within the Southern Region, Stump and Topsail sounds have accounted for 11.0% of the value (Figure 2.3.20). Since the 1990s, landings and trips have declined in both areas. Historically, brown shrimp made up a large percentage of the landings; however, white shrimp have accounted for over 60% of the landings since 2016.

Trawling is allowed in the IWW main channel from Marker #72A in the New River to Marker #17 in Stump Sound (Appendix 3, Map 3.8-3.10). The tributaries and bays adjacent to the IWW are designated as PNAs and are closed to trawling. The area south of Marker #17 to the site of the old Highway 50 Bridge at Surf City is designated as SSNA and may be opened to trawling from August 16 through May 14. Trawling in the SSNA is primarily limited to the main channel only; however, trawling is allowed within 100 ft on either side of the channel from Marker #49 to the Surf City Bridge. South of the SSNA, trawling is allowed within 100 ft on either side of the channel to Marker #93. Trawling is restricted to the main channel only throughout the rest of the IWW to Rich Inlet. Trawling is allowed in channels that connect the IWW to the ocean (Howards and Green channel). The division maintains three SMAs throughout Topsail and Stump sounds as well as an oyster sanctuary in Stump Sound, all of which are located in waters closed to shrimp trawling. Trawling is further prohibited from March 1 to October 31 in crab spawning sanctuaries, located at New Topsail and Rich inlets.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

26. Complete Closure of IWW and Sounds from New River to Rich Inlet

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

INTRACOASTAL WATERWAY AND SOUNDS FROM RICH INLET TO CAROLINA BEACH INLET

The estuarine waters of the IWW and adjacent sounds between Rich Inlet and Carolina Beach stretch over 21 miles and include four inlets separating four barrier islands, three of which (Figure Eight, Wrightsville, Carolina Beach) are heavily developed. The IWW stretches across Masonboro and Myrtle Grove sounds and are regularly dredged for navigation purposes. Landings from this area accounted for 0.9% of shrimp landings in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway (Brunswick), Inland Waterway (Onslow), Lockwood’s Folly, Masonboro Sound, New River, Shallotte River, Stump Sound, Topsail Sound; Table 2.3.12), 1.5% of the trips, and 2.9% of participants from 1994 to 2019 (Table 2.3.13 and 2.3.14). Within the

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Southern Region, the IWW and sounds from Rich Inlet to Carolina Beach Inlet accounted for 0.7% of the value (Figure 2.3.20). Landings and effort have sharply declined since 1994; no shrimp landings or trips were reported in 2018 and 2019. Shrimp from this area are smaller in size (40-50 shrimp per pound on average) relative to other waterbodies and are often sold as live bait. Over the last decade, white shrimp have accounted for almost 80% of the landings.

Many of the bays, creeks, and tributaries that surround the IWW from Rich Inlet to Carolina Beach are designated as PNAs and SNAs and are closed to trawling (Appendix 3, Map 3.8-3.10). Trawling is restricted to the main channel throughout the waterway; however, trawling is allowed in the Carolina Beach Yacht Basin as well as channels that connect to the Atlantic Ocean (Nixon Channel, Mason Channel, Stokley Cut/Old Moores Inlet Channel, Lee's Cut/Spring Landing Channel, Banks Channel, and Mott Channel). The area from Marker #105 to the Wrightsville Beach drawbridge was closed to trawling following the adoption of the 2006 Shrimp FMP. Actions were also taken as part of the 2006 FMP to manage the IWW from Marker #139 to Marker #146 (William's Landing) as a SSNA, opening by proclamation from August 16 through May 14. Due to the abundance of small shrimp and limited interest, this area has not opened since 2014 (SH-12-2014). Within the waters from Rich Inlet to Carolina Beach, the division maintains six SMAs as well as an oyster sanctuary at the mouth Hewlett's Creek, all of which are closed to trawling. Trawling is further prohibited from March 1 to October 31 in crab spawning sanctuaries, located at Rich, Mason, Masonboro, and Carolina Beach inlets.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

- 27. Complete Closure of IWW and Sounds from Rich Inlet to Carolina Beach Inlet
 - + Reduces bycatch
 - + Protects critical habitat
 - + Reduces conflict between trawlers and other sectors
 - + Creates increased area for juvenile fish to disperse into larger water bodies
 - Eliminates shrimp trawling in a potentially productive area
 - May increase trawl effort in open areas
 - Particularly limiting to smaller commercial and recreational shrimpers

CAPE FEAR RIVER COMPLEX

The Cape Fear River complex includes the waters of the Wilmington Harbor navigation channel to the inlet and the bays behind Carolina and Kure Beach and Bald Head Island. The shrimp closure line in the Cape Fear River runs easterly across the river just upstream from the mouth of Lilliput Creek. Just downstream of this line, the upper portion of the shrimp trawl management area is connected to the IWW at Snow's Cut. The lower portion of the river adjoins the IWW at Marker #1 near Southport and borders the mouths of Dutchman Creek and the Elizabeth River. The Cape Fear River Complex accounted for 19.9% of shrimp landings in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway (Brunswick), Inland Waterway (Onslow), Lockwood's Folly, Masonboro Sound, New River, Shallotte River, Stump Sound, Topsail Sound; Table 2.3.12), 16.0% of the trips and 9.4% of participants from 1994 to 2019 (Table 2.3.13 and 2.3.14). Within

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the Southern Region, the Cape Fear River has accounted for 19.7% of the value (Figure 2.3.20). Landings have continuously declined since the 1990s. Over the last decade, white shrimp have accounted for approximately 80% of the landings on average. In general, shrimp caught in the Cape Fear River are smaller in size (40-50 shrimp per pound on average) relative to other parts of the state and are often sold as live bait or to local markets and breeding operations.

Nearly all of the upper Cape Fear River is designated as PNA or Inland Waters and is therefore closed to shrimp trawling (Appendix 3, Map 3.11). Below Snow’s Cut, trawling is allowed in the main river channel and behind many of the spoil islands. The areas known as the “Dow Chemical Bay” and “Radar Bay” are closed to trawling. Most trawl effort occurs outside the main channel from the Fort Fisher Ferry to Battery Island. Trawling, and all other boating activity, is prohibited in the military restricted area at the Sunny Point Military Ocean Terminal. The SSNA behind Kure Beach has not opened to trawling since being designated as SSNA in 1986, and shrimp trawling will no longer be allowed pending rule changes effective May 1, 2021 associated with Amendment 1 that re-designate this area as a permanent SNA (refer to the *Management of Special Secondary Nursery Areas issue paper* for a detailed description of this change). The bays south of the Fort Fisher Ferry Terminal (First Bay or “the Basin”, Second Bay, Buzzard’s Bay) and behind Bald Head Island (Cape and Bay creeks) were designated as Trawl Net Prohibited areas with the implementation of the 2006 Shrimp FMP. Trawling is further prohibited in the crab spawning sanctuary at the Cape Fear River Inlet from March 1 to October 31.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

28. Complete Closure of Cape Fear River complex

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

BRUNSWICK COUNTY

The Brunswick County coastline stretches approximately 33 miles across four barrier islands (Oak Island, Holden Beach, Ocean Isle, Sunset Beach) and is bound by the Little River Inlet on the west end and the Cape Fear River Inlet on the east end. Brunswick County (IWW, Shallotte River, Lockwood’s Folly River) has accounted for 3.0% of shrimp landings in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway (Brunswick), Inland Waterway (Onslow), Lockwood’s Folly, Masonboro Sound, New River, Shallotte River, Stump Sound, Topsail Sound; Table 2.3.12), 6.1% of the trips, and 7.7% of participants from 1994 to 2019 (Table 2.3.13 and 2.3.14). Within the Southern Region, Brunswick County has accounted for 2.7% of the value (Figure 2.3.20). Landings and trips have significantly declined since 2010. Historically, landings consisted of a mix of brown and white shrimp with numerous closures occurring throughout the

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1990s and early 2000s to protect recruiting white shrimp. In recent years, limited effort and poor catches of brown shrimp have limited the need for closures to protect white shrimp. Over the last decade, white shrimp have made up over 60% of the landings in Brunswick County.

Trawling in Brunswick County is primarily limited to the main channel of the IWW. Most of the shoreline bordering the IWW is designated as nursery area and is closed to trawling (Appendix 3, Map 3.11-3.12). With the adoption of Amendment 1, shrimp trawling was prohibited in the IWW from the Sunset Beach Bridge to the South Carolina line, including the Shallotte River, Eastern Channel, and lower Calabash River to protect small shrimp and reduce bycatch. In February 2020, the MFC also recommend that the Lockwood Folly River and Saucepan Creek SSNAs be re-designated as permanent SNAs; thus, prohibiting all trawling. Rule changes are scheduled to be effective May 1, 2021 (refer to the *Management of Special Secondary Nursery Areas issue paper* for a detailed description of this change). Trawling is also prohibited in the Southport Boat Harbor and the Progress Energy Intake Canal. Trawling is allowed in the channels that connect the IWW to Atlantic Ocean, such as the Elizabeth River, Dutchman Creek, Montgomery Slough, Jinks Creek, and Bonaparte Creek. Trawling is prohibited from March 1 to October 31 in crab spawning sanctuaries located at Shallotte River Inlet, Lockwoods Folly Inlet, and Tubbs Inlet.

Example Option, additional options are discussed in *Appendix 2.1: Management of Shrimp Trawling for Protection of Critical Sea Grass and Shell Bottom Habitats* and *Appendix 2.2: Management of Special Secondary Nursery Areas*.

29. Complete Closure of Brunswick County

- + Reduces bycatch
- + Protects critical habitat
- + Reduces conflict between trawlers and other sectors
- + Creates increased area for juvenile fish to disperse into larger water bodies
- Eliminates shrimp trawling in a potentially productive area
- May increase trawl effort in open areas
- Particularly limiting to smaller commercial and recreational shrimpers

VI. PROPOSED RULE(S)

This action will result in no immediate rulemaking, rather existing proclamation authority pertaining to use of trawls may be used.

VII. SHRIMP FMP WORKSHOPS

Shrimp FMP Workshops were held in March 2021 between the division plan development team and the Shrimp FMP Advisory Committee (AC). The goal of these workshops is for the AC to assist the division in drafting the plan. The division presented discussion points to guide conversation and inform specific areas where stakeholder input was needed in addition to other AC feedback. The guidance received during workshops on area closures to reduce bycatch was incorporated into the draft plan. Many AC members expressed hesitancy over implementing large scale area closures because they would be extremely detrimental to the shrimp trawl industry, would hurt the early season brown shrimp fishery, and would hurt small boats and skimmer

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trawlers more than larger boats. However, there was generally an acknowledgement that area closures, particularly the examples presented, would reduce bycatch. Some AC member expressed support for the approach presented but largely deferred to commercial AC members in identifying specific areas that might be considered for closure. There was a suggestion to take a more incremental approach, like closing areas near the river mouths and Croatan Sound and observing potential. There was generally support for allowing alternative gears that may not have significant bycatch concerns, like skimmer trawls, in closed areas. During the wrap up workshop there was a suggestion to delay the opening of Pamlico Sound to shrimp trawls based on count size of shrimp. Throughout the duration of the workshops there was discussion about the role Pamlico Sound potentially serves as a nursery for finfish. Some areas adjacent to Pamlico Sound are designated as primary or secondary nursery areas and this Amendment has an objective to “develop a strategy through the CHPP to review current nursery areas and to identify and evaluate potential areas suitable for designation”. Work to meet this objective will be ongoing. Given this objective, it would be inappropriate to designate nursery areas through the shrimp FMP prior to a thorough scientific review, but shrimp trawl area closures can be considered based on information presented.

IX. RECOMMENDATION

The division will make recommendations after receiving input from the MFC Advisory Committees.

X. LITERATURE CITED

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Tables

Table 2.3.1. Commercial landings (pounds) and number of commercial trips and participants landing shrimp in North Carolina, 1994-2019.

Year	Landings	Trips	Participants
1994	7,284,793	21,768	1,580
1995	8,669,257	23,891	1,891
1996	5,261,147	17,085	1,513
1997	6,988,243	20,442	1,526
1998	4,635,189	14,969	1,196
1999	8,991,521	19,821	1,504
2000	10,334,915	18,442	1,725
2001	5,254,132	14,072	1,213
2002	9,969,018	18,342	1,372
2003	6,167,371	14,057	1,110
2004	4,880,816	11,882	988
2005	2,357,516	6,582	703
2006	5,736,649	8,025	715
2007	9,537,230	9,291	804
2008	9,414,418	8,084	849
2009	5,407,708	7,770	735
2010	5,955,335	7,864	755
2011	5,140,360	5,361	573
2012	6,141,480	8,924	755
2013	4,858,885	8,689	728
2014	4,690,933	6,478	642
2015	9,116,730	8,182	751
2016	13,195,269	9,727	896
2017	13,905,392	9,571	892
2018	9,729,526	6,097	739
2019	9,547,982	5,909	652
Total	193,171,815	311,325	26,807
Average	7,429,685	11,974	1,031

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Table 2.3.2. Cumulative total count of the top 20 species captured in the Estuarine Trawl Survey (Program 120) from May and June, 2015-2019. Species in bold are those commonly associated with the North Carolina commercial shrimp trawl fishery.

Species	Count	Percent
Spot	1,719,494	43.0
Pinfish	685,624	17.2
Brown Shrimp	419,500	10.5
Atlantic Croaker	345,241	8.6
Bay Anchovy	335,827	8.4
Atlantic Menhaden	117,408	2.9
Silver Perch	86,129	2.2
Blue Crab	73,849	1.8
Pigfish	32,148	0.8
Southern Flounder	30,170	0.8
Rainwater Killifish	27,635	0.7
White Shrimp	10,607	0.3
Hogchoker	9,312	0.2
Inland Silverside	9,281	0.2
Atlantic Rangia	7,795	0.2
Naked Goby	5,910	0.1
Bluegill	5,776	0.1
Weakfish	4,836	0.1
Marsh Killifish	4,631	0.1
Fundulus Killifishes	3,897	0.1
Remaining 289 Species	.	1.6

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Table 2.3.3. Cumulative total count and biomass (kg) of the top 20 species captured in the Pamlico Sound Survey (Program 195) from June and September, 2015-2019. Species in bold are those commonly associated with the North Carolina commercial shrimp trawl fishery.

<u>June</u>	Number		Biomass		<u>September</u>	Number		Biomass	
Species	Number	Percent	Weight (kg)	Percent	Species	Number	Percent	Weight (kg)	Percent
Atlantic Croaker	485,083	39.7	9,941.0	28.8	Atlantic Croaker	428,071	37.7	12,774.2	35.6
Spot	455,062	37.2	10,396.7	30.1	Spot	376,797	33.1	9,843.6	27.5
Blue Crab	97,915	8.0	4,852.5	14.1	Weakfish	45,421	4.0	1,974.3	5.5
Weakfish	37,424	3.1	3,013.7	8.7	Pinfish	40,419	3.6	1,583.9	4.4
Brown Shrimp	20,904	1.7	246.8	0.7	Atlantic Menhaden	28,586	2.5	524.9	1.5
Bay Anchovy	19,621	1.6	34.9	0.1	Bay Anchovy	21,439	1.9	33.0	0.1
Hogchoker	17,848	1.5	685.0	2.0	White Shrimp	21,355	1.9	509.2	1.4
Pinfish	16,365	1.3	648.2	1.9	Blue Crab	20,054	1.8	1,761.5	4.9
Atlantic Menhaden	13,023	1.1	365.4	1.1	Silver Perch	18,509	1.6	682.8	1.9
Silver Perch	11,616	1.0	615.8	1.8	Harvestfish	14,921	1.3	371.6	1.0
Pink Shrimp	10,158	0.8	152.5	0.4	Pigfish	12,999	1.1	539.8	1.5
Summer Flounder	7,998	0.7	223.9	0.6	Pink Shrimp	11,599	1.0	109.4	0.3
Southern Flounder	6,698	0.5	420.5	1.2	Brown Shrimp	10,870	1.0	206.2	0.6
Butterfish	2,993	0.2	106.5	0.3	Striped Anchovy	10,269	0.9	80.5	0.2
Mantis Shrimp	2,764	0.2	48.3	0.1	Atlantic Thread Herring	8,008	0.7	150.7	0.4
Lesser Blue Crab	2,015	0.2	14.6	0.0	Hogchoker	7,934	0.7	290.0	0.8
Southern Kingfish	1,653	0.1	182.0	0.5	Lesser Blue Crab	6,564	0.6	109.6	0.3
Atlantic Thread Herring	1,451	0.1	47.6	0.1	Summer Flounder	6,487	0.6	381.4	1.1
Harvestfish	1,292	0.1	141.6	0.4	Atlantic Spadefish	5,771	0.5	130.7	0.4
Pigfish	1,290	0.1	84.0	0.2	Gizzard Shad	4,920	0.4	110.4	0.3
Remaining 137 Species	.	0.8	.	6.6	Remaining 144 Species	.	3.2	.	10.3

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Table 2.3.4. General life history characteristics of species commonly associated with the commercial shrimp trawl fishery in North Carolina.

Species	Spawning Period	Spawning Location	Larval Stage	Juvenile Stage	References
Brown Shrimp	February-March	Ocean	Enter estuaries February-April	Move to deeper portions of estuary as they grow	see NCDMF (2015) for review
Pink Shrimp	April-July	Ocean	Enter estuaries May-November	Move to deeper portions of estuary as they grow	see NCDMF (2015) for review
White Shrimp	March-November	Ocean	Enter estuaries May-July; 2-3 weeks after hatching	Move to deeper portions of estuary as they grow	see NCDMF (2015) for review
Atlantic croaker	October-March	Ocean; continental shelf	larvae enter estuaries late fall to late winter	Remain in upper estuarine habitats until mid-summer before moving into deeper open water habitats	see Odell et al. (2017) for review
Southern flounder	November-April	Ocean	Enter estuaries 30-45 days after hatching, settling throughout sounds and rivers in the winter and early spring	Overwinter in low salinity waters or rivers and bays for first two years of life before migrating offshore	see Flowers et al. (2019) for review
Summer flounder	Fall and early winter	Ocean	Enter estuary October-May	Spend first year in bays and other inshore areas	see Packer et al. (1999) for review
Spot	Fall-Winter	Ocean; continental shelf	Enter estuaries winter-early spring	As they grown move from shallow habitat to deeper water habitats	see Odell et al. (2017) for review
Weakfish	March-September	Nearshore ocean; lower reaches of estuaries	Larvae distribute throughout estuaries	Inhabit nearshore and deeper waters of bays, estuaries, and sounds	see Odell et al. (2017) for review

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Table 2.3.5. Existing areas closed to the use of trawls in coastal and estuarine waters of North Carolina.

Type of Closure	Location	Restriction	Purpose	Reference
Primary Nursery Area	Statewide/Internal Coastal Waters	Unlawful to use trawl nets or other bottom disturbing gear	Protect habitat for juvenile fish and shrimp	15A NCAC 03N .0104 15A NCAC 03R .0103
Secondary Nursery Area	Statewide/Internal Coastal Waters	Unlawful to use trawl nets	Protect habitat for juvenile fish and shrimp	15A NCAC 03N .0105(a) 15A NCAC 03R .0104
Special Secondary Nursery Area	Statewide/Internal Coastal Waters	Can be opened to the use of trawl nets by proclamation from August 16 to May 14	Protect habitat for juvenile fish and shrimp while allowing taking of shrimp after they have grown or when juvenile fish have left area	15A NCAC 03N .0105 15A NCAC 03R .0105
Trawl Net Prohibited Areas	Statewide/Coastal and Internal Coastal Waters	Unlawful to use trawl nets; parts of Pamlico, Core and Back sounds can be opened to peeler crab trawling by proclamation	Protect sensitive habitat or reduce bycatch	15A NCAC 03J .0104(b)(3)(4) 15A NCAC 03R .0106
Military Danger Zones	Statewide/Coastal and Internal Coastal Waters	No public access	Public safety	15A NCAC 03R .0102
Crab Spawning Sanctuaries	All coastal inlets	From Barden Inlet north unlawful to use trawls in spawning sanctuaries from March 1 to August 31; From Beaufort inlet south unlawful to use trawls in spawning sanctuaries from March 1 to October 31	Provide protection for spawning blue crabs	15A NCAC 03L .0205 15A NCAC 03R .0110 Proclamation M-7-2020

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Type of Closure	Location	Restriction	Purpose	Reference
Designated Pot Areas	Pamlico, Bay, Neuse rivers and their tributaries	Unlawful to use trawl nets in designated pot areas from June 1 to November 30	Reduce gear conflicts between trawls and crab pots	NCAC 03J .0104(b)(6) 15A NCAC 03J .0301(a)(2) 15A NCAC 03R .0107 Proclamation (i.e., SH-1-2020)
Seed Oyster Management Areas	Statewide/Internal Coastal Waters	Unlawful to use trawl nets in seed oyster management areas	Protect oyster habitat	15A NCAC 03K .0208 15A NCAC 03R .0116
Oyster Sanctuaries	Croatan Sound, Pamlico Sound, Neuse River	Unlawful to use trawl nets in oyster sanctuaries	Protect oyster habitat	15A NCAC 03k .0209 15A NCAC 03R .0117
Shrimp Trawl Prohibited Areas	Pungo, Pamlico, Neuse, Shallotte, Calabash rivers; Eastern Channel; Sunset Beach	Unlawful to use shrimp trawls	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03L .0103(e) 15A NCAC 03R .0114
Other Trawl Closures				
Miscellaneous	Atlantic Ocean	Unlawful to use trawls in specified areas, during specified times	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03J .0202 (1)(2) 15A NCAC 03J .0202 (8)
Miscellaneous	Albemarle Sound and Tributaries	Unlawful to use trawls	Protect habitat, reduce bycatch, reduce gear conflicts	15A NCAC 03J .0104 (b)(3)
Miscellaneous	Southport Boat Harbor	Unlawful to use any commercial fishing gear	Reduce user group conflict, public safety	15A NCAC 03J .0206
Miscellaneous	Duke Energy Progress Brunswick Nuclear Plant Intake Canal Closure	Unlawful to use any commercial fishing gear	Public safety	15A NCAC 03J .0207

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Type of Closure	Location	Restriction	Purpose	Reference
Miscellaneous	Dare County	Unlawful to use commercial fishing gear within 750 feet of licensed fishing piers when open to the public	Reduce user group conflict	15A NCAC 03J .0402(a)(1)(ii)
Miscellaneous	Onslow and Pender counties	Unlawful to use commercial fishing gear during specified times and distances from fishing piers	Reduce user group conflict	15A NCAC 03J .0402(a)(2)(A)(B)(i)(ii)
Miscellaneous	New Hanover County	Unlawful to use commercial fishing gear during specified times and distances from fishing piers	Reduce user group conflict	15A NCAC 03J 0402(a)(3)(A)(B)(i)(iii)

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Table 2.3.6. Total commercial shrimp landings from each water body within the Pamlico Region (Pamlico Sound, Neuse River, Bay River, Pamlico/Pungo River), 1994-2019.

Year	Pamlico Sound	Neuse River	Bay River	Pamlico/Pungo River
1994	3,861,536	115,689	20,051	46,107
1995	4,096,835	114,705	10,021	34,756
1996	1,933,536	111,098	6,051	23,948
1997	3,722,785	164,538	16,409	41,096
1998	1,115,961	83,765	1,358	14,664
1999	3,876,339	216,922	27,913	50,703
2000	6,708,334	210,970	35,348	51,636
2001	2,890,943	19,942	5,935	27,090
2002	6,147,806	213,697	14,070	110,329
2003	2,023,826	102,366	2,010	11,944
2004	2,104,690	87,384	526	6,546
2005	558,104	110,286	1,915	4,367
2006	2,477,858	125,952	1,600	3,876
2007	6,761,768	139,720	858	30,015
2008	5,944,307	391,739	7,144	21,779
2009	3,686,102	116,298	4,192	18,710
2010	3,837,536	116,953	2,405	12,813
2011	3,636,369	115,586	6,069	399
2012	3,955,615	111,098	3,969	5,285
2013	3,041,974	107,772	3,230	4,352
2014	3,351,981	102,625	1,334	0
2015	6,529,484	188,902	21,613	17,844
2016	6,973,945	161,748	5,138	1,815
2017	8,542,675	168,309	3,361	2,640
2018	7,265,369	115,069	4,552	3,214
2019	2,897,791	85,715	383	194
Total	107,934,165	3,598,051	207,418	546,123
Average	4,151,314	138,387	7,978	21,005

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Table 2.3.7. Total commercial trips and participants landing shrimp from each water body within the Pamlico Region (Pamlico Sound, Neuse River, Bay River, Pamlico/Pungo River), 1994-2019.

Year	Trips				Participants			
	Pamlico Sound	Neuse River	Bay River	Pamlico/Pungo River	Pamlico Sound	Neuse River	Bay River	Pamlico/Pungo River
1994	3,512	555	98	85	288	63	13	25
1995	4,154	620	71	59	303	77	14	39
1996	1,956	510	39	20	212	70	10	11
1997	3,132	862	106	65	267	78	14	21
1998	1,269	383	54	9	151	49	4	7
1999	3,124	559	78	57	286	57	8	23
2000	4,011	541	91	128	383	106	47	37
2001	2,800	155	55	89	283	32	14	37
2002	3,576	603	40	119	340	85	15	64
2003	1,272	368	3	25	182	49	3	18
2004	1,944	554	3	7	209	52	2	5
2005	469	332	9	14	106	57	5	9
2006	1,509	306	3	29	172	35	1	10
2007	2,623	332	14	61	219	35	3	15
2008	2,020	685	19	36	234	81	5	13
2009	1,866	259	14	12	217	36	3	9
2010	1,625	395	9	52	207	56	3	10
2011	1,459	492	23	6	198	45	10	3
2012	1,756	359	23	40	179	55	8	5
2013	1,686	388	11	7	187	45	7	7
2014	1,608	446	8	0	190	48	4	0
2015	2,265	422	68	50	216	61	16	11
2016	2,411	449	22	16	231	63	5	7
2017	2,734	297	15	7	239	49	5	4
2018	2,294	240	19	26	226	40	4	9
2019	1,422	188	5	12	171	31	3	2
Total	58,497	11,300	900	1,031	5,896	1,455	226	401
Average	2,250	435	35	40	227	56	9	15

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Table 2.3.8. Percentage of hot spots within 3, 4, 5, and 6 miles from the northern and eastern shores of Pamlico Sound.

Species	June				September			
	3 miles	4 miles	5 miles	6 miles	3 miles	4 miles	5 miles	6 miles
Atlantic croaker	15	32	39	44	39	50	57	68
Spot	20	24	31	43	52	65	72	80
Southern flounder	35	44	52	60	59	73	82	90
Summer flounder	38	44	51	64	39	53	60	65
Weakfish	13	21	27	30	22	28	33	40
Brown shrimp	78	100	100	100	15	18	18	21
Pink shrimp	14	29	29	29	13	25	33	38
White shrimp	9	9	9	13	27	38	44	51

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Table 2.3.9. Total commercial shrimp landings, trips, and participants landing shrimp from each water body within the Northern Region (Croatan and Roanoke sound), 1994-2019.

Year	Landings		Trips		Participants	
	Croatan Sound	Roanoke Sound	Croatan Sound	Roanoke Sound	Croatan Sound	Roanoke Sound
1994	7,701	14,776	102	251	16	24
1995	13,768	5,632	116	71	16	15
1996	6,590	7,896	109	183	17	29
1997	12,539	8,568	166	183	27	28
1998	1,389	188	26	9	7	3
1999	3,793	1,488	93	48	18	15
2000	40,989	7,298	490	124	56	23
2001	799	75	20	4	5	2
2002	10,010	32,080	109	390	18	58
2003	641	2,415	12	41	4	6
2004	6,856	6,646	96	142	19	23
2005	12	907	2	27	1	5
2006	2,421	642	23	20	7	3
2007	23,961	6,059	70	30	22	12
2008	4,761	2,189	32	51	12	10
2009	8,175	2,607	40	60	5	11
2010	1,075	429	18	9	3	6
2011	1,309	742	13	9	4	6
2012	4,072	713	31	21	7	3
2013	9,264	1,010	49	5	12	4
2014	2,487	289	22	11	6	3
2015	24,637	2,063	122	29	21	6
2016	23,068	15,213	60	106	16	22
2017	99,418	20,155	213	138	27	12
2018	27,507	13,685	150	152	20	19
2019	38,035	23,359	168	140	23	16
Total	375,278	177,123	2,352	2,254	389	364
Average	14,434	6,812	90	87	15	14

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Table 2.3.10. Total commercial shrimp landings from each water body within the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River), 1994-2019.

Year	Bogue Sound	Core Sound	Newport River	North River	White Oak River
1994	23,344	863,245	166,380	127,327	44,995
1995	34,345	1,069,213	275,201	196,322	39,013
1996	45,689	737,829	125,092	56,511	23,825
1997	17,009	636,805	213,818	92,489	12,986
1998	41,849	547,488	71,793	27,391	23,582
1999	48,219	884,325	307,501	160,649	37,984
2000	23,875	464,916	240,583	216,045	62,164
2001	9,906	431,489	176,502	71,739	62,361
2002	31,389	783,852	292,696	186,314	137,397
2003	127,781	821,174	142,654	117,353	52,052
2004	18,624	252,813	125,039	126,873	60,283
2005	12,729	317,370	70,030	84,838	6,655
2006	70,432	260,588	199,986	258,670	58,950
2007	39,385	241,093	170,636	179,602	24,277
2008	57,928	434,900	118,998	145,782	20,282
2009	31,643	191,151	73,951	65,725	36,720
2010	34,534	119,470	91,966	55,370	15,457
2011	20,769	25,117	13,964	16,849	3,005
2012	15,117	320,249	130,512	46,086	77,767
2013	26,989	365,379	114,235	75,308	30,286
2014	3,837	219,530	91,409	23,059	10,513
2015	37,253	252,384	237,588	69,397	11,465
2016	54,536	361,792	314,397	217,710	47,499
2017	39,795	275,215	170,247	71,402	16,510
2018	50,599	209,829	86,305	61,620	5,754
2019	46,819	62,329	72,587	38,744	5,858
Total	964,396	11,149,543	4,094,071	2,789,174	927,641
Average	37,092	428,829	157,464	107,276	35,679

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Table 2.3.11. Total commercial trips and participants landing shrimp from each water body within the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River), 1994-2019.

Year	Trips					Participants				
	Bogue Sound	Core Sound	Newport River	North River	White Oak River	Bogue Sound	Core Sound	Newport River	North River	White Oak River
1994	379	6,664	1,045	980	432	48	256	84	90	36
1995	363	7,366	1,033	938	265	62	290	75	157	25
1996	423	5,743	830	445	174	48	221	78	83	22
1997	259	5,627	1,350	765	187	28	213	87	93	14
1998	427	4,546	490	275	268	41	185	54	40	21
1999	257	4,696	1,313	490	177	47	184	89	67	33
2000	203	3,248	1,051	751	238	53	146	89	82	31
2001	119	3,278	921	440	352	23	146	76	68	27
2002	156	3,842	1,456	572	553	32	137	72	58	25
2003	312	3,663	893	549	387	48	143	56	61	20
2004	285	1,755	779	797	219	23	109	43	53	14
2005	183	1,343	497	465	68	13	97	33	38	8
2006	251	976	446	575	138	32	73	33	37	15
2007	174	916	543	573	132	16	68	29	44	13
2008	137	916	337	516	87	21	71	32	39	10
2009	174	903	423	361	203	12	82	24	34	13
2010	218	579	488	329	78	19	65	35	26	11
2011	115	140	98	145	34	17	37	13	14	7
2012	114	1,340	589	298	246	12	97	35	22	20
2013	179	1,442	436	315	112	21	89	31	26	17
2014	35	1,223	465	210	64	14	95	33	21	7
2015	170	835	689	197	38	20	70	40	12	3
2016	187	994	732	316	140	30	90	41	17	12
2017	166	942	476	186	35	28	93	26	19	6
2018	154	500	242	145	14	24	68	18	16	5
2019	114	170	147	99	23	17	48	12	11	1
Total	5,554	63,647	17,769	11,732	4,664	749	3,173	1,238	1,228	416
Average	214	2,448	683	451	179	29	122	48	47	16

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Table 2.3.12. Total commercial shrimp landings from each water body within the Southern Region, 1994-2019. Waterbody code for Inland Waterway was split in 2002 but was still periodically recorded on old Trip Tickets through 2007.

Year	Cape Fear River	Inland Waterway	Inland Waterway (Brunswick)	Inland Waterway (Onslow)	Lockwood's Folly	Masonboro Sound	New River	Shallotte River	Stump Sound	Topsail Sound
1994	149,791	50,936	.	.	426	4,638	103,006	1,807	8,553	29,485
1995	114,261	110,409	.	.	477	1,952	274,212	1,491	25,546	59,202
1996	80,354	84,630	.	.	50	5,973	148,257	394	27,088	21,898
1997	138,424	66,675	.	.	16	5,715	244,360	2,413	29,139	22,508
1998	82,592	54,768	.	.	25	4,961	259,274	814	16,038	36,579
1999	118,742	66,506	.	.	12	2,266	271,883	176	20,522	72,561
2000	46,058	79,462	.	.	22	4,212	483,739	896	21,888	39,152
2001	17,850	51,538	.	.	1	1,514	189,084	6,123	11,795	21,888
2002	82,868	55,313	.	2,966	1	3,373	428,783	1,968	48,099	14,383
2003	101,424	47,487	18,404	31,972	1	6,561	230,381	4,333	25,010	43,141
2004	32,730	14,381	8,633	27,523	0	17,722	174,901	318	9,840	28,312
2005	46,241	13,018	16,746	45,855	0	4,745	49,506	1,352	17,202	26,535
2006	35,843	0	8,380	57,007	0	7,603	164,411	0	11,655	18,925
2007	46,124	4	11,512	25,631	2	335	151,743	0	16,497	10,657
2008	47,264	0	19,944	29,588	0	165	101,554	0	31,862	5,435
2009	44,658	0	15,873	53,465	0	125	22,552	0	20,612	24,652
2010	137,009	0	30,935	47,345	0	5,918	144,919	125	19,360	27,903
2011	79,197	0	21,042	13,421	1	66	66,584	0	2,631	25,405
2012	78,384	0	20,184	53,753	0	135	156,247	0	16,859	11,563
2013	63,635	0	6,520	88,799	0	344	135,937	0	28,334	16,203
2014	34,269	0	10,973	16,815	0	0	87,047	0	5,475	5,837
2015	33,526	0	12,766	50,143	0	0	156,882	483	17,643	15,483
2016	80,262	0	7,277	16,697	0	1,470	209,334	3,861	13,196	9,697
2017	68,323	0	16,725	12,254	0	2,408	87,073	387	10,319	5,310
2018	12,298	0	9,321	21,835	38	0	53,537	81	25,043	15,852
2019	29,326	0	2,711	4,768	0	0	106,900	712	1,784	1,547
Total	69,287	26,736	13,997	33,324	41	3,162	173,158	1,067	18,538	23,466
Average	69,287	49,652	13,997	33,324	41	3,162	173,158	1,067	18,538	23,466

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Table 2.3.13. Total commercial trips landing shrimp from each water body within the Southern Region, 1994-2019. Waterbody code for Inland Waterway was split in 2002 but was still periodically recorded on old Trip Tickets through 2007.

Year	Cape Fear River	Inland Waterway	Inland Waterway (Brunswick)	Inland Waterway (Onslow)	Lockwood's Folly	Masonboro Sound	New River	Shallotte River	Stump Sound	Topsail Sound
1994	916	932	.	.	4	88	1,364	28	110	450
1995	476	1,156	.	.	7	22	2,283	21	189	660
1996	433	925	.	.	9	57	1,337	7	324	320
1997	583	819	.	.	6	111	2,344	30	315	322
1998	450	753	.	.	10	94	1,733	2	168	420
1999	447	694	.	.	6	69	2,681	3	246	641
2000	281	841	.	.	21	85	2,632	14	206	381
2001	219	719	.	.	1	39	1,626	41	180	311
2002	361	751	.	.	1	56	2,559	17	385	199
2003	323	387	203	290	1	79	1,677	37	285	351
2004	162	114	141	292	0	151	1,211	3	91	313
2005	183	63	278	341	0	36	348	7	160	216
2006	177	0	175	179	0	46	527	0	75	216
2007	362	1	183	161	1	10	628	0	163	134
2008	286	0	296	221	0	1	365	0	289	119
2009	376	0	301	454	0	1	180	0	174	242
2010	620	0	454	348	0	30	662	2	150	317
2011	479	0	371	113	1	1	349	0	46	207
2012	632	0	459	343	0	2	702	0	161	220
2013	625	0	277	682	0	3	617	0	176	212
2014	355	0	210	112	0	0	473	0	38	112
2015	331	0	235	303	0	0	386	3	139	142
2016	531	0	78	137	0	34	503	3	150	107
2017	585	0	215	92	0	19	327	6	151	71
2018	279	0	171	163	1	0	273	1	117	148
2019	456	0	74	48	0	0	226	3	47	77
Total	420	314	242	252	3	40	1,077	9	174	266
Average	409	575	220	227	3	39	1,068	9	166	252

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Table 2.3.14. Total commercial participants landing shrimp from each water body within the Southern Region, 1994-2019. Waterbody code for Inland Waterway was split in 2002 but was still periodically recorded on old Trip Tickets through 2007.

Year	Cape Fear River	Inland Waterway	Inland Waterway (Brunswick)	Inland Waterway (Onslow)	Lockwood's Folly	Masonboro Sound	New River	Shallotte River	Stump Sound	Topsail Sound
1994	52	104	.	.	3	27	134	14	41	47
1995	36	132	.	.	2	12	182	5	48	64
1996	33	115	.	.	3	11	136	6	49	33
1997	40	101	.	.	2	9	158	6	42	38
1998	35	89	.	.	4	14	153	2	34	39
1999	40	139	.	.	1	14	321	3	52	69
2000	32	140	.	.	4	9	325	4	29	64
2001	26	119	.	.	1	15	197	8	32	63
2002	35	113	.	6	1	15	219	2	40	38
2003	33	76	27	41	1	18	192	4	46	47
2004	23	29	28	43	0	16	177	1	18	44
2005	19	25	37	51	0	13	93	1	31	36
2006	15	0	26	38	0	12	74	0	13	31
2007	19	1	38	23	1	7	103	0	20	30
2008	23	0	40	30	0	1	69	0	33	20
2009	22	0	43	50	0	1	38	0	32	31
2010	33	0	61	52	0	5	64	1	26	31
2011	23	0	49	18	1	1	40	0	9	22
2012	27	0	66	45	0	2	83	0	21	35
2013	27	0	36	71	0	3	68	0	28	36
2014	18	0	41	24	0	0	64	0	8	20
2015	19	0	34	45	0	0	55	2	20	24
2016	20	0	16	16	0	5	61	3	17	20
2017	24	0	26	18	0	5	42	4	20	13
2018	16	0	20	26	1	0	49	1	23	28
2019	23	0	10	9	0	0	31	2	7	9
Total	27	46	35	34	1	8	120	3	28	36
Average	43	128	43	41	2	13	171	5	43	51

Figures

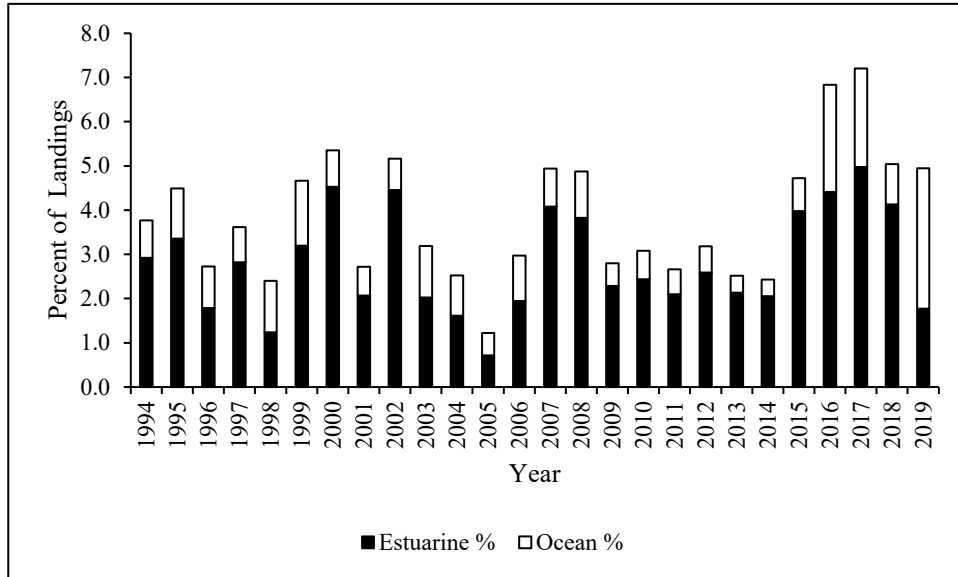


Figure 2.3.1. Percent of commercial shrimp landings reported from estuarine and ocean waters scaled to total commercial shrimp landings, 1994-2019.

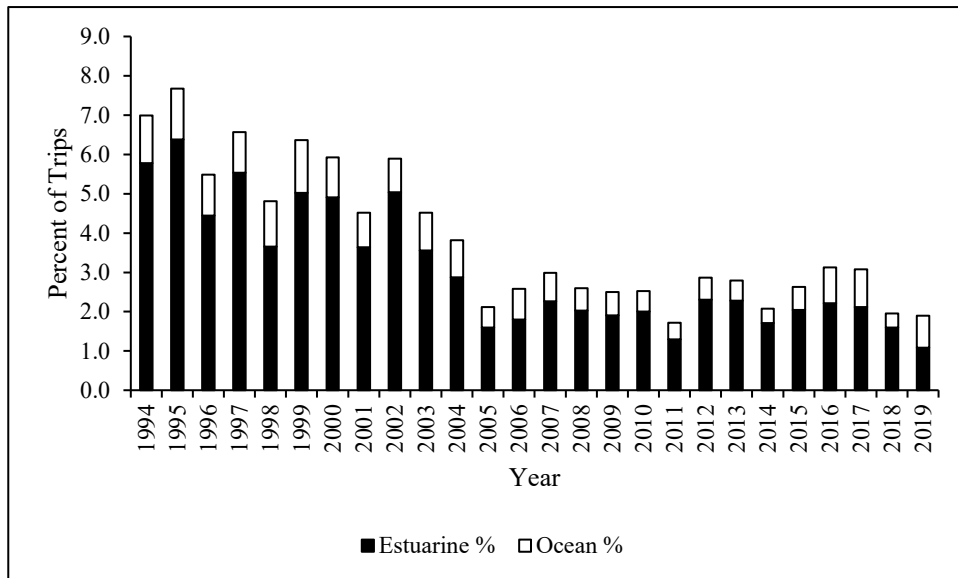


Figure 2.3.2. Percent of commercial trips landing shrimp reported from estuarine and ocean waters scaled to total commercial trips landing shrimp, 1994-2019.

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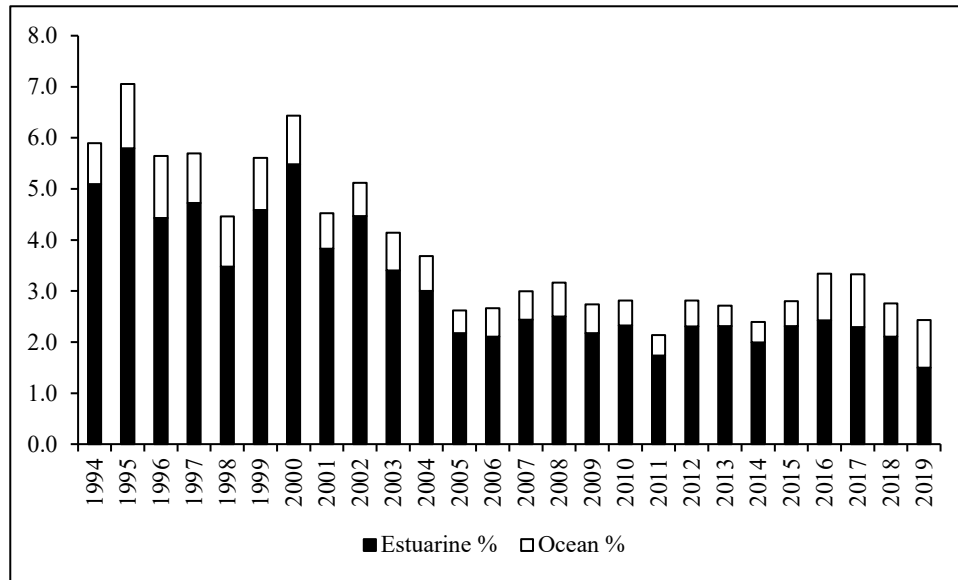


Figure 2.3.3. Percent of commercial participants landing shrimp reported from estuarine and ocean waters scaled to total commercial participants landing shrimp, 1994-2019.

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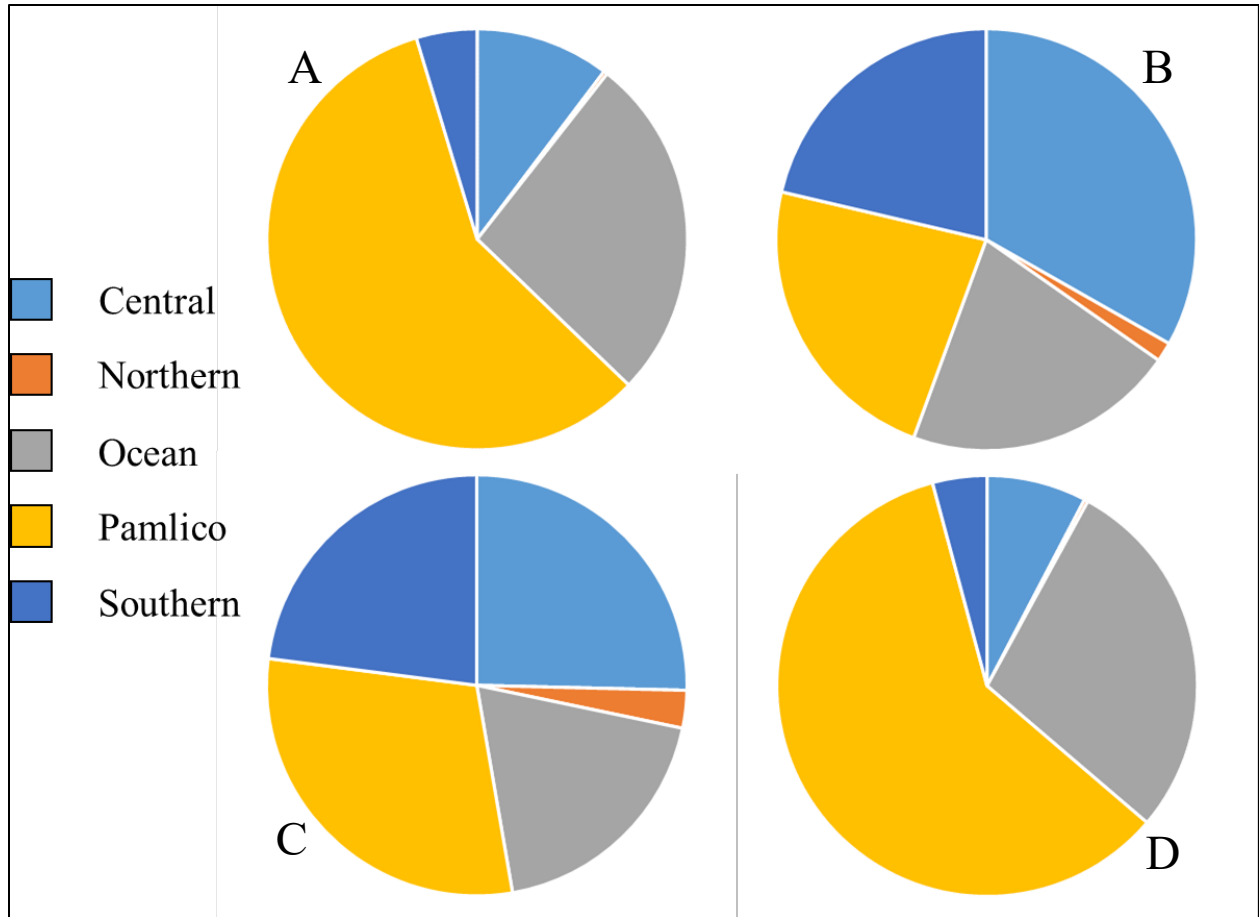


Figure 2.3.4. Percent of commercial shrimp landings (A), commercial shrimp trips (B), commercial shrimp participants (C) and value (D) in the Central, Northern, Ocean, Pamlico and Southern Regions, 1994-2019.

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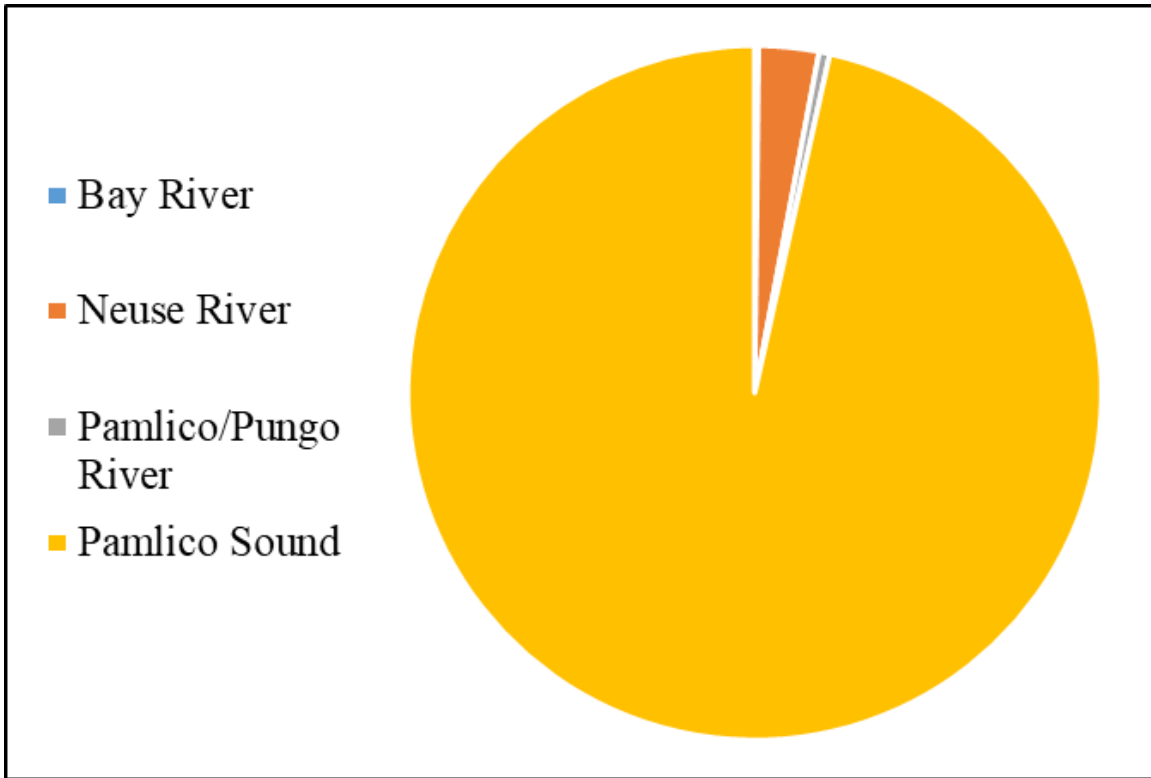


Figure 2.3.5. Percent of value by waterbody in the Pamlico Region (Pamlico Sound, Bay River, Pamlico/Pungo River).

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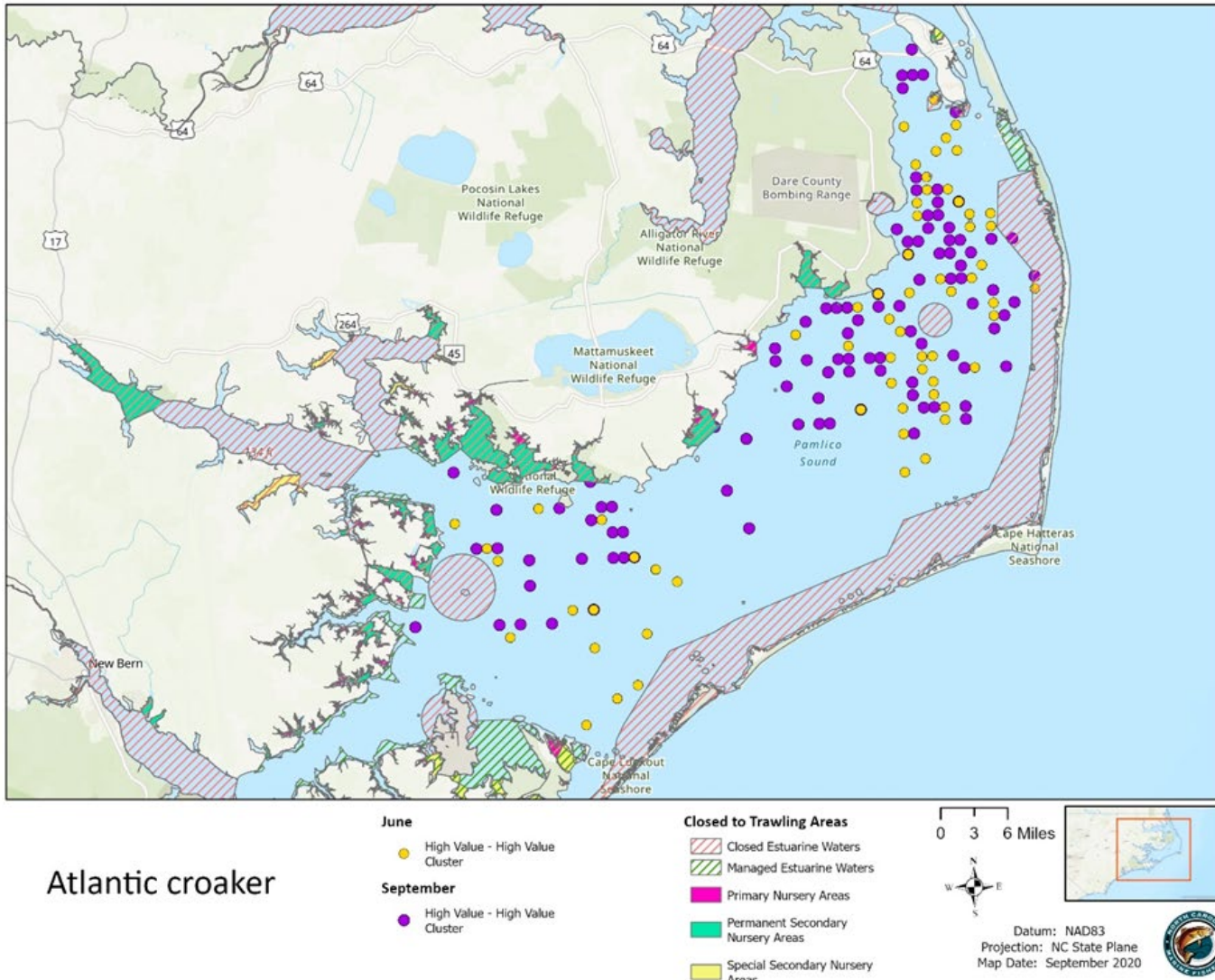


Figure 2.3.6. Hot spots of abundance for Atlantic croaker in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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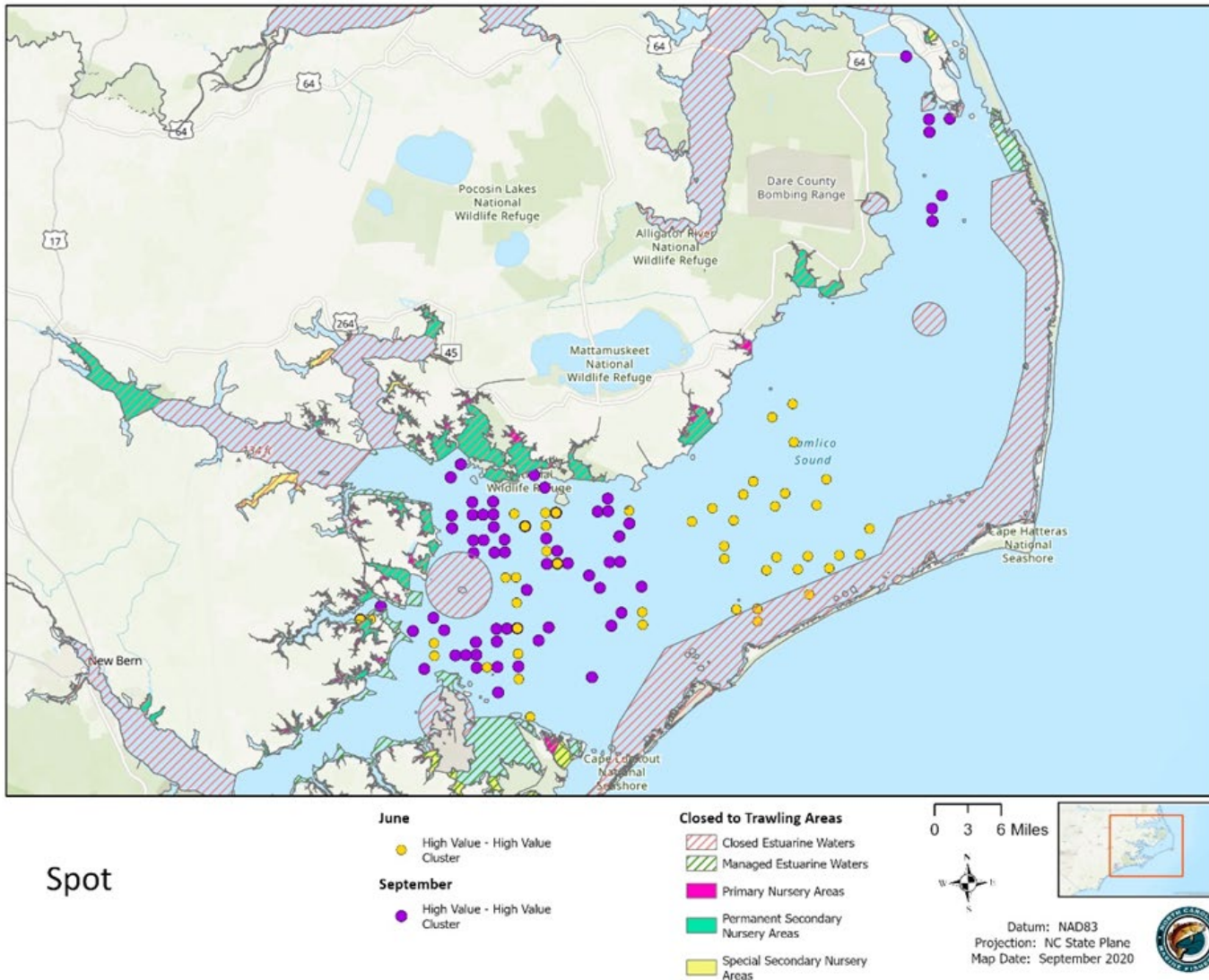


Figure 2.3.7. Hot spots of abundance for spot in Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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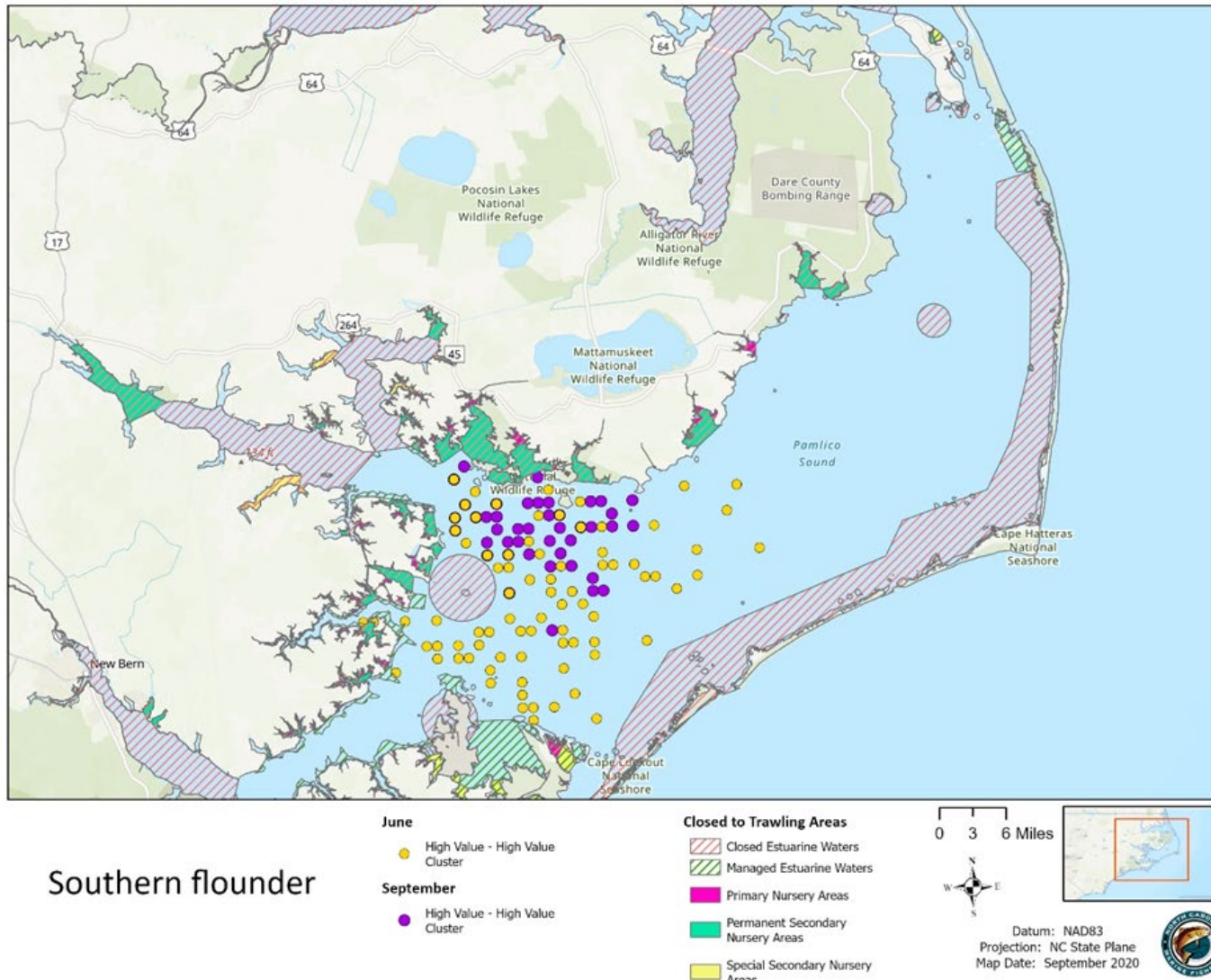


Figure 2.3.8. Hot spots of abundance for southern flounder in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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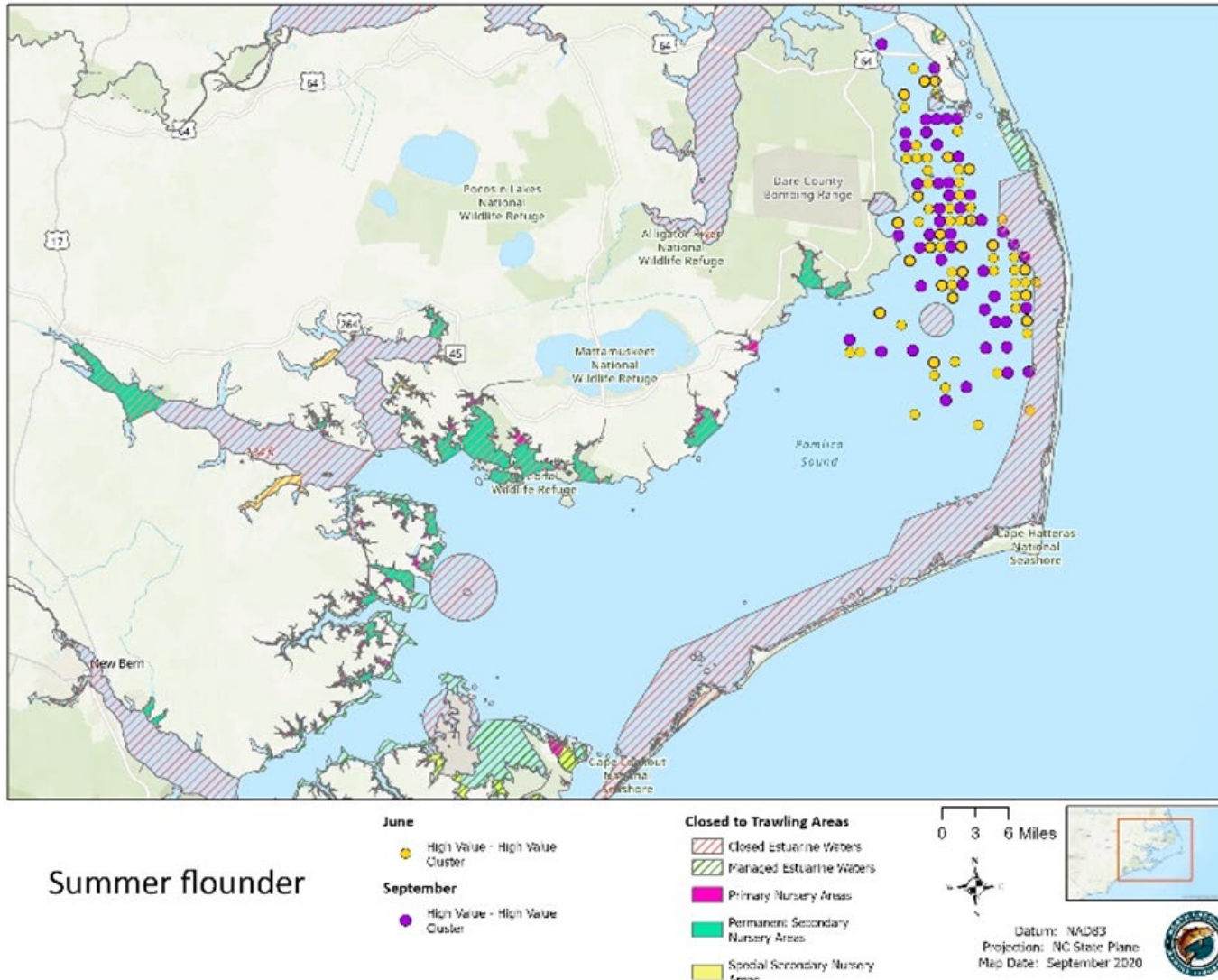


Figure 2.3.9. Hot spots of abundance for summer flounder in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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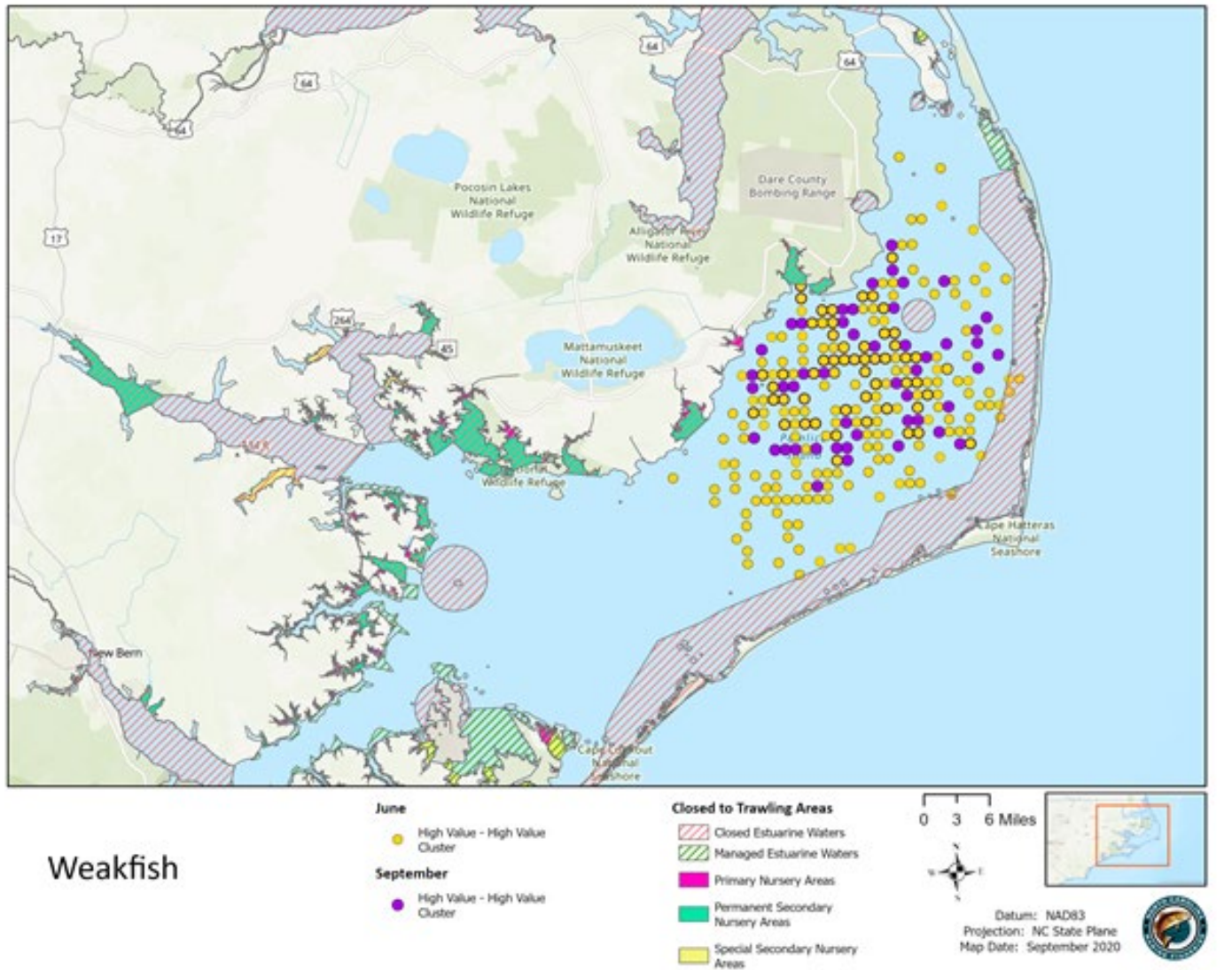


Figure 2.3.10. Hot spots of abundance for weakfish in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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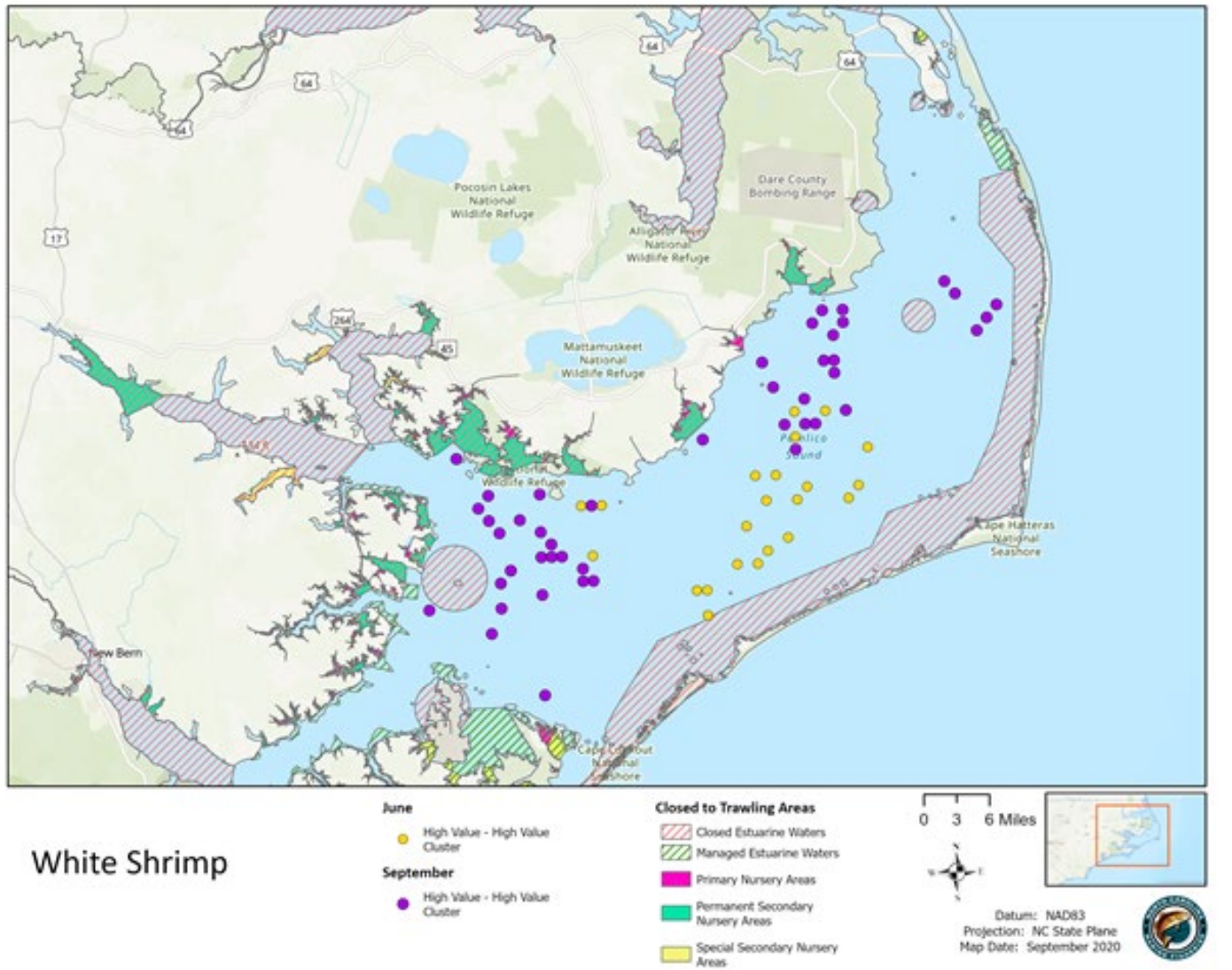


Figure 2.3.11. Hot spots of abundance for white shrimp in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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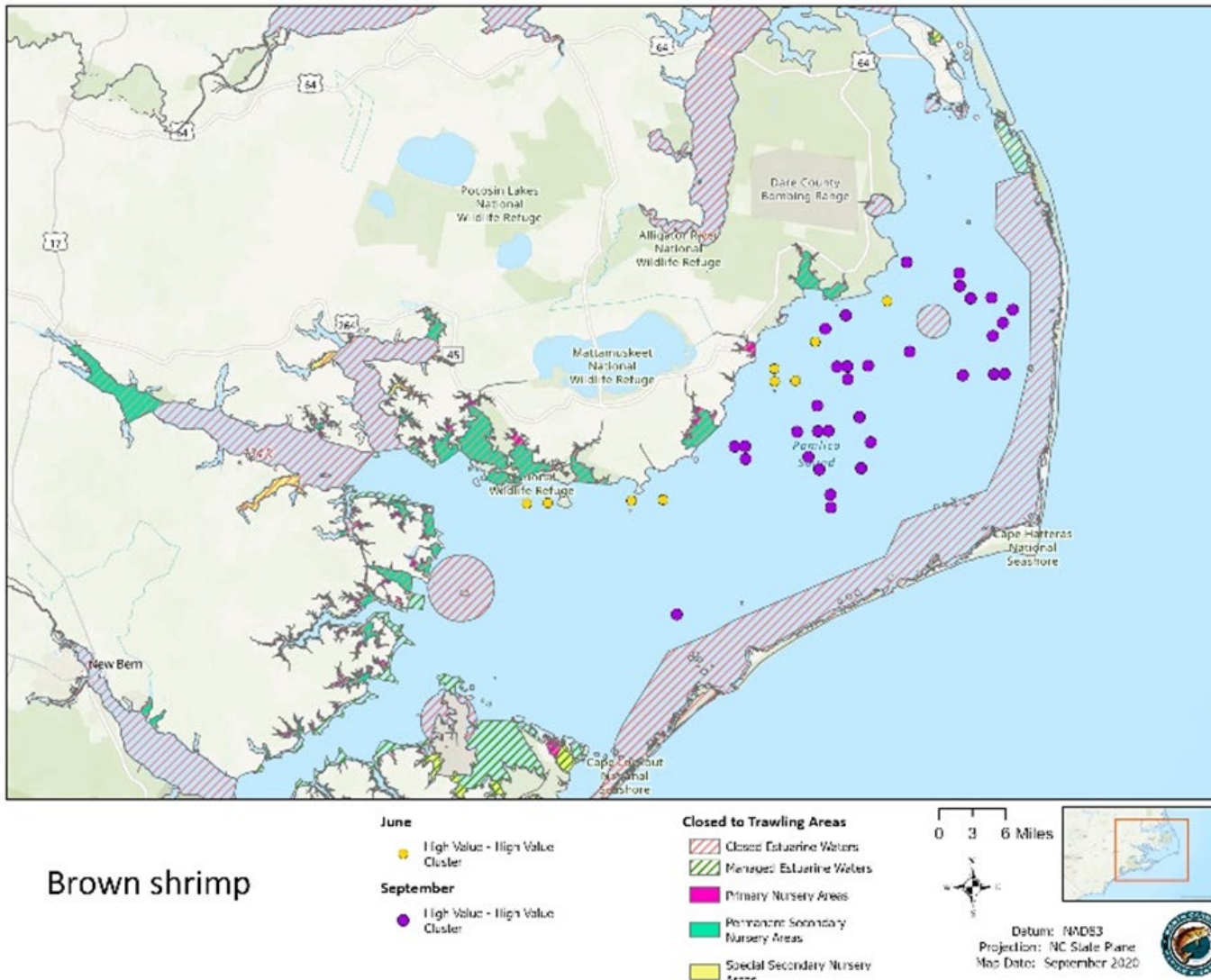


Figure 2.3.12. Hot spots of abundance for brown shrimp in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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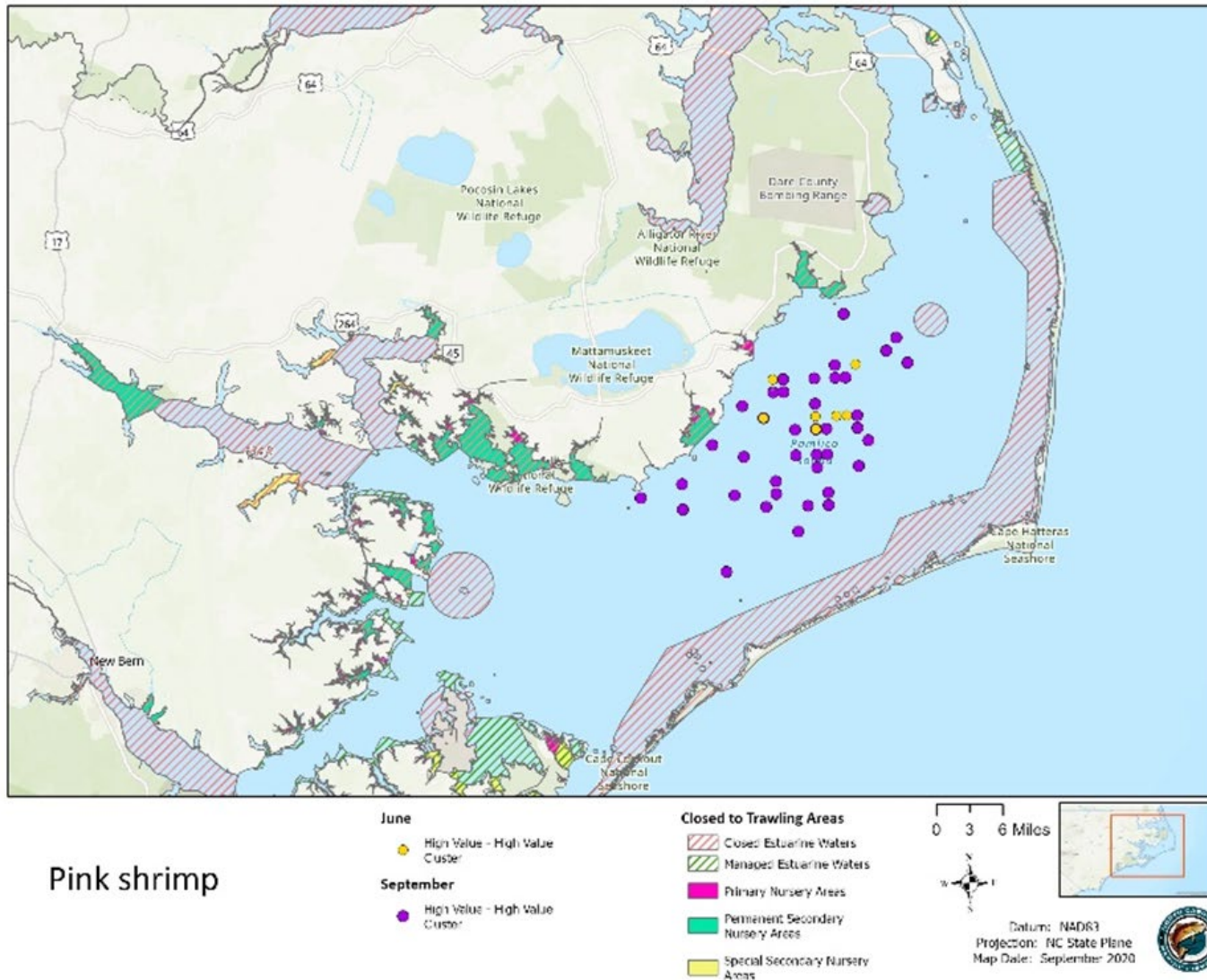


Figure 2.3.13. Hot spots of abundance for pink shrimp in the Pamlico Sound during June and September using aggregate data from Program 195, 1987-2019.

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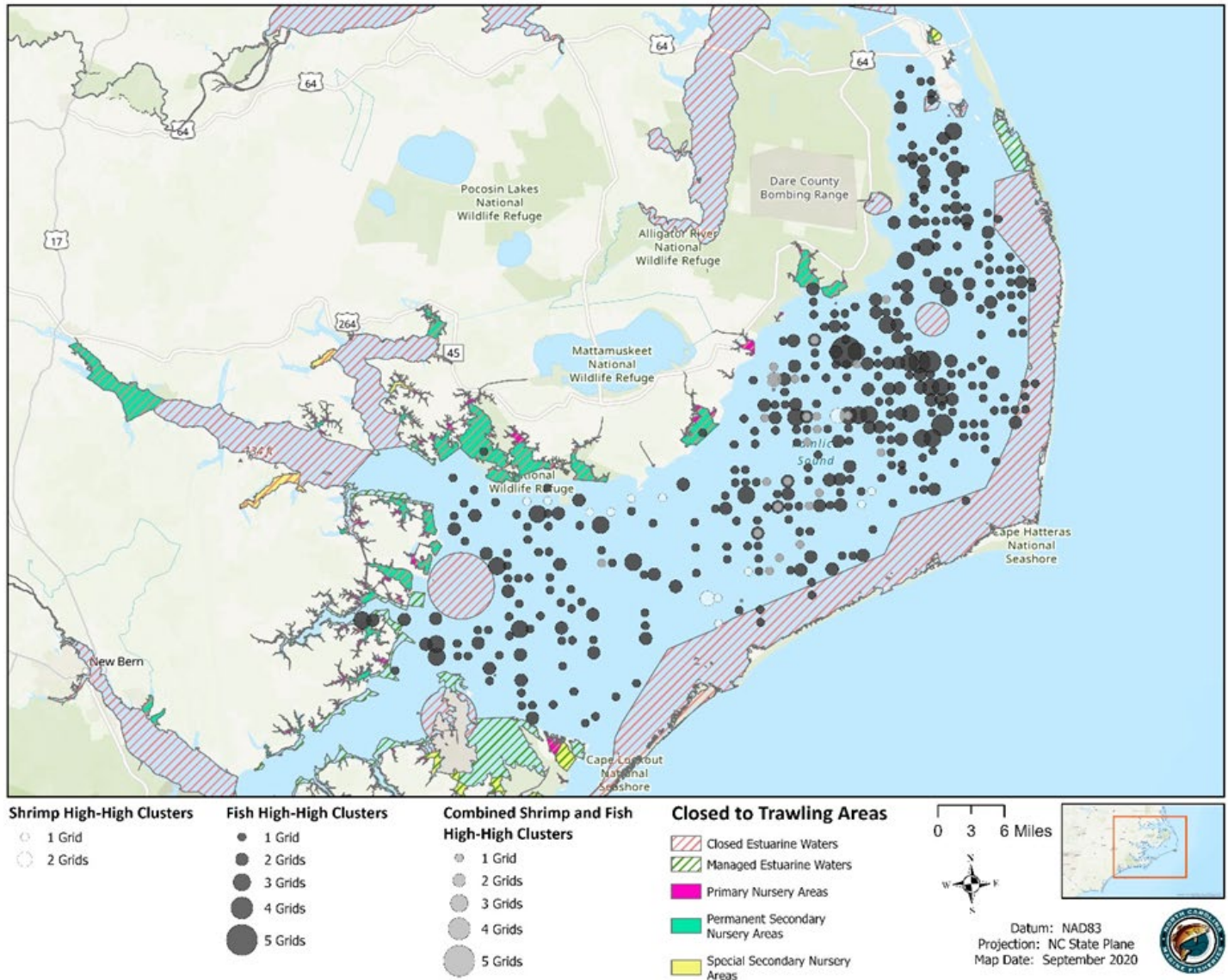


Figure 2.3.14. Frequency of hot spots for Pamlico Sound Survey sites during June using aggregate finfish and shrimp abundance data, 1987-2019.

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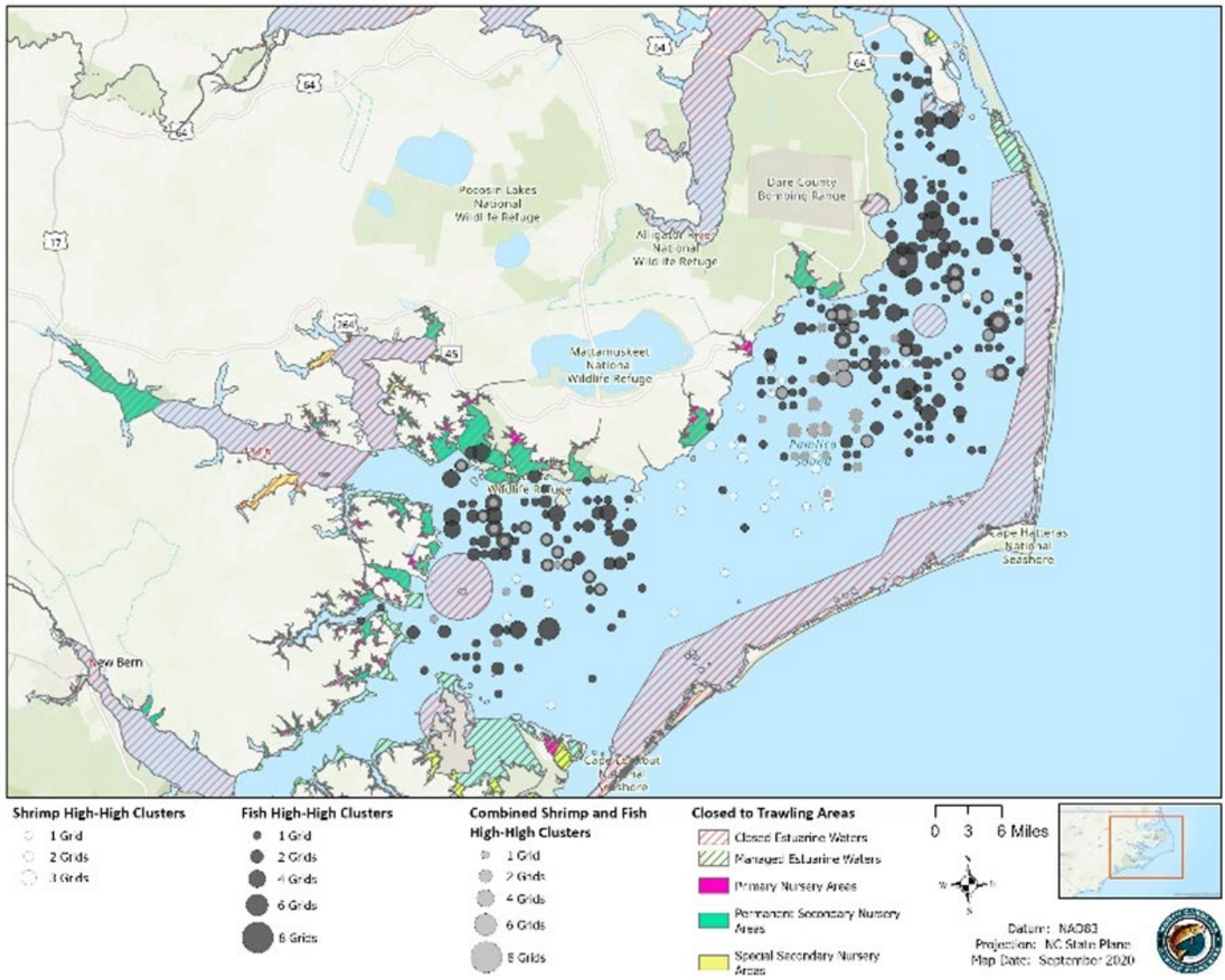


Figure 2.3.15. Frequency of hot spots for Pamlico Sound Survey sites during September using aggregate finfish and shrimp abundance data, 1987-2019.

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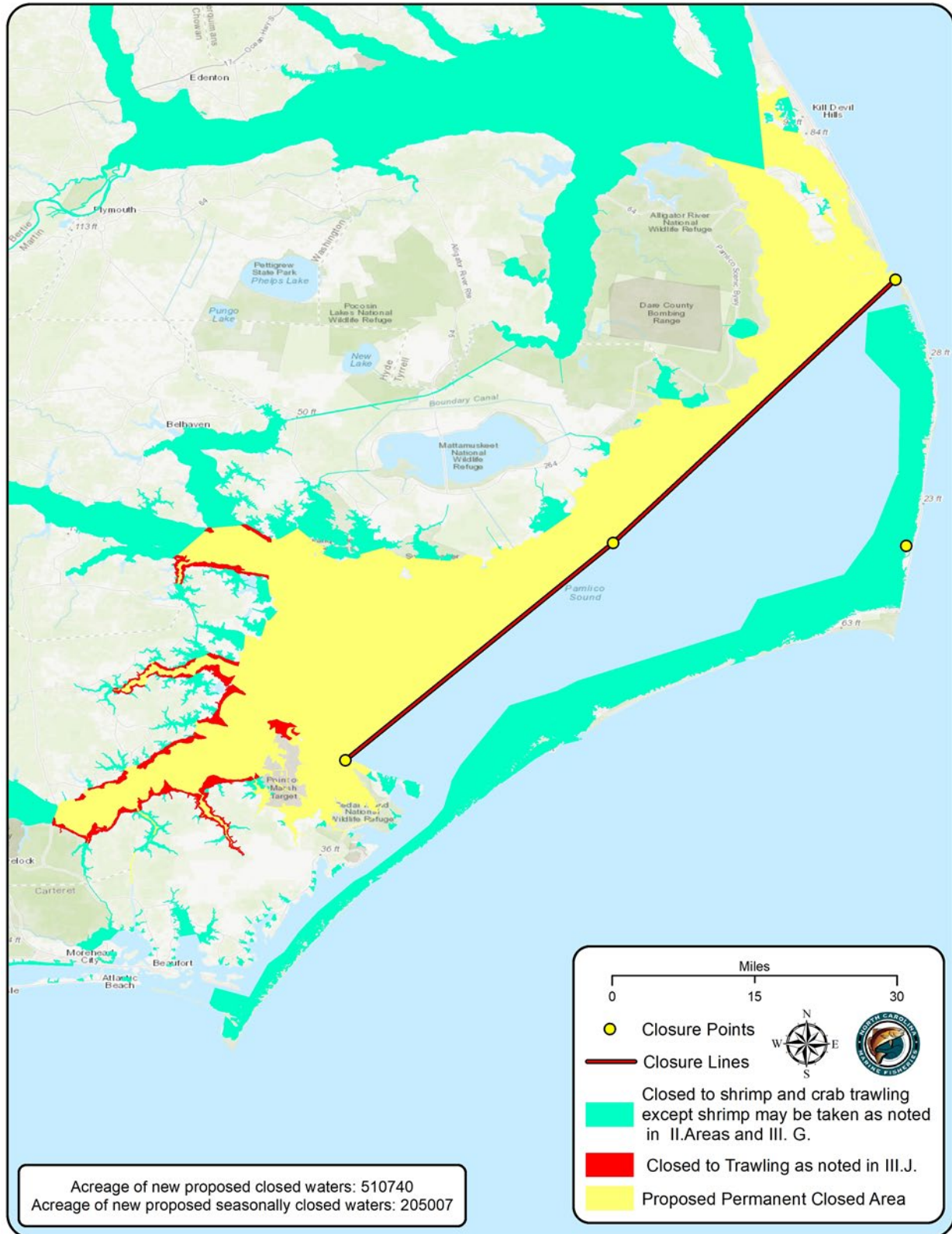


Figure 2.3.16. Example of Pamlico Sound area closure. No shrimp trawling would be permitted in internal coastal waters north and west of the red line (permanent closure).

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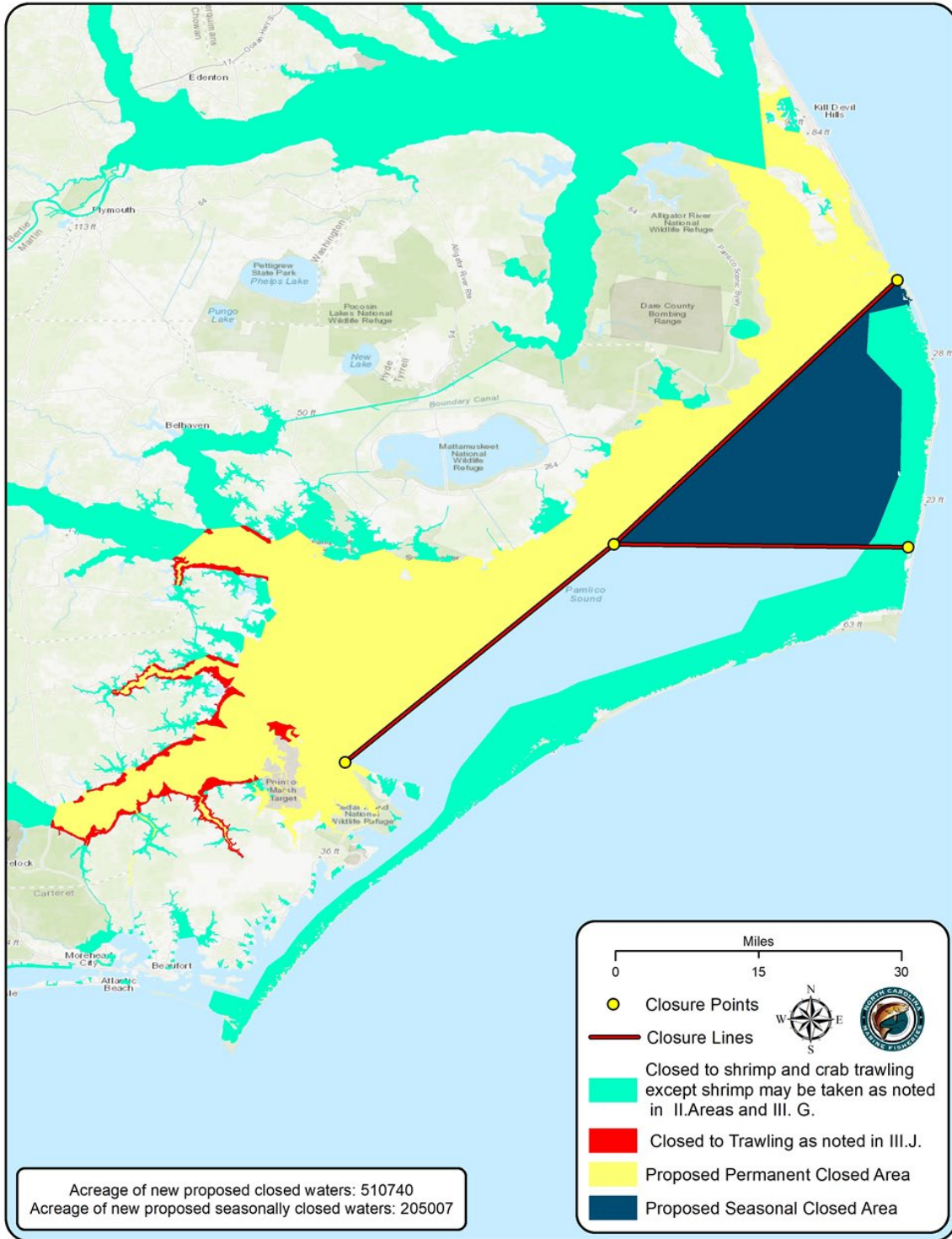


Figure 2.3.17. Example of Pamlico Sound area closure. No shrimp trawling would be permitted in internal coastal waters north and west of the larger red line (permanent closure). No shrimp trawling would be permitted north of the smaller red line from August 1 through November 30.

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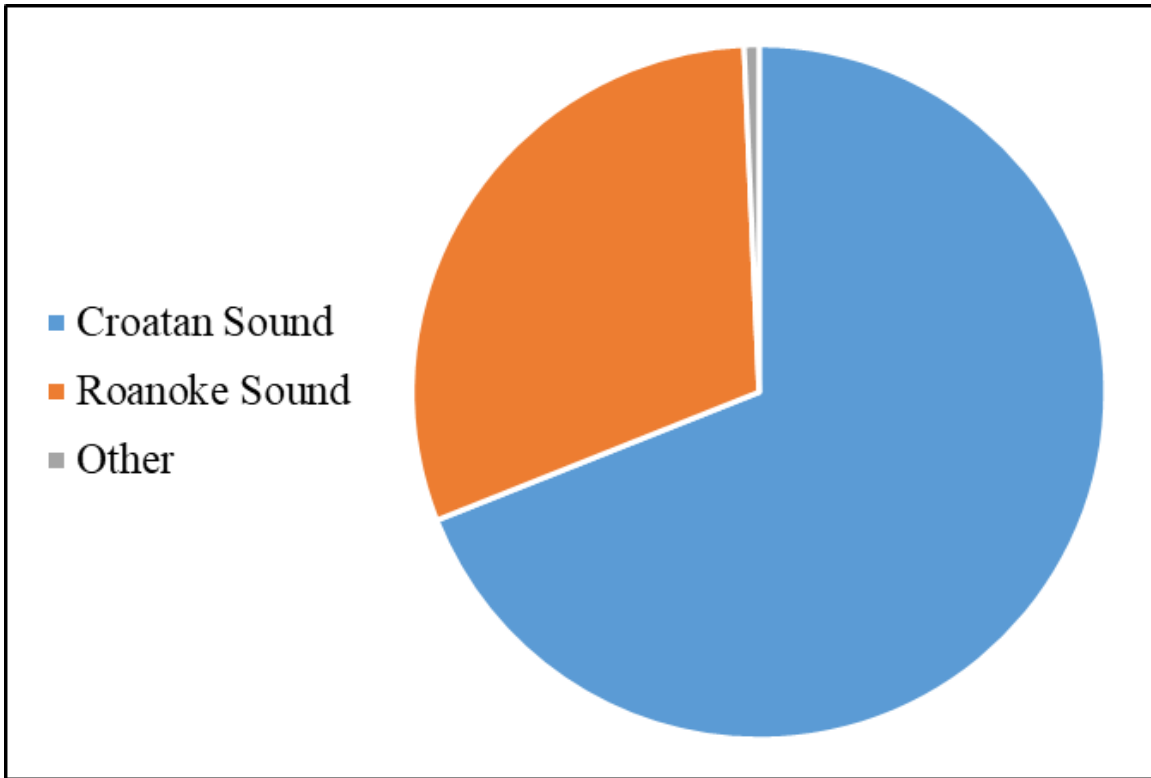


Figure 2.3.18. Percent of value by waterbody in the Northern Region (Croatan Sound, Roanoke Sound, other waterbodies). Other waterbodies include all waters north of Croatan and Roanoke sounds.

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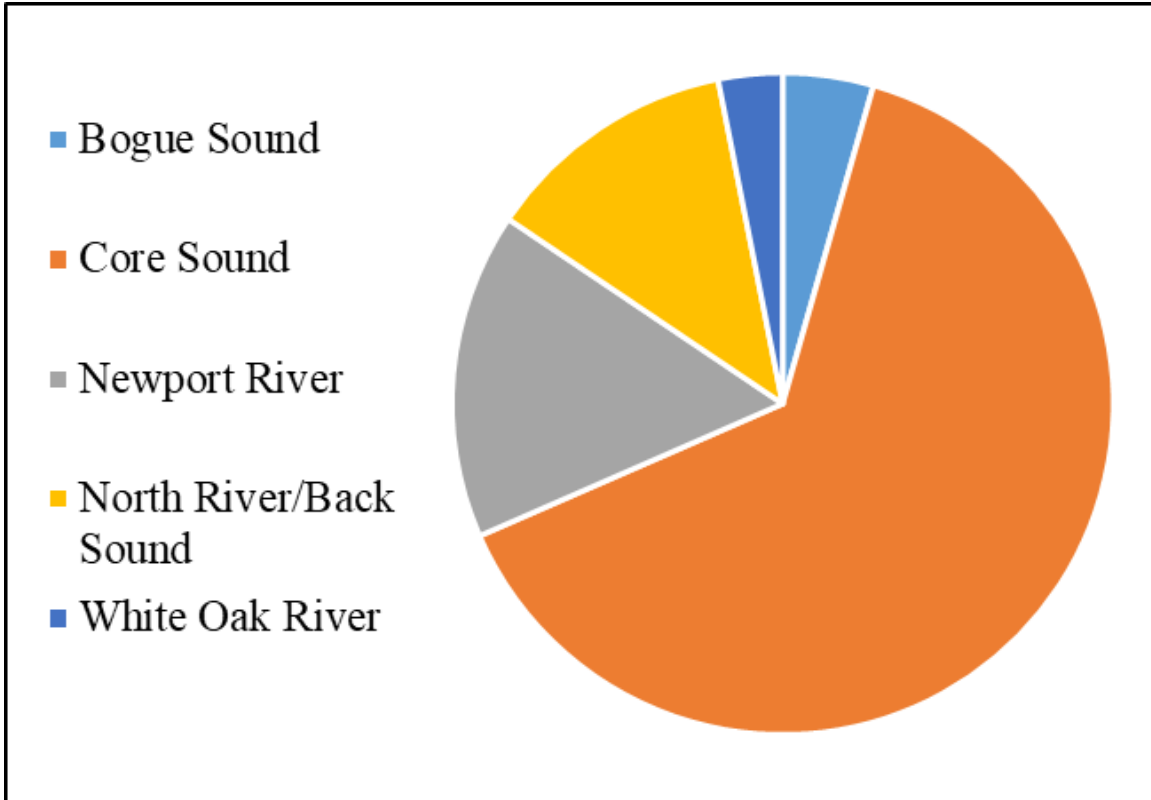


Figure 2.3.19. Percent of value by waterbody in the Central Region (Bogue Sound, Core Sound, Newport River, North River, White Oak River).

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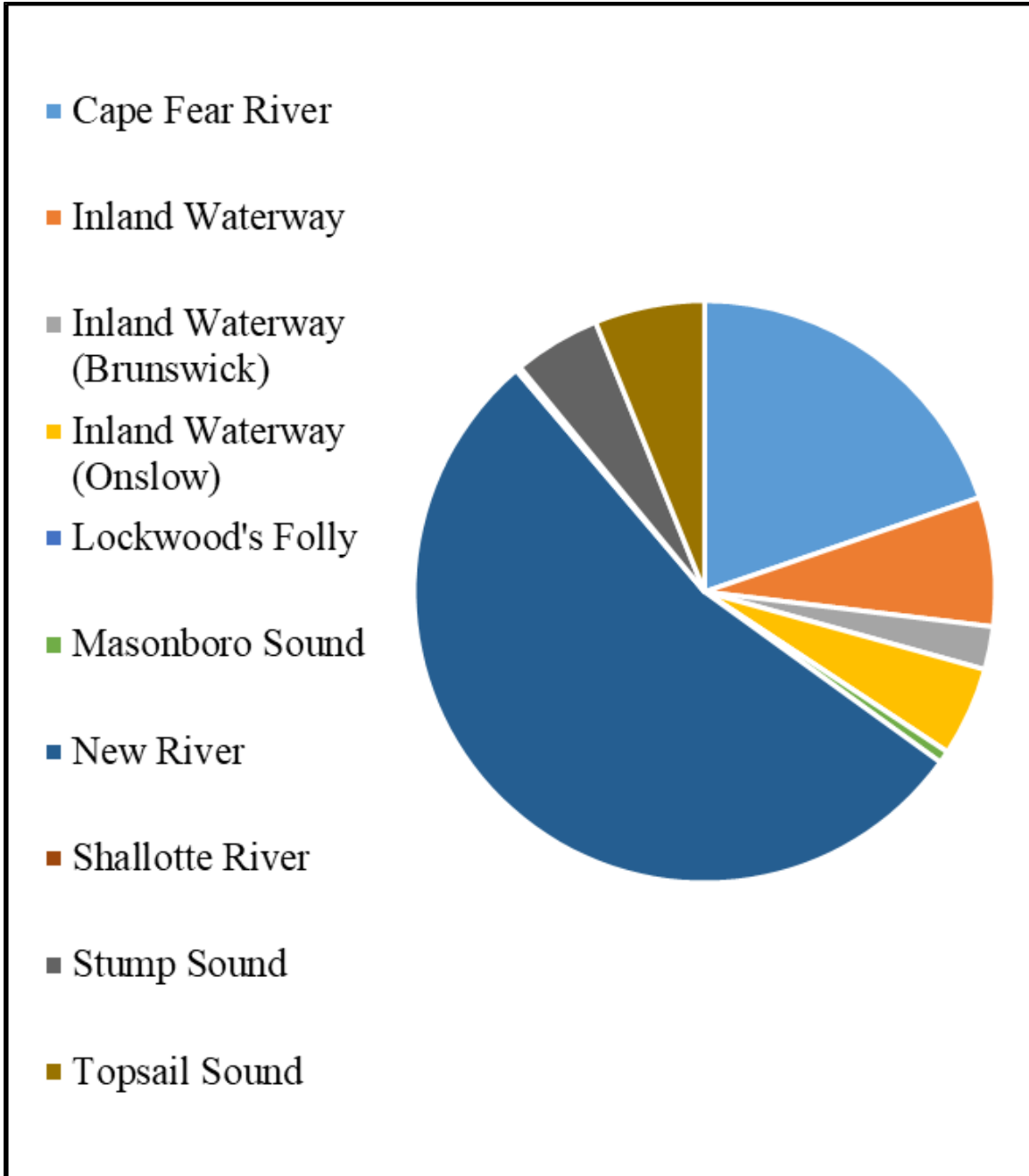


Figure 2.3.20. Percent of value by waterbody in the Southern Region (Cape Fear River, Inland Waterway, Inland Waterway Brunswick, Inland Waterway Onslow, Lockwood's Folly, Masonboro Sound). Waterbody code for Inland Waterway was split in 2002 but was still periodically recorded on old Trip Tickets through 2007.

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APPENDIX 2.3.A. HOT SPOT ANALYSIS

Objective

The objective of this paper is to determine “hot spots” of abundance in the Pamlico Sound, North Carolina for shrimp and economically important species that are common as bycatch in the Pamlico Sound shrimp trawl fishery using fishery independent data collected from the Pamlico Sound Survey (Program 195).

Pamlico Sound Survey

The primary objective of the Pamlico Sound Survey is to produce fishery independent indices of abundance for important recreational and commercial fish species in Pamlico Sound, and the lower Neuse, Pamlico, and Pungo rivers (Figure 1). The survey is considered a stratified random design with strata designated by geographic location and water depth. Stations (one-minute by one-minute grid system equivalent to one square nautical mile) are randomly selected, with 54 stations sampled in June and 54 sampled in September (108 total annually).

Tow duration is 20 minutes at 2.5 knots using the R/V Carolina Coast pulling double rigged 30 ft (9.14 m) mongoose-type Falcon trawls (manufactured by Beaufort Marine Supply; Beaufort, SC) without TEDs. The R/V Carolina Coast is a 44-ft fiberglass hulled double rigged trawler owned and operated by the North Carolina Division of Marine Fisheries (NCDMF). The body of the trawl is constructed of #30 twine with 1.5 in (38.1 mm) stretch mesh. The tailbag is 80 meshes around and 80 meshes long (approximately 10 ft). A 120 ft (36.58 m) three lead bridle is attached to each of a pair of wooden, chain doors that measure 4 ft by 2 ft (1.22 m X 0.61 m) and to a tongue centered on the headrope. A 60 cm “polyball” is attached between the end of the tongue and the tongue bridle cable. A 0.1875 in (4.76 mm) tickler chain, that is 3.0 ft (0.9 m) shorter than the 34 ft (10.36 m) footrope, is connected to the door next to the footrope.

Time Series

Sampling has occurred during the middle two weeks of June and September since 1987, with some exceptions when sampling was extended into July or October because of boat maintenance or bad weather. The time series for this analysis is 1987 to 2019 with June (summer) and September (fall) analyzed separately to capture seasonal variation in “hot spot” locations. Years were combined into three-year groupings (i.e., 1987-1989, 1990-1992, etc.) to create a more spatially robust selection of sampled stations (n=162 in a year grouping for each month) while maintaining the ability to identify potential temporal variation in “hot spot” locations.

Spatial Range

The sample area covers all of Pamlico Sound and its bays, Croatan Sound up to the highway 64 Bridge, the Pamlico River up to Blounts Bay, the Pungo River up to Smith Creek, and the Neuse River up to Upper Broad Creek (Figure 1). Stations sampled are randomly selected from strata based on depth and geographic location. The seven designated strata are the Neuse River (NR), Pamlico River (PR), Pungo River (PUR), shallow and deep Pamlico Sound east of Bluff Shoal

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(PSE and PDE) and shallow and deep Pamlico Sound west of Bluff Shoal (PSW and PDW). For this analysis, only stations in the Pamlico Sound strata (PSE, PDE, PSW, PDW) were considered. This was done based on the analysis objective to identify “hot spots” of abundance in Pamlico Sound to explore potential management actions in the form of areas closed to trawling and including river strata in the analysis could bias the location of these areas and most of the rivers are currently closed to bottom trawl gear.

Target Species / Assemblages

“Hot spots” of abundance for brown shrimp, white shrimp, and pink shrimp were identified. In addition, “hot spots” of abundance for economically important finfish species that are common as bycatch in the Pamlico Sound shrimp trawl fishery were identified. Species analyzed included brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), pink shrimp (*Farfantepenaeus duorarum*), Atlantic croaker (*Micropogonias undulatus*), spot (*Leiostomus xanthurus*), southern flounder (*Paralichthys lethostigma*), summer flounder (*Paralichthys dentatus*), and weakfish (*Cynoscion regalis*). Analysis was performed on each species individually because of variable spatial and temporal habitat use.

Data Processing

To examine spatial and temporal clustering of fish abundance, analysis was performed by the Optimized Outlier Analysis (OOA) and Incremental Spatial Autocorrelation (ISA) tools using ArcGIS Pro 2.5.0 (ESRI) software. The OOA tool creates a map of statistically significant hot spots, cold spots, and spatial outliers using the Anselin Local Moran's I statistic. Moran's I evaluates the overall pattern and trend of the data to determine if it is clustered, random, or dispersed (Moran 1948). In this analysis, fish and shrimp abundances from each sampling site are compared with abundances at all other sampling sites creating an index by using the Anselin Local Moran's I statistic of spatial association:

$$I_i = \frac{x_i - \bar{X}}{S_i^2} \sum_{j=1, j \neq i}^n w_{i,j} (x_j - \bar{X}) \quad (1)$$

where x_i is an attribute for feature i , \bar{X} is the mean of the corresponding attribute, $w_{i,j}$ is the spatial weight between feature i and j , and:

$$S_i^2 = \frac{\sum_{j=1, j \neq i}^n (x_j - \bar{X})^2}{n - 1} \quad (2)$$

with n equating to the total number of features.

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The z_{I_i} -score for the statistics are computed as:

$$z_{I_i} = \frac{I_i - E[I_i]}{\sqrt{V[I_i]}} \quad (3)$$

where:

$$E[I_i] = \frac{\sum_{j=1, j \neq i}^n w_{ij}}{n - 1} \quad (4)$$

$$V[I_i] = E[I_i^2] - E[I_i]^2 \quad (5)$$

A positive value for I indicates that a site has neighboring sites with similarly high or low abundances; these sites will be labeled either a high or low value cluster. A negative value for I indicates that a site has a neighboring site with dissimilar values; this site is labeled an outlier. The local Moran's I is a relative measure and can only be interpreted within the context of its computed z-score or p-value. When the p-value for the site is $p < 0.05$, the cluster or outlier to be considered statistically significant.

Local statistics are calculated on the basis of a defined distance threshold or neighborhood and the results for locations containing similar neighbors are likely to be correlated (Anselin 1995, Getis and Ord 1996). For this analysis, the Incremental Spatial Autocorrelation tool was used to compute Moran's I statistics, z-scores and p-values (Table 1.) Each of the eight finfish and three shrimp species in this analysis exhibit different spatial and temporal differences between spring and fall. Therefore, it was necessary to find an appropriate distance threshold where spatial autocorrelation is maximized for each species (Table 2; ESRI Events 2017).

Though the OOA tool will determine the distance band, the ISA tool was used to confirm the appropriate distance thresholds used in this analysis. The ISA tool measures spatial autocorrelation for a series of distances and optionally creates a line graph of those distances and their corresponding z-scores. ISA compares the abundance values at one site with the values at all other sites creating an index by using the following equation:

$$I = \frac{n \sum_{i=1}^n \sum_{j=1}^n w_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\left(\sum_{i=1}^n \sum_{j=1}^n w_{ij} \right) \left(\sum (x_i - \bar{x})^2 \right)}$$

Where:

n = the total number of sites

\bar{x} = the global mean value

x_i = the abundance value at a particular site

x_j = the abundance value at another site

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w_{ij} = the weight applied to the comparison between site i and site j ,
which is the inverse distance between the two sites ($1/d_{ij}$).

The statistical significance for Moran's I can be calculated using z-score methods. Based on the expected values ($E[I]$) for a random pattern and the variances ($VAR[I]$), the standardized z-score can be mathematically represented as follows:

$$Z = \frac{I - E(I)}{\sqrt{VAR(I)}}$$

The z-scores reflect the intensity of spatial clustering, and statistically significant z-score peaks indicate the distances where clustering is most pronounced (Figure 2). These peak distances are the most appropriate values to use for the distance band parameter in the various clustering and hot spot analysis tools in ArcGIS. When more than one statistically significant peak is present, the appropriate distance is often the first statistically significant peak encountered.

For this analysis, the OOA tool was run with each distance where a peak z-score occurred. The output for each distance threshold was examined for the number of significant clusters, number of locational outliers, and percent of sites with less than eight neighbors (Table 3). Cluster and hot spot analyses have three caveats in determining the appropriate distance threshold: all features should have at least one neighbor, no feature should have all other features as neighbors, and the most appropriate distance will allow a feature to have at least eight neighbors (ESRI).

The OOA tool creates a map showing statistically significant clusters or outliers with 95% confidence level. Sites with high abundance values surrounded by other sites with high abundance values are labeled as high-high (HH) clusters; sites with low abundance values surrounded by other sites with low abundance values are labeled low-low (LL) clusters. Outlier sites, in which a site with a high abundance value is surrounded primarily by sites with low abundance values, are labeled as a high-low (HL) outlier; or a low abundance value primarily surrounded by sites with high abundance values are labeled a low-high (LH) outlier (Fig. 3).

Results and Discussion

This analysis used Cluster and Outlier Analysis to identify high abundance clusters or, hot spots, for five species of finfish and three species and examines temporal and spatial differences in distribution. The OOA tool calculates a z-score to indicate the intensity of clustering at a distance where the clustering is most pronounced. All species analyzed seemed to have hot spots located near the west side of the Pamlico Sound and at the mouths of the Pamlico and Neuse Rivers. However, each of the eight finfish and shrimp species exhibited different distributions of hot spots and showed temporal differences between spring and fall. Atlantic croaker and spot are the two most abundant species captured in the Pamlico Sound Survey (Paris et al. 2020a, 2020b) and the resulting hot spots for both species were the most widely distributed of the five finfish species (Figures 2.3.6 and 2.3.7). The resulting z-scores and distance thresholds indicated similar clustering between the two species. Atlantic croaker had the greatest number of hot spots in

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September, $n = 115$; 26%, and third highest in June, $n = 75$; 14%, while spot had the least number of hot spots in June, $n = 51$; 9% and second least in September $n = 75$; 17% (Table 4). The distance threshold for both species in September was 25,600 m and z -scores were similar, Atlantic croaker $z = 12.29$ and spot, $z = 10.29$. In June, the distance threshold for Atlantic croaker was larger and had a greater z -score, 30,400 m and $z = 9.53$, compared to spot, 25,600 m, $z = 4.88$. Clustering for Atlantic croaker was stronger in the northern portion of the sound extending into the Croatan Sound during September, compared to June where hot spots occurred along the south west portion of the sound. Spot hot spots in June were less concentrated at the mouth of the rivers, extending further east compared to Atlantic croaker and had much less clustering in the north.

Southern flounder showed strong clustering in the southern portion of the sound at the mouths of the Pamlico and Neuse Rivers in both June and September (Figure 2.3.7). More hot spots were identified in June, ($n = 97$; 18%) compared to September ($n = 49$; 11%). Hot spots in September were clustered at the mouth of the Pamlico River, compared to June where hot spots were centered at the mouth of the Pamlico and Neuse rivers extending east towards the center of the sound. The more concentrated clustering in September can also be identified by the lower distance threshold, 14,400 m compared to a distance threshold of 38,400 m in June.

Summer flounder and weakfish had the least temporal differences in hot spot distribution. The hot spots for summer flounder were all located in the northern Pamlico Sound and Croatan Sound in both June and September (Figure 2.3.9), though more hot spots were identified in September. Weakfish hot spots in September are more concentrated in the center of Pamlico Sound compared to June (Figure 2.3.10). The distance threshold for weakfish for both seasons was 25,600 m and with nearly identical z -scores for both seasons ($z = 12.52$ and $z = 12.53$) indicating similarly intense clustering with the same spatial scope for both seasons. Weakfish had the greatest number of hot spots, ($n = 258$; 47%, $n = 116$; 27%) while summer flounder had the second greatest number of hot spots in September ($n = 80$; 18%), and the fourth highest number in June ($n = 72$; 13%). Summer flounder was shown to have close to no temporal difference in hot spot distribution. The number of hot spots was very similar in both seasons ($n = 72$; 13% and $n = 80$; 18%) and had identical distance threshold and z -scores (25,600 m and $z = 11.62$) indicating the same level of clustering.

All three shrimp species had fewer hot spots in June compared to September. In June, shrimp utilize nearshore habitats before moving out to the ocean in the fall. White shrimp hot spots were more prevalent in September ($n = 45$; 38%) compared to June ($n = 23$; 59%) and hot spots were distributed throughout the center of the sound in June and closer to the shoreline in September (Figure 2.3.11). Though white shrimp hot spots were seemingly separated in two different regions, the clustering was strong in those areas. The white shrimp distance threshold in September was lower and the z -score higher (12,800 m; $z = 18.27$) compared to June (22,400 m; $z = 3.98$). Brown shrimp (Figure 2.3.12) had the fewest hot spots of the shrimp species in September ($n = 9$; 23%) and the second fewest in June ($n = 33$; 28%). Hot spots were located close to shore the northern shore of the sound in June and had a low z -score ($z = 4.30$) indicating low intensity clustering. In September, brown shrimp moved toward the center of the sound with a low z -score, $z = 3.39$. Pink shrimp hot spots were concentrated in the center of the sound in both seasons (Figure 2.3.13). Pink shrimp had the fewest hot spots in June ($n = 7$; 18%) increasing in September ($n = 40$; 34%).

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Clustering in June was not as strong (14,400 m; $z = 6.72$) compared to September (14,400 m; $z = 11.08$).

This analysis contained data from eight separate species with varied life histories and distributions over a 32-year time series. Examining each species individually was necessary to discern species specific temporal and spatial trends. When all species' hot spots were plotted on one map no clear pattern spatial pattern emerges. The map of June hot spot frequency shows distribution of finfish and shrimp throughout the sound (Figure 2.3.14). There is a concentration of high value clusters in the northern part of the sound between Hyde County and Cape Hatteras, likely because of weakfish hot spots in this region. The map of September hot spot frequency shows a distinct temporal shift in distribution from June. Finfish are concentrated at the mouths of the Pamlico and Neuse Rivers and in the northern portion of Pamlico Sound into Croatan Sound. Shrimp hot spots were found in the center of Pamlico Sound, but not in large numbers.

Identifying hot spots for commercially important bycatch species commonly found in the North Carolina shrimp trawl fishery can help managers determine regulations to protect areas that are important for these species. Examining hot spots for shrimp and bycatch species together helps identify area where finfish may not be abundance and shrimp may be abundant, therefore allowing the shrimp trawling in these areas may effectively reduce bycatch while allowing shrimp harvest to occur. This analysis does indicate a strong temporal shifts in distribution for some finfish and shrimp species, and provides evidence for mangers to propose seasonal regulations to protect important bycatch species.

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Tables

Table 2.3.A.1. Output from the Incremental Spatial Autocorrelation Tool (ISA) from weakfish in June.

Year	Distance (ft)	Moran's I	z-score	p-value
1987_1989	20,800	0.25	12.62	0.00
1990_1992	14,400	0.30	10.23	0.00
1993_1995	33,600	0.14	11.93	0.00
1996_1998	28,800	0.02	2.29	0.00
1999_2001	33,600	0.15	12.52	0.02
2002_2004	17,600	0.15	7.21	0.00
2005_2007	25,600	0.11	7.39	0.00
2008_2010	36,800	0.01	2.26	0.02
2011_2013	24,000	0.17	10.20	0.00
2014_2016	14,400	0.31	11.56	0.00
2017_2019	14,400	0.22	7.63	0.00

Table 2.3.A.2. Distance thresholds and z-scores for the five finfish and three shrimp species used in this analysis.

Species	June		September	
	Distance (m)	z-score	Distance (m)	z-score
Atlantic croaker	30,400	9.53	25,600	12.29
southern flounder	38,400	13.91	14,400	11.06
spot	25,600	4.88	25,600	10.29
summer flounder	25,600	11.62	25,600	11.62
weakfish	33,600	12.52	19,200	12.53
brown shrimp	16,000	4.30	20,800	3.39
pink shrimp	14,400	6.72	14,400	11.08
white shrimp	22,400	3.98	12,800	18.27

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Table 2.3.A.3. Output from Optimized Outlier Analysis tool for identified peak z-scores with ISA, with June weakfish data.

Year	Distance (ft)	Features (N)	Locational outliers	Significant Clusters	High-value Outliers	Low-value Outliers	Low Value Clusters	High Value Clusters	% of Features Have Less Than 8 Neighbors
1993_1995	33,600	114	0	100	4	24	40	32	0
1999_2001	33,600	118	1	106	3	26	40	37	0
2014_2016	14,400	119	2	48	2	14	12	20	8.4

Table 2.3.A.4. Total amount of Hot Spots generated by species.

Species	June		September	
	Total	% of Total	Total	% of Total
Atlantic croaker	75	14	115	26
southern flounder	97	18	49	11
spot	51	9	75	17
summer flounder	72	13	80	18
weakfish	258	47	116	27
Finfish Total	553	100	435	100
brown shrimp	9	23	33	28
pink shrimp	7	18	40	34
white shrimp	23	59	45	38
Shrimp Total	39	100	118	100

Table 2.3.A.5. Distance thresholds and Z-scores produced by the Optimized Outlier Analysis tool for each finfish and shrimp species.

Species	June		September	
	Distance (m)	z-score	Distance (m)	z-score
Atlantic croaker	30,400	9.53	25,600	12.29
southern flounder	38,400	13.91	14,400	11.06
spot	25,600	4.88	25,600	10.29
summer flounder	25,600	11.62	25,600	11.62
weakfish	33,600	12.52	19,200	12.53
brown shrimp	16,000	4.30	20,800	3.39
pink shrimp	14,400	6.72	14,400	11.08
white shrimp	22,400	3.98	12,800	18.27

Figures

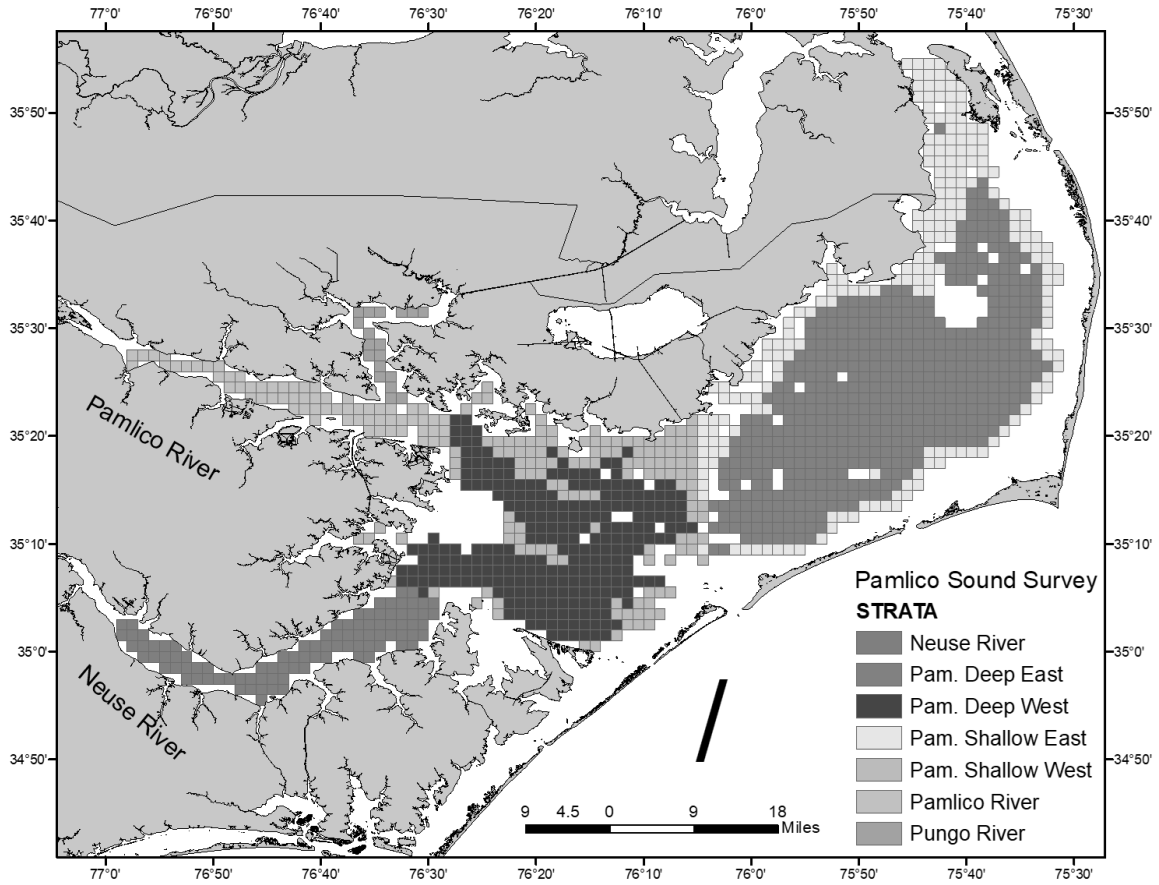


Figure 2.3.A.1. Pamlico Sound Survey sampling grids by strata.

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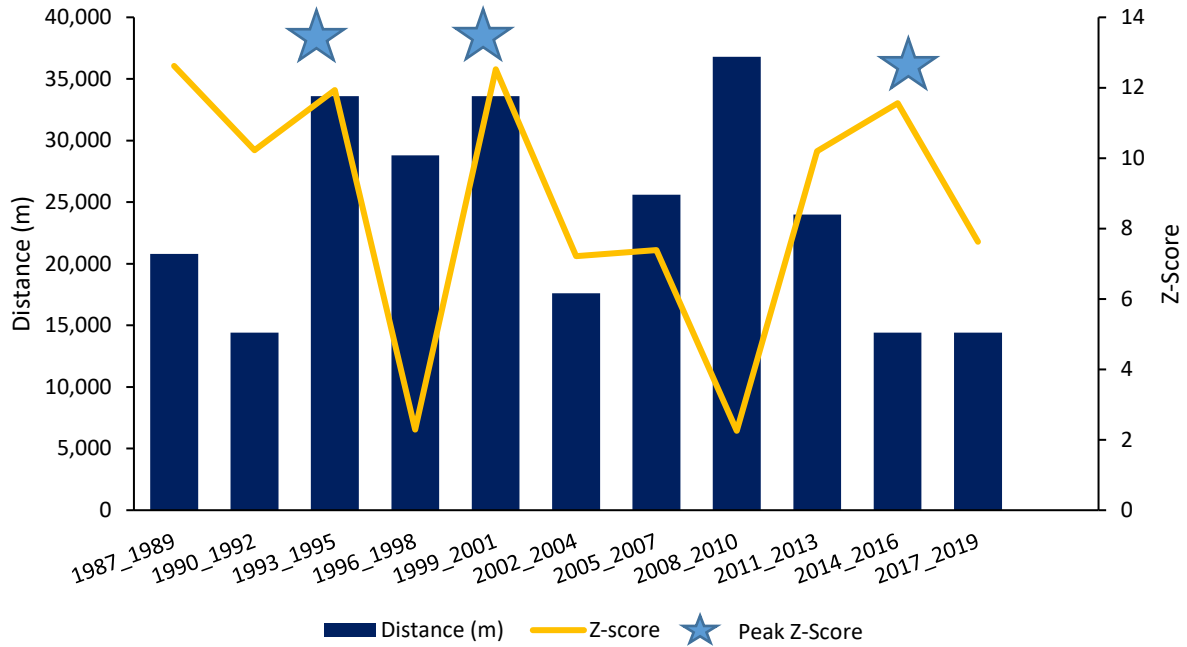


Figure 2.3.A.2. Results from ISA on June weakfish survey data, showing the highest (peak) z-score values using a 33,600 m distance threshold. z-score peaks reflect distances where clustering is most pronounced.

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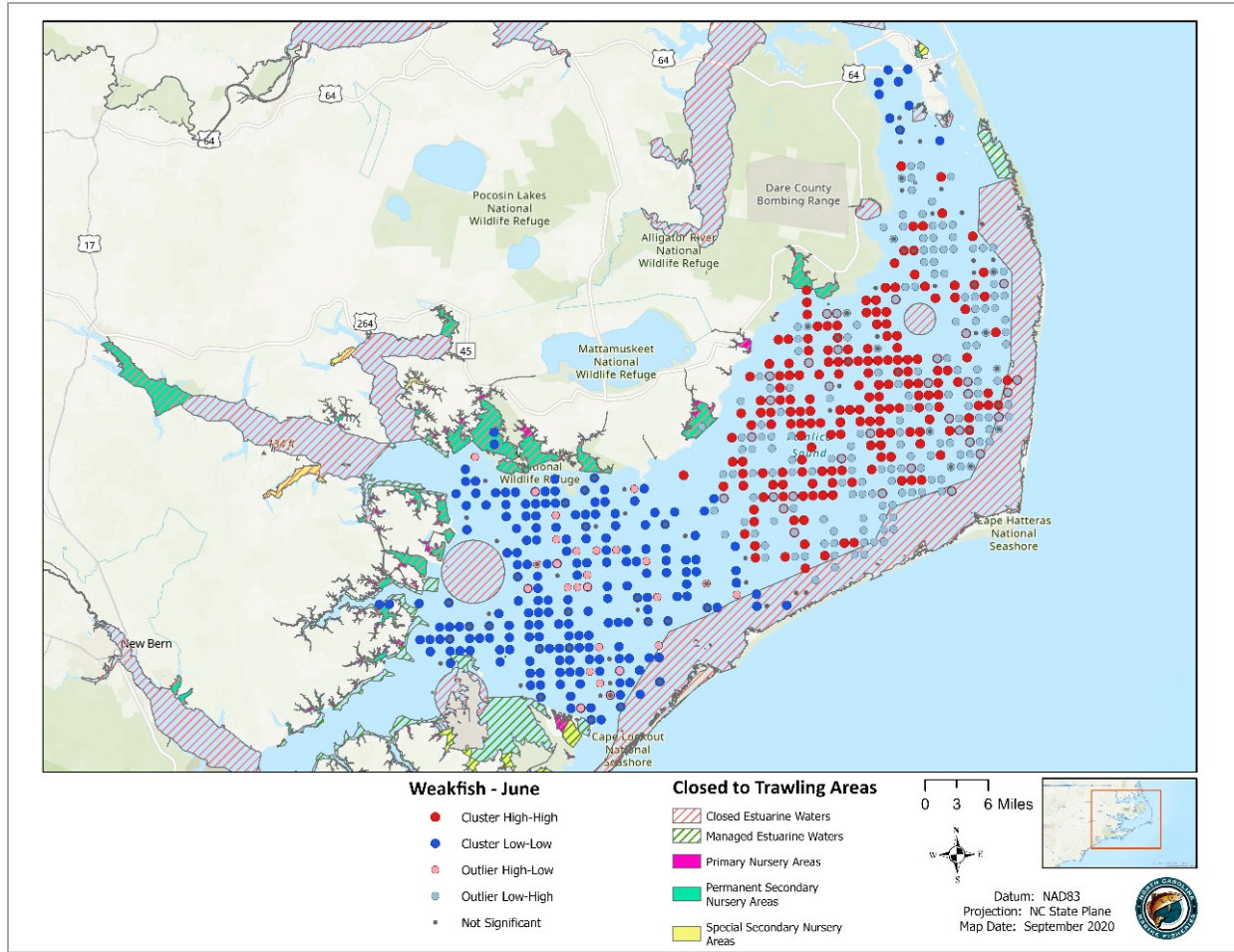
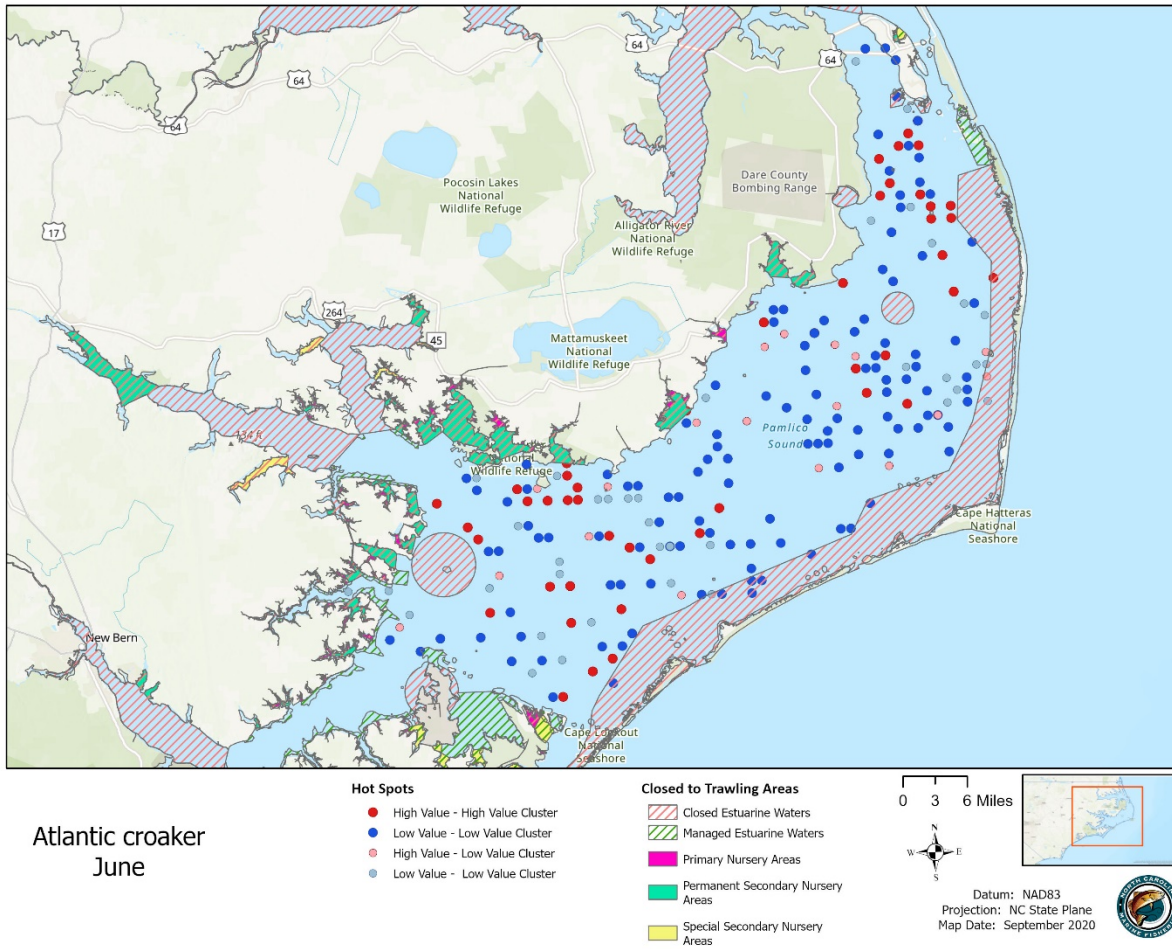


Figure 2.3.A.3. Results of OOA tool using weakfish data from June, between the years 1987-2019.

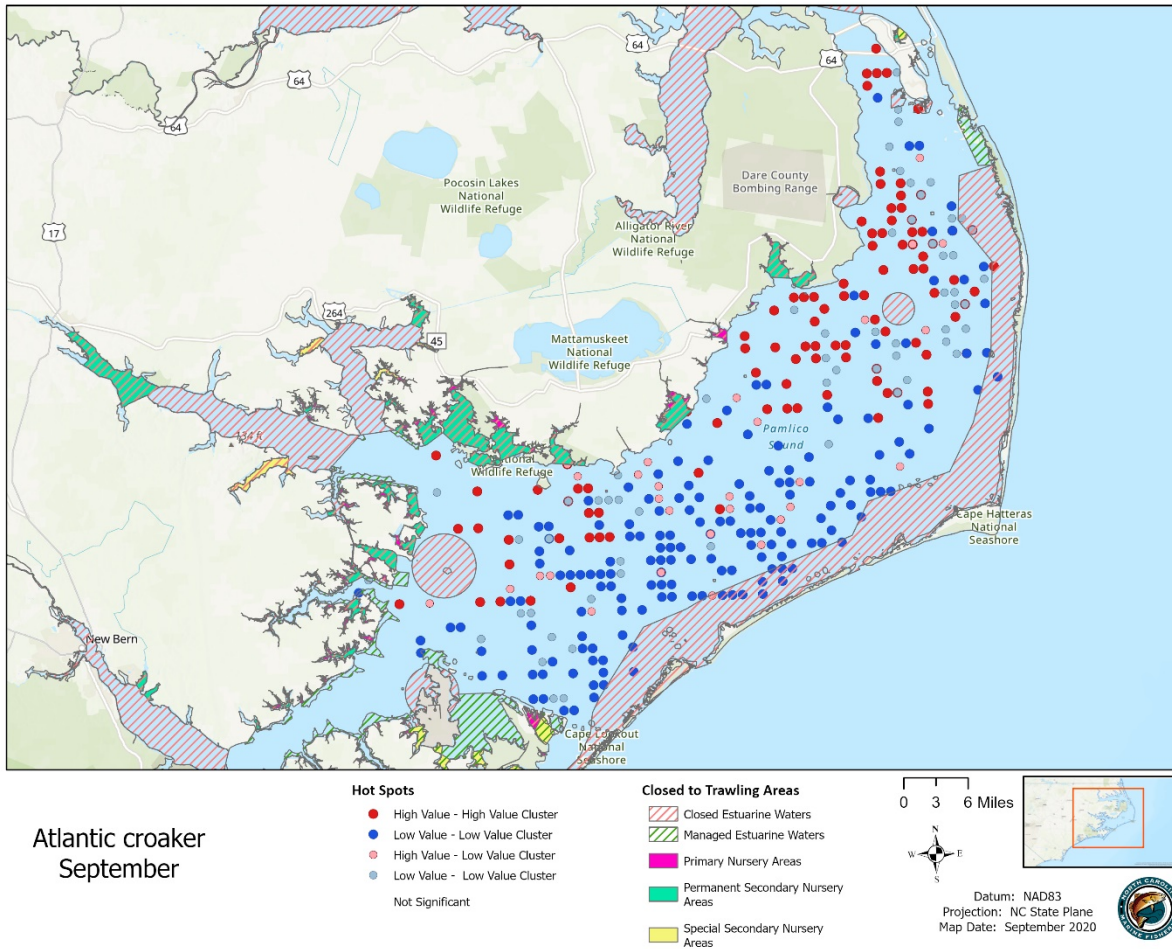
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APPENDIX 2.3.B. MAPS OF HOT SPOTS OF ABUNDANCE IN PAMLICO SOUND



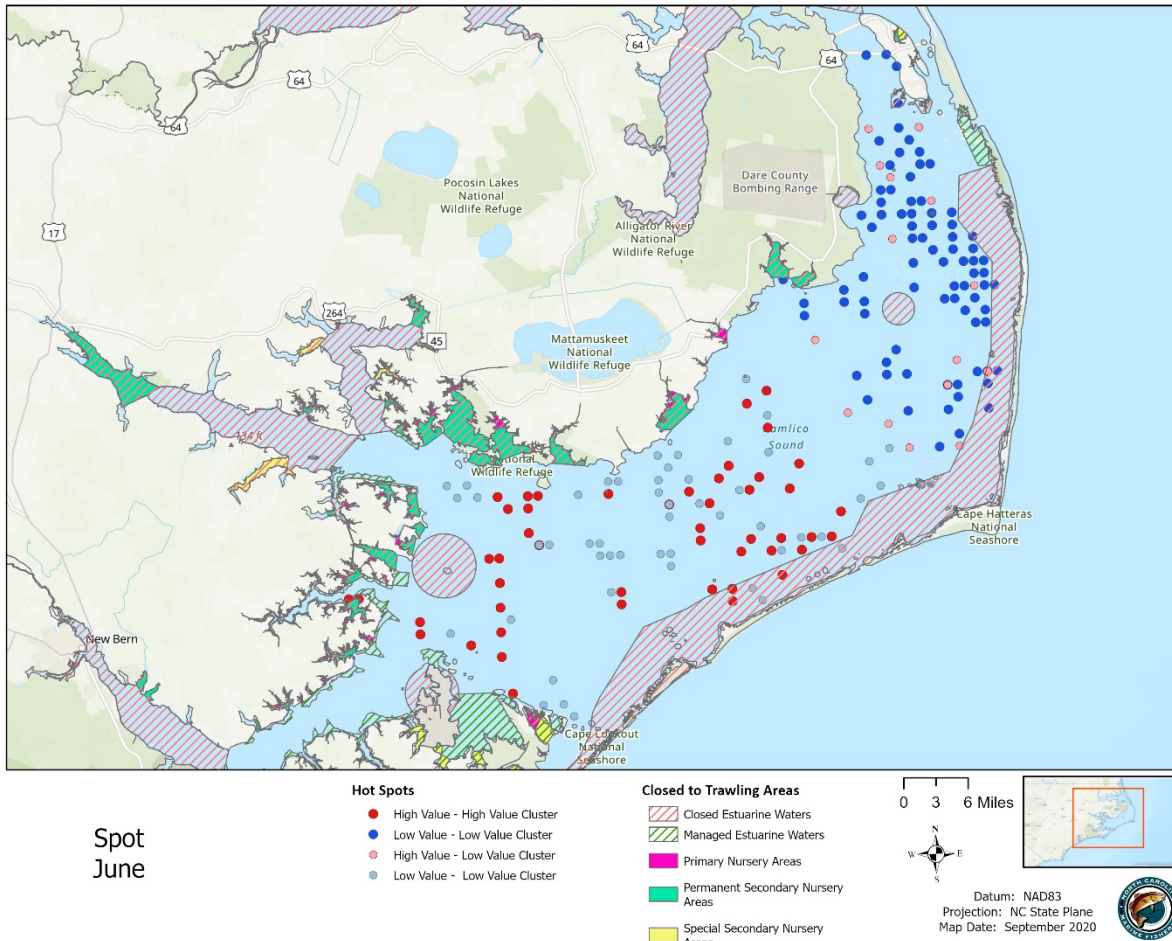
Map 2.3.B.1. Hot spots of abundance for Atlantic croaker in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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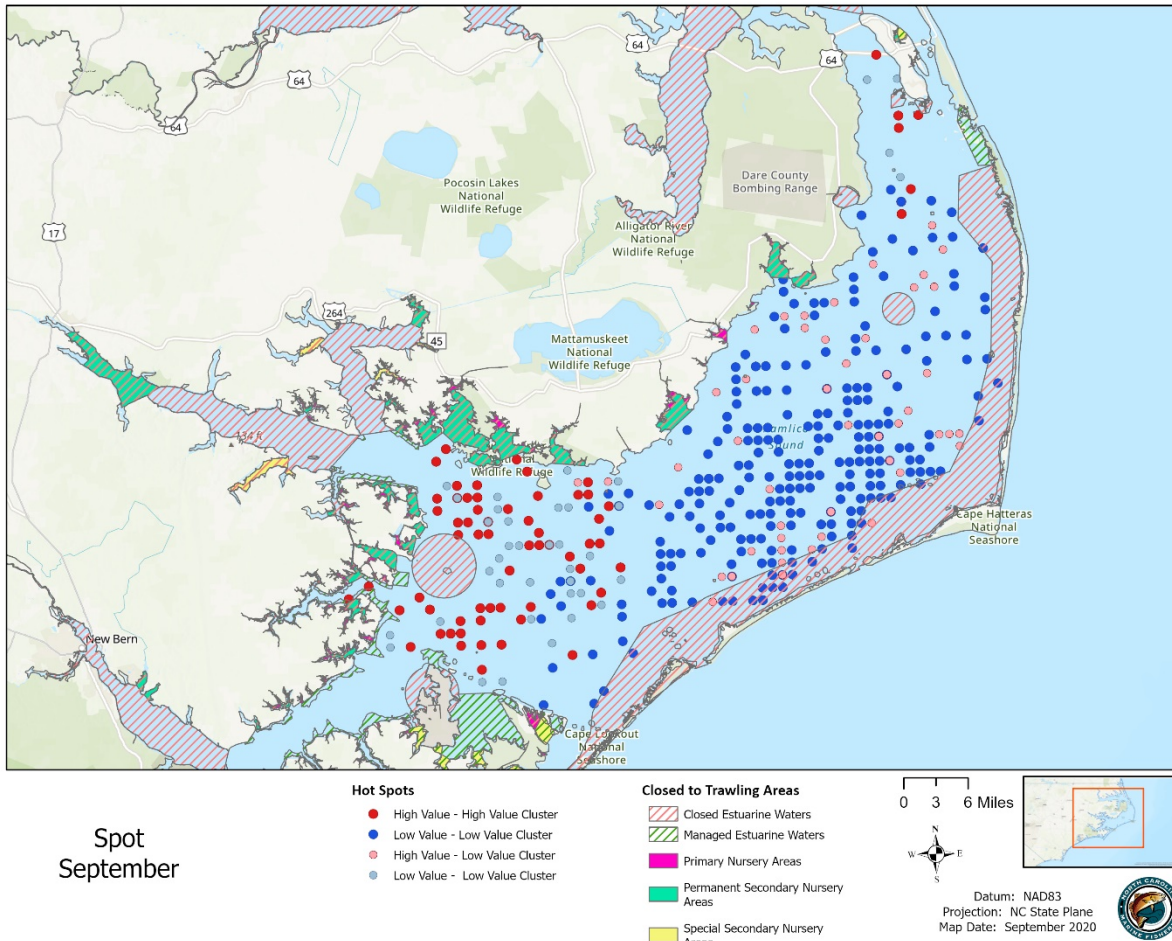
Map 2.3.B.2. Hot spots of abundance for Atlantic croaker in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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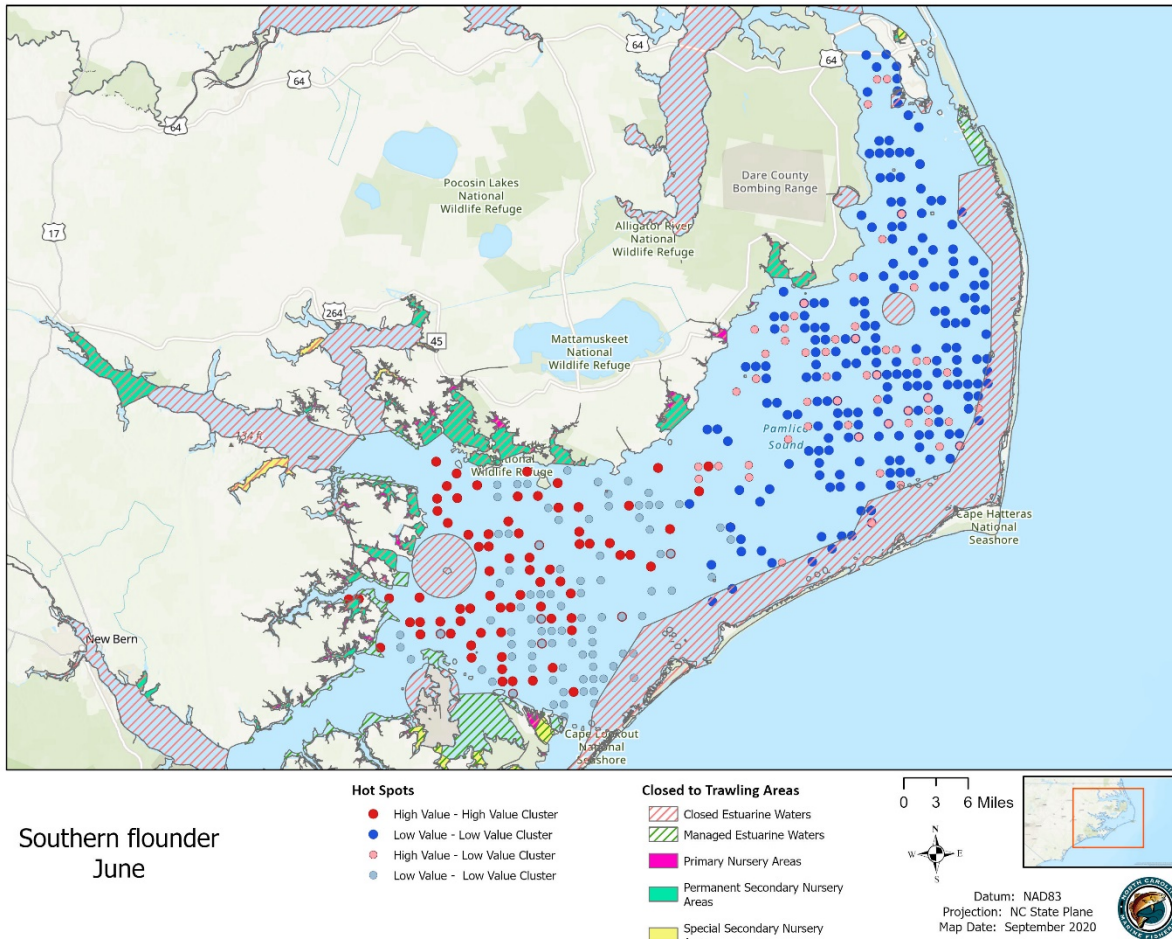
Map 2.3.B.3. Hot spots of abundance for spot in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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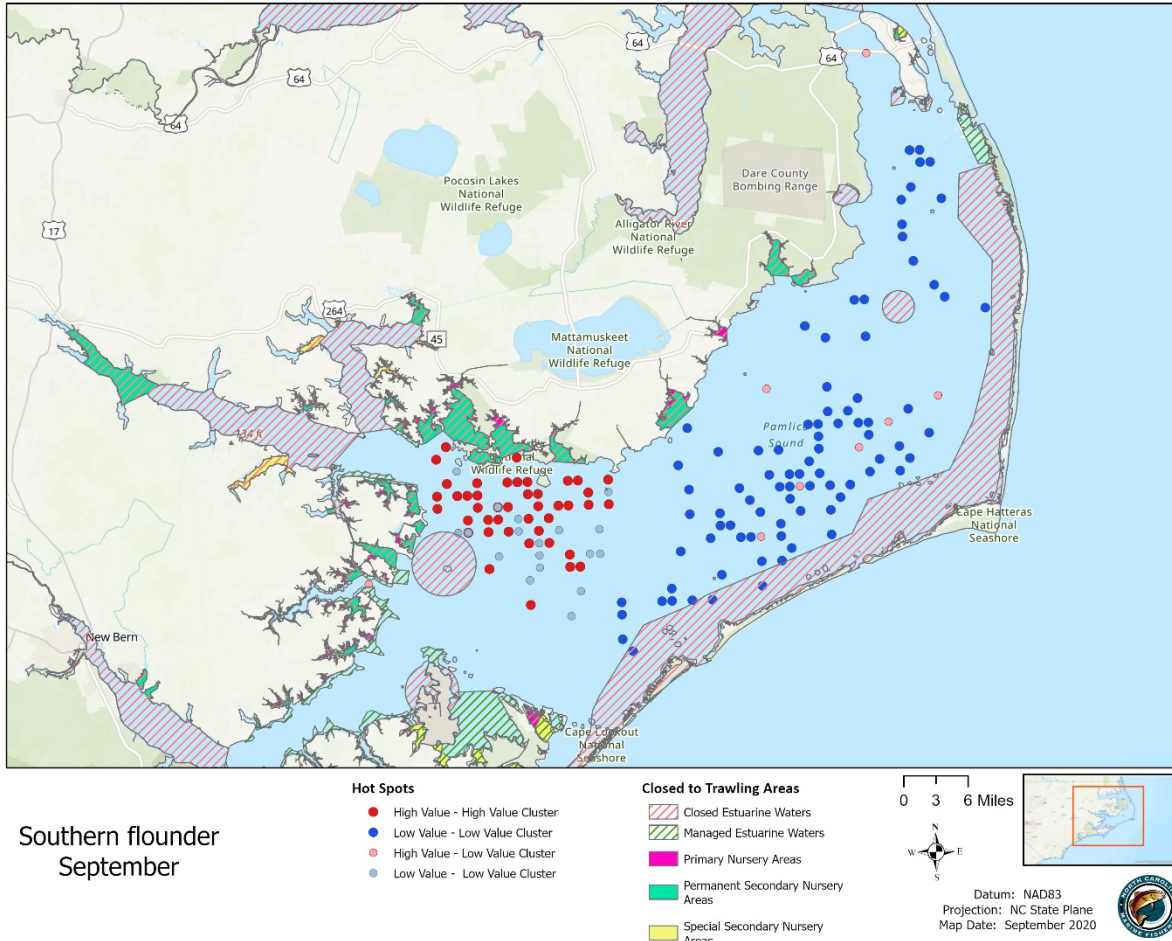
Map 2.3.B.4. Hot spots of abundance for spot in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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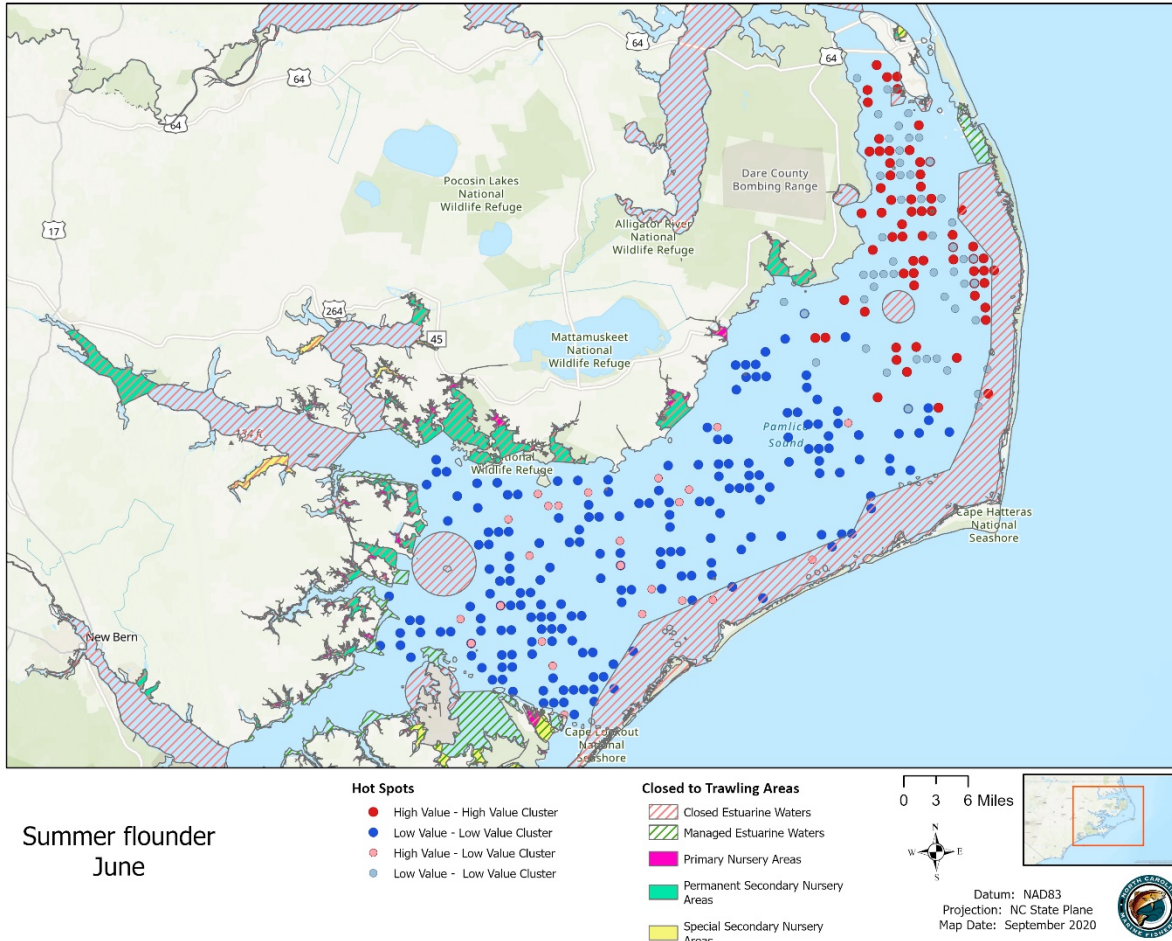
Map 2.3.B.5. Hot spots of abundance for southern flounder in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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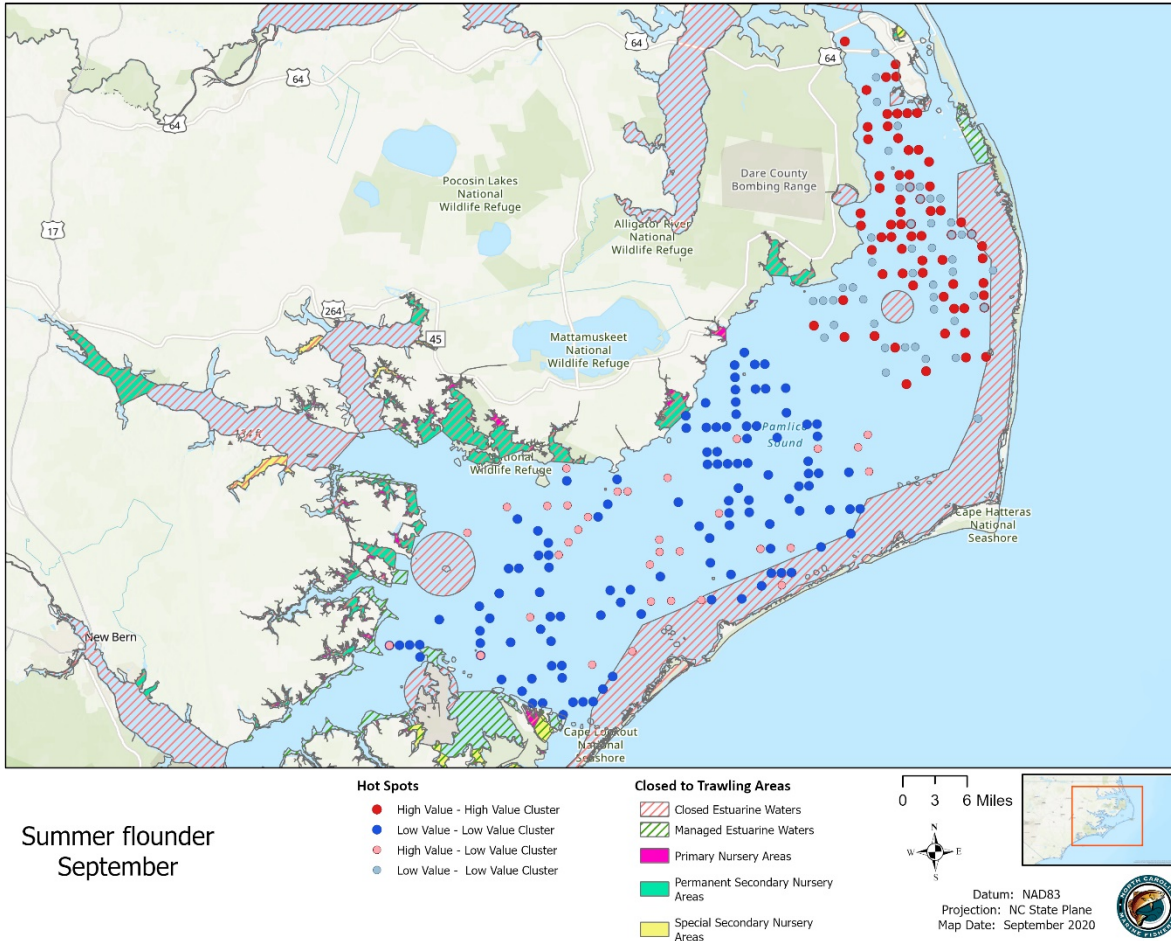
Map 2.3.B.6. Hot spots of abundance for southern flounder in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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Map 2.3.B.7. Hot spots of abundance for summer flounder in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

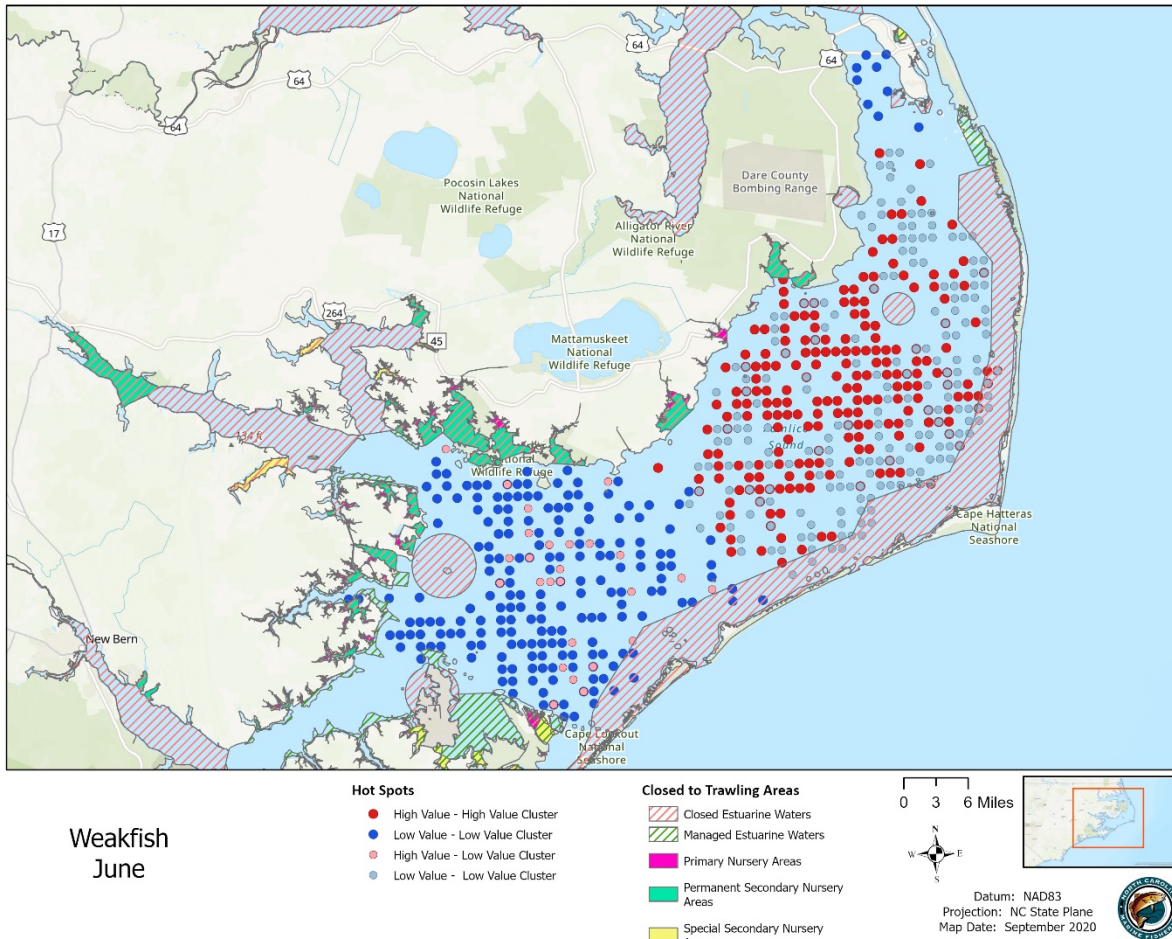
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Summer flounder
September

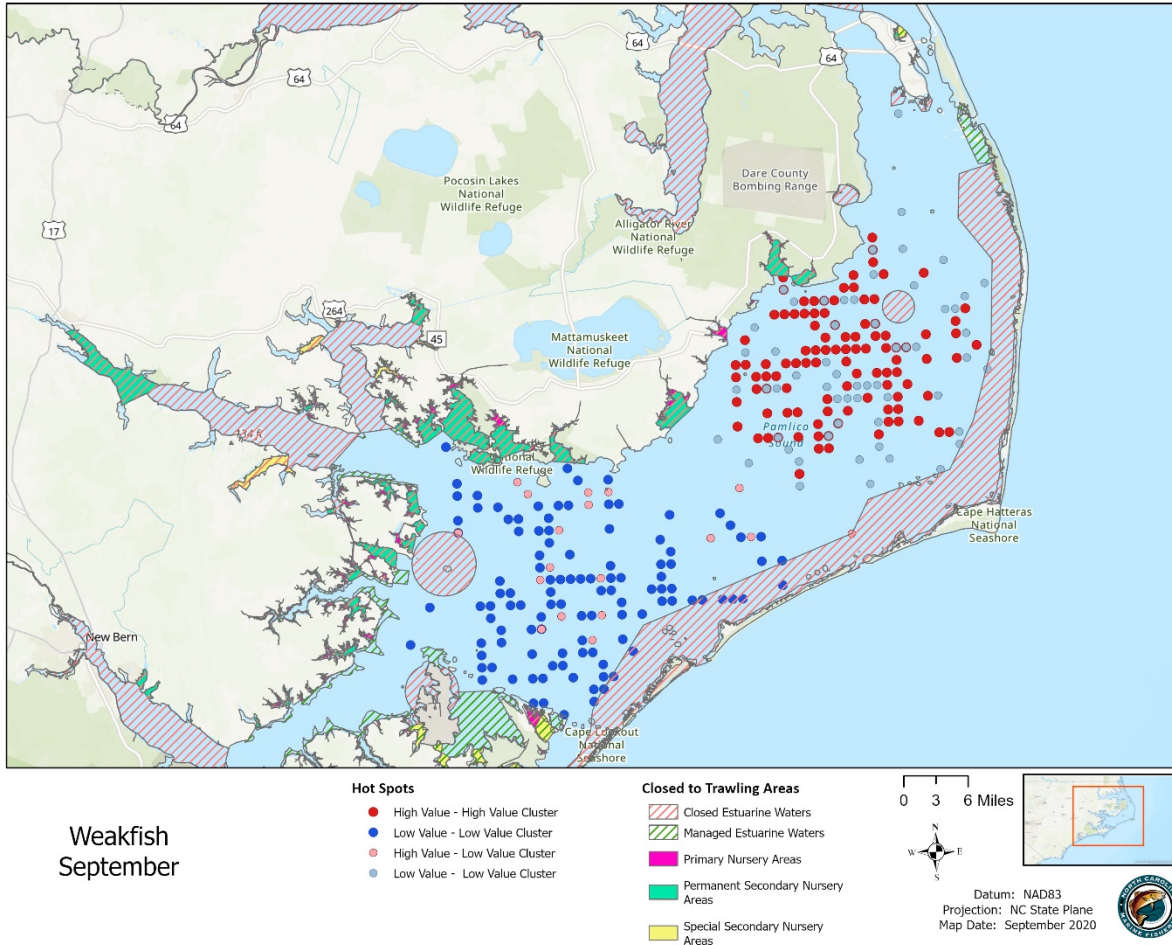
Map 2.3.B.8. Hot spots of abundance for summer flounder in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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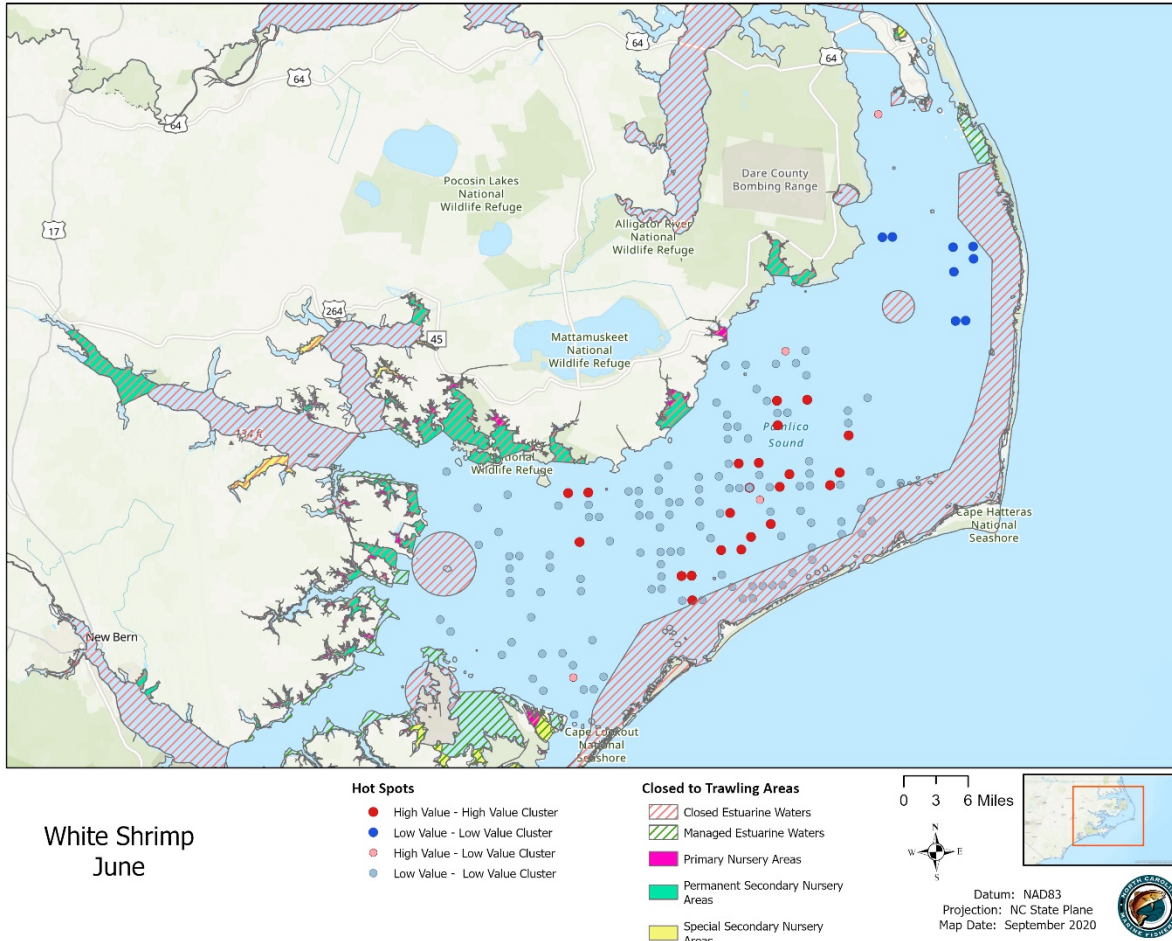
Map 2.3.B.9. Hot spots of abundance for weakfish in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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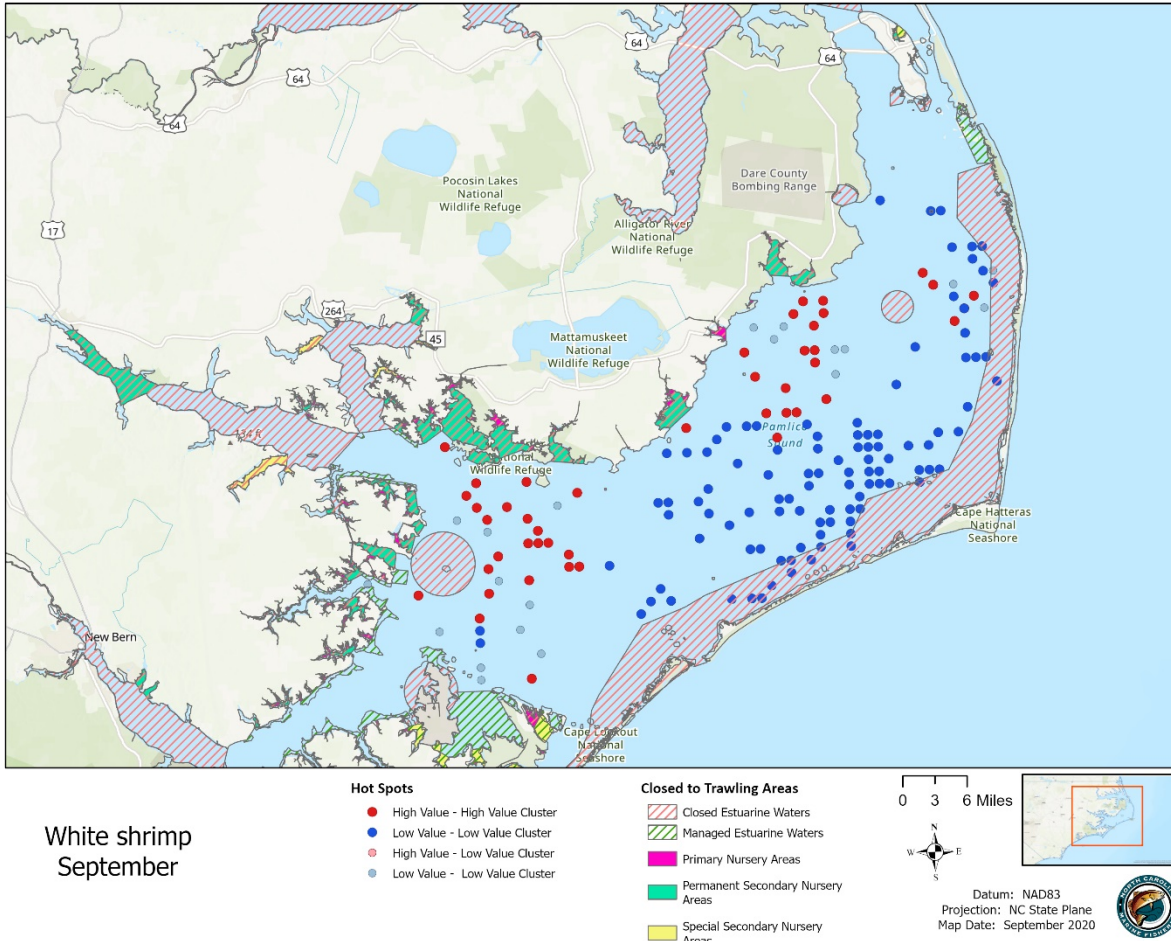
Map 2.3.B.10. Hot spots of abundance for weakfish in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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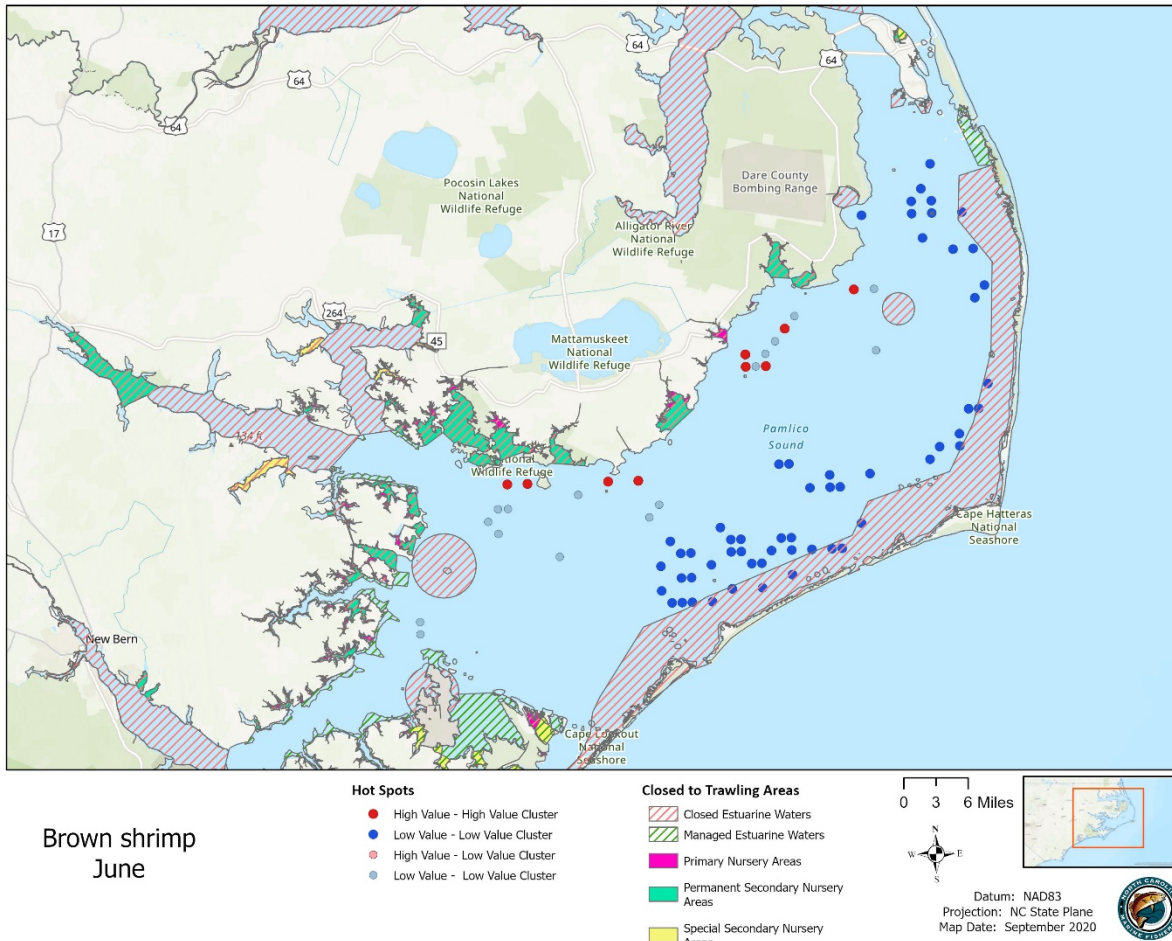
Map 2.3.B.11. Hot spots of abundance for white shrimp in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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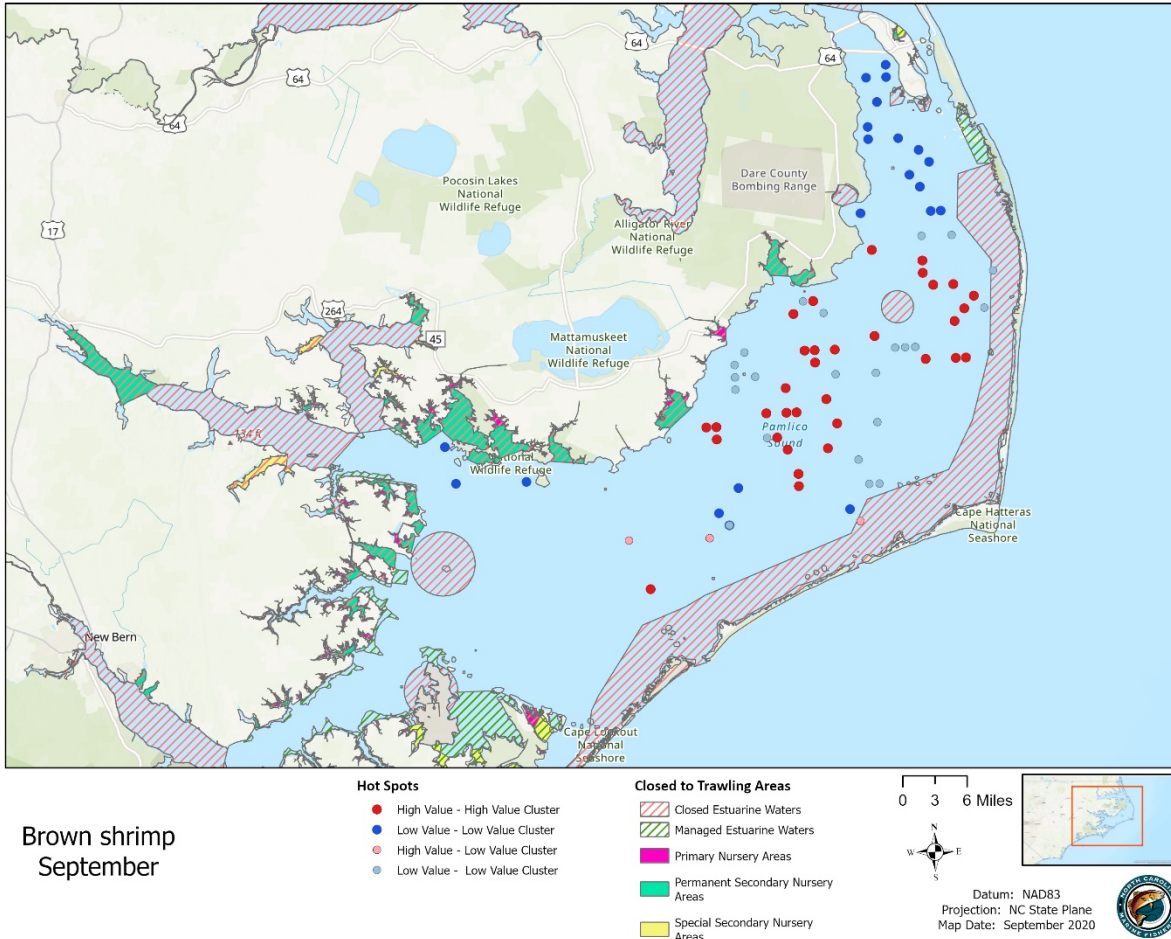
Map 2.3.B.12. Hot spots of abundance for white shrimp in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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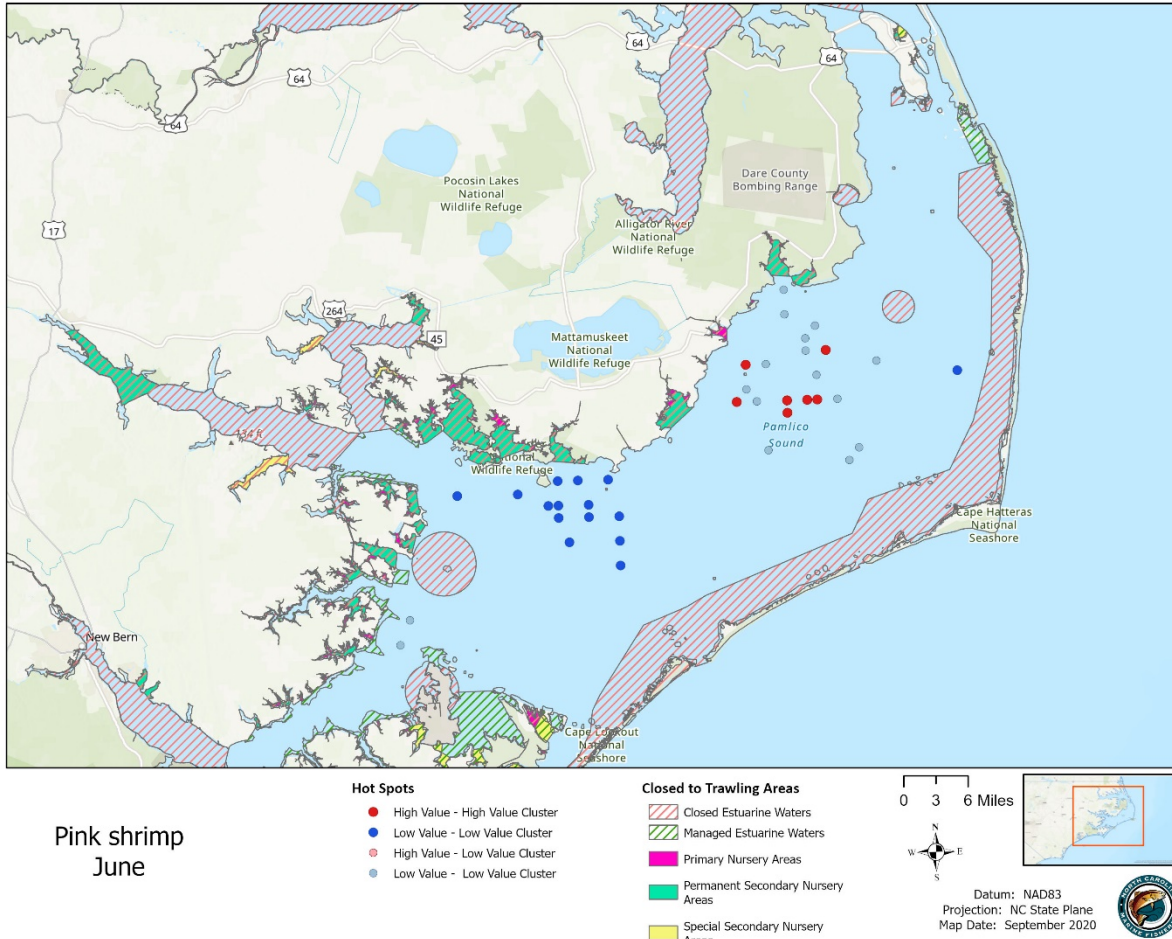
Map 2.3.B.13. Hot spots of abundance for brown shrimp in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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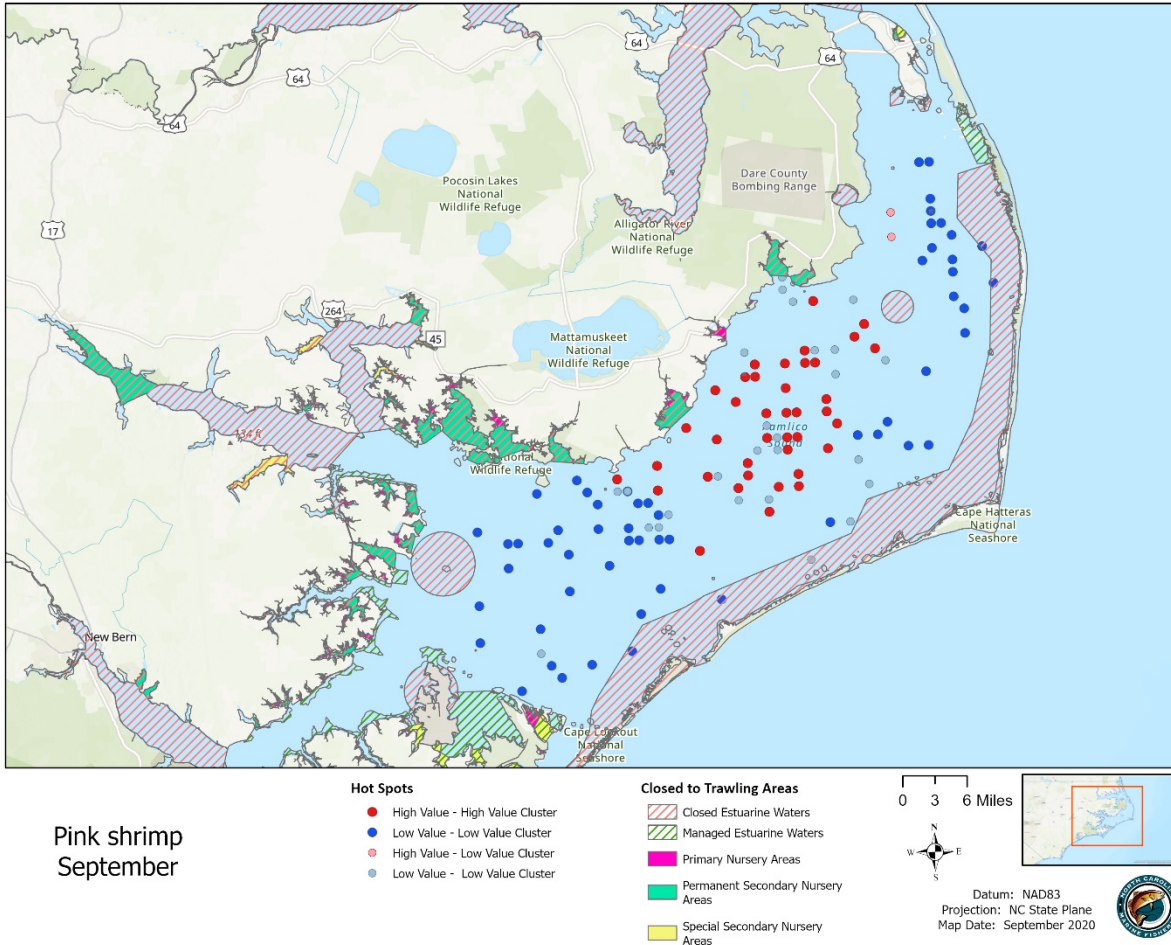
Map 2.3.B.14. Hot spots of abundance for brown shrimp in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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Map 2.3.B.15. Hot spots of abundance for pink shrimp in the Pamlico Sound during June using aggregate data from Program 195, 1987-2019.

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Map 2.3.B.16. Hot spots of abundance for pink shrimp in the Pamlico Sound during September using aggregate data from Program 195, 1987-2019.

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APPENDIX 2.4. MANAGING EFFORT AND GEAR IN THE NORTH CAROLINA SHRIMP FISHERY TO REDUCE BYCATCH

I. ISSUE

Examine potential management measures to reduce bycatch in the North Carolina shrimp fishery through effort reductions and gear management.

II. ORIGINATION

This issue originated from concerns brought forth by the public, conservation groups, and the North Carolina Marine Fisheries Commission.

III. BACKGROUND

General Background on Bycatch

Bycatch is defined by the Atlantic States Marine Fisheries Commission (ASMFC) as “the portion of a catch taken incidentally to the targeted catch because of non-selectivity of the fishing gear to either species or size differences” (ASMFC 1994). In the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), bycatch is defined as “fish which are harvested in a fishery, but which are not sold or kept for personal use.” Fish in the MSFCMA is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. Bycatch can generally be divided into two components: incidental catch and discarded catch. Incidental catch refers to retained catch of non-target species. Discarded catch is that portion of the catch returned to the sea because of economic, legal, or personal considerations. Differences in market prices for a given size-class of a species or limited storage space can also lead to “high grading”, where less valuable species and size classes are discarded to make space for more valuable fish (Bellido et al. 2011). The biological significance of bycatch can be judged from a number of different perspectives, including those of the populations (e.g., of a particular species), of the fishery or fisheries that target or otherwise encounter the species, and of the general biological community or ecosystem (Murawski 1995).

Through the years, interest in bycatch has shifted from its potential commercial use to concerns about impacts on finfish and other populations, biodiversity, and ecosystem trophic structure (Murray et al. 1992; Hall et al. 2000; Davies et al. 2009). Despite increased public awareness, greater management scrutiny, and significant research efforts, many basic questions remain unanswered. The biggest unanswered question in most fisheries is simply: *How much bycatch is there?* Given this situation, it is not surprising little is known about the impacts of bycatch on specific fisheries, fish populations, and marine communities. Although more information is needed to fully assess the effect of bycatch on fish populations and the ecosystem, continued concern and public policy dictates that bycatch be either eliminated or reduced to insignificant levels (Crowder and Murawski 1998). A prime example of this point can be found in the 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) which contained National Standard (#9) requiring bycatch minimization (USDOC 1996). National Standard 9 states: “Conservation and management measures shall, to the extent practicable, (A) minimize

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bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.” This has been maintained in each subsequent reauthorization of the MSFCMA [16 U.S.C. 1801 - 1891(d)]. Additionally, in 1991 the North Carolina Marine Fisheries Commission (NCMFC) adopted a policy directing the division to establish the goal of reducing bycatch losses to the absolute minimum and to consciously incorporate this goal into all management considerations (Murray et al. 1992).

It is apparent to scientists, natural resource managers, fishermen, and much of the public that bycatch is an important issue and must be addressed. However, characterizing the nature and extent of bycatch has proven difficult. These difficulties are generally attributed to inadequate monitoring of many pertinent fishery characteristics including actual bycatch levels, effort of the directed fishery, distribution of bycatch species, and the mortality rate of discarded species. The problem is exacerbated by the patchy distribution of effort and juvenile finfish in both time and space. The amount of bycatch generally varies from tow to tow (and depends on many factors), with many tows having some bycatch and fewer tows with high bycatch (Diamond 2003). Additionally, available effort data are often insufficient. Although research indicates tow duration is often a significant factor when estimating bycatch losses (e.g., mortality), the division and most other agencies typically record effort data by trip, without any accompanying information on tow duration or the number of tows made during a trip; although a few fisheries use logbooks to record effort metrics like tow time (Broadhurst et al. 2006; A. Bianchi, NCDMF, personal communication). Mortality of bycatch captured in shrimp trawls varies considerably, not only by species, but also in response to factors such as tow time and time out of water (Johnson 2003) as well as water temperature, fishing location, time of year, and gear configuration.

Several methods have been used to estimate shrimp trawl bycatch. One popular method of estimating bycatch is the ratio method. This method uses some information about the ratio of bycatch to the target catch caught by a gear or fishery and uses the reported landings of the target species multiplied by the ratio to estimate the total amount of bycatch (Diamond 2003). Typically, bycatch to catch ratios have been used to support or deny claims about how “clean” a fishery or gear is operated. As an example, if a particular gear or fishery has a bycatch to catch ratio of 1:5 it may be perceived to be a cleaner fishery than one with a 5:1 or even a 1:1 ratio. However, if the actual amount of bycatch is relatively equal in all these cases, then the variability in the ratio is caused by either differing target species or variations in the population of the target species. If the primary concern is the impact to the bycatch species, all the examples above have the same impact regardless of the bycatch to catch ratio. Therefore, the bycatch to catch ratio is not as informative as much as the actual catch rate (or total catch) of the bycatch species. A comparison among several ratio methods and a catch-per-unit-effort (CPUE) method found that the four ratio methods tested were more biased than the CPUE method. Additionally, the four ratio methods were more influenced by the mean or variance of the catch, observer coverage, and correlation between the bycatch and target catch (Diamond 2003). However, in most cases the data needed to calculate reliable CPUE estimates for bycatch species is lacking.

The lack of reliable discard estimates has not stopped researchers from investigating stock assessment impacts, but it has prevented increases in precision. Most stock assessments address the impact of bycatch through sensitivity analyses by comparing the basic stock assessment results over a range of bycatch estimates and assumptions [see 2010 Atlantic croaker stock assessment

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for an example of this approach (ASMFC 2010)]. If none of the results seem plausible, the stock assessment may proceed without bycatch estimates included but with the caveat that results may be biased or contain additional uncertainties due to unknown levels of missing catch. However, the omission of discard data may result in underestimating fishing mortality and lead to a biased stock assessment (Bellido et al. 2011).

Incidental Landings from Shrimp Trawls

The incidental landings of non-target species by shrimp trawls have declined significantly since 1994 (NCDMF Trip Ticket Program; Figure 2.4.1). On average, 125,402 pounds of incidental finfish catch were landed and sold annually from shrimp trawls from 2010 to 2019; representing 83.3% of all incidental landings sold during this period. Species where the effects of incidental landings and bycatch in shrimp trawls on their sustainability has been raised as a concern include spot (*Leiostomus xanthurus*), flounder (Paralichthid spp.), Atlantic croaker (*Micropogonias undulatus*), sheepshead (*Archosargus probatocephalus*), and weakfish (*Cynoscion regalis*). These species on average accounted 44% of the incidental landings annually from shrimp trawls from 1994 through 2009 (Figure 2.4.2). However, this has decreased substantially to only 17% from 2010 through 2019. Additionally, the magnitude of incidental landings has decreased significantly over time (Figure 2.4.3). The largest decreases in incidental landings have been seen for weakfish (98%), Atlantic croaker (97%), flounder (93%), and spot (90%) when comparing the average landings for the 1994 through 1999 period to the 2015 through 2019 period. Incidental landings of kingfishes have declined (34%), but since their decrease has been less dramatic than other species their overall proportion of incidental bycatch landings has increased over time (Figures 2.4.2 and 2.4.3). Sheepshead landings have generally remained consistently low, averaging less than 4,000 pounds annually. Incidental landings of crabs [blue crab (*Callinectes sapidus*); Florida stone crab (*Menippe mercenaria*), horseshoe crab (*Limulus Polyphemus*)] have declined since the 1990s (Figure 2.4.1), averaging 17,750 pounds annually and making up 12% of the total landings for 2010 through 2019. Incidental landings of mollusks (conch/whelks, squid, octopus spp.) have generally declined (Figure 2.4.1), averaging 7,426 pounds annually and 5% of the total landings for 2010 through 2019. Additional species-specific landings information is included in the species sections below.

Discarded Bycatch in Shrimp Trawls

Over 200 species of finfish and crustaceans have been identified in the North Carolina shrimp trawl fishery in recent years (Brown 2009, 2010, 2015, 2016, 2017, 2018; Brown et al. 2017, 2018, 2019). In both estuarine and ocean waters, Atlantic croaker and spot were the most abundant bycatch species. While southern flounder (*Paralichthys lethostigma*), summer flounder (*P. dentatus*), and weakfish typically make up the largest portion of regulatory discards, they only account for a small portion of the total catch by weight. Additional species-specific information for discarded bycatch is included in the species sections below.

Shrimp Trawl Bycatch Impacts on Stock Assessments

Discards are a significant source of mortality that must be accounted for to estimate total removals from a population (Alverson and Hughes 1996; Nance 1998; Bellido et al 2011). Most quantitative

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stock assessment techniques involve statistical analysis of catch data that require an accurate record of the entire catch to reliably estimate stock parameters such as recruitment, abundance, and selectivity. Therefore, it is not only important to know the magnitude of discarded bycatch, but the age composition as well (Alverson et al. 1994; Murawski 1995). Omitting discard data can underestimate recruitment and mortality at age and further lead to biased stock assessments (Punt et al. 2006) and stock predictions (Alverson et al. 1994). Recently, discard estimates from the shrimp trawl fishery were incorporated into stock assessments for Atlantic croaker (ASMFC 2017a), spot (ASMFC 2017b), and southern flounder (Flowers et al. 2019), and was attempted for weakfish (ASMFC 2016).

While stock assessment models can help fisheries managers evaluate the relative impact of natural and fishing mortality on a stock, it is difficult to quantify how finfish stocks will improve or change in response to management measures put in place to reduce bycatch due to the many unpredictable human and natural factors that affect fish stock abundance. Habitat quality and fish stock abundance is not only influenced by directed fishing but is also influenced by factors that cannot be controlled through fishery management strategies, such as environmental fluctuations (e.g., pH, temperature, dissolved oxygen, storms), habitat loss due to land development, water quality, and natural mortality rates specific to each species. Furthermore, it is not possible to estimate net changes in fishing effort, temporal and geographic shifts in fishing patterns, and changes in gear and targeted species that could affect fishing mortality and bycatch both positively and negatively. Additional species-specific information regarding stock assessment impacts is included in the species sections below.

Bycatch Management in North Carolina

Concerns about bycatch in North Carolina began in the 1950s after serious declines in the catch of commercial fish were observed in North Carolina waters with attention focused on the shrimp fishery in Pamlico Sound (NCDMF 2015). In the 1960s and early 1970s, directed finfish trawling in the ocean for bait and pet food led to the NCMFC establishing rules to prohibit directed scrap fishing (taking the young of edible fish before they are of sufficient size to be valuable as individual food fish). In 1977, the NCMFC began designating nursery areas to protect both the physical habitat, as well as juvenile finfish and crustaceans. The Albemarle Sound was closed to trawling in 1987 due to conflicts with crab pot and gill net fishermen as well as concerns about bycatch and habitat. North Carolina was the first state to mandate the use of bycatch reduction devices (BRDs) in all shrimp trawls in 1992. The use of BRDs installed in penaeid shrimp trawls can reduce total bycatch by 30 to 70% (McHugh et al. 2017).

The National Marine Fisheries Service first mandated the use of turtle excluder devices (TEDs) in shrimp trawls for inshore (unless following tow time restrictions) and offshore waters in 1987 [Sea Turtle Conservation; Shrimp Trawling Requirements, 50 C.F.R §217, 222, and 227 (1987)]. The use of TEDs has not only been shown to reduce the number of sea turtle stranding's and takes in the shrimp trawl fishery but has also been shown to reduce finfish bycatch (Brewer et al. 2006; Broome et al. 2011; Price and Gearhart 2011). In 1993, NCDMF wrote a comprehensive report on estuarine trawling that addressed bycatch, overfishing, and habitat and water quality concerns. Based on the findings of this report, rules were established in 1994 that prohibited trawling in seagrass beds in eastern Pamlico Sound, eliminated weekend trawling, and established special

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secondary nursery areas (SSNA) which could be opened by proclamation from August 16 through May 14.

In 2006, the first Shrimp FMP implemented several management measures to address bycatch concerns which included effort controls and gear modifications (NCDMF 2006). Gear modifications and effort controls included: 1) prohibiting the use of otter trawls upstream of the Highway 172 Bridge in the New River; therefore, limiting trawling to skimmer trawls which have been shown to minimize and increase survivability of bycatch (Coale et al. 1994; Hein and Meier 1995) and 2) a maximum combined 90 ft headrope length limit was established for all internal waters except Pamlico Sound and the mouths of the Pamlico and Neuse rivers. This measure was meant to reduce conflict between small and large vessels but may have also helped to reduce bycatch of juvenile finfish and crustaceans as well as protect habitat.

In February 2015, the NCMFC adopted Amendment 1 to the Shrimp FMP which contained management measures to reduce bycatch in the commercial and recreational shrimp trawl fishery (NCDMF 2015). It increased the number of certified BRDs available for use, required two BRDs in shrimp otter trawls and skimmer trawls, and established a maximum combined headrope length of 220 feet in all internal coastal waters where no maximum combined headrope limit previously existed. An industry workgroup was also formed to test gear modifications to reduce finfish bycatch in the shrimp trawl fishery by an additional 40%. Four of the gear configurations tested reduced bycatch an additional 40 to 57% (Brown et al. 2019). In July 2019, the use of these gear configurations was mandated in all shrimp otter trawls operating in Pamlico Sound and portions of Pamlico, Bay, and Neuse rivers through the May 2018 Revision to Amendment 1 (NCDMF 2018). These gear modifications reduce finfish bycatch in shrimp otter trawls by approximately 60% when compared to a net without a TED and any BRDs.

NCDMF Shrimp Trawl Bycatch Characterization Studies

Six commercial shrimp trawl bycatch characterization studies were conducted from July 2007 to December 2017 (Table 2.4.1; Brown 2009, 2010, 2015, 2016, 2017, 2018). The studies observed catches from commercial shrimp trawls (skimmer and otter) in a variety of estuarine waters inside and outside of Pamlico Sound, as well as the nearshore ocean waters (0-3 miles) of North Carolina. Observations were made on a total of 756 fishing days, consisting of 2,068 tows. Additional species-specific information for the characterization studies is included in the species sections below.

Bycatch Species Information

The species included in this section are either commonly caught as bycatch in shrimp trawls and their stock status is either unknown or they are overfished and/or overfishing is occurring (e.g., Atlantic croaker, southern flounder, spot, and weakfish), there are concerns over increased bycatch due to recent shifts in effort by the shrimp trawl fishery (e.g., sheepshead), or they are protected under the Endangered Species Act or Marine Mammal Protection Act (e.g., sea turtle species, Atlantic sturgeon, bottlenose dolphin).

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ATLANTIC CROAKER

Harvest from Shrimp Trawls

Harvest of Atlantic croaker in the ocean otter trawl fishery from 1994 through 2019 averaged 41,781 pounds and ranged from three to 545,123 pounds. Harvest in the ocean skimmer trawl fishery occurred in only two years of the time series and averaged less than 10 pounds. Harvest in the estuarine (excluding Pamlico Sound) otter trawl fishery averaged less than 200 pounds and ranged from 0 to 1,057 pounds. Harvest in the estuarine (excluding Pamlico Sound) skimmer trawl fishery averaged 9 pounds and ranged from 0 to 58 pounds. Harvest in the Pamlico Sound otter trawl fishery averaged 1,948 pounds and ranged from 19 to 10,678 pounds. Harvest in the Pamlico Sound skimmer trawl fishery occurred in only three years during the time series and averaged less than 10 pounds.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, Atlantic croaker was the most abundant finfish bycatch, representing between 5% (Study 4) and 42% (Study 3) of the catch by weight. The observed at net mortality ranged from 0% (Study 4, fall season) to 57% (Study 4, spring season). Across all studies, most Atlantic croaker ranged from 100 to 180 mm (Table 2.4.1).

Stock Assessment/Status

In 2017, a benchmark stock assessment was completed (ASMFC 2017a). This assessment used a stock synthesis model to address a major source of uncertainty from previous assessments – the magnitude of Atlantic croaker bycatch in South Atlantic shrimp trawl fishery (North Carolina through Florida). However, due to conflicting trends in abundance and harvest, as well as other uncertainties, this assessment was not recommended for management use (ASMFC 2017a). A traffic light approach is used to evaluate Atlantic croaker fishery trends and develop management actions when harvest and abundance thresholds are exceeded (ASMFC 2020a).

The 2017 assessment did show most annual removals of Atlantic croaker were discards from the South Atlantic shrimp trawl fishery, followed by commercial landings and recreational harvest. Annual discards from the South Atlantic shrimp trawl fishery ranged from 180 million pounds to 1.1 billion pounds with a long term mean of 396 million pounds. Shrimp trawl bycatch accounted for 81 to 99% of annual Atlantic croaker removals and averaged 91.6% of all removals. The peer reviewers recognized that discard/bycatch estimates are unusually uncertain due to data insufficiencies, but agreed the method used to develop estimates of Atlantic croaker bycatch from the South Atlantic shrimp trawl fishery was current, supported, and similar (or identical) to methods used in Southeast Data, Assessment, and Review (SEDAR) assessments of South Atlantic king mackerel (*Scomberomus cavalla*), Gulf of Mexico red snapper (*Lutjanus campechanus*), gray triggerfish (*Balistes capricus*), and domestic sharks.

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SPOT

Harvest from Shrimp Trawls

Harvest of spot in the ocean otter trawl fishery from 1994 through 2019 averaged 17,218 pounds and ranged from 1,807 to 52,662 pounds. Harvest in the ocean skimmer trawl fishery occurred in only two years of the time series and averaged 45 pounds. Harvest in the estuarine (excluding Pamlico Sound) otter trawl fishery averaged 1,793 pounds and ranged from 105 to 7,511 pounds. Harvest in the estuarine (excluding Pamlico Sound) skimmer trawl fishery averaged 135 pounds and ranged from 0 to 822 pounds. Harvest in the Pamlico Sound otter trawl fishery averaged 12,695 pounds and ranged from 293 to 52,037 pounds. Harvest in the Pamlico Sound skimmer trawl fishery averaged 34 lb.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, spot represented between 0.7% (Study 6, otter trawls in the ocean) and 23% (Study 3) of the catch by weight. The observed at net mortality ranged from 66% (Study 3) to 82% (Study 4). Across all studies, most spot ranged from 100 to 180 mm (Table 2.4.1).

Stock Assessment/Status

In 2017, the first coastwide benchmark stock assessment was completed for spot (ASMFC 2017b). The assessment used a catch survey model to estimate population parameters (e.g., stock status, natural mortality, discard rates, and mortality) and biological reference points. However, due to conflicting trends in abundance and harvest, as well as other uncertainties, this assessment was not recommended to be used for management advice (ASMFC 2017b). A traffic light approach is used to evaluate spot fishery trends and develop management actions when harvest and abundance thresholds are exceeded (ASMFC 2020b).

Most fishery removals of spot were discards in the South Atlantic shrimp trawl fisheries, followed by commercial landings and recreational harvest. The panelists recognized discard/bycatch estimates are unusually uncertain due to data insufficiencies, but agreed the method used to develop estimates of spot bycatch from the southern shrimp trawl fishery was current, supported, and similar (or identical) to methods used in SEDAR assessments of South Atlantic king mackerel, Gulf of Mexico red snapper, gray triggerfish, and domestic sharks.

WEAKFISH

Harvest from Shrimp Trawls

Harvest of weakfish in the ocean otter trawl fishery from 1994 through 2019 averaged 2,008 pounds and ranged from 29 to 26,644 pounds. Harvest in the ocean skimmer trawl fishery occurred in only one year of the time series and averaged less than 10 lbs. Harvest in the estuarine (excluding Pamlico Sound) otter trawl fishery averaged 276 pounds and ranged from zero to 1,956 pounds. Harvest in the estuarine (excluding Pamlico Sound) skimmer trawl fishery averaged two pounds

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and ranged from zero to six pounds. Harvest in the Pamlico Sound otter trawl fishery averaged 5,847 pounds and ranged from 36 to 43,600 pounds. Harvest in the Pamlico Sound skimmer trawl fishery averaged six lb.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, weakfish represented between 0.1% (Study 5, in skimmer trawls in estuarine waters) and 6% (Study 2) of the catch by weight. The observed at net mortality ranged from 87% (Study 3) to 100% (Study 5). Across all studies, most weakfish were less than 305 mm (12 inches; Table 2.4.1).

Stock Assessment/Status

The 2016 Weakfish Stock Assessment attempted to include estimates of shrimp trawl discards from the South Atlantic (ASMFC 2016). However, the final estimates of weakfish bycatch were very small relative to total commercial removals. The catch from shrimp trawls consisted of mainly age-0 fish which were not included in the model. There was also high uncertainty in the data set due to low sample size, the lack of mandatory observer coverage prior to 2008, and uncertainty in extrapolating catch estimates further into the past. For these reasons, estimates of shrimp trawl bycatch were not included in the assessment. They also explored the NCDMF shrimp trawl observer dataset, but due to the limited temporal and spatial coverage, estimates of weakfish bycatch were not developed. Both the 2016 stock assessment and an updated stock assessment conducted in 2019 found the weakfish stock was depleted (ASMFC 2019).

SOUTHERN FLOUNDER

Harvest from Shrimp Trawls

The NCDMF Trip Ticket Program does not distinguish between summer and southern flounder species and therefore designates southern flounder as being harvested from estuarine waters (hence no ocean landings are produced). Harvest in the estuarine (excluding Pamlico Sound) otter trawl fishery averaged 2,419 pounds and ranged from 83 to 17,024 pounds. Harvest in the estuarine (excluding Pamlico Sound) skimmer trawl fishery averaged 114 pounds and ranged from 0 to 365 pounds. Harvest in the Pamlico Sound otter trawl fishery averaged 18,393 pounds and ranged from 449 to 88,967 pounds. Harvest in the Pamlico Sound skimmer trawl fishery averaged 12 lbs.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, southern flounder represented between 0.01% (Study 6) and 1.6% (Study 3, in 2013 season in estuarine otter trawls) of the catch by weight. The observed at net mortality ranged from 0% (Study 3, in 2012) to 88% (Study 5, in 2015). Across all studies, most southern flounder ranged from 80 to 300 mm (Table 2.4.1).

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Stock Assessment/Status

The assessment model estimated a value of 0.35 for $F_{35\%}$ (fishing mortality target) and a value of 0.53 for $F_{25\%}$ (fishing mortality threshold; Flowers et al. 2019). The estimate of F in 2017 is 0.91, which is above the threshold ($F_{25\%} = 0.53$) and suggests overfishing is currently occurring. The estimate of spawning stock biomass target ($SSB_{35\%}$) was 5,452 mt and the estimate of $SSB_{25\%}$ (threshold) was 3,900 mt. The model estimate of SSB in 2017 was 1,031 mt, which is below the threshold and suggests the stock is currently overfished (Flowers et al. 2019).

The shrimp trawl fishery was modeled as a bycatch-only fleet and the input landings included only dead discards. No live discards were assumed for the shrimp trawl fishery. Estimates of southern flounder bycatch in the shrimp trawl fishery have shown a general decline over time and were not a major source of fishing mortality (Flowers et al. 2019).

SHEEPSHEAD

Harvest from Shrimp Trawls

Harvest of sheephead in the ocean otter trawl fishery from 1994 through 2019 averaged 3,048 pounds and ranged from 201 to 13,894 pounds. Harvest in the ocean skimmer trawl fishery occurred in only one year of the time series and averaged less than 10 pounds. Harvest in the estuarine (excluding Pamlico Sound) otter trawl fishery averaged 166 pounds and ranged from 10 to 1,098 pounds. Harvest in the estuarine (excluding Pamlico Sound) skimmer trawl fishery averaged 18 pounds and ranged from 0 to 117 pounds. Harvest in the Pamlico Sound otter trawl fishery averaged 916 pounds and ranged from 89 to 2,561 pounds. Harvest in the Pamlico Sound skimmer trawl fishery averaged 6 lb.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, sheephead represented between 0% (Study 2) and 0.2% (Study 1) of the catch by weight. Across all studies, sheephead ranged from 182 to 388 mm (Table 2.4.1).

Stock Assessment/Status

No formal stock assessment has been completed for sheephead in North Carolina; however, one is being prepared by researchers at North Carolina State University with results expected sometime in 2021.

PROTECTED SPECIES

Protected species (sometimes referred to as “protected resources”) is a broad term that encompasses a range of organisms protected by federal or state statutes because their populations are at risk or are vulnerable to risk of extinction. Federal statutes include the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and the Migratory Bird Treaty Act (MBTA). Of federally protected species found in North Carolina, only sea turtles, sturgeon species,

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and the common bottlenose dolphin (*Tursiops truncatus*) are known or suspected to be incidentally taken in the shrimp fishery. Due to their protected status, harvest of these species is prohibited.

Sea Turtles

Common sea turtles in North Carolina include the Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricate*), leatherback sea turtle (*Dermochelys coriacea*), green sea turtle (*Chelonia mydas*), and the loggerhead sea turtle (*Caretta caretta*). After a decline in sea turtle populations and their listing under the endangered species act in 1977, it was determined that the primary cause of sea turtle mortality was the incidental capture as bycatch in the southeast U.S. shrimp fishery (Henwood and Stuntz 1987; National Research Council 1990). This was addressed through regulatory decisions and the development and use of a TED. TEDs in trawls are estimated to have a 97% exclusion rate with minimal shrimp loss (Watson 1981; Murray 2020). Recent studies have shown that sea turtles can exhibit symptoms of decompression sickness, commonly known as "the bends" from forced submergence in bottom trawls which can be greatly reduced through the use of a TED (García-Párraga et al., 2014; Fahlman et al., 2017). In August 2021, the National Oceanic and Atmospheric Administration (NOAA) Fisheries is expected to require the use of TEDs in all skimmer trawls over 40 ft.

Bottlenose Dolphin

While bottlenose dolphins are commonly seen feeding behind shrimp trawlers in North Carolina (Fleming 2004; Johnson 2006; Brown 2009), very few takes have been observed in the shrimp trawl fishery. However, in the Gulf of Mexico, otter trawls have been identified as a significant source of mortality and serious injury for several species of dolphin (Soldevilla et al. 2015).

Atlantic Sturgeon

The bycatch of Atlantic sturgeon (*Acipenser oxyrinchus*) from a variety of fisheries (gill nets, pound nets, trawls, etc.) is thought to be the primary source of mortality and biggest threat to the species recovery (ASMFC 2017c). Results from the 2017 Atlantic Sturgeon Stock Assessment indicate the total and dead bycatch of Atlantic sturgeon from otter trawls has declined since 2002 and the stock is showing signs of recovery (ASMFC 2017c). It should be noted that bycatch estimates from the South Atlantic shrimp trawl fishery was not evaluated for inclusion in the stock assessment for several reasons (i.e., under-reporting of takes, inappropriate survey methods, time series limitations). Continued bycatch monitoring and development of new BRD and TED configurations should further aid in their recovery. In an evaluation of TED designs used in the Mid-Atlantic Atlantic croaker flynet fishery, Atlantic sturgeon were observed escaping through TED openings (Gearhart 2010) and may further be excluded from shrimp trawls.

Characterization Studies

In the six characterization studies conducted from July 2007 to December 2017, there were 16 total protected species interactions observed. The interactions comprised 13 sea turtles, two Atlantic sturgeon, one bird, and zero marine mammals. Details about specific interactions for each study are found in Table 2.4.1.

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Effort in the Shrimp Fishery

OTTER TRAWL

Effort in the otter trawl sector of the North Carolina shrimp fishery based on the number of participants and vessels has been relatively steady since 2005 (Figure 2.4.4) and has averaged 381 participants and 416 vessels annually in the shrimp otter trawl fishery for 2010 through 2019. Similarly, the number of trips and total number of trip days have remained relatively steady since 2005 (Figure 2.4.5) and has averaged 5,762 trips and 10,499 trip days in the shrimp otter trawl fishery for 2010 through 2019. However, from 2015 through 2019, the number of trips and trip days have been increasing, although they are still well below the highs seen in the early 2000s. The pounds of shrimp harvested by otter trawls fluctuates annually, sometimes by millions of pounds from one year to the next; the value of the fishery also follows a similar pattern (Figure 2.4.6). However, landings and value from 2016 through 2019 are among the highest in the time series, driven largely by increased landings of white shrimp in the Atlantic Ocean north of Cape Hatteras. From 2010 through 2019, landings have averaged 7.7 million pounds with an ex-vessel value of \$17.0 million.

Otter trawl effort by area (Pamlico Sound, other inshore waters, and ocean) shows a similar pattern as the overall trend (Figure 2.4.7). Participants, vessels, trips, and trip days for all three areas declined in the early 2000s and then stabilized from 2006 to 2019 in most cases. The average length of commercial otter trawl trips (Figure 2.4.8) has remained relatively stable throughout the time series for all areas. The average trip length in Pamlico Sound ranged from 2.5 to 3 days, while in other inshore waters trip length averaged about 1 day per trip. Trip lengths in the ocean averaged about 1.5 days for most of the time series but in recent years increased to an average of about two days per trip. When looking at trip days keep in mind this does not equate to fishing days. Trip days includes travel time, lay days, bad weather days, etc. in addition to fishing days.

SKIMMER TRAWL

Effort in the skimmer trawl sector of the North Carolina shrimp fishery based on the number of participants and vessels has been relatively steady since 2005 (Figure 2.4.9) and has averaged 64 participants and 69 vessels annually in the shrimp skimmer trawl fishery for 2010 through 2019. However, from 2018 through 2019, both participants and vessels have declined sharply. Similarly, the number of trips and total number of trip days have remained relatively steady since 2005 (Figure 2.4.10) and has averaged 806 trips and 851 trip days in the shrimp skimmer trawl fishery for 2010 through 2019. However, from 2016 through 2019, the number of trips and trip days have decreased sharply and are well below the highs seen in the early 2000s. The amount of shrimp harvested by skimmer trawls fluctuates annually, sometimes by hundreds of thousands of pounds from one year to the next, the value of the fishery also follows a similar pattern (Figure 2.4.11). Landings and value from 2018 through 2019 are among the lowest in the time series. From 2010 through 2019, landings have averaged 345,779 pounds with an ex-vessel value of \$534,808.

Further examination of skimmer trawl effort trends by area (Pamlico Sound and other inshore waters). shows a similar pattern as the overall trend (Figure 2.4.12). Participants, vessels, trips, and trip days declined in the early 2000s and then stabilized around 2006 until recent years when

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there was a sharp decline in all effort metrics. In Pamlico Sound, effort was stable (though at a much lower level than other inshore areas) from the mid-2000s until the past few years when there was a sharp increase in effort (presumably due to increased white shrimp abundance). The average length of commercial skimmer trawl trips (Figure 2.4.13) has remained relatively stable throughout the time series in other inshore waters at roughly 1 day per trip and in Pamlico Sound the average trip length ranged from 1.5 to two days. Ocean data (as well as Pamlico Sound data in some years) was not included because there were no trips or trip data were considered confidential (< 3 trips). When looking at trip days keep in mind this does not equate to fishing days. Trip days includes travel time, lay days, bad weather days, etc. in addition to fishing days.

CHANNEL NETS, CAST NETS, AND OTHER GEARS

Effort in the shrimp fishery from non-trawl gears (i.e., channel nets, cast nets, etc.) is relatively low compared to trawl gears. The number of participants using non-trawl gears fluctuates annually and the number of participants using channel nets, cast nets, and other gears has averaged 62, 11, and 17 participants, respectively for 2010 through 2019 (Figure 2.4.14A). Similarly, the number of trips using non-trawl gears fluctuates annually and the number of trips using channel nets, cast nets, and other gears has averaged 903, 52, and 157 trips, respectively, for 2010 through 2019 (Figure 2.4.14B). Shrimp landings from non-trawl gears is relatively low compared to shrimp trawls. Landings from channel nets, cast nets, and other gears has averaged 166,157,818, and 10,959 pounds, respectively for 2010 through 2019 (Figure 2.4.14C). Similar to landings, the value of the harvest from non-trawl gears is relatively low compared to the value of shrimp trawl harvest. The ex-vessel value of landings from channel nets, cast nets, and other gears has averaged \$266,279, \$4,025, and \$23,034, respectively for 2010 through 2019 (Figure 2.4.14D).

Current Gear Modifications and Effort Reduction Management Measures

HEADROPE LIMIT

The size of gear allowed in North Carolina's shrimp fishery has been the subject of debate, particularly with respect to trawls. Prior to the 2006 Shrimp FMP, there were size limits on channel nets and on recreational shrimp trawls (26 ft headrope length) used by Recreational Commercial Gear License (RCGL) holders, but no restriction on the size of trawls used in the commercial shrimp fishery. At the time, many fishermen felt there should be a maximum limit placed on the size of trawls particularly in some smaller water bodies. They cited it was unfair to allow larger vessels into these areas especially on opening days when many boats would crowd into an area. Small vessel operators thought the larger vessels took most of the shrimp, rendering areas unproductive for several days, and then left to fish in more open waters unworkable by the smaller vessels. Currently, it is unlawful to use shrimp trawls (otter and skimmer) with a combined headrope length greater than 90 ft in internal coastal waters of North Carolina, except in the Pamlico Sound and mouths of the Pamlico and Neuse rivers where up to 220 ft of combined headrope may be used [NCMFC Rule 15A NCAC 03L .0103(c)(d)]. There is no limit on the amount of headrope that can be fished in the state ocean waters. The 90 ft headrope areas were primarily established due to conflicts between small and large trawlers, not to limit or reduce bycatch in those areas. The 220 ft headrope limit in Pamlico Sound was established to cap fleet capacity and not to limit or reduce bycatch.

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MESH SIZE

For all net types, it is unlawful to use nets with an inner or outer mesh liner. Net material used as chaffing gear must have a mesh length of at least four inches, except smaller mesh may be used along the bottom half of the tailbag. Chaffing gear may not be tied in a way that forms an additional tailbag [NCMFC Rule 15A NCAC 03L. 0103L(b)].

Otter and Skimmer Trawls

The minimum mesh size for otter and skimmer trawls is one and one-half inches [NCMFC Rule 15A NCAC 03L. 0103L(a)(1)]. Except, in areas where up to 220 ft of headrope is allowed (Pamlico Sound and portions of the Pamlico and Neuse rivers), the minimum tailbag mesh size is one and three-quarter inches (Proclamation SH-3-2019).

Channel Nets, Float Nets, Butterfly Nets, Hand Seines, and Cast Nets

The minimum mesh size for channel nets, float nets, butterfly nets, and hand seines is one and one-quarter inches [NCMFC Rule 15A NCAC 03L. 0103L(a)(2)]. There is no minimum mesh size for cast nets [NCMFC Rule 15A NCAC 03L. 0103L(a)(3)].

Other Shrimp Trawl Gear Modifications

BYCATCH REDUCTION DEVICES

Bycatch reduction devices are required to be used in all trawls used to harvest shrimp. Proclamation SH-3-2019 describes the BRD requirements for otter trawls in Pamlico Sound and the mouths of the Pamlico and Neuse rivers. Allowable BRDs in these areas include: 1) two Federal Fisheyes placed inline or 2) the Virgil Potter BRD and one Florida Fish Excluder. Otter trawls in all other waters and skimmer trawls statewide are required to have two BRDs installed on each net. The primary BRD must be one of the following: 1) Florida Fish Excluder, 2) Federal Fisheye, 3) Gulf Fisheye, 4) Eight Inch PVC “Sea Eagle” Fish Excluder, 5) General Eight Inch and Ten Inch Large Mesh and Extended Mesh Funnel BRD, 6) Eight Inch and Ten Inch Inshore Large Mesh and Extended Funnel BRD, 7) Large Mesh Funnel Excluder, 8) Jones-Davis BRD, 9) Modified Jones-Davis BRD, 10) Cone Fish Deflector Composite Panel, or a 11) Square Mesh Composite Panel. The secondary BRD may include: 1) a second BRD listed above, 2) Reduced Bar Spacing TED (<3 inches), or 3) a T-90 or Square Mesh (T-45) tailbag. The BRD requirements in all areas do not apply to single test trawls (also called a try net) with a headrope of 12 feet or less provided: 1) the net is pulled immediately in front of another net or is not connected to another net in any way, 2) no more than one net is used at a time, and 3) the net is not towed as a primary net.

TURTLE EXCLUDER DEVICES

The use of a federally approved TED is required in all trawls in accordance with federal rules and are adopted by reference through NCMFC Rule 15A NCAC 03L 0103(h). Currently all otter trawl nets are required to have a federally approved TED if using mechanical retrieval methods. Beginning August 1, 2021, it is expected that skimmer trawl vessels 40 ft and greater must have a

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federally approved TED installed in each net. The new TED requirements for skimmer trawls state the bar spacing may not be greater than three inches (compared to otter trawls which are allowed bar spacings up to four inches). Skimmer trawl vessels less than 40 ft will not be required to use TEDs and instead are allowed to use minimum tow times in accordance with federal rules.

FISHING DAYS RESTRICTIONS

The present 9:00 p.m. Friday through 5:00 p.m. Sunday evening closure for Internal Coastal Waters [NCMFC Rule 15A NCAC 03J. 0104(b)(1)] evolved from a February 1984 petition from fishermen to close Core Sound from 8:00 a.m. Saturday to 6:00 a.m. Monday by proclamation so they had time to rest, make boat and gear repairs, etc. Although some fishermen and dealers complained that they needed shrimp for the Monday morning market and there was a fear of effort shifting to adjacent open areas, there was some support for a Sunday night closure. A proposal to close from Saturday morning through Monday morning by rule failed. Fishermen continued to request a weekend closure, and this was tried in July 1984 by proclamation. Core Sound, North, South, and Newport rivers, and Turnagain, Rataan, Cedar, Long, and West bays, and Adams Creek were closed on the weekend from July 15 through December 31, 1984 and this was continued from that time on in some fashion. In 1993 the weekend closure was adjusted to begin one hour after sunset on Fridays and end one hour before sunset on Sundays. A 1993 effort by the NCMFC to extend the closure through Monday morning failed. Actual times (9:00 p.m. and 5:00 p.m.) were implemented in 2004 to avoid confusion with varying times found on sunrise/sunset tables.

DAILY FISHING TIME RESTRICTIONS

In North Carolina it is unlawful to trawl for shrimp in the Atlantic Ocean off Brunswick County, 9:00 p.m. to 5:00 a.m. [NCMFC Rule 15A NCAC 03J .0202 (8)]. This management measure was implemented in large part to reduce the bycatch of finfish in this gear. Ingraham (2003) examined this question by conducting a study of shrimp and finfish catch rates (day vs. night) in state waters from Topsail Inlet to Little River Inlet. Data from the study showed that finfish bycatch was higher at night than during the day. Of the nine commercially important finfish species caught, southern flounder, spot, Atlantic croaker, and southern kingfish (*Menticirrhus americanus*) catch rates were significantly higher at night. The catch of shrimp did not vary significantly between nighttime and daytime trawling, although catches were slightly higher during the day. Additionally, it is unlawful to use trawl nets from December 1 through February 28 from one hour after sunset to one hour before sunrise in portions of the Pamlico, Pungo, Bay, Neuse, and New rivers [15A NCAC 3J .0104 (b) (5)(A)(B)(C)(D)(E)]. This was originally put in place to protect juvenile southern flounder that were being harvested from crab trawls (K. West, NCDMF, personal communication).

In 1997, many Sneads Ferry trawl fishermen requested opening the New River to daytime shrimp trawling only. This was not based on any biological information. Many of the local shrimpers preferred to fish during the daytime and wanted to keep trawlers from neighboring areas out of New River at night. NCMFC Rule 15A NCAC 03J .0208, effective in 1998, makes it unlawful to use trawl nets upstream of the Highway 172 bridge over New River from 9:00 p.m. through 5:00 a.m. when opened by proclamation from August 16 through November 30.

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TOW TIME RESTRICTIONS

Skimmer trawls are currently exempt from TED requirements in lieu of tow time restrictions (55 minutes from April to October and 75 minutes from March to November). However, beginning August 1, 2021 it is expected that skimmer trawls 40 feet and greater in length will be required to use a TED with a bar spacing of no more than three inches in each net. Skimmer trawl vessels under 40 feet will still be able to abide by the tow time restrictions in lieu of installing TEDs. Similarly, try nets are exempt from TED requirements in lieu of tow time restrictions (55 minutes and 75 minutes, seasonally). This exemption is also contingent on: 1) the net is pulled immediately in front of another net or is not connected to another net in any way, 2) no more than one net is used at a time, and 3) the net is not towed as a primary net.

TRIP/CREEL LIMITS

Currently, there are no trip limits for the commercial shrimp fishery. However, there are creel limits for the recreational shrimp fishery. In areas open to shrimp harvest, recreational fishermen are limited to no more than 48 quarts (heads on) or 30 quarts (heads off) of shrimp per person per day or per vessel per day if a vessel is used [NCMFC Rule 15A NCAC 03L .0105(1)]. However, if more than one RCGL holder is aboard a vessel they are limited to no more than 96 quarts (heads on) or 60 quarts (heads off) of shrimp per vessel per day [NCMFC Rule 15A NCAC 03O .0303(e)(f)]. In areas closed to the harvest of shrimp, no more than four quarts (heads on) or two and one-half quarts (heads off) of shrimp per person per day may be taken by cast net only [NCMFC Rule 15A NCAC 03L .0105(2)]. Although it should be noted no areas are completely closed to shrimp harvest, however, enforcement of this rule has used the areas closed to taking shrimp with nets as defined in proclamation as areas closed to the taking of shrimp under this rule.

OTHER GEARS

In addition to trawls, several other gears are used to harvest shrimp, these include but are not limited to channel nets, seines, cast nets, shrimp pots, and shrimp pounds. Current management measures, implemented through proclamation, restrict the commercial and recreational harvest of shrimp (therefore effort) with nets to shrimp trawls, crab trawls, seines, and cast nets to specific areas and times. Areas are open to harvest with seines and cast nets at the same time they open to shrimp and crab trawls, so the use of these non-trawl nets is limited to when areas are opened to trawling. The use of shrimp pounds, shrimp pots, channel nets, fyke nets, and other non-net gears used to harvest shrimp are not limited to areas and times open to shrimp trawls, crab trawls, seines, and cast nets. Harvest of shrimp with other types of nets not specifically listed above (such as gill nets) is prohibited regardless of the area or time. These restrictions on harvest with other gears were primarily put in place due to issues of fairness over access to the shrimp resource raised by shrimp trawl fishermen as well as some fishermen wanting to delay harvest of shrimp until they were larger and more valuable.

Channel nets are also managed with area closures (Proclamation M-10-2007). Permanently closed areas are: 1) all waters bound on the north by the site of the old N.C. Highway 210-50 swing bridge at Surf City and on the south by a line beginning on the east side of the Intracoastal Waterway (IWW) at 34° 25.6049' N, 77° 33.4116' W running to a point on the west side of the IWW at 34°

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25.7193' N, 77° 33.4649' W to include all areas on either side of the IWW channel and 2) the New River marked navigation channel from Marker #17 to New River Inlet. While some areas are permanently closed to channel nets, others are closed unless they are open to shrimping with other gears by proclamation. These areas include: 1) New River above a line beginning at a point on the north shore 34° 34.9000' N – 77° 24.1740' W running southerly through Marker # 25 to a point on the south shore 34° 34.2700' N – 77° 24.4770' W, 2) areas adjacent to the IWW from the site of the old Highway 210-50 Surf City swing bridge to IWW Marker #49, and 3) the Cape Fear River. Closures (permanent or conditional) for channel nets were typically put in place to address user conflict issues.

AREA RESTRICTIONS

Area restrictions for trawling have been used to deal with allocation, resource, habitat, and safety issues in North Carolina. During the late 1980s trawling was prohibited in Albemarle Sound and its tributaries [15A NCAC 3J .0104 (b) (3)]. This action was implemented to protect the flounder fishery in this area (allocation issue) and to reduce conflicts with crab pot fishermen. Since 1978 over 124,000 acres of estuarine nursery areas have been closed to trawling to protect juvenile fish and crustaceans. NCMFC Rule 15A NCAC 3N .0102 (a) defines Nursery Areas “as those areas in which for reasons such as food, cover, bottom type, salinity, temperature and other factors, young fish and crustaceans spend the major portion of the initial growing season.” There are approximately 77,000 acres of Primary Nurseries (PNAs), 47,000 acres of Secondary Nursery Areas (SNAs), and 37,000 of Special Secondary Nursery Areas (SSNAs). PNAs and SNAs are permanently closed to trawling, while SSNAs may only be opened to trawling by proclamation from August 16 through May 15. In the mid-1990s the seagrass beds along the Outer Banks were closed to trawling to protect this critical habitat. Over 78,000 acres of military danger zones and restricted areas are also closed to trawling for safety reasons. In all, approximately 47% of estuarine waters are closed to trawling, 4% are managed, and 49% are open. In state ocean waters, approximately 19% are closed, 1% are managed, and 80% are open to trawling. Although, it should be noted that not all these open, closed, and managed areas are ideal for shrimp trawling. For additional discussion of area closures for shrimp trawls see *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* or *Appendix 2.3: Reducing Shrimp Trawl Bycatch Through Area Closures that Increase Connectivity Between Closed Areas*.

SEASON RESTRICTIONS

Harvest seasons have been used to reduce bycatch by relegating fishing activity to times of maximum target species abundance, or by limiting activity during times of high bycatch. Currently shrimp trawling is permitted all year in North Carolina. However, some areas are only opened to shrimp trawling for limited time periods. These include SSNAs, other managed shrimp trawl areas, and Crab Spawning Sanctuaries. For additional discussion of season closures see *Appendix 2.2: Shrimp Management in Special Secondary Nursery Areas* or *Appendix 2.3: Reducing Shrimp Trawl Bycatch Through Area Closures that Increase Connectivity Between Closed Areas*.

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IV. AUTHORITY

North Carolina General Statutes

G.S. 113-134 RULES

G.S. 113-173 RECREATIONAL COMMERCIAL GEAR LICENSE

G.S. 113-182 REGULATION OF FISHING AND FISHERIES

G.S. 113-182.1 FISHERY MANAGEMENT PLANS

G.S. 143B-289.52 MARINE FISHERIES COMMISSION – POWERS AND DUTIES

North Carolina Marine Fisheries Commission Rules

15A NCAC 03J .0104 TRAWL NETS

15A NCAC 03L .0101 SHRIMP HARVEST RESTRICTIONS

15A NCAC 03L .0102 WEEKEND SHRIMPING PROHIBITED

15A NCAC 03L .0103 PROHIBITED NETS, MESH LENGTHS AND AREAS

15A NCAC 03L .0105 RECREATIONAL SHRIMP LIMITS

V. DISCUSSION

The management options presented in this paper are a starting point for discussion on reducing effort in the shrimp trawl fishery to limit or reduce bycatch. Public input could provide additional options.

Carry Forward Items from Amendment 1

There are a few effort reduction management measures that will be carried forward from Amendment 1 to the N.C Shrimp Fishery Management Plan. These include: 1) requiring shrimp trawls, with the exception of skimmer trawls, to use BRDs or gear configurations that reduce finfish bycatch by at least 40% over a standard shrimp trawl consisting of a Florida fisheye BRD, a federally approved TED, and a 1.5-inch mesh tailbag, 2) allowing any federally certified BRD to be used in areas where new BRD or gear configurations have not been established, and 3) requiring two approved BRDs to be used in shrimp trawls in areas where new BRD or gear configurations have not been established.

Limited Entry

Limited entry methods of management restrict access to a fishery. Capping or reducing fishing effort can protect the biological viability of a species and the economic integrity of the fishery. The species is protected by preventing overfishing and depletion of the stocks. The fishery is enhanced by reducing costs and increasing earnings, effectively increasing efficiency. Other benefits of limited entry programs include an incentive to conserve, more efficient management, bycatch minimization, and habitat protection. However, piecemeal implementation of limited entry programs can easily displace fishing effort from one fishery to create new problems in other areas and fisheries (Buck 1995). For bycatch reduction, limited entry systems are often used in conjunction with other management measures, such as quotas or trip limits to achieve management objectives.

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North Carolina General Statute 113-182.1 states the NCMFC can only recommend the General Assembly limit participation in a fishery if the commission determines sustainable harvest in the fishery cannot otherwise be achieved. As shrimp in North Carolina are managed as an annual crop, due to the strong influence of environmental factors on population size, sustainable harvest is not currently a concern. Therefore, limited entry is not considered a realistic option for managing shrimp at this point due to the statutory constraints on its use. However, several bycatch species in the shrimp trawl fishery are currently classified as either overfished, overfishing is occurring, or both (e.g., weakfish and southern flounder). An amended state FMP for southern flounder (NCDMF 2019) has recently been adopted to recover the stock. Weakfish (ASMFC 2002, 2009a) is an interjurisdictional stock managed by the ASMFC and has an FMP in place to monitor and recover the stock. If it chose to do so, the NCMFC may ask the legislature to limit participation in the shrimp trawl fishery to potentially reduce bycatch of these species. To be effective in reducing bycatch, any limited entry program should not simply “freeze” participation in the shrimp trawl fishery to those currently in the fishery. It would have to reduce the number of participants/vessels to some number below those currently in the shrimp trawl fishery. Although, no clear link has been established between shrimp trawl discards and the status of these species and it will be impossible to attribute any population increases of these species with this type of action due to the many unpredictable human and natural factors that affect fish stock abundance.

If the areas where shrimp trawls can be used are significantly reduced, then limited entry may become more important as fishing effort will become concentrated in smaller areas. This concentration of effort may increase the detrimental effects on the habitat and bycatch species in those areas that remain open. It may also lead to increased conflict among fishermen in these areas competing for resources in limited space.

NCDMF Shrimp Trawl Observer Data Analysis

In order to determine if any trawl gear parameters influenced the catch rate of bycatch in otter and skimmer trawls, NCDMF shrimp trawl observer data from 2012 through 2017 were examined using two different modelling approaches, catch-per-unit-effort (CPUE) and presence/absence models. Observations from 1,567 individual tows were used in the analyses. The results of the analyses generally varied depending on the species or species group included in the model as well as how areas were delineated in the different model scenarios (see *Appendix 2.4.A: Shrimp Trawl Bycatch Effort Analysis* for more details).

There was some variation in the significant predictor variables dependent on the species or species group, scenario, and sub-model. For example, for the CPUE sub-model, there are consistent results for multiple species and species groups across scenarios. Specifically, of the 65 possible combinations of scenarios and species or species groups; year, net type, and season are significant for 80%, 66%, and 52% of the sub-models. Gear parameters such as headrope per boat, wing mesh, and tailbag mesh were not significant factors in any of the CPUE sub-models, however, potentially valuable species-specific information was still extracted from the analysis. For example, spot and weakfish were encountered in shrimp trawls more frequently than other key bycatch species, present in 93% and 54%, respectively, of all trawl samples and present in 99% and 73%, respectively, in trawl samples from Pamlico Sound where the majority of estuarine shrimp harvest and effort occurs. For spot, net type was a significant factor in the 3-area (Pamlico, inshore,

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offshore), 2-area (inshore, offshore), and inshore models with tongue style nets having more spot bycatch than two-seam and four-seam nets. Similarly, net type was also a significant factor for weakfish in the 3-area, 2-area, inshore, offshore, and Pamlico models with tongue nets having more weakfish bycatch. While not entirely surprising, this does suggest net type may be important to consider when discussing gear modifications to reduce bycatch for these species. Season was also consistently a significant factor for weakfish in all models. With summer having higher rates of weakfish bycatch in the 3-area, 2-area, inshore, and offshore models, and the fall having higher rates of weakfish bycatch in the Pamlico model. This suggests for weakfish that season should be considered when discussing methods to reduce weakfish bycatch and that one approach may not work for all areas.

The presence/absence sub-models provided less clearly distinct generalizations yet, there is still valuable species-specific information. In the presence/absence models used for zero-inflated species (those with high numbers of zero catches), total headrope per boat (summer flounder), wing mesh size (Atlantic croaker and summer flounder), and tailbag mesh size (summer flounder) were selected as significant factors and may provide some direction for future research.

Due to the onboard observations being made opportunistically and inconsistently across years, months, and areas many had few or no observations. Modelling efforts were further hampered by the high number of zero catches for some species as well as variations in the level of data collected for each tow. Due to these limitations the results should be viewed as exploratory and inconclusive. However, some factors were repeatedly selected as significant among models including year, net type (typically indicating increased bycatch in tongue nets), and season (typically indicated increased bycatch in the fall). Although the results of these analyses are inconclusive, it does provide some direction for future research efforts. The significant data gaps also highlight the need for consistent monitoring of discards in the shrimp trawl fishery through a dedicated onboard observer program. This will allow managers to better quantify shrimp trawl bycatch and its impact on bycatch species as well as provide additional data that can be used to research and implement more constructive and focused means to reduce bycatch in the shrimp trawl fishery.

Headrope Limit

In early 2020, the NCDMF surveyed active shrimp trawlers to gather information on the characteristics of gear currently used in the shrimp trawl fishery. Of the 521 active shrimp trawlers, headrope length data were received for 212 gear configurations (197 otter and 15 skimmer) from 146 shrimp trawlers (135 otter and 11 skimmer) active in the shrimp trawl fishery. The headrope data came from a representative cross section of the shrimp trawl fishery. The highest percentage of vessels in the shrimp otter and skimmer trawl fleets occur in the 20-29-ft vessel size category and likewise survey responses were highest from this group (Figures 2.4.15 and 2.4.16). For both the otter trawl (Figure 2.4.17) and skimmer trawl (Figure 2.4.18) fleets, the total amount of headrope fished increased with vessel size. Vessels 60 ft and greater in length were found to fish up to the maximum amount of headrope allowed to be fished (220 ft in Pamlico Sound), though not all vessels do so. The median total amount of headrope fished by vessels in the 60-ft category was 180 ft, 200 ft in the 70-ft category, and 220 ft in both the 80 and 90-ft categories. The most common net type being fished by the shrimp trawl fleet is tongue nets (51%), followed by two-seam (25%), four-seam (16%), and skimmer (7%; Figure 2.4.19).

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In the analysis of NCDMF shrimp trawl observer data (described above), total headrope per boat was not a significant factor influencing the amount of bycatch in any of the CPUE sub-models. In the presence/absence models used for zero-inflated species, total headrope per boat was a significant factor influencing bycatch of summer flounder. This analysis suggests the effects of total headrope per boat on bycatch catch rates may be an important factor for some species and should be investigated further.

Shrimp trawl design has evolved to improve the efficiency of the gear to capture shrimp and maximize area swept. Regulations limiting total headrope length will likely reduce the efficiency of both large and small vessels using trawls with headropes larger than 35 ft. Thus, overall effort will likely be reduced due to a loss of fishing power and fishermen leaving the fishery because it is no longer economically feasible. Not only will the current gear configuration used by many fishermen become obsolete, but operating costs may begin to exceed the value of their catch. Shifts in effort may also occur putting more pressure on already overburdened fishing locations, leading to increased conflict and potentially local increases in bycatch. Fishermen attempting to compensate for lost catches because of being forced to use less efficient gear may make more or longer tows, potentially generating as much or more bycatch. Reductions in bycatch may also be minimal if crews of larger vessels begin operating multiple smaller vessels, not only increasing effort (participants and trips) but the total amount of headrope being fished by the fleet. Additionally, some fishermen may begin towing at a faster speed to attempt to cover more area or increase the depth (height) of their nets to maintain shrimp numbers. This could increase bycatch by reducing the efficiency of existing BRDs. There is also the potential for shifts in the species and size makeup of the bycatch. If larger vessels are forced out of the internal coastal waters into the ocean due to regulations that reduce total headrope length, more pressure may be put on the winter ocean spawners (e.g., spot, Atlantic croaker, sheepshead, and southern flounder). While reducing headrope length has the potential to reduce bycatch associated with inshore trawling (Watson et al. 1984), the issue is extremely complex making it difficult to quantify its total impact on bycatch species and the fishery beyond a reduction in effort.

If the areas where shrimp trawls can be used are significantly reduced, then reducing the amount of headrope allowed in Internal Coastal Waters may be needed as fishing effort will be further concentrated into smaller areas. This concentration of effort may have detrimental effects on the habitat and bycatch species in those areas. It may also lead to increased conflict among fishermen in these areas competing for resources in limited space.

Otter Trawl Headrope/Footrope Regulations in Other States

All states in the U.S. South Atlantic have enacted various regulations limiting maximum headrope length, which often varies by area, fleet (commercial or recreational), and purpose (food or bait; Appendix 4). Estuarine trawling is prohibited in much of South Carolina; however, in designated areas fishermen may use shrimp trawls with a combined footrope length no greater than 220 ft. In Georgia, it is unlawful to fish for shrimp for human consumption with trawls having a total footrope length greater than 220 ft (only allowed in state ocean waters) and commercial and recreational bait shrimpers are restricted to trawls with maximum footrope lengths of 20 ft and 10 ft, respectively in designated bait shrimp areas. In the nearshore and inshore waters of Florida

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where otter trawls are allowed, fishermen are limited to a single net with a headrope no greater than 10 ft. Two trawls may be used in certain nearshore and inshore regions, however combined headrope length cannot exceed 20 ft. Outside of these areas trawlers may use a single net with headrope no greater than 20 ft.

States along the Gulf of Mexico have also limited the maximum headrope length and the number of nets fishermen can use (Appendix 4) typically to address conflict issues within the fishery. In Alabama, commercial vessels operating in Mobile Bay and its sounds are limited to two trawls with a maximum combined headrope length of 50 ft. In the offshore waters of Alabama there is no restriction on headrope length. Commercial and recreational bait trawlers are restricted to a single trawl with a maximum headrope length of 16 ft. In Mississippi, commercial shrimp trawlers operating in internal waters can use one trawl with a maximum headrope length of 50 ft or two 25 ft trawls. Recreational fishermen are limited to a 16 ft maximum headrope length. Commercial vessels fishing inshore waters of Louisiana are limited to one net with a headrope length of 50 ft or two 25 ft nets [except in Breton and Chandeleur sounds two nets with a headrope length of 65 ft (130 ft combined) may be used]. Vessels fishing in Louisiana's state ocean waters may use up to 130 ft of headrope. Recreational fishermen are limited to one net with a maximum headrope length of 25 ft. In major bays of Texas, commercial fishermen targeting penaeid shrimp may use a single net with a headrope measuring 40 to 54 ft during the spring (statewide) and winter (south of the Colorado River) seasons and may use a single net with a headrope not exceeding 95 ft during the fall season. Commercial bait fishermen are also limited to a single net with a headrope measuring 40 to 54 ft. Commercial vessels operating in Texas state ocean waters may use two trawls with headrope lengths ranging from 71 to 89 ft based on door size inside three nautical miles and are not limited by number of nets or headrope from three to nine nautical miles offshore.

Skimmer Trawl Headrope Regulations in Other States

While headrope length is most associated with otter trawls, headrope length can also be used to describe the length of the support structure the mesh or webbing attaches to nearest the surface of the water for skimmer trawls. Thus, the headrope length of most skimmer trawls is dictated by the length of the skimmer trawl frame. Very few states have specific regulations for skimmer trawl configuration regarding headrope length and design (Appendix 4). Mississippi's skimmer trawl regulations mirror their otter trawl regulations, limiting vessels to two nets with a 25 ft headrope on each diagonal arm (not to exceed a combined headrope length of 50 ft). In Florida, skimmers must be equipped with rollers and vessels are limited to two unconnected trawls with upper and lower horizontal beams that do not exceed 16 ft in length each net. In most states where skimmer trawl net and frame lengths are not specified, headrope length is defined to include the length of supporting structure that is the nearest to the surface of the water.

Fishing Days Restriction

Adding additional day(s) of the week to the present closed trawling period is another time related bycatch reduction measure to consider. Although an additional day added to the weekend closure, be it Friday or Monday, would reduce shrimp trawling effort, it is not possible to quantify the reduction in bycatch. A uniform number of shrimp, as well as bycatch species, are not caught each available trawling day so an additional closed day may not reduce bycatch significantly.

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Regardless of the day(s) of the week closed, it has been observed the best catches of shrimp are on the night of the opening after the weekend “rest period”. Johnson (2006) noted twice as much shrimp were caught early in the five-day trawling week than later in the week in the coastal shrimp trawl fishery in NC, suggesting extending the weekly closure could further improve the efficiency of the shrimp trawl fishery. Extending the weekend closure would likely reduce effort; however, reducing the number of days available for shrimp trawling does not consider days already lost to wind and weather, unfavorable tides, moon phases, etc. Additional day(s) added to the weekend closure may also disproportionately impact RCGL holders and part-time fishermen who shrimp trawl mainly around the weekends.

Daily Fishing Time Restriction

Reducing the number of hours in a day when shrimp trawling is allowed is another way to potentially reduce bycatch. The habits of North Carolina’s three shrimp species determine when they are targeted. In the central part of the state, brown and pink shrimp usually burrow into the substrate during the day and trawling for them usually occurs at night. Occasionally trawling for brown shrimp can occur during the daytime when waters are murky. These trips usually last one night or one day. Larger trawlers fishing in Pamlico Sound and the Atlantic Ocean with the capacity to store ice usually stay out four or five days and tow day and night. White shrimp are found higher up in the water column and fishing for them occurs mainly during the day with some fishing at night as well.

South Carolina shrimp trawling has been closed at night since the 1970s, but that was enacted to keep North Carolina fishermen from catching brown shrimp at night because South Carolina fishermen wanted to work during the day, not for any biological reason (L. DeLancey, SCDNR, personal communication). Georgia, Mississippi, Louisiana, and Texas also close all or parts of their shrimp trawl fisheries to nighttime trawling (Appendix 4).

Tow Time Restriction

Another way to potentially reduce effort in the shrimp trawl fishery is to restrict individual tow times. A tow time limit of 45 minutes has been mentioned by the public. Although reducing tow times should logically reduce bycatch, in reality that may not necessarily occur as additional tows could be made and result in minimal reductions in the amount of time the trawl is actually fishing. Reduced tow times could likely reduce bycatch mortality for some species by allowing them to be released from the trawl more quickly. Fish aggregations, as well as shrimp aggregations, are not uniformly distributed and each tow is different depending on depth, tide stage, moon phase, bottom type, etc. Carothers and Chittendon (1985) found a significant linear relationship between catch and tow duration (i.e., the longer you tow, the more you catch). Their study examined the catch for tow times of 5, 10, 15, 20, 25, and 30-minute durations.

A tow time requirement would be very difficult to enforce without constant Marine Patrol oversight or costly Vessel Monitoring Systems. Tow times in the ocean were enforced from 1996 through 2005 under a now-expired Incidental Take Permit from NOAA issued to trawlers from Browns Inlet to Rich Inlet due to the presence of brown algae. This involved constant monitoring by observers and was very difficult to enforce. The timing of tows began when the otter trawl

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doors were lowered into the water and ended when they exited the water. Skimmer trawl tows could not be timed in that way since they are towed continuously and the tailbags are pulled in and emptied periodically. Additional tows could be made to make up for the “lost effort” of limited tow times. Although, limiting tow times may be effective in reducing bycatch mortality in individual tows.

Trip/Creel Limits

Another method of reducing effort is to establish commercial trip limits or recreational creel limits. The reasoning behind this method is the expectation that once the limit is reached fishermen will either cease fishing for the day or begin to target another species.

Commercial Fishery

In the commercial shrimp trawl fishery, establishing a trip limit may be effective in reducing overall shrimp trawl effort and therefore presumably reducing the amount of bycatch and dead discards. However, the limit would have to be high enough for a trip to still be profitable but low enough that the vessel would have to cease fishing operations for the day for single day trips or to return to port to offload their catch at least once during the weekly open period if capable of multi-day trips. Establishing vessel limits for annual crop species (such as shrimp) in high volume fisheries that can have large annual fluctuations in abundance due to environmental conditions can be difficult. Adding to the difficulty for shrimp in North Carolina is the wide range in the size of vessels and size of gear used in the fishery and the subsequent range in how many pounds can be stored onboard across vessel sizes. Establishing a trip limit that works for 40 ft vessels may not work for 80 ft vessels in terms of maintaining profitable trips. Waste would also be a potential issue if the trip limit were set too low given the high-volume nature of the fishery. Additionally, enforcement of this type of measure can be difficult to enforce without adequate assets in place (ASMFC 2009b).

Recreational Fishery

As previously discussed, the recreational fishery has different creel limits in place for areas open versus closed to shrimp harvest (keeping in mind no areas are completely closed to shrimp harvest). Increased access could be given to recreational fishermen in closed areas by allowing non-trawl net gears (i.e., seines and other non-trawl nets) to be used to harvest shrimp in areas closed to trawling, increasing the creel limit for closed areas, or both. With these gears, discards of bycatch species are not a big concern so allowing them would presumably have little negative impact on these species. Removing the four quarts (heads on) or two and one-half quarts (heads off) creel limit for cast nets in closed areas and allowing recreational harvest limited to 48 quarts (heads on) or 30 quarts (heads off) of shrimp per person per day or per vessel for all gears and areas would simplify regulations and allow additional harvest opportunities for recreational fishermen if additional areas are closed to shrimp trawls.

Other Gears

As previously stated, the reason for tying the opening of crab trawls, seines, and cast nets and prohibiting harvest with other nets (except for channel nets and fyke nets) with shrimp trawls was

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done primarily due to fairness issues raised by shrimp trawl fishermen. With the possibility of additional area and/or seasonal closures for shrimp trawls, severing the tie between when areas open to shrimp trawls versus other net gears would eliminate impacts to these gears from additional shrimp trawl closures. Additionally, fishermen holding a RCGL may have the use of shrimp trawl gear severely reduced if additional areas are closed to shrimp trawling (either permanently or seasonally). Having additional harvest opportunities using seines and cast nets may alleviate some of these impacts. Even if additional closures are not adopted for shrimp trawls, removing the connection between non-trawl gears and shrimp trawls will allow additional harvest opportunities for fishermen using these gears, simplify regulations, and ease confusion over what areas are open to which gears.

While some areas are permanently closed to channel nets, others are closed until they are opened to shrimp harvest with other gears. This has been enforced to mean when these areas are open to taking shrimp with nets as defined in proclamation. These areas include: 1) New River above a line beginning at a point on the north shore 34° 34.9000'N – 77° 24.1740' W running southerly through Marker # 25 to a point on the south shore 34° 34.2700' N – 77° 24.4770' W, 2) areas adjacent to the IWW from the site of the old Highway 210-50 Surf City swing bridge to IWW Marker #49, and 3) the Cape Fear River. Removing the dependency on other gears (i.e., shrimp trawls) for these areas to be opened to channel nets will allow increased access to channel net fishermen in these areas. This may be more desirable if the areas where shrimp trawls can be used are significantly reduced or the areas where channel net openings are dependent on other gears become permanently closed to shrimp trawls.

Economic Impacts

Each of the different management measures discussed in this paper would have economic impacts to the shrimp fishery with economic consequences for those operating and working on shrimp trawlers. Any reduction in effort will likely reduce the efficiency of the shrimp trawl fishery and consequently reduce the amount of shrimp harvested and likewise profitability of each trip. This may also lead to reduced employment in the shrimp trawl fishery as operators have to deal with tighter profit margins. However, there is also the possibility for economic gains in other portions of the shrimp fishery as well as other fisheries. Additional opportunities for recreational and commercial fishermen using non-trawl gears may lead to some economic gains for commercial fishermen using these gears and recreational fishery suppliers as fishermen purchase additional gear. Another potential benefit of reduced shrimp trawl effort may be improved habitat and reduced bycatch mortality (hence increased survival) of bycatch and other species and thus have more available for harvest as recruits grow into the fishery (both commercially and recreationally). Additionally, improved habitat may also improve other economic niches like eco-tourism. Although, these types of economic benefits are more abstract, uncertain, and dependent on other external factors.

Summary

While the management measures presented here have the potential to reduce effort and presumably bycatch and dead discards in the shrimp fishery, the necessary data do not exist to adequately quantify the full impact any of these regulations may have on bycatch reduction and survival as

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well as on the shrimp fishery and its associated industries. Limited entry would be difficult to implement with the current statutory restrictions but may need to be explored depending on other management measures enacted in this or future FMPs. While no clear connection between headrope length and bycatch has been established, this measure may warrant consideration if the areas open to shrimp trawling are significantly reduced. Reducing the number of days open to shrimp trawling would have some reduction on effort but may disproportionately impact part-time and RCGL fishermen. Daily fishing time restrictions may also reduce effort and would likely impact boats that make multi-day trips. Limiting tow times would likely reduce bycatch mortality but is difficult to enforce. Establishing commercial trip limits may also reduce effort but determining an appropriate trip limit that balances ecological and economic considerations will be difficult. Simplifying recreational creel limits will aid both the fishing public and enforcement actions. Additionally, removing the dependency of other gears on shrimp trawls will help to simplify regulations and potentially create additional opportunities for non-trawl gears. Ultimately, the decision to be weighed will be the potential unquantified gain in some bycatch species versus the losses to an economically important fishery.

VI. PROPOSED MANAGEMENT OPTIONS

(+ Potential positive impact of action)

(- Potential negative impact of action)

1. Status quo: no additional management changes at this time
 - + No additional management changes for fishermen to learn
 - No additional reductions in bycatch
 - Continues disparity between rules and management practices
2. Request the N.C. General Assembly consider limited entry as a means to manage the shrimp trawl fishery
 - + Most effective way to limit effort in the shrimp trawl fishery
 - Current participants may be excluded from the fishery moving forward
3. Reduce the total amount of trawl headrope that may be used per vessel to harvest shrimp in Internal Coastal Waters
 - + May reduce bycatch
 - Effort may increase to make up for loss of efficiency/fishing power
 - Possible financial hardships for fishermen due to loss of fishing power, gear modification, further distance from fishing grounds where headrope limits not imposed
 - May shift effort offshore and further impact other species and/or age classes
4. Reduce the number of days per week shrimp may be harvested using trawls in Internal Coastal Waters
 - + May reduce bycatch
 - + Easy to enforce
 - Effort may increase to make up for loss of fishing days
 - Additional days may be lost due to wind and weather, unfavorable tides, moon phases

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- May impact RCGL holders and part-time fishermen disproportionately
 - May force fishermen to work in unfavorable conditions
 - May increase conflict in more productive areas
5. Reduce the number of hours during the day trawls may be used to harvest shrimp in Internal Coastal Waters
 - + May reduce bycatch
 - May negatively impact the harvest of brown and pink shrimp
 - May force fishermen to work in unfavorable conditions
 - Increased enforcement (maybe?)
 6. Establish a maximum tow time for trawls being used to harvest shrimp in Internal Coastal Waters
 - + Increased survivability of culled bycatch
 - Hard to enforce / increased enforcement
 - Reductions in bycatch offset by additional tows
 - Loss of fishing time due to more haul backs
 7. Establish a trip limit for the commercial shrimp trawl fishery in Internal Coastal Waters
 - + May reduce bycatch
 - May create waste or encourage high grading
 8. Eliminate the four quarts (heads-on) or two and one-half quarts (heads-off) recreational creel limit for cast nets only in areas closed to shrimping and allow recreational harvest limits in closed areas to be the same as open areas for all gears
 - + Increased access to the resource (bait, consumption)
 - + Eliminates confusion over creel limits
 - May increase conflict between recreational and commercial fishermen
 9. Allow non-trawl gears (e.g., seines, channel nets, shrimp pots, shrimp pounds, cast nets, etc.) to harvest shrimp in areas closed to shrimp trawling
 - + Encourages the use of non-bottom distributing gears with less bycatch
 - + Increased access to the resource
 - + Eliminates confusion over what areas are open to shrimp harvest for non-trawl gears
 - Increased conflict over set locations and navigation issues with channel nets

VII. SHRIMP FMP WORKSHOPS

Shrimp FMP Workshops were held in March 2021 between the division plan development team and the Shrimp FMP Advisory Committee (AC). The goal of these workshops is for the AC to assist the division in drafting the plan. The division had distinct discussion points to lead conversation to inform individual issue papers where stakeholder input was needed. The guidance received during workshops on enforcement, gear usage, possible industry behavioral changes, fishing times, and harvest limits were used to inform the draft plan. Some AC members indicated how they fish is less important to bycatch than where and when they fish. Additionally, industry behavior will change if certain measures in this issue paper are put in place. Support was mixed

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on management measures regarding recreational harvest limits and increased access for non-trawl gears.

VIII. RECOMMENDATION

The division will make recommendations after receiving input from the MFC Advisory Committees.

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Tables

Table 2.4.1. Summary of North Carolina commercial shrimp trawl characterization studies performed by the division, 2007-2017.

Study Details			Bycatch Characteristics	Species							
				Atlantic croaker	spot	weakfish	blue crab	southern flounder	sheepshead	protected species	
Study 1 Brown 2009	Study Period	7/2007 – 6/2008	Percent of Catch	25%	7%	2%	<1%	<1%	<1%	sea turtles	3
	Area Fished	Ocean	Size Range	120 – 180 mm	90 – 140 mm	50 – 305 mm	-	<355 mm	-	Atlantic sturgeon	0
	Fishing Days Observed	143 (trips)	At-net Mortality	n/a	n/a	n/a	n/a	n/a	n/a	marine mammals	0
	Trawl Type	Otter								birds	0
	Number of Tows Sampled	314									
Study 2 Brown 2010	Study Period	7/2009 – 12/2009	Percent of Catch	33%	13%	6%	2%	<1%	0%	sea turtles	0
	Area Fished	Pamlico Sound	Size Range	100 – 140 mm	80 – 120 mm	70 – 150 mm	-	130 – 180 mm	n/a	Atlantic sturgeon	0
	Fishing Days Observed	66 (trips)	At-net Mortality	n/a	n/a	n/a	n/a	n/a	n/a	marine mammals	0
	Trawl Type	Otter								birds	0
	Number of Tows Sampled	191									
Study 3 Brown 2015	Study Period	8/2012 – 8/2015	Percent of Catch	34 – 49%	10 – 21%	2%	<1 – 2%	<1 – 2%	<1%	sea turtles	1
	Area Fished	Estuary and Ocean	Size Range	100 – 170 mm	80 – 120 mm	70 – 180 mm	-	100 – 300 mm	-	Atlantic sturgeon	0
	Fishing Days Observed	388	At-net Mortality	23%	66%	87%	-	0 – 88%	-	marine mammals	0
	Trawl Type	Otter								birds	0
	Number of Tows Sampled	1,037									
Study 4 Brown 2016	Study Period	1/2015 – 11/2015	Percent of Catch	5%	1%	1%	2%	<1%	<1%	sea turtles	4
	Area Fished	Estuary	Size Range	100 – 180 mm	60 – 110 mm	140 – 210 mm	-	80 – 130 mm	-	Atlantic sturgeon	0
	Fishing Days Observed	62	At-net Mortality	41%	82%	97%	-	-	-	marine mammals	0
	Trawl Type	Skimmer								birds	1
	Number of Tows Sampled	238									
Study 5 Brown 2017	Study Period	1/2016 – 12/2016	Percent of Catch	8 – 27%	1 – 11%	<1 – 4%	<1%	<1%	0 – <1%	sea turtles	4
	Area Fished	Estuary and Ocean	Size Range	70 – 180 mm	60 – 190 mm	80 – 190 mm	-	-	-	Atlantic sturgeon	2
	Fishing Days Observed	72	At-net Mortality	21%	77%	100%	-	-	-	marine mammals	0
	Trawl Type	Otter and Skimmer								birds	0
	Number of Tows Sampled	218									
Study 6 Brown 2018	Study Period	7/2017 – 12/2017	Percent of Catch	6 – 35%	1 – 7%	<1 – 6%	<1 – 3%	<1 – 1%	0 – <1%	sea turtles	1
	Area Fished	Estuary and Ocean	Size Range	100 – 170 mm	70 – 210 mm	-	-	-	-	Atlantic sturgeon	0
	Fishing Days Observed	25	At-net Mortality	24 – 33%	n/a	-	-	-	-	marine mammals	0
	Trawl Type	Otter and Skimmer								birds	0
	Number of Tows Sampled	70									

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Figures

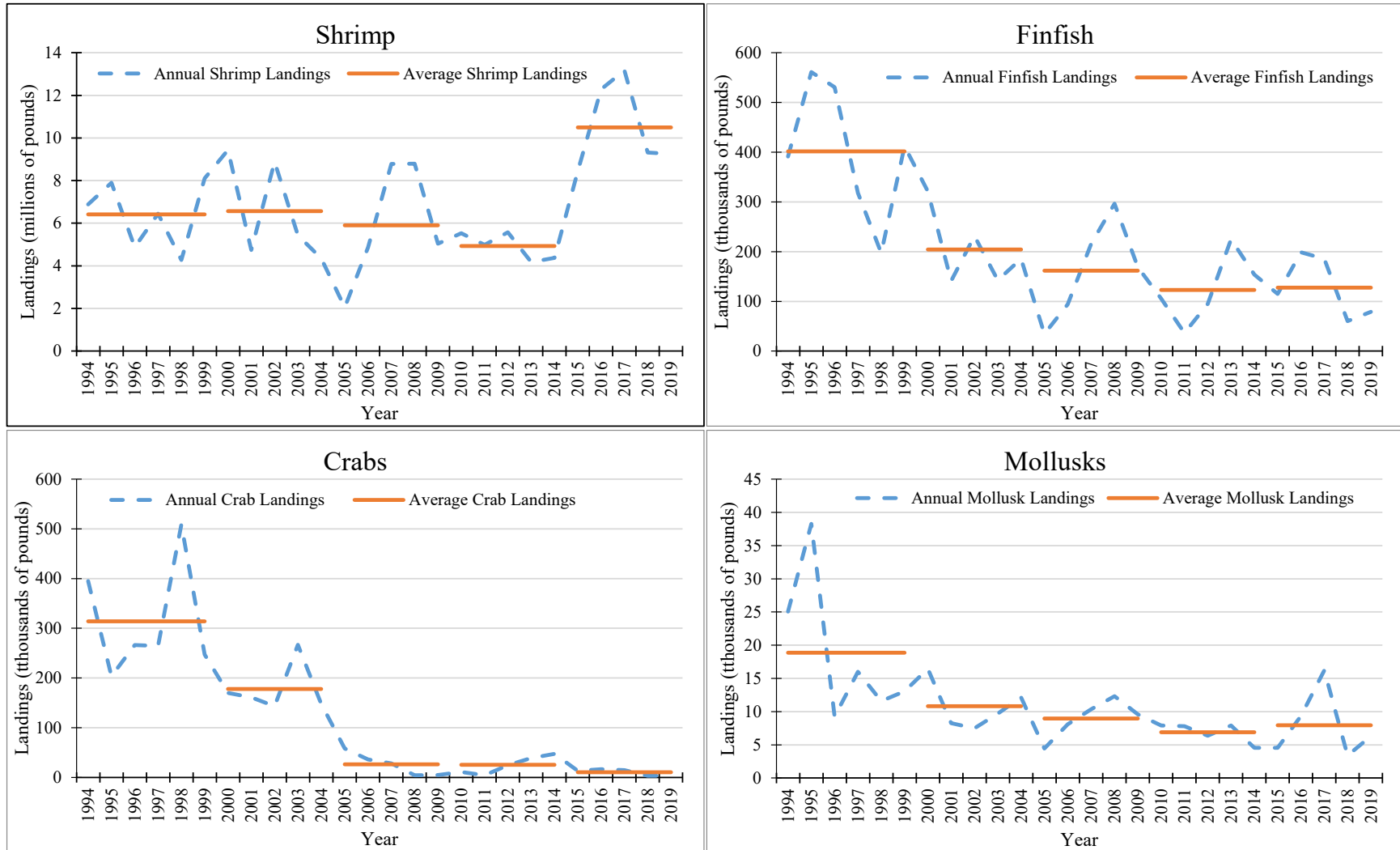


Figure 2.4.2. Annual landings (dashed line) and average landings (solid lines) of shrimp and incidental landings of finfish, crab, and mollusks from the commercial shrimp trawl fishery, 1994-2019. Note: the solid lines represent the average landings for the period covered.

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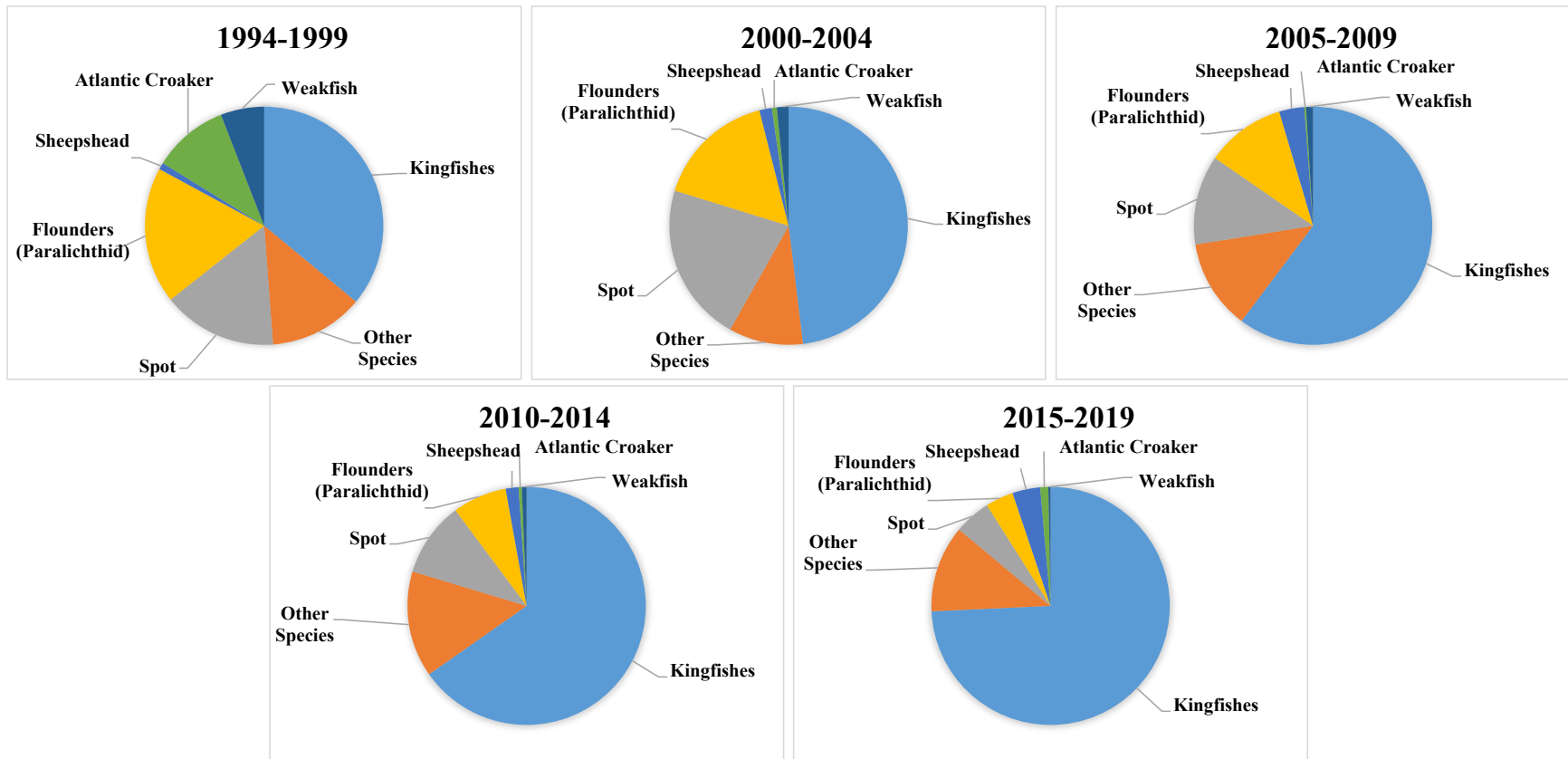


Figure 2.4.3. Proportional species makeup of incidental finfish landings in the shrimp trawl fishery for different periods, 1994-2019.

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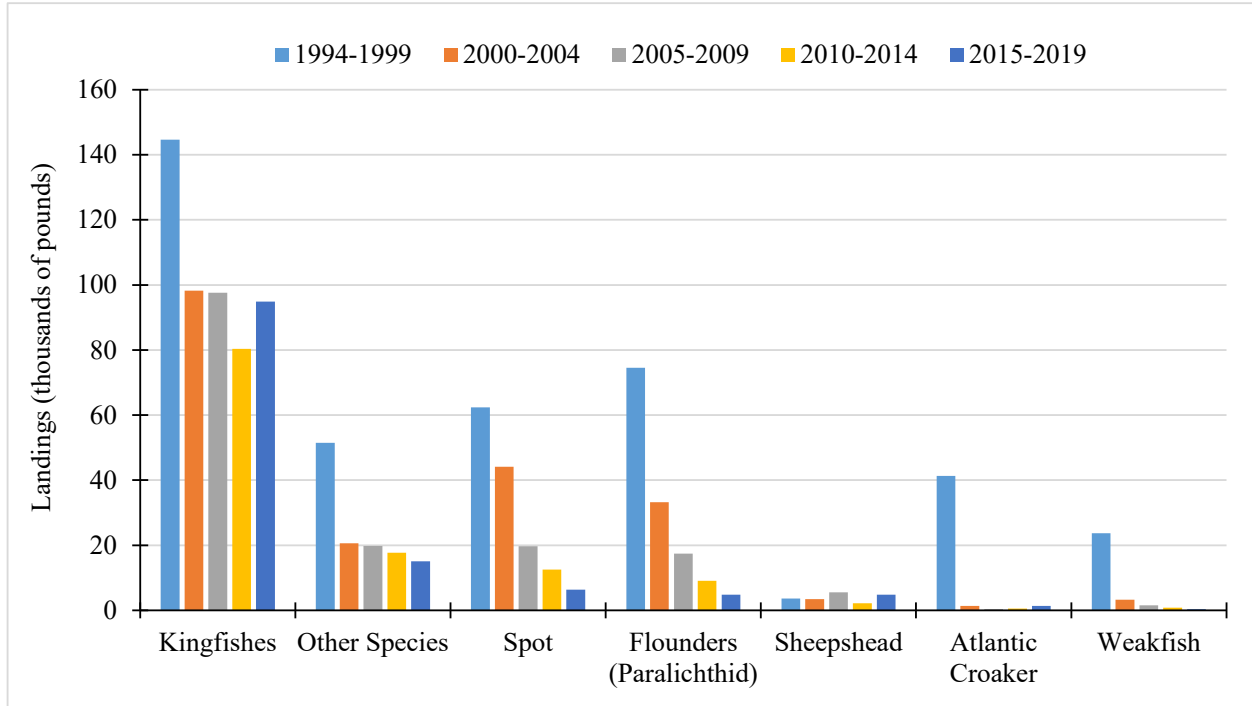


Figure 2.4.4. Average incidental landings of finfish species in the shrimp trawl fishery for different periods, 1994-2019.

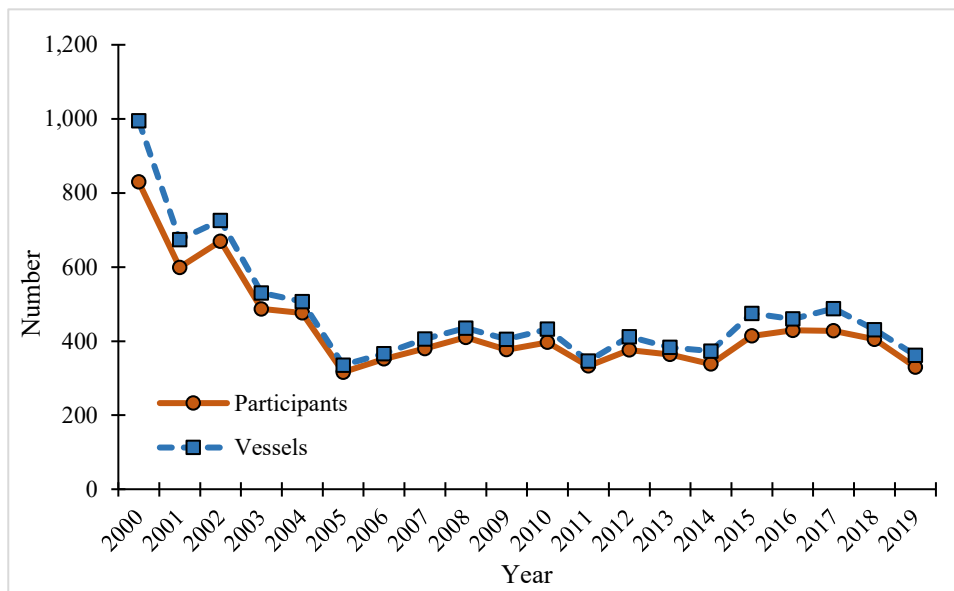


Figure 2.4.5. Number of participants and number of vessels in the North Carolina shrimp otter trawl fishery by year, 2000 – 2019.

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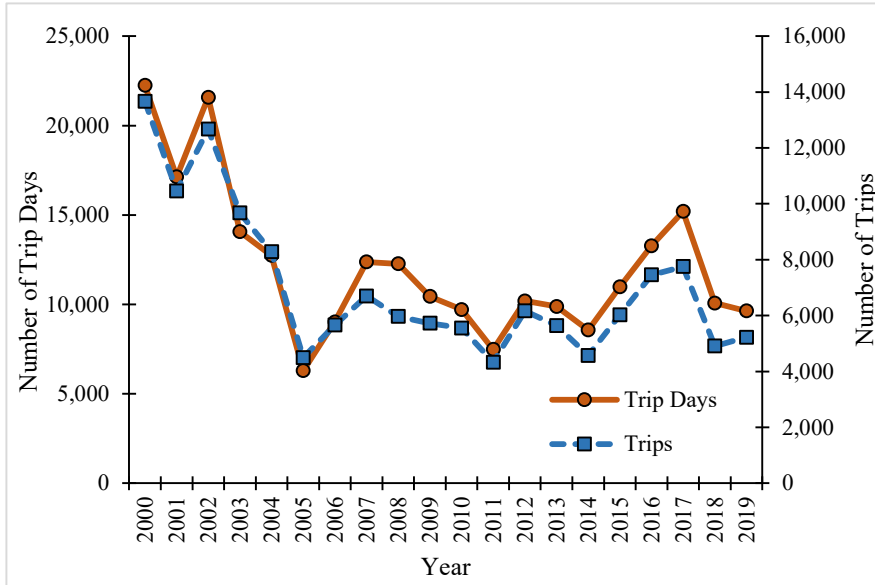


Figure 2.4.6. Number of trip days (number of trips x trip duration) and number of trips in the North Carolina shrimp otter trawl fishery by year, 2000 – 2019.

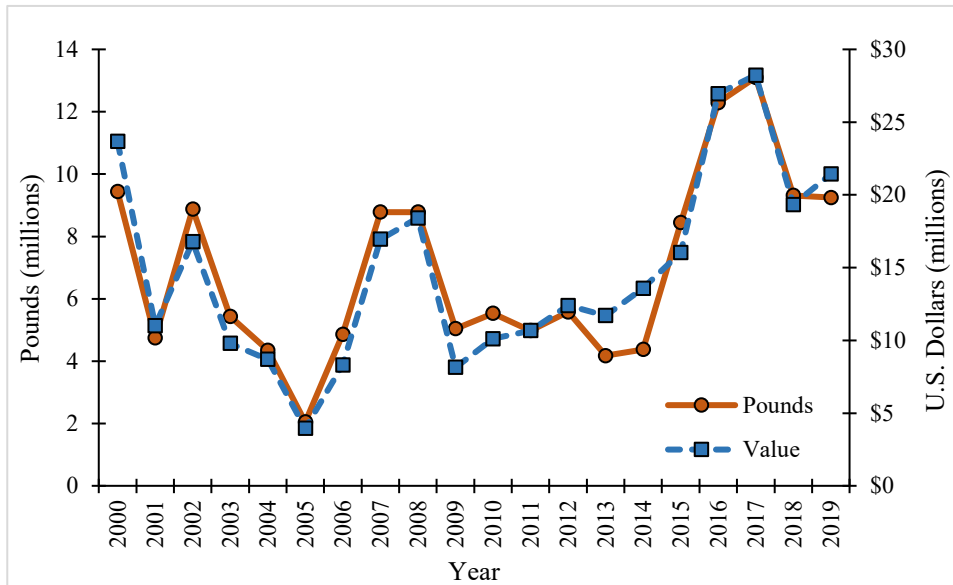


Figure 2.4.7. Pounds of shrimp landed and value for the North Carolina shrimp otter trawl fishery by year, 2000 – 2019.

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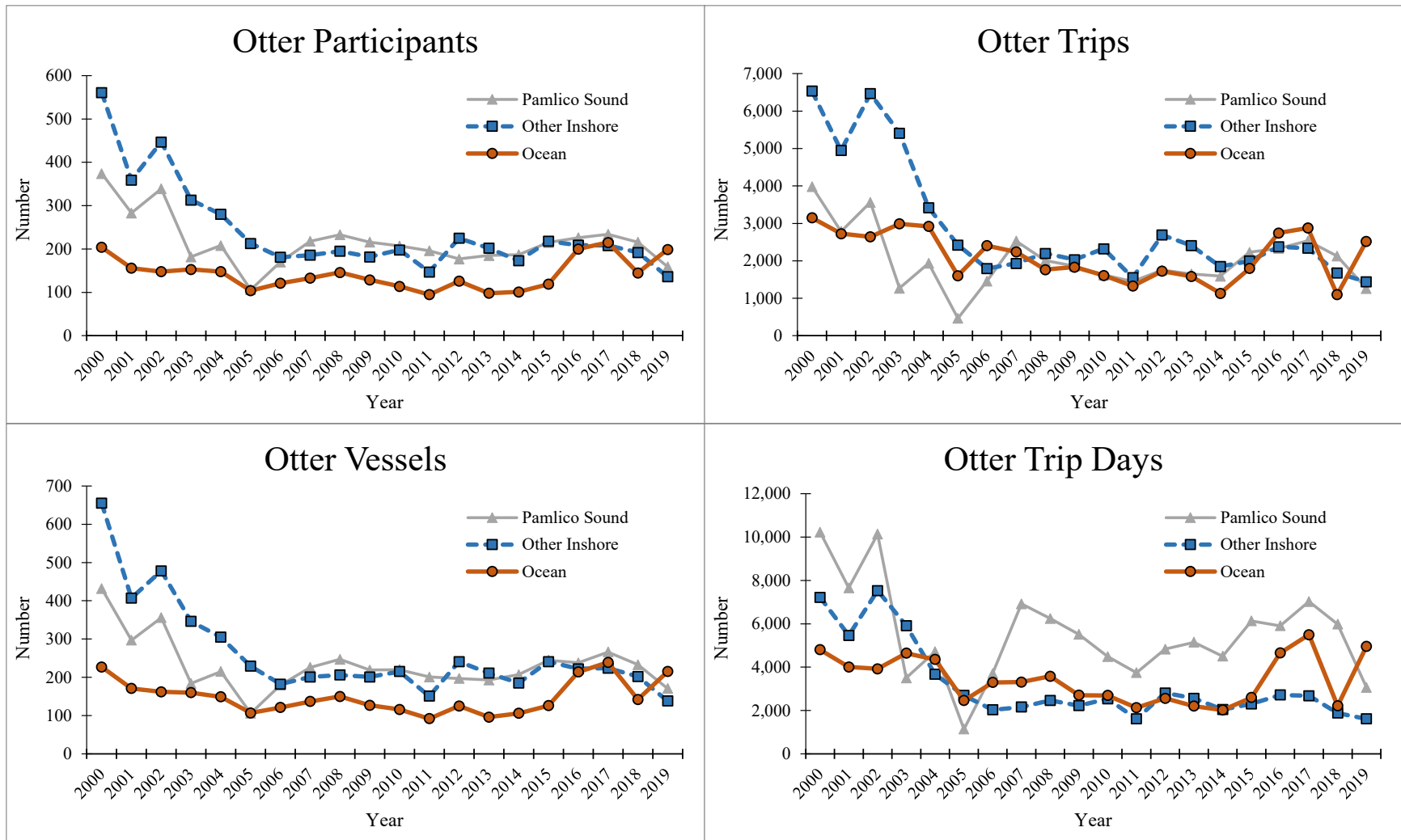


Figure 2.4.8. Number of participants, vessels, trips, and trip days by area for the North Carolina shrimp otter trawl fishery by year, 2000-2019.

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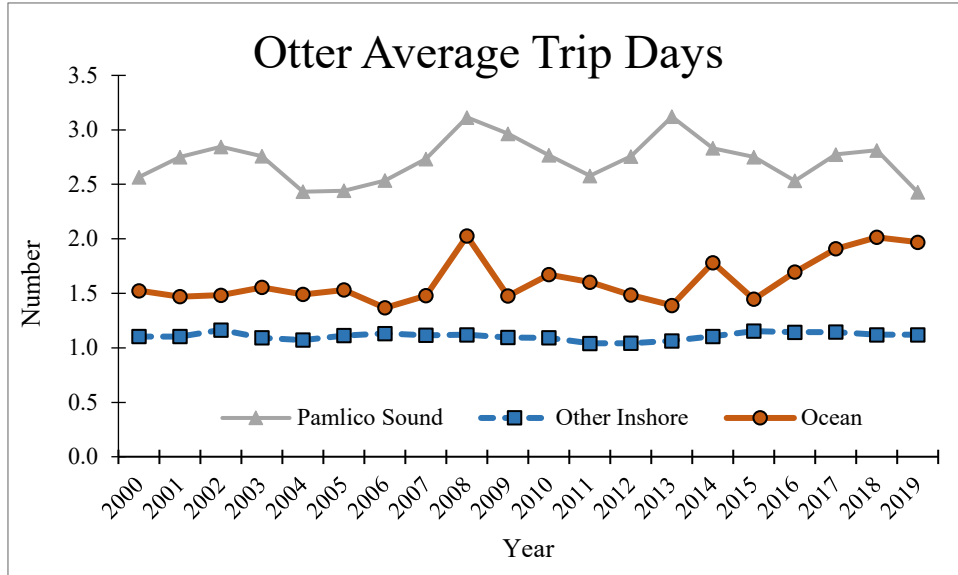


Figure 2.4.9. Average number of trip days by area for the North Carolina shrimp otter trawl fishery by year, 2000-2019.

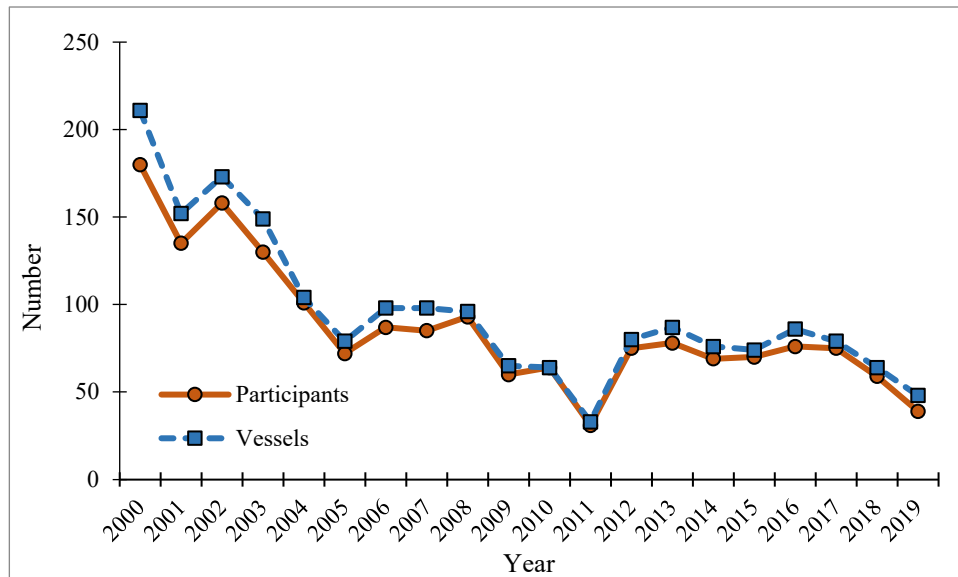


Figure 2.4.10. Number of participants and number of vessels in the North Carolina shrimp skimmer trawl fishery by year, 2000 – 2019.

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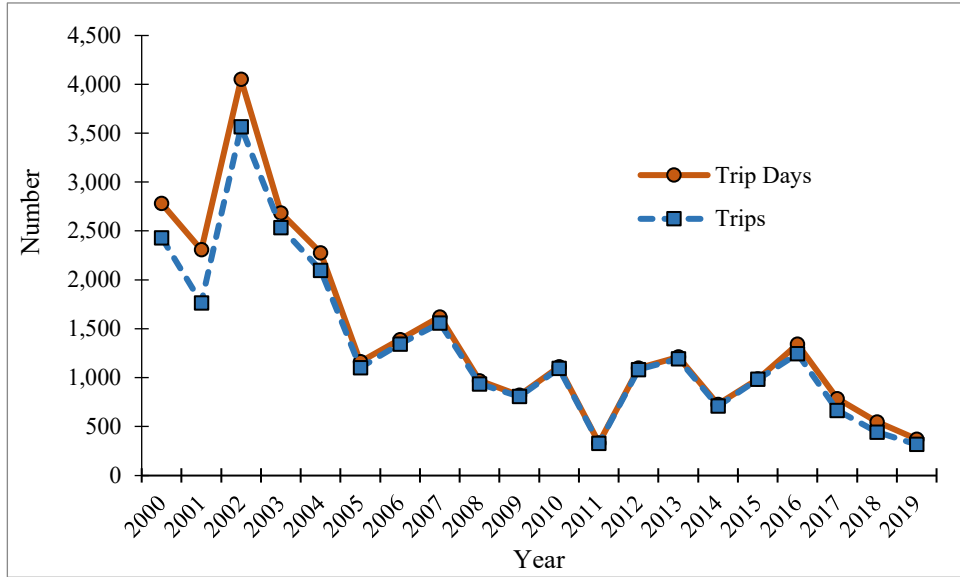


Figure 2.4.11. Number of trip days (number of trips x trip duration) and number of trips in the North Carolina shrimp skimmer trawl fishery by year, 2000 – 2019.

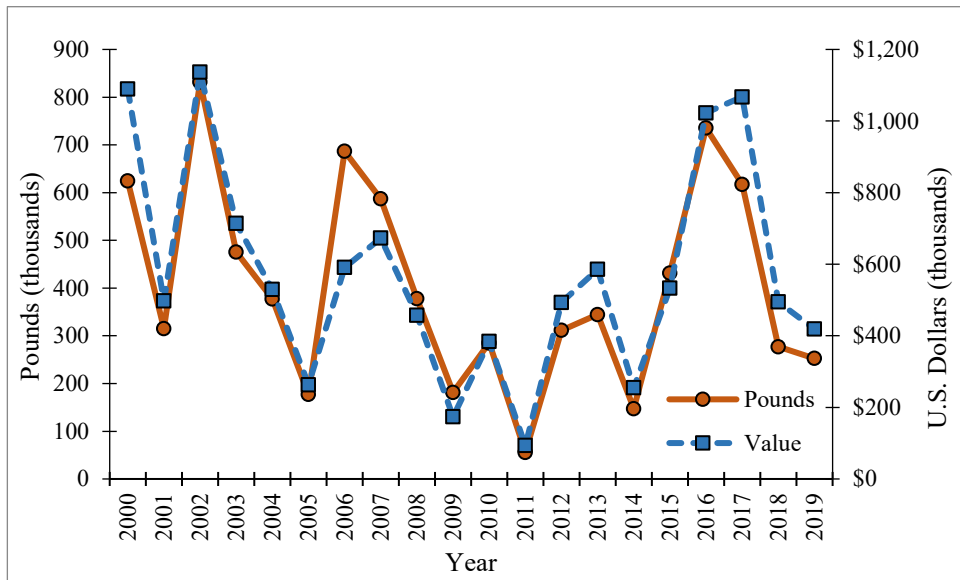


Figure 2.4.12. Pounds of shrimp landed and value for the North Carolina shrimp skimmer trawl fishery by year, 2000 – 2019.

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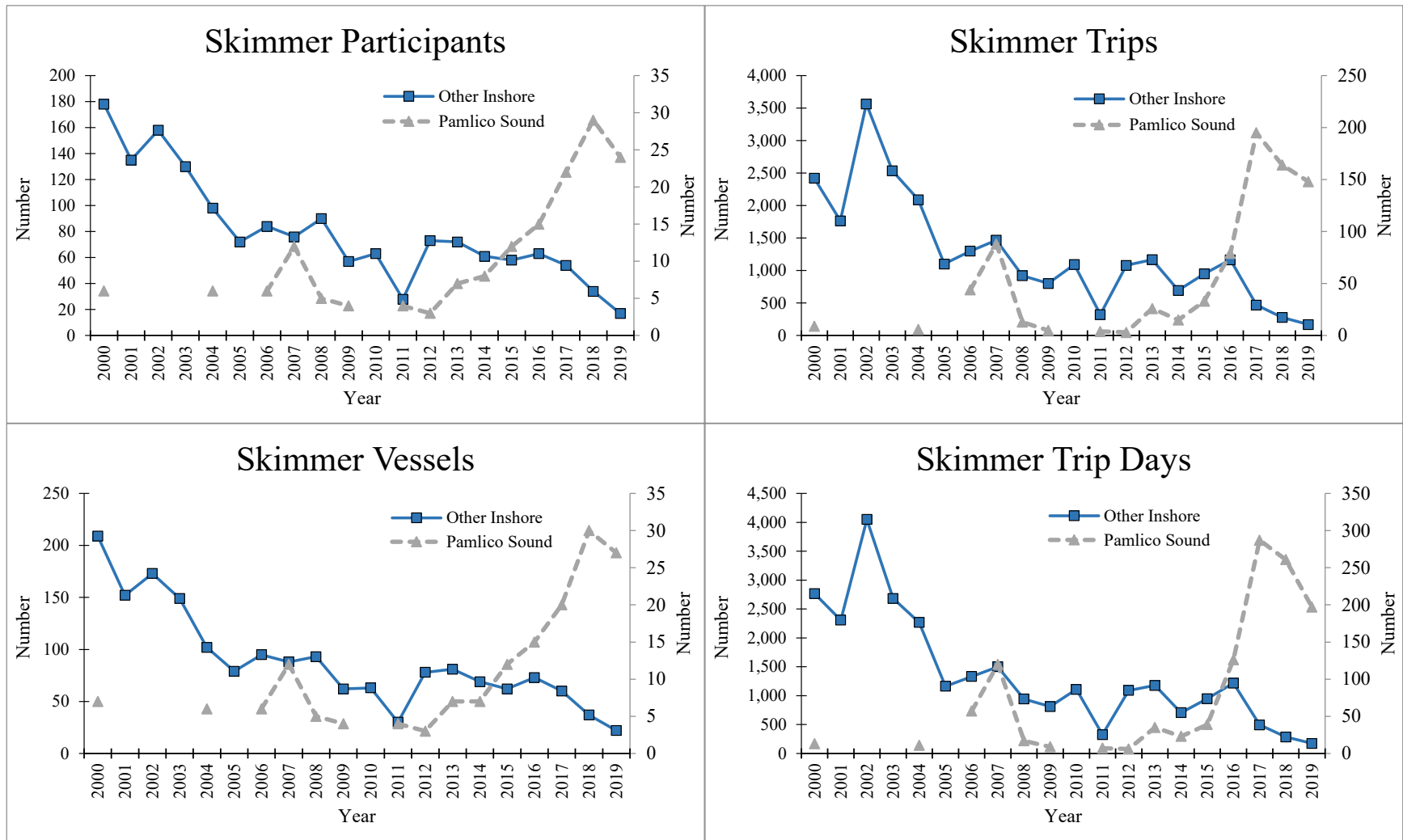


Figure 2.4.13. Number of participants, vessels, trips, and trip days by area for the North Carolina shrimp skimmer trawl fishery by year, 2000-2019.

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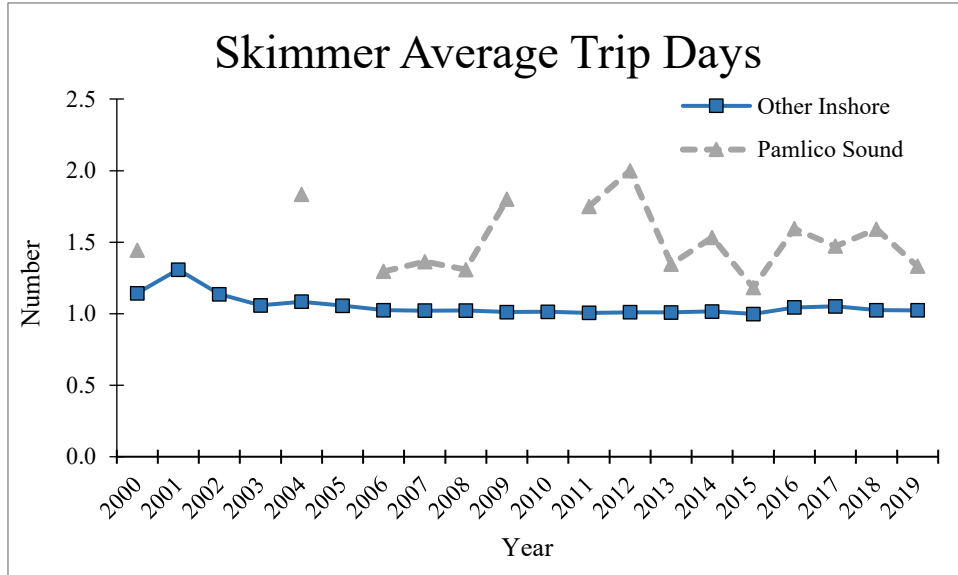


Figure 2.4.14. Average number of trip days by area for the North Carolina shrimp otter trawl fishery by year, 2000-2019.

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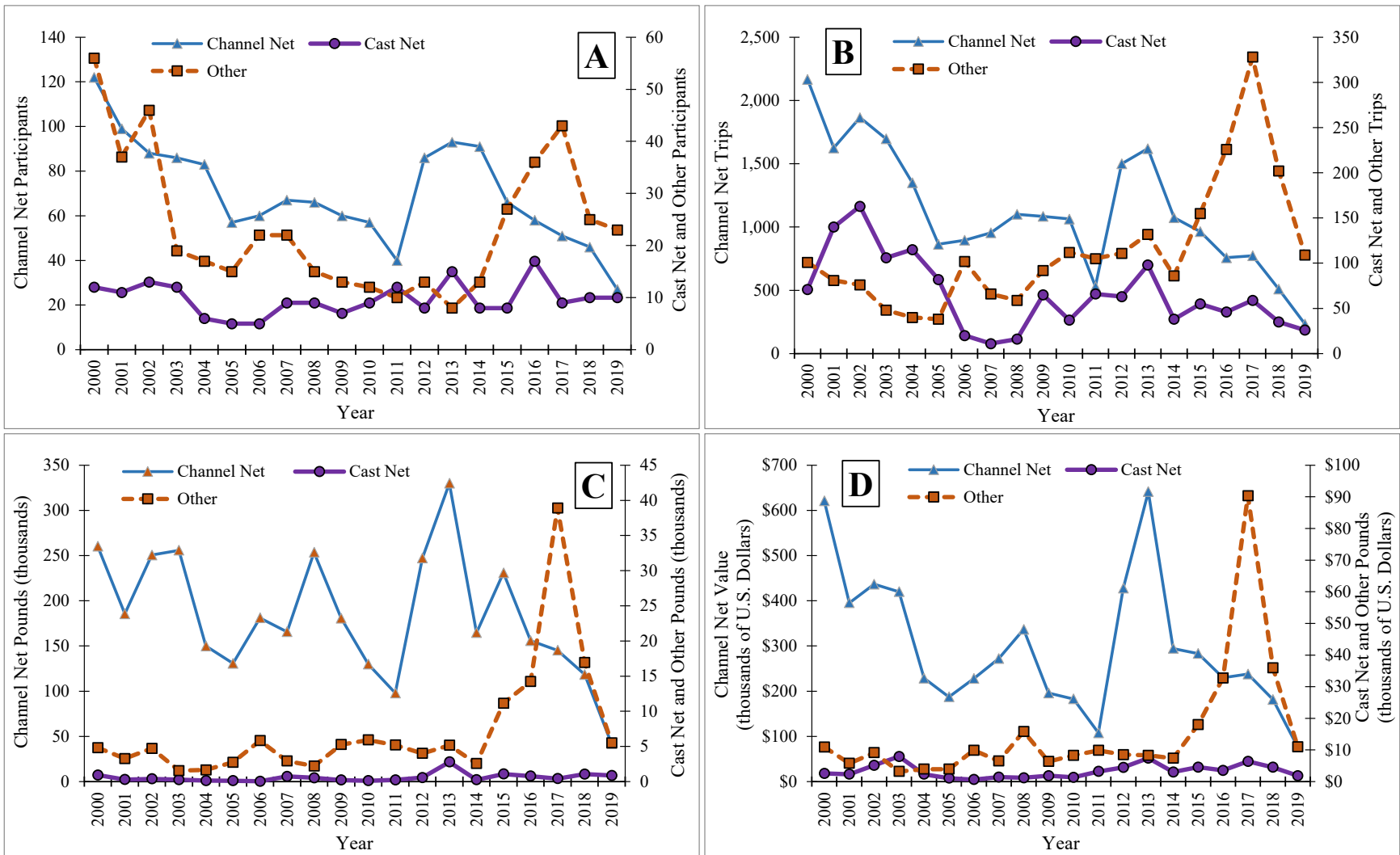


Figure 2.4.15. Commercial shrimp channel net, cast net, and other gear participants (A), trips (B), landings (C), and value (D), 2000-2019.

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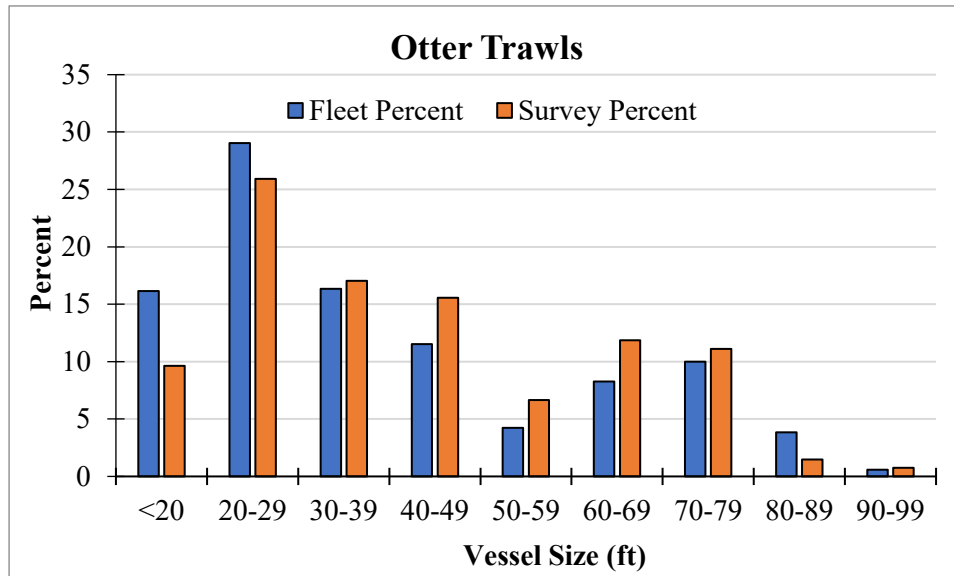


Figure 2.4.16. Commercial shrimp otter trawl fleet vessel size vs. surveyed portion of the fleet in the NCDMF BRD characterization survey.

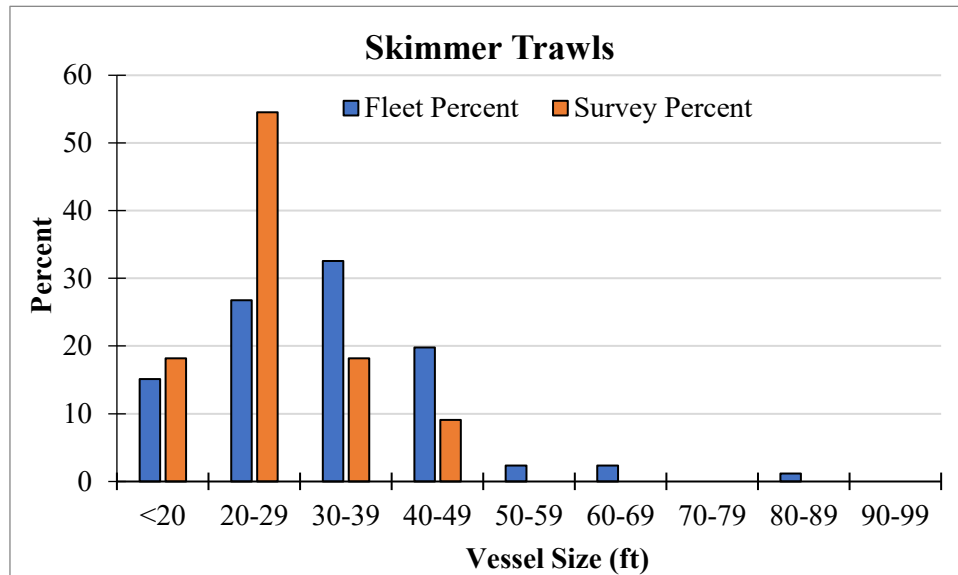


Figure 2.4.17. Commercial shrimp skimmer trawl fleet vessel size vs. surveyed portion of the fleet in the NCDMF BRD characterization survey.

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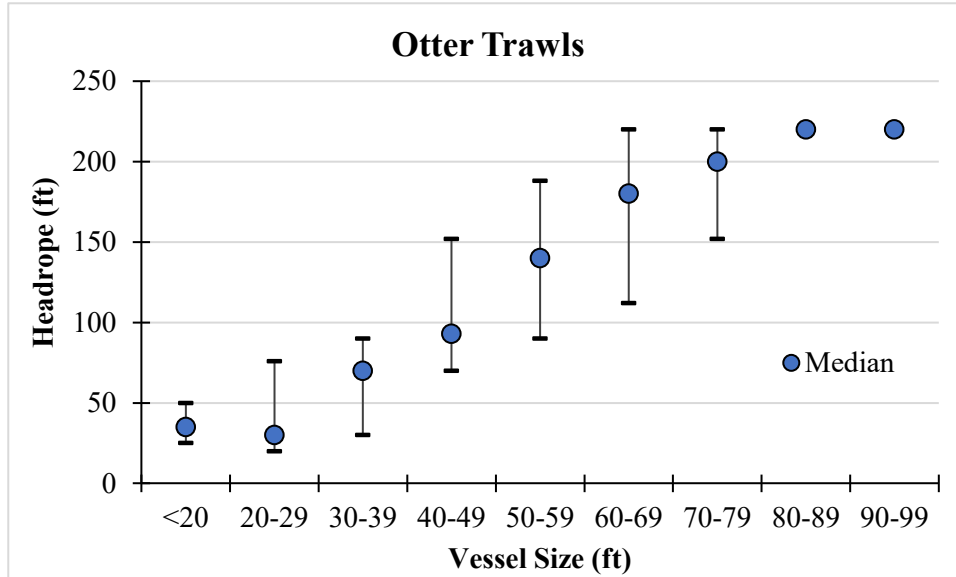


Figure 2.4.18. Commercial shrimp otter trawl median (blue dot), minimum (lower dash), and maximum (upper dash) total headrope per boat by vessel size bin from the NCDMF BRD characterization survey.

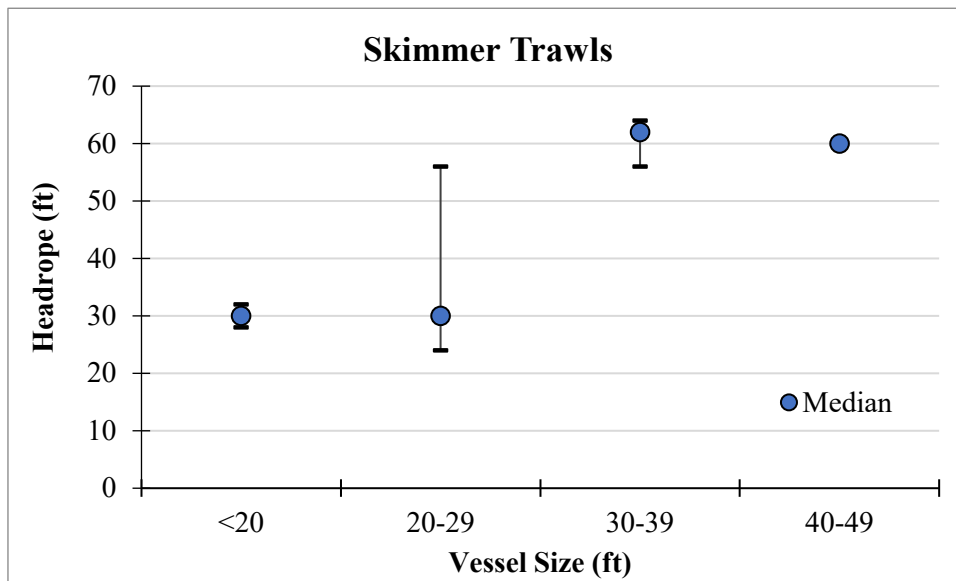


Figure 2.4.19. Commercial shrimp skimmer trawl median (blue dot), minimum (lower dash), and maximum (upper dash) total headrope per boat by vessel size bin from the NCDMF BRD characterization survey.

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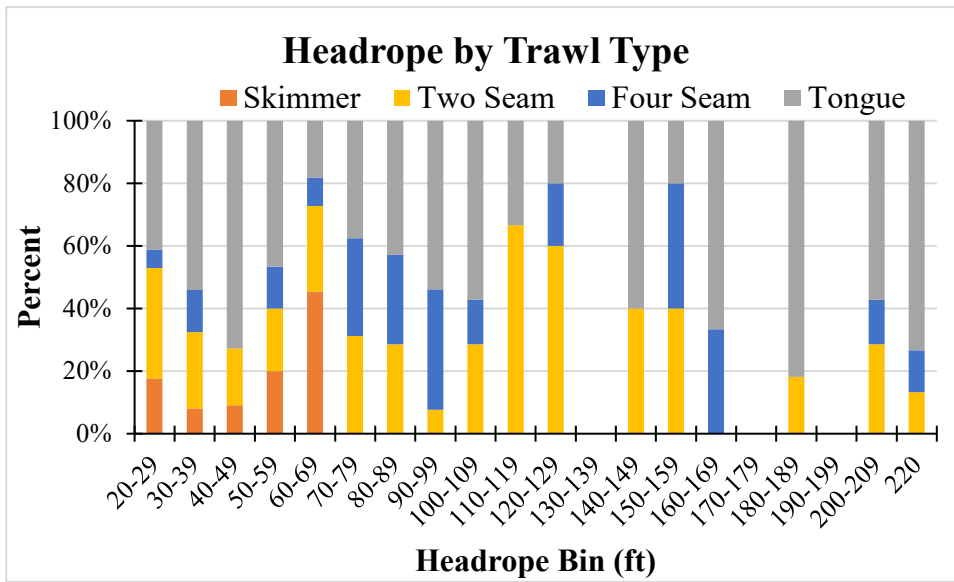


Figure 2.4.20. Proportion of net types by total headrope bin for vessels surveyed in the NCDMF BRD characterization survey.

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APPENDIX 2.4.A. SHRIMP TRAWL BYCATCH EFFORT ANALYSES

Objective

The objective of these analyses was to determine what fishery and gear characteristics significantly affect CPUE of shrimp (brown, pink, and white) and finfish bycatch in the North Carolina shrimp trawl fishery.

Methods

Data sub-setting

The data included species sampled from individual tows ($n = 1,567$) obtained from commercial shrimp trawls in North Carolina waters within 3 areas (Pamlico Sound, offshore and inshore) from 2012 to 2017 (Table A1). The data was subset and aggregated by species groups as follows: “finfish” (all finfish), “key shrimp” (brown shrimp, pink shrimp, and white shrimp), “key bycatch” (blue crab, southern flounder, summer flounder, spot, croaker, and weakfish), and “key finfish” (southern flounder, summer flounder, spot, croaker, weakfish). Individual species were also subset as follows: white shrimp, brown shrimp, pink shrimp, blue crab, southern flounder, summer flounder, spot, croaker, weakfish.

Each dataset was analyzed in 5 scenarios with regards to area as follows: “3 areas” (all 3 areas included; 1, 567 individual tows), “2 areas” (Pamlico tows were combined with inshore and then offshore and inshore were both included; 1,567 individual tows), “Pamlico” (Pamlico only; 488 individual tows), “inshore” (inshore only not including Pamlico; 559 individual tows), and “offshore” (offshore only; 520 individual tows).

Potential predictors

Potential categorical predictors included year, day of the week, season, day or night tow, turtle excluder device (TED) position (position 0 = no TED, position 1 = top, position 2 = bottom), net type (net type 1 = two seamed, net type 2 = four seamed, net type 3 = tongue, net type 4 = skimmer), area (levels dependent on scenario as described previously), and management regime (Figure 2.4.A.1). Management regime was defined with two levels as prior and post June 2015 when regulations that were assumed to impact CPUE of catch and bycatch were implemented. Season was defined with three levels as follows: spring was from March 21st to June 21st, summer was from June 22nd to September 22nd, and fall was from September 23rd to December 21st. Day or night was defined with two levels as follows: in spring day was from 6:17 am to 8:04 pm, in summer day was from 6:25 am to 8:13 pm, and in fall day was from 6:41 am to 5:13 pm.

Potential numerical predictors included bycatch reduction device (BRD) placement from centerline (CL) (number of meshes), BRD placement from tailbag ties (TT) (number of meshes), wing mesh (bar mesh length in inches), tailbag mesh (bar mesh length in inches), tow speed (knots), tow duration (minutes), tow distance (nautical miles), TED bar spacing (inside edge to inside edge in inches), number of nets, total head-rope per boat, latitude, longitude, and interaction between latitude and longitude (Figure 2.4.A.2).

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Spatial heterogeneity

Spatial components were an important consideration in determining which variables were the most significant predictors of CPUE. Spatial distribution and density maps were created for each species by area (Figures 2.4.A.3, A.4, and A.5).

Effort metrics

Several metrics were considered as appropriate measures for effort including tow duration (minutes) and distance towed (nautical miles). Distance towed was calculated as tow duration multiplied by tow speed (knots). The natural log of catch weight for each species group was plotted against tow duration and tow distance for visual comparison of the relationships between these metrics to catch weight (Figures 2.4.A.6, A.7, A.8, and A.9). Spearman's rank correlation coefficient (ρ) was calculated for each species group for the natural log of catch weight and tow duration (Table 2.4.A.2) and tow distance (Table 2.4.A.3). Correlations varied based on species group and tow distance had slightly higher correlations for most of the species groups; however, since correlations for both metrics were comparable, tow duration was selected as the unit of effort as this metric would be easier to use for enforcement purposes if future regulations were implemented to limit effort.

Modeling

To determine which variables were correlated with each other, variables were sequentially dropped from the variance inflation factor (VIF) analysis until all VIFs were below a value of 3 (Zuur et al. 2010). Total head-rope per boat and number of nets were found to be correlated (Tables 2.4.A.4, A.5, and A.6). Subsequently, number of nets was dropped as a potential predictor because it was determined that total head-rope per boat would be a more important variable to evaluate as a predictor.

The response variable modeled was the logarithm of CPUE (Y) using generalized least squares with a spatial correlation matrix to account for spatial, non-constant variance. The spatial correlation matrix was only included when it improved the model based on the difference in Akaike's information criterion (ΔAIC). Any model with latitude and/or longitude as predictor variables was not fitted with a spatial correlation matrix. Models were developed as:

$$Y \sim \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \varepsilon$$

where $\beta_{1,2,3,\dots}$ were the coefficients for the potential predictor variables, $X_{1,2,3,\dots}$ were the potential predictor variables, and ε was random error. Models that included a spatial correlation matrix were modeled as:

$$Y_l \sim \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 \dots + \varepsilon_l$$

where Y at location l was modeled as previously with random error specific to location l .

A forward model selection process was implemented using a likelihood ratio test (LRT). Candidate models were developed by adding one predictor variable to the base model ($Y \sim 1$). The candidate

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models were compared to the base model with a LRT and the candidate model with the lowest p-value that was lower than the significance level (α) of 0.01 was adopted as the updated base model. This process was repeated until none of the candidate models were lower than the significance level.

To prevent the overfitting of models, a backward selection process was also incorporated where the resulting model from the forward selection was assigned as the base model and candidate models were developed by removing one predictor variable from the base model. The candidate models were compared to the base model using AIC. If the candidate model had a lower AIC than the base model, then the candidate was accepted as the updated base model. This process was repeated for each predictor variable until the candidate model AIC was no longer lower than the base model AIC.

Zero-inflation

Some species groups were zero-inflated (Table 2.4.A.7) and were modeled using two sub-models; a presence/absence model and the log(CPUE) model as described above. Species groups with the percentage of zeroes $\geq 60\%$ were considered zero-inflated and the presence/absence of the selected species group was modeled using a generalized linear model with a similar model structure as the log(CPUE) model except the response variable was binomially distributed and a spatial correlation matrix was not included.

Results

Plots were developed for each species group of log(CPUE) against each potential variable (Figures 2.4.A.10-A.22). Some variables indicated a relationship for predicting CPUE, for example, in Figure A14 the plot of CPUE against day or night indicates a possible significant difference between day and night for predicting CPUE however, the data was inadequate due to the high number of missing data points (93.2%). These results indicate a possible relationship for predicting CPUE based on the time of day and might be an avenue of further research.

3-area scenario

Results for the 3-area scenario indicate that for the log(CPUE) sub-models (Table 2.4.A.8), the predominant predictors for the various species groups were year (12 species groups), net type (11 species groups), area (8 species groups), and season (5 species groups). Management regime (3 species groups), day of the week (3 species groups), latitude (2 species groups), longitude (2 species groups), and the interaction between latitude and longitude (2 species groups) were each significant but not as frequently. The presence/absence sub-models (Table 2.4.A.9) indicate that of the five zero-inflated species groups with converged models; year (5 species groups), TED position (5 species groups), net type (5 species groups), and area (4 species groups) were the predominant predictors. Season (2 species groups), management regime (2 species groups), wing mesh (1 species group), tailbag mesh (1 species group), and BRD placement TT (1 species group) were each significant less frequently.

2-area scenario

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Results for the 2-area scenario indicate that for the log(CPUE) sub-models (Table 2.4.A.8), the predominant predictors for the various species groups were year (12 species groups), net type (11 species groups), day of the week (4 species groups), season (5 species groups), and management regime (4 species groups). Area (3 species groups), latitude (1 species group), longitude (1 species group), and the interaction between latitude and longitude (1 species group) were each significant but not as frequently. The presence/absence sub-models (Table A9) indicate that of the five zero-inflated species groups with converged models; year (5 species groups), TED position (5 species groups), and net type (4 species groups) were the predominant predictor variables. Area (2 species groups), season (2 species groups), management regime (1 species group), wing mesh (2 species groups), tailbag mesh (1 species group), BRD placement TT (1 species group), latitude (1 species group), longitude (1 species group), and the interaction between latitude and longitude (1 species group) were each significant less frequently.

Inshore scenario

Results for the inshore scenario indicate that for the log(CPUE) sub-models (Table 2.4.A.8), the predominant predictors for the various species groups were year (9 species groups), net type (9 species groups), and season (5 species groups). Day of week, management regime, latitude, longitude, and the interaction between latitude and longitude were each significant for two species groups. The presence/absence sub-models (Table A9) indicate that of the five zero-inflated species groups with converged models; total head-rope per boat and TED bar spacing were significant for three species groups and were the predominant predictor variables. Year (2 species groups), TED position (2 species groups), day/ night (1 species group), season (2 species groups), management regime (1 species group), longitude (1 species group), and the interaction between season and longitude (1 species group) were each significant less frequently.

Offshore scenario

Results for the offshore scenario indicate that for the log(CPUE) sub-models (Table 2.4.A.8), the predominant predictors for the various species groups were year (8 species groups), net type (5 species groups), and season (7 species groups). Day of week was only significant for one species group and latitude, longitude, and the interaction between latitude and longitude were each significant for three species groups. The presence/absence sub-models (Table 2.4.A.9) indicate that of the four zero-inflated species groups with converged models; season (3 species groups) and BRD placement TT (2 species groups) were the two most frequent predictors. Year, management regime, wing mesh, BRD placement CL, TED bar spacing, latitude, longitude, and the interaction between latitude and longitude were each significant for only one species group.

Pamlico scenario

Results for the Pamlico scenario indicate that for the log(CPUE) sub-models (Table 2.4.A.8), the predominant predictors for the various species groups were year (10 species groups), TED position (5 species groups), net type (6 species groups), and season (8 species groups). Management regime (1 species group), latitude (4 species groups), longitude (4 species groups), and the interaction between latitude and longitude (4 species groups) were significant but not as frequently. The presence/absence sub-models (Table A9) indicate that of the four zero-inflated species groups with

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converged models; year, TED position, and TED bar spacing each were significant in 2 species groups and net type, season, management regime, wing mesh, total head-rope per boat and latitude were each significant for only one species group.

Discussion

The data used for these analyses were acquired opportunistically through onboard observations of commercial shrimp trawlers. Consequently, the data have some limitations as some areas have years and months with little or no data (Table 2.4.A.1). These results should be viewed as exploratory in nature and not conclusive.

There is some variation in the significant predictor variables dependent on the species or species group, scenario, and sub-model (Tables 2.4.A.8 and A.9). For example, for the log(CPUE) sub-models, TED position is almost exclusively important for the Pamlico area and the coefficients indicate that for brown shrimp and the key shrimp species group, position 2 (bottom) has the highest increase on CPUE and position 1 (top) has a higher increase on CPUE compared to position 0. However, for the log(CPUE) sub-model, there are consistent results for multiple species and species groups across scenarios. Specifically, of the 65 possible combinations of scenarios and species or species groups; year, net type, and season are significant for 80.0%, 66.2%, and 51.8% of the sub-models. Unfortunately, the presence/absence sub-models provide less clearly distinct generalizations yet, there is still valuable species-specific information.

For example, spot and weakfish were encountered in shrimp trawls more frequently than other key bycatch species, present in 93.3% and 54.1%, respectively, of all trawl samples and present 99.2% and 73%, respectively, in trawl samples from Pamlico Sound where the majority of estuarine shrimp harvest and effort occurs (Table 2.4.A.7). For spot, net type was a significant factor in the 3-area, 2-area, and inshore models with tongue style nets having more bycatch than two-seam and four-seam nets. Similarly, net type was also a significant factor for weakfish in the 3-area, 2-area, inshore, offshore, and Pamlico models with tongue nets having more bycatch. This suggests net type may be important to consider when discussing methods to reduce bycatch for these species. Season was also consistently a significant factor for weakfish in all the models, with summer having higher rates of bycatch in the 3-area, 2-area, inshore, and offshore models, and the fall having higher rates of bycatch in Pamlico model. This suggests for weakfish that season should be considered when discussing methods to reduce bycatch and that one approach may not work for all areas.

Although results of these analyses are inconclusive, this work does provide some direction for future research efforts. The significant data gaps also highlight the need for more consistent monitoring of discards in the shrimp trawl fishery through a dedicated onboard observer program and/or directed experimental research. This will allow more constructive and focused efforts to be made to reduce bycatch in the shrimp trawl fishery.

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Literature Cited

Zuur, A.F., Ieno, E.N., Elphick, C.S. 2010. A protocol for data exploration to avoid common statistical problems: Data exploration. *Methods in Ecology and Evolution* 1, 3–14.
<https://doi.org/10.1111/j.2041-210X.2009.00001.x>

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Tables

Table 2.4.A.1. Number of individual tows sampled by area, year, and month, 2012-2017.

Area	Year	Month									
		March	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.
All areas (1,567 tows)	2012	0	0	0	0	0	61	55	61	21	23
	2013	0	6	46	45	54	1	33	30	24	4
	2014	0	0	11	88	128	71	48	50	0	0
	2015	0	0	14	89	50	80	61	85	11	0
	2016	4	20	19	33	41	37	23	27	13	0
	2017	0	10	10	11	0	32	30	7	0	0
	Totals	4	36	100	266	273	282	250	260	69	27
Inshore (559 tows)	2012	0	0	0	0	0	22	21	17	0	6
	2013	0	6	23	4	0	0	0	3	0	0
	2014	0	0	0	5	0	7	5	16	0	0
	2015	0	0	7	46	12	10	61	85	11	0
	2016	0	20	3	17	30	23	20	6	0	0
	2017	0	10	10	3	0	20	28	2	0	0
	Totals	0	36	43	75	42	82	135	129	11	6
Offshore (520 tows)	2012	0	0	0	0	0	14	23	20	21	17
	2013	0	0	23	26	17	1	15	6	15	4
	2014	0	0	11	68	24	8	15	34	0	0
	2015	0	0	4	25	13	32	0	0	0	0
	2016	4	0	16	16	4	0	3	21	13	0
	2017	0	0	0	0	0	0	2	5	0	0
	Totals	4	0	54	135	58	55	58	86	49	21
Pamlico (488 tows)	2012	0	0	0	0	0	25	11	24	0	0
	2013	0	0	0	15	37	0	18	21	9	0
	2014	0	0	0	15	104	56	28	0	0	0
	2015	0	0	3	18	25	38	0	0	0	0
	2016	0	0	0	0	7	14	0	0	0	0
	2017	0	0	0	8	0	12	0	0	0	0
	Totals	0	0	3	56	173	145	57	45	9	0

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Table 2.4.A.2. Correlation results for Ln(catch weight) vs. tow duration.

Species	Spearman ρ
Brown	0.59
Croaker	0.55
Spot	0.53
Key bycatch	0.51
Key shrimp	0.51
Key finfish	0.5
Finfish	0.49
Crab	0.48
Weakfish	0.4
Southern	0.36
Summer	0.36
Pink	0.36
White	0.18

Table 2.4.A.3. Correlation results for Ln(catch weight) vs. distance towed.

Species	Spearman ρ
Brown	0.63
Croaker	0.61
Spot	0.57
Key finfish	0.55
Key bycatch	0.55
Finfish	0.54
Key shrimp	0.53
Pink	0.48
Crab	0.46
Weakfish	0.44
Summer	0.4
Southern	0.38
White	0.14

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Table 2.4.A.4. Correlation variance inflation factors for potential model variables with headrope per boat and number of nets included. Values under 3 are acceptable for modeling.

Variable	Variance Inflation Factors
Wing mesh	1.57
Tailbag mesh	1.40
Tow speed	2.60
BRD placement TT	1.36
BRD placement CL	1.30
TED bar spacing	1.92
Number of nets	9.48
Total head-rope per boat	9.92

Table 2.4.A.5. Correlation variance inflation factors for potential model variables without headrope per boat. Values under 3 are acceptable for modeling.

Variable	Variance Inflation Factors
Wing mesh	1.47
Tailbag mesh	1.35
Tow speed	2.56
BRD placement TT	1.35
BRD placement CL	1.10
TED bar spacing	1.76
Number of nets	2.73

Table 2.4.A.6. Correlation variance inflation factors for potential model variables without number of nets. Values under 3 are acceptable for modeling.

Variable	Variance Inflation Factors
Wing mesh	1.56
Tailbag mesh	1.39
Tow speed	2.52
BRD placement TT	1.33
BRD placement CL	1.13
TED bar spacing	1.90
Total head-rope per boat	2.86

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Table 2.4.A.7. Percentage of tows with zero catches of species group for each area subset.

Species group	All areas	Inshore	Offshore	Pamlico
Finfish	1.8	3.0	1.9	0.2
Key shrimp	1.7	2.7	1.9	0.2
Key bycatch	1.9	3.0	2.1	0.2
Key finfish	1.9	3.2	2.1	0.2
Blue crab	62.5	57.4	89.6	39.5
Spot	6.7	12.9	5.6	0.8
Croaker	47.5	22.4	61.2	61.9
Southern flounder	78.0	87.3	82.3	62.7
Summer flounder	73.1	81.0	71.7	65.4
Weakfish	44.9	63.0	42.1	27.0
White shrimp	74.6	43.1	86.9	97.5
Brown shrimp	38.7	69.1	33.3	9.6
Pink shrimp	88.4	90.5	81.7	93.0

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Table 2.4.A.8. Log(CPUE) model predictor variables for each analysis.

Species/ Group Variable	FF	KF	KB	KS	Bc	Sp	Cr	So	Su	Wf	Ws	Bs	Ps
Year	32POI	32POI	32POI	32POI	32I	32POI	32POI	32PO	32P	32POI	32PI	32P	
TED Pos.		P		P		P	P					P	32
Net Type	32POI	32OI	32POI	32I	32PI	32OI	32I		32P	32POI		32PI	32P
Area	32	3	3	32	3	3				3		32	
Day of Week		2		32OI							32I	32	
Day/ Night													
Season	32PO	P	P	32PI	32P	P	POI	32POI	O	32POI		OI	32O
Manage. Regime			2	32I	P	3	32			2			I
Wing Mesh													
Tailbag Mesh													
Tow Speed													
BRD Place TT													
BRD Place CL													
TED bar spacing													
Headrope / Boat													
Number of Nets													
Latitude					3			I	32PO	P		POI	PO
Longitude					3			I	32PO	P		POI	PO
Lat * Lon					3			I	32PO	P		POI	PO

Abbreviations are as follows:

FF: Finfish, **KF:** Key finfish, **KB:** Key bycatch, **KS:** Key shrimp, **Bc:** Blue crab, **Sp:** Spot, **Cr:** Croaker, **So:** Southern flounder, **Su:** Summer flounder, **Wf:** Weakfish, **Ws:** White shrimp, **Bs:** Brown shrimp, **Ps:** Pink shrimp.

Area symbol coding as follows:

3: 3 areas (inshore, offshore, & Pamlico), **2:** 2 areas (inshore & offshore), **P:** Pamlico, **O:** offshore, **I:** inshore.

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Table 2.4.A.9. Presence/absence model predictor variables for data sets that were zero-inflated.

Species/ Group Variable	FF	KF	KB	KS	Bc	Sp	Cr	So	Su	Wf	Ws	Bs	Ps
Year					32		P	32POI	32I		32		32
TED Pos.					32		P	32	32PI		32	I	32
Net Type					32			32	3		32		32P
Area					32			32	3		3		
Day of Week													
Day or Night										I			
Season								OI	O		32O	I	32P
Season * Lon								I					
Manage. Regime					32						2O		3PI
Wing Mesh							P		3O				
Tailbag Mesh									3				
Tow Speed													
BRD Place TT								O			O		32
BRD Place CL											O		
TED bar spacing							P	I	POI			I	
Headrope / Boat									2PI			I	I
Number of Nets													
Latitude							P		O		2		
Longitude								I	O		2		
Lat * Lon									O		2		

Abbreviations are as follows:

FF: Finfish, **KF:** Key finfish, **KB:** Key bycatch, **KS:** Key shrimp, **Bc:** Blue crab, **Sp:** Spot, **Cr:** Croaker, **So:** Southern flounder, **Su:** Summer flounder, **Wf:** Weakfish, **Ws:** White shrimp, **Bs:** Brown shrimp, **Ps:** Pink shrimp.

Area symbol coding as follows:

3: 3 areas (inshore, offshore, & Pamlico), **2:** 2 areas (inshore & offshore), **P:** Pamlico, **O:** offshore, **I:** inshore.

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Figures

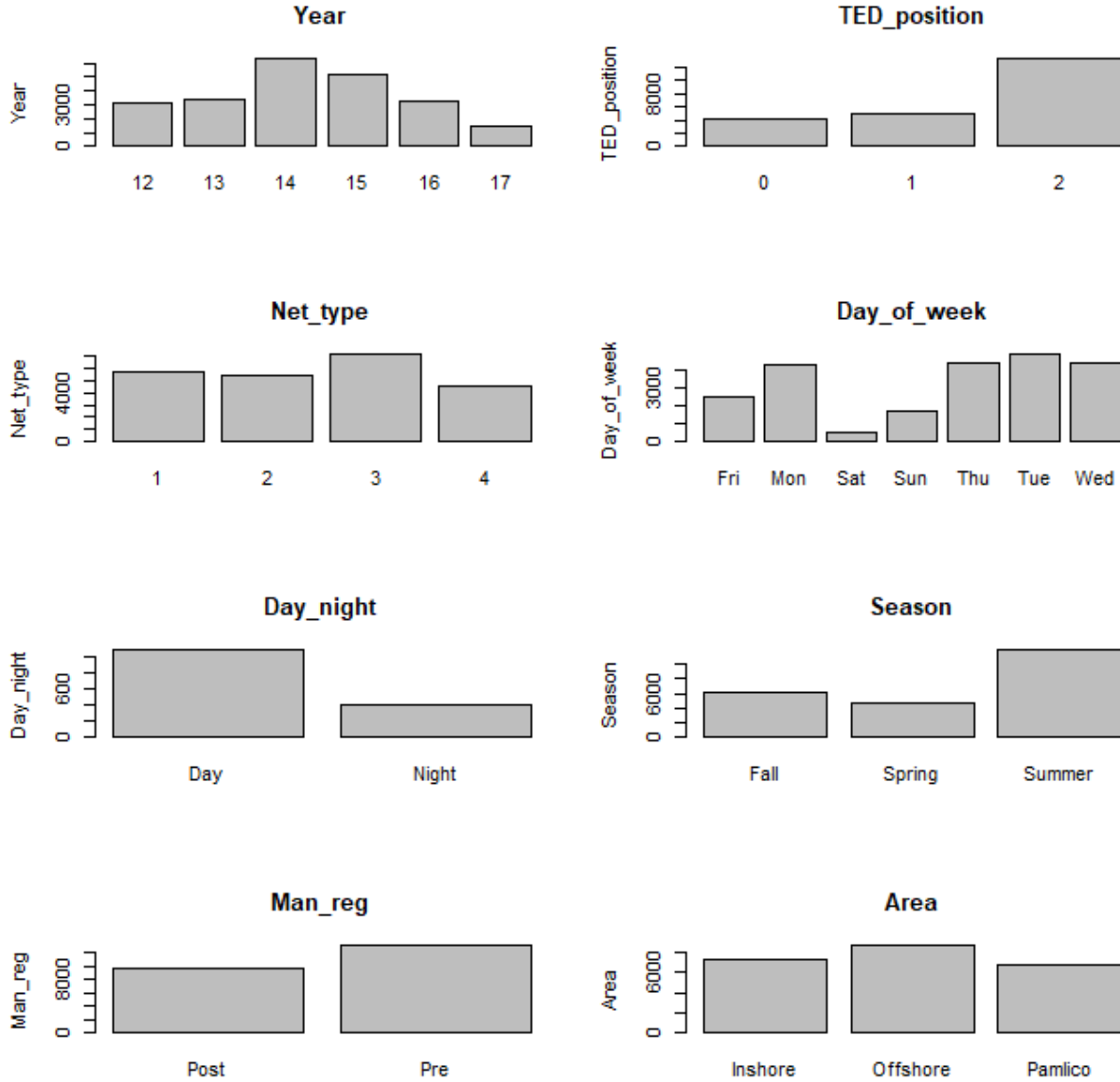


Figure 2.4.A.1. Histograms of potential categorical variables. “Man_reg” refers to management regime.

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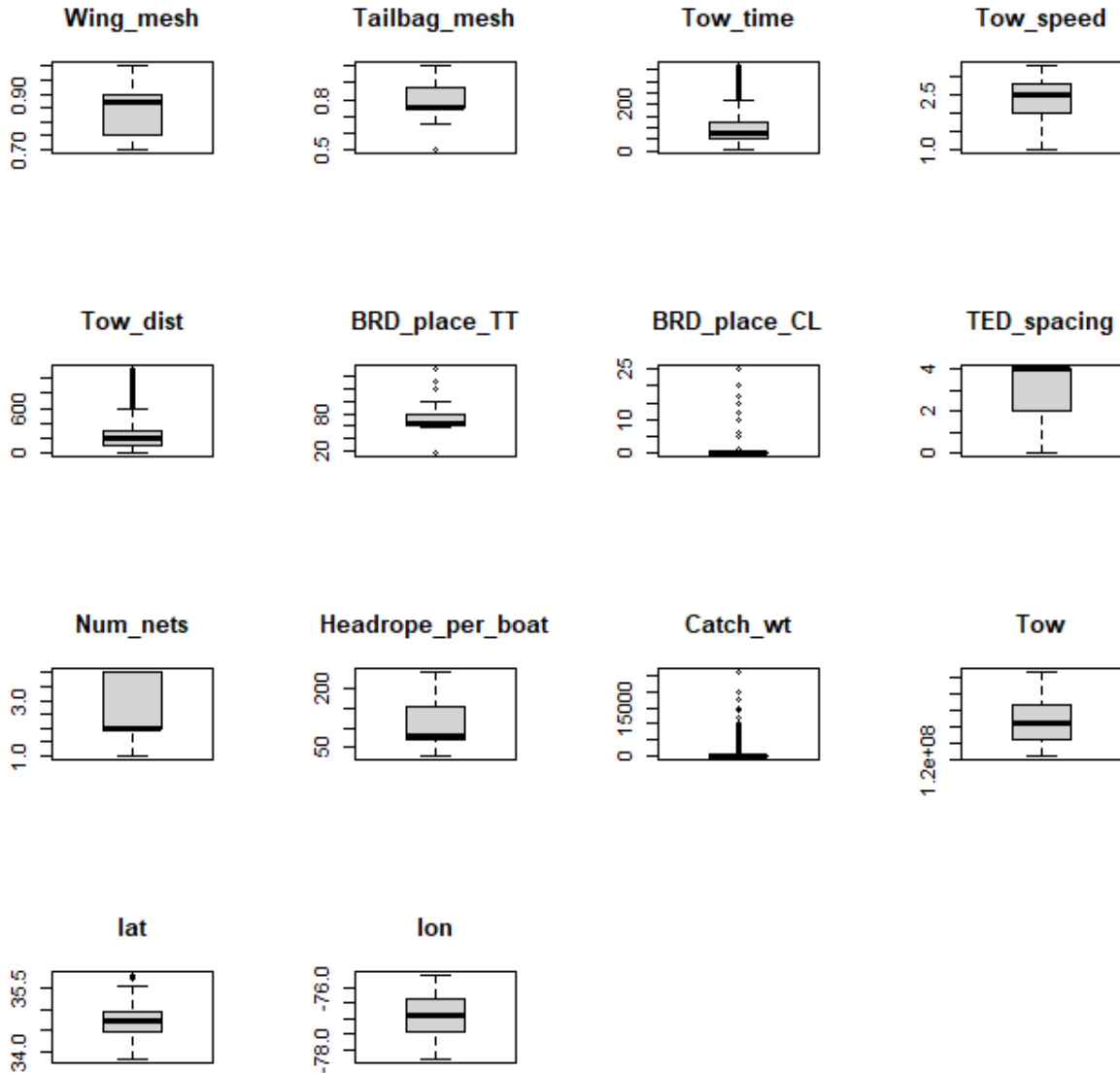


Figure 2.4.A.2. Boxplots of potential numerical variables. “lat”, “lon”, and “Num_nets” refer to latitude, longitude, and number of nets, respectively.

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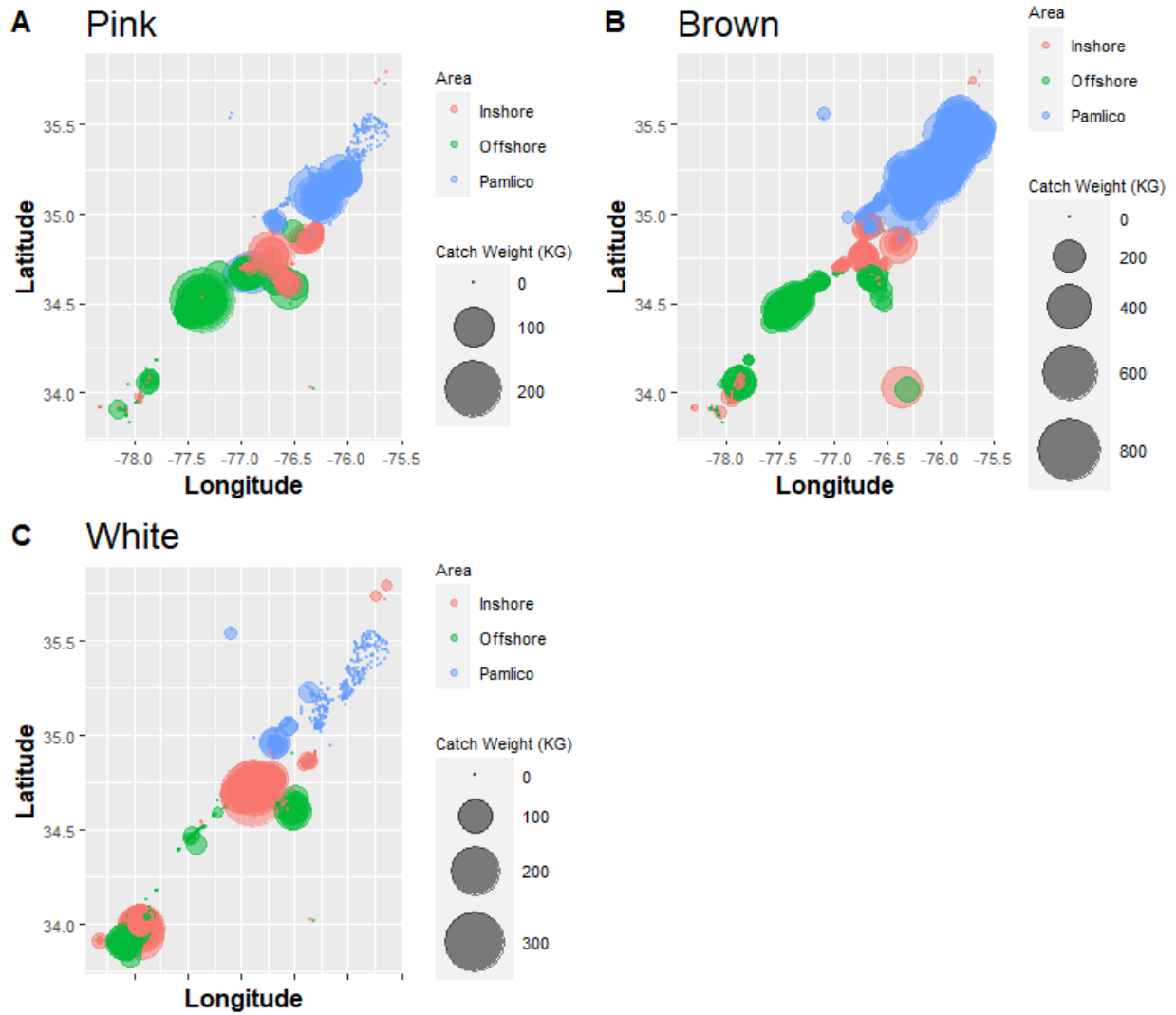


Figure 2.4.A.3. Spatial distribution and density of catch for pink shrimp (a), brown shrimp (b), and white shrimp (c).

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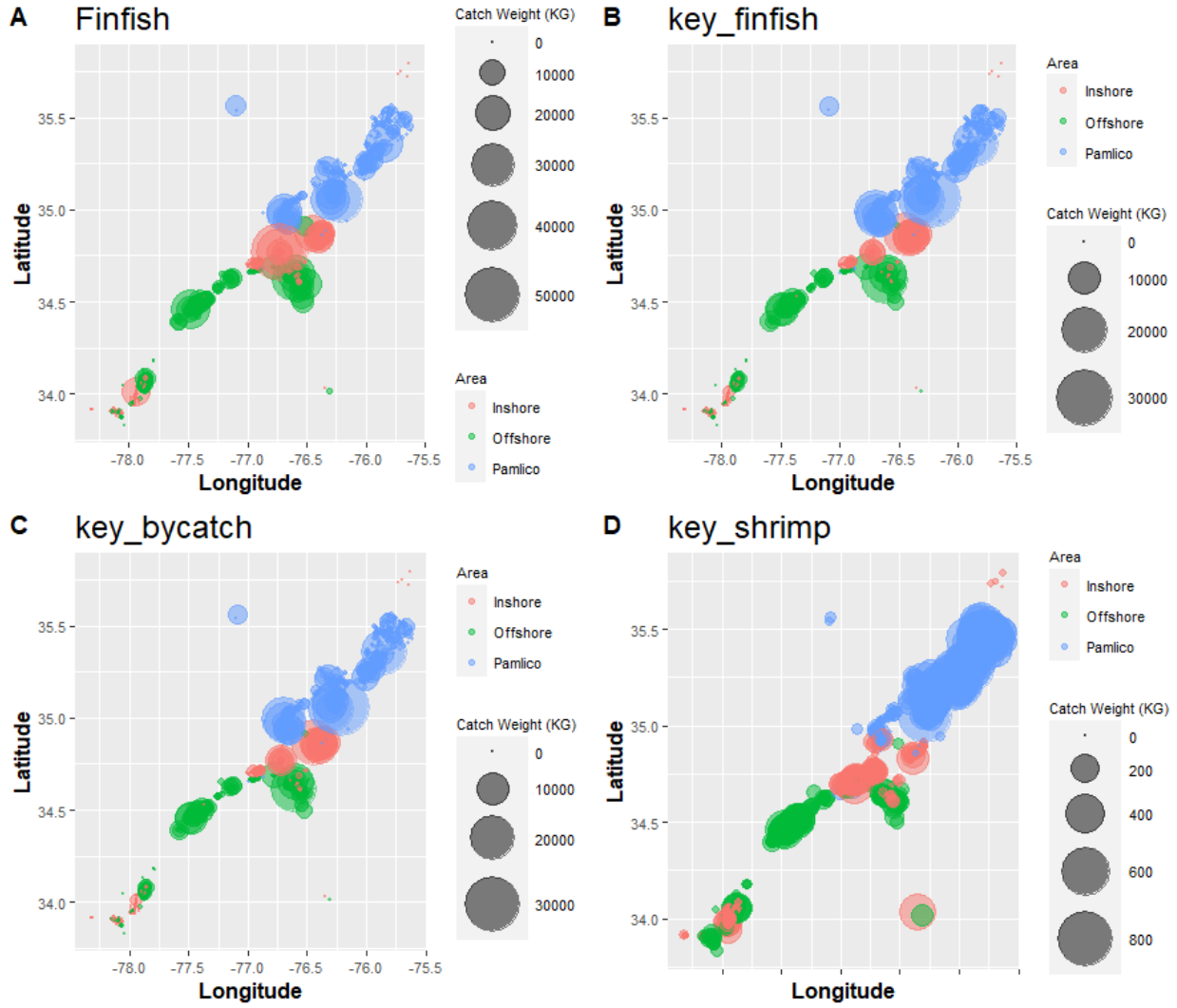


Figure 2.4.A.4. Spatial distribution and density of catch for finfish (a), key finfish (b), key bycatch (c), and key shrimp (d).

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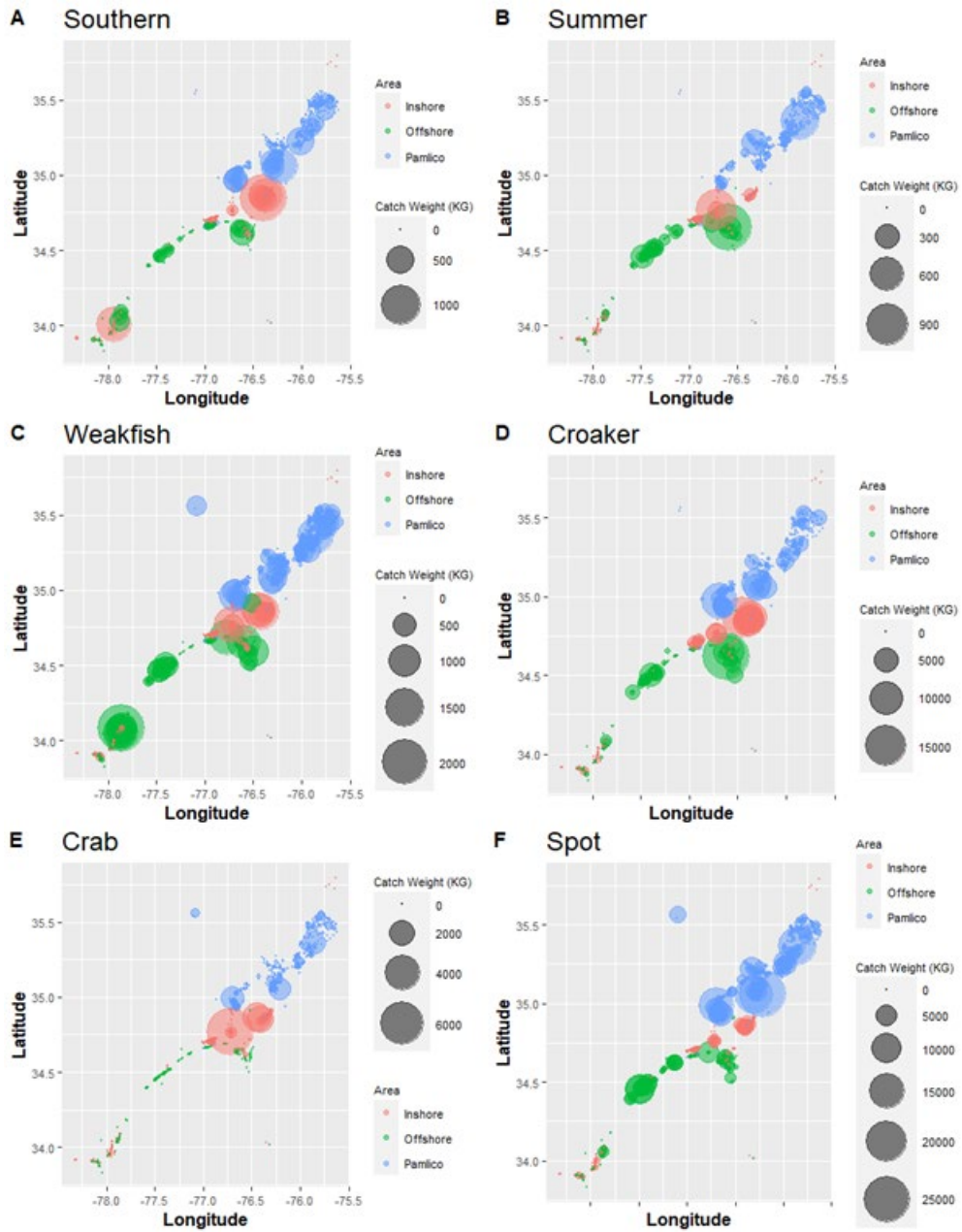


Figure 2.4.A.5. Spatial distribution and density of catch for southern flounder (a), summer flounder (b), weakfish (c), croaker (d), blue crab (e), and spot (f).

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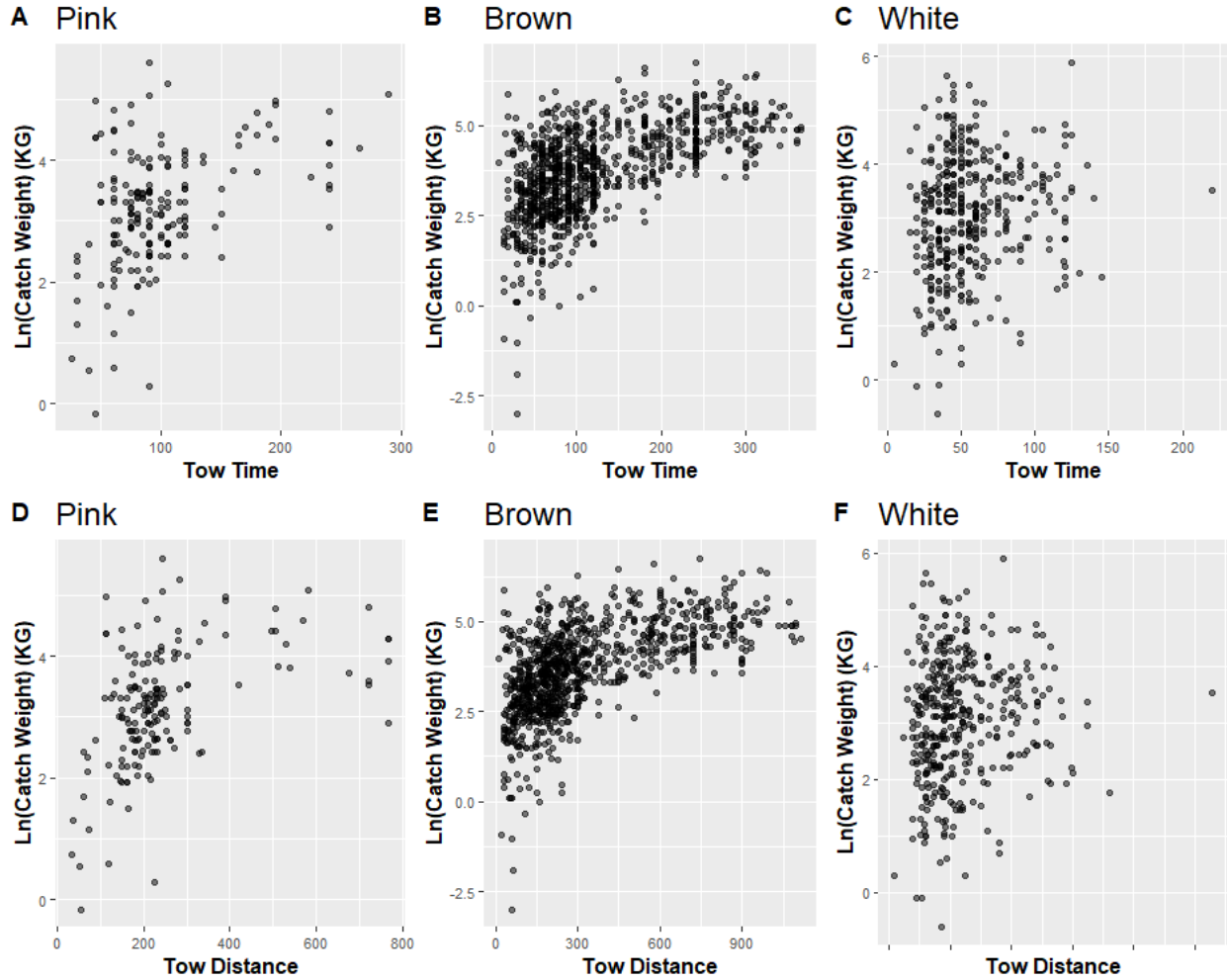


Figure 2.4.A.6. The natural log of catch weight (KG) was plotted against tow duration (tow time) for pink shrimp (a), brown shrimp (b), and white shrimp (c). The natural log of catch weight (KG) was plotted against distance towed for pink shrimp (d), brown shrimp (e), and white shrimp (f).

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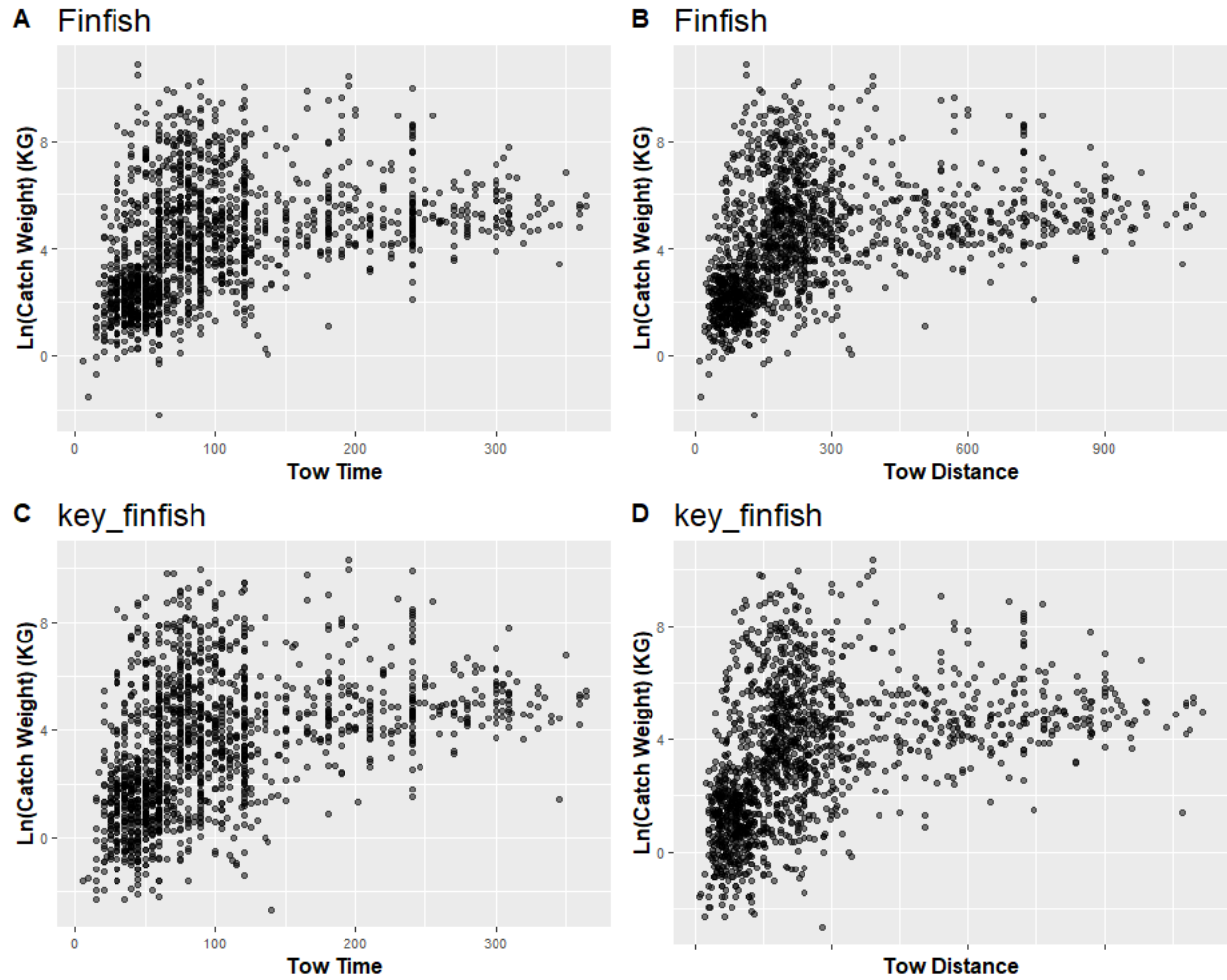


Figure 2.4.A.7. The natural log of catch weight (KG) was plotted against tow duration (tow time) for finfish (a) and key finfish (c). The natural log of catch weight (KG) was plotted against distance towed for finfish (b) and key finfish (d).

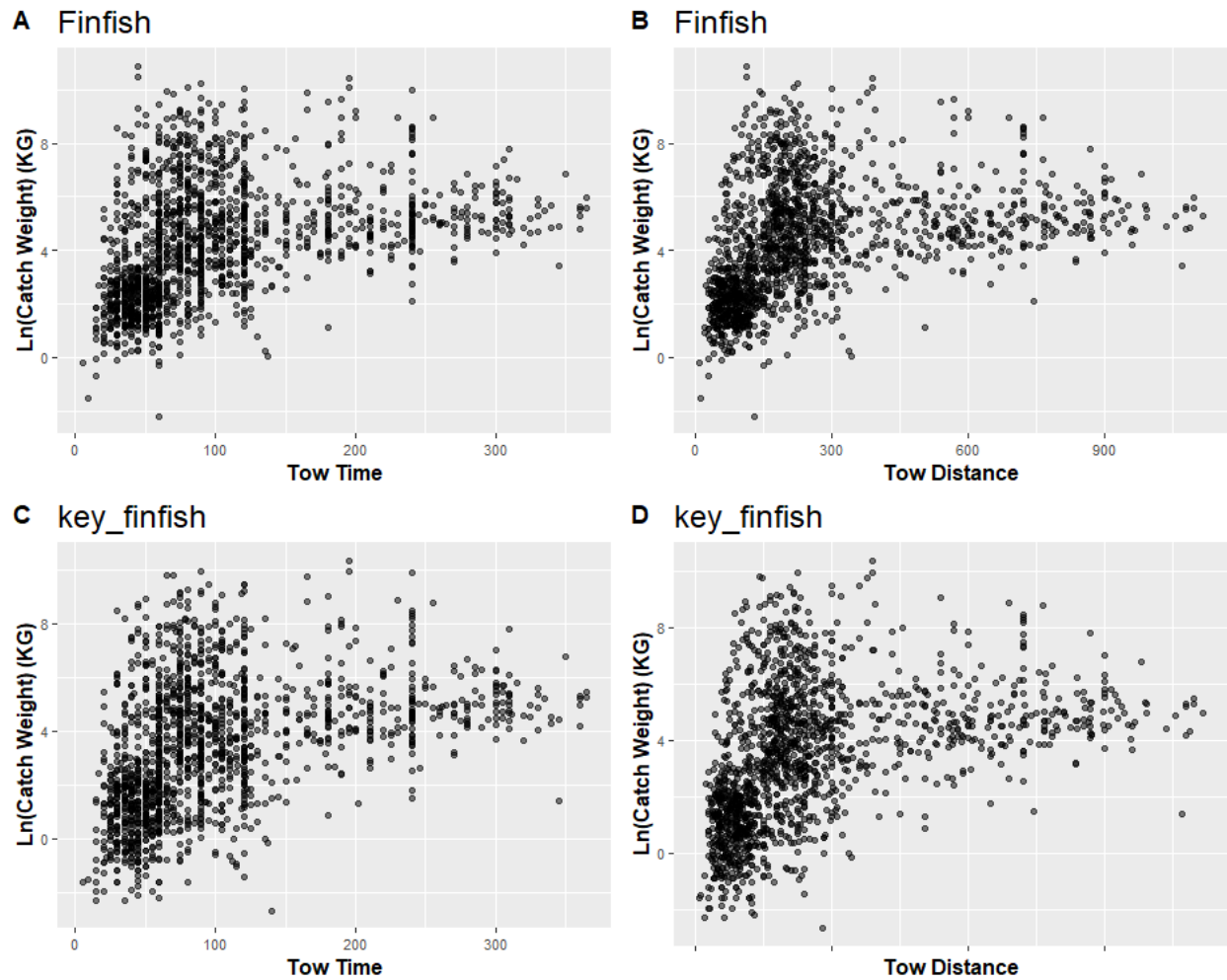


Figure 2.4.A.8. The natural log of catch weight (KG) was plotted against tow duration (tow time) for finfish (a) and key finfish (c). The natural log of catch weight (KG) was plotted against distance towed for finfish (b) and key finfish (d).

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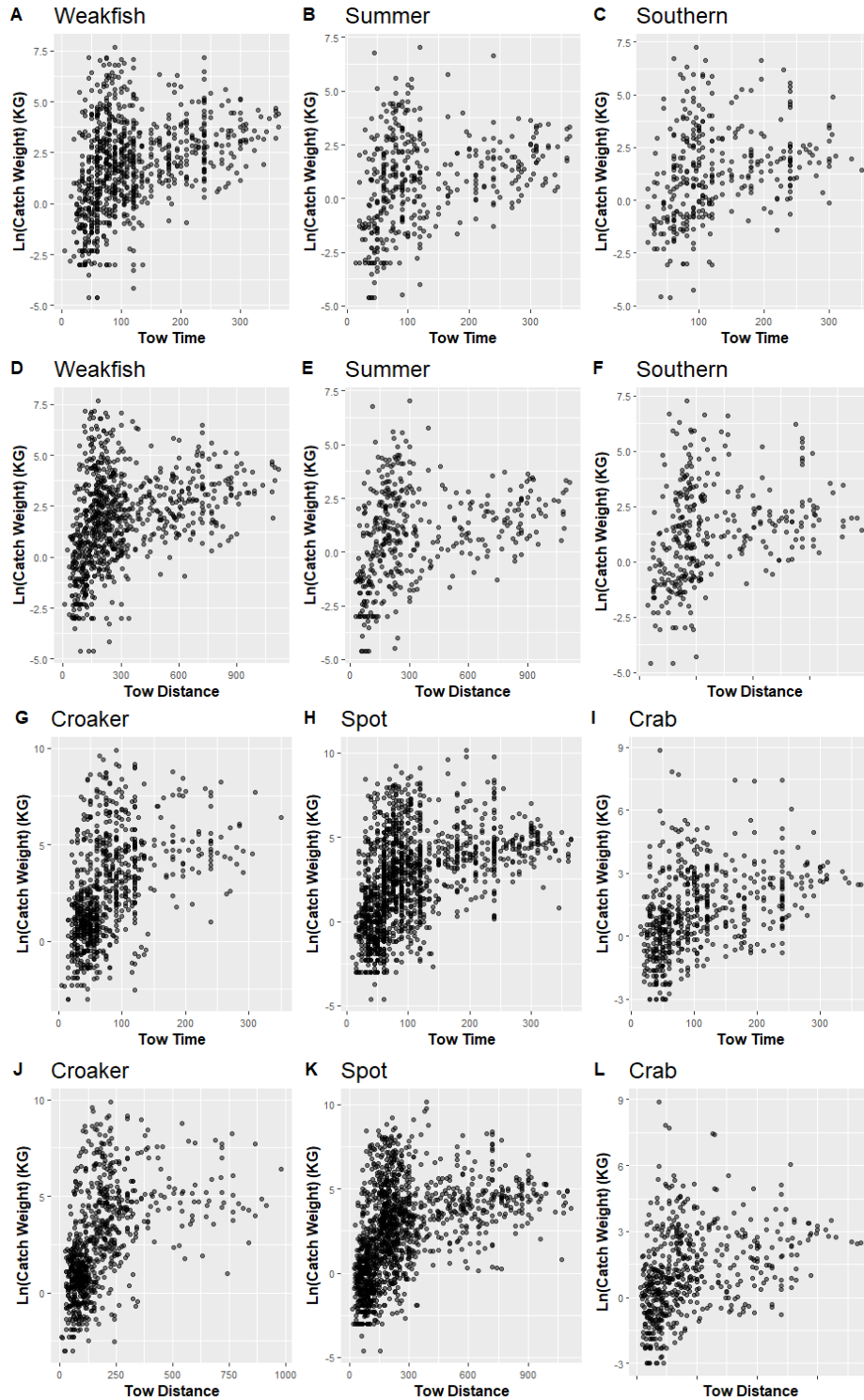


Figure 2.4.A.9. The natural log of catch weight (KG) was plotted against tow duration (tow time) for weakfish (a), summer flounder (b), southern flounder (c), croaker (g), spot (h), and blue crab (i). The natural log of catch weight (KG) was plotted against distance towed for weakfish (d), summer flounder (e), southern flounder (f), croaker (j), spot (k), and blue crab (l).

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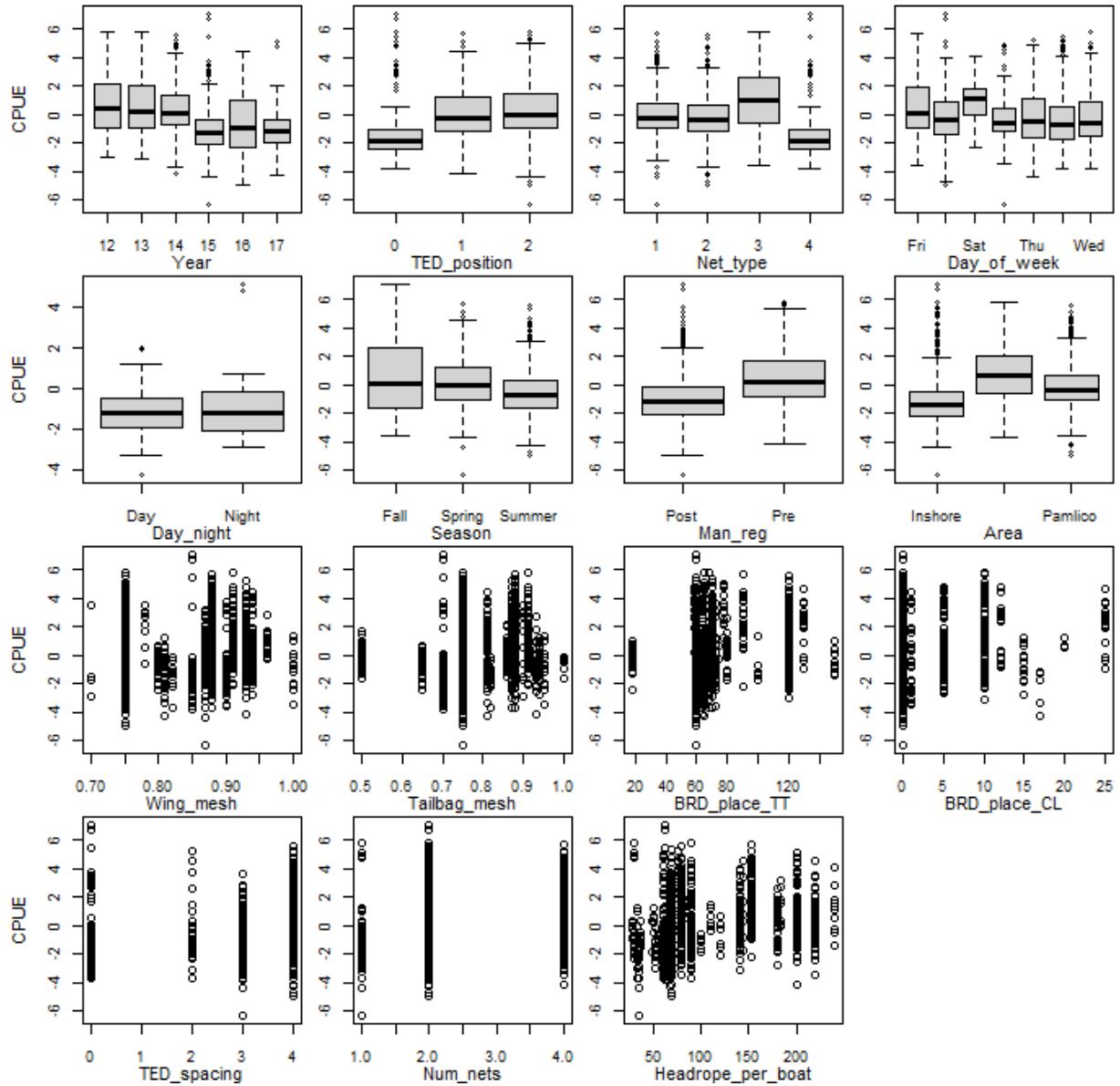


Figure 2.4.A.10. Plots of log(CPUE) against each potential predictor variable for finfish.

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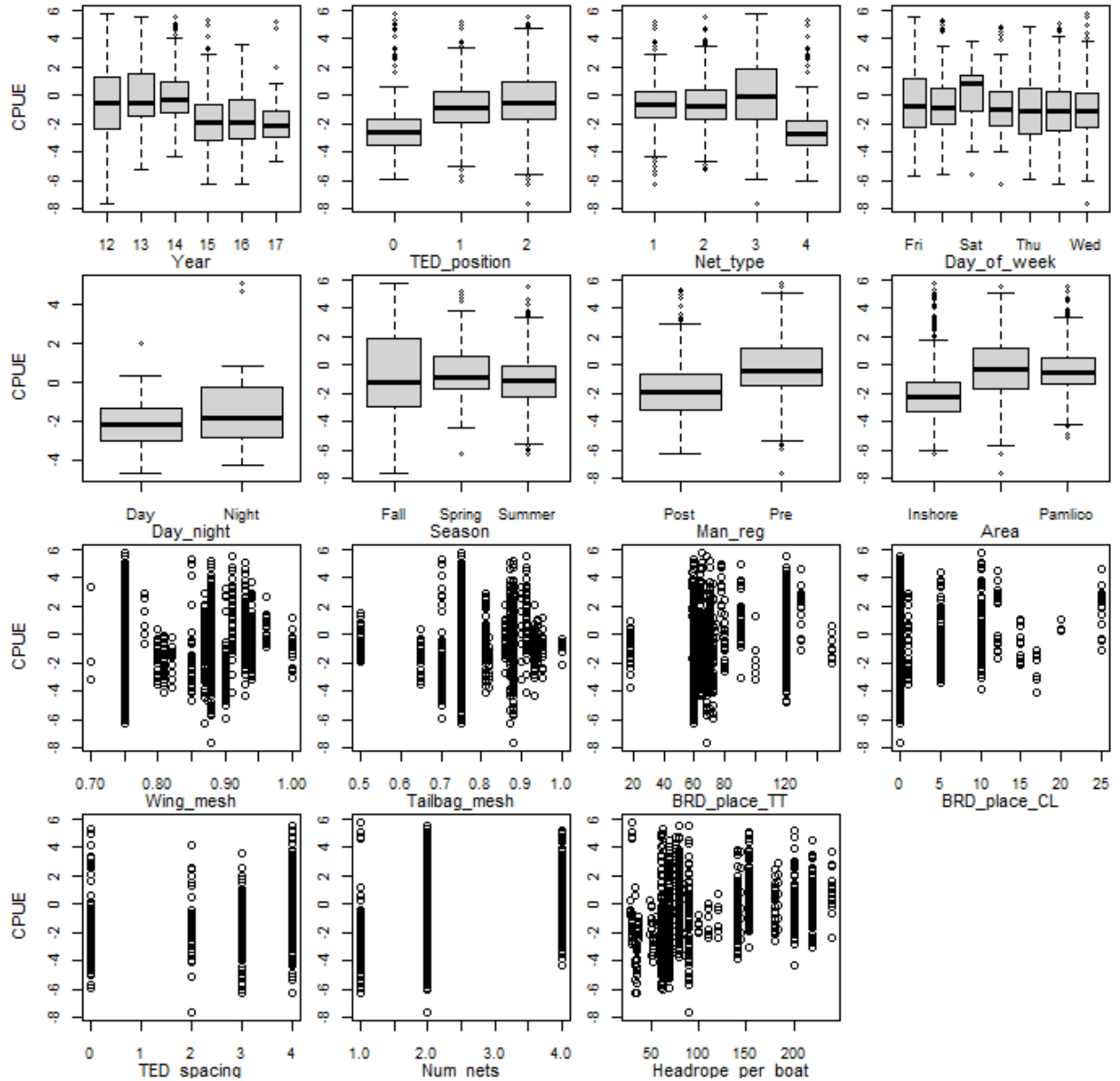


Figure 2.4.A.11. Plots of log(CPUE) against each potential predictor variable for key bycatch (blue crab, southern flounder, summer flounder, spot, croaker, and weakfish).

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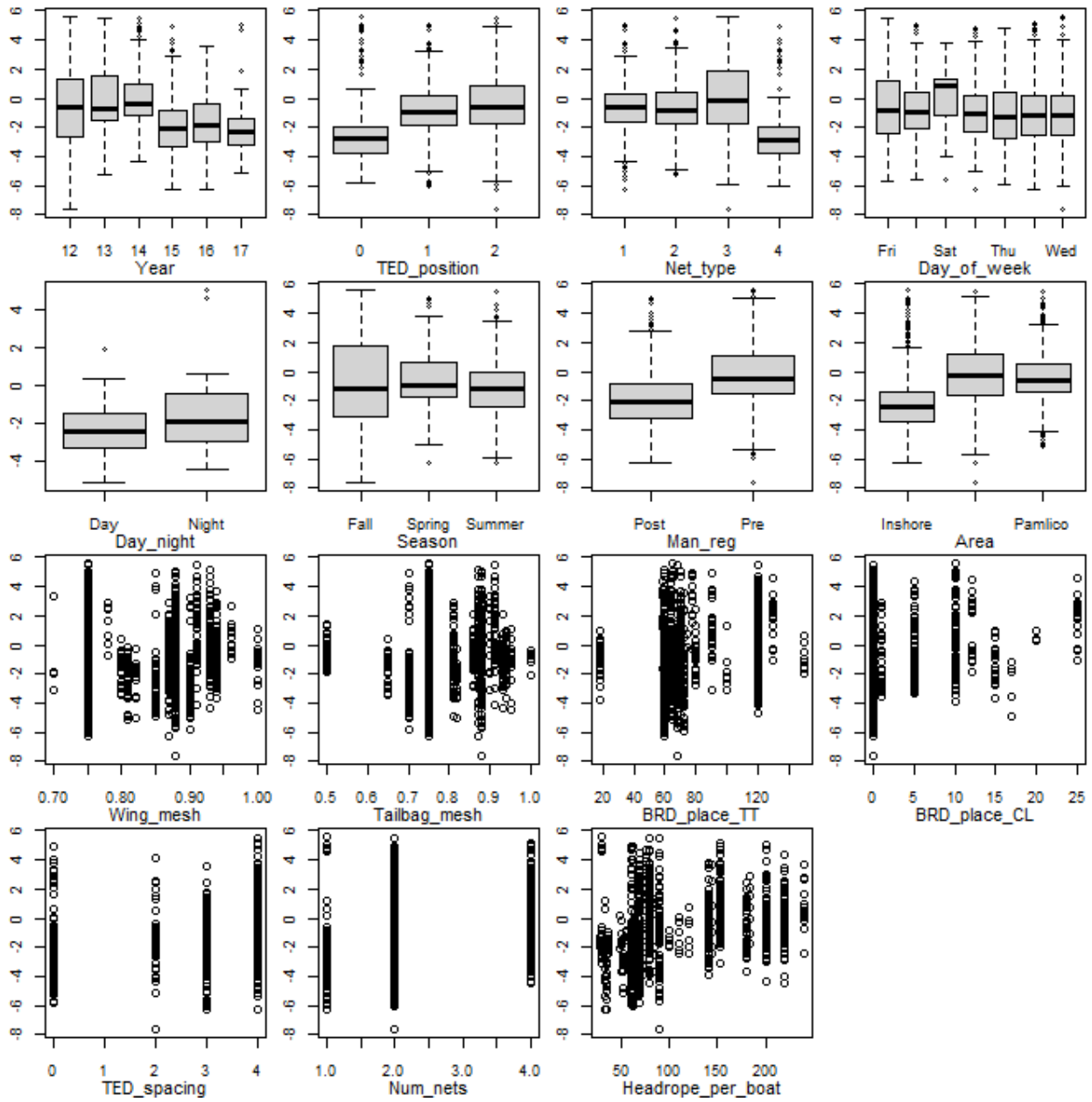


Figure 2.4.A.11. Plots of log(CPUE) against each potential predictor variable for key finfish (southern flounder, summer flounder, spot, croaker, and weakfish).

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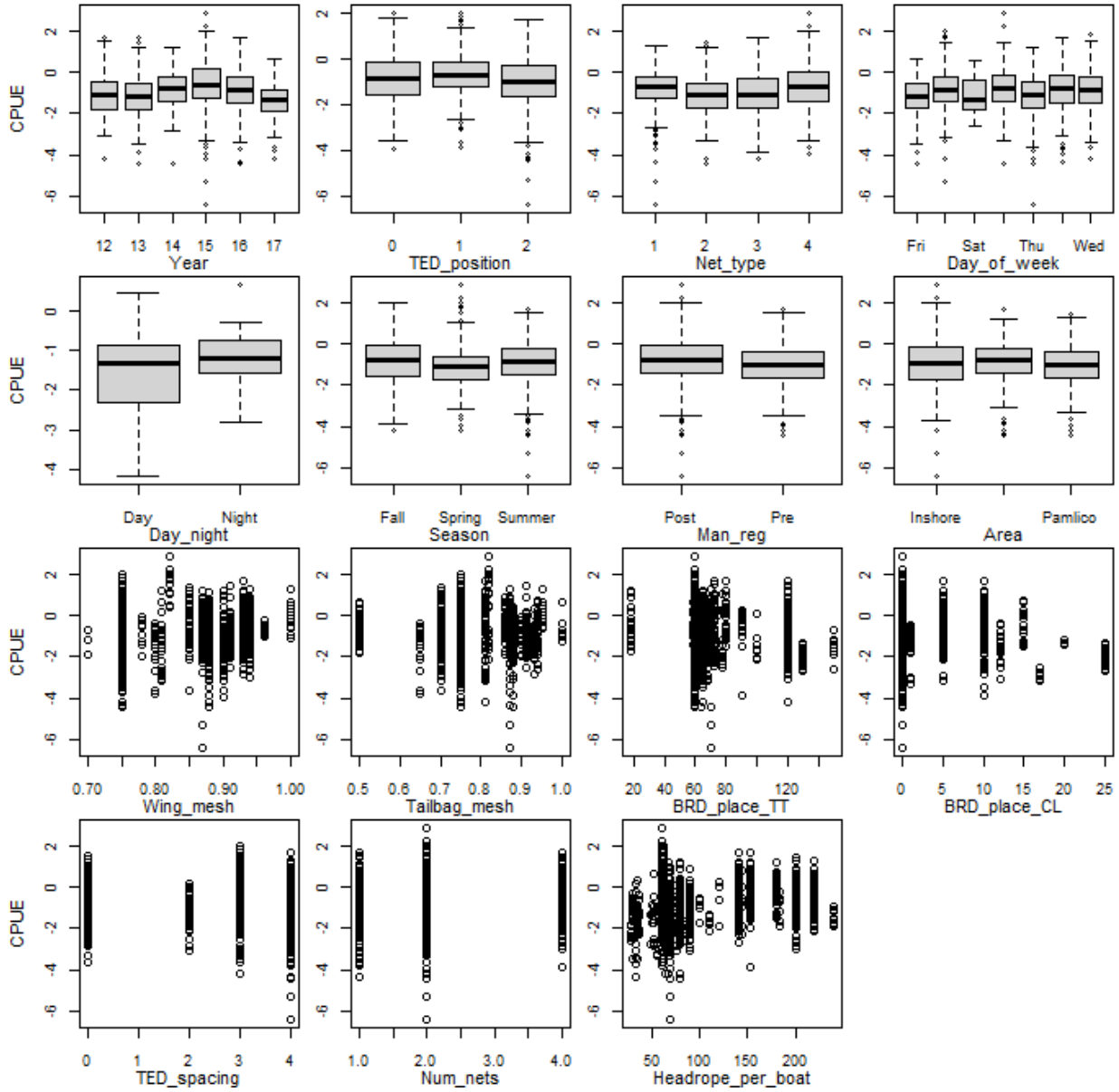


Figure 2.4.A.13. Plots of log(CPUE) against each potential predictor variable for key shrimp (brown, white, and pink).

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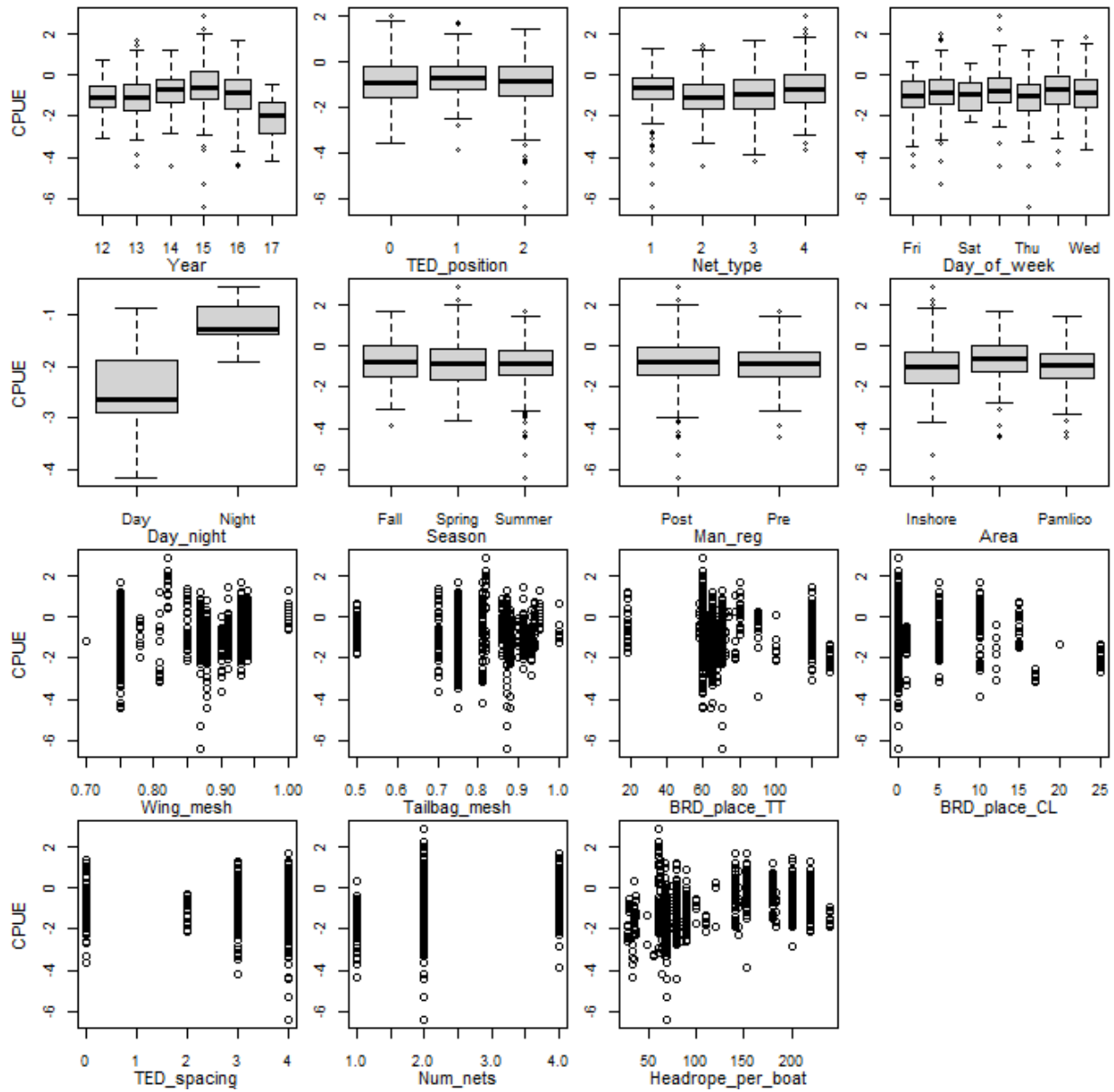


Figure 2.4.A.14. Plots of log(CPUE) against each potential predictor variable for brown shrimp.

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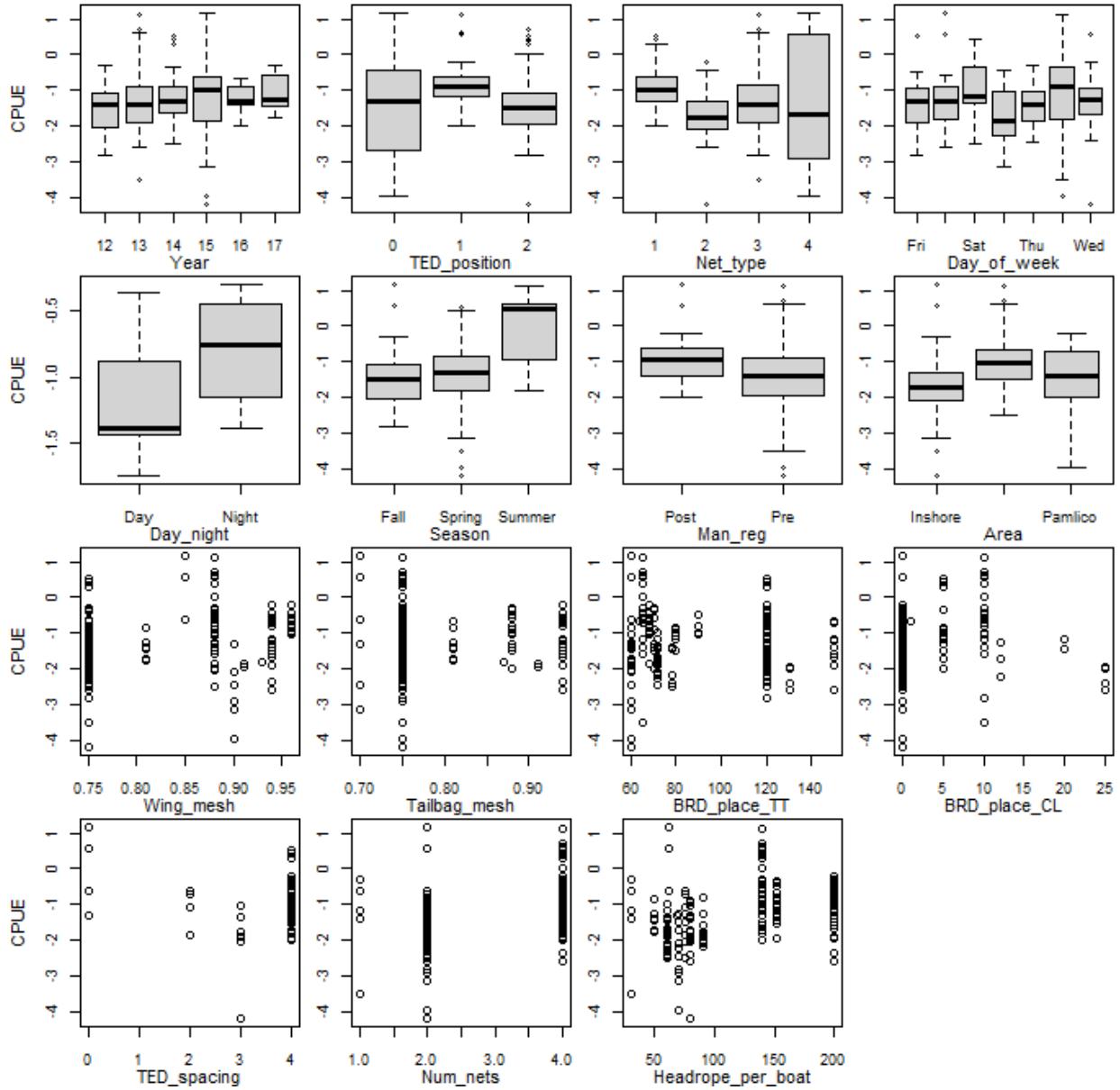


Figure 2.4.A.15. Plots of log(CPUE) against each potential predictor variable for pink shrimp.

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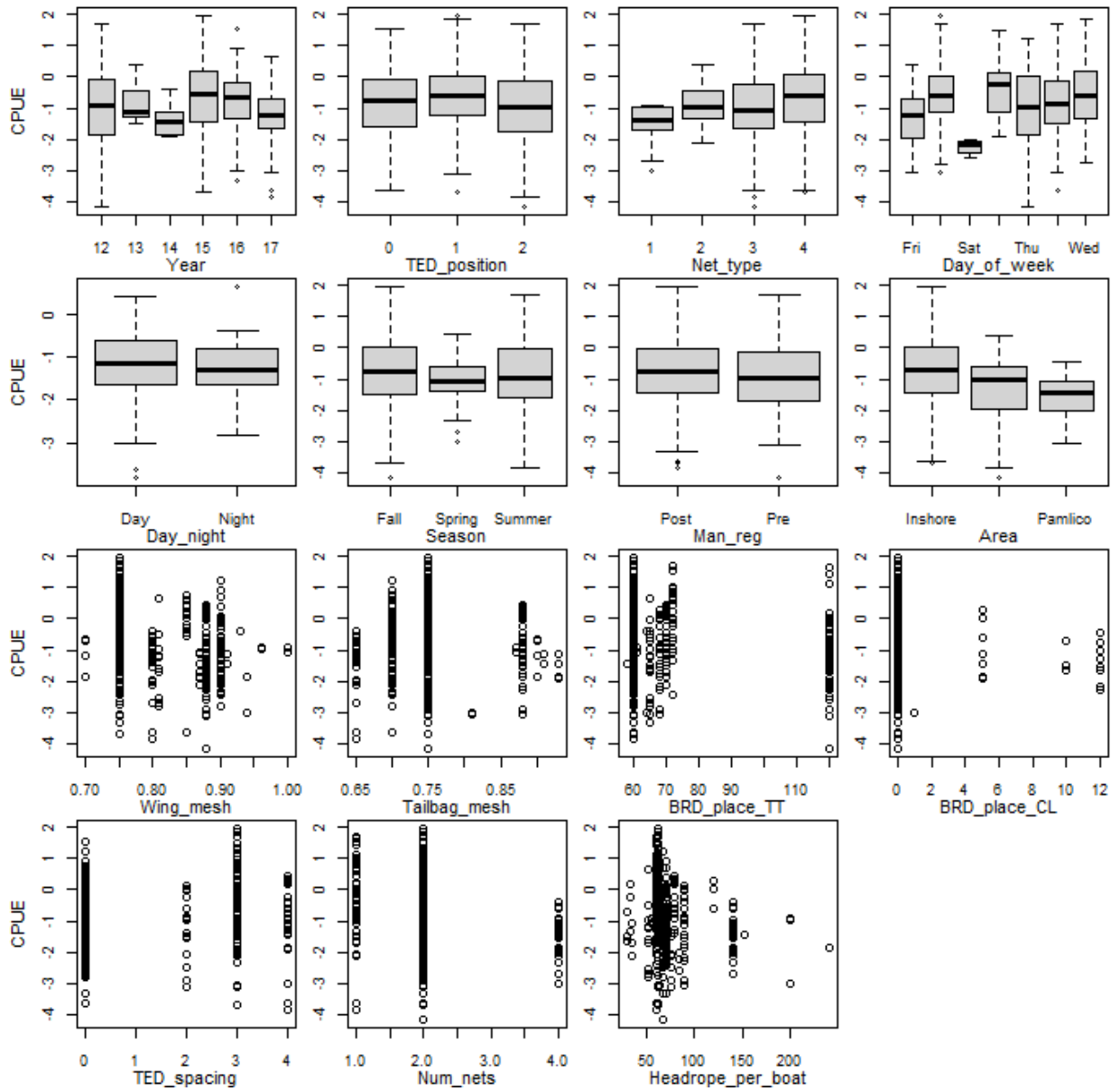


Figure 2.4.A.16. Plots of log(CPUE) against each potential predictor variable for white shrimp.

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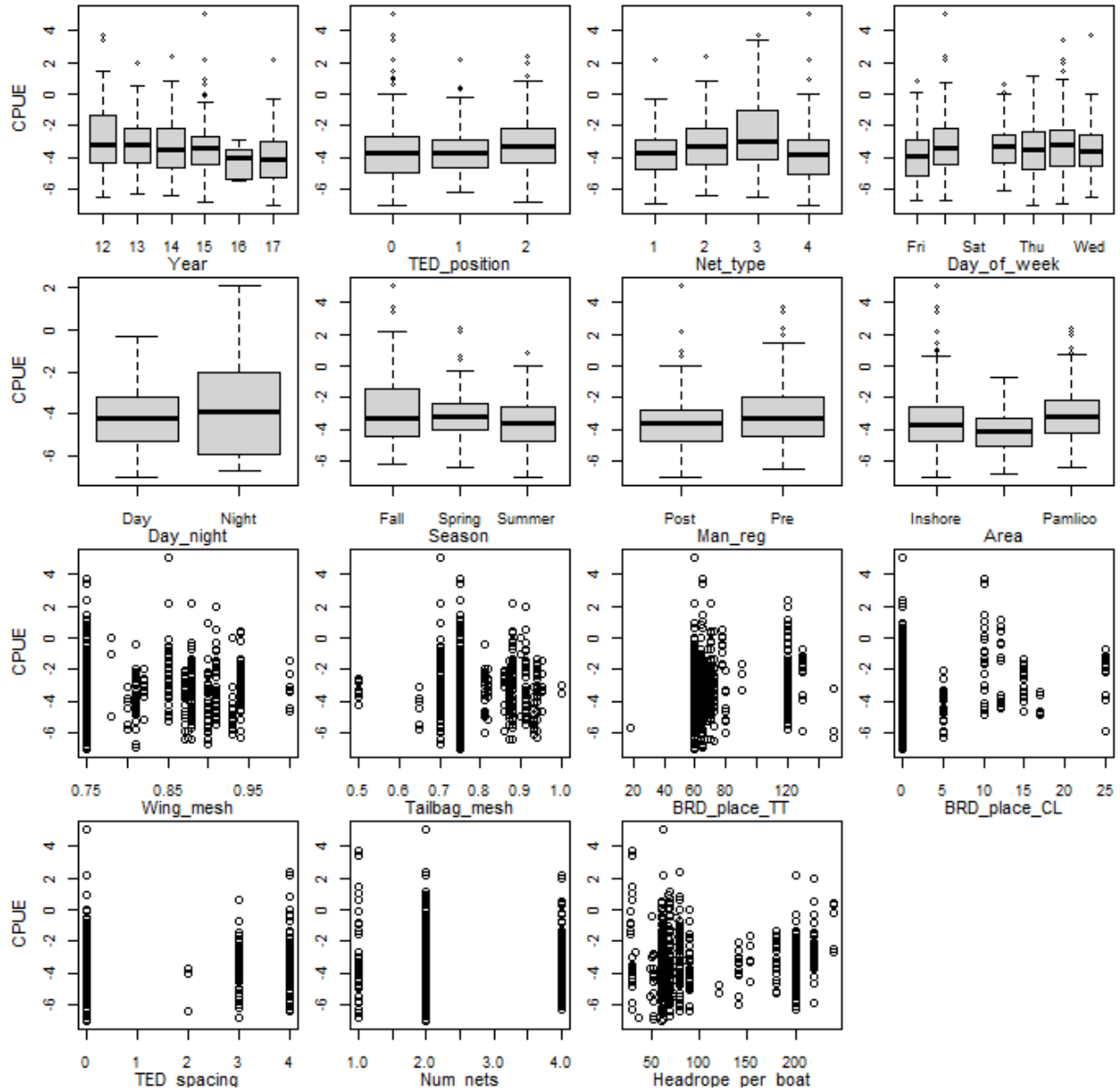


Figure 2.4.A.17. Plots of log(CPUE) against each potential predictor variable for blue crab.

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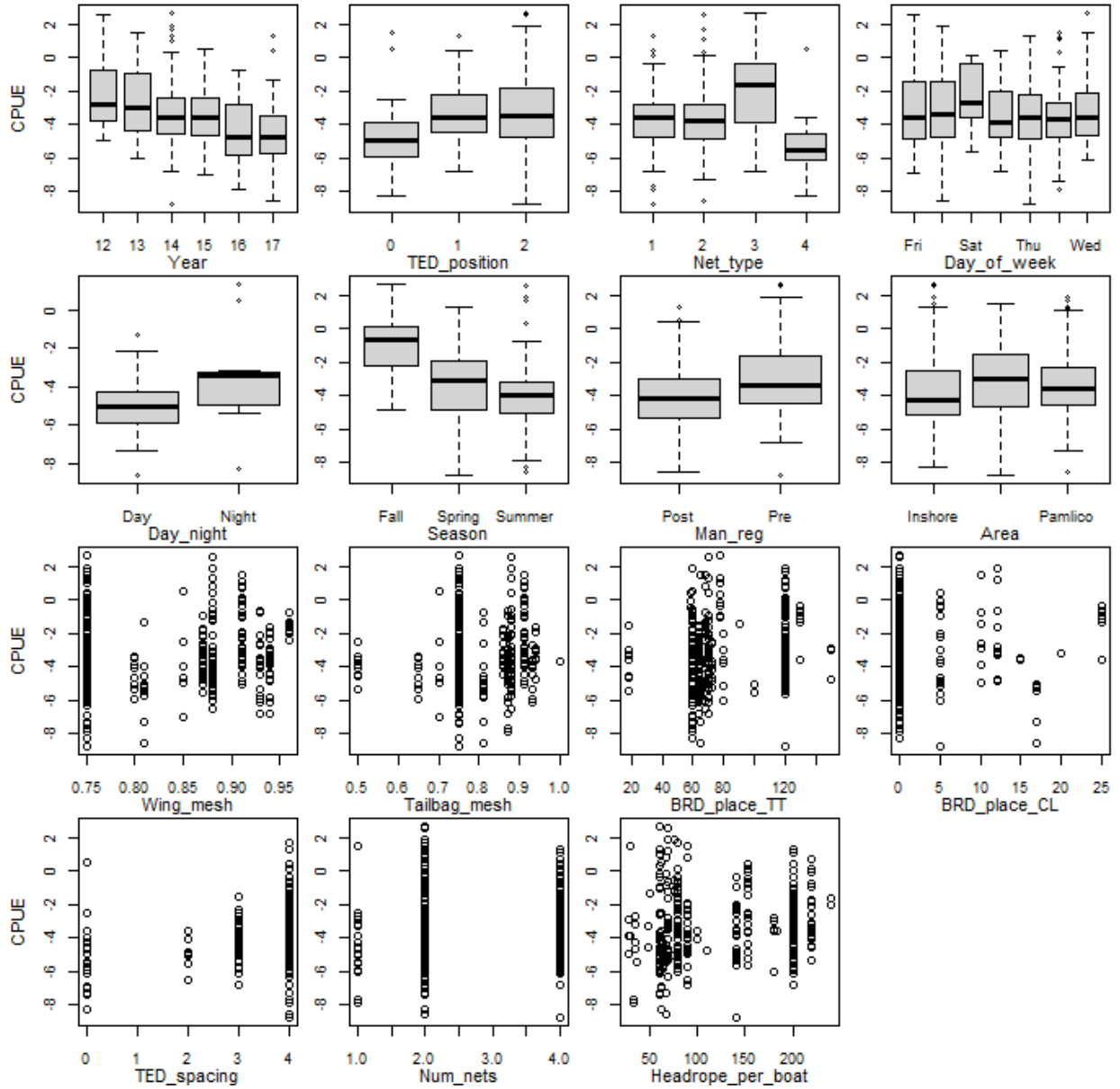


Figure 2.4.A.18. Plots of log(CPUE) against each potential predictor variable for southern flounder.

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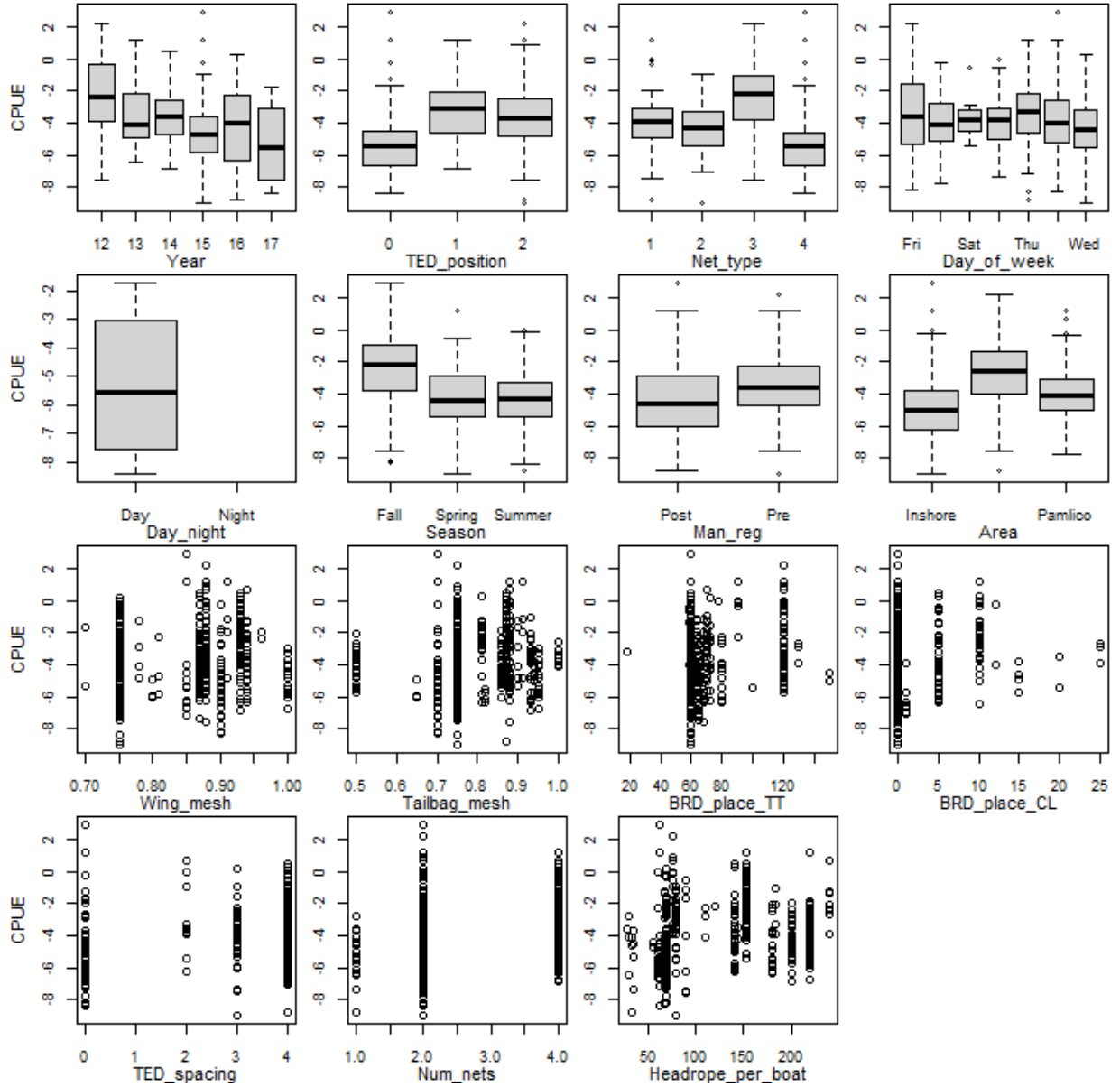


Figure 2.4.A.19. Plots of log(CPUE) against each potential predictor variable for summer flounder.

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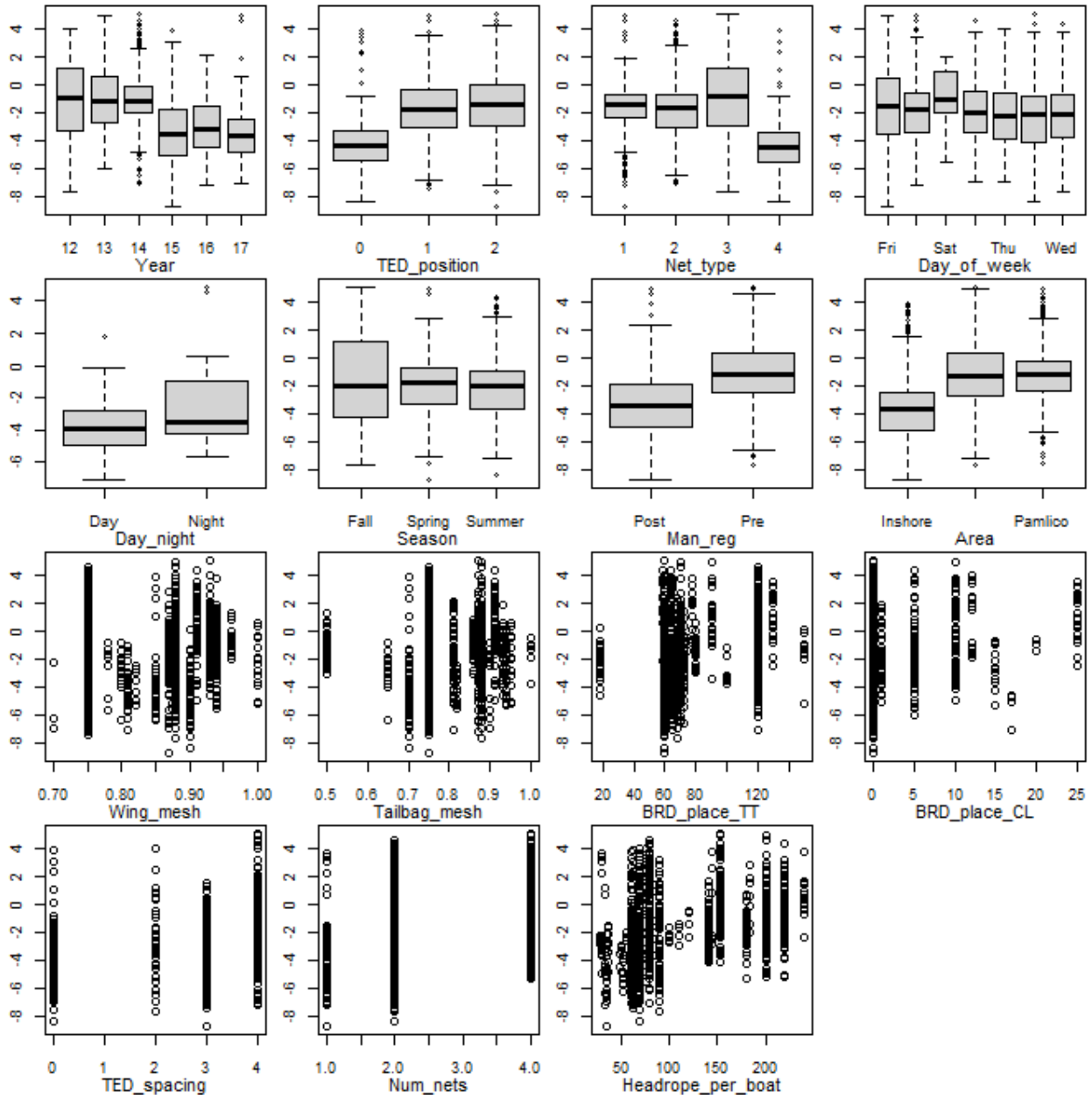


Figure 2.4.A.20. Plots of log(CPUE) against each potential predictor variable for spot.

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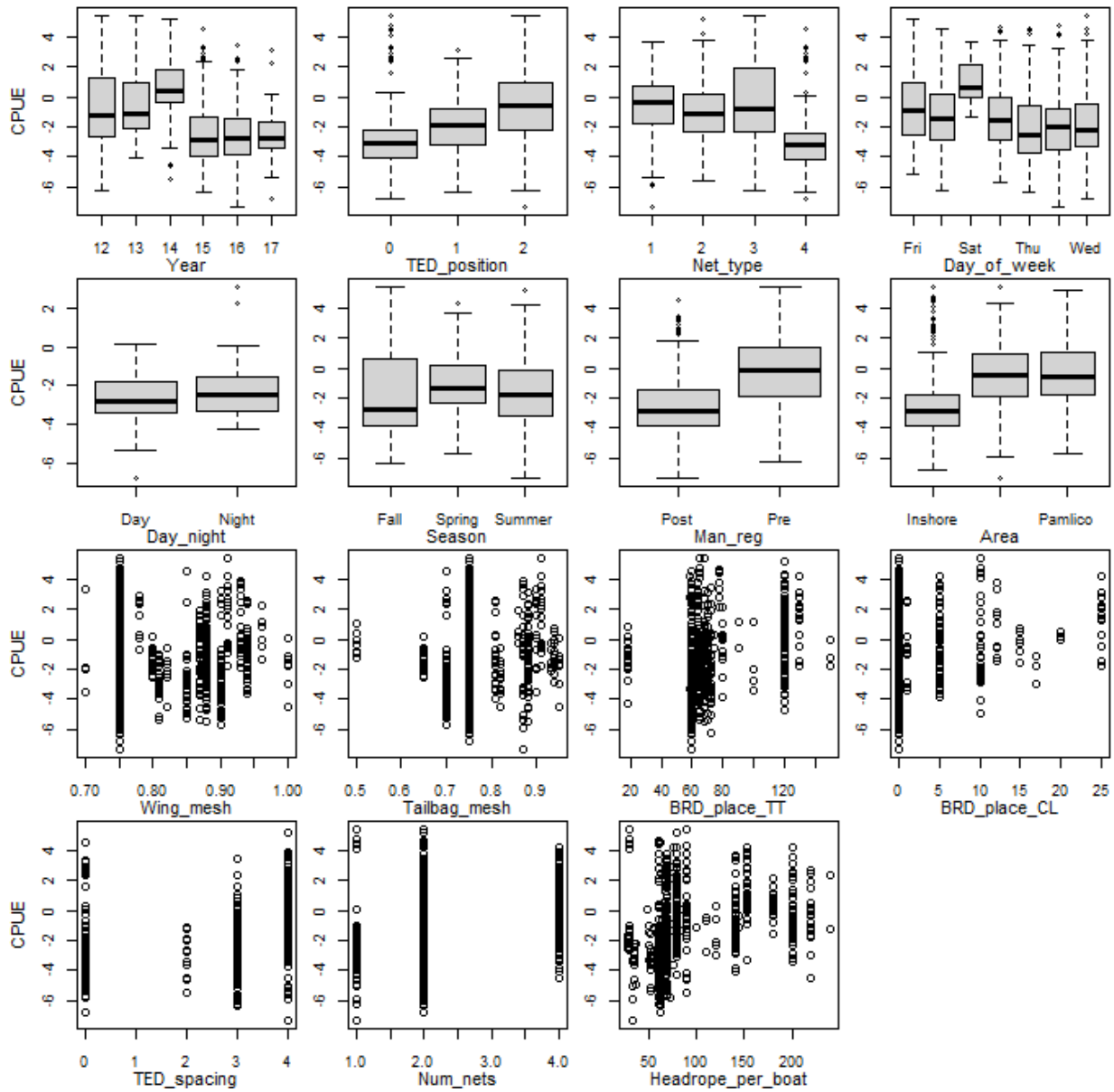


Figure 2.4.A.21. Plots of log(CPUE) against each potential predictor variable for croaker.

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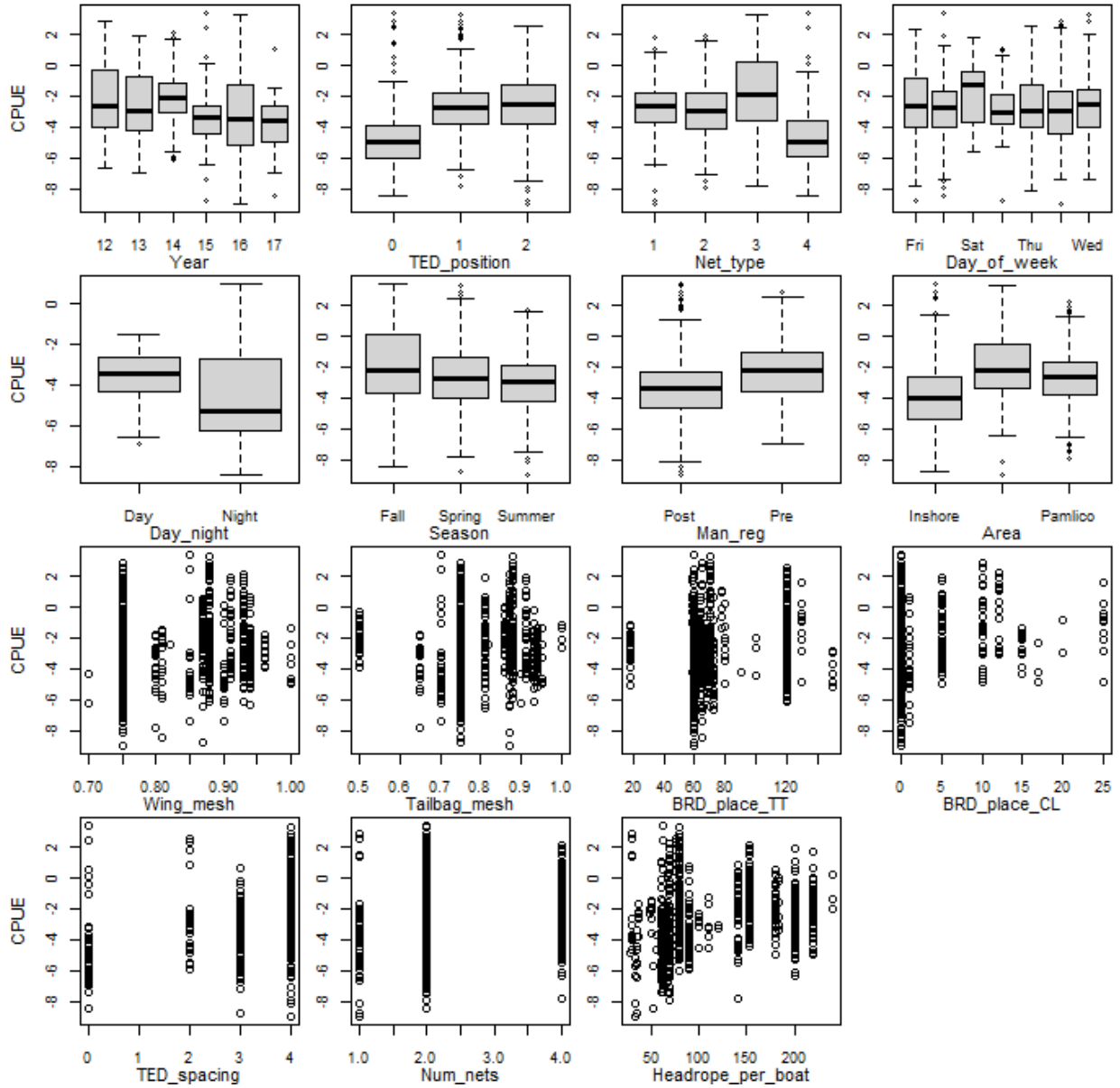
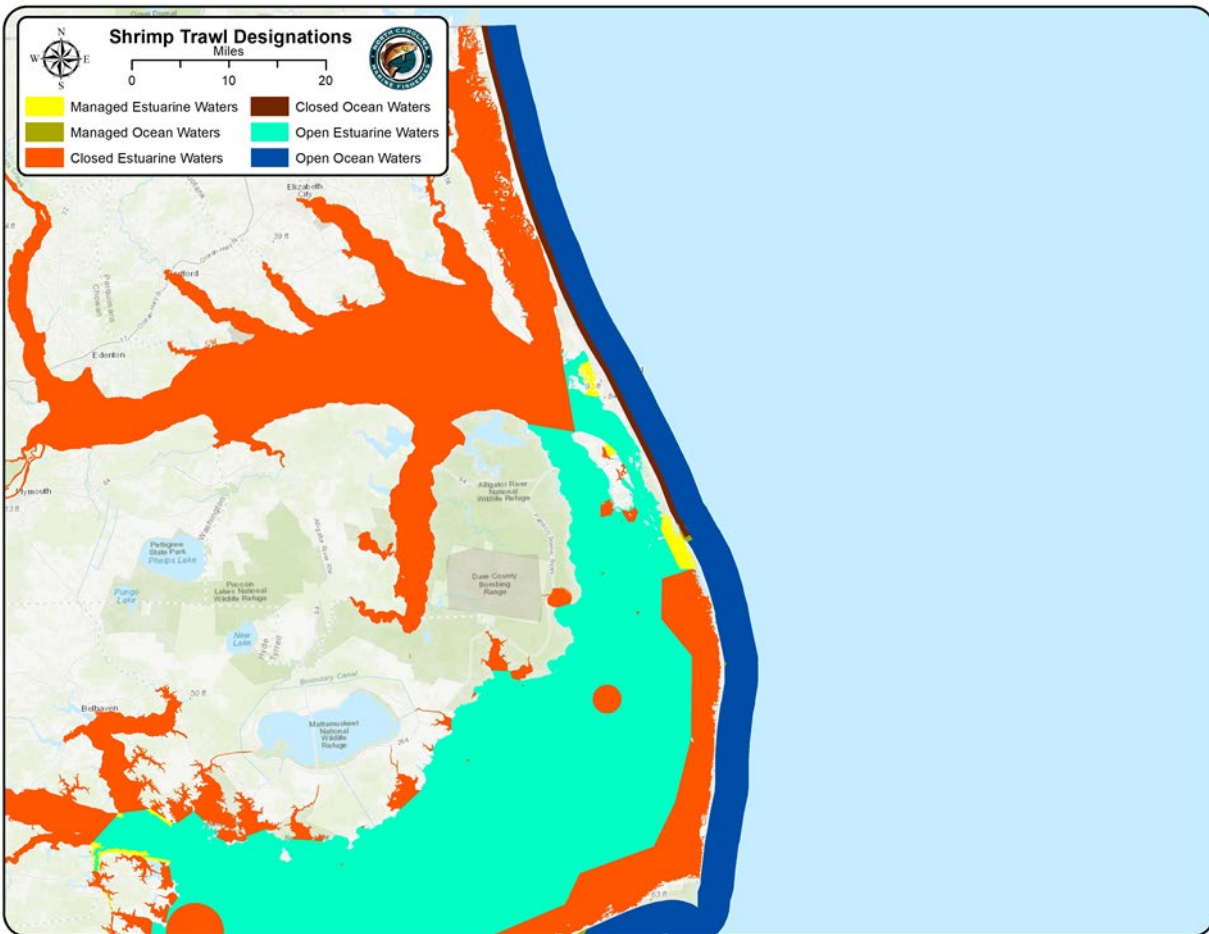


Figure 2.4.A.22. Plots of log(CPUE) against each potential predictor variable for weakfish.

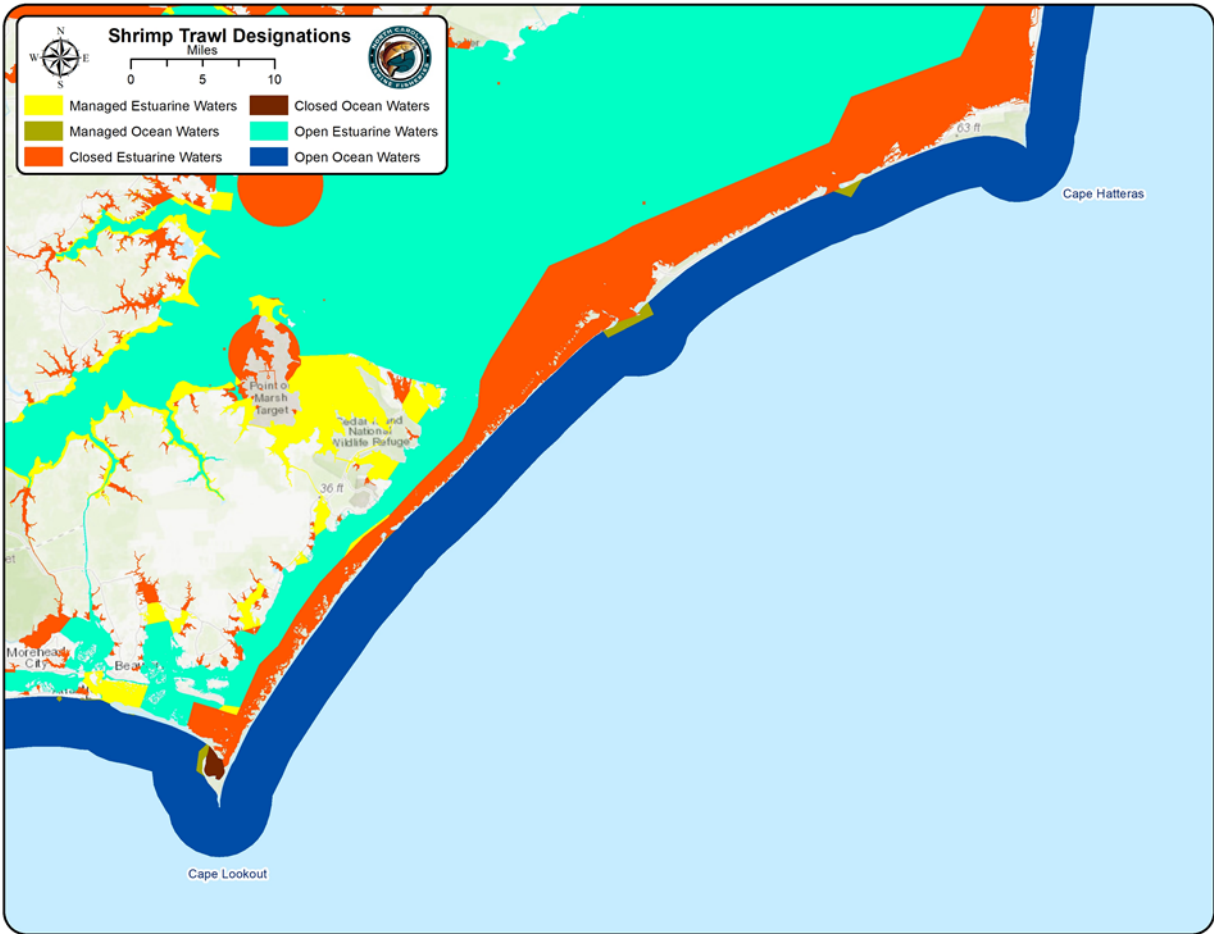
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APPENDIX 3. MAPS OF CURRENT AREA CLOSURES



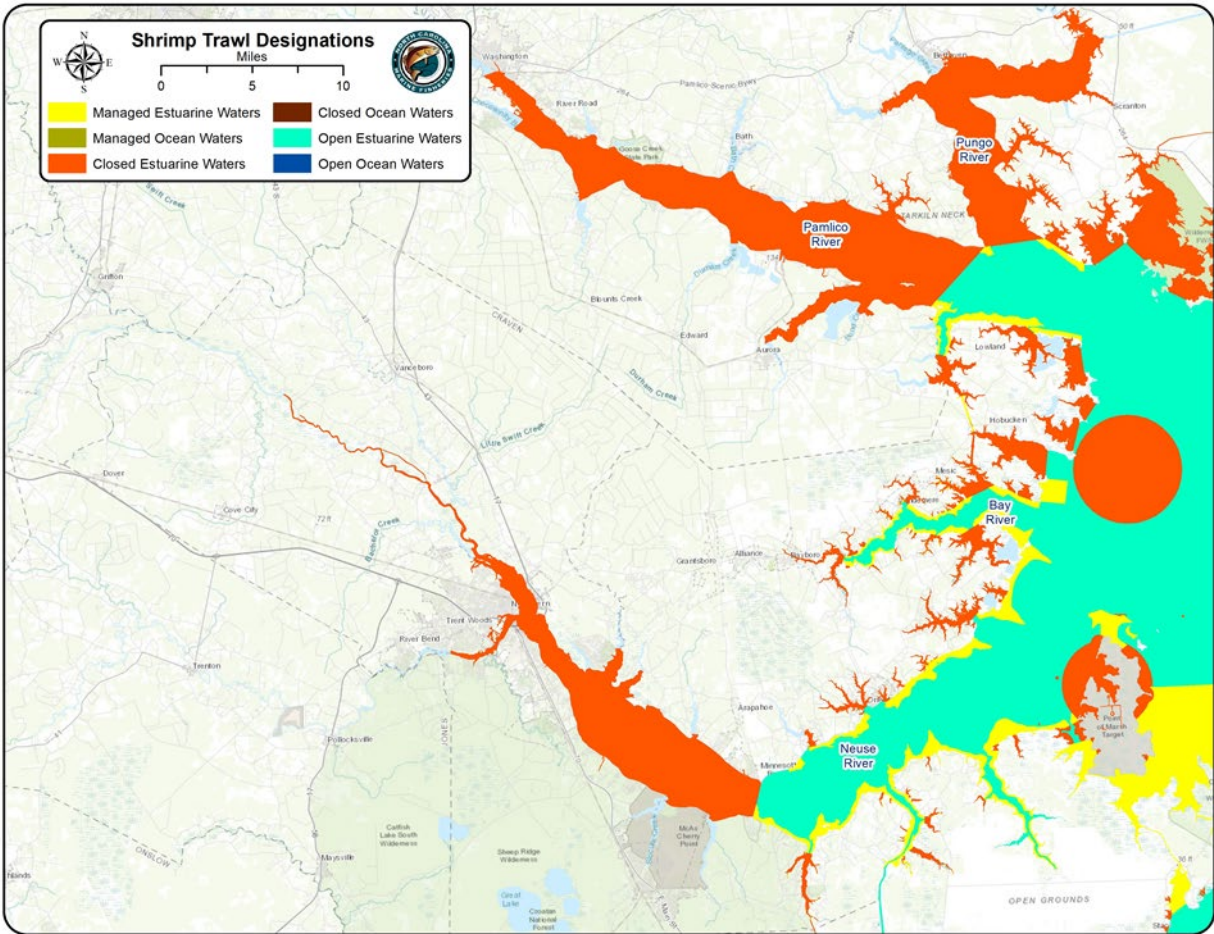
Map 3.1. Map of shrimp trawl areas in northern Pamlico Sound.

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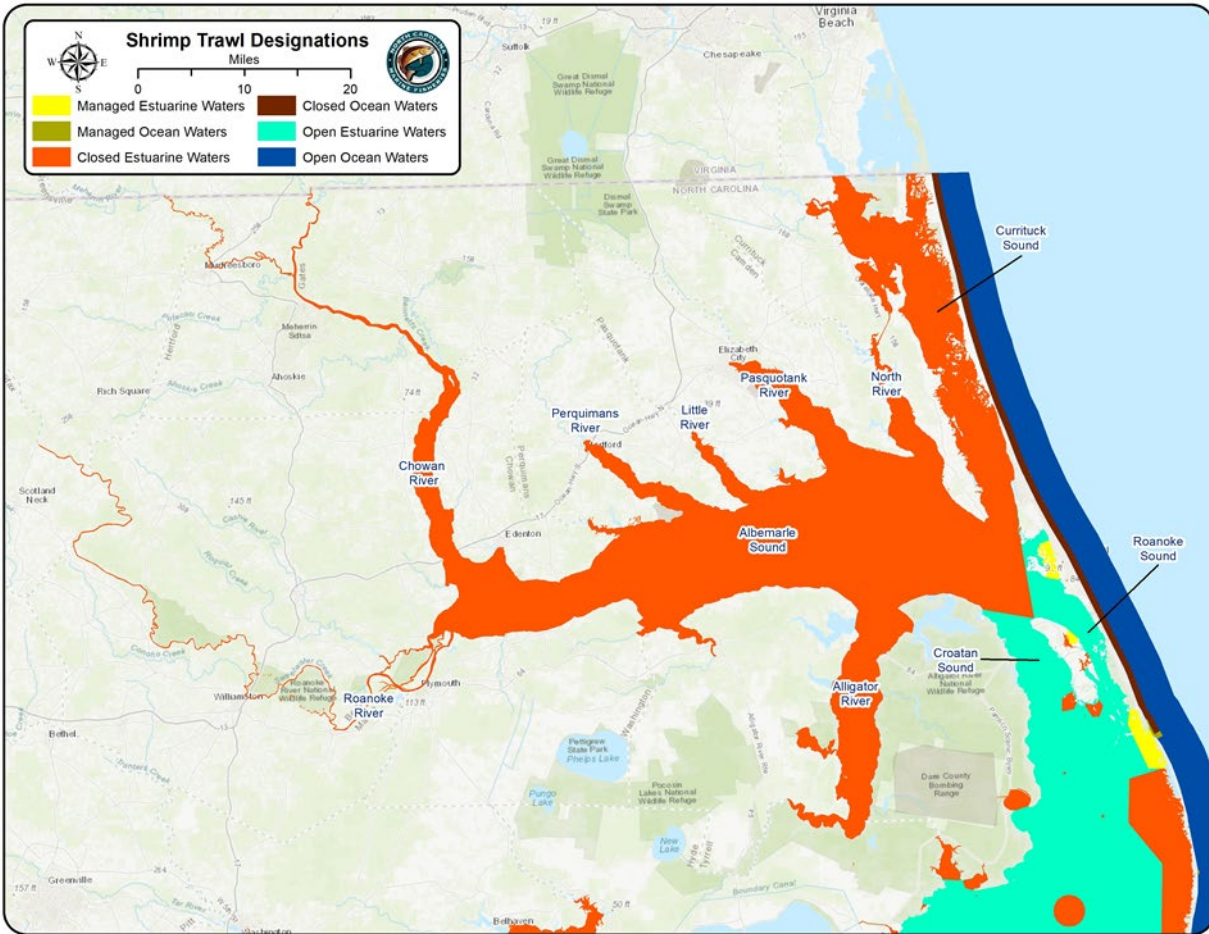
Map 3.2. Map of shrimp trawl areas in eastern Pamlico Sound Core Sound.

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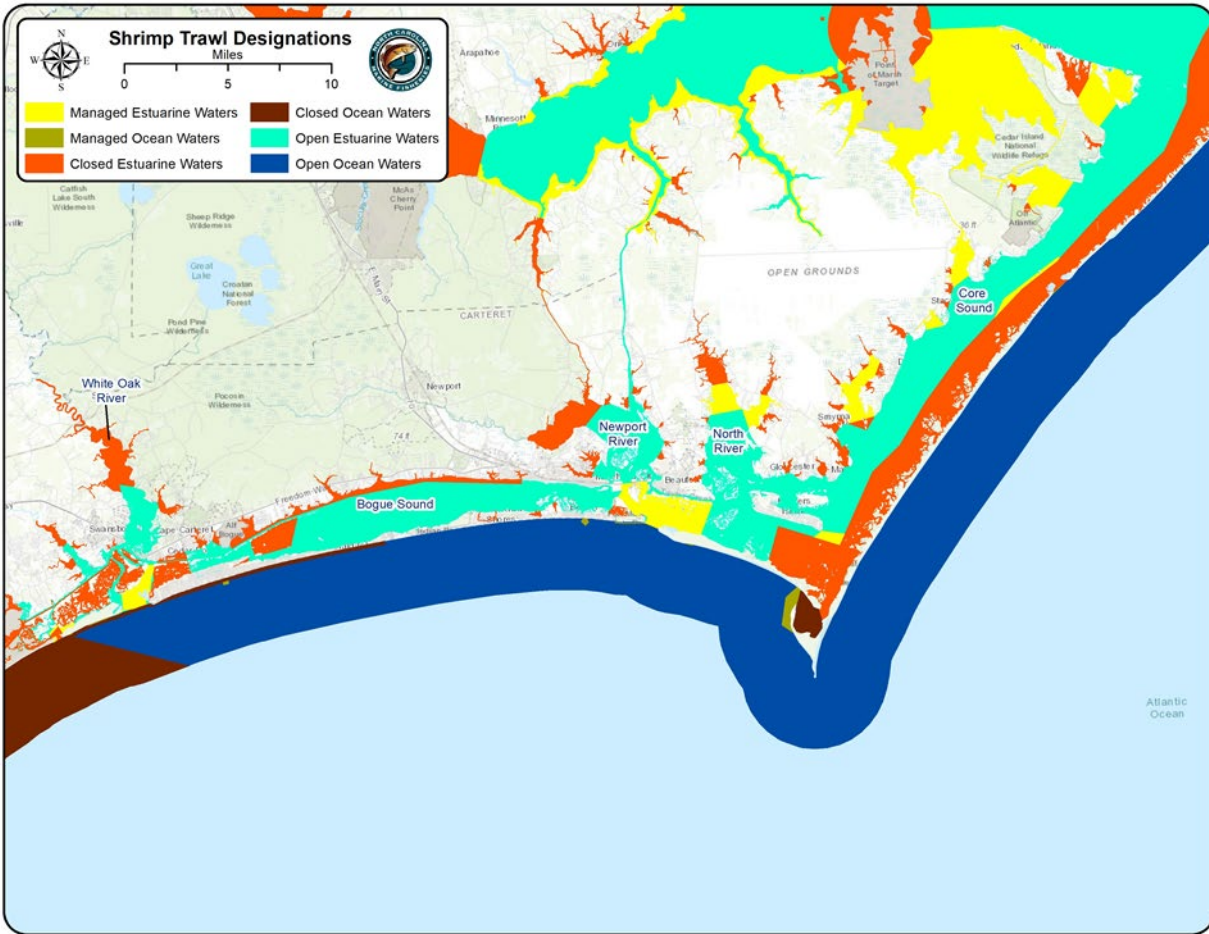
Map 3.3. Map of shrimp trawl areas in Pamlico, Pungo, Bay and Neuse rivers.

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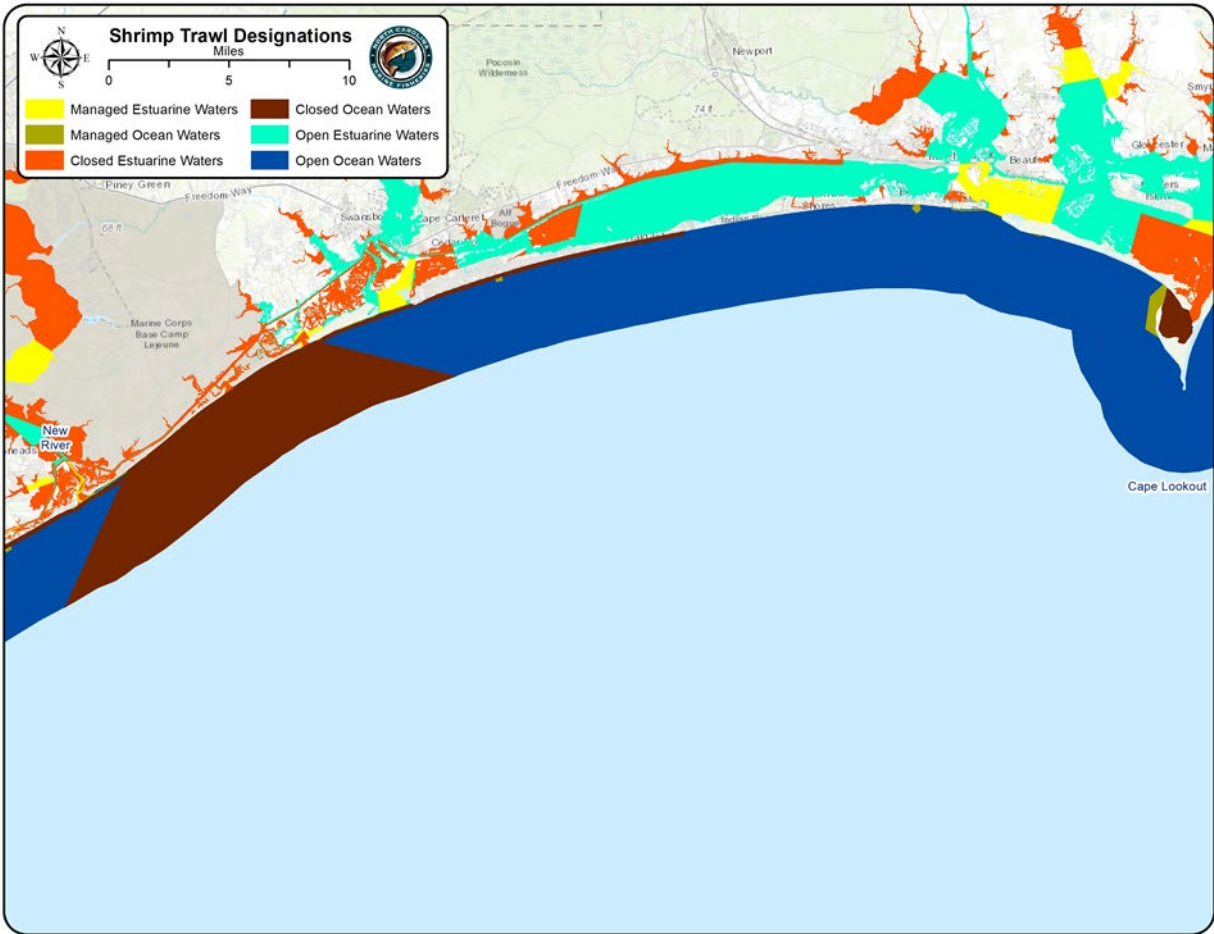
Map 3.4. Map of shrimp trawl areas north of Pamlico Sound (Croatan and Roanoke sounds).

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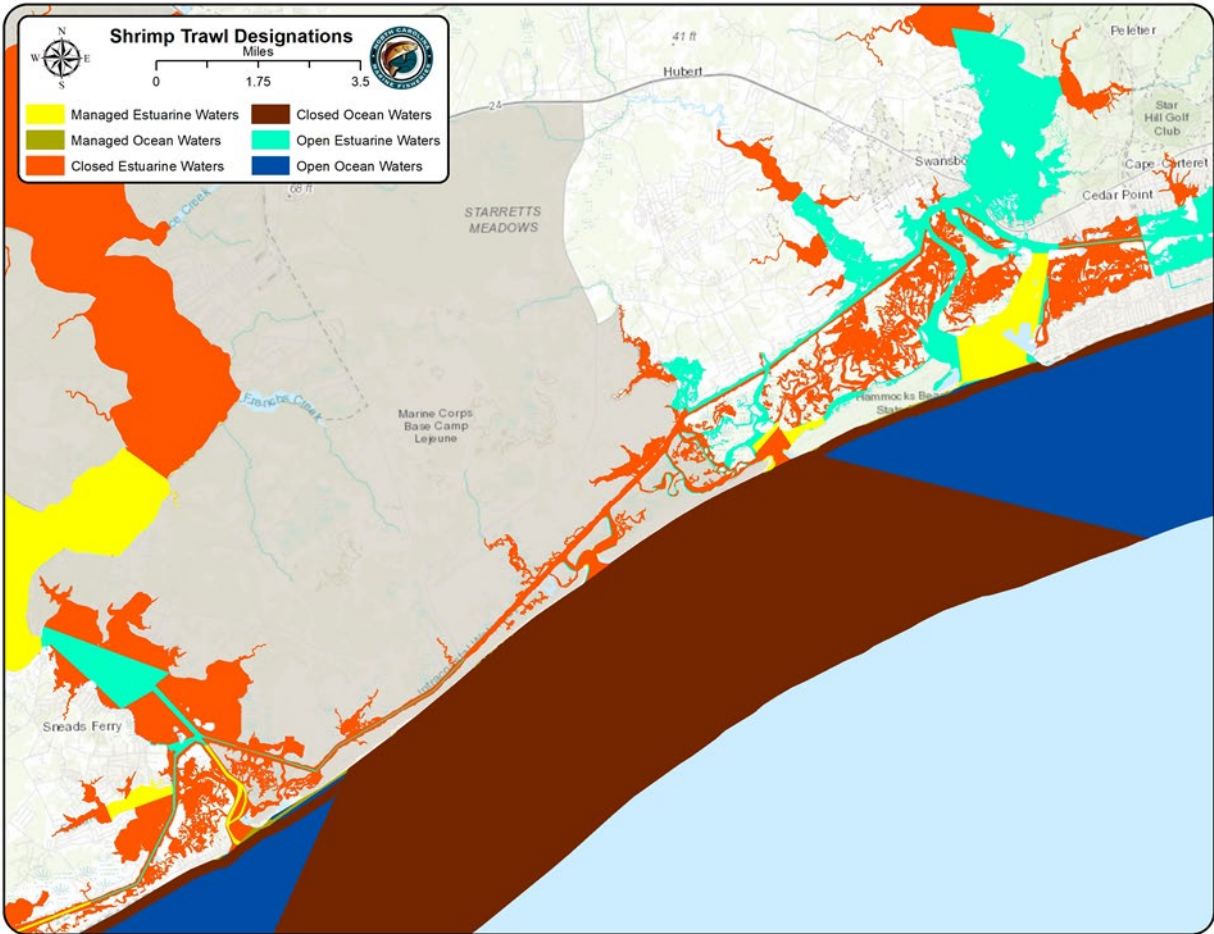
Map 3.5. Map of shrimp trawl areas from Core Sound to White Oak River.

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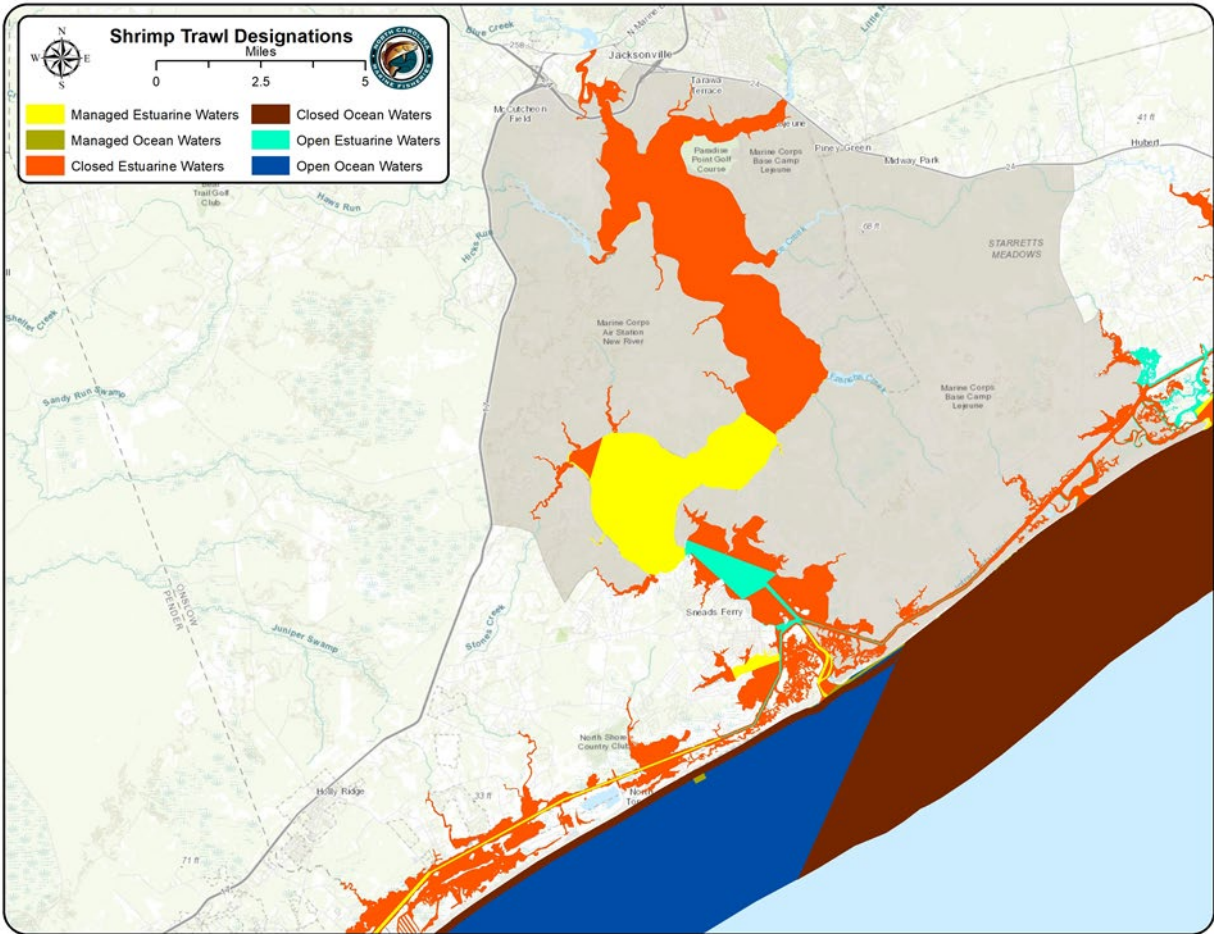
Map 3.6. Map of shrimp trawl areas from Cape Lookout to New River.

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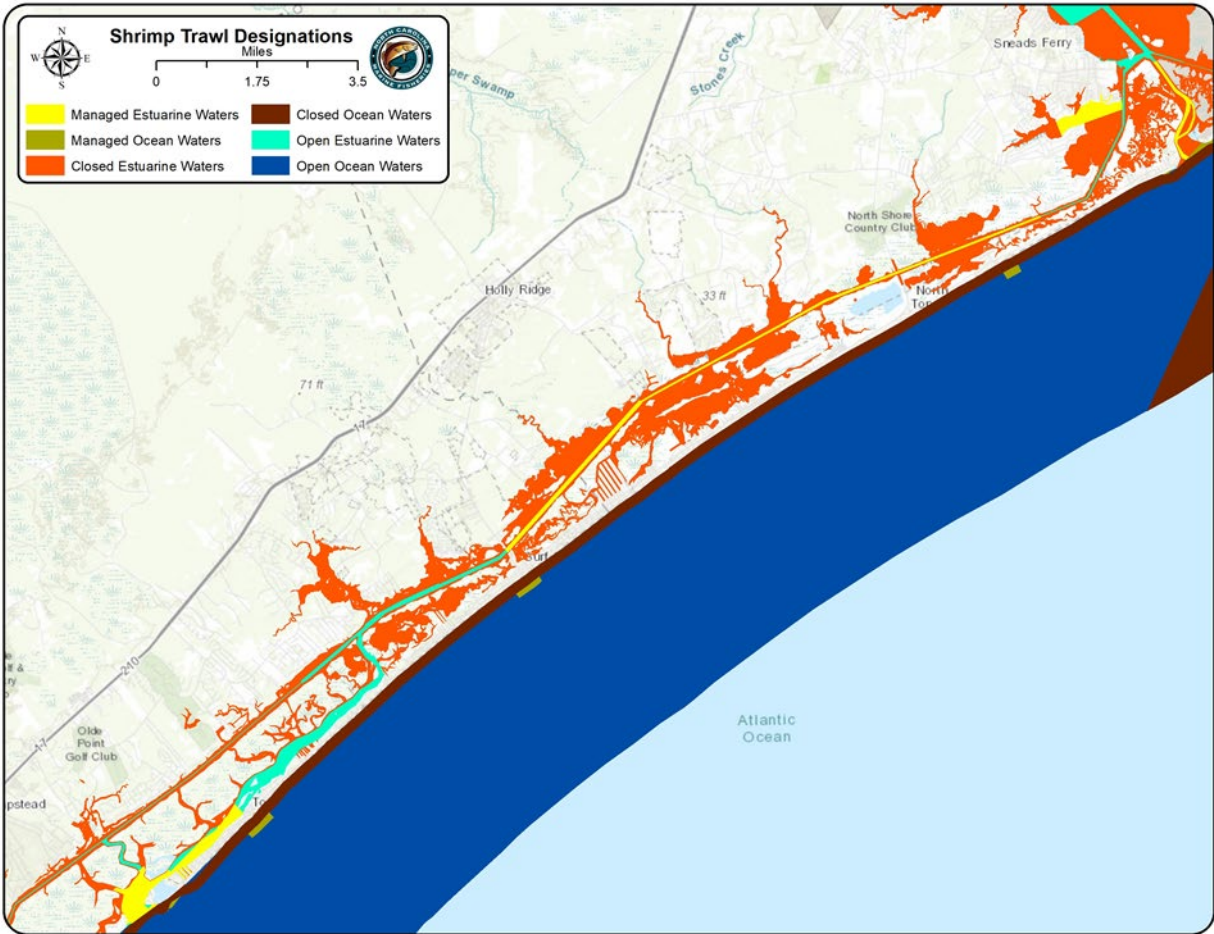
Map 3.7. Map of shrimp trawl areas from White Oak River to New River.

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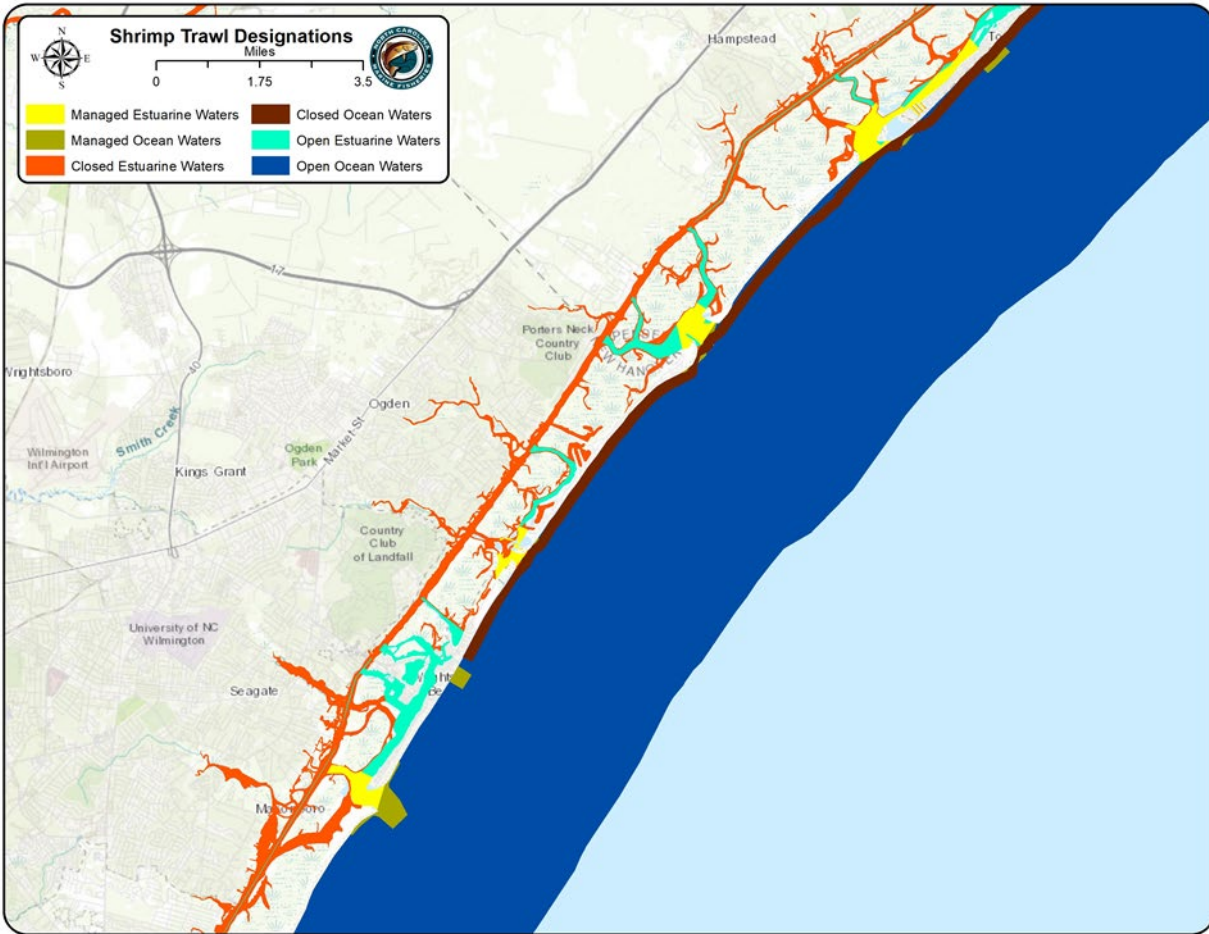
Map 3.8. Map of shrimp trawl areas in New River.

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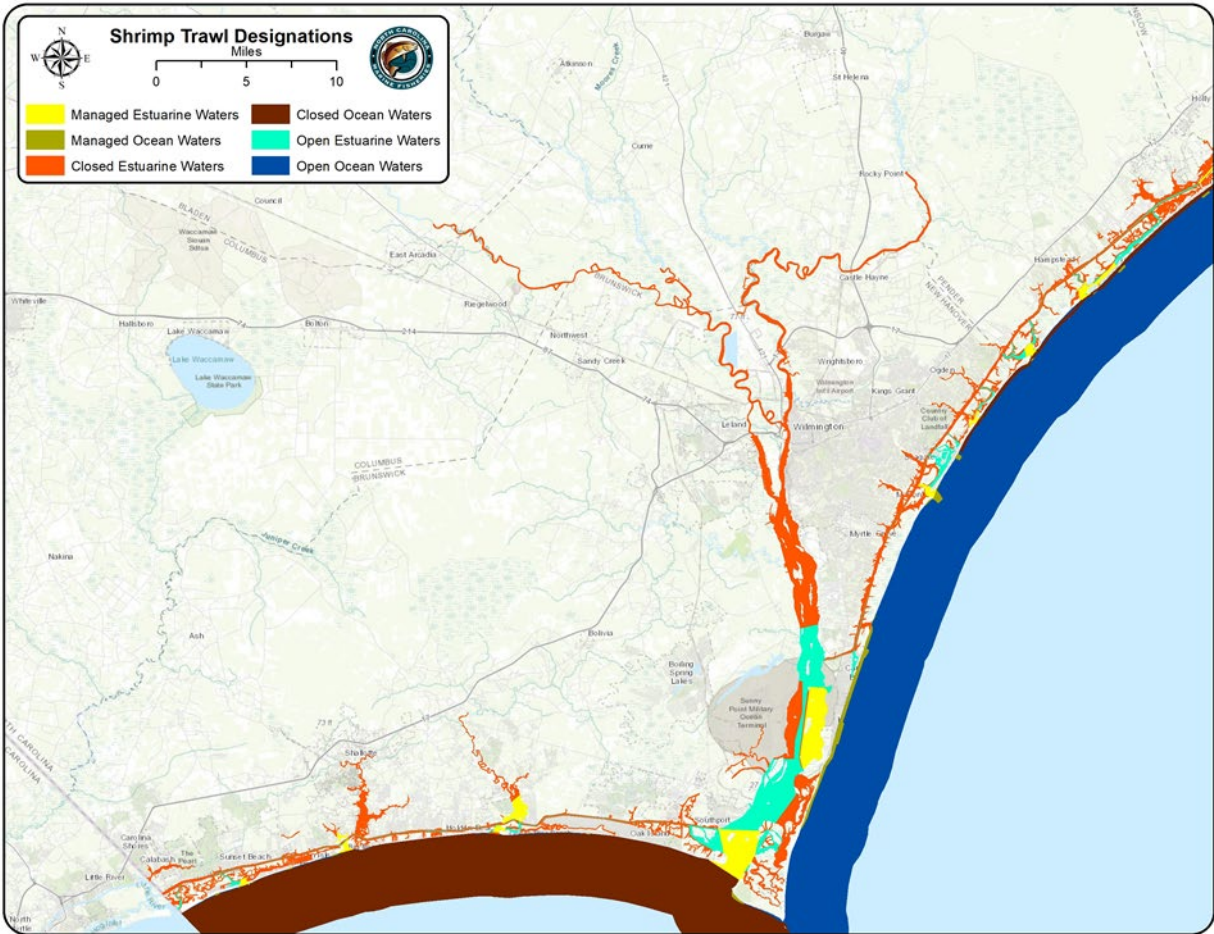
Map 3.9. Map of shrimp trawl areas from New River to Topsail Inlet.

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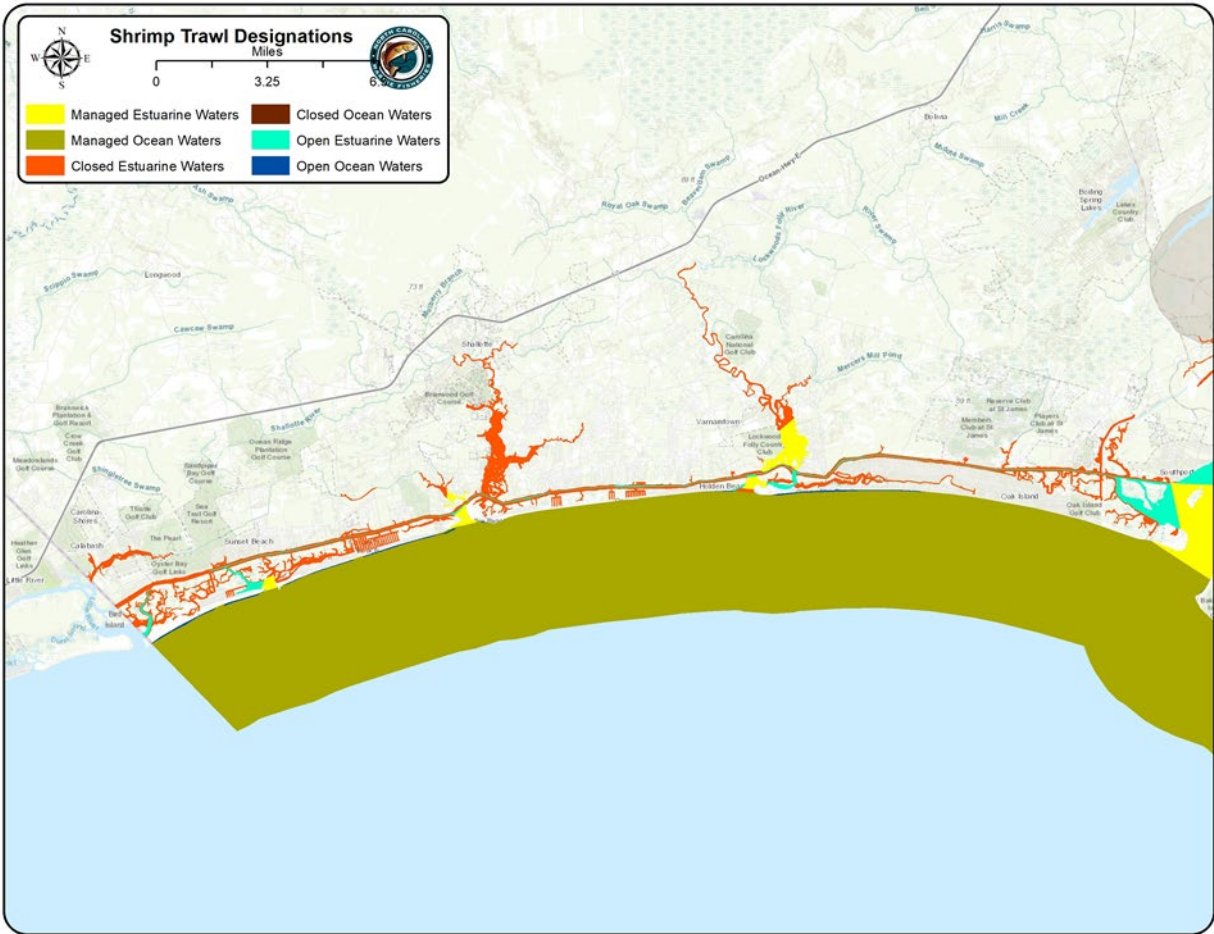
Map 3.10. Map of shrimp trawl areas from Topsail Inlet to Wrightsville Beach.

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Map 3.11. Map of shrimp trawl areas in Cape Fear River

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DRAFT – SUBJECT TO CHANGE

APPENDIX 4. COMMERCIAL, BAIT, AND RECREATIONAL SHRIMP TRAWL REGULATIONS FOR SOUTH ATLANTIC AND GULF STATES MAY 2021

Table A.4.1. Commercial food shrimp trawl regulations for South Atlantic and Gulf of Mexico states. *Unable to verify regulations with state fisheries agency.

State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
North Carolina	Pamlico Sound up to 220 ft of headrope; other inshore waters up to 90 ft headrope; no headrope limit in state ocean waters; two BRDs required in all trawl nets	Open year-round in most areas; special secondary nursery areas and other managed areas open based on biological sampling	Yes: prohibited in primary and secondary nursery areas and Albemarle Sound	
South Carolina	Up to 220 ft of footrope; BRD required in nets with 2.5" stretch mesh or less or with a headrope 16 ft or greater	Open May - Dec. in general trawl areas; open Sep. - Dec. 15 below channel net areas	Yes: mouths of St Helena, Port Royal, and Alibogue sounds and Winyah and North Santee bays	Cannot dispose of bycatch within half mile of beach; no shrimping at night
Georgia*	BRD in all nets > 16 ft headrope; TED in all nets >12 ft headrope unless hand retrieved	Open as early as May 15; close Dec 31 or may extend into Jan or Feb	No	No TED required if hand retrieved, must follow seasonal tow time restrictions
Florida*	1-2 roller frame, otter, and/or skimmer trawls depending on region; no more than 500 square feet of mesh area in net/bag; BRD and TED required	June-Oct.: no weekend shrimping; Apr-May: closed in certain counties	Yes, managed by region: North West region-yes with additional gear restrictions; Big Bend Region-yes; South West Region-Tampa Bay-yes; South East Region-Biscayne Bay-no; North East Region-yes, tributaries of rivers closed	
Alabama	Up to 50 ft headrope and no more than 2 trawls; no restrictions offshore; TED required	Closed May 1 - June 1, other specific seasonal closures	Yes: Mobile Bay, parts of Mississippi Sound, and other smaller bays	Minimum size limit 68 count head-on or lower

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State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
Mississippi	Up to 50 ft headrope if using one trawl net; up to 25 ft of headrope per net if using two trawl nets; no more than two trawl nets may be used; trawl doors: 8 ft length, 43 in. high; TED required	Opens in May/June; closes: Jan. 1 north of IWW and April 30 south of IWW	Yes: all inside bays and rivers closed and closed in Mississippi Sound within 1/2 mile of mainland shoreline; closed within 1 mile perimeter around barrier islands eight miles from mainland shoreline	Minimum size limit 68 count head-on
Louisiana	Inshore: up to 50 ft headrope if using one trawl net; up to 25 ft headrope per net if using two trawl nets; no more than two trawl nets may be used; max trawl door size: 8' long x 43" high; Offshore to 3 miles: up to 130 ft headrope max; Breton and Chandeleur Sounds - 2 trawl nets, with no more than 65 ft of headrope each; EEZ: up to 4 trawls, any size; Mesh size restrictions - 5/8" bar of 1-1/4" stretched, 3/4" bar or 1.5" stretched in Vermilion-Teche Basin in fall shrimp season; BRD and TED required in federal waters, TED required in trawl nets fishing state waters	Spring inshore season: typically, May - early July; fall inshore season: Aug - Dec; offshore: open year-round; exemptions (live bait) close late fall-early winter	Yes: managed by zones	Minimum size limit of 100 count head-on for white shrimp, except Oct. 15 - third Monday in Dec.; crab trap interactions requirements; night shrimping prohibited in some areas (Vermilion-Teche and Calcasieu Basins); restricted areas in refuges and WMAs;
Texas	Major bays: spring - one otter trawl net 40-54 ft wide depending on door size, one beam trawl up to 25 ft; fall - one trawl up to 95 ft wide; winter - same as spring, BRD and TED required. Minimum mesh size: spring - 1.3 in.; fall - Aug. 15-Oct. 31 1.75 in., Nov. 1-Nov. 30 1.3 in.; winter: 1.3 in.	Major Bays: Spring - May 15 - July 15; Fall - Aug. 15 - Nov. 30; Winter (south of Colorado River only) - Feb. 1 - April 15.	Yes	Daily fishing time: spring and fall - 30 minutes before sunrise to 30 minutes after sunrise; winter - 30 minutes after sunset to 30 minutes before sunrise. Harvest limit: spring - 800 lb; fall - Aug. 15-Oct. 31 50 count heads on per pound, Nov. 1-Nov. 30 no limit; winter - no limit.
	Inside 3 nm: Southern and Northern zones - up to two trawl nets, each net 71-89 ft wide depending on door size, minimum mesh size 1.75 in., BRD and TED required.	Southern: July 16-Nov. 30; Northern: Feb. 16-May 15 and July 16-Nov. 30.		Daily fishing time: Southern and Northern zones 30 minutes before sunrise to 30 minutes after sunset.
	3-5 nm: Southern and Northern zones - minimum mesh size 1.75 in., BRD and TED required.	Southern: July 16-Nov. 30; Northern: Feb. 16-May 15 and July 16-Nov. 30.		Daily fishing time: Southern and Northern zones 30 minutes before sunrise to 30 minutes after sunset.

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State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
Texas cont.	5-9 nm: Southern and Northern zones - minimum mesh size 1.75 in., BRD and TED required.	Southern and Northern zones: July 16-Nov. 30 and Dec. 1-May 15.		Daily fishing time: Southern and Northern zones 30 minutes before sunrise to 30 minutes after sunset.
	Seabob fishery: one otter trawl net 48-62 ft wide depending on door size, minimum mesh size 1.3 in., BRD and TED required.	Northern zone only: Dec. 1-May 15 and July 16-Nov. 30.		Daily fishing time: 30 minutes before sunrise to 30 minutes after sunset. No more than 10% in weight or number any other species of shrimp.

DRAFT – SUBJECT TO CHANGE

Table A.4.2. Commercial bait shrimp trawl regulations for South Atlantic and Gulf of Mexico states. *Unable to verify regulations with state fisheries agency.

State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
North Carolina	One trawl net with up to 40 ft headrope	Same as commercial	Same as commercial	Allowed on weekend with permit; live well required; no more than 1-gallon dead shrimp
South Carolina	Same as commercial	Same as commercial	Same as commercial	Same as commercial
Georgia*	One trawl net with up to 20 ft headrope	Open year-round	Yes: 60 bait zones located in middle and upper estuaries	TED and BRD are not required; 50-quart harvest limit; less than 10% dead shrimp
Florida*	Roller frame trawl only except 1 otter trawl in North East Region with 5/8 in. body and 1/2 in. cod end	North East Region closed Apr - May	Yes	Live well required; no more than 5-gallon dead shrimp
Alabama	One trawl net with up to 50 ft headrope; trawl net cannot exceed 16 ft headrope in areas temporarily closed to commercial shrimping or in exclusive bait areas	Closed May 1 - June 1	Yes: same as commercial and exclusive bait areas	Exclusive bait areas open 4 a.m. to 10 p.m.; live well or aerator required; two standard shrimp baskets live or dead harvest limit; 20-minute maximum tow time
Mississippi	One trawl net no larger than 16 ft headrope and 22 ft footrope, except areas west of Bayou Caddy where trawl net may be up to 25 ft headrope and 32 ft footrope	Open year-round	Yes: major bays closed; live bait catcher boats can trawl within 1/2 mile of the mainland shoreline	Minimum size of 100 count or lower; no more than 30 lb dead shrimp; daytime only; 25-minute maximum tow time

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State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
Louisiana	One trawl net no more than 25 ft along the cork line and 33 ft along the lead line; two skimmer nets with individual nets no more than 16 ft measured horizontally, 12 ft measured vertically, or 20 ft measured diagonally	Open year-round	Yes	\$1,000 cash bond, background check, facility inspection, 12" signage, and VMS required
Texas	One trawl net with a 40 to 54 ft headrope	Open year-round	Yes: major bays	200 lb harvest limit; Nov. - Aug. 50% must be live; Aug. - Nov. all heads must be attached

DRAFT – SUBJECT TO CHANGE

Table A.4.3. Recreational shrimp regulations for South Atlantic and Gulf of Mexico states. *Unable to verify regulations with state fisheries agency.

State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
North Carolina	One trawl net with up to 26 ft headrope; BRDs required; TED required for mechanical retrieval	same as commercial	same as commercial	Recreational Commercial Gear License (RCGL) required; harvest limit of 48-quart heads-on or 30-quart heads-off per person; up to two limits per vessel if more than one RCGL holder onboard
South Carolina	same as commercial	same as commercial	same as commercial	Trawling for personal use is restricted to the same license requirements, areas, and seasons as commercial
Georgia*	One trawl net with up to 10 ft headrope	Open year-round	60 bait zones located in middle and upper estuaries	Harvest limit of 2 quarts per person or 4 quarts per vessel; no recreational trawling for food shrimp
Florida*	Dip net, cast net, push net, frame net, shrimp trap, and seine only	Closed season: April and May closed in Nassau, Duval, St. Johns, Putnam, Flagler, and Clay counties.	No	Harvest limit of 5-gallon heads-on limit
Alabama	One trawl net with up to 16 ft headrope; hand retrieval only; TED not required	Closed May 1 - June 1	same as commercial and exclusive bait areas	Harvest limit of 5 gallon heads-on per person in non-bait areas; harvest limit of 1 gallon heads-on per person in exclusive bait areas
Mississippi	One trawl net with up to 16 ft headrope; TED not required for hand retrieval	same as commercial	same as commercial	same as commercial

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State	Gear Restrictions	Season	Estuarine Trawling Allowed	Miscellaneous
Louisiana	One trawl net with up to 16 ft or 25 ft headrope (separate licenses); minimum mesh size of 5/8" bar or 1-1/4" stretched; Vermilion-Teche Basin minimum mesh size of 3/4" bar or 1-1/2" stretched	same as commercial	same as commercial; must be 500' beyond shoreline around Grand Isle	Minimum size limit of 100 ct for white shrimp, except Oct 15 - third Monday of Dec; harvest limit of 100 lb per boat (for headrope 16 ft or less) or 250 lb limit per boat (for headrope 16-25 ft headrope)
Texas	Maximum of 20 ft width between trawl doors	Major bays (excluding closed areas): May 15 - July 15 and August 15 - November 30. Gulf: same as commercial.	same as commercial	Bays: harvest limit of 15 lb heads-on per person per day; Gulf: harvest limit of 100 lb heads-on per boat per day; required to have a valid recreational fishing license; fishing hours are 30 minutes before sunrise to 30 minutes after sunset

DRAFT – SUBJECT TO CHANGE

APPENDIX 5. SUMMARY OF ADVISORY COMMITTEE AND NCDMF RECOMMENDATIONS FOR ISSUE PAPERS IN THE AMENDMENT 2 OF THE SHRIMP FISHERY MANAGEMENT PLAN

This section to be completed prior to final adoption of the plan.



INTERJURISDICTIONAL FISHERIES FMP



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission
FROM: Jason Rock, Interjurisdictional FMP Lead, Fisheries Management
SUBJECT: Interjurisdictional Fishery Management Plan Overview

Issue

During the May 2021 Marine Fisheries Commission (MFC) business meeting Division of Marine Fisheries (DMF) staff will present an overview of the Interjurisdictional (IJ) Fishery Management Plan (FMP) and its purpose.

Action Needed

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

Overview

The IJ FMP is the mechanism through which North Carolina adopts FMPs, consistent with N.C. law, approved by the Councils or the Atlantic States Marine Fisheries Commission (ASMFC) by reference. Corresponding fishery regulations are then implemented in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future. Fishery management plans established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA; federal Council FMPs) and the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA; ASMFC FMPs), have goals similar to the Fisheries Reform Act of 1997 (FRA) to “ensure long-term viability” of these fisheries.

The ASMFC and federal councils provide stewardship of fishery resources through the preparation, monitoring, and revision of Fishery Management Plans (FMPs). These enable the States, the fishing industry, consumer and environmental organizations, and other interested persons to participate in, and advise on, the establishment and administration of such plans which take into account the social and economic needs of the States. The MFC role is advisory to the state representatives regarding marine fisheries within the jurisdiction of the ASMFC and federal councils. Table 1 shows the finfish species and species groups currently managed under the IJ FMP and which entity has jurisdiction over their management.

Table 1. Finfish species or species groups managed under the jurisdiction of the ASMFC, South and/or Mid-Atlantic Councils and the N.C. MFC.

Species or species group	Atlantic States Marine Fisheries Commission	South Atlantic Fishery Management Council	Mid-Atlantic Fishery Management Council	North Carolina ¹ Marine Fisheries Commission
American Eel	X			
Atlantic Croaker	X			
Atlantic Menhaden	X			
Atlantic Striped Bass	X			X
Atlantic Sturgeon*	X			
Black Drum ²	X			
Black Sea Bass – North of Cape Hatteras	X		X	
Bluefish	X		X	
Cobia	X			
Red Drum	X			X
River Herring	X			X
Scup – North of Cape Hatteras	X		X	
Shad	X			
Sharks	X			
Spanish Mackerel	X	X		
Spiny Dogfish	X		X	
Spot	X			
Spotted Seatrout	X			X
Summer Flounder	X		X	
Tautog	X			
Weakfish	X			
Dolphin/Wahoo		X		
King Mackerel		X		
Snapper Grouper Complex (includes Black Sea Bass – South of Cape Hatteras)^{3,4}		X		
Monkfish			X	

¹ State FMPs were developed for these species prior or subsequent to those developed by ASMFC or the Councils.

²Black drum added to IJ FMP management unit subsequent to approval of ASMFC FMP in 2013.

³Tiger grouper, black margate, blue-striped grunt, French grunt, Spanish grunt, smallmouth grunt, porkfish, queen triggerfish, crevalle jack, yellow jack, grass porgy, sheepshead and puddingwife were removed from the Snapper Grouper Complex in April 2012; blue runner was removed from the Snapper Grouper Complex in January 2013; black snapper, dog snapper, mahogany snapper, and schoolmaster were removed from the Snapper Grouper Complex in June 2016.

⁴Includes 51 different species

*Listed as endangered under the ESA.

Species or species groups in **bold** require federal permits for commercial and/or for-hire fishermen fishing in federal waters.



AMENDMENT 2 TO THE ESTUARINE STRIPED BASS FMP UPDATE



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: North Carolina Marine Fisheries Commission

FROM: Charlton H. Godwin, Striped Bass FMP Co-Lead, Fisheries Management
M. Todd Mathes, Striped Bass FMP Co-Lead, Fisheries Management

SUBJECT: Estuarine Striped Bass Fishery Management Plan Amendment 2

Issue

During the May 2021 Marine Fisheries Commission (MFC) business meeting North Carolina Division of Marine Fisheries (DMF) staff will present a progress update on the continuing development of the N.C. Estuarine Striped Bass Fishery Management Plan (FMP) Amendment 2.

Actions Needed

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

The division requests the commission review and provide input on the Amendment 2 update.

Overview

DMF and the North Carolina Wildlife Resource Commission (WRC) staff are developing a first draft of Amendment 2 including four issue papers and an information paper addressing the Estuarine Striped Bass FMP goal and objectives approved by the MFC in February 2020. Solicitation for the Striped Bass FMP Advisory Committee (AC) members will occur in June 2021 with AC meetings scheduled to occur in July 2021. ACs are comprised of members representing scientific, recreational, commercial, and conservation communities. The Estuarine Striped Bass AC will discuss and provide input on management to assist the division and WRC in developing draft Amendment 2. Workshops provide a more informal setting for staff and AC members to collaborate in development of the amendment. The division will provide the MFC an overview of draft Amendment 2, including the four issue papers and the information paper at an upcoming business meeting. At that time, the MFC will be asked to vote to send the draft FMP out for public and advisory committee review. Commissioners are strongly encouraged to attend the Estuarine Striped Bass AC workshops to hear detailed discussions regarding each FMP issue.

N.C. Estuarine Striped Bass FMP Amendment 2 Issues

Sustainable Harvest



Albemarle-Roanoke

End overfishing and rebuild the spawning stock to achieve long-term sustainable harvest.

Example Options

Reduce TAL, restrict season/area, size limits, and gear modifications



Tar-Pamlico and Neuse Rivers

Promote natural recruitment by expanding the age structure of the stock to achieve a self-sustaining population.

Example Options

Continue the no-possession provision and gear modifications



Cape Fear River

Consider implications of allowing harvest given high hatchery contribution to the stock, low overall abundance, limited natural recruitment, and impediments of locks and dams on spawning migration.

Example Options

Continue no-possession or allow limited harvest by area

Across Systems



Hook & Line as Commercial Gear

Evaluate the purpose and benefit of hook-and-line as an allowable gear in the commercial striped bass fishery and examine concerns and issues surrounding implementing the use of hook-and-line gear.



Stocking Information Paper

Describes the history of striped bass stocking strategies in North Carolina and gives an overview of future stocking strategies by system. Strategies are developed through the North Carolina Interjurisdictional Fisheries Cooperative (COOP) annual work plans.

Amendment 2 Issue and Information Papers

Albemarle-Roanoke Sustainable Harvest Issue Paper

The Albemarle-Roanoke stock is overfished and overfishing is occurring. The issue paper examines ways to end overfishing and rebuild the Albemarle-Roanoke striped bass spawning stock to end the overfished status and achieve long-term sustainable harvest.

Tar-Pamlico and Neuse Rivers Sustainable Harvest Issue Paper

A matrix model indicates sustainability in the Central Southern Management Area (CSMA) is unlikely at any level of fishing mortality given model assumptions. The issue paper describes reasons for high hatchery contribution and lack of consistent natural recruitment and examines possible scenarios from maintaining no harvest (implemented in 2019) to harvest implementation considerations for Tar-Pamlico and Neuse rivers.

Cape Fear River Sustainable Harvest Issue Paper

A matrix model indicates sustainability in the CSMA is unlikely at any level of fishing mortality given model assumptions and a tagging model estimates low overall abundance in the Cape Fear. The issue paper describes reasons for limited natural recruitment, from the impediments to spawning migrations and stocked fish contributing to the recreational catch and release fishery. The issue paper also examines possible scenarios from maintaining the no harvest provision (implemented 2008) to allowing seasonal harvest of striped bass in various jurisdictional reaches of the river.

Hook-and-Line as a Commercial Gear Issue Paper

Evaluate the purpose and benefit of hook-and-line as an allowable gear in the commercial striped bass fishery and examine concerns and issues surrounding implementing the use of hook-and-line gear.

Striped Bass Stocking Information Paper

Describes the history of striped bass stocking strategies in North Carolina and gives an overview of future stocking strategies by system. Strategies are developed through the North Carolina Interjurisdictional Fisheries Cooperative (COOP) annual work plans. The COOP consists of staff from the United States Fish and Wildlife Service, WRC, and DMF. Authority to engage in the COOP agreement is set forth in G.S. 113-181(a) and G.S. 113-224.

RULEMAKING UPDATE

RULEMAKING UPDATE MEMO

2019 - 2020 ANNUAL RULEMAKING CYCLE

2020 - 2021 RULEMAKING CYCLE PACKAGE A

2020 - 2021 RULEMAKING CYCLE PACKAGE B

MAY 1, 2021 MFC RULEBOOK SUPPLEMENT

2021 - 2022 RULEMAKING CYCLE PACKAGE A

2021 - 2022 RULEMAKING CYCLE PACKAGE B



ROY COOPER
Governor

DIONNE DELLI-GATTI
Secretary

KATHY B. RAWLS
Director

May 5, 2021

MEMORANDUM

TO: N.C. Marine Fisheries Commission

FROM: Catherine Blum, Rulemaking Coordinator
Marine Fisheries Commission Office

SUBJECT: Rulemaking Update

Issue

Update the N.C. Marine Fisheries Commission (MFC) on the status of the 2019-2020, 2020-2021, and 2021-2022 annual rulemaking cycles, including rulemaking in accordance with the Periodic Review and Expiration of Existing Rules per G.S. 150B-21.3A, and request the MFC vote on approval to begin the rulemaking process for rules in "Package A" for the 2021-2022 cycle.

Findings

- Periodic Review and Readoption of Rules – Requirements
 - North Carolina G.S. 150B-21.3A, adopted in 2013, requires state agencies to review existing rules every 10 years in accordance with a prescribed process that includes rule readoption.
 - 15A NCAC 03 – Marine Fisheries: On June 14, 2018, the Rules Review Commission (RRC) approved the readoption schedule of June 30, 2022 for 172 MFC rules.
 - 15A NCAC 18A – Sanitation: On Jan. 16, 2020, the RRC approved the readoption schedule of June 30, 2024 for 164 MFC rules.
 - The MFC must readopt these rules by these deadlines or the rules will expire and be removed from the N.C. Administrative Code.
- Periodic Review and Readoption of Rules – Rule Readoptions for May MFC Meeting
 - 15A NCAC 03 – Marine Fisheries
 - Rules with no changes in 15A NCAC 03I, 03J (11 rules)
 - Interjurisdictional species (8 rules)
 - 15A NCAC 18A – Sanitation
 - Rules with minor changes relating to standards for handling, packing, and shipping crustacea meat (34 rules)
 - Prohibit repacking of foreign crab meat in North Carolina (2 rule readoptions; 1 rule adoption)

Action Needed

In accordance with G.S. 150B-21.3A, the MFC is scheduled to begin the rule readoption and adoption process for the 56 rules in "Package A".

Recommendation

The division recommends the MFC vote on approval to begin the rule readoption and adoption process for the 56 listed rules. For more information, please refer to the [Rulemaking](#) section of the briefing materials.

2019-2020 Annual Rulemaking Cycle Update (2 rules)

At its February 2020 business meeting, the MFC gave final approval for readoption of two rules: 15A NCAC 03M .0509, Tarpon, and 15A NCAC 03O .0108, License and Commercial Fishing Vessel Registration Transfers. Both rules were subject to legislative review and became effective March 17, 2021. Rule 15A NCAC 03M .0509, as now amended, prohibits the possession of tarpon and makes it illegal to gaff, spear, or puncture tarpon by any method other than hook and line. Rule 15A NCAC 03O .0108, as now amended, clarifies the circumstances under which transfers of Standard and Retired Standard Commercial Fishing Licenses are allowed.

Text of the readopted rules can be found in the May 1, 2021 Supplement to the North Carolina Marina Fisheries Commission Rules April 1, 2020 on the division's website and in the [Rulemaking](#) section of the briefing materials. The corresponding news release and rulemaking cycle schedule are also available in the [Rulemaking](#) section of the briefing materials.

2020-2021 Annual Rulemaking Cycle Update

"Package A" (7 rules)

At its November 2020 business meeting, the MFC gave final approval for readoption of seven rules in 15A NCAC 18A .3401-.3407, Coastal Recreational Waters Monitoring, Evaluation, and Notification that became effective April 1, 2021. These rules were adopted in 2004 and needed updating to bring the Recreational Water Quality Program into compliance with new federal performance criteria and to be more efficient as a program in protecting public health by modifying the public notification process. The purpose of the program is to protect public health by monitoring recreational coastal waters and to notify the public when samples collected exceed the safe swimming standard. The rules, as now amended, also ensure equal protection for swimmers by requiring the same bacteriological threshold to trigger public health advisories for all swimming locations, regardless of usage frequency.

Text of the readopted rules can be found in the May 1, 2021 Supplement to the North Carolina Marina Fisheries Commission Rules April 1, 2020 on the division's website and in the [Rulemaking](#) section of the briefing materials. The corresponding news release and rulemaking cycle schedule are also available in the [Rulemaking](#) section of the briefing materials.

"Package B" (41 rules)

At its February 2021 business meeting, the MFC gave final approval for readoption and amendment of 41 rules for the following subjects:

- Shrimp Fishery Management Plan Amendment 1 Special Secondary Nursery Areas;
- Classification of shellfish growing waters and laboratory procedures;
- Rules with minor changes relating to standards for commercial shellfish sanitation and processing procedures;
- Oyster sanctuaries; and
- Shellfish lease user conflicts, per Session Law 2019-37.

The rules became effective May 1, 2021, except for the shellfish lease user conflict rules that are subject to legislative review.

Two rules, as amended, reclassify nine Special Secondary Nursery Areas to Secondary Nursery Areas, as recommended by the Shrimp Fishery Management Plan Amendment 1. The nine areas have not been opened to trawling since at least 2004, so there is no change to the shrimp trawl fishery. The reclassification results in additional small mesh gill net attendance requirements in all but one of the areas.

Additional rules pertaining to shellfish growing waters and processing of crustacea meat, as amended, update shellfish sanitation laboratory procedures, sanitary survey reporting requirements, standards for classifying shellfish waters, and definitions to conform with current national standards. One other rule updates oyster sanctuaries by adding five new sites, updating boundaries for three existing sites, and removing two sites that no longer function as sanctuaries.

Text of the readopted rules can be found in the May 1, 2021 Supplement to the North Carolina Marina Fisheries Commission Rules April 1, 2020 on the division's website and in the [Rulemaking](#) section of the briefing materials. The corresponding news release and rulemaking cycle schedule are also available in the [Rulemaking](#) section of the briefing materials.

2021-2022 Annual Rulemaking Cycle

"Package A" (56 rules)

Periodic Review and Expiration of Existing Rules – Rule Readoptions for May MFC Meeting

At its May 2021 business meeting, the MFC is scheduled to vote on approval to begin the rule readoption and adoption process for 56 rules. A summary of the proposed rules is provided here. Please refer to the materials for "Package A" in the [Rulemaking](#) section of the briefing materials, including the rulemaking cycle schedule and the fiscal analysis of each of the four subjects described below. The proposed rules are appended to each respective fiscal analysis. The intended effective date of the rule package is April 1, 2022. Rules with an asterisk (*) are subject to legislative review pursuant to Session Law 2019-198 and G.S. 14-4.1, Legislative review of regulatory crimes, and thus are expected to have a delayed effective date. The MFC may request a group of related rules to become effective at the same time per G.S. 150B-21.3.

RULES WITH NO CHANGES IN 15A NCAC 03I, 03J (11 rules)

(03I .0108, .0115, .0122, 03J .0103*, .0104*, .0106*, .0111*, .0202*, .0208*, .0401, .0402*)

The MFC is scheduled to vote on the proposed readoption of 11 rules in 15A NCAC 03 pursuant to the requirements of G.S. 150B-21.3A. The proposed readoptions consist of no changes.

INTERJURISDICTIONAL SPECIES (8 rules)

(15A NCAC 03L .0207, .0301*, .0302, 03M .0301, .0302*, .0511, .0516, .0519*)

The MFC is scheduled to vote on proposed amendments to readopt eight rules in 15A NCAC 03 pursuant to the requirements of G.S. 150B-21.3A. The management and harvest restrictions of North Carolina's interjurisdictional fishery species are implemented through a state fishery management plan and MFC rules that coordinate with relevant interstate and federal regulatory bodies. Since fish are not contained within political boundaries, state, interstate, federal and even international authorities share fisheries management responsibilities. Over time, regulation of these species in North Carolina has shifted towards ongoing proclamations and rule suspensions by the division director in order to keep pace with shifting interstate and federal regulations. The state is required by the Atlantic Coastal Fisheries Cooperative Management Act and the Magnuson-Stevens Fishery Conservation and Management Act to comply with interstate and federal restrictions.

The proposed amendments and repeals through readoption seek to formalize proclamation authority of these interjurisdictional species in rule language and remove existing harvest requirements that are likely to be invalidated. The proposed changes would conform with existing management practices by the division and would increase the division's efficiency in managing these species.

RULES WITH MINOR CHANGES RELATING TO STANDARDS FOR HANDLING, PACKING, AND SHIPPING CRUSTACEA MEAT (34 rules)
(15A NCAC 18A .0134, .0137-.0139, .0144, .0145, .0147-.0149, .0151-.0153, .0156-.0158, .0161, .0162, .0164-.0166, .0168, .0174-.0178, .0181-.0187, .0191)

The MFC is scheduled to vote on proposed amendments to readopt 34 rules in 15A NCAC 18A pursuant to the requirements of G.S. 150B-21.3A. The proposed readoptions consist of amendments that are of an administrative nature to update the rules. All proposed changes are either intended to provide heightened clarity to rule language, or to conform rule language for crustacea meat storage, processing, and facility maintenance to that of ongoing practice by the division staff and licensed seafood processors and dealers. The proposed changes would not affect the operations or material needs of the division or outside stakeholders.

PROHIBIT REPACKING OF FOREIGN CRAB MEAT IN NORTH CAROLINA (3 rules)
(15A NCAC 03L .0210*, 18A .0136, .0173)

The MFC is scheduled to vote on proposed amendments to readopt two rules in 15A NCAC 18A pursuant to the requirements of G.S. 150B-21.3A and adopt one rule in 15A NCAC 03. Following recent developments in North Carolina where foreign crab meat was fraudulently marketed and sold as domestic blue crab, the MFC requested the division develop rules to prohibit the repacking of foreign crab meat in the state to prevent future fraud and improve consumer confidence moving forward. After investigating its statutory authority over the issue, the division prepared a new rule for adoption in 15A NCAC 03 that prohibits the repacking of foreign crab meat in North Carolina into another container. This does not affect value-added crab products, such as crab cakes. Two existing rules for readoption in 15A NCAC 18A are proposed with conforming changes to address the new repacking rule.

"Package B" (approximately 110 rules)

At the May 2021 MFC business meeting, Division staff will provide a preview of rules for the MFC's 2021-2022 "Package B". There will be two packages of rules this year, similar to the 2020-2021 cycle, due to the number of rules remaining to be readopted. Please see Figure 1, detailed in the Background Information section below, that shows the MFC's rule readoption schedule. Also, the [Rulemaking](#) section of the briefing materials includes the rulemaking cycle schedule for "Package B".

Background Information

Periodic Review and Expiration of Existing Rules per G.S. 150B-21.3A

Session Law 2013-413, the Regulatory Reform Act of 2013, implemented requirements known as the "Periodic Review and Expiration of Existing Rules." These requirements are codified in a new section of Article 2A of Chapter 150B of the General Statutes in G.S. 150B-21.3A. Under the requirements, each agency is responsible for conducting a review of all its rules at least once every 10 years in accordance with a prescribed process.

The review has two parts. The first is a report phase, which has concluded, followed by the readoption of rules. An evaluation of the rules under the authority of the MFC was undertaken in two lots (see Figure 1.) The MFC has 211 rules in Chapter 03 (Marine Fisheries), of which 172 are subject to readoption, and 164 rules in Chapter 18, Subchapter 18A (Sanitation) that are also subject to readoption. The MFC is the body with the authority for the approval steps prescribed in the process.

Rules	2017	2018	2019	2020	2021	2022	2023	2024
Chapter 03 (172 rules)	Report	41 Rules Readopted	2 Rules Readopted	4 Rules Readopted	Rule Readoption (125)	6/30/22 deadline		
Subchapter 18A (164 rules)			Report	42 Rules Readopted	Rule Readoption (40)	Rule Readoption (82)	6/30/24 deadline	

Figure 1. Marine Fisheries Commission rule readoption schedule to comply with G.S. 150B-21.3A, Periodic Review and Expiration of Existing Rules.

N.C. Marine Fisheries Commission 2019-2020 Annual Rulemaking Cycle

May 2021

Time of Year	Action
April-July 2019	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
August 2019	MFC approved Notice of Text for Rulemaking
Oct. 1, 2019	Publication of proposed rules in the <i>North Carolina Register</i>
Oct. 16-Dec. 2, 2019	Public comment period held
Oct. 23, 2019	Public hearing held: 6 p.m., Division of Marine Fisheries, 5285 Highway 70 West, Morehead City, NC 28557
February 2020	Rules approved by MFC
April 2020	Rules approved by Office of Administrative Hearings/ Rules Review Commission
2021 legislative session	Possible effective date of rules subject to legislative review per S.L. 2019-198 and G.S. 14-4.1.
March 17, 2021	Effective date of rules
March 17, 2021	Rulebook supplement available online

Roy Cooper
Governor

Dionne Delli-Gatti
Secretary DEQ



John G. Batherson
Acting Director

Release: Immediate
Date: March 23, 2021

Contact: [Patricia Smith](#)
Phone: 252-726-7021

Changes to tarpon, commercial fishing license and vessel transfer rules now in effect

MOREHEAD CITY – Changes to two marine fisheries rules are now in effect. One of the rules pertains to tarpon and the other to the transfer of Standard and Retired Standard Commercial Fishing Licenses.

Marine Fisheries Commission rule 15A NCAC 03M .0509, as now amended, prohibits the possession of tarpon and makes it illegal to gaff, spear, or puncture tarpon by any method other than hook and line.

Rule 15A NCAC 03O .0108, as now amended, clarifies the circumstances under which transfers of Standard and Retired Standard Commercial Fishing Licenses are allowed, including the following changes:

1. Adds grandparents, grandchildren, and legal guardians to the list of immediate family members eligible to receive a transferred license.
2. Codifies the existing requirement of a certification statement from the transferee that affirms the information provided to the division is true and accurate.
3. Allows an individual license holder to transfer the license to a business in which the license holder is also an owner.
4. Allows a business that is dissolved to transfer a license to an individual owner of the business.
5. Allows a business that is sold to transfer a license to the successor business at the time of sale.
6. Allows a business to transfer a license back to an owner who is leaving the business if the owner originally held the license as an individual.
7. Restricts business transfers to corporations and limited liability companies.
8. Defines “owner” to include shareholder of a corporation and member of a limited liability company.

Specific wording of the amended rules in their entirety can be found in the North Carolina Marine Fisheries Commission Rules April 1, 2020 – Supplement – March 17, 2021 on the [Division of Marine Fisheries Rules and Regulations webpage](#). The Division of Marine Fisheries received official notification on March 22 that the rules became effective on March 17, 2021.

The Marine Fisheries Commission approved the rules in February 2020 after a public comment period in the fall of 2019; however, both rules were subject to legislative review under various statutes, which delayed the effective date.

For more information, contact [Catherine Blum](#), rules coordinator for the N.C. Division of Marine Fisheries, at 252-808-8014.

###

N.C. Marine Fisheries Commission 2020-2021 Annual Rulemaking Cycle Package A

May 2021

Time of Year	Action
February-April 2020	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
May 2020	MFC approved Notice of Text for Rulemaking
Aug. 3, 2020	Publication of proposed rules in the <i>North Carolina Register</i>
Aug. 3-Oct. 2, 2020	Public comment period held
Aug. 26, 2020	Public hearing held via WebEx
November 2020	Rules approved by MFC
January 2021	Rules approved by Office of Administrative Hearings/ Rules Review Commission
April 1, 2021	Effective date of rules
April 1, 2021	Rulebook supplement available online

Roy Cooper
Governor

Dionne Delli-Gatti
Secretary DEQ



John G. Batherson
Acting Director

Release: Immediate
Date: April 1, 2021

Contact: [Patricia Smith](#)
Phone: 252-726-7021

Newly amended coastal recreational water quality rules take effect today

MOREHEAD CITY – Newly amended rules pertaining to coastal recreational water quality monitoring to protect the public health of swimmers go into effect today.

The rules, readopted by the Marine Fisheries Commission in November 2020 under a state-mandated periodic review schedule, include changes to 15A NCAC 18A .3400. Rules .3401, .3402, .3403, and .3405:

- Update biological standards for the N.C. Division of Marine Fisheries' Recreational Water Quality Program to align with new federal performance criteria.
- Ensure equal protection for swimmers by requiring the same bacteriological threshold to trigger public health advisories for all swimming locations, regardless of usage frequency.
- Modify terminology and the public notification process to reduce delays and confusion, without generating an increased frequency of swimming advisories for the public.

Other changes to the rules are technical in nature; two rules were repealed because they duplicated requirements.

Text of the readopted rules can be found in North Carolina Marine Fisheries Commission Rules April 1, 2020 – Supplement – April 1, 2021 on the N.C. Marine Fisheries Commission's [Rules and Regulations webpage](#).

For more information about changes to the N.C. Recreational Water Quality Program rules, email [Erin Bryan-Millush](#), who is the Division of Marine Fisheries' Recreational Water Quality Program manager or call her at 252-808-8153.

For more information about the rulemaking process, email [Catherine Blum](#), the division's rules coordinator.

###

N.C. Marine Fisheries Commission 2020-2021 Annual Rulemaking Cycle Package B

May 2021

Time of Year	Action
February-July 2020	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
August 2020	MFC approved Notice of Text for Rulemaking
Oct. 1, 2020	Publication of proposed rules in the <i>North Carolina Register</i>
Oct. 1-Nov. 30, 2020	Public comment period held
Oct. 21 and 27, 2020	Public hearings held via WebEx
February 2021	Rules approved by MFC
April 2021	Rules approved by Office of Administrative Hearings/ Rules Review Commission
2022 legislative session	Possible effective date of three rules subject to legislative review per S.L. 2019-198 and G.S. 14-4.1.
May 1, 2021	Effective date of 38 rules
May 1, 2021	Rulebook supplement available online

Roy Cooper
Governor

Dionne Delli-Gatti
Secretary DEQ



John G. Batherson
Acting Director

Release: Immediate
Date: April 29, 2021

Contact: [Patricia Smith](#)
Phone: 252-726-7021

Newly amended rules take effect May 1

MOREHEAD CITY – Newly amended rules pertaining to special secondary nursery areas will go into effect Saturday, May 1.

The rule changes, readopted by the Marine Fisheries Commission in February 2021 under a state-mandated periodic review schedule, reclassify nine Special Secondary Nursery Areas to Secondary Nursery Areas, as recommended by the Shrimp Fishery Management Plan Amendment 1. The nine areas have not been opened to trawling since at least 2004, so there is no change to the shrimp trawl fishery. The reclassification results in additional small mesh gill net attendance requirements in most of the areas:

- Newport River, Cape Fear River, Lockwood Folly River, and Saucepan Creek, where attendance in all waters from May 1 - Nov. 30 is now required.
- Pungo Creek, Slade Creek, South Creek, and Bond/Muddy creeks, where year-round attendance within 200 yards of shore is maintained with an additional requirement of attendance in all waters from May 1 - Nov. 30.
- Scranton Creek, which has no change in its small mesh gill net attendance requirements from the reclassification.

Additional rules pertaining to shellfish growing waters, processing of crustacea meat, and oyster sanctuaries were also readopted and will go into effect May 1. Rules in 15A NCAC 03R and 18A:

- Amend the oyster sanctuaries rule by adding five new sites (Long Shoal, Little Creek, Pea Island, Raccoon Island, and Swan Island), updating boundaries for three existing sites (Neuse River, West Bluff, and Gibbs Shoal), and removing two sites that no longer function as sanctuaries (Ocracoke and Clam Shoal).
- Update shellfish sanitation laboratory procedures, sanitary survey reporting requirements, standards for classifying shellfish waters, and definitions to conform with current national standards.
- Correct grammar, typographical errors, and update agency names.

Text of the readopted rules will be posted Saturday in the May 1, 2021 Supplement to the North Carolina Marine Fisheries Commission Rules April 1, 2020 on the N.C. Marine Fisheries Commission's [Rules and Regulations webpage](#). Until May 1, the [April 1, 2021 Supplement to the North Carolina Marine Fisheries Commission Rules April 1, 2020](#) remains in effect.

###

NORTH CAROLINA
MARINE FISHERIES COMMISSION
RULES

APRIL 1, 2020



SUPPLEMENT – MAY 1, 2021

MARINE FISHERIES COMMISSION
Rob Bizzell, Chair

DEPARTMENT OF ENVIRONMENTAL QUALITY
Dionne Delli-Gatti, Secretary

DIVISION OF MARINE FISHERIES
Kathy B. Rawls, Director
<http://portal.ncdenr.org/web/mf>

N.C. MARINE FISHERIES COMMISSION

Rob Bizzell, *Chair/Recreational Fisherman*
R.Bizzell.MFC@ncdenr.gov

Doug Cross, *Vice Chair/Commercial Industry*
D.Cross.MFC@ncdenr.gov

Mike Blanton, *Commercial Fisherman*
M.Blanton.MFC@ncdenr.gov

Tom Hendrickson, *At-Large*
T.Hendrickson.MFC@ncdenr.gov

Pete Kornegay, *Scientist*
J.Kornegay.MFC@ncdenr.gov

Robert McNeill, *Recreational Fisherman*
Robert.B.McNeill.MFC@ncdenr.gov

Dr. Martin Posey, *At-Large*
Martin.Posey.MFC@ncdenr.gov

Tom Roller, *Recreational Industry*
Tom.Roller.MFC@ncdenr.gov

Sam Romano, *Commercial Fisherman*
S.Romano.MFC@ncdenr.gov

**NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALITY
CHAPTER 03 – MARINE FISHERIES**

THE FOLLOWING RULES ARE READOPTED OR AMENDED
EFFECTIVE MARCH 17, 2021 OR MAY 1, 2021.

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**NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALITY
CHAPTER 18 – ENVIRONMENTAL HEALTH**

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EFFECTIVE APRIL 1, 2021 OR MAY 1, 2021.

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**NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALITY
CHAPTER 03 – MARINE FISHERIES**

SUBCHAPTER 03M – FINFISH

SECTION .0500 – OTHER FINFISH

15A NCAC 03M .0509 TARPON

- (a) It shall be unlawful to possess, sell, or offer for sale tarpon.
- (b) It shall be unlawful to take tarpon by any method other than hook and line.
- (c) It shall be unlawful to gaff, spear, or puncture a tarpon.

*History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. March 17, 2021.*

SUBCHAPTER 03O – LICENSES, LEASES, FRANCHISES, AND PERMITS

SECTION .0100 – LICENSES

15A NCAC 03O .0108 LICENSE AND COMMERCIAL FISHING VESSEL REGISTRATION TRANSFERS

- (a) To transfer a license or Commercial Fishing Vessel Registration, the license or registration shall not be expired prior to transfer.
- (b) Upon transfer of a license or Commercial Fishing Vessel Registration, the transferee becomes the licensee and assumes the privileges of holding the license or Commercial Fishing Vessel Registration.
- (c) A transfer application including a certification statement form shall be provided by the Division of Marine Fisheries. A transfer application shall be completed for each transfer including, but not limited to:
 - (1) the information required as set forth in Rule .0101(a) of this Section;
 - (2) a notarized statement from the transferee listing any violations involving marine or estuarine resources in the State of North Carolina during the previous three years; and
 - (3) a notarized statement from the transferee that the information and supporting documentation submitted with the transfer application is true and correct, and that the transferee acknowledges that it is unlawful for a person to accept transfer of a license for which they are ineligible.
- (d) A completed transfer application shall be returned to an office of the Division by mail or in person, except as set forth in Paragraph (e) of this Rule.
- (e) A transfer application submitted to the Division without complete and required information shall be deemed incomplete and shall not be considered further until resubmitted with all required information. Incomplete applications shall be returned to the applicant with deficiency in the application so noted.
- (f) A License to Land Flounder from the Atlantic Ocean shall only be transferred:
 - (1) with the transfer of the ownership of a vessel that the licensee owns that individually met the eligibility requirements of Rule .0101 (b)(1)(A) and (b)(1)(B) of this Section to the new owner of that vessel; or
 - (2) by the owner of a vessel to another vessel under the same ownership.Transfer of a License to Land Flounder from the Atlantic Ocean transfers with it all flounder landings from the Atlantic Ocean associated with that vessel. Any transfer of license under this Paragraph shall only be processed through the Division of Marine Fisheries Morehead City Headquarters Office and no transfer is effective until approved and processed by the Division.
- (g) Transfer of a Commercial Fishing Vessel Registration: If transferring ownership of a vessel bearing a current Commercial Fishing Vessel Registration, the new owner:
 - (1) shall follow the requirements in Rule .0101 of this Section and pay a replacement fee as set forth in Rule .0107 of this Section for a replacement Commercial Fishing Vessel Registration; and
 - (2) shall submit a transfer application with the signatures of the former owner and the new owner notarized.
- (h) Transfer of a Standard or Retired Standard Commercial Fishing License:
 - (1) It is unlawful for a person to accept transfer of a Standard or Retired Standard Commercial Fishing License for which they are ineligible. Grandparents, grandchildren, and legal guardians of an individual are eligible to transfer a license and receive a transferred license.

- (2) A Standard or Retired Standard Commercial Fishing License shall only be transferred if both the transferor and the transferee have no current suspensions or revocations of any Marine Fisheries license privileges. In the event of the death of the transferor, this requirement shall only apply to the transferee.
- (3) For purposes of effecting transfers under this Paragraph:
 - (A) "business" shall mean corporations and limited liability companies that have been registered with the Secretary of State; and
 - (B) "owner" shall mean owner, shareholder, or manager of a business.
- (4) At the time of the transfer of a Standard or Retired Standard Commercial Fishing License, the transferor shall indicate the retainment or transfer of the landings history associated with that Standard or Retired Standard Commercial Fishing License. The transferor may retain a landings history only if the transferor holds an additional Standard or Retired Standard Commercial Fishing License. Transfer of a landings history is all or none.
- (5) To transfer a Standard or Retired Standard Commercial Fishing License, in addition to the requirements in Paragraph (c) of this Rule, the following information is required:
 - (A) information on the transferee as set forth in Rule .0101 of this Section;
 - (B) notarization of the transferor's and the transferee's signatures on the transfer application; and
 - (C) if the transferor is retiring from commercial fishing, evidence showing that such retirement has in fact occurred, which may include, but is not limited to, evidence of the transfer of all the transferor's Standard Commercial Fishing Licenses, sale of all the transferor's registered vessels, or discontinuation of any active involvement in commercial fishing.
- (6) The Standard or Retired Standard Commercial Fishing License that is being transferred shall be surrendered to the Division at the time of the transfer application.
- (7) Fees:
 - (A) The transferee shall pay a replacement fee as set forth in Rule .0107 of this Section.
 - (B) The transferee shall pay the differences in fees as specified in G.S. 113-168.2(e) or G.S. 113-168.3(b) if the transferee is a non-resident.
 - (C) The transferee shall pay the differences in fees as specified in G.S. 113-168.2(e) if the license to be transferred is a Retired Standard Commercial Fishing License and the transferee is less than 65 years old.
- (8) Transfer of Standard or Retired Standard Commercial Fishing License for a Business:
 - (A) An individual holding a Standard or Retired Standard Commercial Fishing License may transfer their license to a business in which the license holder is also an owner of the business in accordance with application requirements as set forth in Rule .0101(a) of this Section.
 - (B) If a business is dissolved, the business may transfer the license or licenses of the business to an individual owner of the dissolved business. A dissolved business holding multiple licenses may transfer one license or multiple licenses to one owner or multiple owners or any combination thereof. A notarized statement showing agreement for the transfer of all owners of the business is required to complete this transaction.
 - (C) If a business is sold, the business may transfer the license or licenses of the business to the successor business at the time of sale.
 - (D) If an owner leaves the business, any license owned by that owner may be transferred back to themselves as an individual at the time the owner leaves the business, provided the owner was the last individual to own the license before the business owned the license. A notarized statement showing agreement for the transfer of all owners of the business is required to complete this transaction.
- (9) Transfer of Standard or Retired Standard Commercial Fishing License for a Deceased Licensee:
 - (A) If an immediate surviving family member of the deceased licensee is eligible to hold the deceased licensee's Standard Commercial Fishing License or Retired Standard Commercial Fishing License, the Administrator or Executor shall give written notification within six months after the Administrator or Executor qualifies under G.S. 28A to the Division of the request to transfer the deceased's license to the estate Administrator or Executor.
 - (B) A transfer to the Administrator or Executor shall be made according to the provisions of Subparagraphs (2) through (4) of this Paragraph. The Administrator or Executor shall provide a copy of the deceased licensee's death certificate, a copy of the certificate of administration, and a list of eligible immediate family members to the Division.
 - (C) The Administrator or Executor shall only transfer a license in the Administrator or Executor name on behalf of the estate to an eligible surviving family member. The surviving family member transferee shall only transfer the license to a third party purchaser of the deceased licensee's fishing vessel. Transfers shall be made according to the provisions of Subparagraphs (2) through (4) of this Paragraph.

History Note: Authority G.S. 113-134; 113-168.1; 113-168.2; 113-168.3; 113-168.6; 113-182; 143B-289.52; Eff. January 1, 1991; Amended Eff. March 1, 1994; Temporary Amendment Eff. August 1, 1999; July 1, 1999; Amended Eff. August 1, 2000; Readopted Eff. March 17, 2021.

SUBCHAPTER 03R – DESCRIPTIVE BOUNDARIES

SECTION .0100 – DESCRIPTIVE BOUNDARIES

15A NCAC 03R .0104 PERMANENT SECONDARY NURSERY AREAS

The permanent secondary nursery areas referenced in 15A NCAC 03N .0105(a) are delineated in the following coastal water areas:

- (1) Roanoke Sound:
Inner Shallowbag Bay - west of a line beginning on the northeast shore at a point 35° 54.6729' N – 75° 39.8099' W; running southerly to the southeast shore to a point 35° 54.1722' N – 75° 39.6806' W;
- (2) in the Pamlico Long Sound Area:
 - (a) Long Shoal River - north of a line beginning at the 5th Avenue Canal at a point 35° 35.2120' N – 75° 53.2232' W; running easterly to the east shore on Pains Point to a point 35° 35.0666' N – 75° 51.2000' W;
 - (b) Pains Bay - east of a line beginning on Pains Point at a point 35° 35.0666' N – 75° 51.2000' W; running southerly to Rawls Island to a point 35° 34.4666' N – 75° 50.9666' W; running easterly to the east shore to a point 35° 34.2309' N – 75° 50.2695' W;
 - (c) Wysocking Bay - northwest of a line beginning at Benson Point at a point 35° 22.9684' N – 76° 03.7129' W; running northeasterly to Long Point to a point 35° 24.6895' N – 76° 01.3155' W;
 - (d) Juniper Bay-Cunning Harbor - north of a line beginning on the west shore of Juniper Bay at a point 35° 20.6217' N – 76° 15.5447' W; running easterly to a point 35° 20.4372' N – 76° 13.2697' W; running easterly to the east shore of Cunning Harbor to a point 35° 20.3413' N – 76° 12.3378' W;
 - (e) Swanquarter Bay - north of a line beginning at The Narrows at a point 35° 20.9500' N – 76° 20.6409' W; running easterly to the east shore to a point 35° 21.5959' N – 76° 18.3580' W;
 - (f) Deep Cove - The Narrows - north and east of a line beginning on the west shore at a point 35° 20.9790' N – 76° 23.8577' W; running southeasterly to Swanquarter Island to a point 35° 20.5321' N – 76° 22.7869' W; and west of a line at The Narrows beginning on the north shore to a point 35° 20.9500' N – 76° 20.6409' W; running southerly to Swanquarter Island to a point 35° 20.7025' N – 76° 20.5620' W;
 - (g) Rose Bay - north of a line beginning on Long Point at a point 35° 23.3404' N – 76° 26.2491' W; running southeasterly to Drum Point to a point 35° 22.4891' N – 76° 25.2012' W;
 - (h) Spencer Bay - northwest of a line beginning on Roos Point at a point 35° 22.3866' N – 76° 27.9225' W; running northeasterly to Long Point to a point 35° 23.3404' N – 76° 26.2491' W;
 - (i) Abel Bay - northeast of a line beginning on the west shore at a point 35° 23.6463' N – 76° 31.0003' W; running southeasterly to the east shore to a point 35° 22.9353' N – 76° 29.7215' W;
 - (j) Mouse Harbor - west of a line beginning on Persimmon Tree Point at a point 35° 18.3915' N – 76° 29.0454' W; running southerly to Yaupon Hammock Point to a point 35° 17.1825' N – 76° 28.8713' W;
 - (k) Big Porpoise Bay - northwest of a line beginning on Big Porpoise Point at a point 35° 15.6993' N – 76° 28.2041' W; running southwesterly to Middle Bay Point to a point 35° 14.9276' N – 76° 28.8658' W;
 - (l) Middle Bay - west of a line beginning on Deep Point at a point 35° 14.8003' N – 76° 29.1923' W; running southerly to Little Fishing Point to a point 35° 13.5419' N – 76° 29.6123' W;
 - (m) Jones Bay - west of a line beginning on Mink Trap Point at a point 35° 13.4968' N – 76° 31.1040' W; running southerly to Boar Point to a point 35° 12.3253' N – 76° 31.2767' W; and
 - (n) in the Bay River Area:
 - (i) Bonner Bay - southeast of a line beginning on the west shore at a point 35° 09.6281' N – 76° 36.2185' W; running northeasterly to Davis Island Point to a point 35° 10.0888' N – 76° 35.2587' W; and
 - (ii) Gales Creek-Bear Creek - north and west of a line beginning on Sanders Point at a point 35° 11.2833' N – 76° 35.9000' W; running northeasterly to the east shore to a point 35° 11.9000' N – 76° 34.2833' W;
- (3) in the Pamlico and Pungo Rivers Area:
 - (a) Pungo River - north of a line beginning on the west shore at a point 35° 32.2000' N – 76° 29.2500' W; running east near Beacon "21" to the east shore to a point 35° 32.0833' N – 76° 28.1500' W;

- (b) Pungo Creek - west of a line beginning on Persimmon Tree Point at a point 35° 30.7633' N – 76° 38.2831' W; running southwesterly to Windmill Point to a point 35° 31.1546' N – 76° 37.7590' W;
 - (c) Scranton Creek - south and east of a line beginning on the west shore at a point 35° 30.6810' N – 76° 28.3435' W; running easterly to the east shore to a point 35° 30.7075' N – 76° 28.6766' W;
 - (d) Slade Creek - east of a line beginning on the west shore at a point 35° 27.8879' N – 76° 32.9906' W; running southeasterly to the east shore to a point 35° 27.6510' N – 76° 32.7361' W;
 - (e) Fortescue Creek - east of a line beginning on Pasture Point at a point 35° 25.9213' N – 76° 31.9135' W; running southerly to the Lupton Point shore to a point 35° 25.6012' N – 76° 31.9641' W;
 - (f) Pamlico River - west of a line beginning on Ragged Point at a point 35° 27.5768' N – 76° 54.3612' W; running southwesterly to Mauls Point to a point 35° 26.9176' N – 76° 55.5253' W;
 - (g) North Creek - north of a line beginning on the west shore at a point 35° 25.3988' N – 76° 40.0455' W; running southeasterly to the east shore to a point 35° 25.1384' N – 76° 39.6712' W;
 - (h) South Creek - west of a line beginning on Hickory Point at a point 35° 21.7385' N – 76° 41.5907' W; running southerly to Fork Point to a point 35° 20.7534' N – 76° 41.7870' W;
 - (i) Bond Creek/Muddy Creek - south of a line beginning on Fork Point at a point 35° 20.7534' N – 76° 41.7870' W; running southeasterly to Gum Point to a point 35° 20.5632' N – 76° 41.4645' W;
 - (j) in the Goose Creek Area, Campbell Creek - west of a line beginning on the north shore at a point 35° 17.3600' N – 76° 37.1096' W; running southerly to the south shore to a point 35° 16.9876' N – 76° 37.0965' W; and
 - (k) Oyster Creek-Middle Prong - southwest of a line beginning on Pine Hammock at a point 35° 19.5586' N – 76° 32.8830' W; running easterly to Cedar Island to a point 35° 19.5490' N – 76° 32.7365' W; and southwest of a line beginning on Cedar Island at a point 35° 19.4921' N – 76° 32.2590' W; running southeasterly to Beard Island Point to a point 35° 19.1265' N – 76° 31.7226' W;
- (4) in the Neuse River Area:
- (a) Lower Broad Creek - west of a line beginning on the north shore at a point 35° 05.8314' N – 76° 35.3845' W; running southwesterly to the south shore to a point 35° 05.5505' N – 76° 35.7249' W;
 - (b) Greens Creek - north of a line beginning on the west shore of Greens Creek at a point 35° 01.3476' N – 76° 42.1740' W; running northeasterly to the east shore to a point 35° 01.4899' N – 76° 41.9961' W;
 - (c) Dawson Creek - north of a line beginning on the west shore at a point 34° 59.5920' N – 76° 45.4620' W; running southeasterly to the east shore to a point 34° 59.5800' N – 76° 45.4140' W;
 - (d) Goose Creek - north and east of a line beginning at a point on the west shore at a point 35° 02.6642' N – 76° 56.4710' W; running southeasterly to a point on Cooper Point 35° 02.0908' N – 76° 56.0092' W;
 - (e) Upper Broad Creek - northeast of a line beginning at a point on Rowland Point on the north shore at a point 35° 02.6166' N – 76° 56.4500' W; running southeasterly to the south shore to a point 35° 02.8960' N – 76° 56.7865' W;
 - (f) Clubfoot Creek - south of a line beginning on the west shore at a point 34° 54.5424' N – 76° 45.7252' W; running easterly to the east shore to a point 34° 54.4853' N – 76° 45.4022' W; and
 - (g) in the Adams Creek Area, Cedar Creek - east of a line beginning on the north shore at a point 34° 56.1203' N – 76° 38.7988' W; running southerly to the south shore to a point 34° 55.8745' N – 76° 38.8153' W;
- (5) Newport River - west of a line beginning near Penn Point on the south shore at a point 34° 45.6960' N – 76° 43.5180' W; running northeasterly to the north shore to a point 34° 46.8490' N – 76° 43.3296' W;
 - (6) Virginia Creek - all waters of the natural channel northwest of the primary nursery area line;
 - (7) Old Topsail Creek - all waters of the dredged channel northwest of the primary nursery area line;
 - (8) Mill Creek - all waters west of a line beginning on the north shore at a point 34° 20.6420' N – 77° 42.1220' W; running southwesterly to the south shore to a point 34° 20.3360' N – 77° 42.2400' W;
 - (9) Pages Creek - all waters west of a line beginning on the north shore at a point 34° 16.1610' N – 77° 45.9930' W; running southwesterly to the south shore to a point 34° 15.9430' N – 77° 46.1670' W;
 - (10) Bradley Creek - all waters west of a line beginning on the north shore at a point 34° 12.7030' N – 77° 49.1230' W; running southerly near the dredged channel to a point 34° 12.4130' N – 77° 49.2110' W;
 - (11) Cape Fear River - all waters bounded by a line beginning on the south side of the Spoil Island at the intersection of the Intracoastal Waterway and the Cape Fear River ship channel at a point 34° 01.5780' N – 77° 56.0010' W; running easterly to the east shore of the Cape Fear River to a point 34° 01.7230' N – 77° 55.1010' W; running southerly and bounded by the shoreline to the Ferry Slip at Federal Point at a point 33° 57.8080' N – 77° 56.4120' W; running northerly to Bird Island to a point 33° 58.3870' N – 77° 56.5780' W; running northerly along the west shoreline of Bird Island and the Cape Fear River spoil islands back to the point of origin;

- (12) Lockwood Folly River - all waters north of a line beginning on Howells Point at a point 33° 55.3680' N – 78° 12.7930' W and running in a westerly direction along the Intracoastal Waterway near Intracoastal Waterway Marker "46" to a point 33° 55.3650' N – 78° 13.8500' W;
- (13) Saucepan Creek - all waters north of a line beginning on the west shore at a point 33° 54.6290' N – 78° 22.9170' W; running northeasterly to the east shore to a point 33° 54.6550' N – 78° 22.8670' W; and
- (14) Davis Creek - all waters east of a line beginning on Horse Island at a point 33° 55.0160' N – 78° 12.7380' W; running southerly to Oak Island to a point 33° 54.9190' N – 78° 12.7170' W; continuing upstream to the primary nursery line and Davis Canal, all waters southeast of a line beginning on Pinner Point at a point 33° 55.2930' N – 78° 11.6390' W; running southwesterly across the mouth of Davis Canal to the spoil island at the southwest intersection of the Intracoastal Waterway and Davis Canal to a point 33° 55.2690' N – 78° 11.6550' W.

History Note: Authority G.S. 113-134; 113-182; 143B-289.52; Eff. January 1, 1991; Amended Eff. March 1, 1996; March 1, 1994; Recodified from 15A NCAC 3R .0004 Eff. December 17, 1996; Amended Eff. April 1, 2011; August 1, 2004; May 1, 1997; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. January 9, 2018; Amended Eff. May 1, 2021.

15A NCAC 03R .0105 SPECIAL SECONDARY NURSERY AREAS

The special secondary nursery areas referenced in 15A NCAC 03N .0105(b) are designated in the following coastal water areas:

- (1) Roanoke Sound:
 - (a) Outer Shallowbag Bay - west of a line beginning on Baum Point at a point 35° 55.1461' N – 75° 39.5618' W; running southeasterly to Ballast Point to a point 35° 54.6250' N – 75° 38.8656' W; including the canal on the southeast shore of Shallowbag Bay; and
 - (b) Kitty Hawk Bay/Buzzard Bay - within the area designated by a line beginning at a point on the east shore of Colington Creek at a point 36° 02.4360' N – 75° 42.3189' W; running westerly to a point 36° 02.6630' N – 75° 41.4102' W; running along the shoreline to a point 36° 02.3264' N – 75° 42.3889' W; running southwesterly to a point 36° 02.1483' N – 75° 42.4329' W; running along the shoreline to a point 36° 01.6736' N – 75° 42.5313' W; running southwesterly to a point 36° 01.5704' N – 75° 42.5899' W; running along the shoreline to a point 36° 00.9162' N – 75° 42.2035' W; running southeasterly to a point 36° 00.8253' N – 75° 42.0886' W; running along the shoreline to a point 35° 59.9886' N – 75° 41.7284' W; running southwesterly to a point 35° 59.9597' N – 75° 41.7682' W; running along the shoreline to the mouth of Buzzard Bay to a point 35° 59.6480' N – 75° 32.9906' W; running easterly to Mann Point to a point 35° 59.4171' N – 75° 32.7361' W; running northerly along the shoreline to the point of beginning;
- (2) in the West Bay Area:
 - (a) West Thorofare Bay - south of a line beginning on the west shore at a point 34° 57.2199' N – 76° 24.0947' W; running easterly to the east shore to a point 34° 57.4871' N – 76° 23.0737' W;
 - (b) Long Bay-Ditch Bay - west of a line beginning on the north shore of Ditch Bay at a point 34° 57.9388' N – 76° 27.0781' W; running southwesterly to the south shore of Ditch Bay to a point 34° 57.2120' N – 76° 27.2185' W; then south of a line running southeasterly to the east shore of Long Bay to a point 34° 56.7633' N – 76° 26.3927' W; and
 - (c) Turnagain Bay - south of a line beginning on the west shore at a point 34° 59.4065' N – 76° 30.1906' W; running easterly to the east shore to a point 34° 59.5668' N – 76° 29.3557' W;
- (3) in the Core Sound Area:
 - (a) Cedar Island Bay - northwest of a line beginning near the gun club dock at a point 34° 58.7203' N – 76° 15.9645' W; running northeasterly to the south shore to a point 34° 57.7690' N – 76° 16.8781' W;
 - (b) Thorofare Bay-Barry Bay - northwest of a line beginning on Rumley Hammock at a point 34° 55.4853' N – 76° 18.2487' W; running northeasterly to Hall Point to a point 34° 54.4227' N – 76° 19.1908' W;
 - (c) Nelson Bay - northwest of a line beginning on the west shore of Nelson Bay at a point 34° 51.1353' N – 76° 24.5866' W; running northeasterly to Drum Point to a point 34° 51.6417' N – 76° 23.7620' W;
 - (d) Brett Bay - north of a line beginning on the west shore at a point 34° 49.4019' N – 76° 26.0227' W; running easterly to Piney Point to a point 34° 49.5799' N – 76° 25.0534' W; and
 - (e) Jarrett Bay - north of a line beginning on the west shore near Old Chimney at a point 34° 45.5743' N – 76° 30.0076' W; running easterly to a point east of Davis Island 34° 45.8325' N – 76° 28.7955' W;

- (4) in the North River Area:
 - (a) North River - north of a line beginning on the west shore at a point 34° 46.0383' N – 76° 37.0633' W; running easterly to a point on the east shore 34° 46.2667' N – 76° 35.4933' W; and
 - (b) Ward Creek - east of a line beginning on the north shore at a point 34° 46.2667' N – 76° 35.4933' W; running southerly to the south shore to a point 34° 45.4517' N – 76° 35.1767' W;
- (5) New River - all waters upstream of a line beginning on the north side of the N.C. Highway 172 Bridge at a point 34° 34.7680' N – 77° 23.9940' W; running southerly to the south side of the bridge at a point 34° 34.6000' N – 77° 23.9710' W;
- (6) Chadwick Bay - all waters west of a line beginning on the northeast side of Chadwick Bay at a point 34° 32.5630' N – 77° 21.6280' W; running southeasterly to a point near Marker "6" at 34° 32.4180' N – 77° 21.6080' W; running westerly to Roses Point at a point 34° 32.2240' N – 77° 22.2880' W; following the shoreline in Fullard Creek to a point 34° 32.0340' N – 77° 22.7160' W; running northwesterly to a point 34° 32.2210' N – 77° 22.8080' W; following the shoreline to the west point of Bump's Creek at a point 34° 32.3430' N – 77° 22.4570' W; running northeasterly to the east shore to a point 34° 32.4400' N – 77° 22.3830' W; following the shoreline of Chadwick Bay back to the point of origin; and
- (7) Intracoastal Waterway - all waters in the Intracoastal Waterway maintained channel from a point near Marker "17" north of Alligator Bay 34° 30.7930' N – 77° 23.1290' W; to a point near Marker "49" at Morris Landing at a point 34° 28.0820' N – 77° 30.4710' W; and all waters in the Intracoastal Waterway maintained channel and 100 feet on either side from Marker "49" to the N.C. Highway 50-210 Bridge at Surf City.

History Note: Authority G.S. 113-134; 113-182; 143B-289.52; Eff. January 1, 1991; Amended Eff. March 1, 1996; March 1, 1994; Recodified from 15A NCAC 3R .0005 Eff. December 17, 1996; Amended Eff. April 1, 2011; August 1, 2004; May 1, 1997; Readopted Eff. May 1, 2021.

15A NCAC 03R .0117 OYSTER SANCTUARIES

The Oyster Sanctuaries referenced in 15A NCAC 03K .0209 are delineated in the following coastal water areas:

- (1) Pamlico Sound area:
 - (a) Croatan Sound: within the area described by a line beginning at a point 35° 48.2842' N - 75° 38.3360' W; running southerly to a point 35° 48.1918' N - 75° 38.3360' W; running westerly to a point 35° 48.1918' N - 75° 38.4575' W; running northerly to a point 35° 48.2842' N - 75° 38.4575' W; running easterly to the point of beginning.
 - (b) Crab Hole: within the area described by a line beginning at a point 35° 43.6833' N - 75° 40.5083' W; running southerly to a point 35° 43.5000' N - 75° 40.5083' W; running westerly to a point 35° 43.5000' N - 75° 40.7500' W; running northerly to a point 35° 43.6833' N - 75° 40.7500' W; running easterly to the point of beginning.
 - (c) Pea Island: within the area described by a line beginning at a point 35° 05.4760' N - 76° 23.5370' W; running southerly to a point 35° 05.4760' N - 76° 23.4040' W; running westerly to a point 35° 05.3680' N - 76° 23.4040' W; running northerly to a point 35° 05.3680' N - 76° 23.5370' W; running easterly to the point of beginning.
 - (d) Long Shoal: within the area described by a line beginning at a point 35° 33.8600' N - 75° 49.9000' W; running southerly to a point 35° 33.8600' N - 75° 49.7670' W; running westerly to a point 35° 33.7510' N - 75° 49.7670' W; running northerly to a point 35° 33.7510' N - 75° 49.9000' W; running easterly to the point of beginning.
 - (e) Gibbs Shoal: within the area described by a line beginning at a point 35° 27.3550' N - 75° 55.9190' W; running southerly to a point 35° 27.1010' N - 75° 55.9190' W; running westerly to a point 35° 27.1010' N - 75° 56.2300' W; running northerly to a point 35° 27.3550' N - 75° 56.2300' W; running easterly to the point of beginning.
 - (f) Deep Bay: within the area described by a line beginning at a point 35° 22.9126' N - 76° 22.1612' W; running southerly to a point 35° 22.7717' N - 76° 22.1612' W; running westerly to a point 35° 22.7717' N - 76° 22.3377' W; running northerly to a point 35° 22.9126' N - 76° 22.3377' W; running easterly to the point of beginning.

- (g) West Bluff: within the area described by a line beginning at a point 35° 18.3160' N - 76° 10.2960' W; running southerly to a point 35° 18.3160' N - 76° 10.0690' W; running westerly to a point 35° 18.1290' N - 76° 10.0690' W; running northerly to a point 35° 18.1290' N - 76° 10.2960' W; running easterly to the point of beginning.
 - (h) Middle Bay: within the area described by a line beginning at a point 35° 14.1580' N - 76° 30.1780' W; running southerly to a point 35° 14.1150' N - 76° 30.1780' W; running westerly to a point 35° 14.1150' N - 76° 30.3320' W; running northerly to a point 35° 14.1580' N - 76° 30.3320' W; running easterly to the point of beginning.
 - (i) Swan Island: within the area described by a line beginning at a point 35° 05.6170' N - 76° 27.5040' W; running southerly to a point 35° 05.6020' N - 76° 26.7650' W; running westerly to a point 35° 05.4850' N - 76° 26.7640' W; running northerly to a point 35° 05.4990' N - 76° 27.5030' W; running easterly to the point of beginning.
 - (j) Raccoon Island: within the area described by a line beginning at a point 35° 05.4760' N - 76° 23.5370' W; running southerly to a point 35° 05.4760' N - 76° 23.4040' W; running westerly to a point 35° 05.3860' N - 76° 23.4040' W; running northerly to a point 35° 05.3680' N - 76° 23.5370' W; running easterly to the point of beginning.
 - (k) West Bay: within the area described by a line beginning at a point 34° 58.8517' N - 76° 21.3632' W; running southerly to a point 34° 58.7661' N - 76° 21.3632' W; running westerly to a point 34° 58.7661' N - 76° 21.4735' W; running northerly to a point 34° 58.8517' N - 76° 21.4735' W; running easterly to the point of beginning.
- (2) Neuse River area:
- (a) Little Creek: within the area described by a line beginning at a point 35° 02.6940' N - 76° 30.9840' W; running southerly to a point 35° 02.6940' N - 76° 30.7940' W; running westerly to a point 35° 02.5380' N - 76° 30.7940' W; running northerly to a point 35° 02.5380' N - 76° 30.9840' W; running easterly to the point of beginning.
 - (b) Neuse River: within the area described by a line beginning at a point 35° 00.4910' N - 76° 31.9350' W; running southerly to a point 35° 00.3750' N - 76° 31.9350' W; running westerly to a point 35° 00.3750' N - 76° 32.0750' W; running northerly to a point 35° 00.4910' N - 76° 32.0750' W; running easterly to the point of beginning.

History Note: Authority G.S. 113-134; 113-182; 113-201; 113-204; 143B-289.52; Eff. October 1, 2008; Amended Eff. April 1, 2011; Pursuant to G.S. 150B-21.3A, rule is necessary without substantive public interest Eff. January 9, 2018; Amended Eff. May 1, 2021.

**NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALITY
CHAPTER 18 – ENVIRONMENTAL HEALTH**

SUBCHAPTER 18A – SANITATION

SECTION .0100 – HANDLING: PACKING: AND SHIPPING OF CRUSTACEA MEAT

15A NCAC 18A .0140 FLOORS

Floors shall be of concrete or other impervious material, constructed so that they are easily cleanable and shall be sloped so that water drains.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0141 WALLS AND CEILINGS

- (a) Walls and ceilings shall be constructed of smooth, easily cleanable, non-corrosive, impervious material.
- (b) Insulation on cooked crustacea cooler walls shall be covered to the ceiling with a smooth, easily cleanable, non-corrosive, impervious material.
- (c) Doors and windows shall be tightly fitted and maintained in good repair so as to keep insects and weather out of the facility.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0142 LIGHTING

- (a) Natural or artificial lighting shall be provided in all parts of the facility. Minimum lighting intensities shall be as follows:
 - (1) 50 foot-candles on working surfaces in the picking and packing rooms and areas.
 - (2) 10 foot-candles measured at a height of 30 inches above the floor throughout the rest of the processing portion of the facility.
- (b) Light bulbs within the processing portion of the facility shall be shatterproof or shielded to prevent product contamination in case of breakage.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0143 VENTILATION

All rooms and areas shall be ventilated.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0146 PREMISES

- (a) Premises under the control of the owner shall be kept clean at all times. Waste materials, rubbish, other articles, or litter shall not be permitted to accumulate on the premises.
- (b) Measures shall be taken to prevent the harborage and breeding of insects, rodents, and other vermin on premises.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0150 SEWAGE DISPOSAL

All sewage and other liquid wastes shall be disposed of in a public sewer system or in the absence of a public sewer system, by an on-site method approved by the Division of Marine Fisheries.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0154 EMPLOYEES' PERSONAL ARTICLES

Employees' street clothing, aprons, gloves, and personal articles shall not be stored in rooms or areas described in Rule .0159(b) of this Section.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0155 SUPPLY STORAGE

Shipping containers, boxes, and other supplies shall be stored in a storage room or area. The storage room or area shall be kept clean.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0159 SEPARATION OF OPERATIONS

(a) Facility design shall provide for continuous flow of raw materials and product to prevent contamination by exposure to areas involved in earlier processing steps, refuse, or other areas subject to contamination.

(b) The following processes shall be carried out in separate rooms or areas:

- (1) raw crustacea receiving or refrigeration;
- (2) crustacea cooking;
- (3) cooked crustacea air-cool;
- (4) cooked crustacea refrigeration;
- (5) picking;
- (6) packing;
- (7) picked crustacea meat refrigeration;
- (8) pasteurizing or thermal processing;
- (9) machine picking;
- (10) repacking; and
- (11) other processes when carried out in conjunction with the cooking of crustacea or crustacea meat.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Amended Eff. April 1, 1997;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0160 RAW CRUSTACEA RECEIVING AND REFRIGERATION

(a) Only fresh crustacea shall be accepted for processing.

(b) Within two hours of receipt at the facility, crustacea shall be cooked or placed in a refrigerated area maintaining a temperature of 50° F (10° C) or below.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0163 COOKED CRUSTACEA REFRIGERATION

(a) The cooked crustacea cooler shall be large enough to store all cooked crustacea and maintain a minimum temperature of 40° F (4.4° C). The cooler shall open directly into the picking room or into a clean, enclosed area leading into the picking room.

(b) Cooked crustacea shall be stored at a temperature between 33° F (0.5° C) and 40° F (4.4° C) ambient air temperature if not immediately processed. The cooler shall be equipped with an accurate, operating thermometer.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0167 DELIVERY WINDOW OR SHELF

A delivery window or a non-corrosive shelf shall be provided between the picking room and packing room or area. The delivery window shall be equipped with a shelf completely covered with smooth, non-corrosive metal or other material approved by the Division of Marine Fisheries and sloped to drain towards the picking room.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0169 FREEZING

- (a) If crustacea or crustacea meat is to be frozen, the code date shall be followed by the letter "F."
- (b) Frozen crustacea or crustacea meat shall be stored at a temperature of 0° F (-18° C) or less.
- (c) The frozen storage rooms shall be equipped with an accurate, operating thermometer.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Amended Eff. August 1, 2002; April 1, 1997;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0170 SHIPPING

Cooked crustacea and crustacea meat shall be shipped between 33° F (0.5° C) and 40° F (4.4° C). Frozen crustacea products shall be shipped at 0° F (-18° C) or below.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0171 WHOLE CRUSTACEA OR CRUSTACEA PRODUCTS

Whole crustacea, claws, or any other crustacea products shall be prepared, packaged, and labeled in accordance with the rules of this Section.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0172 COOKED CLAW SHIPPING CONDITIONS

- (a) Vehicles used to transport cooked claws shall be mechanically refrigerated, enclosed, tightly constructed, kept clean, and equipped with an operating thermometer.
- (b) Cooked crab claws shall be stored and transported between 33° F (0.5° C) and 40° F (4.4° C) ambient air temperature.
- (c) All vehicles shall be approved by the Division of Marine Fisheries prior to use.
- (d) Cooked claw shipping containers shall be marked for intended use, cleaned, and sanitized prior to use and shall meet the requirements in Rule .0156 of this Section.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0179 RECALL PROCEDURE

Each owner of a cooked crustacea or crustacea meat facility or repacker facility shall keep on file a written product recall procedure. A copy of this recall procedure shall be provided to the Division of Marine Fisheries.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0180 SAMPLING AND TESTING

Samples of cooked crustacea or crustacea meat may be taken and examined by the Division of Marine Fisheries at any time or place. Samples of cooked crustacea or crustacea meat shall be furnished by the owner or operator of facilities, trucks, carriers, stores, restaurants, and other places where cooked crustacea or crustacea meat are sold.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0188 HAZARD ANALYSIS

Each dealer shall conduct a hazard analysis to determine the food safety hazards that are reasonably likely to occur for each kind of crustacea or crustacea meat product processed by that dealer and to identify the preventative measures that the dealer can apply to control those hazards.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. August 1, 2000;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0189 HACCP PLAN

Each dealer shall have and implement a written HACCP plan. The owner or authorized designee shall sign the plan when implemented and after any modification. The plan shall be reviewed at least annually and updated if necessary. The plan shall, at a minimum:

- (1) list the food safety hazards that are reasonably likely to occur;
- (2) list the critical control points for each of the food safety hazards;
- (3) list the critical limits that must be met for each of the critical control points;
- (4) list the procedures, and frequency thereof, that will be used to monitor each of the critical control points to ensure compliance with the critical limits;
- (5) list any corrective action plans to be followed in response to deviations from critical limits at critical control points;
- (6) provide a record keeping system that documents critical control point monitoring; and
- (7) list the verification procedures, and frequency thereof, that the dealer will use.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. August 1, 2000;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0190 SANITATION MONITORING REQUIREMENTS

Each dealer shall monitor, at a minimum, the following sanitation items:

- (1) safety of water;
- (2) condition and cleanliness of food contact surfaces;
- (3) prevention of cross contamination;
- (4) maintenance of hand washing, hand sanitizing, and toilet facilities;
- (5) protection of crustacea or crustacea meat, crustacea or crustacea meat packaging materials, and food contact surfaces from adulteration;
- (6) proper labeling, storage, and use of toxic compounds;
- (7) control of employees with adverse health conditions; and
- (8) exclusion of pests from the facility.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. August 1, 2000;*

Readopted Eff. May 1, 2021.

SECTION .0400 – SANITATION OF SHELLFISH - GENERAL OPERATION STANDARDS

15A NCAC 18A .0431 STANDARDS FOR AN APPROVED SHELLFISH GROWING AREA

*History Note: Authority G.S. 130A-230;
Eff. February 1, 1987;
Repealed Eff. May 1, 2021.*

SECTION .0700 – OPERATION OF DEPURATION (MECHANICAL PURIFICATION) FACILITIES

15A NCAC 18A .0704 LABORATORY PROCEDURES

(a) All laboratory analyses used to evaluate the effectiveness of the depuration process shall be performed by a laboratory found by a Food and Drug Administration (FDA) Shellfish Laboratory Evaluation Officer or by an FDA-certified State Shellfish Laboratory Evaluation Officer to conform or provisionally conform to the requirements established under the National Shellfish Sanitation Program (NSSP).

(b) All methods for the analysis of depuration process water and shellfish that are used to evaluate the effectiveness of the depuration process shall be cited in the latest edition of the NSSP Guide for the Control of Molluscan Shellfish, Section IV: Guidance Documents, subsection Approved NSSP Laboratory Tests, which is incorporated by reference, including subsequent amendments and editions, and available at <https://www.fda.gov/food/federalstate-food-programs/national-shellfish-sanitation-program-nssp> at no cost, or validated for use by the NSSP under the Constitution, Bylaws and Procedures of the Interstate Shellfish Sanitation Conference, which is incorporated by reference, including subsequent amendments and editions, and available at <https://www.issc.org/constitution-bylaws-procedures>, at no cost. If there is an immediate or ongoing critical need for a method and no method approved for use within the NSSP exists, the following may be used:

- (1) a validated Association of Analytical Communities, Bacteriological Analysis Manual, or Environmental Protection Agency method; or
- (2) an Emergency Use Method as set forth in the latest approved edition of the NSSP Guide for the Control of Molluscan Shellfish.

(c) The laboratory shall conduct examinations of depuration process water and shellfish and conduct special examinations if necessary or required, in accordance with Rules .0706 through .0709 of this Section.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. February 1, 1987;
Amended Eff. September 1, 1991; September 1, 1990;
Readopted Eff. May 1, 2021.*

SECTION .0900 - CLASSIFICATION OF SHELLFISH GROWING WATERS

15A NCAC 18A .0901 DEFINITIONS

The following definitions shall apply to this Section.

- (1) "Approved" means shellfish growing waters determined suitable by the Division for the harvesting of shellfish for direct market purposes.
- (2) "Closed-system marina" means a marina constructed in canals, basins, tributaries, or any other area with restricted tidal flow.
- (3) "Colony forming unit" means an estimate of the number of viable bacteria cells in a sample as determined by a plate count.
- (4) "Commercial marina" means a marina that offers one or more of the following services: fuel, transient dockage, haul-out facilities, or repair services.
- (5) "Conditionally approved" means shellfish growing waters that are subject to predictable intermittent pollution but that may be used for harvesting shellfish for direct market purposes when management plan criteria are met.
- (6) "Division" means the Division of Marine Fisheries or its authorized agent.
- (7) "Estimated 90th percentile" means a statistic that measures the variability in a sample set that shall be calculated by:
 - (a) calculating the arithmetic mean and standard deviation of the sample result logarithms (base 10);
 - (b) multiplying the standard deviation in Sub-Item (a) of this Item by 1.28;
 - (c) adding the product from Sub-Item (b) of this Item to the arithmetic mean; and

- (d) taking the antilog (base 10) of the results from Sub-Item (c) of this Item to determine the estimated 90th percentile.
- (8) "Fecal coliform" means bacteria of the coliform group that will produce gas from lactose in a multiple tube procedure liquid medium (EC or A-1) within 24 plus or minus two hours at 44.5° C plus or minus 0.2° C in a water bath.
- (9) "Geometric mean" means the antilog (base 10) of the arithmetic mean of the sample result logarithm.
- (10) "Marina" means any water area with a structure (such as a dock, basin, floating dock) that is utilized for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than 10 boats.
- (11) "Marine biotoxins" means any poisonous compound produced by marine microorganisms and accumulated by shellstock.
- (12) "Median" means the middle number in a given sequence of numbers, taken as the average of the two middle numbers when the sequence has an even number of numbers.
- (13) "Most probable number (MPN)" means a statistical estimate of the number of bacteria per unit volume and is determined from the number of positive results in a series of fermentation tubes.
- (14) "National Shellfish Sanitation Program (NSSP)" means the cooperative federal-state-industry program for the sanitary control of shellfish that is adequate to ensure that the shellfish produced in accordance with the NSSP Guide For The Control Of Molluscan Shellfish will be safe and sanitary.
- (15) "Open-system marina" means a marina constructed in an area where tidal currents have not been impeded by natural or man-made barriers.
- (16) "Private marina" means any marina that is not a commercial marina as defined in this Rule.
- (17) "Prohibited" means shellfish growing waters unsuitable for the harvesting of shellfish for direct market purposes.
- (18) "Public health emergency" means any condition that may immediately cause shellfish waters to be unsafe for the harvest of shellfish for human consumption.
- (19) "Restricted" means shellfish growing waters from which shellfish may be harvested only by permit and are subjected to a treatment process through relaying or depuration that renders the shellfish safe for human consumption.
- (20) "Sanitary survey" means the written evaluation of factors that affect the sanitary quality of a shellfish growing area including sources of pollution, the effects of wind, tides, and currents in the distribution and dilution of polluting materials, and the bacteriological quality of water.
- (21) "Shellfish" means the term as defined in G.S. 113-129, except the term shall not include scallops when the final product is the shucked adductor muscle only.
- (22) "Shellfish growing area" means a management unit that defines the boundaries of a sanitary survey and that is used to track the location where shellfish are harvested.
- (23) "Shellfish growing waters" means marine or estuarine waters that support or could support shellfish life.
- (24) "Shellstock" means live molluscan shellfish in the shell.
- (25) "Shoreline survey" means an in-field inspection by the Division to identify and evaluate any potential or actual pollution sources or other environmental factors that may impact the sanitary quality of a shellfish growing area.
- (26) "Systematic random sampling strategy" means a sampling strategy designed to assess the bacteriological water quality of shellfish growing waters impacted by non-point sources of pollution and scheduled sufficiently far in advance to support random collection with respect to environmental conditions.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Amended Eff. August 1, 1998; February 1, 1997; September 1, 1990;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0902 CLASSIFICATION OF SHELLFISH GROWING WATERS

- (a) All shellfish growing waters shall be classified by the Division of Marine Fisheries as to their suitability for shellfish harvesting. Shellfish growing waters shall be designated with one of the following classifications:
 - (1) approved;
 - (2) conditionally approved;
 - (3) restricted; or
 - (4) prohibited.
- (b) Maps showing the classification of shellfish growing waters shall be maintained by the Division.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0903 SANITARY SURVEY

(a) Shellfish growing waters shall be divided into shellfish growing areas by the Division of Marine Fisheries. Maps showing the boundaries of these shellfish growing areas shall be maintained by the Division and can be found at: <https://deq.nc.gov/polluted-area-proclamations>.

(b) Except in shellfish growing areas where all shellfish growing waters are classified as prohibited, the Division shall complete a sanitary survey report for each shellfish growing area at least once every three years.

(c) A sanitary survey report shall include the following:

- (1) a shoreline survey.
- (2) an evaluation of meteorological, hydrodynamic, and geographic factors that may affect distribution of pollutants.
- (3) a microbiological survey to assess water quality. A microbiological survey shall include the collection of water samples and their analysis for fecal coliforms. The number and location of sampling stations shall be selected to produce the data necessary to effectively evaluate all point and non-point pollution sources identified during the shoreline survey. A minimum of six samples shall be collected annually from each designated sampling station.
- (4) a determination of the appropriate classification for all shellfish growing waters within the shellfish growing area in accordance with Rule .0902 of this Section.

(d) A sanitary survey report shall be required to designate any portion of a shellfish growing area with a classification other than prohibited, or for a reclassification from:

- (1) prohibited to any other classification;
- (2) restricted to conditionally approved or approved; or
- (3) conditionally approved to approved.

All other reclassifications may be made without a sanitary survey.

(e) In each calendar year that a shellfish growing area is not evaluated with a sanitary survey, a written annual evaluation report shall be completed by the Division and shall include the following:

- (1) a microbiological survey to assess water quality as set forth in Subparagraph (c)(3) of this Rule.
- (2) an evaluation of changes in pollution source impacts that may affect the classifications of the shellfish growing area.

If the annual evaluation determines conditions have changed and a classification for shellfish growing waters is incorrect, the Division shall initiate action to reclassify the shellfish growing waters in accordance with Rule .0902 of this Section.

(f) Sanitary survey reports and annual evaluation reports shall be maintained by the Division.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0904 APPROVED WATERS

Shellfish growing waters classified as approved for shellfish harvesting shall meet the following criteria as indicated by a sanitary survey, as set forth in Rule .0903 of this Section:

- (1) the shoreline survey indicates there are no significant point sources of pollution;
- (2) the area is not contaminated with fecal material, pathogenic microorganisms, poisonous or deleterious substances, or marine biotoxins that may render consumption of the shellfish hazardous; and
- (3) the microbiological survey, as set forth in Rule .0903(c)(3) of this Section, indicates the bacteriological water quality does not exceed the following standards based on results generated using the systematic random sampling strategy:
 - (a) a median fecal coliform most probable number (MPN) or geometric mean MPN of 14 per 100 milliliters;
 - (b) a median fecal coliform colony-forming units (CFU) or geometric mean CFU of 14 per 100 milliliters;
 - (c) an estimated 90th percentile of 43 MPN per 100 milliliters for a five-tube decimal dilution test; or
 - (d) an estimated 90th percentile of 31 CFU per 100 milliliters for a membrane filter membrane-Thermotolerant *Escherichia coli* (mTEC) test.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0905 CONDITIONALLY APPROVED WATERS

(a) Shellfish growing waters may be classified as conditionally approved if the Division of Marine Fisheries determines the following:

- (1) the sanitary survey indicates the shellfish growing waters will not meet the approved waters classification criteria as set forth in Rule .0904 of this Section under all conditions, but will meet those criteria under certain conditions;

- (2) the conditions when the shellfish growing waters will meet the approved waters classification criteria are known and predictable;
- (3) the public bottom within those shellfish growing waters support a population of harvestable shellfish; and
- (4) staff are available to carry out the requirements defined in the management plan, as set forth in Paragraph (b) of this Rule.

(b) A written management plan shall be developed by the Division for conditionally approved areas. This plan shall define the conditions under which the shellfish growing waters may be open to the harvest of shellfish. If the conditions defined in the management plan are not met, the Division shall immediately close the shellfish growing waters to shellfish harvesting.

(c) All conditionally approved growing waters shall be re-evaluated on an annual basis. A written report summarizing this re-evaluation shall be produced and shall include the following:

- (1) an evaluation of compliance with management plan criteria;
- (2) a review of the cooperation of all persons involved;
- (3) an evaluation of bacteriological water quality in the growing waters with respect to the standards for the classification; and
- (4) an evaluation of critical pollution sources.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0906 RESTRICTED AREAS

(a) Shellfish growing waters may be classified as restricted if:

- (1) a sanitary survey indicates there are no significant point sources of pollution; and
- (2) levels of fecal pollution, human pathogens, or poisonous or deleterious substances are at such levels that shellstock can be made safe for human consumption by either relaying or depuration.

(b) Relaying of shellfish shall be conducted in accordance with all applicable rules, including 15A NCAC 03K and 15A NCAC 18A .0300.

(c) Depuration of shellfish shall be conducted in accordance with all applicable rules, including 15A NCAC 03K and 15A NCAC 18A .0300 and .0700.

(d) For shellfish growing waters classified as restricted and used as a source of shellstock for depuration, the microbiological survey, as set forth in Rule .0903(c)(3) of this Section, shall indicate the bacteriological water quality does not exceed the following standards based on results generated using the systematic random sampling strategy:

- (1) a median fecal coliform most probable number (MPN) or geometric mean MPN of 88 per 100 milliliters;
- (2) a median fecal coliform colony-forming units (CFU) or geometric mean CFU of 88 per 100 milliliters;
- (3) an estimated 90th percentile of 260 MPN per 100 milliliters for a five-tube decimal dilution test; or
- (4) an estimated 90th percentile of 163 CFU per 100 milliliters for a membrane filter membrane-Thermotolerant Escherichia coli (mTEC) test.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0907 PROHIBITED WATERS

Shellfish growing waters shall be classified as prohibited if:

- (1) no current sanitary survey, as set forth in Rule .0903 of this Section, exists for the growing area; or
- (2) the sanitary survey determines:
 - (a) the shellfish growing waters are adjacent to a sewage treatment plant outfall or other point source outfall with public health significance; or
 - (b) the shellfish growing waters are contaminated with fecal material, pathogenic microorganisms, poisonous or deleterious substances, or marine biotoxins that render consumption of shellfish from those growing waters hazardous.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0908 UNSURVEYED AREAS

*History Note: Authority G.S. 130A-230;
Eff. June 1, 1989;
Repealed Eff. May 1, 2021.*

15A NCAC 18A .0909 BUFFER ZONES

(a) The Division of Marine Fisheries shall establish a buffer zone around the following:

- (1) marinas, in accordance with Rule .0911 of this Section; and
- (2) wastewater treatment plant outfalls or other point source outfalls determined to be of public health significance, in accordance with the latest approved edition of the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, Section II: Model Ordinance, Chapter IV: Shellstock Growing Areas, which is incorporated by reference, including subsequent amendments and editions, and available at <https://www.fda.gov/food/federalstate-food-programs/national-shellfish-sanitation-program-nssp> at no cost.

(b) Buffer zones shall be classified as prohibited.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0910 RECLASSIFICATION

*History Note: Authority G.S. 130A-230;
Eff. June 1, 1989;
Repealed Eff. May 1, 2021.*

15A NCAC 18A .0913 PUBLIC HEALTH EMERGENCY

(a) The Division of Marine Fisheries shall immediately close any potentially impacted shellfish growing waters to the harvesting of shellfish in the event of a public health emergency.

(b) The Division may re-open shellfish growing waters if the condition causing the public health emergency no longer exists and shellfish have had time to purify naturally from possible contamination.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;
Readopted Eff. May 1, 2021.*

15A NCAC 18A .0914 LABORATORY PROCEDURES

(a) All laboratory analyses used for the evaluation of shellfish growing areas shall be performed by a laboratory found by a Food and Drug Administration (FDA) Shellfish Laboratory Evaluation Officer or by an FDA-certified State Shellfish Laboratory Evaluation Officer to conform or provisionally conform to the requirements established under the National Shellfish Sanitation Program (NSSP).

(b) All methods for the analysis of shellfish and shellfish growing waters that are used for the evaluation of shellfish growing areas shall be cited in the latest edition of the NSSP Guide for the Control of Molluscan Shellfish, Section IV: Guidance Documents, subsection Approved NSSP Laboratory Tests, which is incorporated by reference, including subsequent amendments and editions, and available at <https://www.fda.gov/food/federalstate-food-programs/national-shellfish-sanitation-program-nssp> at no cost, or validated for use by the NSSP under the Constitution, Bylaws and Procedures of the Interstate Shellfish Sanitation Conference, which is incorporated by reference, including subsequent amendments and editions, and available at <https://www.issc.org/constitution-bylaws-procedures>, at no cost. If there is an immediate or ongoing critical need for a method and no method approved for use within the NSSP exists, the following may be used:

- (1) a validated Association of Analytical Communities, Bacteriological Analysis Manual, or Environmental Protection Agency method; or
- (2) an Emergency Use Method as set forth in the latest approved edition of the NSSP Guide for the Control of Molluscan Shellfish.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. June 1, 1989;*

*Amended Eff. September 1, 1991; September 1, 1990;
Readopted Eff. May 1, 2021.*

SECTION .3400 – COASTAL RECREATIONAL WATERS MONITORING, EVALUATION, AND NOTIFICATION

15A NCAC 18A .3401 DEFINITIONS

The following definitions shall apply to this Section:

- (1) "Division" means the Division of Marine Fisheries or its authorized agent.
- (2) "Enterococcus" means a gram positive coccoid-shaped bacteria that is found in the intestinal tracts of warm-blooded animals that include *Enterococcus faecalis*, *Enterococcus faecium*, *Enterococcus avium*, and *Enterococcus gallinarum*.
- (3) "Geometric mean" means the mean of "n" positive numbers obtained by taking the "nth" root of the product of the numbers with at least five samples collected within a 30-day period.
- (4) "Pending swimming advisory" means a notification to the public that recommends no primary contact with the water in a designated swimming area when bacteriological limits are exceeded, but does not close a swimming area to the public. A pending swimming advisory shall include a public notification via social media release to notify the public of the risks of swimming in the area. A pending swimming advisory shall be followed by a resample that will determine if a swimming advisory will be issued.
- (5) "Point source discharge" means the discharge of liquids through a pipe, drain, ditch, or other conveyance into a swimming area.
- (6) "Primary contact" means an activity in water in which a person's head is partially or completely submerged.
- (7) "Resample" means a water sample that is collected by the Division of Marine Fisheries or its authorized agent after the results of the initial water sample collected are processed by the Division and the results are analyzed by the Division.
- (8) "Storm water discharge" means any natural or manmade conveyance of rainwater or the resultant runoff into coastal recreational waters.
- (9) "Swimming advisory" means a notification to the public that recommends no primary contact with the water in a designated swimming area when bacteriological limits are exceeded, but does not close a swimming area to the public. A swimming advisory shall include a sign posted at the site of the advisory and a public notification via social media and news release to notify the public of the risks of swimming in the area.
- (10) "Swimming area" means a coastal recreation area that is used for primary contact located within waters classified by the Division of Water Resources as SC, SA, or SB as set forth in 15A NCAC 02B .0220 through .0222, and is hereby incorporated by reference including subsequent amendments.
- (11) "Swimming season" means from April 1 through October 31 of each year.
- (12) "Tier I swimming area" means a swimming area used daily during the swimming season, including all oceanfront beaches that are monitored by the Division.
- (13) "Tier II swimming area" means a swimming area that is not used daily during the swimming season.

*History Note: Authority G.S. 113-134; 113-221.3; 143B-289.52;
Eff. February 1, 2004;
Readopted Eff. April 1, 2021.*

15A NCAC 18A .3402 BACTERIOLOGICAL LIMITS FOR SWIMMING AREAS

- (a) The enterococcus level in a Tier I swimming area shall not equal or exceed either:
 - (1) a geometric mean of 35 enterococci per 100 milliliters of water; or
 - (2) a single sample of 104 enterococci per 100 milliliters of water.
- (b) The enterococcus level in a Tier II swimming area shall not equal or exceed a single sample of 104 enterococci per 100 milliliters of water.

*History Note: Authority G.S. 113-134; 113-221.3; 143B-289.52;
Eff. February 1, 2004;
Readopted Eff. April 1, 2021.*

15A NCAC 18A .3403 PUBLIC NOTICE OF INCREASED HEALTH RISKS IN SWIMMING AREAS

(a) Tier I Swimming areas:

- (1) A pending swimming advisory shall be issued by the Division of Marine Fisheries if a water sample from a swimming area is equal to or exceeds the bacteriological limit set forth in Rule .3402(a)(2) of this Section during the swimming season.
- (2) A swimming advisory shall be issued by the Division if either of the following standards are exceeded during the swimming season:
 - (A) Both the initial water sample and resample collected from a swimming area are equal to or exceed the bacteriological limit set forth in Rule .3402(a)(2) of this Section; or
 - (B) The most recent five water samples collected within a 30-day period from a swimming area are equal to or exceed the bacteriological limit set forth in Rule .3402(a)(1) of this Section.

(b) Tier II swimming areas:

- (1) A pending swimming advisory shall be issued by the Division if a water sample from a swimming area is equal to or exceeds the bacteriological limit set forth in Rule .3402(a)(2) of this Section during the swimming season.
- (2) A swimming advisory shall be issued by the Division if both the initial water sample and resample collected from a swimming area are equal to or exceed the bacteriological limit set forth in Rule .3402(a)(2) of this Section during the swimming season.

(c) Signs posted pursuant to this Section shall be placed or erected in open view where the public may see the sign prior to entering the water.

(d) Signs shall state the following:

ATTENTION: SWIMMING IN THIS AREA IS NOT RECOMMENDED. BACTERIA TESTING INDICATES LEVELS OF CONTAMINATION THAT MAY BE HAZARDOUS TO YOUR HEALTH. THIS ADVISORY AFFECTS WATERS WITHIN 200' OF THIS SIGN. OFFICE OF THE STATE HEALTH DIRECTOR.

*History Note: Authority G.S. 113-134; 113-221.3; 143B-289.52;
Eff. February 1, 2004;
Readopted Eff. April 1, 2021.*

15A NCAC 18A .3404 SWIMMING ADVISORIES FOR POINT SOURCE DISCHARGES INTO SWIMMING AREAS

(a) The Division of Marine Fisheries shall post at least one sign at a wastewater treatment plant that discharges into swimming waters, which shall stay posted until the discharge is removed. The sign for a wastewater treatment plant discharge shall state the following:

WARNING! SEWAGE TREATMENT EFFLUENT DISCHARGE SITE. SWIMMING IS NOT ADVISED IN THESE WATERS BECAUSE OF THE INCREASED RISK OF ILLNESS. OFFICE OF THE STATE HEALTH DIRECTOR.

(b) A swimming advisory shall be issued by the Division and at least one sign shall be posted at the public access to swimming waters that have been impacted by a wastewater system failure. The sign for waters impacted by a wastewater spill shall state the following:

WARNING! WASTEWATER SPILL. SWIMMING IS NOT ADVISED IN THESE WATERS BECAUSE OF THE INCREASED RISK OF ILLNESS. OFFICE OF THE STATE HEALTH DIRECTOR.

(c) A swimming advisory shall be issued by the Division and at least one sign shall be posted at a storm drain or pipe or storm water discharge that is discharging into a Tier I swimming area. A sign shall be placed to advise the public as they enter the area impacted by the storm drain or pipe or storm water discharge. For dry weather discharges, the sign shall state the following:

WARNING! STORM WATER DISCHARGE AREA. SWIMMING WITHIN 200 YARDS OF THIS SIGN MAY INCREASE THE RISKS OF WATERBORNE ILLNESS. OFFICE OF THE STATE HEALTH DIRECTOR.

For wet weather discharges, the sign shall state the following:

WARNING! STORM WATER DISCHARGE AREA. WATERS MAY BE CONTAMINATED BY DISCHARGE FROM PIPE. SWIMMING IS NOT RECOMMENDED WITHIN 200 YARDS OF THIS SIGN DURING ACTIVE DISCHARGE. FOR MORE INFORMATION, CALL 252-726-6827. OFFICE OF THE STATE HEALTH DIRECTOR.

(d) A swimming advisory shall be issued by the Division and at least two signs shall be posted at a storm drain or pipe where flood waters are being pumped into a swimming area. The signs shall state the following:

SWIMMING IS NOT RECOMMENDED BETWEEN SIGNS. WATERS MAY BE CONTAMINATED BY DISCHARGE FROM PIPE. OFFICE OF THE STATE HEALTH DIRECTOR.

(e) A swimming advisory shall be issued by the Division and at least two signs shall be posted at an area receiving dredge material on a swimming beach if the dredge material is being pumped from an area closed to shellfish harvesting. The signs shall state the following:

SWIMMING IS NOT RECOMMENDED BETWEEN SIGNS. WATERS MAY BE CONTAMINATED BY DISCHARGE FROM PIPE. OFFICE OF THE STATE HEALTH DIRECTOR.

History Note: Authority G.S. 113-134; 113-221.3; 143B-289.52;

Eff. January 1, 2004;
Readopted Eff. April 1, 2021.

15A NCAC 18A .3405 RESCINDING A PENDING SWIMMING ADVISORY OR SWIMMING ADVISORY

- (a) A pending swimming advisory shall be rescinded by the Division of Marine Fisheries via social media release when the resample collected meets the bacteriological limit set forth in Rule .3402(a)(2) of this Section.
- (b) A Tier I swimming area advisory shall be rescinded by the Division via social media and news release, including the removal of signs, when both of the following conditions are met:
- (1) the geometric mean has met the bacteriological limit set forth in Rule .3402(a)(1) of this Section; and
 - (2) two consecutive weekly water samples meet the bacteriological limit set forth in Rule .3402(a)(2) of this Section.
- (c) A Tier II swimming area advisory shall be rescinded by the Division via social media and news release, including the removal of signs, after water samples meet the bacteriological limit set forth in Rule .3402(b) of this Section.
- (d) A swimming advisory resulting from a flood water discharge or the discharge of dredge material shall be rescinded by the Division via social media and news release, including the removal of signs, 24 hours after the discharge has ceased, to allow for tidal dispersion.
- (e) A swimming advisory resulting from a wastewater system failure shall be rescinded by the Division via social media and news release, including the removal of signs, when failure has been corrected and water samples collected meet the bacteriological limit set forth in Rule .3402(a)(2) of this Section.

History Note: Authority G.S. 113-134; 113-221.3; 143B-289.52;
Eff. January 1, 2004;
Readopted Eff. April 1, 2021.

15A NCAC 18A .3406 DESTRUCTION OF SIGNS
15A NCAC 18A .3407 APPLICABILITY OF RULES

History Note: Authority G.S. 130A-233.1;
Eff. January 1, 2004;
Repealed Eff. April 1, 2021.

INDEX

A “♦” symbol is used in the index of the rulebook as a visual sign to alert readers there may be a public notice, or proclamation, for a subject. The Marine Fisheries Commission has the authority to delegate to the Fisheries Director the ability to issue proclamations, suspending or implementing particular commission rules that may be affected by variable conditions. For example, the index entry “species, sheepshead♦” indicates there may be a proclamation outlining harvest restrictions or other information for that species. Proclamations are not included in the rulebook because they change frequently.

Go to <http://portal.ncdenr.org/web/mf/proclamations> to view proclamations and learn about the restrictions. If you do not have Internet access, please call 252-726-7021 or 800-682-2632 to find out how to receive proclamation information. It is imperative that persons affected by proclamations keep themselves informed.

Please note: entries for fishing gear and equipment are listed alphabetically under the heading “gear.” **Other major headings** in the index include “lease,” “license,” “permit,” and “species.” For example, to look up information about a shellfish lease, see “lease, shellfish.”

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◆ = go to <http://portal.ncdenr.org/web/mf/proclamations> to check for proclamations

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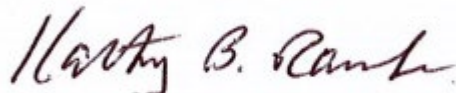
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THE ORIGINAL AND OFFICIAL COPY OF TITLE 15A,
CHAPTER 03 AND SUBCHAPTER 18A OF THE N.C.
ADMINISTRATIVE CODE ARE ON FILE IN THE OFFICE OF
ADMINISTRATIVE HEARINGS AND ARE AVAILABLE FOR
PUBLIC INSPECTION DURING NORMAL WORKING HOURS.

THIS DOCUMENT IS AVAILABLE FROM:
N.C. DIVISION OF MARINE FISHERIES
P.O. BOX 769
3441 ARENDELL STREET
MOREHEAD CITY, NC 28557
1-800-682-2632 or 252-726-7021
<http://portal.ncdenr.org/web/mf>

CERTIFICATION

PURSUANT TO G.S. 113-221 (B) AND G.S. 113-221 (G), THIS IS TO
CERTIFY THAT THE PRECEDING “NORTH CAROLINA MARINE
FISHERIES COMMISSION RULES APRIL 1, 2020, SUPPLEMENT - MAY
1, 2021” IS THE OFFICIAL CODIFICATION OF THE RULES OF THE N.C.
MARINE FISHERIES COMMISSION EFFECTIVE AS OF MAY 1, 2021.



KATHY B. RAWLS, DIRECTOR
N.C. DIVISION OF MARINE FISHERIES

N.C. Marine Fisheries Commission 2021-2022 Annual Rulemaking Cycle Package A

May 2021

Time of Year	Action
February-April 2021	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
May 2021	MFC votes on approval of Notice of Text for Rulemaking
August 2021	Publication of proposed rules in the <i>North Carolina Register</i>
August-October 2021	Public comment period held
August 2021	Public hearing held via WebEx
November 2021	MFC votes on approval of permanent rules *
January 2022	Rules reviewed by Office of Administrative Hearings/ Rules Review Commission
2022 legislative session	Possible effective date of rules subject to legislative review per S.L. 2019-198 and G.S. 14-4.1.
April 1, 2022	Proposed effective date of rules not subject to legislative review
April 1, 2022	Rulebook supplement available online

* 15A NCAC 03 readoption deadline of June 30, 2022 for final MFC approval

**Rule Impact Analysis for Readoption of 15A NCAC 03 Rules
Pursuant to G.S. 150B-21.3A**

Rule Amendments: 15A NCAC 03I .0108, .0115, .0122
15A NCAC 03J .0103, .0104, .0106, .0111, .0202, .0208, .0401,
.0402

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: David Dietz, Fisheries Economics Program Manager
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
919-707-8573
David.Dietz@ncdenr.gov

Impact Summary: State government: No
Local government: No
Federal government: No
Substantial impact: No

Authority:

North Carolina General Statutes

G.S. 113-133.	Abolition of local coastal fishing laws.
G.S. 113-134.	Rules.
G.S. 113-173.	Recreational Commercial Gear License.
G.S. 113-181.	Duties and powers of Department.
G.S. 113-182.	Regulation of fishing and fisheries.
G.S. 113-221.	Rules.
G.S. 113-221.1.	Proclamations: emergency review.
G.S. 113-267.	Replacement costs of marine, estuarine, and wildlife resources; rules authorized; prima facie evidence.
G.S. 143B-289.52.	Marine Fisheries Commission - powers and duties.
G.S. 150B-21.3A.	Periodic review and expiration of existing rules.

I. Necessity:

General Statute 150B-21.3A requires state agencies to review their existing rules every 10 years to determine which rules are still necessary, and to either readopt or repeal each rule as appropriate. The agency proposes for readoption 11 rules in 15A NCAC 03 pursuant to this requirement.

II. Summary

These rules have been reviewed to conform to the requirements of G.S. 150B-21.3A, Periodic Review and Expiration of Existing Rules. The proposed readoptions consist of no substantive changes, resulting in no economic impact at any level.

III. Introduction and Purpose of Rule Changes

The purpose of the Marine Fisheries Commission (MFC) is to manage, restore, develop, cultivate, conserve, protect, and regulate the marine and estuarine resources within its jurisdiction, as described in G.S. 113-132, including commercial and recreational fisheries resources (Chapter 143B, Article 7, Part 5D). As stated above, no changes are proposed for these rules through readoption.

IV. Fiscal Impact Analysis

As all eleven rules proposed for readoption in this analysis are presented with no substantive changes whatsoever, no economic impacts are expected from these readoptions as well.

V. Appendix

Proposed Rules for Readoption

15A NCAC 03I .0108 is proposed for readoption without substantive changes as follows:

15A NCAC 03I .0108 OCEAN FISHING PIERS

(a) It is unlawful to fish with nets of any kind or from boats within the zone adjacent to any ocean fishing pier meeting the requirements of G.S. 113-185(a), if such zone is marked by one of the following methods or a combination of methods:

- (1) Yellow range poles at least three inches in diameter and extending not less than six feet above the surface of the ground, and which are parallel to the pier and identified by signs with the name of the pier printed in letters at least three inches high; or
- (2) Buoys, which shall be yellow in color and not less than nine inches in diameter and extend no less than three feet above the surface of the water.

(b) It is unlawful to define a zone that extends more than 750 feet from the pier. When a marking system defines a smaller area than authorized, the limitations on fishing activities shall apply within the marked zone. When the marking system does not include buoys placed seaward of the pier's offshore end, the zone protected under G.S. 113-185 shall be limited to the areas parallel to the sides of the pier and shall include no area seaward of the offshore end of the pier.

(c) Owners of qualifying ocean piers shall be responsible for complying with all applicable local, state and federal regulations for marking systems.

*History Note: Authority G.S. 113-134; 113-181; 113-182; 143B-289.52;
Eff. January 1, 1991;
Recodified from 15A NCAC 3I .0008 Eff. December 17, 1996;
Readopted Eff. April 1, 2022.*

15A NCAC 03I .0115 is proposed for readoption without substantive changes as follows:

15A NCAC 03I .0115 REPLACEMENT COSTS OF MARINE AND ESTUARINE RESOURCES - FISH

(a) Fish, as used throughout this Rule, is defined in G.S. 113-129(7).

(b) Replacement Costs Distinguished. As it applies to fishes the term "replacement costs" must be distinguished from the "value" of the fish concerned. Except in cases where fish may lawfully be sold on the open market, as with commercially reared species, the monetary value of the specimens cannot be determined easily. The degree of special interest or concern in a particular species by the public, including not only anglers, but conservationists and those to whom the value of fishes is primarily aesthetic, cannot be measured in dollar amounts. The average cost of fish legally taken by anglers including travel and lodging, fishing equipment and bait, excise taxes on equipment, licenses and other fees, may fairly be estimated. This too, however, is a reflection on the value of existing fishery resources rather than a measure of the cost of their replacement. Thus, the relative value of fish species shall be considered only as they may bear on the necessity or desirability of actual replacement.

(c) Determining replacement costs. The replacement costs of species of fishes that have been taken, injured, removed, harmfully altered, damaged, or destroyed shall be determined as follows. The weight of each undersized fish shall be adjusted to the average weight of a fish on the minimum legal size established by the Marine Fisheries Commission for that species. The replacement cost shall be calculated based on the greater of either:

- (1) the cost of propagating and rearing the species in a hatchery and the cost of transporting them to areas of suitable habitat; or
- (2) the average annual ex-vessel value of fish species per pound.

(d) The cost of propagating, rearing and transporting the fish and the average annual ex-vessel value of fish species per pound shall be taken from the Division of Marine Fisheries annual statistical report for the calendar year next preceding the year in which the offense was committed. When the cost of propagating, rearing or transporting a particular species is not available, replacement costs shall be calculated based upon the average annual ex-vessel value of the species. When neither the cost of propagating, rearing or transporting a particular species, nor the average annual ex-vessel value of the species is available, replacement costs shall be determined according to the following factors:

- (1) whether the species is classified as endangered or threatened;
- (2) the relative frequency of occurrence of the species in the state;
- (3) the extent of existing habitat suitable for the species within the state;
- (4) the dependency of the species on unique habitat requirements;
- (5) the cost of improving and maintaining suitable habitat for the species;
- (6) the cost of capturing the species in areas of adequate populations and transplanting them to areas of suitable habitat with low populations;
- (7) the availability of the species and the cost of acquisition for restocking purposes;
- (8) the cost of those species which, when released, have a probability of survival in the wild;

- (9) the ratio between the natural life expectancy of the species and the period of its probable survival when, having been reared in a hatchery, it is released to the wild.

(e) Replacement costs will be assessed for the following fish:

- (1) Alewife (River Herring);
- (2) Amberjacks;
- (3) Anglerfish (Goosefish);
- (4) Bluefish;
- (5) Bonito;
- (6) Butterfish;
- (7) Carp;
- (8) Catfishes;
- (9) Cobia;
- (10) Croaker, Atlantic;
- (11) Cutlassfish, Atlantic;
- (12) Dolphinfish;
- (13) Drum, Black;
- (14) Drum, Red (Channel Bass);
- (15) Eels;
- (16) Flounders;
- (17) Flounders, Fluke;
- (18) Garfish;
- (19) Gizzard Shad;
- (20) Groupers;
- (21) Grunts;
- (22) Hakes;
- (23) Harvestfish;
- (24) Herring, Thread;
- (25) Hickory Shad;
- (26) Hogfish;
- (27) Jacks;
- (28) Kingfishes (Sea Mullet);
- (29) Mackerel, Atlantic;
- (30) Mackerel, King;
- (31) Mackerel, Spanish;
- (32) Menhaden, Atlantic;
- (33) Mullet;
- (34) Perch, White;

- (35) Perch, Yellow;
- (36) Pigfish;
- (37) Pompano;
- (38) Porgies;
- (39) Scup;
- (40) Sea Basses;
- (41) Seatrout, Spotted;
- (42) Shad (American);
- (43) Sharks;
- (44) Sharks, Dogfish;
- (45) Sheepshead;
- (46) Skippers;
- (47) Snappers;
- (48) Spadefish, Atlantic;
- (49) Spot;
- (50) Striped Bass;
- (51) Swellfishes (Puffers);
- (52) Swordfish;
- (53) Tilefish;
- (54) Triggerfish;
- (55) Tuna;
- (56) Wahoo;
- (57) Weakfish (Grey Trout);
- (58) Whiting;
- (59) Wreckfish;
- (60) Unclassified Fish;
- (61) Brown Shrimp;
- (62) Pink Shrimp;
- (63) Rock Shrimp;
- (64) White Shrimp;
- (65) Unclassified Shrimp;
- (66) Clam, Hard;
- (67) Conchs;
- (68) Crabs, Blue, Hard;
- (69) Crabs, Blue, Soft;
- (70) Octopus;
- (71) Oyster;

- (72) Scallop, Bay;
- (73) Scallop, Calico;
- (74) Scallop, Sea;
- (75) Squid;
- (76) Unclassified Shellfish.

(f) Cost of Investigations:

- (1) Factors to be Considered. Upon any investigation required as provided by G.S. 143-215.3(a)(7) or by court order for the purpose of determining the cost of replacement of marine and estuarine resources which have been killed, taken, injured, removed, harmfully altered, damaged, or destroyed, the factors to be considered in determining the cost of the investigation are as follows:
 - (A) the time expended by the employee or employees making the investigation, including travel time between the place of usual employment and the site of the investigation, and the time required in formulating and rendering the report;
 - (B) the cost of service to the state of each employee concerned, including annual salary, hospitalization insurance, and the state's contribution to social security taxes and to the applicable retirement system;
 - (C) subsistence of the investigating personnel, including meals, reasonable gratuities, and lodging away from home, when required;
 - (D) the cost of all necessary transportation;
 - (E) the use or rental of boats and motors, when required;
 - (F) the cost of cleaning or repairing any uniform or clothing that may be damaged, soiled or contaminated by reason of completing the investigation;
 - (G) the cost of necessary telephonic communications;
 - (H) any other expense directly related to and necessitated by the investigation.
- (2) Computation of Costs. In assessing the cost of time expended in completing the investigation, the time expended by each person required to take part in the investigation shall be recorded in hours, the value of which shall be computed according to the ratio between the annual cost of service of the employee and his total annual working hours (2087 hours reduced by holidays, annual leave entitlement, and earned sick leave). Other costs shall be assessed as follows:
 - (A) subsistence: the per diem amount for meals, reasonable gratuities, and lodging away from home, not to exceed the then current maximum per diem for state employees;
 - (B) transportation: total mileage by motor vehicle multiplied by:
 - (i) the then current rate per mile for travel by state-owned vehicle; or
 - (ii) the then current rate per mile for travel by privately owned vehicle, as applicable;
 - (C) boat and motor: ten dollars (\$10.00) per hour;
 - (D) uniform and clothing cleaning and repair: actual cost;
 - (E) telephonic communications: actual cost;

(F) other expenses: actual cost.

*History Note: Authority G.S. 113-134; 113-267; 143B-289.52;
Eff. March 1, 1995;
Recodified from 15A NCAC 3I .0015 Eff. December 17, 1996;
Readopted Eff. April 1, 2022.*

15A NCAC 03I .0122 is proposed for reoption without substantive changes as follows:

15A NCAC 03I .0122 USER CONFLICT RESOLUTION

(a) In order to address user conflicts, the Fisheries Director may, by proclamation, impose any or all of the following restrictions:

- (1) specify time;
- (2) specify area;
- (3) specify means and methods;
- (4) specify seasons; and
- (5) specify quantity.

This authority may be used based on the Fisheries Director's own findings or on the basis of a valid request in accordance with Paragraph (b) of this Rule. The Fisheries Director shall hold a public meeting in the area of the user conflict prior to issuance of a proclamation based on his or her own findings.

(b) Request for user conflict resolution:

- (1) Any person(s) desiring user conflict resolution may make such request in writing addressed to the Director of the Division of Marine Fisheries, P.O. Box 769, 3441 Arendell St., Morehead City, NC 28557-0769. A request shall contain the following information:
 - (A) a map of the affected area including an inset vicinity map showing the location of the area with detail sufficient to permit on-site identification and location;
 - (B) identification of the user conflict causing a need for user conflict resolution;
 - (C) recommended solution for resolving user conflict; and
 - (D) name and address of the person(s) requesting user conflict resolution.
- (2) Within 90 days of the receipt of the information required in Subparagraph (b)(1) of this Rule, the Fisheries Director shall review the information and determine if user conflict resolution is necessary. If user conflict resolution is not necessary, the Fisheries Director shall deny the request. If user conflict resolution is necessary, the Fisheries Director or designee shall hold a public meeting in the area of the user conflict. The requestor shall present his or her request at the public meeting.
- (3) Following the public meeting as described in Subparagraph (b)(2) of this Rule, the Fisheries Director shall refer the users in the conflict for mediation or deny the request. If the user conflict cannot be resolved through mediation, the Fisheries Director shall submit for approval a proclamation to the Marine Fisheries Commission that addresses the conflict.
- (4) Proclamations issued under this Rule shall suspend appropriate rules or portions of rules under the authority of the Marine Fisheries Commission as specified in the proclamation. The provisions of Rule .0102 of this Section terminating suspension of a rule pending the next Marine Fisheries Commission meeting and requiring review by the Marine Fisheries Commission at the next meeting shall not apply to proclamations issued under this Rule.

*History Note: Authority G.S. 113-134; 113-181; 113-182; 113-221.1; 143B-289.52;
Eff. May 1, 2015;
Readopted Eff. April 1, 2022.*

15A NCAC 03J .0103 is proposed for readoption without substantive changes as follows:

15A NCAC 03J .0103 GILL NETS, SEINES, IDENTIFICATION, RESTRICTIONS

(a) It is unlawful to use gill nets:

- (1) with a mesh length less than two and one-half inches; and
- (2) in Internal Coastal Waters from April 15 through December 15, with a mesh length five inches or greater and less than five and one-half inches.

(b) The Fisheries Director may, by proclamation, limit or prohibit the use of gill nets or seines in Coastal Fishing Waters, or any portion thereof, or impose any or all of the following restrictions on gill net or seine fishing operations:

- (1) specify time;
- (2) specify area;
- (3) specify means and methods, including:
 - (A) gill net mesh length, but the maximum length specified shall not exceed six and one-half inches in Internal Coastal Waters; and
 - (B) net number and length, but for gill nets with a mesh length four inches or greater, the maximum length specified shall not exceed 2,000 yards per vessel in Internal Coastal Waters regardless of the number of individuals involved; and
- (4) specify season.

(c) It is unlawful to use fixed or stationary gill nets in the Atlantic Ocean, drift gill nets in the Atlantic Ocean for recreational purposes, or any gill nets in Internal Coastal Waters unless nets are marked by attaching to them at each end two separate yellow buoys which shall be of solid foam or other solid buoyant material no less than five inches in diameter and no less than five inches in length. Gill nets that are not connected together at the top line are considered as individual nets, requiring two buoys at each end of each individual net. Gill nets connected together at the top line are considered as a continuous net requiring two buoys at each end of the continuous net. Any other marking buoys on gill nets used for recreational purposes shall be yellow except one additional buoy, any shade of hot pink in color, constructed as specified in this Paragraph, shall be added at each end of each individual net. Any other marking buoys on gill nets used in commercial fishing operations shall be yellow except that one additional identification buoy of any color or any combination of colors, except any shade of hot pink, may be used at either or both ends. The owner shall be identified on a buoy on each end either by using engraved buoys or by attaching engraved metal or plastic tags to the buoys. Such identification shall include owner's last name and initials and if a vessel is used, one of the following:

- (1) owner's N.C. motor boat registration number; or
- (2) owner's U.S. vessel documentation name.

(d) It is unlawful to use gill nets:

- (1) within 200 yards of any flounder or other finfish pound net set with lead and either pound or heart in use, except from August 15 through December 31 in all Coastal Fishing Waters of the Albemarle Sound, including its tributaries to the boundaries between Coastal and Joint Fishing Waters, west of

a line beginning at a point 36° 04.5184' N - 75° 47.9095' W on Powell Point; running southerly to a point 35° 57.2681' N - 75° 48.3999' W on Caroon Point, it is unlawful to use gill nets within 500 yards of any pound net set with lead and either pound or heart in use; and

- (2) from March 1 through October 31 in the Intracoastal Waterway within 150 yards of any railroad or highway bridge.

(e) It is unlawful to use gill nets within 100 feet either side of the center line of the Intracoastal Waterway Channel south of the entrance to the Alligator-Pungo River Canal near Beacon "54" in Alligator River to the South Carolina line, unless such net is used in accordance with the following conditions:

- (1) no more than two gill nets per vessel may be used at any one time;
- (2) any net used must be attended by the fisherman from a vessel who shall at no time be more than 100 yards from either net; and
- (3) any individual setting such nets shall remove them, when necessary, in sufficient time to permit unrestricted vessel navigation.

(f) It is unlawful to use runaround, drift, or other non-stationary gill nets, except as provided in Paragraph (e) of this Rule:

- (1) to block more than two-thirds of any natural or manmade waterway, sound, bay, creek, inlet, or any other body of water; or
- (2) in a location where it will interfere with navigation.

(g) It is unlawful to use unattended gill nets with a mesh length less than five inches in a commercial fishing operation in the gill net attended areas designated in 15A NCAC 03R .0112(a).

(h) It is unlawful to use unattended gill nets with a mesh length less than five inches in a commercial fishing operation from May 1 through November 30 in the Internal Coastal Waters and Joint Fishing Waters of the state designated in 15A NCAC 03R .0112(b).

(i) It is unlawful for any portion of a gill net with a mesh length five inches or greater to be within 10 feet of any point on the shoreline while set or deployed, unless the net is attended from June through October in Internal Coastal Waters.

(j) For the purpose of this Rule and 15A NCAC 03R .0112, "shoreline" is defined as the mean high water line or marsh line, whichever is more seaward.

History Note: Authority G.S. 113-134; 113-173; 113-182; 113-221.1; 143B-289.52;

Eff. January 1, 1991;

Amended Eff. August 1, 1998; March 1, 1996; March 1, 1994; July 1, 1993; September 1, 1991;

Temporary Amendment Eff. October 2, 1999; July 1, 1999; October 22, 1998;

Amended Eff. April 1, 2001;

Temporary Amendment Eff. May 1, 2001;

Amended Eff. April 1, 2016; April 1, 2009; December 1, 2007; September 1, 2005; August 1, 2004;

August 1, 2002;

Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03J .0104 is proposed for readoption without substantive changes as follows:

15A NCAC 03J .0104 TRAWL NETS

(a) It is unlawful to possess aboard a vessel while using a trawl net in Internal Coastal Waters more than 500 pounds of finfish from December 1 through March 1, and 1,000 pounds of finfish from March 2 through November 30.

(b) It is unlawful to use trawl nets:

- (1) in Internal Coastal Waters from 9:00 p.m. on Friday through 5:00 p.m. on Sunday, except:
 - (A) from December 1 through March 1 from one hour after sunset on Friday to one hour before sunrise on Monday in the areas listed in Subparagraph (b)(5) of this Rule; or
 - (B) for a holder of a Permit for Weekend Trawling for Live Shrimp in accordance with 15A NCAC 03O .0503;
- (2) for the taking of oysters;
- (3) in Albemarle Sound, Currituck Sound, and their tributaries, west of a line beginning on the south shore of Long Point at a point 36° 02.4910' N – 75° 44.2140' W; running southerly to the north shore on Roanoke Island to a point 35° 56.3302' N – 75° 43.1409' W; running northwesterly to Caroon Point to a point 35° 57.2255' N – 75° 48.3324' W;
- (4) in the areas described in 15A NCAC 03R .0106, except that the Fisheries Director may, by proclamation, open the area designated in Item (1) of 15A NCAC 03R .0106 to peeler crab trawling;
- (5) from December 1 through March 1 from one hour after sunset to one hour before sunrise in the following areas:
 - (A) in Pungo River, north of a line beginning on Currituck Point at a point 35° 24.5833' N – 76° 32.3166' W; running southwesterly to Wades Point to a point 35° 23.3062' N – 76° 34.5135' W;
 - (B) in Pamlico River, west of a line beginning on Wades Point at a point 35° 23.3062' N – 76° 34.5135' W; running southwesterly to Fulford Point to a point 35° 19.8667' N – 76° 35.9333' W;
 - (C) in Bay River, west of a line beginning on Bay Point at a point 35° 11.0858' N – 76° 31.6155' W; running southerly to Maw Point to a point 35° 09.0214' N – 76° 32.2593' W;
 - (D) in Neuse River, west of a line beginning on the Minnesott side of the Neuse River Ferry at a point 34° 57.9116' N – 76° 48.2240' W; running southerly to the Cherry Branch side of the Neuse River Ferry to a point 34° 56.3658' N – 76° 48.7110' W; and
 - (E) in New River, all waters upstream of the N.C. Highway 172 Bridge when opened by proclamation; and
- (6) in designated pot areas opened to the use of pots by 15A NCAC 03J .0301(a)(2) and described in 15A NCAC 03R .0107(a)(5), (a)(6), (a)(7), (a)(8), and (a)(9) within an area bound by the shoreline to the depth of six feet.

(c) Mesh sizes for shrimp and crab trawl nets shall meet the requirements of 15A NCAC 03L .0103 and .0202.

- (d) The Fisheries Director may, with prior consent of the Marine Fisheries Commission, by proclamation, require bycatch reduction devices or codend modifications in trawl nets to reduce the catch of finfish that do not meet size limits or are unmarketable as individual foodfish by reason of size.
- (e) It is unlawful to use shrimp trawl nets for recreational purposes unless the trawl net is marked by attaching to the codend (tailbag) one floating buoy, any shade of hot pink in color, which shall be of solid foam or other solid buoyant material no less than five inches in diameter and no less than five inches in length. The owner shall be identified on the buoy by using an engraved buoy or by attaching engraved metal or plastic tags to the buoy. Such identification shall include owner's last name and initials and, if a vessel is used, one of the following:
- (1) gear owner's current motor boat registration number; or
 - (2) owner's U.S. vessel documentation name.
- (f) It is unlawful to use shrimp trawl nets for the taking of blue crabs in Internal Coastal Waters, except that it shall be permissible to take or possess blue crabs incidental to shrimp trawling in accordance with the following limitations:
- (1) for individuals using shrimp trawl nets authorized by a Recreational Commercial Gear License, 50 blue crabs per day, not to exceed 100 blue crabs if two or more Recreational Commercial Gear License holders are on board the same vessel; and
 - (2) for commercial operations, crabs may be taken incidental to lawful shrimp trawl net operations provided that the weight of the crabs shall not exceed the greater of:
 - (A) 50 percent of the total weight of the combined crab and shrimp catch; or
 - (B) 300 pounds.
- (g) The Fisheries Director may, by proclamation, close any area to trawling for specific time periods in order to secure compliance with this Rule.

History Note: Authority G.S. 113-134; 113-173; 113-182; 113-221.1; 143B-289.52;
Eff. February 1, 1991.
Amended Eff. August 1, 1998; May 1, 1997; March 1, 1994; February 1, 1992;
Temporary Amendment Eff. July 1, 1999;
Amended Eff. May 1, 2017; April 1, 2014; April 1, 2009; September 1, 2005; August 1, 2004; August 1, 2000;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03J .0106 is proposed for readoption without substantive changes as follows:

15A NCAC 03J .0106 CHANNEL NETS

- (a) It is unlawful to use a channel net:
- (1) Until the Fisheries Director specifies by proclamation, time periods and areas for the use of channel nets and other fixed nets for shrimping.
 - (2) Without yellow light reflective tape on the top portion of each staff or stake and on any buoys located at either end of the net.
 - (3) With any portion of the set including boats, anchors, cables, ropes or nets within 50 feet of the center line of the Intracoastal Waterway Channel.
 - (4) In the middle third of any navigation channel marked by Corps of Engineers or U.S. Coast Guard.
 - (5) Unless attended by the fisherman who shall be no more than 50 yards from the net at all times.
- (b) It is unlawful to use or possess aboard a vessel any channel net with a corkline exceeding 40 yards.
- (c) It is unlawful to leave any channel net, channel net buoy, or channel net stakes in coastal fishing waters from December 1 through March 1.
- (d) It is unlawful to use floats or buoys of metallic material for marking a channel net set.
- (e) From March 2 through November 30, cables used in a channel net operation shall, when not attached to the net, be connected together and any attached buoy shall be connected by non-metal line.
- (f) It is unlawful to leave channel net buoys in coastal fishing waters without yellow light reflective tape on each buoy and without the owner's identification being legibly printed on each buoy. Such identification must include one of the following:
- (1) Owner's N.C. motorboat registration number; or
 - (2) Owner's U.S. vessel documentation name; or
 - (3) Owner's last name and initials.
- (g) It is unlawful to use any channel nets, anchors, lines, or buoys in such a manner as to constitute a hazard to navigation.
- (h) It is unlawful to use channel nets for the taking of blue crabs in internal waters, except that it shall be permissible to take or possess blue crabs incidental to channel net operations in accordance with the following limitations:
- (1) Crabs may be taken incidental to lawful channel net operations provided that the weight of the crabs shall not exceed:
 - (A) 50 percent of the total weight of the combined crab and shrimp catch; or
 - (B) 300 pounds, whichever is greater.
 - (2) The Fisheries Director may, by proclamation, close any area to channel net use for specific time periods in order to secure compliance with this Paragraph.

*History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Eff. January 1, 1991;*

Amended Eff. September 1, 2005;

Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03J .0111 is proposed for re adoption without substantive changes as follows:

15A NCAC 03J .0111 FYKE OR HOOP NETS

- (a) It is unlawful to use fyke or hoop nets in coastal fishing waters without:
- (1) the owner's identification being clearly printed on a sign no less than six inches square, securely attached on an outside corner stake of each such net; or
 - (2) each net being marked by attaching a floating buoy to a single net and a buoy on each end of the line connecting multiple (two or more) nets, when stakes are not used. Buoys shall be of solid foam or other solid buoyant material and no less than five inches in diameter and no less than five inches in length. Buoys shall be of any color except yellow or hot pink. The owner shall always be identified on the attached buoy by using engraved buoys or by engraved metal or plastic tags attached to the buoy. Such identification shall include the gear owner's current motorboat registration number and the gear owner's last name and initials.
- (b) It is unlawful to use a fyke or hoop net within 200 yards of any operational pound net set.
- (c) It is unlawful to use a fyke or hoop net within 150 yards of any railroad or highway bridge.

*History Note: Authority G.S. 113-134; 113-182; 113-221; 143B-289.52;
Temporary Adoption Eff. August 1, 2000;
Amended Eff. April 1, 2003; April 1, 2001;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).*

15A NCAC 03J .0202 is proposed for readoption without substantive changes as follows:

15A NCAC 03J .0202 ATLANTIC OCEAN

In the Atlantic Ocean:

- (1) It is unlawful to use nets from June 15 through August 15 in the waters of Masonboro Inlet or in the ocean within 300 yards of the beach between Masonboro Inlet and a line running southeasterly through the water tank 34° 13.1500' N - 77° 47.300' W on the northern end of Wrightsville Beach, a distance of 4400 yards parallel with the beach.
- (2) It is unlawful to use trawls within one-half mile of the beach between the Virginia line and Oregon Inlet.
- (3) It is unlawful to use a trawl with a mesh length less than four inches in the main body, three inches in the extension, and one and three-fourths inches in the cod end or tail bag inshore of a line beginning on the western side of Beaufort Inlet Channel at a point 34° 41.3000' N - 76° 40.1333' W; running westerly parallel to and one-half miles from the shore off Salter Path to a point 34° 40.5333' N - 76° 53.7500' W.
- (4) It is unlawful to use trawl nets, including flynets, southwest of the 9960-Y chain 40250 LORAN C line (running offshore in a southeasterly direction) from Cape Hatteras to the North Carolina/South Carolina line except:
 - (A) Shrimp trawls as defined in 15A NCAC 03L .0103;
 - (B) Crab trawls as defined in 15A NCAC 03L .0202; or
 - (C) Flounder trawls as defined in 15A NCAC 03M .0503.
- (5) It is unlawful to possess finfish (including pursuant to 15A NCAC 03M .0102) incidental to shrimp or crab trawl operations from December 1 through March 31 unless the weight of the combined catch of shrimp and crabs exceeds the weight of finfish, except an additional 300 pounds of kingfish (*Menticirrhus*, spp.) may be taken south of Bogue Inlet.
- (6) It is unlawful to use unattended gill nets or block or stop nets in the Atlantic Ocean within 300 yards of the beach from Beaufort Inlet to the South Carolina line from sunset Friday to sunrise Monday from Memorial Day through Labor Day.
- (7) It is unlawful to use gill nets in the Atlantic Ocean with a mesh length greater than seven inches from April 15 through December 15.
- (8) It is unlawful to use shrimp trawls in all waters west of a line beginning at the southeastern tip of Baldhead Island at a point 33° 50.4833' N - 77° 57.4667' W; running southerly in the Atlantic Ocean to a point 33° 46.2667' N - 77° 56.4000' W; from 9:00 P.M. through 5:00 A.M.

*History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Eff. January 1, 1991;
Amended Eff. March 1, 1996; September 1, 1991;*

Temporary Amendment Eff. December 1, 1997;

Amended Eff. October 1, 2008; August 1, 2004; August 1, 1998;

Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03J .0208 is proposed for reoption without substantive changes as follows:

15A NCAC 03J .0208 NEW RIVER

- (a) It is unlawful to use trawl nets except skimmer trawls upstream of the Highway 172 Bridge over New River.
- (b) It is unlawful to use skimmer trawls upstream of the Highway 172 Bridge over New River from 9:00 P.M. through 5:00 A.M. from August 16 through November 30.

*History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Eff. August 1, 1998;
Amended Eff. May 1, 2015; August 1, 2004;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).*

15A NCAC 03J .0401 is proposed for re adoption without substantive changes as follows:

SECTION .0400 - FISHING GEAR

15A NCAC 03J .0401 FISHING GEAR

(a) The Fisheries Director in order to address issues involving user conflicts may, by proclamation, close the areas described in Paragraph (b) of this Rule to the use of specific fishing gear.

(b) It is unlawful to use fishing gear as specified by proclamation at the time and dates specified in the proclamation between the Friday before Easter through December 31 in the following areas when such areas have been closed by proclamation:

- (1) All or part of the Atlantic Ocean, up to one-half mile from the beach;
- (2) Up to one-half mile in all directions of Oregon Inlet;
- (3) Up to one-half mile in all directions of Hatteras Inlet;
- (4) Up to one-half mile in all directions of Ocracoke Inlet;
- (5) Up to one-half mile of the Cape Lookout Rock Jetty;
- (6) Up to one-half mile in all directions of fishing piers open to the public;
- (7) Up to one-half mile in all directions of State Parks;
- (8) Up to one-half mile of marinas as defined by the Coastal Resources Commission.

(c) The Fisheries Director shall specify in the proclamation the boundaries of the closure through the use of maps, legal descriptions, prominent landmarks or other permanent type markers.

(d) The Fisheries Director shall hold a public meeting in the affected area before issuance of proclamations authorized by this Rule.

History Note: Authority G.S. 113-133; 113-134; 113-182; 113-221; 143B-289.52;
Eff. July 1, 1993;
Amended Eff. June 1, 1996; March 1, 1995; October 1, 1993;
Readopted Eff. April 1, 2022.

15A NCAC 03J .0402 is proposed for readoption without substantive changes as follows:

15A NCAC 03J .0402 FISHING GEAR RESTRICTIONS

(a) It is unlawful to use commercial fishing gear in the following areas during dates and times specified for the identified areas:

- (1) Atlantic Ocean - Dare County:
 - (A) Nags Head:
 - (i) Seines and gill nets may not be used from the North Town Limit of Nags Head at Eight Street southward to Gulf Street:
 - (I) From Wednesday through Saturday of the week of the Nags Head Surf Fishing Tournament held during October of each year the week prior to Columbus Day.
 - (II) From November 1 through December 15.
 - (ii) Commercial fishing gear may not be used within 750 feet of licensed fishing piers when open to the public.
 - (B) Oregon Inlet. Seines and gill nets may not be used from the Friday before Easter through December 31:
 - (i) Within one-quarter mile of the beach from the National Park Service Ramp #4 (35° 48.2500' N - 75° 32.7000' W) on Bodie Island to the northern terminus of the Bonner Bridge (35° 46.5000' N - 75° 32.3666' W) on Hwy. 12 over Oregon Inlet.
 - (ii) Within the area known locally as "The Pond", a body of water generally located to the northeast of the northern terminus of the Bonner Bridge.
 - (C) Cape Hatteras (Cape Point). Seines and gill nets may not be used within one-half mile of Cape Point from the Friday before Easter through December 31. The closed area is defined by a circle with a one-half mile radius having the center near Cape Point at a point 35° 12.9000' N - 75° 31.7166' W.
- (2) Atlantic Ocean - Onslow and Pender Counties. Commercial fishing gear may not be used during the time specified for the following areas:
 - (A) Topsail Beach. From January 1 through December 31, that area around Jolly Roger Fishing Pier bordered on the offshore side by a line 750 feet from the end of the pier and on the northeast and southwest by a line beginning at a point on the beach one-quarter mile from the pier extending seaward to intersect the offshore boundary.
 - (B) Surf City:
 - (i) From January 1 to June 30, that area around the Surf City Fishing Pier bordered on the offshore side by a line 750 feet from the end of the pier, on the southwest by a line beginning at a point on the beach one-quarter mile from the pier and on

the northeast by a line beginning at a point on the beach 750 feet from the pier extending seaward to intersect the offshore boundaries.

- (ii) From July 1 to December 31, those areas around the pier bordered on the offshore side by a line 750 feet from the end of the pier, on the southwest by a line beginning at a point on the beach 750 feet from the pier and on the northeast by a line beginning at a point on the beach one-quarter mile from the pier extending seaward to intersect the offshore boundaries.

- (3) Atlantic Ocean - New Hanover County. Carolina Beach Inlet through Kure Beach. Commercial fishing gear may not be used during the times specified for the following areas:

- (A) From the Friday before Easter to November 30, within the zones adjacent to the Carolina Beach and Kure Beach Fishing Piers bordered on the offshore side by a line 750 feet from the ends of the piers and on the north and south by a line beginning at a point on the beach one-quarter mile from the pier extending seaward to intersect the offshore boundary, except the southern boundary for Kure Beach Pier is a line beginning on the beach one mile south of the pier to the offshore boundary for the pier.

- (B) From May 1 to November 30, within 900 feet of the beach, from Carolina Beach Inlet to the southern end of Kure Beach with the following exceptions:

- (i) From one-quarter mile north of Carolina Beach Fishing pier to Carolina Beach Inlet from October 1 to November 30:

- (I) Strike nets may be used within 900 feet of the beach;
- (II) Attended nets may be used between 900 feet and one-quarter mile of the beach.

- (ii) Strike nets and attended gill nets may be used within 900 feet of the beach from October 1 to November 30 in other areas except those described in Part (a)(3)(A) and Subpart (a)(3)(B)(i) of this Rule.

- (iii) It is unlawful to use commercial fishing gear within 900 feet of the beach from Carolina Beach Inlet to a point on the beach $33^{\circ}55.0026' N - 77^{\circ}56.6630' W$ near the former location of New Inlet during the October surf fishing tournament in Carolina Beach.

- (4) Pamlico River – Beaufort County. Goose Creek State Park. Commercial fishing gear may not be used from the Friday before Easter through December 31 for the following areas:

- (A) Within 150 feet of the shoreline within park boundaries;
- (B) Within the marked channel from Dinah Landing to the mouth of Upper Goose Creek.

- (b) It is unlawful to use gill nets or seines in the following areas during dates and times specified for the identified areas:

- (1) Neuse River and South River, Carteret County. No more than 1,200 feet of gill net(s) having a stretched mesh of five inches or larger may be used:

- (A) Within one-half mile of the shore from Winthrop Point at Adams Creek to Channel Marker "2" at the mouth of Turnagain Bay.
 - (B) Within South River.
- (2) Cape Lookout, Carteret County:
- (A) Gill nets or seines may not be used in the Atlantic Ocean within 300 feet of the Rock Jetty (at Cape Lookout between Power Squadron Spit and Cape Point).
 - (B) Seines may not be used within one-half mile of the shore from Power Squadron Spit south to Cape Point and northward to Cape Lookout Lighthouse including the area inside the "hook" south of a line from the COLREGS Demarcation Line across Bardens Inlet to the eastern end of Shackleford Banks and then to the northern tip of Power Squadron Spit from 12:01 a.m. Saturdays until 12:01 a.m. Mondays from May 1 through November 30.
- (3) State Parks/Recreation Areas:
- (A) Gill nets or seines may not be used in the Atlantic Ocean within one-quarter mile of the shore at Fort Macon State Park, Carteret County.
 - (B) Gill nets or seines may not be used in the Atlantic Ocean within one-quarter mile of the shore at Hammocks Beach State Park, Onslow County, from May 1 through October 1, except strike nets and attended gill nets may be used beginning August 15.
 - (C) Gill nets or seines may not be used within the boat basin and marked entrance channel at Carolina Beach State Park, New Hanover County.
- (4) Mooring Facilities/Marinas. Gill nets or seines may not be used from May 1 through November 30 within:
- (A) One-quarter mile of the shore from the east boundary fence to the west boundary fence at U.S. Coast Guard Base Fort Macon at Beaufort Inlet, Carteret County;
 - (B) Canals within Pine Knoll Shores, Carteret County;
 - (C) Spooners Creek entrance channel and marina on Bogue Sound, Carteret County; Harbor Village Marina on Topsail Sound, Pender County; and Marina and entrance canal within Carolina Marlin Club property adjacent to Newport River, Carteret County.
- (5) Masonboro Inlet. Gill nets and seines may not be used:
- (A) Within 300 feet of either rock jetty; and
 - (B) Within the area beginning 300 feet from the offshore end of the jetties to the Intracoastal Waterway including all the waters of the inlet proper and all the waters of Shinn Creek.
- (6) Atlantic Ocean Fishing Piers. At a minimum, gill nets and seines may not be used within 300 feet of ocean fishing piers when open to the public. If a larger closed area has been delineated by the placement of buoys or beach markers as authorized by G.S. 113-185(a), it is unlawful to fish from vessels or with nets within the larger marked zone.
- (7) Topsail Beach, Pender County. It is unlawful to use gill nets and seines from 4:00 p.m. Friday until 6:00 a.m. the following Monday in the three finger canals on the south end of Topsail Beach.

- (8) Mad Inlet to Tubbs Inlet - Atlantic Ocean, Brunswick County. It is unlawful to use gill nets and seines from September 1 through November 15, except that a maximum of four commercial gill nets per vessel not to exceed 200 yards in length individually or 800 yards in combination may be used.
- (9) Spooners Creek, Carteret County. It is unlawful to use gill nets and seines between sunset and sunrise in Spooners Creek entrance channel in Bogue Sound, all of Spooners Creek proper and the adjoining tributary canals and channels.

History Note: Authority G.S. 113-133; 113-134; 113-182; 113-221; 143B-289.52;
Eff. March 1, 1996;
Amended Eff. October 1, 2004; August 1, 2004; April 1, 2001;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

Fiscal Impact Analysis of Proposed Rule Amendments Regarding Interjurisdictional Species Management

Rule Amendments: 15A NCAC 03L .0207, .0301, .0302
15A NCAC 03M .0301, .0302, .0511, .0516, .0519

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: David Dietz, Fisheries Economics Program Manager
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
(919) 707 8573
david.dietz@ncdenr.gov

Impact Summary: State government: Yes
Local government: No
Federal government: No
Substantial impact: No

Authority:

North Carolina General Statutes
§ 113-134. Rules.
§ 113-182. Regulation of fishing and fisheries.
§ 113-221.1. Proclamations: emergency review.
§ 143B-289.52. Marine Fisheries Commission - powers and duties.

Necessity: General Statute 150B-21.3A requires state agencies to review their existing rules every 10 years to determine which rules are still necessary, and to either readopt or repeal each rule as appropriate. The following eight rules regarding the management of harvest of interjurisdictional species have been reviewed and proposed for readoption with amendments that conform with current management and interstate and federal requirements.

I. Summary

The management and harvest restrictions of North Carolina's interjurisdictional fishery species are implemented through a state Fishery Management Plan (FMP) and N.C. Marine Fisheries Commission (MFC) rules that coordinate with relevant interstate and federal regulatory bodies. Since fish aren't contained within political boundaries, state, interstate, federal and even international authorities share fisheries management responsibilities. Over time, regulation of these species in North Carolina has shifted towards ongoing proclamations and rule suspensions by the DMF Director in order to keep pace with shifting interstate and federal regulations. The state is required by the Magnuson-Stevens Fishery Conservation and Management Act (MSA, 1976) and the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA, 1993) to comply with interstate and federal restrictions. The following proposed amendments and repeals through readoption seek to formalize proclamation authority of these interjurisdictional species in rule language and remove existing harvest requirements that are likely to be invalidated. These proposed changes would conform with existing management practices by the Division. Ultimately,

these proposed changes would increase NCDMF's efficiency in managing these species, which could generate a small benefit to the state moving forward. Alternatively, as these proposed changes do not alter the ongoing management practices for these interjurisdictional species, there are no costs expected either to the state or to enforcement.

II. Introduction and Purpose of Rule Changes

The N.C. Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP) was approved by the MFC in September 2002 (NCDMF, 2002). The goal of the IJ FMP is to adopt FMPs, consistent with N.C. law, approved by the federal Councils or the Atlantic States Marine Fisheries Commission (ASMFC) by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (MSA; federal Councils FMPs) and the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA; ASMFC FMPs), are similar to the goals of the Fisheries Reform Act of 1997 (FRA) to "ensure long-term viability" of these fisheries.

Amendment 1 to the IJ FMP was adopted by the MFC in June 2008 (NCDMF, 2008). This amendment did not change the goal and objectives of the plan; however, it included a management strategy, with associated rule changes, to streamline and consolidate the use of proclamation authority by the N.C. Division of Marine Fisheries (DMF) Director to implement management measures to comply with or complement ASMFC and federal Council FMPs. In 2015, the IJ FMP was updated with additional information regarding the impetus for the original IJ FMP, changes in N.C. statutes, relevant management authorities, interstate and federal public process, and the link between overlapping state and ASMFC FMPs (NCDMF, 2015).

The primary MFC rule used for the management of species listed in the IJ FMP is 15A NCAC 03M .0512, Compliance with Fishery Management Plans. This rule delegates to the DMF Director the ability to issue proclamations to comply with federal Council and ASMFC FMPs or to implement state management measures for the interjurisdictional finfish species listed in the IJ FMP. The rule provides the necessary flexibility to address the variable condition of compliance with FMPs, as described in 15A NCAC 03H .0103.

Under Amendment 1 to the IJ FMP, several MFC rules for individual finfish species were repealed consistent with one of the main purposes of the plan: to avoid duplication of effort in the development of plans under the FRA for species or species groups where equivalent federal Council or ASMFC FMPs have been developed and adopted with full participation from the state of North Carolina. The rules that were repealed did not contain any static requirements; they only contained requirements subject to change as the federal Council or ASMFC FMPs changed. Prior to repeal of the rules, when a federal Council or ASMFC FMP changed an affected rule had to be suspended in whole or in part, under the authority of 15A NCAC 03I .0102, and a proclamation had to be issued under the authority of 15A NCAC 03M .0512 to maintain compliance with the corresponding FMPs. This could result in certain requirements remaining in the original rule and other requirements being implemented by proclamation, which was confusing for stakeholders. In other words, a stakeholder may have read a requirement in an individual species rule that had been suspended and not be aware that a different requirement was in place that had been issued by proclamation.

Consistent with the IJ FMP, MFC rules 15A NCAC 03M .0301, .0511, and .0516 are proposed for repeal through readoption. These rules relate to the harvest of Spanish and king mackerel, bluefish, and cobia, respectively. These rules currently only contain requirements that are subject to change under the ASMFC FMPs and the Mid-Atlantic Fishery Management Council and South Atlantic Fishery Management Council (federal Councils) FMPs for these species.

The proposed amendments are consistent with the goal and purpose of the IJ FMP. The changes will reduce confusion for stakeholders about the requirements in place for the management of these fisheries. There would be no change in DMF operation under the proposed changes because proclamations for these fisheries are already issued under 15A NCAC 03M .0512. Stakeholders would continue to rely on the issuance of a proclamation to know what changed and what is required to participate in these fisheries.

In some cases under the 2008 IJ FMP management strategy, an individual rule was retained if it contained any static requirements that were not expected to change, and thus would likely not need to be suspended in the future. This is the case for MFC rule 15A NCAC 03M .0519, Shad. Paragraph (c) of the rule states it “is unlawful to take or possess American shad from the Atlantic Ocean.” This is the only element of the current rule not expected to change. The remainder of the rule is proposed to be deleted so the requirements for the fishery can be implemented by proclamation as the requirements of the ASMFC Interstate FMP for Shad and River Herring change, as they have in recent years and are expected to continue doing so.

In addition to these proposed amendments to interjurisdictional finfish species, rules related to three different interjurisdictional crustacea and arthropod species are also proposed for readoption with similar amendments. Firstly, 15A NCAC 03L .0301 and .0302 pertain to the harvest of American lobster and spiny lobster, respectively. As the harvest requirements for these species is managed through the ASMFC and South Atlantic Fishery Management Council, respectively, proposed amendments seek to again apply proclamation authority for management. This allows harvest requirements to continue to align with ASMFC and federal Council regulations with greater flexibility and speed.

Regarding spiny lobster, a final rule for Regulatory Amendment 4 to the FMP for Spiny Lobster in the Gulf of Mexico and the South Atlantic (Regulatory Amendment 4) became effective July 23, 2018. Regulatory Amendment 4 increases the catch limit for spiny lobster based on updated landings information and revised scientific recommendations; and prohibits the use of traps for recreational harvest of spiny lobster in federal waters off North Carolina, South Carolina, and Georgia.

The current Marine Fisheries Commission rule is silent on this new prohibition on the use of traps for recreational harvest and the rule’s language in its current form suggests a vessel limit while the federal regulations do not, which has led to some confusion. Additionally, the current rule prohibits possessing aboard or landing detached spiny lobster tails, which is not in line with the current Gulf of Mexico and South Atlantic Fishery Management Councils’ FMP for Spiny Lobster in the Gulf of Mexico and South Atlantic that allows the tailing of spiny lobster by those who possess a federal spiny lobster tailing permit. The Fisheries Director does not have proclamation authority for spiny lobster via this rule or 15A NCAC 03M .0512, as the latter only applies to species listed in the N.C. IJ FMP. The IJ FMP does not apply to invertebrate species. Amending 15A NCAC 03L

.0302 to add proclamation authority for the Fisheries Director will provide needed flexibility to manage the spiny lobster fishery and stay in compliance with federal regulations.

Additionally, 15A NCAC 03L .0207 is proposed to amend the harvest restrictions of horseshoe crabs. While horseshoe crabs are already primarily managed via proclamation authority in rule, the proposed amendment exempts biomedical harvest from static requirements in the rule. Past stock assessments have demonstrated that biomedical harvest of horseshoe crabs in North Carolina has a negligible effect on the overall stock status (ASMFC, 2020). Thus, placing commercial harvest restrictions on this industry imposes an unnecessary burden on stakeholders. Upon amendment of this rule, the biomedical harvest would be managed by a separate proclamation outlining permit conditions and harvest restrictions. Since the ASMFC FMP covers the commercial quota and biomedical use, the proclamation authority proposed in the rule extends to both fisheries. A separate proclamation would be issued for each fishery under the authority of this rule.

Lastly, 15A NCAC 03M .0302 is proposed for readoption only with changes to capitalization. This rule prohibits the possession of a purse gill net on board a vessel when Spanish and king mackerel are being landed.

III. Fiscal Analysis

As the management of interjurisdictional species in North Carolina has continued by coordinating with interstate and federal regulatory bodies, the need for management via proclamation authority has emerged as a key tool in keeping up with the interstate and federal requirements that increasingly change and are difficult to predict. As a result, the suite of proposed amendments and repeals through readoption seek to conform North Carolina rule language with current practice, which simplifies management by implementing new requirements through proclamation, rather than also requiring rule suspension to meet interstate and federal harvest requirements.

As evidence of this practice, the management of the Spanish mackerel, king mackerel, bluefish, cobia, shad, and horseshoe crab fisheries are all currently augmented via proclamation, in addition to certain static requirements in rule (NCDMF, 2020). In fact, management by proclamation (as opposed to management by static rule requirements alone) has been ongoing sporadically for these species since 2013, with harvest requirements for each of these fisheries being implemented by more than one proclamation during this time to keep pace with interstate and federal requirements (C. Flora, Personal Communication, April 13, 2021). While the American and spiny lobster fisheries are not commercially active fisheries in North Carolina and proclamation authority is not currently in place, the Division is still required to conform to increasingly shifting ASMFC and SAFMC regulations, and therefore will rely on the proposed proclamation authority in each species rule to continue managing these species as they have historically been managed. Due to this, the primary role of this fiscal analysis is to assess potential impacts from simplifying the use of proclamations to conform management of interjurisdictional species with interstate and federal requirements.

a. Summary of Potential Economic Benefits

The primary economic impacts from the proposed amendments and repeals through readoption will occur as a small stream of benefits due to increased administrative efficiency. While the fisheries in question have relied on proclamation authority to align with interstate and federal

regulations dating back to 2013, the existence of management measures in rule required proclamations to contain both rule suspensions and requirements implemented in place of those rules. This requires additional procedures for the Division and the state, while rule suspension updates must also be provided to the MFC on a quarterly basis. By streamlining the management pipeline of these interjurisdictional species between interstate and federal bodies and the NCDMF, the state should expect an insignificant, non-quantifiable flow of benefits due to reduced time cost and administrative burden related to these fisheries.

b. Summary of Potential Economic Costs

Overall, the only expected impacts from the proposed rule amendments and repeals through readoption are the small stream of benefits described above. Given the consistent management of interjurisdictional species through proclamation in the past, the public is already aware of how to access shifting harvest regulation information for these species, and the proposed rules simply codify processes employed by both the Division and the public. Because of this, no costs are expected from the proposed rule amendments and repeals through readoption.

Lastly, as these rules have been continually managed through proclamation and stay current with shifting interstate and federal regulations, Marine Patrol is consistently aware of new harvest regulations or proclamations. Because of this, no additional costs to enforcement are expected.

References:

- “Atlantic Coastal Fisheries Cooperative management Act of 1993.” H.R. 2134, 103rd Congress. (1993). <https://www.congress.gov/bill/103rd-congress/house-bill/2134?s=1&r=5>.
- ASMFC (October 21, 2020). “Review of the Interstate Fishery Management Plan, Horseshoe Crab (*Limulus polyphemus*), 2019 Fishing Year.” Atlantic States Marine Fisheries Commission, Plan Review Team.
- “Magnuson–Stevens Fishery Conservation and Management Act.” H.R. 200, 94th Congress. (1976). <https://www.govinfo.gov/content/pkg/STATUTE-90/pdf/STATUTE-90-Pg331.pdf>.
- NCDMF (September 30, 2020). “Proclamations Current.” North Carolina Division of Marine Fisheries, Fisheries Management Section. Accessed at <http://portal.ncdenr.org/web/mf/proclamations-current>.
- NCDMF (November, 2015). “Fishery Management Plan for Interjurisdictional Species, Information Update.” *North Carolina Division of Marine Fisheries, Fisheries Management Section*.
- NCDMF (June, 2008). “Interjurisdictional Fisheries Management Plan.” *North Carolina Division of Marine Fisheries, Fisheries Management Section*.
- NCDMF (September, 2002). “Interjurisdictional Fisheries Management Plan.” *North Carolina Division of Marine Fisheries, Fisheries Management Section*.

Appendix I: Proposed Rules

15A NCAC 03L .0207 is proposed for readoption with substantive changes as follows:

15A NCAC 03L .0207 HORSESHOE CRABS

(a) The annual (January through December) commercial quota for North Carolina for horseshoe crabs is established by the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe Crab.

(b) The Fisheries Director may, by proclamation, impose any ~~or all~~ of the following restrictions on the taking of horseshoe crabs to maintain compliance with the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe ~~Crab~~: Crab or to implement state management measures:

- ~~(1) Specify season;~~
- ~~(2) Specify areas;~~
- ~~(3) Specify quantity;~~
- ~~(4) Specify means and methods; and~~
- ~~(5) Specify size.~~
- (1) specify time;
- (2) specify area;
- (3) specify means and methods;
- (4) specify season;
- (5) specify size; and
- (6) specify quantity.

~~(c) Horseshoe crabs taken for biomedical use under a Horseshoe Crab Biomedical Use Permit are subject to this Rule.~~

*History Note: Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52;
 Temporary Adoption Eff. August 1, 2000;
 Codifier determined that findings did not meet criteria for temporary rule on October 31, 2000;
 Temporary Adoption Eff. December 6, 2000;
 Eff. August 1, 2002;
 Amended Eff. April 1, 2011;
Readopted Eff. April 1, 2022.*

15A NCAC 03L .0301 is proposed for readoption with substantive changes as follows:

SECTION .0300 – LOBSTER

15A NCAC 03L .0301 AMERICAN LOBSTER (NORTHERN LOBSTER)

(a) It ~~is~~ shall be unlawful to possess American lobster:

- ~~(1)~~ (1) with a carapace less than 3 3/8 inches or greater than 5 1/4 inches;
- ~~(2)~~ (1) which ~~that~~ has eggs or from which eggs have been artificially removed by any method;
- ~~(3)~~ (2) meats, detached meats, detached tails or ~~claws~~ claws, or any other part of a lobster that has been separated from the lobster;
- ~~(4)~~ (3) which ~~that~~ has an outer shell which has been speared; or
- ~~(5)~~ (4) that is a V-notched female lobster. A V-notched female lobster is any female lobster that bears a notch or indentation in the base of the flipper that is at least as deep as 1/8 inch, with or without setal hairs. A V-notched female lobster is also any female lobster ~~which that~~ is mutilated in a manner ~~which that~~ would hide, ~~obscure~~ obscure, or obliterate such a ~~mark~~; or mark.
- ~~(6)~~ (6) in quantities greater than 100 per day or 500 per trip for trips five days or longer taken by gear or methods other than traps.

(b) ~~American lobster traps not constructed entirely of wood (excluding heading or parlor twine and the escape vent) must contain a ghost panel that meets the following specifications:~~

- ~~(1)~~ (1) the opening to be covered by the ghost panel shall be not less than 3 3/4 inches (9.53 cm) by 3 3/4 inches (9.53 cm);
- ~~(2)~~ (2) the panel must be constructed of, or fastened to the trap with, one of the following untreated materials: wood lath, cotton, hemp, sisal or jute twine not greater than 3/16 inch (0.48 cm) in diameter, or non-stainless, uncoated ferrous metal not greater than 3/32 inch (0.24 cm) in diameter;
- ~~(3)~~ (3) the door of the trap may serve as the ghost panel, if fastened with a material specified in this Section;
- ~~(4)~~ (4) the ghost panel must be located in the outer parlor(s) of the trap and not the bottom of the trap; and
- ~~(5)~~ (5) contains at least one rectangular escape vent per trap, 2 inches by 5 3/4 inches minimum size, or two circular escape vents per trap, with a minimum inside diameter of 2 5/8 inches.

(b) The Fisheries Director may, by proclamation, impose any of the following restrictions on the taking of American lobster to maintain compliance with the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for American Lobster or to implement state management measures:

- (1) specify time;
- (2) specify area;
- (3) specify means and methods;
- (4) specify season;
- (5) specify size; and
- (6) specify quantity.

History Note: Authority G.S. 113-134; 113-182; ~~113-221~~; 113-221.1; 143B-289.52;
 Eff. January 1, 1991;
 Amended Eff. March 1, 1996;
 Temporary Amendment Eff. August 1, 2000;
 Amended Eff. April 1, 2009; September 1, 2005; April 1, 2001;
 Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03L .0302 is proposed for re adoption with substantive changes as follows:

15A NCAC 03L .0302 SPINY LOBSTER

It is unlawful to:

- (1) ~~Possess a egg bearing spiny lobster or a spiny lobster from which eggs have been stripped, scrubbed or removed;~~
- (2) ~~Possess spiny lobster with a carapace length less than 3 inches;~~
- (3) ~~Possess aboard a vessel or land more than two spiny lobsters per person;~~
- (4) ~~Possess aboard a vessel or land detached spiny lobster tails; or~~
- (5) ~~Take spiny lobsters with a gaff hook, spear or similar device. Possession of a speared, pierced, or punctured spiny lobster is prima facie evidence that prohibited gear was used.~~

The Fisheries Director may, by proclamation, impose any of the following restrictions on the taking of spiny lobster to maintain compliance with the Fishery Management Plan for Spiny Lobster in the Gulf of Mexico and the South Atlantic or to implement state management measures:

- (1) specify time;
- (2) specify area;
- (3) specify means and methods;
- (4) specify season;
- (5) specify size; and
- (6) specify quantity.

*History Note: Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52;
Eff. January 1, 1991;
Amended Eff. March 1, 1996;
Readopted Eff. April 1, 2022.*

15A NCAC 03M .0301 is proposed for repeal through readoption as follows:

SECTION .0300 - SPANISH AND KING MACKEREL

15A NCAC 03M .0301 SPANISH AND KING MACKEREL

~~(a) Spanish Mackerel:~~

- ~~(1) It is unlawful to possess Spanish mackerel less than 12 inches fork length.~~
- ~~(2) It is unlawful to possess more than 15 Spanish mackerel per person per day taken for recreational purposes.~~
- ~~(3) It is unlawful to possess more than 15 Spanish mackerel per person per day in the Atlantic Ocean beyond three miles in a commercial fishing operation except for persons holding a valid National Marine Fisheries Service Spanish Mackerel Commercial Vessel Permit.~~

~~(b) King mackerel:~~

- ~~(1) It is unlawful to possess king mackerel less than 24 inches fork length.~~
- ~~(2) It is unlawful to possess more than three king mackerel per person per day taken for recreational purposes.~~
- ~~(3) It is unlawful to possess more than three king mackerel per person per day in the Atlantic Ocean:~~
 - ~~(A) by hook and line except for persons holding a valid National Marine Fisheries Service King Mackerel Commercial Vessel Permit; or~~
 - ~~(B) between three miles and 200 miles from the State's mean low water mark in a commercial fishing operation except for persons holding a valid National Marine Fisheries Service King Mackerel Commercial Vessel Permit.~~
- ~~(4) It is unlawful to use gill nets in the Atlantic Ocean to take more than three king mackerel per person per day south of 34° 37.3000' N (Cape Lookout).~~

~~(c) Charter vessels or head boats that hold a valid National Marine Fisheries Service Coastal Migratory Pelagic (Charter Boat and Head Boat) permit must comply with the Spanish mackerel and king mackerel possession limits established in Subparagraphs (a)(2) and (b)(2) of this Rule when fishing with more than three persons (including the captain and mate) on board.~~

~~(d) It is unlawful to possess aboard or land from a vessel, or combination of vessels that form a single operation, more than 3,500 pounds of Spanish or king mackerel, in the aggregate, in any one day.~~

*History Note: Authority G.S. 113-134; 113-182; 113-221; 143B-289.52;
Eff. January 1, 1991;
Amended Eff. March 1, 1996;
Temporary Amendment Eff. January 1, 2000; July 1, 1999;
Amended Eff. October 1, 2008; August 1, 2002; April 1, 2001;
Repealed Eff. April 1, 2022.*

15A NCAC 03M .0302 is proposed for reoption with substantive changes as follows:

15A NCAC 03M .0302 PURSE GILL NET PROHIBITED

It ~~is shall be~~ unlawful to have a purse gill net on board a vessel when taking or landing Spanish or ~~King Mackerel~~.
king mackerel.

History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Eff. January 1, 1991;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).

15A NCAC 03M .0511 is proposed for repeal through readoption as follows:

15A NCAC 03M .0511 BLUEFISH

~~It is unlawful to possess more than 15 bluefish per person per day for recreational purposes. Of these 15 bluefish, it is unlawful to possess more than five bluefish that are greater than 24 inches total length.~~

History Note: Authority G.S. 113-134; 113-182; 113-221; 143B-289.52;
Eff. March 1, 1994;
Amended Eff. March 1, 1996;
Temporary Amendment Eff. September 9, 1996;
Amended Eff. April 1, 1997;
Temporary Amendment Eff. July 1, 1999;
Amended Eff. October 1, 2008; April 1, 2003; August 1, 2000;
Repealed Eff. April 1, 2022.

15A NCAC 03M .0516 is proposed for repeal through readoption as follows:

15A NCAC 03M .0516 COBIA

- ~~(a) It is unlawful to possess cobia less than 33 inches fork length.~~
- ~~(b) It is unlawful to possess more than two cobia per person per day.~~

History Note: Authority G.S. 113-134; 113-182; 143B-289.52;
Temporary Adoption Eff. July 1, 1999;
Eff. August 1, 2000;
Repealed Eff. April 1, 2022.

15A NCAC 03M .0519 is proposed for re adoption with substantive changes as follows:

15A NCAC 03M .0519 SHAD

~~(a) It is unlawful to take American shad and hickory shad by any method except hook and line from April 15 through December 31.~~

~~(b) It is unlawful to possess more than 10 American shad or hickory shad, in the aggregate, per person per day taken by hook and line or for recreational purposes.~~

~~(c) It is shall be unlawful to take or possess American shad from the Atlantic Ocean.~~

*History Note: Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52;
Eff. October 1, 2008;
Amended Eff. April 1, 2012;
Readopted Eff. (Pending legislative review pursuant to S.L. 2019-198).*

**Rule Impact Analysis for Readoption of 15A NCAC 18A Rule Package
Pursuant to G.S. 150B-21.3A**

Rule Amendments: 15A NCAC 18A .0134, .0137-.0139, .0144, .0145, .0147-.0149, .0151-.0153, .0156-.0158, .0161, .0162, .0164-.0166, .0168, .0174-.0178, .0181-.0187, .0191

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: David Dietz, Fisheries Economics Program Manager
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
919-707-8573
David.Dietz@ncdenr.gov

Impact Summary: State government: No
Local government: No
Federal government: No
Substantial impact: No

Authority:

North Carolina General Statutes

G.S. 106-129.	Foods deemed to be adulterated.
G.S. 106-130.	Foods deemed misbranded.
G.S. 113-134.	Rules.
G.S. 113-182.	Regulation of fishing and fisheries.
G.S. 113-221.2.	Additional rules to establish sanitation requirements for scallops, shellfish, and crustacea; permits and permit fees authorized.
G.S. 113-221.4.	Embargo.
G.S. 143B-289.52.	Marine Fisheries Commission - powers and duties.
G.S. 150B-21.3A.	Periodic review and expiration of existing rules.

I. Necessity:

General Statute 150B-21.3A requires state agencies to review their existing rules every 10 years to determine which rules are still necessary, and to either readopt or repeal each rule as appropriate. The proposed amendments readopt 34 rules in 15A NCAC 18A pursuant to this requirement. These rules all relate to protocols and regulations regarding the proper storage and processing of crustacea meat, as well as the facilities that hold these products.

II. Summary

While all 34 rules proposed for readoption contain substantive changes, upon review none of these changes produce any procedural changes, and therefore no economic costs or benefits to the state are incurred. In short, all proposed changes are either intended to provide heightened clarity to rule language, or to conform rule language around crustacea meat storage, processing, and facility maintenance to that of ongoing practice by North Carolina Division of Marine

Fisheries (NCDMF) staff and licensed seafood processors and dealers. Of particular note, 15A NCAC 18A .0134 defines terms related to shellfish sanitation, and proposes four new definitions in rule. However, it was determined that these new terms simply help clarify ongoing Division practices, and result in no procedural changes as well. As these proposed changes would not affect the operations or material needs of NCDMF or outside stakeholders, there are no incurred economic impacts as well.

These rules have been reviewed to conform to the requirements of G.S. 150B-21.3A, Periodic Review and Expiration of Existing Rules. The proposed readoptions consist of amendments that are of an administrative nature to update the rules. Overall, the proposed readoptions do not result in a significant economic impact to the regulated community, state government, or other parties.

III. Introduction and Purpose of Rule Changes

Session Law 2011-145 abolished the Division of Environmental Health and transferred the Shellfish Sanitation and Recreational Water Quality section to the Division of Marine Fisheries under a Type I transfer. As a result, G.S. 130A-230 was repealed and the authority for rulemaking for the sanitation requirements for harvesting, processing and handling of scallops, shellfish and crustacea was transferred to the Marine Fisheries Commission, which is now contained in G.S. 113-221.2 and G.S. 113-221.4.

The purpose of the Marine Fisheries Commission (MFC) is to manage, restore, develop, cultivate, conserve, protect, and regulate the marine and estuarine resources within its jurisdiction, as described in G.S. 113-132, including commercial and recreational fisheries resources (Chapter 143B, Article 7, Part 5D). For the protection of public health, the MFC is also required to adopt rules establishing sanitation requirements for the harvesting, processing, and handling of scallops, shellfish, and crustacea of in-state origin. The rules of the MFC may also regulate scallops, shellfish, and crustacea shipped into North Carolina (G.S. 113-221.2).

Proposed amendments to these rules seek to accomplish two simple goals. Firstly, some proposed amendments update inconsistencies or typographical issues with rule text to increase clarity. The remaining proposed amendments seek to update rule language to conform with the current practices regarding shellfish sanitation, both by NCDMF staff and affected stakeholders. This also remains true for the four new definitions proposed in 15A NCAC 18A .0134 (“Easily Cleanable”, “Most Probable Number”, “Process Validation Study Report”, and “Retort”), which are proposed amendments that would define in rule ongoing practices by the Division. As such, all of these proposed text changes would not generate any procedural changes or economic impacts to the operations outlined in these 34 rules.

IV. Fiscal Impact Analysis

As these 34 rules are being proposed for readoption with no procedural changes, there will be no changes to the economic benefits and costs of the rules. As such, no fiscal impact will be observed from this proposed readoption package.

V. Appendix

Proposed Rules for Readoption

15A NCAC 18A .0134 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0134 DEFINITIONS

The following definitions shall apply ~~throughout to~~ this Section; however, nothing in this Section shall be construed as expanding or restricting the definitions in G.S. 106-129 and G.S. 106-130:

- (1) "Adulterated" as used in G.S. 106-129 means the following:
 - (a) ~~Any-any~~ cooked crustacea or crustacea meat that does not comply with ~~these Rules; the~~ Rules in this Section;
 - (b) ~~Any-any~~ cooked crustacea or crustacea meat ~~which-that~~ exceeds the bacteriological standards in Rule .0182 of this Section;
 - (c) ~~Any-any~~ cooked crustacea or crustacea meat ~~which-that~~ has been deemed to be an imminent hazard;
- (2) "Code date" means the date conspicuously placed on the container to indicate the date that the product was packed.
- (3) "Cook" means to prepare or treat raw crustacea by heating.
- (4) "Critical control point" means a point, ~~step-step,~~ or procedure in a food process at which a control can be applied, applied and a food safety hazard ~~can-can,~~ as a ~~result-result,~~ be prevented, ~~eliminated~~ eliminated, or reduced to acceptable levels.
- (5) "Critical limit" means the maximum or minimum value to which a physical, ~~biological-biological,~~ or chemical parameter ~~must-shall~~ be controlled at a critical control point to prevent, ~~eliminate~~ eliminate, or reduce to an acceptable level the occurrence of the identified food safety hazard.
- (6) "Crustacea meat" means the meat of crabs, lobster, ~~shrimp-shrimp,~~ or crayfish.
- (7) "Division" means the Division of ~~Environmental Health or its authorized agent,~~ Marine Fisheries.
- (8) "Easily cleanable" means a surface that is readily accessible and made of such materials, has a finish, and is so fabricated that residues may be effectively removed by normal cleaning methods.
- ~~(8)~~(9) "Food-contact surface" means the parts of equipment, including auxiliary equipment, ~~which-that~~ may be in contact with the food being processed, or ~~which-that~~ may drain into the portion of equipment with which food is in contact.
- ~~(9)~~(10) "Food safety hazard" means any biological, ~~chemical-chemical,~~ or physical property that may cause a food to be unsafe for human consumption.
- ~~(10)~~(11) "Foreign" means any place or location outside the United States.
- ~~(11)~~(12) "Fresh crustacea" means a live, ~~raw-raw,~~ or frozen raw crab, lobster, ~~shrimp-shrimp,~~ or crayfish ~~which-that~~ shows no decomposition.
- ~~(12)~~(13) "HACCP plan" means a written document that delineates the formal procedures a dealer follows to implement food safety controls.
- ~~(13)~~(14) "Hazard analysis critical control point (HACCP)" means a system of inspection, ~~control-control,~~ and monitoring measures initiated by a dealer to identify microbiological, ~~chemical-chemical,~~ or physical food safety hazards ~~which-that~~ are likely to occur in shellfish products produced by the dealer.

- ~~(14)~~(15) "Imminent hazard" means a situation ~~which that~~ is likely to cause an immediate threat to human life, an immediate threat of serious physical injury, an immediate threat of serious physical adverse health effects, or a serious risk of irreparable damage to the environment if no immediate action is taken.
- ~~(15)~~(16) "Internal temperature" means the temperature of the product as opposed to the ambient temperature.
- ~~(16)~~(17) "Misbranded" as used in G.S. 106-130 means any container of cooked crustacea or crustacea meat ~~which that~~ is not labeled in compliance with ~~these Rules.~~ the Rules in this Section.
- (18) "Most probable number (MPN)" means a statistical estimate of the number of bacteria per unit volume and is determined from the number of positive results in a series of fermentation tubes.
- ~~(17)~~(19) "Operating season" means the season of the year during which a crustacea product is processed.
- ~~(18)~~(20) "Pasteurization" means the process of heating every particle of crustacea meat in a hermetically-sealed ~~401 by 301 one pound~~ container to a temperature of at least ~~185°F (85°C).~~ 185° F (85° C) and holding it continuously at or above this temperature for at least one minute at the geometric center of a container in properly operated equipment. equipment being operated in compliance with the Process Validation Study Report. The term includes any other process ~~which that~~ has been found equally effective by the Division.
- ~~(19)~~(21) "Pasteurization date" means a code conspicuously placed on the container to indicate the date that the product was pasteurized.
- (20) ~~"Person" means an individual, corporation, company, association, partnership, unit of government or other legal entity.~~
- (22) "Process Validation Study Report" means a report of tests that shows a piece of equipment can produce time-temperature results as required by the Rules of this Section, and the procedures required to achieve such results.
- ~~(21)~~(23) "Processing" means any of the following operations when carried out in conjunction with the cooking of crustacea or crustacea meat: receiving, refrigerating, air-cooling, picking, packing, repacking, thermal processing, or pasteurizing.
- ~~(22)~~(24) "Repacker" means a facility ~~which that~~ repacks cooked crustacea meat into other containers.
- ~~(23)~~(25) "Responsible person" means the individual present in a cooked crustacea facility who is the apparent supervisor of the cooked crustacea facility at the time of the inspection. If no individual is the apparent supervisor, then any employee is the responsible person.
- (26) "Retort" means a pressure vessel used to cook raw crustacea.
- ~~(24)~~(27) "Sanitize" means a bactericidal treatment by a process ~~which meets the temperature and chemical concentration levels in 15A NCAC 18A .2619.~~ to treat food contact surfaces by a process that is effective in:
- (a) destroying vegetative cells of microorganisms of public health significance;
 - (b) substantially reducing the numbers of other undesirable microorganisms; and
 - (c) not adversely affecting the product or its safety for the consumer.
- ~~(25)~~ ~~"Standardization report" means a report of tests which show that a piece of equipment can produce time/temperature results as required by these Rules.~~
- ~~(26)~~(28) "Thermal processing" means the heating of previously cooked crustacea or crustacea meat to a desired temperature for a specified time ~~at the geometric center of a container in properly operated equipment.~~ equipment being operated in compliance with the Process Validation Study Report.

History Note: Authority G.S. 106-129; 106-130; 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52; Eff. October 1, 1992;

Amended Eff. August 1, 2000; August 1, 1998; February 1, 1997;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0137 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0137 GENERAL REQUIREMENTS FOR OPERATION

- (a) During the operating season the processing portion of the facility shall be used for no purpose other than the processing of cooked crustacea or crustacea meat.
- (b) Retail sales of cooked crustacea or crustacea meat shall not be made from any processing portion of the facility.
- (c) Accurate records of all purchases and sales of crustacea and crustacea meat shall be maintained for one year. The records shall be available for inspection by the ~~Division~~ Division of Marine Fisheries.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Amended Eff. April 1, 1997.
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0138 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0138 SUPERVISION

(a) The owner or responsible person shall supervise the processing operation and be responsible for compliance with the rules of this ~~Section.~~ Section, including compliance with personal hygiene requirements as set forth in Rule .0153 of this Section.

(b) No unauthorized persons shall be allowed in the facility during the periods of operation.

~~(c) The owner or responsible person shall observe employees daily to ensure compliance with Rule .0153 of this Section.~~

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0139 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0139 FACILITY FLOODING

(a) If the facility floors are flooded, processing shall be discontinued until flood waters have receded and the facility and equipment are cleaned and sanitized.

(b) Any cooked crustacea or crustacea meat ~~which that~~ may have been contaminated by flood waters shall be deemed adulterated and disposed of in accordance with G.S. ~~130A-21(e)~~ 113-221.4 and Rule .0181 of this Section.

History Note: Authority G.S. ~~130A-230~~; 113-134; 113-182; 113-221.2; 113-221.4; 143B-289.52;

Eff. October 1, 1992;

Readopted Eff. April 1, 2022.

15A NCAC 18A .0144 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0144 INSECT CONTROL

All outside openings shall be screened, provided with wind ~~curtains~~curtains, or be provided with other methods to eliminate the entrance of insects. All screens shall be kept in good repair. All outside doors shall open outward and shall be self-closing. The use and storage of pesticides shall comply with all applicable State and Federal laws and rules.

History Note: Authority G.S. ~~130A-230~~113-134; 113-182; 113-221.2; 143B-289.52;

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0145 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0145 RODENT AND ANIMAL CONTROL

Measures shall be taken by the owner or responsible person to keep animals, fowl, rodents, and other vermin out of the facility. The storage and use of rodenticides shall comply with all applicable State and Federal laws and rules.

History Note: *Authority G.S. ~~130A-230~~; 113-134; 113-182; 113-221.2; 143B-289.52;*

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0147 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0147 WATER SUPPLY

(a) The water supply used shall be in accordance with ~~15A NCAC 18A .1700-~~15A NCAC 18A .1720 through .1728.

~~(b) A cooked crustacea facility using a non-community water supply shall be listed with the Public Water Supply Section, Division of Environmental Health.~~

~~(b)~~ Water samples for bacteriological analysis shall be collected at least annually by the Division of Marine Fisheries and submitted to ~~the Laboratory Division of the Department or another~~ a laboratory certified by the Department for potable water testing in the State of North Carolina for analysis.

~~(c)~~ Cross-connections with unapproved water supplies are prohibited. Hot and cold running water under pressure shall be provided to food preparation, ~~utensils-utensils,~~ and handwashing areas and any other areas in which water is required for cleaning. Running water under pressure shall be provided in sufficient quantity to carry out all food preparation, utensil washing, hand washing, ~~cleaning-cleaning,~~ and other water-using operations.

History Note: Authority ~~G.S. 130A-230;~~113-134; 113-182; 113-221.2; 143B-289.52;

Eff. October 1, 1992;

Amended Eff. April 1, 1997;

Readopted Eff. April 1, 2022.

15A NCAC 18A .0148 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0148 ICE

- (a) Ice shall be obtained from a water supply approved by the Division of Marine Fisheries pursuant to Rule .0147 of this Section and shall be stored and handled ~~in accordance with these Rules~~ in a manner to prevent contamination.
- (b) All equipment used in the handling of ice shall be used for no other purpose and shall be cleaned and sanitized at least once each day the facility is in operation.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0149 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0149 PLUMBING

- (a) Plumbing fixtures shall be located to facilitate the flow of processing activities and to prevent the splashing of water on food-contact surfaces or cooked crustacea and crustacea meat.
- (b) Fixtures, ~~ducts~~ ducts, and pipes shall not be suspended over working areas.
- (c) Handwash lavatories shall be located so that the supervisor can readily observe that employees wash and sanitize their hands before beginning work and after each interruption.
- (d) Handwash lavatories shall be provided in the following locations:
 - (1) ~~Packing~~ packing room or ~~area~~ area;
 - (2) ~~Toilet~~ toilet or lounge ~~area~~ area; and
 - (3) ~~Picking~~ picking room.
- (e) At least one handwash lavatory shall be provided for every 20 employees among the first 100 employees and at least one handwash lavatory shall be provided for every 25 employees in excess of the first 100 employees.
- (f) Additional lavatories required by Paragraph (e) of this Rule shall be located in the picking room.
- (g) A container shall be located near each handwash lavatory in the picking room and packing room or area to sanitize hands in a solution containing at least 100 parts per million (ppm) of available chlorine or other equally effective bactericide. A ~~suitable~~ testing method or equipment approved by the Division of Marine Fisheries shall be available and ~~regularly~~ used to test chemical sanitizers to ~~insure~~ ensure minimum prescribed strengths.
- (h) Soap and single service towels in protected dispensers, or other approved hand drying devices, shall be available near the handwash lavatories.
- (i) All pre-cool rooms, picking rooms, packing rooms or areas, and cooking areas shall be provided with ~~hose~~ bibs and wash down hoses. Storage racks shall be provided to keep the hoses elevated off the floor when not in use.
- (j) An automatically regulated hot-water system shall be provided to furnish a sufficient volume of hot water with a temperature of at least 130° F (54.5° C) to carry out all processing operations.
- (k) All handwash lavatories and sinks shall be equipped with mixing faucets.
- (l) A three-compartment sink with drainboards, large enough to wash the largest utensils used in the facility, shall be located in the picking room near the delivery shelf. One three-compartment sink, with drainboards, shall be provided for every 50 employees or fraction thereof.
- (m) The floor drains in coolers shall not be connected directly to a sewer in processing or repacking facilities constructed after October 1, 1992.

History Note: Authority G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0151 is proposed for re Adoption with substantive changes as follows:

15A NCAC 18A .0151 TOILETS

- (a) Toilets shall be provided by the owner or responsible person in the facility; ~~however, privies may be substituted for toilets when the conditions in Paragraph (d) of this Rule are met.~~ facility.
- (b) Toilet tissue shall be ~~provided.~~ provided by the owner or responsible person in a holder.
- (c) Toilet room doors shall not open directly into processing areas of the facility and shall be self-closing.
- (d) ~~Only privies that meet the requirements of Section 1900 of this Subchapter and that were in place at a processing or repacking facility prior to October 1, 1992 may be used at the facility after October 1, 1992.~~

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0152 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0152 SOLID WASTE

- (a) Cooked crustacea scrap and other putrescible wastes shall be removed from the premises at least daily. Other solid wastes shall be removed from the premises at least weekly.
- (b) Scrap containers shall be removed from the picking room immediately after filling and placed in storage areas approved by the ~~Division~~ Division of Marine Fisheries.
- (c) Scrap containers shall be non-corrosive and cleaned at least daily.
- (d) Scrap containers shall be cleaned in an area approved by the Division.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.

15A NCAC 18A .0153 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0153 PERSONAL HYGIENE

- (a) All employees shall wash their hands with soap and running water before beginning work and again after each interruption. Signs to this effect shall be posted in conspicuous places in the facility by the ~~owner~~ owner or responsible person.
- (b) All persons handling cooked crustacea or crustacea meat shall sanitize their hands before beginning work and again after each interruption.
- (c) All persons employed or engaged in the handling, ~~picking~~ picking, or packing of cooked crustacea or crustacea meat shall wear clean, washable outer clothing.
- (d) Employees shall not eat food, ~~drink nor~~ drink, or use tobacco in any form in the areas where cooked crustacea or crustacea meat are stored, ~~processed~~ processed, or handled.
- (e) Any person known to be a carrier of any disease which can be transmitted through the handling of cooked crustacea or crustacea meat or who has an infected wound or open lesion on any exposed portion of the body shall be prohibited from handling cooked crustacea or crustacea meat.
- (f) Hair restraints shall be worn by all employees who handle cooked crustacea or crustacea meat.
- (g) The arms of personnel who pick or pack cooked crustacea or crustacea meat shall be bare to the elbow or covered with an arm guard approved by the ~~Division~~ Division of Marine Fisheries.
- (h) Personnel who pick and pack cooked crustacea or crustacea meat shall have ~~clean~~ clean, short ~~finger~~ fingernails, fingernails free from nail polish and shall not wear jewelry other than easily cleanable rings. The use of absorbent wraps or absorbent finger cots shall not be permitted.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.

15A NCAC 18A .0156 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0156 EQUIPMENT AND UTENSIL CONSTRUCTION

All processing equipment and utensils shall be smooth, easily cleanable, ~~durable~~ durable, and kept in good repair. The food-contact surfaces of equipment, ~~utensils~~ utensils, and processing machinery shall be easily accessible for cleaning, non-toxic, non-corrosive, ~~non-absorbent~~ non-absorbent, and free of open seams.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.

15A NCAC 18A .0157 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0157 FACILITY AND EQUIPMENT SANITATION

- (a) The walls and floors in the picking and packing areas shall be kept clean while operating and shall be sanitized at least daily and whenever there is evidence of contamination.
- (b) All food-contact surfaces shall be washed, ~~rinsed~~rinsed, and sanitized prior to starting operation each day and whenever there is evidence of contamination.
- (c) Reusable picking containers and knives shall be washed, ~~rinsed~~rinsed, and sanitized each time crustacea meat is delivered to the packing room.
- (d) Sanitizing methods ~~are~~shall be as follows:
- (1) ~~By~~by steam in a steam chamber or box equipped with an indicating thermometer located in the coldest zone, ~~by~~with exposure to a temperature of 170° F (77° C) for at least 15 minutes or to a temperature of 200° F (93° C) for at least five minutes.
 - (2) ~~By~~by immersion for at least one minute in the third compartment in clean hot water at a temperature of at least 170° F (77° C). A thermometer accurate to ~~3° F~~3° F (1.5° C) shall be available to the compartment. Where hot water is used for bactericidal treatment, a booster heater that maintains a water temperature of at least 170° F (77° C) in the third compartment at all times when utensils are being washed shall be provided. The heating device may be integral with the immersion compartment.
 - (3) ~~By~~by immersion for at least one minute in, or exposure for at least one minute to a constant flow of, a solution containing not less than 100 ppm chlorine residual. Utensils and equipment ~~which that~~ have to be washed in place will require washing, ~~rinsing~~rinsing, and sanitizing.
 - (4) ~~By~~by other equivalent products and procedures approved in 21 CFR 178.1010 "Sanitizing solutions" ~~from the "Food Service Sanitation Manual" published by the U.S. Food and Drug Administration, 21 CFR 178.1010 solutions", which~~ is hereby incorporated by reference including any subsequent amendments and editions. ~~This material is available for inspection, and copies may be obtained at no cost, at the Shellfish Sanitation Branch, 3441 Arendell Street, P.O. Box 769, Morehead City, North Carolina 28557. A copy of the reference material can be found at https://www.ecfr.gov/cgi-bin/retrieveECFR?gp=1&SID=17d119b223f9451322279713caa2e6ab&ty=HTML&h=L&mc=true&n=pt21.3.178&r=PART#se21.3.178_11010, at no cost. A suitable~~ Division of Marine Fisheries approved testing method or equipment shall be available and regularly used to test chemical sanitizers to ~~insure~~ensure minimum prescribed strengths.

*History Note: Authority G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0158 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0158 EQUIPMENT STORAGE

Equipment and utensils that have been cleaned and sanitized shall be stored in a manner to protect against contamination.

History Note: Authority G.S. ~~130A-230;~~113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.

15A NCAC 18A .0161 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0161 CRUSTACEA COOKING

- (a) The cooking area or room shall be under a roof located between the area for receiving raw crustacea and the air-cool room and shall be vented to assure the removal of steam.
- (b) Crustacea shall be cooked in accordance with the following:
- (1) Crabs shall be cooked under steam pressure until the internal temperature of the center-most crab reaches 235° F (112.8° C). Temperature shall be measured with an accurate, indicating thermometer having a range of 170-270° F (77-132° C).
 - (2) Other crustacea shall be cooked until the internal temperature of the center-most crustacean reaches 180° F (83° C) and is held at this temperature for one minute. Temperature shall be measured with an accurate, indicating thermometer. Crayfish shall be culled and cleaned prior to cooking.
 - (3) Nothing in this Rule shall prohibit any other cooking process ~~which that~~ has been found equally effective and approved by the ~~Division~~ Division of Marine Fisheries.
- (c) The retort shall be constructed to permit a working pressure of at least 20 pounds per square inch (psig). Steam inlet and venting shall provide a uniform and complete distribution of steam. Venting shall be sufficient to permit complete elimination of air from the retort. Drains and vents shall be located at least two feet above mean high tide.
- (d) The retorts shall be equipped with:
- (1) ~~An an~~ an accurate, indicating thermometer with a range that will include 170-270° F (77-132° C) and located with the sensor extending into the heat ~~chamber, chamber;~~
 - (2) ~~An an~~ an operating pressure indicator, at least three inches in diameter, with a 0-30 psig range and located adjacent to the indicating ~~thermometer, thermometer; and~~
 - (3) ~~A a~~ a safety valve operational at 18-30 psig, located in the upper portion of the retort, protected from ~~tampering, tampering,~~ and designed to prevent injury to the operator.
- (e) The boiler shall be of such capacity as to maintain 45 to 100 psig during cooking. The steam line from the boiler to the retort shall be at least one and one-fourth inch inside diameter.
- (f) Overhead hoists shall be equipped with chain bags or other means of preventing foreign material from falling onto the cooked product.
- (g) Retort cooking baskets shall be of stainless steel or equally impervious, ~~non-corrosive non-corrosive,~~ and durable material, and shall be designed to allow for equal steam disbursement, ease of handling, ~~dumping, dumping,~~ and cleaning.
- (h) All construction or replacement of retorts after October 1, 1992 shall be "flow-through" type and ~~opening open~~ directly into the air-cool room or a protected passageway into the air-cool room.
- (i) All construction of new or replacement retorts shall require a Process Validation Study Report approved by the Division prior to use.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0162 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0162 COOKED CRUSTACEA AIR-COOL

(a) Cooked crustacea, after removal from the retort, shall be moved immediately to the cooked crustacea ~~air-cool~~air-cool area to be air cooled to ambient temperature without being disturbed. Cooked crustacea shall be stored in the original cooking basket.

(b) The construction and arrangement of the air-cool room shall be designed to provide protection from contamination of the cooked crustacea. The air-cool room shall open directly into the cooked crustacea cooler or other protected area.

History Note: Authority ~~G.S. 130A-230;~~113-134; 113-182; 113-221.2; 143B-289.52;

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0164 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0164 COOKED CRUSTACEA PICKING

- (a) The picking operation shall be conducted in a manner to prevent contamination.
- (b) All cooked crustacea shall be picked before a new supply is delivered to the picking table.
- (c) Picked crustacea meat shall be delivered to the packing room at least every 90 minutes or upon the accumulation of five pounds per ~~picker~~picker, whichever is sooner.
- (d) Paper towels used at the picking table shall be discarded after initial use.
- (e) If provided, bactericidal solutions at picking tables shall be maintained at 100 ppm chlorine solution or an equivalent bactericidal solution. A testing method or equipment approved by the Division of Marine Fisheries to ~~insure~~ ensure minimum prescribed strengths shall be available and used to test chemical sanitizers.
- (f) Handles of picking knives shall not be covered with any material.
- (g) Crustacea shall be cooked and picked in the same permitted facility unless a written plan for interfacility shipment has been filed with the Division. The plan shall address and be approved based ~~upon~~on the following:
 - (1) ~~time-temperature;~~ time-temperature requirements;
 - (2) ~~shipping destination;~~ shipping destination;
 - (3) handling;
 - (4) labeling;
 - (5) records;
 - (6) processing;
 - (7) sanitation; and
 - (8) HACCP plan.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Temporary Amendment Eff. July 1, 2000;
Temporary Rule Expired on March 12, 2001;
Amended Eff. August 1, 2002.
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0165 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0165 PACKING

- (a) Crustacea meat shall be packed in a ~~container, container and~~ iced and cooled to an internal temperature of 40° F (4.4° C) or below within two hours of receipt in the packing room.
- (b) The storage of ice in the packing room shall be in an easily cleanable, non-corrosive, non-toxic container.
- (c) Blending or combining of any of the following shall be prohibited:
 - (1) ~~Fresh-fresh~~ crustacea ~~meat-meat~~;
 - (2) ~~Frozen-frozen~~ crustacea ~~meat-meat~~;
 - (3) ~~Pasteurized-pasteurized~~ crustacea ~~meat-meat~~; and
 - (4) ~~Crustacea-crustacea~~ meat packed in another facility.
- (d) Clean shipping containers shall be provided by the owner or responsible person for storing and shipping of packed crustacea meat.
- (e) The return of overage of crustacea meat to a picker shall be prohibited.
- (f) Washing of picked crustacea meat shall be under running potable water. The crustacea meat shall be ~~thoroughly~~ drained prior to packing.
- (g) Any substance added to cooked crustacea or crustacea meat shall be approved and labeled according to Federal and State rules and regulations.
- (h) Only those individuals responsible for packing the crustacea or crustacea meat shall be allowed in the packing room or area.

History Note: Authority G.S. ~~130A-230~~; 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992.
Readopted Eff. April 1, 2022.

15A NCAC 18A .0166 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0166 PICKED CRUSTACEA MEAT REFRIGERATION

- (a) The refrigeration room or ice box shall be of sufficient size so that a full day's production, with ice, can be ~~properly~~ stored in a sanitary manner and shall be equipped with an accurate, operating thermometer.
- (b) Ice boxes shall be easily cleanable, non-corrosive, and non-toxic with an impervious lining and a drain.
- (c) Picked crustacea meat shall be stored ~~between 33° F (0.5° C) and 40° F (4.4° C).~~ at 40° F (4.4° C) or below.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0168 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0168 SINGLE-SERVICE CONTAINERS

- (a) Single-service containers used for packing or repacking cooked crustacea and crustacea meat shall be made from ~~food safe~~ food-safe materials approved by the United States Food and Drug Administration.
- (b) Containers shall not be reused for packing or repacking cooked crustacea and crustacea meat.
- (c) No person shall use containers bearing a permit number other than the number assigned to the facility.
- (d) Each container or lid shall be legibly impressed, ~~embossed~~ embossed, or lithographed with the name and address of the original packer, ~~repacker~~ repacker, or distributor. The original packer's or repacker's permit number preceded by the state abbreviation shall be legibly impressed, ~~embossed~~ embossed, or lithographed on each container or lid.
- (e) Each container or lid shall be permanently and legibly identified with a code date.
- (f) All containers and lids shall be stored and handled ~~in accordance with these Rules, in a manner to prevent contamination,~~ sanitized by a procedure as stated in Rule .0157 of this Section-Section, and drained prior to filling.
- (g) All containers shall be sealed so that tampering can be detected. The words "Sealed For Your Protection" or equivalent shall be prominently displayed on the container or lid.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~

Eff. October 1, 1992;

Amended Eff. August 1, 1998; February 1, 1997.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0174 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0174 PASTEURIZATION PROCESS CONTROLS - THERMOMETERS

- (a) All pasteurizing equipment shall have a time-temperature recording thermometer with a temperature controller (combined or separately) and an indicating thermometer. The thermometers shall be located to give a true representation of the operating temperature of the water bath. The recording thermometer chart shall be at least a 12-hour chart and at least 10 inches in diameter.
- (b) The recording thermometer shall be installed so that it will be protected from vibration and from striking by loading operations or facility traffic. The thermometer mechanism shall be protected from moisture under prevailing conditions. The thermometer case shall not be opened during the pasteurizing cycle, except for temperature check or for emergency or repair. A record shall be made when the thermometer case has been opened.
- (c) The recording thermometer shall have a range of at least 120-220° F (48.9-104.4° C). It shall be accurate within plus or minus 1° F between 160° F (71° C) and 200° F (93° C). The chart shall be scaled at a maximum of 2° F intervals in the range of 160° F (71° C) and 200° F (93° C).
- (d) The indicating thermometer shall be a thermometer with an accuracy and readability of plus or minus 1° F between 160° F (71° C) and 200° F (93° C). The thermometer shall be protected against damage.
- (e) The recording thermometer shall be equipped with a spring-operated or electrically operated clock. The recorded elapsed time as indicated by the chart rotation shall not exceed the true elapsed time as shown by an accurate watch. The rotating chart support shall be provided with pins upon which the chart shall be affixed by puncturing the chart.
- (f) The pasteurization unit shall not be operated without a recording thermometer chart in place, the pen in contact with the ~~chart~~ chart, and an inked record being made of the operating time-temperature cycle. ~~Any indication of falsification of a thermometer chart shall constitute a violation. Falsification of a thermometer chart shall not occur.~~ A permanent file of the used thermometer charts shall be maintained by the pasteurizer and kept available for inspection by the Division of Marine Fisheries for a period of one year. The following information shall be recorded within the confines of the pen markings after the pasteurization cycle has been completed:
- (1) ~~Date~~ date of pasteurization.
 - (2) ~~Quantity~~ quantity of each batch pasteurized (pounds of crustacea meat or number and size of containers).
 - (3) ~~Processor's~~ processor's code of each pack.
 - (4) ~~If~~ if the pasteurizer processes crustacea meat for someone else, then the packer's name, ~~address~~ address, and permit number ~~must~~ shall be recorded. A copy of the recording chart shall be provided to the owner of the crustacea meat.
 - (5) ~~Notation~~ notation of mechanical or power failure or opening of the recording thermometer case for adjustment or repair during the pasteurizing cycle.
 - (6) ~~After~~ after the optimum temperature in the water bath has been reached and during the holding time, the reading of the indicating thermometer and the time of reading shall be recorded on the chart.
 - (7) ~~Signature~~ signature of the pasteurizer operator.
- (g) A constant flow steam control valve is required, if steam is used as a source of heat.
- (h) The water bath shall be provided with effective agitation to maintain a uniform temperature.
- (i) Other technologies that provide the data, ~~information~~ information, and records as required in this Rule may be used if approved by the Division.

History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Amended Eff. April 1, 1997;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0175 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0175 PREPARATION OF CRUSTACEA MEAT FOR PASTEURIZATION

The preparation of crustacea meat for pasteurization shall be in compliance with the following:

- (1) ~~Crustacea~~ crustacea meat shall be prepared in compliance with Rules .0134 through .0183 of this Section.
- (2) ~~The~~ the containers of crustacea meat shall be sealed as quickly as possible after the crustacea meat is picked.
- (3) ~~The~~ the sealed ~~container~~ containers of crustacea meat shall be placed immediately in ice and refrigerated until pasteurized.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Amended Eff. April 1, 1997;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0176 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0176 PASTEURIZATION OF CRUSTACEA MEAT

(a) All pasteurization operations shall require a Process Validation Study Report approved by the Division of Marine Fisheries prior to operation.

(b) The pasteurization of crustacea meat shall be conducted in compliance with the following:

- (1) The the minimum pasteurization specifications shall be the raising of the internal temperature of the container heating every particle of crustacea meat in a hermetically-sealed container to a temperature of at least 185° F (85° C) and holding it continuously at that or above this temperature for at least one minute at the geometric center of a container. container in equipment being operated in compliance with the Process Validation Study Report. Each set of pasteurizing equipment shall be standardized so that the minimum pasteurization procedure in this Subparagraph can be obtained. The pasteurization procedure shall be performed in accordance with the standardization report. This process. A copy of the procedures for operating the pasteurizing equipment shall also be posted adjacent to the pasteurization vat. The pasteurizer shall keep on file the standardization report on file and shall provide the Division a copy of such report.
- (2) Alteration alteration of the equipment or loading of containers shall require the procedure be restandardized. a new Process Validation Study Report.
- (3) The the containers of crustacea meat shall be cooled to 50° F (10° C) or below within three hours. hours of the completion of pasteurization.
- (4) Refrigerated refrigerated storage shall be provided for the cooled crustacea meat and shall maintain a storage temperature at or below 36° F (2.2° C). 38° F (3.3° C).

*History Note: Authority G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Amended Eff. August 1, 1998;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0177 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0177 LABELING OF PASTEURIZED CRUSTACEA MEAT

Labeling of pasteurized crustacea meat shall be in compliance with the following:

- (1) ~~The the~~ label used shall clearly identify the contents of the container as pasteurized crustacea meat.
- (2) ~~Each each~~ container shall be permanently and legibly identified with a code indicating the batch and day of processing.
- (3) ~~The the~~ words "Perishable-Keep Under ~~Refrigeration~~", or equivalent, Refrigeration" or equivalent shall be prominently displayed on the container.
- (4) ~~The the~~ original packer's or repacker's permit number preceded by the state abbreviation shall be legibly impressed, ~~embossed-embossed~~, or lithographed on each container. Each container shall be legibly impressed, ~~embossed-embossed~~, or lithographed with the name and address of the original packer, ~~repacker-repacker~~, or distributor.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0178 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0178 INTERFACILITY PASTEURIZATION PROCEDURES

No person shall initiate interfacility pasteurization of crustacea meat without prior written approval by the ~~Division~~. Division of Marine Fisheries. ~~Interfacility pasteurization of crustacea meat shall be in conjunction-compliance~~ with the following:

- (1) ~~Crustacea~~ crustacea meat shall be packed, ~~labeled~~ labeled, and refrigerated in compliance with Rules .0134 through .0182 of this Section. Records shall be maintained to identify each batch of crustacea meat pasteurized.
- (2) ~~Crustacea~~ crustacea meat shall be shipped in an enclosed, easily cleanable vehicle at a temperature ~~between 33° F (0.5° C) and of 40° F (4.4° C).~~ 40° F (4.4° C) or below.
- (3) ~~Crustacea~~ crustacea meat shall be pasteurized in compliance with Rules .0175 through .0177 of this Section. The pasteurizer shall provide a copy of each pasteurization chart to the original packer.

History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Readopted Eff. April 1, 2022.

15A NCAC 18A .0181 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0181 EMBARGO OR DISPOSAL OF COOKED CRUSTACEA OR CRUSTACEA MEAT

(a) When it has been determined by the Division of Marine Fisheries that cooked crustacea or crustacea meat have not been stored, transported, handled, cooked, picked, ~~packed~~ packed, or offered for sale in compliance with this Section, the cooked crustacea or crustacea meat shall be deemed adulterated.

(b) Cooked crustacea or crustacea meat ~~prepared for sale to the public~~ determined to be adulterated or ~~misbranded~~, misbranded shall be subject to embargo or disposal by the Division in accordance with G.S. 113-221.4. ~~130A-21(e)~~. ~~The Division may embargo, condemn, destroy or otherwise dispose of all cooked crustacea or crustacea meat found to be adulterated or misbranded.~~

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 113-221.4, 143B-289.52;~~

Eff. October 1, 1992;

Amended Eff. April 1, 1997;

Readopted Eff. April 1, 2022.

15A NCAC 18A .0182 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0182 BACTERIOLOGICAL AND CONTAMINATION STANDARDS

- (a) Cooked crustacea or crustacea meat shall not exceed Escherichia coli Most Probable Number (MPN) of 36 per 100 grams of sample or exceed a standard plate count of 100,000 per gram.
- (b) Pasteurized crustacea meat shall contain no Escherichia coli or fecal coliform. Samples of pasteurized crustacea meat, taken within 24 hours of pasteurizing, shall not have a standard plate count of more than 3,000 per gram.
- (c) Thermally processed crustacea or crustacea meat shall not exceed Escherichia coli MPN of 36 per 100 grams of sample or exceed a standard plate count of 100,000 per gram.
- (d) Cooked crustacea or crustacea meat shall not be handled in a manner to make it an imminent hazard.
- (e) Cooked crustacea or crustacea meat found not complying with the standards as ~~stated~~ set forth in Paragraph (a), (b), ~~(c)~~, or (d) of this Rule may be deemed adulterated by the ~~Division~~ Division of Marine Fisheries.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. October 1, 1992;
Amended Eff. August 1, 1998; February 1, 1997;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0183 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0183 ALTERNATIVE LABELING

A durable label, permanently affixed to the ~~container~~container, may be used to meet any labeling requirement in this Section.

History Note: Authority G.S. ~~130A-230~~113-134; 113-182; 113-221.2; 143B-289.52;

Eff. October 1, 1992.

Readopted Eff. April 1, 2022.

15A NCAC 18A .0184 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0184 THERMAL PROCESSING CONTROLS - THERMOMETERS

(a) All thermal processing equipment shall have a time-temperature recording thermometer with a temperature controller (combined or separately) and an indicating thermometer. The thermometers shall be located to give a true representation of the operating temperature of the process. The recording thermometer chart shall be at least a 12-hour chart and at least 10 inches in diameter.

(b) The recording thermometer shall be installed so that it will be protected from vibration and from striking by loading operations or facility traffic. The thermometer mechanism shall be protected from moisture under prevailing conditions. The thermometer case shall not be opened during the thermal processing cycle, except for temperature check or for emergency or repair. A record shall be made when the thermometer case has been opened.

(c) The recording thermometer shall have a range of at least 120-220° F (48.9-104.4° C). It shall be accurate within plus or minus 1° F between 160° F (71° C) and 200° F (93° C). The chart shall be scaled at a maximum of 2° F intervals in the range of 160° F (71° C) and 200° F (93° C).

(d) The indicating thermometer shall be a thermometer with an accuracy and readability of plus or minus 1° F between 160° F (71° C) and 200° F (93° C). The thermometer shall be protected against damage.

(e) The recording thermometer shall be equipped with a spring-operated or electrically operated clock. The recorded elapsed time as indicated by the chart rotation shall not exceed the true elapsed time as shown by an accurate watch. The rotating chart support shall be provided with pins upon which the chart shall be affixed by puncturing the chart.

(f) The thermal processing unit shall not be operated without a recording thermometer chart in place, the pen in contact with the ~~chart chart~~, and an inked record being made of the operating time-temperature cycle. ~~Any indication of falsification of a thermometer chart shall constitute a violation. Falsification of a thermometer chart shall not occur.~~ A permanent file of the used thermometer charts shall be maintained by the thermal processor and kept available for inspection by the Division of Marine Fisheries for a period of one year. The following information shall be recorded within the confines of the pen markings after the thermal processing cycle has been completed:

- (1) ~~Date~~ date of thermal processing.
- (2) ~~Quantity~~ quantity of each batch thermally processed (pounds of crustacea meat or number and size of containers).
- (3) ~~Thermal~~ thermal processor's code of each pack.
- (4) ~~If~~ if the thermal processor processes crustacea meat for someone else, then the packer's name, ~~address~~ address, and permit number ~~must~~ shall be recorded. A copy of the recording chart shall be provided to the owner of the crustacea meat.
- (5) ~~Notation~~ notation of mechanical or power failure or opening of the recording thermometer case for adjustment or repair during the thermal processing cycle.
- (6) ~~After~~ after the optimum temperature in the thermal process has been reached and during the holding time, the reading of the indicating thermometer and the time of reading shall be recorded on the chart.
- (7) ~~Signature~~ signature of the thermal process operator.

(g) A constant flow steam control valve is required, if steam is used as a source of heat.

(h) The thermal processing unit shall be provided with effective and uniform temperature.

(i) Other technologies that provide the data, ~~information~~ information, and records as required in this Rule may be used if approved by the Division.

History Note: Authority G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;

Eff. April 1, 1997;

Readopted Eff. April 1, 2022.

15A NCAC 18A .0185 is proposed for readoption with substantive changes as follows:

15A NCAC 18A .0185 THERMAL PROCESSING OF CRUSTACEA AND CRUSTACEA MEAT

(a) All thermal processing operations shall require a Process Validation Study Report approved by the Division of Marine Fisheries prior to operation.

(b) The thermal processing of crustacea or crustacea meat shall be conducted in compliance with the following:following procedures:

- (1) ~~The the~~ minimum thermal processing specifications shall be the ~~raising of the internal heating of previously cooked~~ temperature of the container of crustacea or crustacea meat to a desired temperature and for a specified time at the geometric center of a container. ~~container in equipment being operated in compliance with the Process Validation Study Report. Each set of thermal processing equipment shall be standardized so that the minimum procedure can be obtained. The thermal process procedure shall be performed in accordance with the standardization report. This process.~~ A copy of the procedures for operating the thermal processing equipment shall also be posted adjacent to the thermal processing unit. The thermal processor shall keep on file the standardization report on file and shall provide the Division a copy of such report.
- (2) ~~Alteration~~ alteration of the equipment or loading of containers shall require ~~the procedure be restandardized.~~ a new Process Validation Study Report.
- (3) ~~The the~~ containers of crustacea or crustacea meat shall be cooled to 50° F (10° C) or below within ~~three hours.~~ hours of the completion of the thermal process.
- (4) ~~Refrigerated~~ refrigerated storage shall be provided for the cooled crustacea or crustacea meat and shall maintain a storage temperature at or below 36° F (2.2° C).

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. August 1, 1998;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0186 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0186 LABELING OF THERMALLY PROCESSED CRUSTACEA OR CRUSTACEA MEAT

Labeling of thermally processed crustacea or crustacea meat shall be in compliance with the following:

- (1) ~~The~~the label used shall clearly identify the contents of the container as thermally processed crustacea or crustacea meat.
- (2) ~~Each~~each container shall be permanently and legibly identified with a code indicating the batch and day of processing.
- (3) ~~The~~the words "Perishable-Keep Under Refrigeration" or equivalent shall be prominently displayed on the container.
- (4) ~~The~~the original packer's or repacker's permit number preceded by the state abbreviation shall be legibly impressed, ~~embossed~~embossed, or lithographed on each container. Each container shall be legibly impressed, ~~embossed~~embossed, or lithographed with the name and address of the original packer, ~~repacker~~repacker, or distributor.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. April 1, 1997;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0187 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0187 INTERFACILITY THERMAL PROCESSING PROCEDURES

Interfacility thermal processing of crustacea or crustacea meat shall be in ~~conjunction-compliance~~ with the following:

- (1) ~~Crustacea-crustacea~~ or crustacea meat shall be packed, ~~labeled-labeled,~~ and refrigerated in compliance with Rules .0134 through .0187 of this Section. Records shall be maintained to identify each batch of crustacea or crustacea meat thermally processed.
- (2) ~~Crustacea-crustacea~~ or crustacea meat shall be shipped in an enclosed, easily cleanable vehicle at a temperature ~~between 33° F (0.5° C) and of 40° F (4.4° C)-C) or below.~~
- (3) ~~Crustacea-crustacea~~ or crustacea meat shall be thermally processed in compliance with Rules .0184 through .0187 of this Section. The thermal processor shall provide a copy of each thermal processing chart to the original packer.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
Eff. August 1, 1998;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0191 is proposed for reoption with substantive changes as follows:

15A NCAC 18A .0191 MONITORING RECORDS

Monitoring records of critical control points and general sanitation requirements shall be recorded, as specified in ~~plan, the HACCP Plan, and~~ signed and dated when recorded. The records shall be reviewed by the owner or designee within one week of recording.

History Note: Authority ~~G.S. 130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~

Eff. August 1, 2000.

Readopted Eff. April 1, 2022.

Fiscal Impact Analysis of Proposed Rule Adoption and Amendments to Prohibit the Repackaging of Foreign Crab Meat in North Carolina

Rule Amendments: 15A NCAC 03L .0210 (adoption)
15A NCAC 18A .0136, .0173 (amendments and readoptions)

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: David Dietz, Fisheries Economics Program Manager
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
919-707-8573
David.Dietz@ncdenr.gov

Impact Summary: State government: Yes
Local government: Yes
Federal government: No
Substantial impact: No

Authority:

N.C. General Statutes

§ 113-134. Rules.

§ 113-182. Regulation of fishing and fisheries

§ 113-221.2. Additional rules to establish sanitation requirements for scallops, shellfish, and crustacea; permits and permit fees authorized

§ 143B-289.52. Marine Fisheries Commission – powers and duties.

§ 150B-21.3A. Periodic review and expiration of existing rules.

N.C. Marine Fisheries Commission Rules (As of April 1, 2020)

15A NCAC 18A .0135 Permits

15A NCAC 18A .0136 Applicability of Rules

15A NCAC 18A .0173 Repackaging

Necessity: During the November 2020 meeting of the North Carolina Marine Fisheries Commission (MFC), commissioners voted unanimously to begin the rulemaking process to prohibit the repackaging and resale of foreign crab meat within the state of North Carolina. Based on this motion, the North Carolina Division of Marine Fisheries (NCDMF) developed the proposed rule for adoption, as well as two conforming amendments, which this fiscal note addresses. Additionally, N.C.G.S. § 150B-21.3A requires state agencies to review their existing rules every 10 years to determine which rules are still necessary, and to either readopt or repeal each rule as appropriate. The proposed amendments readopt the two rules in 15A NCAC 18A pursuant to this requirement.

I. Summary

Following recent developments in the state of North Carolina where foreign crab meat was fraudulently marketed and sold as domestic blue crab, the MFC requested NCDMF to explore rulemaking options to prohibit the repackaging of foreign crab meat in the state to prevent future fraud and improve consumer confidence moving forward. After investigating its statutory authority over the issue, NCDMF prepared a new rule for adoption which prohibits the repackaging of foreign crab meat in North Carolina into another container. This does not affect value-added crab products, such as crab cakes. NCDMF has also amended two existing rules for readoption with conforming changes to address the new repackaging rules. Overall, NCDMF has identified just three processors in the state that currently repackage foreign crab meat legally for resale, while only four processors have been identified as participating in this practice over the past five years (S. Nelson, Personal Communication, February 15, 2021). We expect this proposed rule to incur insignificant costs due to a marginal reduction in output from the seafood processing sector, which could generate impacts felt at the state and local level. Alternatively, these changes will also generate small, nonquantifiable benefits to the state from increased consumer confidence, a more stable market for packaged domestic blue crab, and a reduced likelihood of future seafood fraud.

Lastly, the maximum allowable temperature during crustacea repacking is proposed to be reduced from 45°F to 40°F. This conforms with current U.S. Food and Drug Administration (FDA) guidance for the maximum storage temperature of cooked crab meat. This adjustment is not expected to have any significant economic impacts, as crab is repacked in small volumes in the state within cold-storage conditions, thus there is no additional cost to maintain this five-degree difference.

No new costs to enforcement are estimated from these proposed rule changes.

II. Introduction and Purpose of Rule Changes

Crab Picking Industry in North Carolina

Blue crab (*Callinectes sapidus*) supports the largest and most valuable commercial fishery in North Carolina (NCDMF 2019). An important part of this fishery involves the harvest of hard-shell crabs from N.C. waters to be sold to NCDMF certified and permitted crab processors. In North Carolina, the number of crab processors, otherwise known as “crab picking” facilities, has decreased significantly from as many as 43 in 1990 to 14 in 2020. Potential factors in the reduced numbers include the live crab or “basket” market where dealers in other states pay higher prices for live crabs, the lack of a steady supply of live crabs due to reduced overall landings during some years, and competition from lower cost crab meat imported from overseas or other states (NCDMF 2020).

Crab Meat Repacking

Processors that are certified and permitted by NCDMF as a crustacea repacker can also repack crab meat that has been previously cooked and packed initially. Crab processors who repack usually do so in order to market the product in their own branded containers. Repacking involves transferring crustacea product from the original packed container into the repacker’s branded

container using sanitary techniques in accordance with MFC rules (15A NCAC 18A Section .0134-.0191, Handling: Packing: and Shipping of Crustacea Meat). Examples of required sanitary techniques include maintaining a safe temperature during repacking in order to limit bacterial growth, and taking precautions such as sanitizing utensils, tables, etc. to limit possible contamination from the packing process. The repacker is required to label the repacked container with their name, address, certification number followed by the letters “RP”, and a code indicating the repack date.

Repacking of Foreign Crab Meat

In addition to repacking domestically sourced crab product, processors can currently also repack product from foreign sources. Common sources include Asian and South American countries such as Indonesia, Vietnam, China, Mexico, Brazil, and Venezuela. Imports include the meat from two types of “swimming crabs” that are related to blue crab: *Portunidae* (family that includes blue crabs) and *Callinectes* (blue crab genus). Processors who repack meat from foreign sources typically receive pasteurized product in cans and then repack the product directly into their own branded plastic containers. In addition to the labeling requirements for repacked containers described above, containers that are repacked with foreign crab meat are required to be labeled in accordance with Federal labeling requirements as set forth in MFC rules 15A NCAC 18A .0136 (Applicability of Rules) and .0173 (Repacking). This includes a requirement to state the country of origin, date of repacking, and the name of the repacking processor.

During the “Issues from Commissioners” portion of the Feb. 20, 2020 MFC meeting, Commissioner Doug Cross requested that the Director of the NCDMF consider developing an information paper to amend MFC Rule 15A NCAC 18A .0173 regarding the repacking of foreign crab meat. Commissioner Cross requested the NCDMF to examine the possibility of making it unlawful to repack or possess foreign crab meat in North Carolina unless it remains in the original container. This request was prompted by a recent case in which a North Carolina seafood processor was found guilty in January 2020 of illegally repacking foreign crab meat for resale between 2012 and 2015. While it was legal for the processor to repack this foreign product, the individual attempted to label it as domestic blue crab and was subsequently tried and charged with retail fraud. Based on this ruling, the MFC argued that continuing to allow the repackaging of foreign crab meat would only perpetuate the risk of seafood fraud, leading to reduced consumer confidence and a lower overall value for North Carolina’s blue crab fishery.

The information paper titled “Information on Repacking of Foreign Crab Meat in North Carolina” was presented during the next MFC meeting on May 14, 2020. The paper covered several topics. These included the negative publicity regarding fraudulent representation of foreign crab meat as “Product of the USA” by firms including one in North Carolina, and the potential economic impact to N.C. crab processors that currently participate in the repacking of foreign crab meat if the practice was to be prohibited.

After presentation of the information paper, Commissioner Cross reiterated his view that the repacking of foreign crab meat into a container other than the original is designed to defraud the customer. He offered that consumers would be more confident if they know that foreign crab

meat cannot be repacked in North Carolina. After further discussion and by unanimous vote, the MFC passed a motion “to make it illegal to repack any imported crab meat in North Carolina into another container for resale in the State of North Carolina through the rulemaking process.”

Crab Meat Repacking Temperatures

Finally, another proposed change to 15A NCAC 18A .0173 would reduce the maximum temperature for crab meat during the repacking process from 45°F to 40°F. The temperature of 40°F is the recommended maximum storage temperature for cooked crab meat according to the FDA Fish and Fishery Products Hazards and Controls Guidance. This change is proposed to conform to that standard in order to prevent the growth of pathogens and is also needed because there is currently no rule on the maximum time that crab meat can remain at 45°F during the repacking process. It should be noted that the State of Maryland, which has a crab meat industry similar to NC, reduced their maximum temperature for crab meat during the repacking process from 45°F to 40°F in 2017.

The reduction from 45°F to 40°F should have little effect on NC crab processors that repack, as only small volumes of crab meat are typically removed from temperature control at a time in order to repack. This minimizes the amount of time that the temperature could rise. An informal inquiry to one crab processor that repacks meat indicated it could potentially require processors to repack smaller volumes of meat at a time to stay below the new temperature threshold. However, this would not impact overall efficiency, productivity, or output over time.

III. Fiscal Impact Analysis

Overall, this proposed rule creates a simple change to seafood processing in the state that generates market-level impacts to North Carolina’s seafood supply chain. Effectively, this rule would eliminate a small, secondary market in the state’s seafood processing industry, eliminating overall output. Conversely, the intent of this rule is to eliminate future cases of fraud, which could improve consumer confidence and purchasing of North Carolina crab. In the past five years, only four North Carolina seafood processors were identified to be repackaging foreign crab meat for resale. Only three of these processors have been identified as currently engaging in this practice; these three processors are located in three coastal counties all within the northeastern part of the state (S. Nelson, Personal Communication, February 15, 2021).

Lastly, there is also a proposed change to 15A NCAC 18A .0173, in which the maximum allowable temperature for repacking crab meat is lowered from 45°F to 40°F. If this proposed change would require processors in the state to change machinery, repacking practices, or the time it takes to repack crab meat it could incur costs to the state in a variety of ways. However, in discussion with seafood processors in North Carolina, this proposed change would simply conform state repackaging temperature requirements with federal storage temperature requirements that are already being met. While this proposed change may impact the total volume of crab meat that can be set outside of the cooler for repackaging at one time, no substantive changes to processors’ operations are expected from this proposed rule change, and therefore no economic impacts should be expected as well.

Summary of Potential Benefits

The principle economic benefit to the state from this proposed rule is a more stable, and potentially more robust, market for North Carolina blue crab due to increased consumer confidence and a lower likelihood of future fraud cases. By making it unlawful to repack foreign crab meat in any capacity, the pathway to engage in labelling fraud in the future becomes much more difficult, and therefore the likelihood of future cases will decline. With this, fewer issues with seafood fraud moving forward should increase consumer confidence in North Carolina blue crab products, leading to a more stable market and supply chain.

Additionally, dealers and processors in the state are still allowed to sell foreign crab meat, it just cannot be repackaged in the state prior to sale. This still allows the foreign crab meat supply chain to stay open, meaning there can still be sales and tax revenue to the state from foreign crab meat. In other words, this rule change does not eliminate the foreign crab meat market, it simply restricts repackaging in order to maintain consumer confidence and reduce potential legal issues moving forward.

In all, these shifts translate to economic benefits to the state due to lower legal risk moving forward, a more trustworthy blue crab market in the state, and possibly increases in total sales volume in the future. However, these benefits cannot be quantified, as economic data on the foreign crab meat market in North Carolina is extremely limited. Despite this, NCDMF reports that only four licensed processors in the state have engaged in any foreign crab meat repackaging over the past five years, and therefore the total sum of benefits from this rule are not significant.

Summary of Potential Costs

While the expected benefits of this proposed rule are relatively broad and indirect in nature, the potential costs simply reflect the elimination of a small, secondary processing market in the state and the related economic impacts. In essence, the ability to repackage foreign crab meat in the state provides processors an additional market (or industry) to operate in. By buying, repackaging, and reselling foreign crab meat, processors marginally increase their sales, employment, and overall tax contribution to the state.

However, only four processors have been identified as generating revenue from this practice in the previous five years, and just three are currently engaging in any level of foreign crab meat repackaging. These three active processors are located in three different coastal counties in the northeast portion of the state. This low, geographically confined level of participation overall means the expected costs of this proposed rule are not significant. Despite this, there is the likelihood for these costs to be felt at both the state and local level, as these small reductions in output and tax revenue will be more strongly felt in the three coastal counties currently participating in the practice.

Lastly, as the inspection of prepared shellfish products at processors is part of the Division's ongoing monitoring activities by both the Marine Patrol and Shellfish Sanitation sections, there are no additional costs to enforcement expected.

Appendix I Proposed Rule Changes:

15A NCAC 03L .0210 REPACKING OF FOREIGN CRAB MEAT PROHIBITED

It shall be unlawful to repack foreign crab meat in North Carolina into another container. This rule shall apply to all facilities and persons permitted in accordance with Rule 15A NCAC 18A .0135. This rule does not apply to crab meat that has been transformed into another product, such as crab cakes or other value-added products.

*History Note: Authority G.S. 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. April 1, 2022.*

15A NCAC 18A .0136 APPLICABILITY OF RULES

The Rules in this Section shall apply to the operation of all facilities and persons permitted in Rule .0135 of this Section and all other businesses and persons that buy, sell, ~~transport~~ transport, or ship cooked crustacea or crustacea meat ~~which~~ that has not been transformed into another product. ~~Foreign crustacea meat processed in North Carolina shall comply with all applicable Federal requirements.~~

*History Note: Authority G.S. ~~130A-230~~; 113-134; 113-182; 113-221.2; 143B-289.52;
Eff. October 1, 1992;
Amended Eff. April 1, 1997;
Readopted Eff. April 1, 2022.*

15A NCAC 18A .0173 REPACKING

(a) Crustacea meat for repacking ~~which that~~ is processed in North Carolina shall comply with Rules .0134 through .0187 of this Section. Crustacea meat for repacking ~~which that~~ is processed outside of North Carolina shall comply with Rule .0182 of this Section. ~~Quarterly bacteriological reports shall be provided to the Division by the repacker of all foreign crustacea meat for repacking.~~

(b) The repacker shall provide the Division of Marine Fisheries a current written list of all sources of crustacea meat used for repacking.

(c) Repacking of crustacea meat:

- (1) Crustacea meat shall not exceed ~~45° F (7.1° C)~~ 40° F (4.4° C) during the repacking process.
- (2) Repacking shall be conducted separately by time or space from the routine crustacea meat picking and packing process.
- (3) The food contact surfaces and utensils utilized in the repacking process shall be cleaned and sanitized prior to repacking and thereafter on ~~30-minute~~ 30-minute intervals during repacking.
- (4) Repacked crustacea meat shall be maintained at or below 40° F (4.4° C).
- (5) Blending or combining of any of the following shall be prohibited:
 - (A) ~~Fresh~~ fresh crustacea meat.
 - (B) ~~Frozen~~ frozen crustacea meat.
 - (C) ~~Pasteurized~~ pasteurized crustacea meat.
 - (D) ~~Crustacea~~ crustacea meat packed in another facility.
- (6) Crustacea meat shall not be repacked more than one time.
- (7) All empty containers shall be rendered unusable.

(d) Labeling of repacked crustacea meat:

- (1) Each container shall be legibly embossed, ~~impressed~~ impressed, or lithographed with the repacker's or the distributor's name and address.
- (2) Each container shall be legibly embossed, ~~impressed~~ impressed, or lithographed with the repacker's certification number followed by the letters "RP."
- (3) Each container shall be permanently and legibly identified with a code indicating the repack date.
- (4) Each container shall be sealed so that tampering can be detected.
- (5) Each container of foreign crustacea meat which has been repacked outside of North Carolina shall be labeled in accordance with Federal labeling requirements.

(e) Records shall be kept for all purchases of crustacea meat for repacking and sales of repacked meat for one year. The records shall be available for inspection by the Division.

*History Note: Authority G.S. ~~130A-230; 113-134; 113-182; 113-221.2; 143B-289.52;~~
 Eff. October 1, 1992;
 Amended Eff. August 1, 2002; April 1, 1997;
 Readopted Eff. April 1, 2022.*

N.C. Marine Fisheries Commission 2021-2022 Annual Rulemaking Cycle Package B

May 2021

Time of Year	Action
February-July 2021	Fiscal analysis of rules prepared by DMF staff and approved by Office of State Budget and Management
August 2021	MFC votes on approval of Notice of Text for Rulemaking
October 2021	Publication of proposed rules in the <i>North Carolina Register</i>
October-November 2021	Public comment period held
October 2021	Public hearing(s) held (details to be determined)
February 2022	MFC votes on approval of permanent rules *
April 2022	Rules reviewed by Office of Administrative Hearings/ Rules Review Commission
2023 legislative session	Possible effective date of rules subject to legislative review per S.L. 2019-37, S.L. 2019-198, and G.S. 14-4.1.
May 1, 2022	Proposed effective date of rules not subject to legislative review
May 1, 2022	Rulebook supplement available online

* 15A NCAC 03 readoption deadline of June 30, 2022 for final MFC approval